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# **Harnessing Search Engine Optimization experience to enhance the visibility of websites**



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This dissertation is submitted for the degree of  
*Doctor of Philosophy*

August 2018



I would like to dedicate this thesis to my loving parents (Sunita and Satish Aul),  
niece (Romita Handa), nephews (Rounak Handa & Vivaan Aul) and family.



## **Declaration**

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements.

Vani Aul  
August 2018



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## **Abstract**

Research has identified that websites can gain an added advantage by getting listed in Search Engine results Pages (SERPs) during search sessions by searchers as SERPS refer targeted traffic to the websites. Search Engine Optimization (SEO) enables websites to become visible in search engines during search sessions for featured products or services. SEO is a complex technique which is directly affected by the ranking algorithms of search engines such as Google. Bearing in mind that Google employs in excess of 200 dynamic ranking factors in its algorithm it can be seen that optimization is not straightforward. Given this complex environment, websites find it difficult to initiate and implement SEO. SEO knowledge and experience gained from optimizing websites in the past is highly valuable and applicable to optimize websites both now and in the future. Therefore the main aim of the research in this thesis is to investigate the problem of optimization of websites using the prior experience gained through the optimization of several case study websites.

To facilitate this, novel process models have been designed in order to capture the experience of implementing essential techniques of SEO and to explain the procedure of implementation of fundamental on-page SEO techniques that have been shown previously to yield results (i.e. increases in ranking) for past case study websites. Quantitative experiments and qualitative evaluation were undertaken to verify the efficacy of the novel process models through their application to case study websites. Mixed methods were used in order to answer the research questions, inductive experimental methods to produce, refine and test the process models and qualitative enquiry through means of a focus group to gather peer review from professionals within the field who had previously been trained and conducted a trial using the process models.

Implementation procedures of acknowledged essential on-page SEO techniques were identified from past case study websites, which have been represented in the novel process models designed in the current research and empirically investigated

by applying them in the experimental case study websites. These models were applied through quantitative experiments that identified essential on-page SEO techniques which were then implemented in two experimental case study websites as per the procedures represented in the process models. These experiments have yielded positive results, resulting in establishing and/or enhancing the visibility of case study websites in SERPs.

Further the implementation procedures of essential on-page SEO techniques were represented in the designed process models and stored in an SEO experience base on the principle of INRECA-II methodology.

Results of the focus group suggest that the process models do achieve credible results (i.e. establishing and/or enhancing visibility of websites in SERPs) through their application and are suitable for use by both novices and professionals alike. Overall the results achieved from both the quantitative experiments and qualitative evaluation provide promising support to validate the created knowledge.

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# Chapter 1

## Introduction

This chapter begins by providing an overview of information retrieval on Web, search engines, search engine optimization, and search stakeholders. It discusses the motivation for undertaking the current research, its aims and objectives and states the research questions of interest. The contributions to the field are highlighted and finally, the structure of the thesis is explained.

### 1.1 Web Information Retrieval (IR), search engines and search engine optimization

#### **Web Information Retrieval (IR)**

IR aims to store and allow quick access to information of different kinds on the web i.e. textual, auditory or visual (Crestani, 1997). Henzinger (2001); Kobayashi and Takeda (2000) state that the documents on the Web form a gigantic database from which information is retrieved to satisfy the information needs of the searchers. Since its introduction in 1990, the Web has provided a platform to consolidate as well as disseminate information via the techno-social Information Retrieval (IR) systems (Aghaei et al., 2012; Macdonald, 2009). Henzinger (2001) observes that the Web is a heterogeneous collection of documents. Unlike the pre-Web collections, which were static in nature, information on the Web is dynamic, which changes constantly and is fully controlled by its publishers.

The primary objective of classical information retrieval is to provide information relevant to the users' query (Abusalah et al., 2005). It is used frequently in the current

web-setting. Although it had been applied in the pre-web setting but it was very different from its current use in the web-setting. In the web setting, information retrieval is executed by retrieving relevant web pages present on the internet, differing from the traditional setting significantly. Moreover, the set up and techniques employed in each case is very different (Kobayashi and Takeda, 2000).

Henzinger (2001) states that the *pre-Web retrieval* techniques solely relied on statistics of words for determining relevance of documents, which have evolved in their application to Web. Macdonald (2009) specifies that *Web retrieval* relies on multiple sources of information to find relevance of the document i.e. content of the document its hyperlink structure on the Web as well as its click through data (number of times it was clicked by the users). Specific IR systems have been developed for retrieving information on the Web which are termed as search engines and discussed below.

### **Search engines**

Search engines answer user search queries by retrieving relevant webpages from their respective database(s). Their databases are created from crawling and indexing the collection of websites available on the Web (Kausar et al., 2013).

In the process it involves extraction of word tokens from searchable documents and creation of 'inverted index' for the respective documents. This 'inverted index' contains a mapping of 'word tokens' or 'keywords' to documents. On receiving a search query, the inverted index document file is consulted to find the documents that best match the words contained in the search query (Steinkraus, 2002).

In the functioning of keyword search engines, although millions of websites are included in the search engines' database, only a subset of websites are considered with respect to users' search queries. For answering the respective queries, search engines analyse the websites in their database to determine the relevance of a website to be included in Search Engine Results Pages (SERPs) (Hakkani-Tur et al., 2016; Zhu et al., 2016; Zola et al., 2007).

Relevance is the driving factor for presenting search results. Calculating the relevance of websites in search engine database is a critical function performed by the search engine algorithms. The relevance is calculated on the basis of the context and intent of search queries (Zhu et al., 2016).

Websites' relevance is determined by analysing the textual fields of webpages existing within the website, as well as the websites' authority and linking-pattern

## 1.1 Web Information Retrieval (IR), search engines and search engine optimization

on the web. This analysis is done at the time of indexing the website which is independent of the search queries (Dean et al., 2014; Shakib et al., 2007). Websites deemed relevant are listed in the SERPs whereas irrelevant websites are not listed.

As the search engines evaluate textual fields existing within the website, therefore, it presents an opportunity for the websites to optimize these textual fields (Kumar, 2014).

Both Henzinger (2001) and Macdonald (2009) classify the ranking schemes in two categories namely query independent scheme (where webpages are assigned a ranking score independent of the query i.e. at indexing time) and query dependent scheme (where relevant webpages are assigned a ranking score in context of the given query). The ranking is awarded on the basis of the *individual and/or cumulative* score of dependent and independent query factors (Dean et al., 2014; Shakib et al., 2007). This mechanism of ranking is further confirmed by patents of giant search engine companies i.e. Google (the most popular search engine, according to Srivastava et al. (2017)) and Microsoft.

Google has filed a patent on query independent and dependent factors for calculating websites' relevance and listing most relevant websites in SERPs in a ranked order. Its patent, 'Document Scoring Based on Query Analysis' Dean et al. (2014) lists the query-independent factors considered in websites, which are evaluated at the time of indexing and are independent of the query terms searched in the search engines. These factors mainly include document content, document topics, unique words, linking pattern with other websites on the Web, document inception dates and website traffic. The query-dependent factors primarily focus on the relevance of websites to the search-query.

As an example, Google's process of calculating the websites' score is shown as a flowchart in figure 1.1.

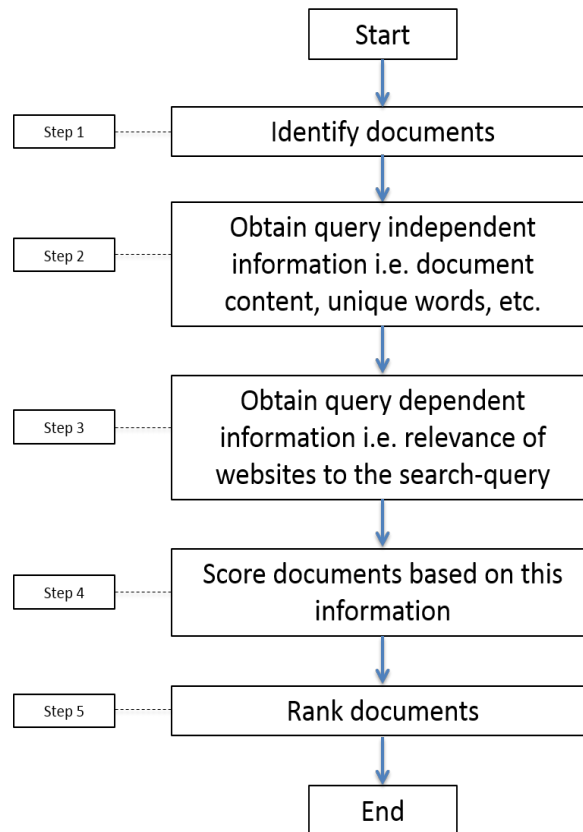


Figure 1.1 Exemplary process of scoring documents, adapted from Fig. 4 of (Dean et al., 2014, p. 4)

As shown in the flowchart in figure 1.1, to answer a search query, Google starts by identifying the documents (*as shown in Step 1 of figure 1.1*), and obtaining their query independent information in terms of document content, keywords specified in content and the topic covered in document (*as shown in Step 2 of figure 1.1*). Further it obtains query dependent information and determines relevance of documents to search queries (*as shown in Step 3*), scores documents (*as shown in Step 4 of figure 1.1*) and ranks documents (*as shown in Step 5 of figure 1.1*).

Microsoft has also filed a patent for calculating the relevance score of websites based on the query-independent and query-dependent factors. It has termed these factors as static and dynamic respectively. Primarily, the static or query-independent factors (determination of factors irrespective of the search query) include document content, website usage and linking pattern on the Web (Shakib et al., 2007). On the other hand, query-dependent or the dynamic factors (determination of factors with respect to the specified search query) include the total number of websites

## 1.1 Web Information Retrieval (IR), search engines and search engine optimization

that have been found relevant to the search-query and/or the frequency of search query specified in those websites (Shakib et al., 2007) and determines relevance of documents to search queries.

As an example, Microsoft's process of this score-calculation process has been highlighted in figure 1.2. This patent is termed as 'Index Partitioning Based on Document Relevance for Document Indexes' and has been proposed by Shakib et al. (2007).

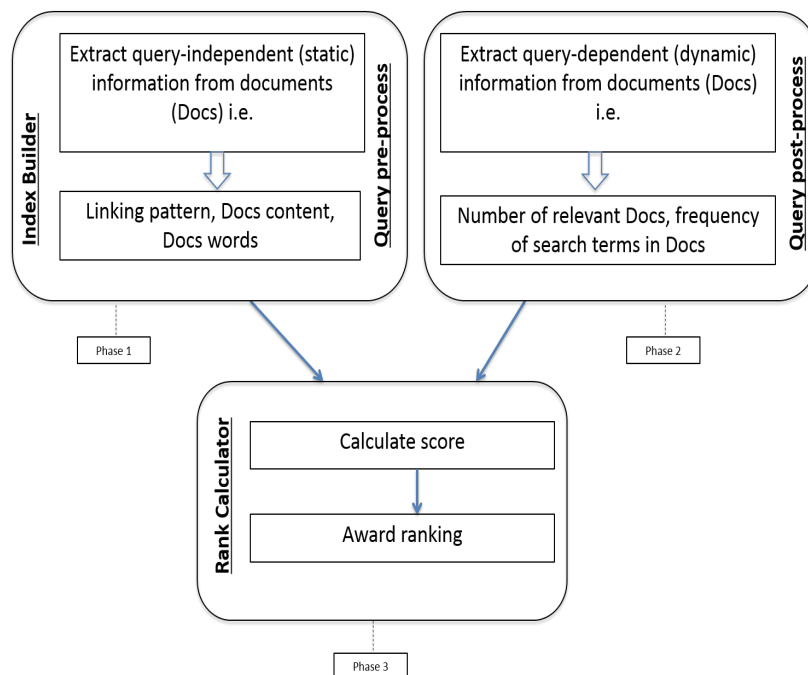


Figure 1.2 Exemplary process of calculating score of documents, adapted from Fig. 3, 4 of (Shakib et al., 2007, p. 4)

As shown in the flowchart in figure 1.2, Microsoft extracts query-independent information (content, specified words and their linking pattern) from documents while building its index before specification of the search query (as shown in phase 1 of figure 1.2). Whereas after specification of the search query, it calculates the query-dependent factors (number of relevant documents and frequency of search terms in the documents (as shown in phase 2 of figure 1.2). Finally it calculates the cumulative score and awards ranking to the documents (as shown in phase 3 of figure 1.2). Observing this functionality of search engines it can be stated that

the query-independent factors are scored independent of the search query whereas query-dependent factors are scored in context of the search query. These scores are used to calculate the overall quality score of websites for consideration to include them in SERPs.

Macdonald (2009) states that the query-independent factors i.e. document content and keywords are calculated at indexing time, prior to the query. For determining the query independent information, search engines weigh the websites for their specified content and use of keywords when they first crawl the websites and store their information for future retrieval. The HTML (Hyper Text Markup Language) provides textual fields to include information related to independent query factors. The information specified in these textual fields in the documents or webpages is used by search engines to record information from websites and retrieve them to answer relevant search queries in the future.

As identified in Step 2 of (figure 1.1, Google's patent) and phase 1 of (figure 1.2, Microsoft's patent), the current research has laid its focus on design of procedures for identifying relevant unique keywords, creating content, defining information architecture and contextualising HTML code for a website. It contributes to existing knowledge by focussing on identifying the core query-independent factors and specifying procedures for optimizing the respective text-fields of websites so that they are recognised by search engines for their specific topic or subject. Its focus is on the 'set of techniques' relevant for defining the keywords, content and topic of the websites and to be recognised by search engines for the same. The implementation of these techniques would favourably impact the calculation of a website's relevance score or query-independent score by search engines and enhance their probability of getting listed in the SERPs for relevant queries. These techniques belong to the category of search engine optimization, which is explained below.

### **Search Engine Optimization**

A number of techniques have been developed by the search engines' observers to account for and address the factors in websites that are favoured by search engines. The umbrella term for these techniques is Search Engine optimization (SEO). SEO consists of a myriad of techniques. A well-informed and balanced implementation of each of these techniques contributes to visibility of websites in some manner. However each of these techniques are likely to fetch completely different results in terms of visibility in SERPs and outreach on the Web. Therefore it is very important to have an awareness and understanding of the existing techniques, which techniques

## 1.1 Web Information Retrieval (IR), search engines and search engine optimization

are important for implementation, when to implement and how to implement (Drivas et al., 2017).

The interpretation and implementation of individual techniques of SEO is complex. It continually evolves with the constant updates in technology of search engines. The functioning of search engines has a direct influence on the techniques of SEO. The introduction of new techniques and effectiveness of existing techniques is dictated by the working of search engine algorithms (Mager, 2012).

The search engine's ranking algorithms and technology is developing constantly. Progressive and incremental changes are implemented every minute to improve the functionality of search engines. To provide up to date information and a good search experience to its users, Chaudhary et al. (2015) state that Google updates its information every minute and Killoran (2013) states that it adjusts its algorithm more than 500 times per year. Google employs more than 200 factors in its ranking algorithm (Luh et al., 2016).

In such a complex environment with an intertwined tangle of varied factors on the SEO axis, it is extremely difficult for some websites to identify the starting point and initiating the SEO implementation for establishing the 'visibility of website' on the platform of search engines as highlighted by Ghandour (2018). Partially, it is because the individual SEO techniques and their implementation process are outside of their knowledge realm.

From all the defined SEO techniques, it is highly desirable to begin with the implementation of content related techniques as they are the pre-requisites for implementation of subsequent SEO techniques and lay the foundation of website visibility in search engines from a semantic perspective (Jain, 2013).

Thurow (2003) affirms this viewpoint by stating that the implementation of SEO techniques related to text-component lays the foundation of an effective and long term SEO campaign. The current research focusses on the implementation of text-component because its scope of implementation falls directly within the website and is in the direct control of the website owner.

In this section the concepts of Web IR, search engines and SEO were identified. The next section discusses the Web search stakeholders.



## 1.2 Search stakeholders: focus on websites

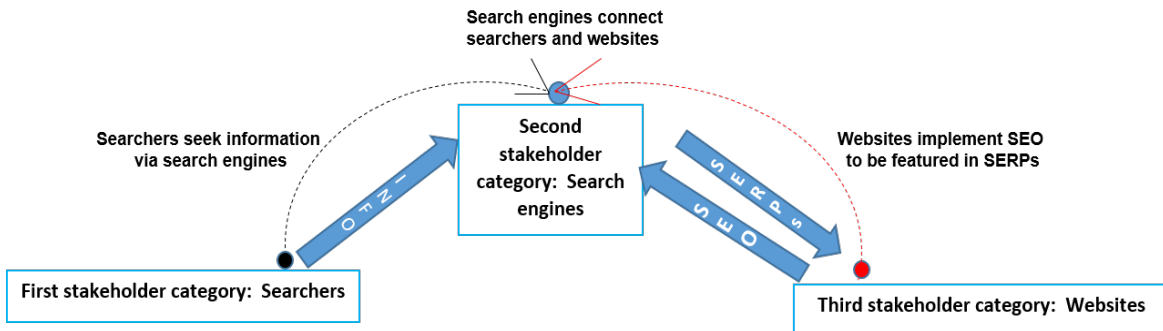


Figure 1.3 Overview of search stakeholders

As highlighted in figure 1.3, the interests of otherwise distinct stakeholders find a common ground in context to Web search (Killoran, 2013). Searchers (first category of stakeholders) visit search engines (second category of stakeholders) to fulfill their information needs. Websites (third category of stakeholders) implement SEO techniques to be oriented for search engines' functionality and become visible in SERPs. Search engines connect searchers and websites on its information platform.

In the above discussion, it has been identified that the Web search space provides a connection point for the identified stakeholders. Berners-Lee et al. (2010) shares this viewpoint by viewing the Web as a platform for sharing information and social networking amongst the identified stakeholders. They identify the vicious triangle of three stakeholder categories of author, reader and advertiser.

Lianos and Motchenkova (2013) view search engines as the intermediating platform between content providers (who want users), users (who want content), and advertisers (who want users) where quality is the driving factor for their relationship. They emphasise that a search engine providing good user experience will attract more users thus becoming a valuable channel for content providers to attract more users.

In comparison to Berners-Lee et al. (2010) and Lianos and Motchenkova (2013), Killoran (2013) extends the categories of search stakeholders to include search marketing practitioners and researchers in the already identified categories of Web users, content creators and search engines.

From the above discussion, primary stakeholders can be categorised as users (i.e. searchers), content creators (i.e. websites) and search engines. These stakeholder

categories are common with the categories of stakeholders as focussed in this research, where it views content creators as websites, users as searchers, and search engines (as search engines alike). These identified stakeholders are inter-dependent and inter-connected in the execution of Web search activity.

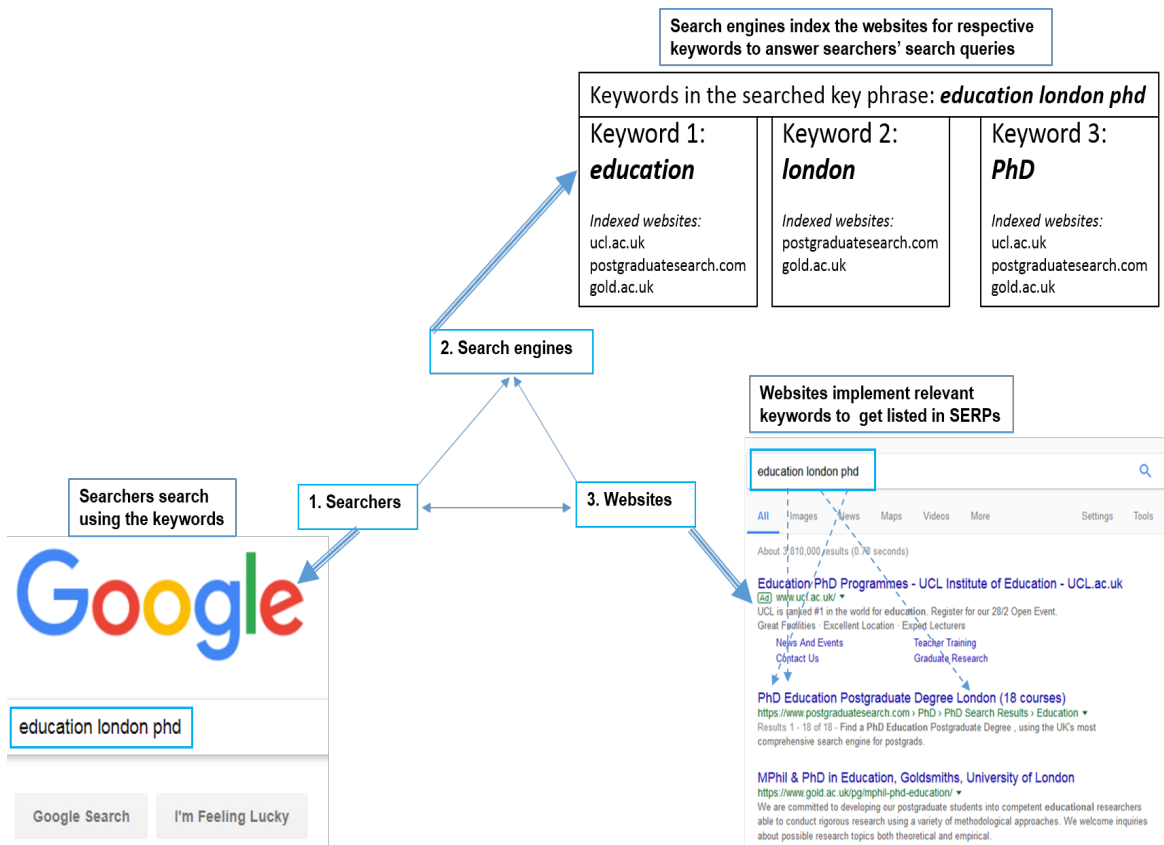


Figure 1.4 Common intersection point of keywords

As shown in figure 1.4, in the Web search space, the three identified categories of stakeholders are inter-connected by the concept of keywords. In this instance the searcher, searches the key phrase *education london phd*, the search engine consults its database to determine relevant websites (ucl.ac.uk, postgraduatesearch.com, gold.ac.uk) for the respective words (*i.e. education london phd*) in the key phrase. The websites listed in SERPs include these keywords in their title.

Along with other techniques, the current research identifies keywords as the connecting point and specifies their implementation procedures. Websites can implement these techniques by following the implementation procedures for getting indexed

and retrieved by search engines to answer the relevant keyword-queries posed by the searchers.

An example of implementation procedure is represented in the process model created within the current research for shortlisting keywords as shown in figure 1.5. This process model is for conducting keyword research as supported by basic search method. Complete details of this procedure are presented in section 4.5.1 in chapter 4.

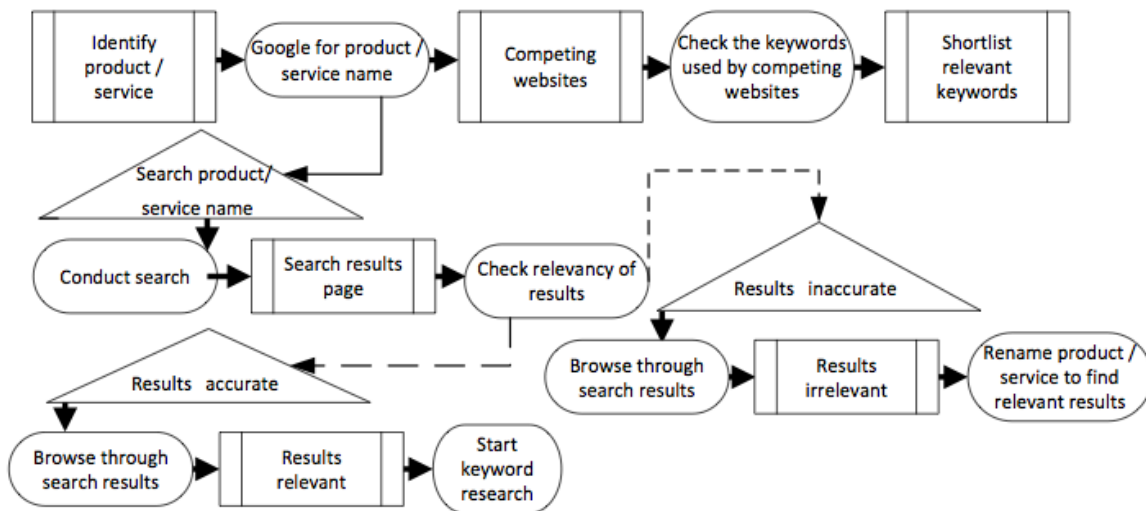


Figure 1.5 Process model for researching keywords using basic search method

Ur Rehman and Khan (2013) state the primary techniques that can be implemented by websites include keyword research, content creation, website structure and contextualising the code of the webpage(s).

### Focus on websites: Websites under organic/free results

White (2013) states that SERPs contain two types of search results i.e. organic or free and paid or sponsored.

The focus of the current research is on websites listed under free results as classified in bottom half of figure 1.6 (in context to its listing in an SERP).

A SERP features organic or free website listings as well as paid or sponsored listings. Organic listings are awarded to websites on the basis of relevance and popularity in context to the searched keyword and paid listings are awarded on the basis of

the amount spent on advertising. Higher advertising bidding leads to higher listings. According to Agarwal et al. (2015); Jansen and Resnick (2006), 82% of searchers prefer to visit websites under organic results in comparison to paid or sponsored results as they are more reliable. Hence, within current research it makes a strong case for focussing on websites listed under organic or free results as opposed to paid results.

education london phd

All Images News Maps Videos More Settings Tools

About 3,810,000 results (0.78 seconds)

**Paid result**  
**Education PhD Programmes - UCL Institute of Education - UCL.ac.uk**  
**Ad** [www.ucl.ac.uk/](http://www.ucl.ac.uk/) ▼  
UCL is ranked #1 in the world for education. Register for our 28/2 Open Event.  
Great Facilities · Excellent Location · Expert Lecturers  
[News And Events](#) [Teacher Training](#)  
[Contact Us](#) [Graduate Research](#)

**Free result**  
**PhD Education Postgraduate Degree London (18 courses)**  
<https://www.postgraduatesearch.com> > PhD > PhD Search Results > Education ▼  
Results 1 - 18 of 18 - Find a PhD Education Postgraduate Degree , using the UK's most comprehensive search engine for postgrads.

**Free result**  
**MPhil & PhD in Education, Goldsmiths, University of London**  
<https://www.gold.ac.uk/pg/mphil-phd-education/> ▼  
We are committed to developing our postgraduate students into competent educational researchers able to conduct rigorous research using a variety of methodological approaches. We welcome inquiries about possible research topics both theoretical and empirical.

Figure 1.6 Free and paid results featured in SERPs

## Targeted user group of this research

The targeted user group of this research is any website that is interested and capable of implementing the techniques of keyword research, content creation, information architecture and HTML code optimization.

### **1.3 Motivation: representation of knowledge via process models, knowledge involved in SEO**

The main motivation of the current research is to share SEO experience-knowledge as well as highlight the importance of knowledge involved in SEO. Ajmal and Koskinen (2008) define experience knowledge as 'knowledge gained from experience' where knowledge is seen as the solution and is accumulated for future use. The emphasis is laid on capturing experiences of the practitioner, which can be made accessible to others, providing an opportunity to learn and to avoid attempts for reinventing the wheel.

In the current research experience knowledge refers to the knowledge captured via the author's professional experience of 100% success rate at establishing and/or enhancing visibility of websites in SERPs in the past, without any spam penalties from search engines. The focus is to guide the SEO techniques' implementation through experience Althoff and Wilke (1997); Ghattas et al. (2014).

It focusses on SEO techniques for the implementation that aim at optimizing websites for search engines (Aul and Roth-Berghofer, 2015). Each and every step executed in implementation of the SEO techniques directly impacts the effectiveness and probability of achieving the most optimal result gained from the implementation of respective techniques and the overall SEO campaign. Some research related to search engine optimization and its techniques has been done in the past. It involves the identification of different random SEO techniques (Killoran, 2013; Mager, 2012; Visser and Weideman, 2011). However, very little attention has been paid to the sequence of implementation of these individual techniques. No research has been undertaken to identify, consolidate and represent knowledge (gained from experience) for implementing the fundamental SEO techniques. Although a decision support system has been created (Sagot et al., 2016), containing some rules, which define only the scenarios but not the implementation procedure of only one SEO technique that of keywords.

Implementation of SEO techniques entail a large number of variables that affect their performance. The current SEO literature does not identify the direct interlink between some of these techniques where the output of one technique provides an input for the subsequent related techniques. For example, the keyword research technique forms the basis and provides input to execute the technique of content

writing. Additionally, the process of implementation of these techniques has not been investigated.

The primary motivation of this research is to specify an optimal process for implementing essential on-page SEO techniques that attain the goal of website's visibility in SERPs. There are more than 200 techniques existing under the umbrella of SEO, where each of these techniques can be implemented in various ways, thus yielding different results which might or might not be sustainable in making websites visible in SERPs (Wang et al., 2011).

Regarding the fact that SEO consists of multiple techniques, the implementation of some SEO techniques establishes and/or enhances the website visibility in SERPs as reported in preliminary work (see Aul, 2011; Aul and Roth-Berghofer, 2015, 2016). The current research aims to identify the fundamental SEO techniques, which need to be prioritised for initiating and/or sustaining the results of implementation of SEO techniques. Based on the author's past experience of SEO implementation, a similarity pattern in implementation of fundamental SEO techniques has been identified. The re-occurrence pattern in implementation of SEO techniques has been analysed from specific SEO implementation projects in the past. It has consolidated and represented the knowledge required for implementing these techniques. The premise that drives this research is that given the current state of SEO art, there is a need to create knowledge to clearly specify 'which' SEO techniques should be implemented and 'how' they should be implemented in order to build a solid foundation of the SEO campaign.

SEO techniques can broadly be classified as on-page (textual component) and off-page (popularity component) (Shafiee et al., 2016). Given the current functionality of search engines with a focus on semantic aspect, it is important for websites to implement on-page (textual component) for creating their semantic identity in order to be recognised by search engines for the targeted concept as well as the context (Bollegala et al., 2007). It is possible to define the semantic identity of websites through overall content. The implementation of core on-page SEO techniques helps to define the website's concept and context (Ur Rehman and Khan, 2013). Based on past experience and validated by experiments, the current research has identified the core SEO techniques (keyword research, information architecture, content creation and HTML code optimization), that attain the goal of website-visibility in SERPs. Thus, it addresses the question of 'which' SEO techniques should be implemented (Aul and Roth-Berghofer, 2015; Ur Rehman and Khan, 2013). These techniques

have been investigated in current research with respect to case study websites, considered in past and current experiments.

For addressing the question of 'how' to implement identified SEO techniques, the motivation is to clearly specify the execution process path to implement the techniques for attaining the outcome of website visibility in SERPs, which is missing in the current state of art of SEO. This knowledge gap has been filled by creating an SEO experience base by aggregating knowledge from past experience and presenting the implementation procedure in the form of process models (Aul and Roth-Berghofer, 2015, 2016). These process models are created on the principle of INRECA-II methodology, an experience management methodology, which clearly represents the interlinked steps progressively for implementing SEO techniques in the form of a process model. Additionally, it clearly defines the constituents of a process model as well as a format for providing a detailed explanation of each of the constituent specified in the process model (Bergmann, 2002).

Currently, the INRECA-II methodology covers experience for specific knowledge domain applications including help desk support and electronic catalogue(s) with a future direction to expand the covered domains. The current research successfully extends the covered domains in INRECA-II methodology by representing SEO knowledge on the principle of INRECA-II methodology.

In the current research, SEO knowledge represented in the process models (see process model example figure 1.5), is presented for reference by websites, where a knowledge gap exists about implementation of SEO techniques. This knowledge gap is highlighted in figure 1.7.



Figure 1.7 SEO knowledge gap

On observing SEO, we can see that different kinds of knowledge play an important role, namely:

- Knowledge about on-page SEO techniques
- Knowledge about search engines
- Knowledge about creating and implementing an SEO strategy

SEO has evolved constantly with a continuous development of search engine technology. Over a period of time many new techniques have been introduced under the umbrella of SEO adding to the already existing techniques. The formulation of a strategy to select the right techniques and implement them accordingly requires specialist skill and knowledge, which is often resource and time intensive as well as heavily dependent on previous experience.

Every SEO campaign executed for a specific website incorporates some implicit knowledge which could be useful for similar future SEO projects. Therefore it is quite useful to represent the experience knowledge gained from successful SEO campaigns for solving similar SEO problems. Such knowledge is particularly beneficial for websites, which possess the willingness and ability to implement SEO techniques but are unaware of the implementation process.



### 1.3.1 Overview of the SEO problem resolution

There is a constant change in the search engine algorithms and a constant increase in the growth of competing websites due to which a website's visibility and ranking might vary constantly (Sagot et al., 2014). This makes it really difficult to understand SEO and implement its techniques. Moreover SEO is not just a set of techniques the implementing of which would lead to desired results, but it is a process that starts and continues with a phased implementation of its techniques. It doesn't have an end, but it is a continuous process. Given all these factors makes SEO a volatile and dynamic technique. In such an unstable and unpredictable scenario there is an unsolved problem for website owners to plan and optimize their websites. Which techniques are more likely to provide long term results (Malaga, 2007)? How can the SEO process be designed and individual techniques be implemented, monitored and maintained (Sagot et al., 2014)? The answer is with the help of the past SEO experience. This research has identified and explained the implementation details of individual SEO techniques that are likely to provide long-term results and crafted SEO as a process to be implemented in phases as shown in figure 1.8.

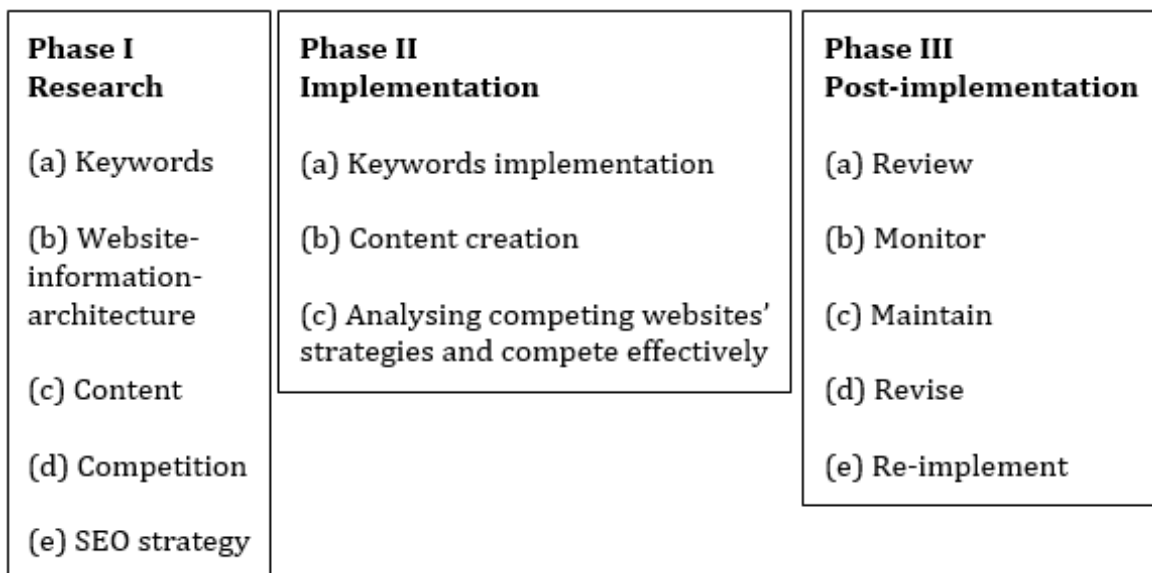


Figure 1.8 SEO implementation phases

**The process: Phase I** In the first phase of Research,

- (a) appropriate keywords (that define the business' product or service and are used by searchers) are defined, searched, analysed and selected.
- (b) Depending on the keyword-concept hierarchy (as applicable to the website), an information architecture is planned for the website. Information architecture refers to the hierarchy of information as presented on the website. It directly influences the navigational structure of the website. The information architecture generally follows a top-down approach, with the main concept presented at the top of the navigation structure followed by sub-concepts.
- (c) Further, the content is written on these concepts. For instance if a website is selling books then the main concept can be of books, further segregated into print and electronic books, which can be further divided into sub categories of subjects like languages, technology, law, etc. as shown in figure 1.9.

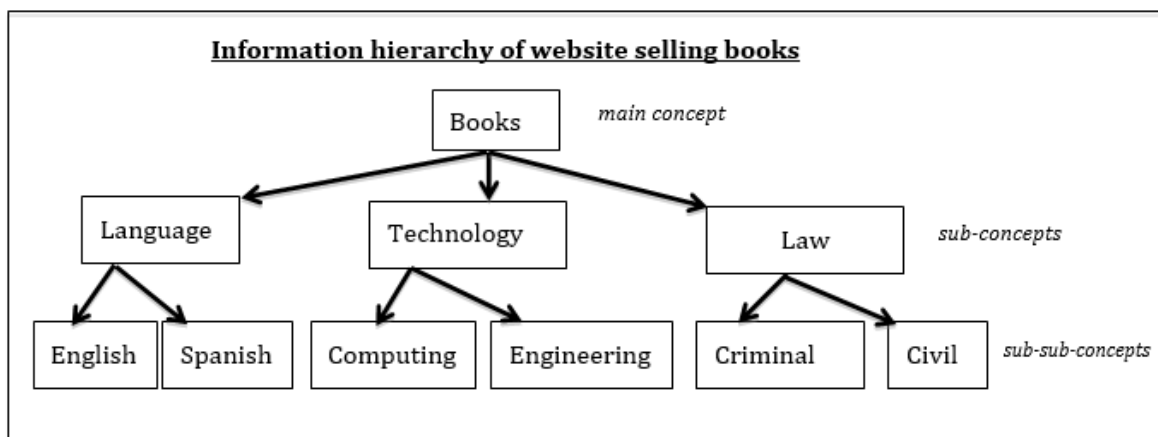


Figure 1.9 Information hierarchy of website

In order to be recognised as valuable content, it needs topic-modelling to build a theme on the covered topic or sub-topic. The content should complement its neighbouring pages (i.e. other content pages in the same section). Additionally the synonyms, or complementary words need to be utilised where appropriate.

- (d) The analysis of competition is very important and can be carried out in the beginning or at any stage of SEO implementation. It provides evidence of the keywords targeted by competitive websites, topics or products covered, general layout and functionality of the website, its establishment in the specified niche, and a probable observation on the SEO strategy adopted.

- (e) The SEO strategy is formulated based on the competitors' SEO strategy. The execution of steps covered in Phase I are fundamentals of on-page SEO techniques.

**The process: Phase II** This is the implementation phase where shortlisted keywords are implemented, content is created and so on.

- (a) In this phase the chosen keywords are allocated to the respective pages and implemented on those pages by including them and their variants in meta tags, URLs, headers, actual content, linking text to internal pages, etc.
- (b) Further content should be added accordingly in order to build a theme as per the concept of the keywords allocated to this webpage.
- (c) Moreover competitors' websites are also analysed and a strategy is devised to effectively compete with the already established competing websites.

**The process: Phase III** This is the post-implementation stage during which the actual

- (a) SEO implementation is reviewed to check if it is done properly.
- (b) Further, the results expected from the implementation are monitored over a regular period of time. This can be done manually or by using automated tools.
- (c) An effort is made to maintain the achieved results. In case the expected results are not achieved then the implementation details are analysed to identify the gaps.
- (d) Subsequently the implementation plan is revised and re-implemented. This human intervention is a critical stage in the optimization process.

SEO implementation should follow a sequential order for a new website. In a real time scenario every website has different needs and requirements at different stages of SEO implementation. Therefore these steps can be implemented randomly, extended or customised to suit the needs of the respective websites.

## 1.4 Overview of the problem

From the discussion in the previous sections it is evident that the usage of search engines is increasing constantly among the web users offering an opportunity to the websites for receiving targeted traffic via search engines (Amerland, 2013). Hence it becomes important for the websites to employ SEO (the technique to become visible on search engines). Generally websites are devoid of this SEO skill as well as the budget required for hiring this skill externally. This reflects a missed opportunity for the websites (Ghandour, 2018).

The SEO knowledge needs to be made available to websites. They need to be educated and informed about the practice and implementation of this technique. Therefore this research aims at making the SEO experience-knowledge available to websites for enabling them to make their websites visible on search engines (particularly Google).

## 1.5 Evaluation criteria

The knowledge created in the current research will be validated by conducting quantitative experiments and qualitative evaluation. The visibility and ranking positions of case study websites in SERPs would be used as a evaluation-metric in quantitative experiments. Whereas, the feedback and evaluation by experienced SEO professionals would be used as an evaluation-metric in qualitative evaluation.

## 1.6 Research aim and objectives

This research aims at identifying the core SEO techniques along with representing their implementation procedures.

Therefore, the main objectives of this research are:

1. Extracting and representing experience knowledge from past projects related to:
  - (a) identification of core SEO techniques implemented
  - (b) procedures adopted for implementation of these SEO techniques

- (c) consolidation of procedures for implementation of identified core SEO techniques

## **1.7 Research questions**

Based on the research aim and objectives the investigation leads to the following research questions:

1. Which SEO techniques are absolutely essential for executing the SEO campaign to achieve visibility in organic/free results of SERPs?
2. Which implementation procedure of SEO techniques can result in visibility of websites in SERPs?
3. How can the experience knowledge of implementing these techniques be represented?

## **1.8 Contributions and outputs**

This research contributes to the field of SEO in the following ways:

- Identifying the on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization essential for optimizing websites for search engines
- Specifying implementation procedures for implementing the identified essential on-page SEO techniques
- Creating an SEO experience base on the principle of INRECA-II methodology.

## **1.9 Scope and structure of thesis**

This thesis is comprised of the following:

Chapter 1: The first chapter introduces the concepts of IR, search engines, SEO, defines the motivation for undertaking the current research along with specifying the research questions to be answered, evaluation criteria and contributions made.

Chapter 2: The second chapter reviews the state of the art in SEO along with reviewing the representation of knowledge in the problem solving paradigms of CBR, CBP and INRECA-II methodology. The knowledge gap is identified in terms of lack of knowledge for implementing the essential on-page SEO techniques.

Chapter 3: The third chapter explains the research design. It describes the research perspective, details of individual websites for which SEO was implemented in the past and defines the websites for which SEO experiments would be performed in the current research. It also shows the example forms using which data will be recorded for quantitative experiments.

Chapter 4: The fourth chapter designs process models at the Common Generic Level, Cookbook Level and Specific Project Level by applying INRECA-II methodology for creating the SEO experience base in the current research. Additionally it identifies the five case study websites and compares and contrasts the role and impact of SEO implementation in each in terms of identifying the benefits and analysing the reasons for gaining those benefits

Chapter 5: The fifth chapter explains the quantitative experiments conducted in the current research alongwith presenting the results.

Chapter 6: The sixth chapter presents the qualitative evaluation i.e. focus group conducted in the current research. It analyses the collected data using thematic analysis, identifies the emerging themes and presents the results.

Chapter 7: The seventh chapter presents a discussion of results obtained within the current research alongwith specifying its limitations and future direction.

The thesis concludes with a reference section and this is followed by appendices providing full technical detail.

Appendix A presents the focus group: protocol and transcript. Appendix B presents the Cookbook level of SEO experience base. Appendix C presents the Specific project level of SEO experience base. Appendix D presents the published paper titled: Towards Experience Management for Search Engine Optimization. Appendix E presents the published paper titled: Managing Search Engine Optimization Experience using the INRECA-II methodology. Appendix F presents the chronological progress of the current research. Appendix G presents the feedback from focus group participants who attended the process models demonstration.

## 1.10 Summary

This chapter introduced the topic of IR, search engines, SEO, its stakeholders, identified the intersection point of keywords connecting these stakeholders along with identifying that query-independent factors are considered by search engines for calculating websites' relevance to include them in SERPs. Additionally, it specified the motivation, research questions and contributions made by current research. The next chapter looks at state of the art in SEO and representation of knowledge in experience-based problem solving paradigms.

# Chapter 2

## Literature review

This chapter discusses the concepts of SEO and knowledge management and presents the state of the art in these areas. As required by the research questions, a critical evaluation of SEO literature is presented followed by knowledge management.

### 2.1 Search Engine Marketing

Search Engine Marketing (SEM), consists of two methods for gaining visibility in SERPs, one being free and the other paid (Sagot et al., 2017). SEO is the free method whereas Search Engine Advertising (SEA) is the paid method. SEO is an umbrella term for the techniques used for establishing and enhancing the visibility of websites in SERPs (Dick, 2011; Ur Rehman and Khan, 2013). SEO techniques are constantly evolving with the continuous development of search engines (Duk et al., 2013). They aim at aligning the website's contents to the functionality and evaluation-criteria of search engines (Di et al., 2010). SEO involves modifying the content of the website-pages' content and implementing certain techniques to make websites visible in SERPs. SEA consists of paid advertisements, where the websites bid for getting listed in the SERPs and pay search engines for every website click received (Jansen, 2006). Advertised websites are placed on the top and right hand side of an SERP whereas unadvertised websites or unpaid website listings attained via implementation of SEO are placed on the left side of the SERP. This has been highlighted in figure 2.1.



The image shows a Google search results page for the query "chocolate candy". The search bar at the top contains the text "chocolate candy" and a search button. Below the search bar, there are navigation tabs for "Web", "Images", "Maps", "Shopping", "Recipes", "More", and "Search tools". The search results are categorized into two main sections: "PPC Paid Results" and "SEO Organic Results".

**PPC Paid Results:** This section includes several advertisements. The first is for "Lindt Premium Chocolate - lindtusa.com" with the text "Over 165 Years Of Our Passion, For That One Moment Of Yours". Other ads include "Handmade Chocolates" from "www.honiewallers.com", "Candy - 2 Day VA Delivery" from "www.blancandy.com/VA-Candy", "Chocolate Candy" from "www.candywarehouse.com", "Ghirardelli Chocolates" from "www.ghirardelli.com", "Chocolate Candy" from "www.williams-sonoma.com", "Candy Chocolate at Amazon" from "www.amazon.com/health", "MY M&M'S® Gifts" from "www.mymms.com", and "Candy & Choc By The Pound" from "www.candybythepound.biz".

**SEO Organic Results:** This section includes several organic search results. The first is "See's Candies, Chocolates & Chocolate Candy" from "www.sees.com". Other results include "Chocolate Candy - Sam's Club" from "www.samsclub.com", "Amazon.com Candy & Chocolate Grocery & Gourmet Food" from "www.amazon.com", "Chocolate Candy Delights - Buy in Bulk By The Pound - Oh! Nuts®" from "www.ohnuts.com", and "Gertrude Hawk Chocolates - Candy Bars" from "www.gettrudehawkchocolates.com". There is also an "Images for chocolate candy" section with four small images of chocolate products.

Figure 2.1 SERP Locations for PPC and SEO (Clarke and Clarke, 2014)

In addition to being free, implementation of SEO offers another advantage of long-term durability and sustainability of results in SERP. The SEO results take much longer to fade away as compared to results from an SEA campaign (Hoell, 2013). Table 2.1 shows a comparison on different parameters of cost, durability of rankings, risk of irrelevant clicks, investment of time and probability of attaining rankings between SEO and SEA.

Table 2.1 SEO vs PPC vs No SEO/PPC, adapted from Chen et al. (2011); Duk et al. (2013)

|  | <b>SEO</b>   | <b>PPC</b>  | <b>No SEO/PPC</b>  |
|--|--|---|--|
| <b>Cost</b>                                  | No fee paid to search engines for receiving traffic. All traffic referred by search engines is free. The only cost involved is <i>SEO implementation cost</i> to optimize the website for gaining visibility in search engines | Fee paid to search engines for every visitor received via search engines  | No cost involved for SEO implementation or no fee paid to search engines |
| <b>Stay of ranking and visibility</b>        | Ranking positions might fluctuate but if implemented properly visibility stays overtime  | Visibility and ranking are directly related with the payment of fee to search engines. It ceases as soon as the payment discontinues. | No significant visibility in SERPs for relevant keywords/keyphrases      |
| <b>Risk of irrelevant and invalid clicks</b> | Bears the risk of invalid clicks where the landing page does not meet the information needs of the searchers   | Bears the risk of invalid clicks resulting in monetary loss to the advertising websites   | Reduced potential of receiving targeted traffic                          |
| <b>Time</b>                                  | Longer: Implementation of SEO techniques require some time to take effect and yield results  | Shorter: The implementation of paid advertising take effect quickly.  | Time neutral as no input is involved                                     |
| <b>Uncertainty of rankings</b>               | The visibility and rankings are uncertain in nature as it varies, depending on the search engine functionality and algorithm updates   | High certainty of visibility as it is directly linked to the payment  | Uncertain as no input is provided to the website                         |

Giromelakis and Veglis (2015) state that in comparison to SEA, SEO has an added advantage as its results are durable. Grzywaczewski et al. (2010) confirms this viewpoint by stating that in the longer term, SEO is more profitable than SEA. They found that even the searchers prefer visiting those websites listed under free listings on SERPs.

According to Giromelakis and Veglis (2015) unadvertised websites or free website listings are clicked by nearly half (i.e. 47%) of all the searchers. Grzywaczewski et al. (2010) report an even higher figure of 72.3% of the searchers who click on such listings as compared to 27.3% of paid or SEA results. Clarke and Clarke (2014) report the highest figure of 94%. From a sample of 1.4 billion searches, Clarke and Clarke (2014) found that free listings were clicked by 94% of searchers, whereas paid results were clicked by a minority of 6% only.

The advantage of gaining visibility in search engines is to receive targeted traffic. From the figures of traffic presented here, it is apparent that free website listings significantly offer more potential to receive targeted traffic as compared to paid website listings. The free website listings are generally attained via implementation of SEO. From the presented argument, the advantage of SEO over SEA is obvious and it makes a strong case for exploration of SEO over SEA.

Given the criticality of SEO, it is worth investigating its techniques along with their implementation procedures. The techniques of SEO have emerged directly from the functionality of search engines (Sabeti et al., 2013). Each of the functions of search engines i.e. crawling, indexing, retrieving and ranking websites have resulted in corresponding techniques. The processes and techniques favoured by search engines are termed as white-hat SEO whereas those techniques that are not favoured by search engines are termed as black-hat SEO (Moreno and Martinez, 2013). To avoid manipulation of its search results by the search community, search engines are secretive about their ranking algorithms (Muriente, 2008). As search engines are secretive about their ranking algorithms and process of awarding visibility to websites in SERPs, it is advisable to review their relevant patents (Daly, 2014; Muriente, 2008).

Google has invented the patent "Onsite and offsite search ranking results" (Tirumalareddy and Upstill, 2014) that analyses how it allocates the scores to websites for ranking them in the SERPs. It states that the relevance, authority and other data of websites and webpages are evaluated for listing them in SERPs. It is worth

investigating the scoring of those techniques that fall within the scope of the current research.

For awarding ranking to a website, its **relevance** is determined by the on-site data whereas **authority** is determined by the off-site data. The on-site data is obtained directly from the webpage or website. It collects information including frequency and number keywords, topic and theme of these keywords, interlinking structure of webpages within the website. The off-site data is obtained from external factors including number of links pointing to the webpage or website from third party websites, number of times a webpage or website was clicked when listed in SERPs for answering a search query and/or other miscellaneous data as deemed relevant on a case by case basis.

The on-site and off-site data is considered to calculate the cumulative, global score for awarding visibility to websites in SERPs. The scoring depends on the availability as well as the strength of available data. In some instances, cumulative score may be based upon the on-site and off-site data with more weight assigned to on-site data, whereas in other instances, off-site data might be given more weight. This indicates the requirement for a balanced approach for implementation of techniques for optimizing a website for search engines in terms of establishing or enhancing its relevance (by implementing on-site techniques) and/or authority (by implementing off-site techniques). An intuitive approach would involve creating the website relevance by implementing on-site factors in the preliminary phase and working on building the website authority by implementing off-site factors after defining its relevance.

The SEO academic literature identifies the on-site (relevance) and off-site (authority) factors as on-page (implemented on the website) and off-page (implemented outside the website). Hence the techniques of SEO are broadly segregated in two groups of on-page and off-page (Clarke and Clarke, 2014; Giomelakis and Veglis, 2015; Sagot et al., 2017).

Given the importance of on-page factors and the need to optimize these factors prior to off-page factors, it can be stated that the implementation of SEO should begin with a focus on on-page factors (Jain, 2013). The on-page factors are implemented on the website and used by search engines to assess the websites' factors independent of the search queries. These factors are termed as query independent factors and have been highlighted in the patents of Google and Microsoft as shown in figures 1.1 and 1.2 in chapter 1. Gandour and Regolini (2011); Jain (2013) and Newstex (2018) state that the SEO process starts with the implementation of on-page SEO. Duk et al.

(2013) reinforces this viewpoint by stating that in an ethical SEO implementation, on-page optimization is a prerequisite for off-page optimization. These on-page factors are the query-independent factors as discussed in section 1.1 of chapter 1. The purpose of on-page and off-page SEO techniques is to work respectively on-the-website and off-the-website to make it search engine friendly. *The focus of this research is to look at the on-page techniques. As both the categories of on-page and off-page are important, their techniques are investigated respectively and critically evaluated to determine their purpose and desirable order of implementation.* Guided by the first research question i.e. "Which SEO techniques are absolutely essential for executing the SEO campaign to achieve visibility in unpaid/organic/free results of SERPs?", the SEO literature is reviewed to identify the techniques known currently in the category of on-page SEO and evaluating it with off-page techniques to determine their criticality.

The researchers are in agreement between the segregation of SEO into the categories of on-page and off-page and implementation of on-page prior to off-page (Jain, 2013). But there lacks a unity in the identification of techniques under each category. Each of them have randomly identified the techniques without any coherence. However, there is an agreement amongst the researchers on identification of primary on-page factors consisting of keywords, content, site structure and code (Hoque et al., 2018; Killoran, 2013). The off-page factors consist of link popularity and social media (Ur Rehman and Khan, 2013). For the sake of clarity as specified in the current research, it is important to distinguish between on-page and off-page factors and on-page and off-page techniques. Keywords, content, site structure and code are on-page factors whereas, keyword research, content creation, information architecture and HTML code optimization are on-page techniques. Similarly, link popularity and social media are off-page factors whereas link building and social media optimization are off-page techniques. A review of these techniques is presented below. A theoretical foundation of on-page techniques is presented followed by an overview of off-page techniques and finally their critical evaluation has been presented. An analysis of the on-page SEO technique of keyword research is presented in section 2.3. The next section discusses the emergence of online shopping platforms.

## 2.2 SEO updates

### 2.2.1 Platform specific optimization: Emergence of online shopping

In this section it is explored if SEO is directly applicable to online shopping malls or third party e-commerce platforms. In the present web scenario/environment, in addition to websites or webstores there exists a platform of electronic shopping malls or intermediaries using which businesses and consumers can undertake different types of e-commerce including B2C – business-to-consumer, B2B – business-to-business, C2C - consumer-to-consumer (Moagar-Poladian et al., 2017). Websites or Web platforms like Amazon, Alibaba, eBay, iTunes, Rakuten (Japan's online shopping mall), Youtube, etc. connect thousands of businesses or sellers to tens of thousands of buyers or consumers (Hagiu, 2007). A wide range of products are sold via these platforms including luxury products like a vintage BMW, a half-million dollar yacht or comparatively low priced products like clothing, domain names, industrial equipment, sports goods, software and services, etc. (Ferguson, 2013). The optimization rules to become visible in the product listings on third party platforms like Amazon or eBay or other third party platforms are entirely different from those of SEO. It is primarily because each platform dictates its own rules based on its functionality. SEO is relevant for search engines and its techniques work for attaining visibility in search engines only.

A focus is being laid on Amazon and eBay because of their reach and scale. The former has been reported as the largest e-commerce platform in US and Europe and the latter has more than 1.5 million sellers (Chen, 2017; Ferguson, 2013). The currently available body of literature was consulted to find specific guidelines for optimizing e-store listings on third party platforms particularly Amazon and eBay. It was found that such knowledge is not covered in the current literature for the specified platforms. Therefore the guidelines provided by these platforms themselves were consulted. However, it is important to mention that the current literature does cover the pros and cons of selling on third party platforms. Such literature has been studied and discussed after presenting the platform-specific optimization guidelines.

As an example, guidelines provided to sellers by Amazon and eBay are presented below. The source of these guidelines are the owners of these platforms i.e. Amazon

and eBay.

**Amazon:**



Figure 2.2 An example of the Buy Box (Chen, 2017)

For sellers, getting their products listed in the Buy Box of Amazon presents their products to searchers or potential buyers. Figure 2.2 shows an example of the Buy Box. Amazon (2018) states Buy Box is the box on the product details page where customers begin the process of purchasing by adding the respective items to the shopping cart. Placement in the Buy Box can result in increased sales. To become eligible to be placed in the Buy Box, Amazon suggests sellers to meet the performance based requirements. The sellers need to have a professional selling account, good performance metrics in terms of reduced order defect rate, cancellation rate and late shipment rate with an overall high amount of order volume. Additionally, it emphasises on pricing the items competitively, offering prime and free shipping, keeping stock available and providing a great customer service.

**eBay:**

An overview of guidelines provided by eBay is provided here. Ebay (2018) guides sellers for creating effective listings. For creating a good listing, it emphasises the importance of writing a descriptive title and description, choosing the right category, providing information of the condition and state of the product, shipping information, etc. Additionally, it suggests adding pictures, adding supplementary information like frequently asked questions, and overall providing a good customer service.

**Evaluation of online shopping malls**

Such web platforms offer a low cost alternative to businesses who don't have the resources to invest in establishing their own website or webstore (Haas, 2002). At the same time, some businesses choose their own websites as the preferred medium to reach out to their customers (Sadowski et al., 2002). Additionally, some businesses opt for a dual or multi-channel strategy which involves selling via their websites as well as on third party platforms (Truong et al., 2017). Some researchers assert the importance of benefits gained from selling through business websites in terms of attracting targeted traffic, engaging the visitors and employing suitable strategies to convert website visitors into buyers (Berthon et al., 1996). In line with the views of Haas (2002); Hagi (2007), also asserts that there are trade-offs in selling through business websites instead of third party platforms. However, as noted above the benefits offered by third party e-commerce platforms can not be denied but it does entail some problems which are discussed below: Firstly the appearance of web store and products are based on the template as offered by the platforms. In order to start selling, businesses set up their 'shop profile' page containing multiple product pages. These pages have a standard layout offering limited customization options (Ha et al., 2016). Secondly, in a case where the seller is focussing on selling compatible complementary products, where each of those products are sourced from different suppliers. If all those suppliers are not in agreement with selling on the platform, then it may cause complications for the seller to sell the intended product range (Hagi, 2007).

Thirdly, selling via platforms may affect the business profitability as the seller's pricing strategy would be effected by the competitors selling substitutable or identical products. However, merchant platforms would offer the seller better control over the pricing, advertising, distribution, etc. where s/he can extract more profits from the consumers (Hagi, 2007). Fourthly, the platforms would charge an access fee for



accessing the customers and generating sales via its platform. However, the sales conducted via the merchant website would not incur any expenditure to the business apart from the initial set-up and maintenance costs. Fifthly, using the auction sites such as eBay, sellers may conduct fraudulent activities.

Auction fraud may be described as the misrepresenting of the product for sale through the auction site or non-delivery of products sold through the auction site (Cliff and Desilets, 2014). Auction fraud has been reported as one of the top internet crimes in recent years (Noufidali et al., 2013).

Consequently, the trust of buyers may be affected, effecting the genuine sellers' sales and profitability on third party platforms. In addition to the above reasons, Corazza et al. (2014) and report the sale of illegal drugs via Amazon and eBay, which was eventually shut down by the Federal Bureau of Investigation (FBI) in October 2013. Such incidents weaken the trust and integrity of such platforms (Forbes, 2013).

The final reason for not considering third party platforms is to avoid loss of equity for the business. Zhu and Liu (2016) reported that Amazon takes advantage of successful small sellers on its platform by replicating their innovations and product space. It enters the market spaces of most successful small sellers on its platform by offering an improvised version of the innovations of these small businesses. It competes directly with the small sellers by lowering the product price and shipping costs, thus reducing the profitability of such businesses. Consequently, small businesses have been discouraged from growing their business on the Amazon platform.

It is also important to note that the major platforms including eBay and Amazon are not available in all countries for sellers and buyers alike (Ferguson, 2013), which limits their geographical reach.

From the above reported complications, it is obvious that the day to day functionality and profitability of businesses could be effected incase they choose to sell via third party platforms only. Therefore, if possible it is advisable for businesses to launch their own website for promoting and trading their products and services.

The focus of the current research is independent websites aiming to become visible in SERPs. It is important to note that the techniques of SEO as discussed by current research are applicable to promoting the websites on the platform of search engines and not ecommerce platforms like Amazon or eBay. The rules and functionality of each platform is different therefore, the optimization rules vary with the varying platforms.

Although, currently limited knowledge exists in this area there has been some progress in academic research for optimization of two sided market places, which is evident from the launch of the first International Workshop on Two-sided Marketplace Optimization: Search, Pricing, Matching & Growth (TSMO) in 2018 (Grbovic and Noulas, 2018). Section 2.1 identifies on-page SEO techniques, the next section presents an analysis of the on-page SEO technique of keyword research.

## 2.3 On-page SEO technique: Keyword research

Section 2.1 introduced the concept of on-page SEO techniques. In this section the 'concept of keywords' and 'technique of keyword research' is discussed. This section begins with the introduction of keywords, identifying types and characteristics of keywords, common features amongst keywords between paid and unpaid search and limitations in current knowledge for executing the technique of keyword research.

Duk et al. (2013); Giomelakis and Veglis (2015) state that keywords are necessary and the most important part of SEO. Keywords represent the information goals of the searchers (Sagot et al., 2014). Searchers use keywords to find information via search engines. Additionally keywords play a central role in search marketing and forms its nucleus. Search marketing centers on their usage. The role of keywords as a connecting point between searchers, search marketing or websites and search engines is highlighted in figure 1.4 in chapter 1. Every website crawled by search engines is indexed under a respective category and identified with certain keywords or keyphrases as deemed relevant by the search engine algorithms. To fulfil a searcher's information needs which are received as a search query from the searcher, search engines present relevant websites from their respective indexes for answering the search query (Muriente, 2008).

As search engines list websites *based on the keywords* specified by searchers, therefore websites must specify *relevant and descriptive keywords* for appropriate interpretation and indexing of websites by search engines. Generally, websites aim to define their products or services using the keywords and key phrases that are searched by the searchers in their search sessions. Such keywords or key phrases have to be researched by websites using appropriate tools. The primary benefit of researching keywords and selecting and using the appropriate keywords is that it provides an opportunity to achieve an overlap between the keywords being searched

by searchers and targeted by the website. Hence, the focus needs to be laid on the stream of queries used by searchers on search engines (Sagot et al., 2014). At the same time it is important to consider only those queries as relevant to the product or service being sold by a website. For instance if a website is selling wedding presents then it is recommended to consider only those keywords which are related to wedding presents.

Keywords are the lifeblood of a website that acts as a magnet to attract the targeted visitors. In an SEO marketing campaign, keywords are used strategically to complement offline marketing. They are the binding element used in the website content, advertising campaign, branding statement, etc. (Zhang and Cabage, 2017). Moreover, the clients learn to identify with the company through the chosen keywords. Given the importance of keywords it is important to understand the types of keywords, their distinctive properties along with the techniques and process of shortlisting and using these keywords in a website (Aul and Roth-Berghofer, 2015). Keyword research leads to keyword intelligence allowing websites to capture every potential *connection opportunity* with their target market (Zhang and Cabage, 2017).

### 2.3.1 Insight of other researchers

In the current literature, almost all the researchers have recommended keyword research to be executed in an SEO campaign (Killoran, 2013; Moreno and Martinez, 2013; Zhu and Tan, 2012). Different researchers have provided different guidelines related to keywords, covering the spectrum of keywords. A critical evaluation of some of these guidelines is noted here. Gandour and Regolini (2011) suggests that keywords must be specified for optimizing a site. But they have not explained which keywords must be chosen, the reasons for choosing them and how they should be chosen.

Moreno and Martinez (2013) make a brief mention that keywords must be included for optimizing a website with some frequency without suggesting any threshold value for keywords' search frequency.

Zhu and Tan (2012) provide some tips for capturing the relevant keywords. They highlight the importance of choosing less popular keywords as they would have low competition and considering keyword-suggestions provided by search engines for inclusion in the website. The case study optimization reported by Gandour and Regolini (2011) provides some insight on the process of keyword research. It

involves creation of keyword pools and shortlisting of keywords on the basis of the competition and searchability by using the Google Adwords tool. On the other hand, Heinze et al. (2010) has also reported the results attained for a case study website from executing an SEO campaign but he has not provided any explanation of the keyword research process adopted for optimizing the website.

For targeting keywords, it is important to correlate with the keywords or key-phrases being used by the searchers. The keywords could possibly be obtained by using keyword tools or browsing through social community websites in order to understand the keywords actually being used. In comparison to other researchers, Killoran (2013) states some useful guidelines for researching keywords. He mentions Google's keyword tool for analysing the potential keywords and suggests focussing on the keywords that describe the needs and problems resolved by the product or service being offered by the website. He also provides some examples of structure of keywords used by searchers to search for holiday destinations. The purpose of Killoran (2013)'s research was to provide a tutorial to its audience on the SEO techniques, and it has fulfilled its purpose to some extent but falls short by not providing explicit guidance for researching and implementing keywords in a website.

Additionally, Web 2.0 features social communication channels including micro blogging platforms, blogs, user feedback forums or product reviews, which could provide useful information as they might feature keywords in the discussions from the clients' perspective (Davis and Khazanchi, 2008; Jansen et al., 2009). Browsing through such services might provide an insight to the searchers' terminology. Yih et al. (2006) found search query logs of search engines to be reliable for finding frequently searched keywords. In their experiments, they found that the inclusion of frequently searched keywords on websites improved performance of these websites significantly.

Experiments conducted by Golbandi et al. (2013) aligned with the findings of Yih et al. (2006). Their research supported the utility of search query frequency predictions provided by search engines. They successfully predicted the future keywords' search frequency in their experiments based on search query log analysis provided by the search engines. The research conducted by Choi and Varian (2012); Goel et al. (2010); Golbandi et al. (2013); Killoran (2013); Yih et al. (2006) highlights that a query log of search engines is a gold mine for predicting future search frequency. Choi and Varian (2012) found that searches conducted on Google successfully help to predict the economic activity in the real world. They observed the search queries'

data for certain industry categories including property, automobile and travel. Using the data for these categories, they found that it aids in predicting the future economic activity to some extent.

Goel et al. (2010) found that the contemporary purchasing behaviour can be predicted via frequency of search queries, which are a strong indicator of consumer behaviour. They traced a high correlation between searches conducted and economic activity for certain niche areas like watching music, buying music or video games and thus verifying that search does "predict the present". For researching keywords effectively, it is important to understand the different types of keywords and principles of keywords, which are discussed below.

### 2.3.2 Types of keywords

Depending on different goals of the information needs, the search queries can broadly be categorised into informational, navigational and transactional. The web search is driven by the need for information. Research has been undertaken to identify the motive for performing a search in the web context (Broder, 2002; Jansen et al., 2008; Rose and Levinson, 2004). Different researchers have defined this need as fact finding, exploratory, formal or informal search, monitoring, etc. (Choo et al., 2000; Navarro-Prieto et al., 1999). This need is represented by the *search query* in the web search engines context.

Some attempts have been made to categorise the search intent by classifying the search queries. Some researchers have classified the search queries as informational, navigational and transactional (Broder, 2002; Jansen et al., 2008; Rose and Levinson, 2004). Rose and Levinson (2004) has labelled transactional queries as a resource, but for comprehensive understanding it is better to use the label of transactional. These different types of search queries are explained below (Jansen et al., 2008):

- Navigational queries indicate the intent to visit a specified website related to a person or an organization the details of which might or might not be known to the user
- Informational queries indicate the intent to locate the information on a particular topic in the form of data, text, documents or multimedia.

- Transactional queries indicate the intent to obtain a resource such as product purchase, software installation, etc.

Adapted from the original specification by Rose and Levinson (2004) the taxonomy of search queries has been shown below in table 2.2:

Table 2.2 Displaying taxonomy of search queries or keywords (Rose and Levinson, 2004)

| S.No. | Search intent | Purpose                         | Key phrase example             |
|-------|---------------|---------------------------------|--------------------------------|
| 1.    | Navigational  | Visiting a specified website    | Brand search such as Pizza Hut |
| 2.    | Informational | Locate information              |                                |
| 2.1   | Directed      | Locate information on a topic   |                                |
| 2.1.1 | Closed        | Specific information            | 2016 election dates            |
| 2.1.2 | Open          | General information             | reasons of diabetes            |
| 2.2   | Undirected    | Discover a topic                | diabetes                       |
| 2.3   | Advice        | Seek guidance                   | how to cure diabetes           |
| 2.4   | Locate        | Obtain product information      | international calling card     |
| 2.5   | List          | Contextual information          | UK universities                |
| 3.    | Transactional | Transact                        |                                |
| 3.1   | Download      | download resource               | download chrome                |
| 3.2   | Entertainment | entertainment purpose           | Free online games              |
| 3.3   | Interact      | Interact with specific resource | currency converter             |
| 3.4   | Obtain        | Procure a resource              | buy laptop                     |

The next section discusses the characteristics of keywords that must be considered while shortlisting keywords.

### 2.3.3 Characteristics of keywords

Characteristics define the features for identifying and selecting the keywords. It helps to evaluate if the identified keywords meet the minimum qualifying criteria to be eligible for targeting. Selecting the appropriate keywords is the first step towards establishing a solid foundation of an SEO campaign. Keywords that are

right, relevant, specific, long-tail, serve the searcher's intent and are interpretable as some of the basic principles defining the core properties of SEO-favourable keywords.

1. **Choosing the right keywords:** refers to the process of selecting and using the right keywords on the page(s) of a website. Targeting the right keywords is particularly important because when a searcher follows the links from the search results page to arrive on a landing page, s/he takes only few seconds to decide if it is the right place and stay or leave accordingly. The content and information presented on the landing page must be related to the searched keyword(s) or key phrases. For example, the keyphrases free email storage, free email account would be right for Gmail.com website instead of keyphrase like postal service (Zhang et al., 2007).
2. **Choosing relevant keywords:** Keyword relevance can be defined as the relation of the selected keywords with the webpage. It involves selecting the right keywords that would eventually match the 'language of search' i.e. keywords specified by the searchers and relate to the product as well. Relevant keywords should be prioritised for optimization of the website. For example, the keyphrases united parcel service, stamps would be relevant for Usps.com website instead of keyphrase like email service (Zhang et al., 2007).
3. **Serving the searcher's intent:** refers to the process of identifying the searcher's intent and serving the content that fulfils the purpose of the search. Generally the search queries could be grouped into categories of informational queries (conducted to collect information e.g. iphone 6 features), navigational queries (conducted to navigate to a certain domain name or brand e.g. Apple.com, iphone 6), commercial queries (conducted to find a relevant product as per their specific parameters e.g. iphone 6 plus camera accessories) and transactional queries (conducted to undertake a transaction to buy the product e.g. buy iphone 6). Generally in a buying cycle, searchers may start with very broad search queries i.e. informational queries and narrowing it to specific queries i.e. commercial or transactional queries (Agarwal and Mukhopadhyay, 2011). While shortlisting keywords it is important to keep these buying or search stages in mind so as to target the searchers at different stages of their search journey.
4. **Broad vs. specific keywords:** refers to the process of prioritising either broad or specific keywords. Broad keywords or informational queries e.g. *iphone 6*

*features* would lead to a general audience whereas specific keywords (commercial or transactional queries) e.g. *buy iphone 6* would result in attracting a targeted audience. Depending on the objective of the website, usually its more beneficial for the businesses to attract a targeted audience since it more likely leads to conversions or sales of the product (Kritzinger and Weideman, 2013).

5. **Choosing long tail keywords:** refer to the descriptive phrases that precisely describe products. These are specific keywords (describing a product exactly e.g. Canon PowerShot SX530 HS Digital Camera) having a high likelihood of being searched and purchased by the searchers or potential customers (Mustafa et al., 2015).
6. **Interpreting keywords:** refers to the process of analysing which keywords are driving traffic to the website or not driving any traffic. The website will need to have an analysis tool installed to provide this information. The analysis of the analytics enables one to peek into the minds of the searchers to understand the language they use and do not use to search for the products being sold by the website (Miller, 2015). The six principles of keywords are displayed in figure 2.3.

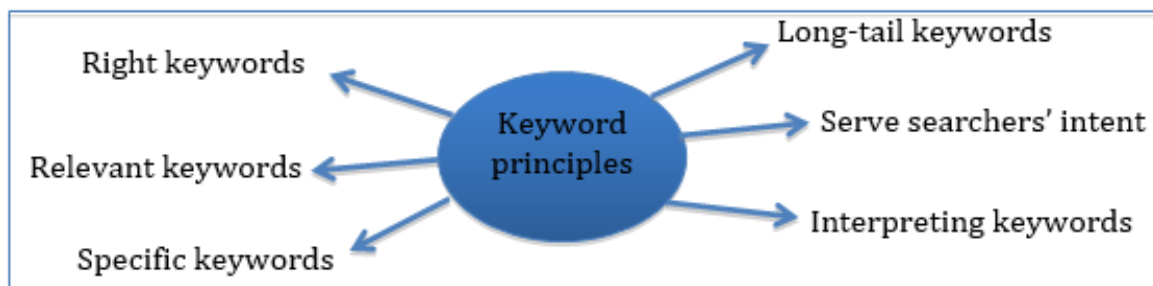


Figure 2.3 Principles of keywords

### 2.3.4 Similarity in keyword research for paid and unpaid search

Although the focus of this research is upon free or unpaid searches the literature has also been reviewed in respect of paid searches to identify a potential overlap in the driving forces and underlying principles of keyword research for both. The primary reason for reviewing literature on keywords in paid searches is that search engines have published their research on keywords in context to paid search only as opposed to unpaid or natural searches. As a matter of fact, given the commercial benefit of



advertisements to search engines, they generally publish research on sponsored or paid searches only. In both the categories of paid and unpaid searches, the purpose of keywords is identical for search engines i.e. retrieval of information relevant to search queries.

In SEA, advertisements are retrieved on the basis of a match between the keywords searched by the searchers and advertised by the websites. Potentially there could be an exact match or broad match between the searched keywords and bided or advertised keywords. For example, a website advertising for an exact match for the keyword "chocolate", may be displayed when the keyword "chocolate" is searched. On the other hand, a website advertising for broad match, may be displayed when the keywords "dark chocolate," "bitter dark chocolate," "white chocolate," and even "cocoa" are searched. A broad match considers variations of keywords, its synonyms, singular and plural forms and misspellings whereas an exact match considers exact keywords only (Amaldoss et al., 2015).

Search engines undertake a significant amount of research to present relevant advertisements for broad matches. They are at an advantage as they are equipped with the important data containing information on user search sessions i.e. search engine query logs of keywords for paid and unpaid search, which consists of millions of user search queries. The experiments conducted by Broder et al. (2009) show the process of matching relevant advertisements with search queries. It involves truncating search phrases into unigrams (single words), phrases and assigning topical-categories or classes to search queries and retrieving relevant advertisements. An example of this process has been highlighted below in table 2.3. The most important lesson from this experiment for implementing SEO is that for optimizing websites it would be effective to consider semantically related keywords for keyword alternatives. As highlighted in table 2.3, broad match considers semantically similar word conjunctions and closely related classes to find closely related advertisements.

Table 2.3 Exemplary processing of search queries to effectively retrieve relevant advertisements, (Broder et al., 2009)

| Query: low sodium tomato soup recipes |             |                     |
|---------------------------------------|-------------|---------------------|
| Unigrams                              | Phrases     | Classes             |
| low                                   | low sodium  | health              |
| sodium                                | tomato soup | health/diet         |
| tomato                                | soup recipe | health/diet/recipes |
| soup                                  |             | cooking             |
| recipe                                |             | cooking/soup        |

It is highly likely that in a natural or unpaid search, search engines employ similar processes for effectively retrieving relevant websites from their corpus to answer search queries. The SEO community can gain an understanding from the processes employed in paid search and benefit from it by employing similar strategies for optimizing their websites. The author conjectures that an understanding of the underlying principles of such processes could provide effective guidance based on empirical experiments to the SEO community. The retrieval process employed by search engines for sponsored (paid) and organic (unpaid) search-listings would not be identical but similar.

### 2.3.5 Limitations in the current knowledge of keyword research technique

The current literature on keyword research randomly identifies different but important aspects of keyword research and provide only the high level conceptual knowledge in this area. The suggestions provided by researchers lack coherence to execute the keyword research process i.e. the starting and ending point with specification of intermediate steps. It does not provide knowledge on the essential steps to be undertaken for executing keyword research i.e. it does not answer the question of how to conduct keyword research.

In the discussed literature, there is a pattern of similar suggestions of identifying relevant keywords, considering less popular and less competitive keywords and consulting keyword tools of search engines discussed by different researchers. It indicates the applicability of a similar approach required to be executed for different

websites. The similarity in suggestions of the current literature highlights that a largely similar approach is required for undertaking keyword research for different websites. The author is in agreement with this point. Hence an assumption can be made that there exists a similar pattern of implementation process for researching keywords for different websites. The author asserts that certain steps need to be executed for researching keywords effectively.

There is a knowledge gap in terms of a clear, concise and unified process of inter-linked steps for implementing keyword research. The current research has addressed this knowledge gap by creating three process models for executing keyword research in a sequential manner. The experience knowledge is represented in these process models to execute the interlinked steps for conducting keyword research effectively and efficiently (see chapter 4). In the next section, another on-page SEO technique of content creation has been analysed.

## 2.4 On-page SEO technique: Content creation

In the previous section the concept of keywords and the technique of keyword research is discussed. The selection of keywords inform the creation of content. In this section the 'concept of content' and the 'technique of content creation' is discussed.

This section begins by reviewing the linguistic features of the English language including synonymy, polysemy, definition and importance of context and concept. They play an important role in *creation* and *interpretation* of content by information retrieval systems or search engines and identify the limitations in current knowledge for executing the technique of content creation.

Compared to traditional information retrieval systems, information space or document collection in the web based retrieval systems (i.e. search engines) is much larger. Given the ambiguity of English language, a search query or keywords specified in a search engine might be open to multiple interpretations of their meaning and fetch results of websites-listings whose content is irrelevant for fulfilling searchers' information needs (Bhogal et al., 2007).

The linguistic features of synonymy and polysemy complicate the interpretation of search engine queries and its matching with website content. Synonymy refers to the possibility of referring the same object by multiple terms or terms sharing similar

meaning (Berger and Lafferty, 2017). Polysemy refers to the multiple meanings of words or same terms having multiple meanings. For example, the term "chips" would indicate very different meaning to different searchers and would be searched to fulfill very different information needs. It would fetch search results from multiple domains covering different contexts when searched as a sole word in the search engine. Depending on the domain knowledge, task at hand, linguistic habits, accessibility and usability and the relationship the searcher shares with the source, searchers describe the same information-needs using very different terms (Deerwester et al., 1990) (Schütze and Pedersen, 1997) (Berry et al., 1995) (Agarwal, 2017).

To satisfy the information needs accurately it is important to determine the context of the search queries. There is no standard definition of context (Finkelstein et al., 2001). The Merriam-Webster dictionary defines context on a linguistic level and on a generic level (Webster, 2018). From a linguistic perspective, it defines context as the parts of a discourse surrounding a word or a passage which can throw light on its meaning. From a general aspect, context has been defined as the interrelated conditions in which something occurs or exists. The linguistic version of context has been found to be more appropriate for information retrieval (Bhogal et al., 2007).

Shen et al. (2014) exemplifies that a single concept can represent multiple meanings in different contexts, which is expressed using multiple vocabularies in web documents and search queries. For instance a search for the word "office" or "body" could have multiple search intentions with the potential of being relevant to multiple documents and categories. In this scenario, documents with the following titles may be found as relevant:

Document titles containing the word office:

- microsoft office excel could allow remote code execution
- welcome to the apartment office

Document titles containing the word body:

- online body fat percentage calculator
- online auto body repair estimates

The information in the above titles have been further elaborated in the tables 2.4 and 2.5.

Table 2.4 Sample document titles. The same word, i.e., “office”, has different meanings depending on its contexts, (Shen et al., 2014)

| <b>Document titles containing the word office</b>        | <b>Relevance</b>  | <b>Search intent</b>   |
|--|---|--|
| microsoft office excel could allow remote code execution | In this example, the document is referring to the Microsoft product | In the situation explained here, the precise search intent for the word ‘office’ cannot be identified without the specification of its context |
| welcome to the apartment office                          | In this example, the document is referring to a working space       | In the situation explained here, the precise search intent for the word ‘office’ cannot be identified without the specification of its context |

Table 2.5 Sample document titles. The same word, i.e., “body”, has different meanings depending on its contexts, (Shen et al., 2014)

| <b>Document titles containing the word body</b> | <b>Relevance</b>   | <b>Search intent</b>   |
|---|--|--|
| online body fat percentage calculator           | In the first example the document is referring to fat calculation pertaining to health | In the situation explained here, the precise search intent for the word ‘body’ cannot be identified without the specification of its context |
| online auto body repair estimates               | In this example, the document is referring to a working space                          | In the situation explained here, the precise search intent for the word ‘body’ cannot be identified without the specification of its context |

### **Determining context**

In spite of the significant progress in the field of web information retrieval, search engines are still not able to effectively interpret the context of search queries or web documents (Shen et al., 2014). They are dependent on a lot of environmental or surrounding information to understand the underlying context. In case it’s a phrase

based search an inter-relation between adjacent query terms is assumed and captured in presenting the search results (Metzler and Croft, 2005). Metzler and Croft (2005) found significant improvement in retrieval effectiveness by modelling dependency in the 'adjacent query terms' or 'sequence of query terms'. Co-occurrence data is an important source of information in providing the missing information in terms of explicit or implicit relationship in the co-occurring keywords and phrases in the content (Shen et al., 2015). Generally, terms or keywords with similar meanings tend to co-occur with similar neighbours or in similar contexts, Schütze and Pedersen (1997), thus indicating the possibility to explore the underlying context. The context of presented information can be discovered via certain terms that would generally co-occur in neighbourhood of other co-occurring terms. Shen et al. (2015) successfully predicted the underlying context and semantic features based on the co-occurrence data.

In their functionality search engines map the linguistic meaning as opposed to lexical or structural matching of search queries to documents to fulfil the information needs of the searchers. Much research has been done and is ongoing to increase the effectiveness of the information retrieval. There is a large body of literature reporting development of language models to overcome the weaknesses of baseline systems and improve efficiency of information retrieval systems (Huston and Croft, 2014). Additionally deployment of machine learning has been reported to improve the functionality of search engine algorithms (Krrabaj et al., 2017). The review of such literature is not being covered as it is beyond the scope of this research. But instead as reported above, a focus has been laid on reviewing the literature on content covering the semantic representation of information and structural content that conveys the information of a document.

Content refers to the information presented on a website regarding its products, services, features, company background, order placement, etc. (Huizingh, 2000). Providing information is the basic goal of the website (Angehrn, 1997). As the well-known slogan states: Content is king (Chase, 1996; McCarthy, 1995). A website and SEO particularly, are nothing without high quality content (Fishkin and Høgenhaven, 2013). Content can be of different types including text content, images, videos, graphics or info-graphics, presentations, etc. In this research we are mainly interested in text content presented on the webpage. Generally the webpage content needs to have certain features such as providing full information on the topic of the webpage, address the target audiences' information needs, and giving a

direction towards fulfilling the information goal of the webpage especially in product transactional pages (Fishkin and Høgenhaven, 2013).

Content can be broadly classified into two main categories i.e. information content and transactional content (Huizingh, 2000). Information content could be commercial or non-commercial. The scope of commercial information is to cover information regarding the company, past and present clients, client feedback, completed projects, etc. Further, there may be product pages with product information and sales function enabled. Non-commercial information could relate to company sponsored events, news, etc. (Huizingh, 2000).

Transactional content refers to content presented on transactional pages of websites having the sales function integrated into their websites. In some cases such content may initiate the product purchase process by submitting a request for proposal.

### **Composition of webpage content**

The present search engines are powered by semantic search technology, which attempts to understand the context of the searched keywords by associating them with other words related to the concept semantically and presenting the search results accordingly (Kassim and Rahmany, 2009).

Content needs to be written for users, using relevant keywords, specifying the topic of our discussion and defining the main concept clearly by using related or co-occurring keywords by following a process as shown in figure 2.4.

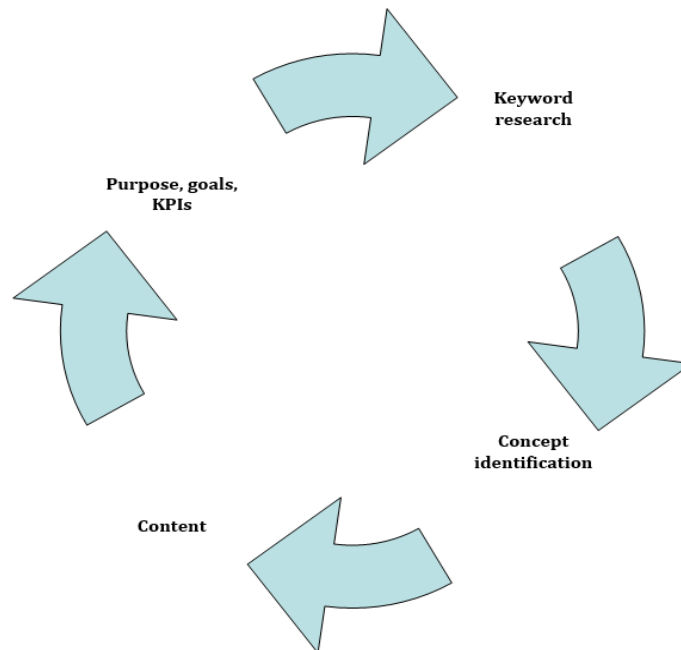


Figure 2.4 Content writing process

As described in the keywords section relevant keywords are researched and deployed on respective pages of the website. For creating content for each of the webpages, it is important to consider the allocated keywords and identify other keywords related to the concept (Broder et al., 2009). It can be done by identifying:

1. Close variants and synonyms (abbreviations, plurals, and phrases that mean the same thing) (Broder et al., 2009),
2. Primary related keywords (words or phrases related to the main keyword phrase) (Broder et al., 2009),
3. Secondary related keywords (words or phrases that relate to the primary related keywords) (Kassim and Rahmany, 2009),
4. Entity relationships (concepts that describe the properties and relationships between people, places, and things) (Shen et al., 2014)

The table 2.6 represents an example to determine the main concept and related key phrases. It represents the above points. Figure 2.5 represents the relationships between different entities.



Table 2.6 Main concept and related keywords

| Main keyword   | Primary keywords                          | Secondary keywords   |
|----------------|---|----------------------|
| UWL university | Higher Education                          | Further education    |
|                | Film, Media, Design courses               | Undergraduate degree |
|                | Business and Marketing courses            | Postgraduate degree  |
|                | Computing and Engineering courses         | Professional courses |
|                | Hospitality and Tourism courses           | Full time courses    |
|                | Law courses                               | Part time courses    |
|                | Music courses                             |                      |
|                | Nursing, Midwifery and healthcare courses |                      |
|                | Human and Social sciences courses         |                      |

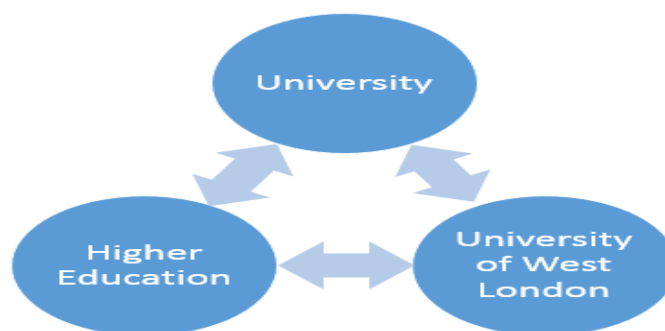


Figure 2.5 Relation between entities

By executing the above steps to compose the expanded keyword list will provide sufficient preparation to start writing content for the webpage. Generally, a webpage consists of a main heading, followed by an introduction, body consisting of paragraphs or subsections, and conclusion as shown in figure 2.6.

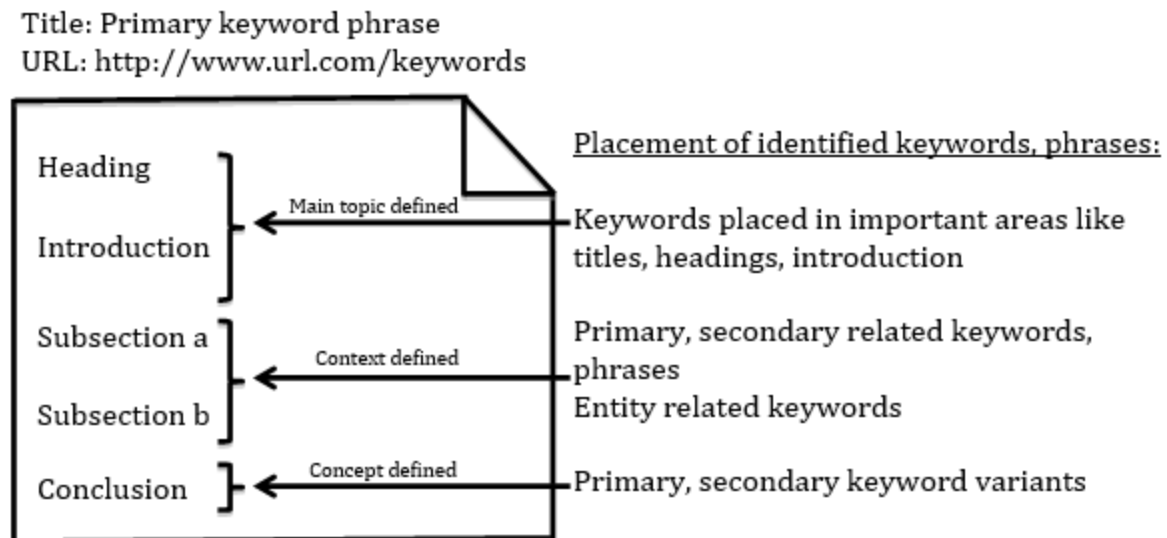


Figure 2.6 Placement of keywords

### 2.4.1 Insight of other researchers

There is general agreement that content is critical for attaining ranking in search engines. The importance of content was highlighted in the experiments conducted by Zhang and Cabage (2017). Their experiments showed that content forms the basis of attaining ranking in search engines. They compared the SEO results attained by implementation of on-page SEO technique of content creation and off-page SEO techniques of link building and social sharing in three experimental websites. The on-page SEO technique of content was implemented in all the three sites whereas link building and social sharing were implemented on only one experimental website. They found that implementation of on-page SEO technique was instrumental in attaining the SEO results.

The importance of content was also confirmed by the experiments conducted by Raiber et al. (2013). The main motive of conducting their experiments was to find if varying degrees of quality of content can influence the ranking in search engines. They composed low to high quality content for approximately 50 million English Web pages. The low quality content focussed on keyword stuffing with very little useful information whereas the high quality content contained thematic content providing real information in order to address the information needs of the users. Their experiments found that high quality content pages attained ranking in search engines. It proved the criticality of content in attaining visibility in the SERPs.

Duk et al. (2013) state that content is key to success. They emphasise that search engine algorithms devalue websites that use low quality content and are of little value to searchers. Google's algorithm updates named as Panda, Penguin and Hummingbird eradicated such low quality sites from its SERPs (Erdemir, 2015). As a result of these updates, website owners and marketers focus on creating informative content that is potentially useful for searchers. Another dimension in content creation is to create shareable content that is useful to a larger audience being shared across different social media channels and creating natural links to the website (Erdemir, 2015).

Content is an important element of SEO constituent for websites of all categories. Onaifo and Rasmussen (2013) and Scott (2015) both highlight the importance of content in making the library websites visible in search engines by defining useful content in the websites.

Killoran (2013) emphasises the website content should be oriented towards problems or needs that a website resolves by including the relevant keywords and phrases. He asserts that in case of local businesses location specific keywords should be included. Similar to the suggestion of Erdemir (2015), Killoran (2013) also highlights the importance of creating shareable content which would be helpful in obtaining inbound links to the website from relevant third party websites.

Ahmed et al. (2013) investigated the utilisation of SEO techniques by B2B and B2C companies. They conducted fifteen semi-structured interviews and found SEO was utilised by a minority of two companies who applied the technique of content in execution of their SEO campaign. Both these organisations deployed relevant keyword rich content in their websites and achieved good results. The positive impact of content on visibility of search engines has been highlighted in the scientific studies of search engine optimization (Zhang and Dimitroff, 2005).

#### **2.4.2 Limitations in the current knowledge of content creation technique**

As explained above, in the current SEO literature, content has been highlighted as one of the most essential ingredients of a successful on-page SEO campaign. But the problem in existing literature is that except for highlighting the importance of inclusion of keywords none of the literature states how to create quality content by

executing relevant procedures and how to undertake the content writing process for structuring the information effectively.

There is clearly a knowledge gap here in terms of the specification of a process or a procedure for creating useful and high quality content that would be rated as high quality by search engines. The current research attempts to fill this knowledge gap by specifying an explicit procedure that needs to be followed for creating content for the webpages. In the next section, another on-page SEO technique of information architecture will be analysed.

## **2.5 On-page SEO technique: Information architecture**

In the previous section the concept and technique of content creation is discussed (which is executed by using the shortlisted keywords) was discussed. The identification of respective categories of keywords then inform the execution of the technique of information architecture. In this section the concept of 'information architecture' and the 'technique of information architecture' is discussed.

This section begins with reviewing the polysemy feature of language alongside the identification and meaning of concept that plays an important role in determining and defining the information structure of a website and identifies the limitations in current knowledge for executing the technique of information architecture.

### **2.5.1 Polysemy and concepts**

The polysemous nature of human language poses a challenge to interpret the meaning of a word in its current usage (Cheng et al., 2015; Wang et al., 2017). For humans it is not a problem for interpreting the intended meaning of synonymous words but it becomes a real problem for machines to interpret the real meaning of words that have multiple meanings. In the current web scenario, it is imperative to discover the represented meaning of words especially, the interpretation of search queries by web search engines, (Wang et al., 2014). However, it is possible to interpret the meaning of the word with the help of adjacent words in a sentence or a paragraph. Harris (1954) states that the meaning of a word can be obtained by its accompanying keywords. It indicates that the meaning of a word can be understood by examining the concept it belongs to and the context in which it appears. For

example, the term python occurring in these instances, [python zoo] [python string] belongs to different concepts and indicates a different context (Wang et al., 2017). The first instance refers to the animal category whereas the second instance refers to the programming language. A concept is a class or set of entities within a common domain (Wang et al., 2014). It refers to the fact that a single concept usually contains sub-concepts, sub-sub-concepts, etc. within the same domain. To assure an effective interpretation of context by automated applications the concept needs to be presented in a hierarchical order of the main concept, followed by its sub-concepts.

It is critical to represent concepts accurately for web information applications whose information has to be interpreted by external stakeholders (human users and automated applications such as search engine robots) Sanchez-Alonso and Garcia-Barriocanal (2006). In such cases the information representation process should follow the process of conceptualisation which involves linking words to context-appropriate concepts (Song et al., 2011). For example for a website featuring information on cars (Wang et al., 2014), it can present information in a hierarchical order where the top concept can be cars, followed by car brands and models of each brand i.e. Cars > Mercedes, Honda, Volvo, Toyota and so on. Each of these brands can represent further model classifications such as:

Cars > Mercedes <sup>1</sup> > A class, B class...

Honda <sup>2</sup> > Accord, Civic...

Volvo <sup>3</sup> > V60, V40...

Toyota <sup>4</sup> > Prius, Verso... and so on.

In the scenario of web search, the websites must present the relevant concepts clearly for an accurate interpretation of their information structure by search engines. Such representation is critical to effective matching between the search queries, websites and webpages (Cheng et al., 2015). Information structure is also termed as information architecture.

Information architecture (IA) refers to the art and science of structuring and organizing the information artefacts in an information environment. The primary aim is to maximize its accessibility by assisting users to fulfil their information needs effectively (Beiers, 2000; Byrne, 2004; Rosenfeld and Morville, 2002). In context to

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<sup>1</sup><https://www.mercedes-benz.co.uk/>

<sup>2</sup><https://automobiles.honda.com/vehicles>

<sup>3</sup><https://www.volvocars.com/uk/cars/model-lineup>

<sup>4</sup><https://www.toyota.co.uk/car-categories/mpvs-family-cars.json>

website, IA refers to the organisation of its structure and content, the labelling and categorization of information to support the browsing and searching of information (Ganeshan et al., 2003; Jadav, 2002; McCracken, 2005; Rosenfeld and Morville, 2002; Van Greunen and Wesson, 2004). Fundamentally, the website architecture is conceptualised and developed by focussing on the information requirements of the user and visualising the user access journey while accessing a website.

Rahim and WMI (2006) have created a framework in order to prescribe the construction of website IA. In their view the foundation of website IA is laid by three techniques namely content, navigation and context as shown in figure 2.7.

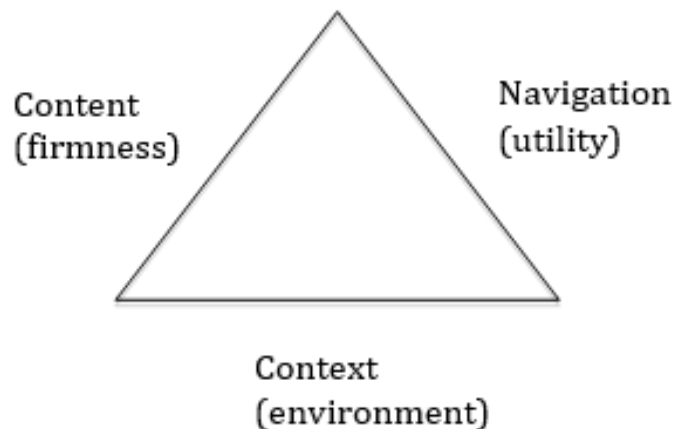


Figure 2.7 Website IA framework (Rahim and WMI, 2006)

Rahim and WMI (2006) draw an analogy with the real world architecture where it states that content is the first building block of the website that represents firmness. It denotes that website information should be well organised and represented in the content with use of proper language and propositions. Further some dimensions of content properties have been observed. It must be valid, trustworthy, authentic and authoritative. It must be relevant, up to date, reliable, and effective. It must be organized following a top down hierarchy in sufficient detail to cover the website's scope of information.

The second building block is navigation that represents utility. It indicates that the navigation should be designed in such a manner that enables the user to rely on intuition for navigating and accessing different sections of the website. It emphasises a navigation element design and a navigation element path that will allow the user to navigate quickly and productively around the website. Element design can be

viewed as a signpost or road map. It refers to appropriate metaphors in hyperlinks, or banners or breadcrumbs that inform the navigation system path to the user. Navigation system path refers to the path to be covered from point A to point B to accomplish a certain goal, which is facilitated by the element design.

The final building block is context. The conceptualisation of the environment creates the context for the website (Peek, 2000). It is constituted by appropriate use of symbols and metaphors by keeping the end user in mind. Other contextual techniques include site genre, discipline, technology and standards (Denn and Maglaughlin, 2000). Culture is another important factor considered while contextualising the techniques for country specific website audience (Farnum, 2002).

### **2.5.2 Insight of other researchers**

Ur Rehman and Khan (2013) did a survey to study the contemporary SEO literature on website structure. From the undertaken survey they mention that the keywords targeted in the optimization should be used in defining the linking structure of the website. They have not provided any guidance on how to interlink the keyword-concepts to the information hierarchy structure of the website and its importance for interpretation of website by search engines.

Killoran (2013) mentions that the website should be structured with human and search engine audiences in mind. He points out that the lack of such an optimized structure would not help in attaining and sustaining the visibility of website in search engines. He has not described the relation between website structure and its interpretation by the search engines.

From the guidance of Killoran (2013); Ur Rehman and Khan (2013) it is observed that the current SEO literature does not identify a concrete relation between the targeted keywords, their concepts in terms of word-concept relationship and the need to define it in the website structure. It does not even specify a procedure to define such a relationship.

### **2.5.3 Limitations in the current knowledge of information architecture technique**

As explained above, there is a clear need to identify the semantic concept hierarchy of the keywords being covered by the website and explicitly specify such a relationship within the structure of the website. It enables the search engines and human users to interpret the semantics and navigate the website in a user friendly and meaningful manner. Despite its criticality the current SEO literature does not explore the importance of definition of concepts and its relation to SEO.

The current research attempts to fill this knowledge gap by defining the process of defining the scope of the website and aligning it with the covered concepts and sub-concepts to define the information structure of the website. Additionally the current research has focussed on creating information architecture for the website by taking into consideration the information scope for a website. Firstly it identifies the main concepts and sub-concepts covered by the website. Further a top down information hierarchy is built based on the concepts covered and a unique webpage is created for each of the concepts or sub-concepts. Based on the concept, keywords are allocated to each of the webpages for creating content. From the SEO perspective webpage content can be created after keywords have been allocated for that page respectively.

Each of the webpages is assigned a descriptive name, hyperlinked and interlinked with all the other pages of the website so as to facilitate an organised navigation structure. Additionally, appropriate symbols, metaphors are used so as to create a contextual layer within the website. Creating the individual webpages creates content firmness, interlinking them creates navigation utility and appropriate tagging and labelling creates contextual environment.

From the viewpoint of the IA process model the process has been visualised in figure 2.8.



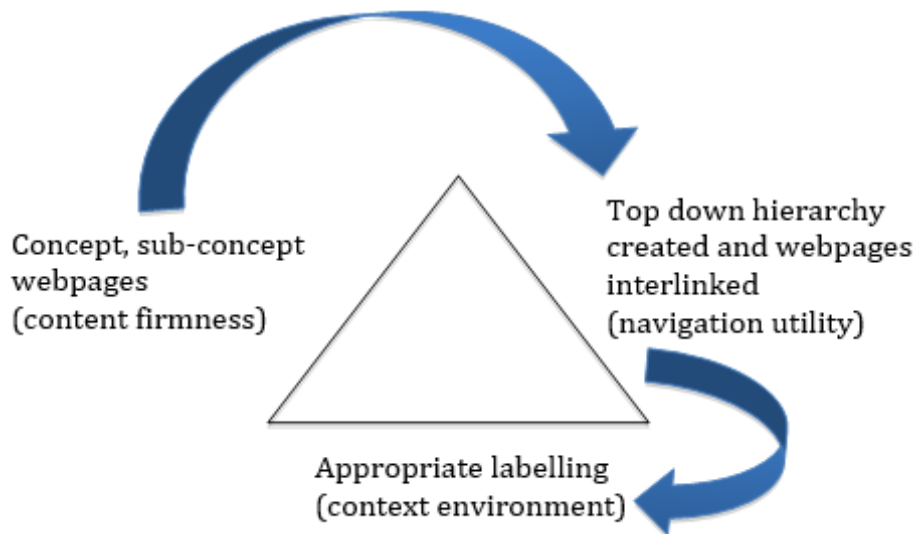


Figure 2.8 SEO implementation phases (Rahim and WMI, 2006)

It is important to observe that the process of creating IA for a website is simple and straightforward while observing the essential properties as discussed above. This is a recurrent process which is required for optimization of every website. The experience knowledge is valuable and can be formulated into a process.

## 2.6 On-page SEO technique: Webpage HTML code optimization

In the previous section the concept and technique of information architecture is discussed, which is informed by the respective categories of keywords. The shortlisted keywords are used to contextualise the HTML code. The inclusion of keywords in HTML code helps to contextualise the code by adding semantic information. In this section, the concept of HTML code optimization and the technique of HTML code optimization is discussed briefly.

Generally a basic webpage is created using HTML (HyperText Markup Language), CSS (Cascading Style Sheets) and Javascript. HTML is the basic markup language for publishing hypertext on the World Wide Web (WWW) (Huh, 2014). CSS describes the presentation of various techniques of the HTML document (Huh, 2014).

Javascript adds functionality to HTML techniques e.g. validating the data submitted through HTML forms, animating HTML link menus, etc. <sup>5</sup>.

When indexing the webpages or websites, the search engine spider is only interested in reading text. It ignores images, flash and all other source code including Javascript, CSS, etc. Therefore it is recommended to externalise the CSS and Javascript code from the webpage text. It can be done by presenting this code in the respective extension files. As a result, informative content and HTML code will occupy the major part of the webpage (Hui et al., 2012). Further optimization of HTML code should be executed by specifying keywords in file names, image alt tags, anchor text of links, etc.

In addition to contextualising the HTML code, it is important to optimize the technical functionality of a website. It includes increasing the speed of the website loading time and assuring that the website is accessible on mobile devices and enhancing the rendering of the website on mobile devices. Additionally it is important to specify canonical tags to avoid duplicate content penalty by search engines.

## 2.7 Off-page SEO techniques

These are the techniques which are implemented externally on the web for promotion of the website. Such techniques are implemented external to the website or the webpage. One of the fundamental off-page element is link building. However, from the broader perspective of gaining clients, social media can be broadly grouped under this category as it involves promotion on the web. Both these techniques are explained briefly:

- (a) Link building: means obtaining links on third party websites for the specific website (Malaga, 2008). Only high quality related websites should be considered for procuring links. A link from Site ABC to Site DEF is treated as a vote to Site DEF from Site ABC, and search engines consider and evaluate these votes vigilantly. Natural high quality links play an important role to build higher rankings in search engines as observed by Kritzinger and Weideman (2013) and (Zhang and Cabage, 2013).

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<sup>5</sup>[https://www.w3.org/wiki/The\\_web\\_standards\\_model\\_-\\_HTML\\_CSS\\_and\\_JavaScript](https://www.w3.org/wiki/The_web_standards_model_-_HTML_CSS_and_JavaScript)

- (b) Social media optimization: In addition to search engines finding information through social networks is an upcoming trend. The number of likes and shares for a particular post or an article reveals its popularity. Such popularity plays an important role when searches are conducted through Facebook, Google Plus or other social media websites. In the recent years, Social Media Optimization has gained a huge momentum. Killoran (2013) states that it is because the SEO research community, professionals, and search engine companies (Google and Bing) have confirmed that social media popularity effects the ranking of the website in search engines. Malaga (2009), an SEO researcher got successful results for two case study websites just by promoting them on social media websites. In a survey conducted in 2011, the SEO practitioners' community confirmed that social media has a positive impact on the website rankings SEOMoz (2011). Currently, inclusion of SMO in an SEO campaign has become crucial as searchers use social media heavily and also rely on its information.

## **2.8 Critical evaluation of on-page and off-page SEO techniques**

Based on the analysis of SEO techniques as presented above, a critical evaluation of on-page and off-page techniques has been presented below in table 2.7 and table 2.8. The table 2.8 shows the functions or features covered by on-page and off-page categories and the table 2.7, presents the impact of the respective techniques in the SERPs.

The on-page techniques are implemented on the website as opposed to off-page techniques which are implemented on third party websites. The implementation of on-page techniques directly feeds information to search engines. Using this information the search engine identifies the relevant keywords, context and theme of website from the presented keywords, content and information architecture of the website. This information is the key using which search engines use to interpret context, assess relevance and award visibility to websites in the SERPs. Additionally, implementation of off-page techniques helps to build popularity and authority of websites on the Web. The established networks and neighbourhood of websites indicate their authority to search engines.

Clay (nd) compares the on-page and off-page categories of SEO to Maslow's hierarchy of self-actualisation. He states that the implementation of on-page techniques is a pre-requisite for effective implementation of off-page techniques. Other researchers are also in agreement with this viewpoint (Jain, 2013; Newstex, 2018).

From a holistic viewpoint, both the parameters of relevance and authority are critical. Researchers are in agreement that it is important to define the website relevance prior to building authority (Jain, 2013; Newstex, 2018).

Patel (nd) argues that the techniques of SEO are implemented in a hierarchical manner. As represented below in figure 2.9, the implementation of on-page techniques forms the basis for implementation of off-page SEO techniques in a well planned and effective SEO campaign (Matošević, 2015; Patel, nd).

Thus, the viewpoints of the above mentioned researchers support the cause of the current research to focus on on-page SEO techniques.

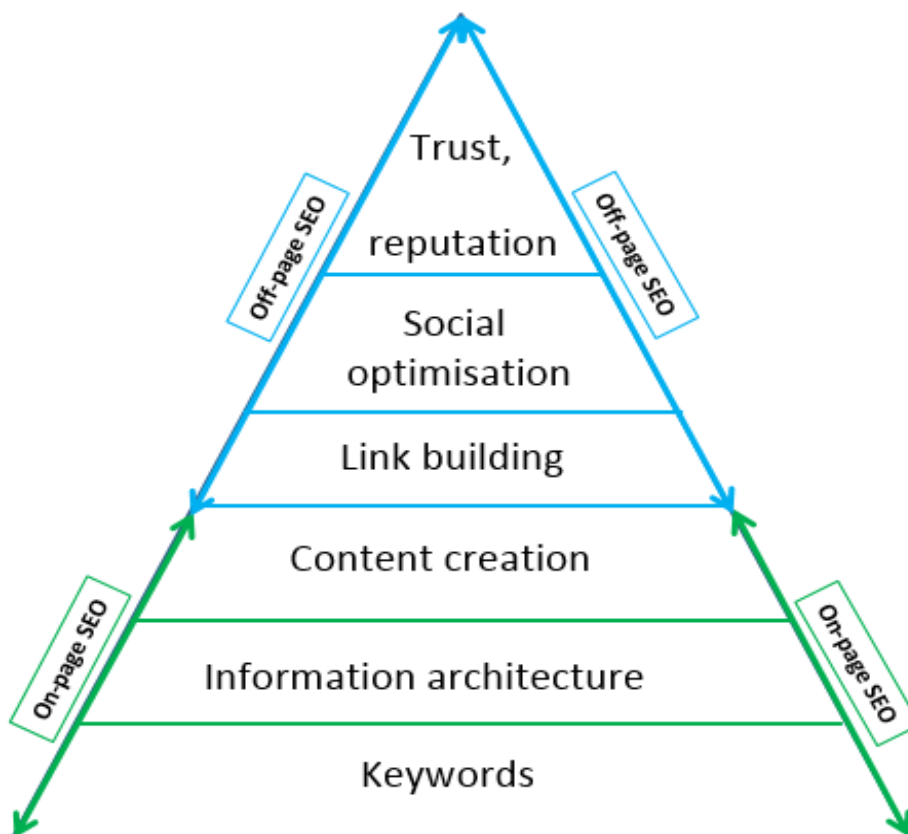


Figure 2.9 Hierarchy of SEO techniques (Clay, nd)

Table 2.7 Effect of SEO techniques in the SERPs

| SEO technique                   | On or Off page | Impact  | Effects visibility                | Provides info. | Interlinked techniques   | Knowledge existing? |
|---------------------------------|----------------|---|-----------------------------------|----------------|--|---------------------|
| <b>Keyword re-search</b>        | on-page        | search engines identify relevant keywords or key-phrases to match against respective search queries                   | yes                               | yes            | supports other techniques content creation, information architecture, HTML code, and link building & social media to some extent | no                  |
| <b>Content creation</b>         | on-page        | search engines identify relevant context and theme of the website to match against respective search queries          | yes                               | yes            | is supported by keyword research   | no                  |
| <b>Info. architecture</b>       | on-page        | search engines identify relevant concepts, sub-concepts that helps interpret the scope of the website within a domain | yes                               | yes            | is supported by keyword research   | no                  |
| <b>HTML code, technical SEO</b> | on-page        | if keywords are specified in file names, image alt tags, etc. then provides some context to search engine robots      | to some extent, if contextualised | to some extent | is supported by keyword research for contextualisation   | no                  |
| <b>Link building</b>            | off-page       | helps search engines indirectly identify some context from the theme of networked websites                            | to some extent                    | to some extent | optionally supported by keyword research   | no                  |
| <b>Social media</b>             | off-page       | helps search engines indirectly identify some context from the theme of content promoted on social media websites     | to some extent                    | to some extent | optionally supported by keyword research   | no                  |

Table 2.8 Functions accomplished by on-page and off-page SEO techniques

| <b>Enables search engines in identifying:</b>      | <b>On-page SEO</b> | <b>Off-page SEO</b> |
|--|--------------------|---------------------|
| <b>Website category from presented content</b>     | yes                | no                  |
| <b>Indexing for respective keywords</b>            | yes                | no                  |
| <b>Context of presented content</b>                | yes                | no                  |
| <b>Identification of potential target audience</b> | yes                | no                  |
| <b>Popularity on web</b>                           | no                 | yes                 |
| <b>Networking with related websites</b>            | no                 | yes                 |
| <b>Scope for increasing traffic</b>                | no                 | yes                 |

## 2.9 Mobile friendly and responsive websites

Web search through mobile devices has gained momentum in recent years and is currently overtaking use of the desktop and laptop (Church et al., 2008). The number of smartphone users is projected to increase to 2.5 billion by 2019 Sandvig (2018). Considering these figures it is important for websites to be optimized for mobile as well. Mobile devices have physical limitations in terms of small screens, which means websites display less amount of information on such devices Sandvig (2018). Google has specified SEO configurations for making mobile friendly websites which include responsive, dynamic serving and redirecting to separate URL.

Websites use responsive web design, serve all the devices with the same set of URLs or web addresses and content, with CSS used to change the rendering of the page (Godhwani, 2013; Sandvig, 2018). The websites can be optimized for mobiles by implementing one of the recommended specifications. Godhwani (2013) states that from the provided specifications by Google, responsive web design is its preferred choice.

Godhwani (2013) states that apart from the technical configuration, there is not a significant difference between the basic principles of mobile and desktop SEO. She recommends tracking keywords used to access mobile versions of the website in order to identify any existing patterns and optimize accordingly. This is one of the important developments in SEO in addition to all other developments.

## 2.10 SEO knowledge need

Gudivada et al. (2015) state that many organizations are ignorant about the working of SEO techniques. They emphasise that a deeper understanding of SEO practices, can enable such organizations to effectively monitor and implement the best practices of SEO in compliance with search engine guidelines such as Google (2013). Giomelakis and Veglis (2018) affirm the viewpoint of Gudivada et al. (2015) by stating that SEO knowledge is a useful tool for any website. Ghandour (2018) found that SMEs are in acute shortage of such knowledge and need to make their websites search engine friendly as part of their web marketing campaign.

Chen et al. (2011); Giomelakis and Veglis (2015) observe SEO to be a knowledge intensive activity designed for enhancing the visibility of websites in search engines. They insist that SEO will always be important in the Web marketing strategy as long as there are search engines. Given the fact that, search engines continue to drive traffic to websites, the basic SEO knowledge would be useful for websites whose target audience appear online (Giomelakis and Veglis, 2015). (Minasyan, 2014) states that effective SEO implementation requires SEO knowledge as a pre-requisite. Such knowledge enables a balanced implementation of the right SEO techniques along with their expected outcomes over short term or long term (Minasyan, 2014). Until now, the SEO techniques have been developed from the experience gained by SEO professionals who have tried and tested the search engine optimization strategies and achieved positive or negative results, and patents of the search engine companies Muriente (2008). Additionally, search engines also provide SEO guidelines but as a matter of fact the guidelines provided by search engine companies are helpful but generic in nature (Google, 2013) Dimenstein (2016). In the guidelines provided by Google (2013) the emphasis is laid on 'what not to do', whilst providing minimal guidance on 'what to do'. Bing has also provided some guidelines for webmasters outlining favourable practices over unfavourable practices to be incorporated in their respective websites from an SEO perspective (Bing, 2013). From a closer look at the guidelines provided by Google and Bing, it may be argued that the guidelines provided by Bing (2013), are more comprehensive in nature as compared to guidelines of Google (2013). However, both these sets of guidelines are provided on a highly explicit level and are not fully sufficient for giving a real insight into the working and implementation of the SEO techniques. The biggest limitation of this information is that it is explicit knowledge and does not

provide the implicit know-how which is gained from undertaking experiments and obtaining positive or negative results for websites from the working of search engine algorithms. The limitation of explicit knowledge is that it provides surface information only as opposed to implicit knowledge that provides the detailed information with insights of what works and what does not work in its application.

### **2.10.1 Explicit, implicit and experience knowledge**

Johnson et al. (2002); Nonaka (1991); Semertzaki (2017) state explicit knowledge is formal and systematic knowledge which provides 'know-what' or 'know-why' information, whereas implicit knowledge is the procedural knowledge that provides the 'know-how' information. Cong and Pandya (2003) argue that tacit knowledge is more valuable as it provides the contextual information gained from experiences, ideas, people and places. Ellis (1996) refers to implicit knowledge as primary and explicit knowledge as secondary. Haddad and Bozdogan (2009); Semertzaki (2017) and Johnson et al. (2002) state explicit knowledge is generic knowledge communicated via formal language.

Chen and Xin (2008) refer to experience knowledge as implicit knowledge that exists in the brain of the specialist or expert. According to Nonaka et al. (2000), the assets of experiential knowledge consists of tacit knowledge which is built through hands-on experience. The skills and know-how acquired through experiences at work are examples of experiential knowledge assets. Woo et al. (2004) highlight the need for disseminating the experience-based and tacit knowledge from the experts' brain to facilitate its reuse especially in the Architecture, Engineering and Construction (AEC) industry, where much knowledge is experience-based. Such knowledge would be highly valuable for other professionals in the AEC industry to solve knowledge intensive problems.

This situation is true in the SEO industry as well. As search engines are secretive about the working of their ranking algorithms and much of such knowledge rests in the brains of experienced SEO professionals in the implicit form gained from experience of implementing different strategies to know which techniques work and which do not work (Muriente, 2008). Hence, this implicit knowledge needs to be transferred to the non-specialist in the most appropriate format Huysman et al. (2002); Westner and Strahringer (2010); Woo et al. (2004) and (Westner, 2009). Westner and Strahringer (2010) define knowledge transfer as a process



of transferring knowledge (experience, contextual information, values and expert insight) between individuals and organisations that allows the recipient to absorb the transferred information and apply it in executing the work.

Chen and Xin (2008) state that knowledge transfer is an information diffusing process involving transmission of information from 'knowledge sending' to 'knowledge receiving' units within some special context. With reference to the current research, it aims to transfer the SEO experience-knowledge to individuals and organisations wanting to learn about the implementation procedure of essential on-page SEO techniques.

Johnson et al. (2002) argue that it is important to transform individual or organizational competencies into a codified format for transforming the implicit into explicit knowledge. They admit that some loss of information and knowledge occurs in the transformation process but it is still possible to codify and transmit the important aspects. But at the same time, they point out the possibility of fully capturing, codifying and transmitting the implicit knowledge of *implementation of procedures*. It is because the *procedures* are undertaken according to the specified steps and the outcomes are subjective to the execution of the steps instead of the specific personalities or the environment. This finding is supportive for the current research as it aims to capture and codify the implementation procedures of the essential SEO techniques. The attempt is to represent implicit knowledge of procedures of implementation of SEO techniques codified as process models. It is a knowledge management attempt in the SEO domain.

Knowledge management is defined as a process involving creation, storage, retrieval, transfer and application of knowledge Nguyen (2013). For managing knowledge, different researchers from different disciplines have researched in the area of knowledge representation and developed various protocols for the same.

### **Model for tacit knowledge transfer**

Chen and Xin (2008) have developed an ontology based model to transfer tacit knowledge to enable its reuse and sharing as shown in figure 2.10.

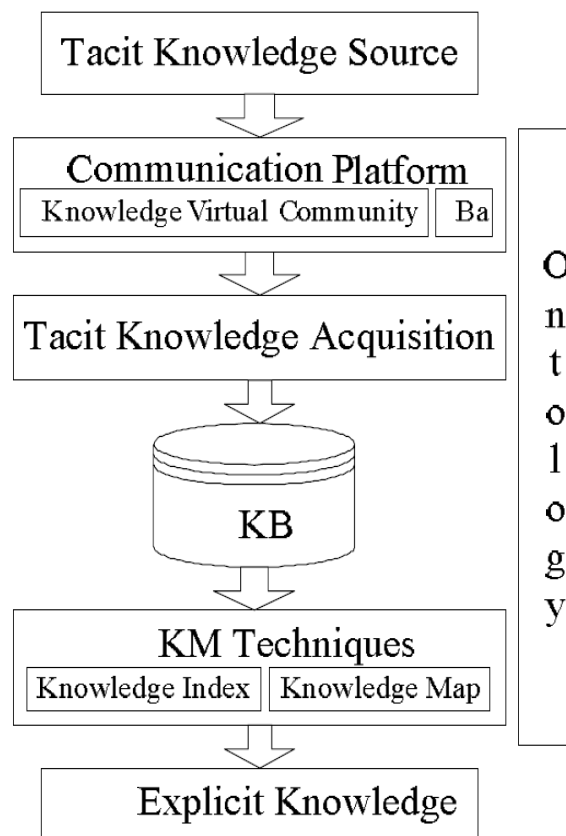


Figure 2.10 Ontology for tacit knowledge transfer (Chen and Xin, 2008)

Their model consists of a knowledge acquisition module, a knowledge delivery module and an inference module. In their knowledge acquisition module, the tacit knowledge is extracted from the source and information is classified into classes based on the domain area and stored in the *experience base*. Their knowledge delivery module provides information to users through a query interface. Their inference module is composed of domain ontologies, scheduling ontologies and management ontologies. It administers and manages the working of the whole system on the basis of ontological specification. It mainly consists of two phases i.e. knowledge-searching and knowledge-presentation.

### 2.10.2 Ontology of SEO knowledge domain: SEO application 1

Interestingly, Nigro et al. (2012) have developed a knowledge based system based on the ontology of SEO knowledge domain. Its components consist of facts base, inductive knowledge base and domain knowledge base. It is based on the ontology

of ranking factors in the SEO domain and is composed of the inference engine, knowledge acquisition module, core module and user interface.

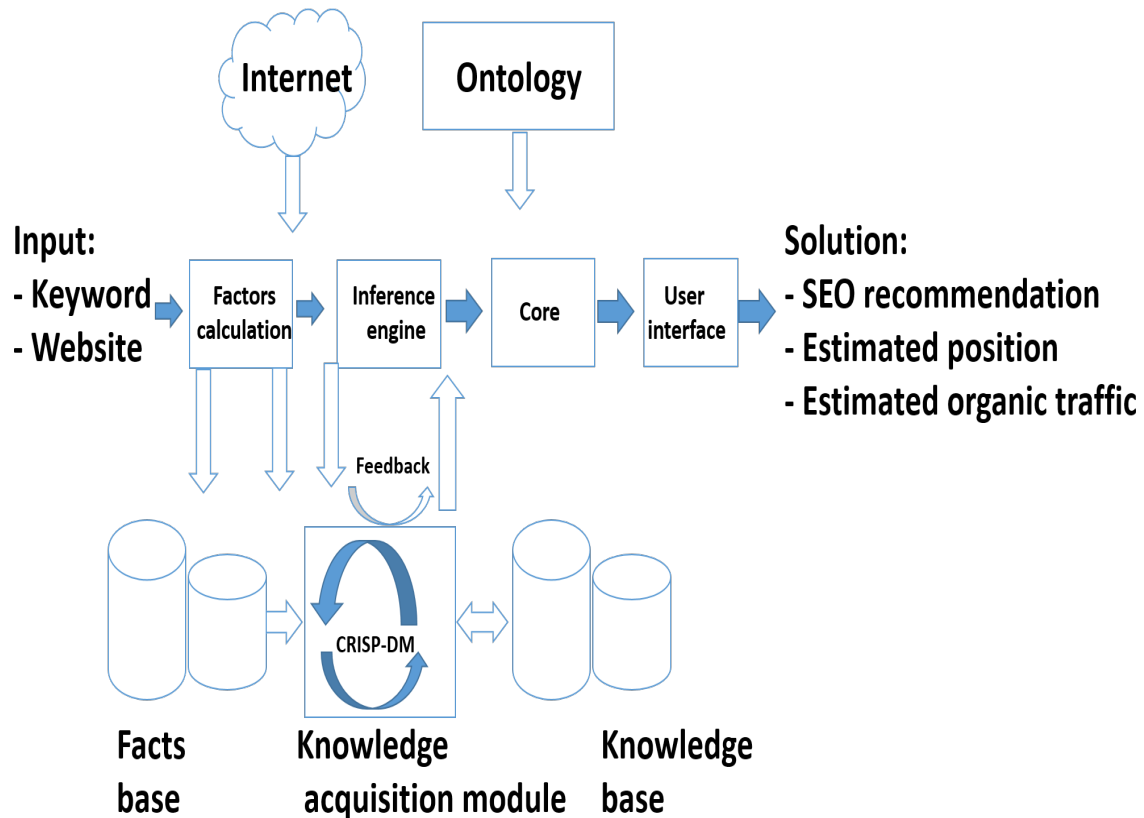


Figure 2.11 SEO knowledge based system (Nigro et al., 2012)

An overview of the system has been shown in figure 2.11. The architecture of the system is almost identical to the one prescribed by Chen and Xin (2008) as shown in figure 2.10. It uses heterogeneous inductive learning techniques to extract the values of factors existing in websites based on which the visibility or ranking had been awarded to the websites in SERPs.

It uses these values as a criteria to calculate the effort required for attaining the top ten ranking. It provides a list of recommendations to be implemented in order to attain a top ten ranking for a website and determines the difficulty in attaining a higher rank. It also infers the prospective ranking position for the website in the post-implementation phase of recommendations. Additionally it determines the potential organic or unpaid traffic to be generated from the attained ranking positions.

Their results show that system's recommendations had been useful for 74% of total experimented websites.

In its current state, the biggest limitation of this system is that the knowledge construction in the knowledge base and functionality of this system is fully automated. Whereby SEO experts' intervention is necessary to define rules for effective functioning of the system. This limitation has also been acknowledged by Nigro et al. (2012). Based on its automatic rule generation, the system makes unrealistic recommendations, which harms its effectiveness. Moreover, it provides the information on a very high-level, based on the numerical or quantitative calculations only generated from its automated data collection from top ranking sites on search engine results pages. Nigro et al. (2012) acknowledge that it is not possible to extract the knowledge of SEO domain experts automatically therefore it needs to be represented to enable the system to function effectively. This highlights the need and importance of *representation of implicit or experience knowledge*, especially in the knowledge domain of SEO.

### **2.10.3 Decision support system for implementing SEO: SEO application 2**

Sagot et al. (2016) have created a decision support system for implementing SEO inhouse or within an organisation which allows managers (client) as well as webmasters (SEO practitioners) to have a better oversight and control over the process.

The motive of their system is to improve the decision making process of the SEO practitioner in the execution of SEO projects, whereby s/he can rely on the information provided by the system as shown in figure 2.12. An example of the suggestions provided by the system include: - KWrText: "increase the number of keyword repetition in full text from 2 to 8 repetitions" - KWrTitle: "decrease the number of keyword repetition in Title tag from 4 to 1 repetition" - KWrH1: "increase the number of keyword repetition in H1 tag from 1 repetition to 2 repetitions"

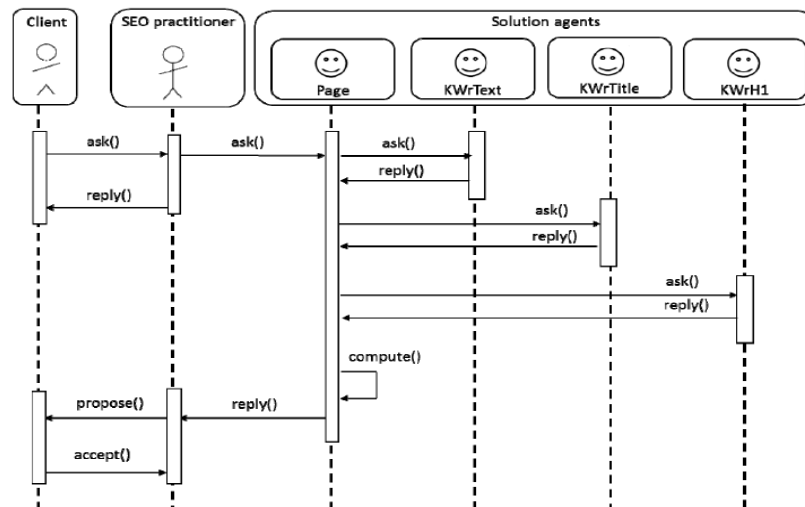


Figure 2.12 Exchange of messages between SEO practitioner and client (Sagot et al., 2016)

The major limitation of this research is that amongst all the important factors it has emphasised the implementation of keywords only, ignoring other important factors like content creation, information architecture and HTML code optimization. They modelled the execution of SEO process primarily through two agents namely the manager (client) and webmaster (SEO practitioners) with sole focus on implementation of just one SEO technique i.e. keywords. They have overlooked and not accounted for the background research required in order to shortlist the keywords, which they have assumed to be accomplished by itself or which they do not consider as necessary. Moreover, the suggestions provided by the system is based on number of repetitions of the keywords mentioned in the webpage content, title and header tag, which would increase the frequency of keywords without increasing the relevancy of content. Such content would not be rated highly by the search engine algorithms. However, their future work identifies their intention to diversify the covered techniques.

#### 2.10.4 Knowledge transfer model using IT

Sentanaa and Yuniastarib (2015) evaluated and re-specified a knowledge transfer model which highlights an important role of Information Technology (IT) in the process. The model consists of three constructs namely IT infrastructure, Knowledge transfer, and Business success. Their IT infrastructure construct has sub-constructs

of Hardware, Software and Network. Their knowledge transfer construct is composed of the sub-constructs of *knowledge base*, process, tools, people, strategy and method.

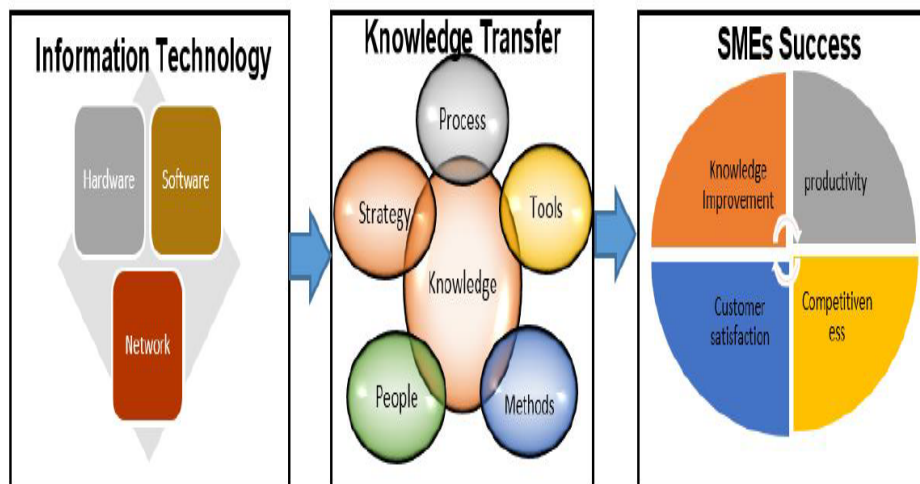


Figure 2.13 Knowledge transfer model utilising IT (after re-specification), (Sentanaa and Yuniastarib, 2015)

SMEs' success consists of the sub-constructs of individual and organization knowledge improvement, productivity improvement, competitiveness improvement, and customer satisfaction. Their model has been shown in figure 2.13. They administered the application of this model on 208 SMEs in Bali and in their results they found that IT has a significant influence on knowledge transfer, which significantly influences SME success.

From a holistic view, it can be argued that the work of Nigro et al. (2012); Sagot et al. (2016) and the current research falls in the *knowledge transfer construct* of the model specified by (Sentanaa and Yuniastarib, 2015).

Although there exist different approaches for knowledge transfer, there is one commonality in the knowledge based systems i.e. **knowledge base**. All of these approaches store the represented knowledge in a repository termed as knowledge base in knowledge based systems, which are termed as experience base in experience based systems and case base in Case Based Reasoning (CBR) systems (Bergmann, 2002).

Although there have been successful implementations of knowledge base creation using artificial intelligence techniques, (see Koga et al., 2015; Vapnik and Izmailov,

2015), Nigro et al. (2012) argue that for effective functioning of an SEO system, the knowledge base must contain representation of domain-experts' knowledge in the SEO domain. Since SEO is a knowledge intensive domain and the knowledge of SEO experts cannot be extracted automatically thus it relies on manual input of the SEO experts' knowledge in the knowledge base. Such manual input would assure the effectiveness of the represented knowledge. It is important to note that the knowledge has to be represented in a format that is easily interpretable and legible to its users.

Boland Jr et al. (2001) appreciate the importance of schemata in human cognition. They propose that **knowledge** can be represented in different forms, and the form of **representation** directly influences its processing and subsequent utilisation. Observing this fact, the current research must adopt a suitable schema for representing knowledge that facilitates easy comprehension. *the current research is focussed on sharing experience knowledge in SEO and the current body of knowledge does not cover the knowledge management methodologies in the field of SEO.* Albeit, there has been limited research to manage knowledge in the field of SEO.

Based on the review of current SEO literature, only two papers were found relevant to knowledge management in SEO, which are discussed above and highlighted in figures 2.11 and 2.12. These include (Nigro et al., 2012) and (Sagot et al., 2016). As reviewed above, the scope of these papers is quite limited and have limitations in their findings. Moreover, they do not provide guidelines for implementing essential techniques in SEO. Therefore as presented below, it is worth investigating paradigms of experience based problem solving, knowledge representation and identifying any methodologies created with the aim of sharing experience knowledge.

### **2.10.5 CBR, CBP and INRECA-II methodology**

CBR is a problem solving paradigm based on experience. Case Based Planning (CBP) and INduction and REasoning from CAseS (INRECA-II) methodology, (Bergmann, 2001) are forms of CBR. The aim of CBR, CBP and INRECA-II methodology is problem solving based on experience. They focus on sharing experience as stored in an experience base. It is worth investigating each of these, critically evaluating their different formats of *representation of knowledge* and finding the representation format suitable for representing knowledge created in current research.

Feldmann et al. (1998) states that the knowledge base of a knowledge based system should ideally meet the following requirements:

1. it should consist of the necessary knowledge in terms of completeness
2. the knowledge should be according to the real world 'in terms of correctness'
3. the knowledge should not be self-contradictory in terms of consistency

The criteria specified by Feldmann et al. (1998) is important. The current research aims to create a knowledge base as the output. It must adhere to this criteria to assure the effectiveness of the created knowledge base.

### **Introducing CBR**

Case Based Reasoning (CBR) is a problem-solving paradigm that operates on the principle of 'similar problems have similar solutions' (Lenz et al., 2003). The experience gained by solving previous problems helps in solving new problems. The acquired experience is critical. This experience is a special knowledge, which can be reused to solve similar problems (Bergmann, 2002; Khobreh, 2014; Roth-Berghofer, 2003). This knowledge can be factual knowledge or some specific knowledge gained by a problem-solving agent during the complex problem solving activity (Bergmann, 2002). This specific knowledge can be termed as valuable-experience that is institutionalised within the agent, the use of which is restricted to him/her only. In the course of solving different problems, different value experiences are gained by problem solving agents. It becomes important to extract such experiences for reuse by other problem solvers.

CBR facilitates reuse and management of experience. Experience is central to CBR Bergmann (2002). CBR deals with experience as a valuable entity and preserves or records it in the form of cases to facilitate its reuse for solving similar problems in the future (Sun and Finnie, 2005). A case is represented as an ordered pair of a problem and a solution. In CBR, experience is called a case and experience base is termed as case base Bergmann (2002).

### **Introducing CBP**

CBR has been applied to solve planning problems giving rise to a promising approach of Case Based Planning (CBP) (Spalzzi, 2001). Planning refers to specifying a set



of actions to achieve a specified set of goals from a given starting point (Bergmann et al., 1998b). Tu et al. (1989) states that generally planners have four components namely, a description of the state of the world, a specific goal to achieve, a set of specific actions to achieve the stated goal and knowledge about the domain or the planning strategies. CBP is planning as remembering Hammond (1990). It is based on the reuse of past experience i.e. reuse of plans which have succeeded and recovery from plans which have failed (Spalzzi, 2001). This paradigm retains plans as concrete experiences.

In planning application domains, the problem solving or planning processes follow a structure of implementation which may be formalised e.g. transportation logistics, manufacturing process planning, software engineering, etc. Such processes or plans can be represented in terms of pre-conditions, actions and effects allowing its reusability in similar or identical contexts of problem solving scenarios (Spalzzi, 2001). Researchers believe that reusing old experience avoids repetition of effort thereby improving efficiency (Goel et al., 1995; Hanks and Weld, 1994; Ihrig and Kambhampati, 1996; Kambhampati and Hendler, 1992; Veloso et al., 1995).

A case based planner adopts the CBR problem solving cycle (Aamodt and Plaza, 1994). The design and functional components of a case based planner can be grouped in the following categories:

- Plan memory representation: involves a decision on what to store and how to organise the information details so as to reuse old plans effectively and efficiently. It is recommended to use a format that has psychological plausibility (Spalzzi, 2001).
- Plan Retrieval: It involves retrieving the similar plans for solving the current problem
- Plan Reuse: It involves reusing the proposed plan to solve the current problem.
- Plan Revision: It involves applying the proposed plan-solution and repairing or revising it, in case of failure.
- Plan Retention: It involves retaining or storing the new plan for using it for future planning.

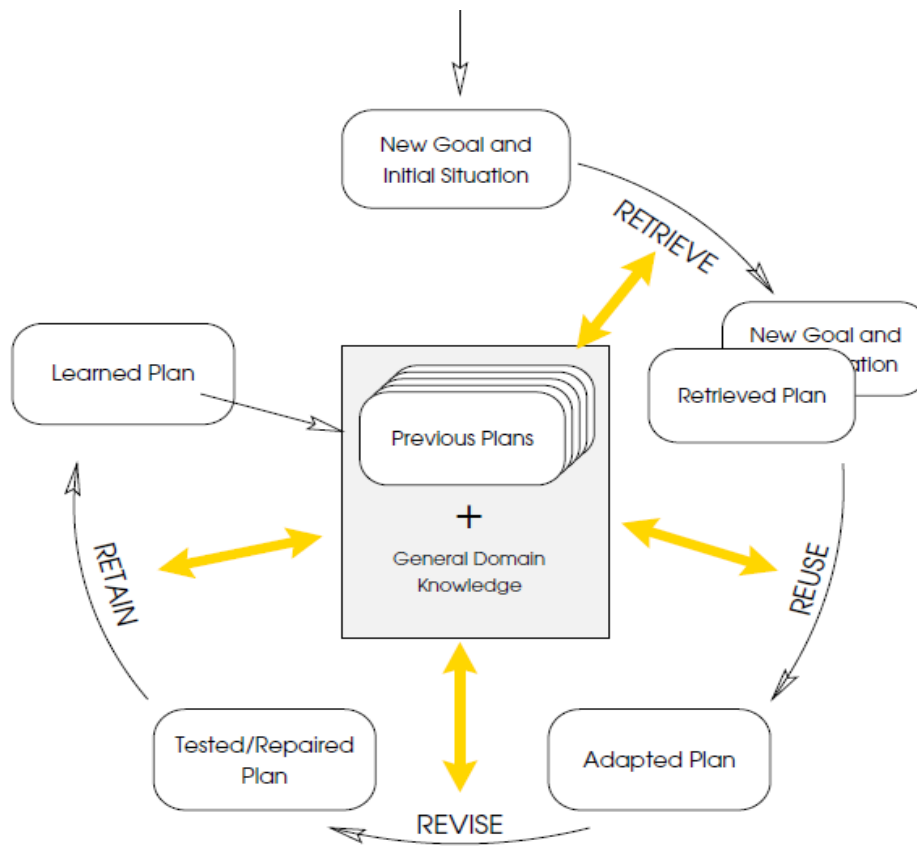


Figure 2.14 The case-based planning cycle (Spalzzi, 2001)

Plan retrieval, reuse, revise and retain are fundamental tasks of CBR, which have been adopted by CBP. Their interactions are highlighted in context of planning in figure 2.14.

CBP represents knowledge in terms of steps to be executed to accomplish a specified goal. As this research aims to represent steps for implementing the SEO techniques, so there is a similarity in terms of specification of steps for achieving the specified goals. Hence it is worth investigating if the knowledge representation formats offered by CBP is suitable for representing the SEO knowledge created at various levels of abstraction by this research. The knowledge representation formats in CBP are discussed below.

According to Spalzzi (2001), the various formats of *knowledge or plan memory* representation approaches can be grouped as follows:

- Pure featural
- Relational representation

- Transformational or derivational representation
- Indexed or flat representation
- Logic based representation

**Pure featural representation:** A case consists of attribute value pairs representing problem-solution information relevant to the problem description (Jurisica, 1993).

Generally, a planning problem is represented via the case features that describe goals (G), initial situations (I), and possible failures (F). Plans are usually the solutions. An example plan of logistic transportation is highlighted in figure 2.15.

|          |  |
|----------|--|
| Goal:    | (AT-OB OB1 $l_d$ )   |
| Initial: | ((IS-A AIRPORT $l_d$ ) (IS-A AIRPORT $l_i$ ) (IS-A AIRPORT $l_p$ )<br>(AT-PL PL1 $l_p$ ) (AT-OB OB1 $l_i$ ))     |
| Failure: | (OR (FOG-AT $l_d$ ) (FOG-AT $l_i$ ) (FOG-AT $l_p$ ))   |
| Plan:    | (FLY-PL PL1 $l_p$ $l_i$ )<br>(LOAD-PL OB1 PL1 $l_i$ )<br>(FLY-PL PL1 $l_i$ $l_d$ )<br>(UNLOAD-PL OB1 PL1 $l_d$ ) |

Figure 2.15 A pure featural case (Ihrig and Kambhampati, 1997; Spalzzi, 2001)

As represented in figure 2.15, the goal of this plan is to have package *ob1* located at the destination location  $l_d$ . The package is initially at location  $l_i$ , which needs to be transported to destination location  $l_d$ . The plan failure caused by fog is also considered. The plan specifies the steps needed to be executed for accomplishing the plan successfully (Ihrig and Kambhampati, 1997).

**Relational representation** is another form of representation (Branting, 1992; Jurisica, 1993; Spalzzi, 2001). Spalzzi (2001) prefers the relational representation over pure featural representation. In a relational representation, the relations between features of the case are highlighted. Relations could be abstraction (i.e. is a) or partonomic relations (i.e. part of). This representation allows plans and planning problems to be organised in an abstraction and partonomic hierarchy. An example of such a case is represented in figure 2.16.

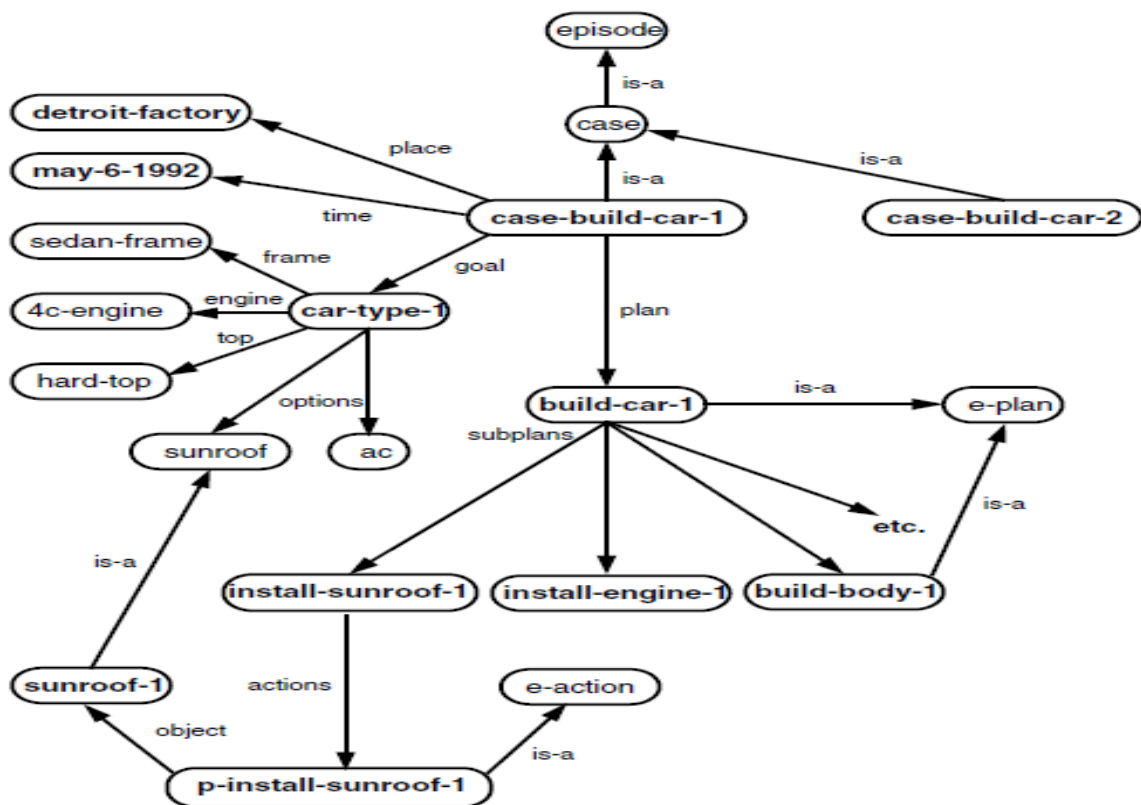


Figure 2.16 Memory organisation in CAPER (Kettler et al., 1994; Spalzzi, 2001)

Figure 2.16 shows an example plan as a semantic network, representing relationship between concepts and episodes. Build-car-1 is the root plan used in case-build-car-1, consisting of sub-plans i.e. build-body-1, install-engine-1, and install-sunroof-1 (Kettler et al., 1994). Spalzzi (2001) prefer the relational representation over pure featural representation.

**Transformational or derivational representation:** In this case, the plan represents all the planning decisions in terms of sub-goals, alternatives, failed search path along

with their justifications (Spalzzi, 2001). An example of a derivation trace is highlighted in figure 2.17.

| Goal : (AT-OB OB1 $l_d$ )  |  |
|--|--|
| Initial : ((IS-A AIRPORT $l_d$ ) (IS-A AIRPORT $l_i$ ))<br>(IS-A AIRPORT $l_p$ ) (AT-PL PL1 $l_p$ )<br>(AT-OB OB1 $l_i$ ) ...  |  |
| Name : G1<br>Type : START-NODE   | Name : G7<br>Type : ESTABLISHMENT<br>Kind : NEW LINK<br>New Link: (0 (IS-A AIRPORT $l_d$ ) 2)<br>Open Cond: ((IS-A AIRPORT $l_d$ ) 2)                                |
| Name : G2<br>Type : ESTABLISHMENT<br>Kind : NEW STEP<br>New Step: (UNLOAD-PL OB1 ?P1 $l_d$ )<br>New Link: (1 (AT-OB OB1 $l_d$ ) GOAL)<br>Open Cond: ((AT-OB OB1 $l_d$ ) GOAL)  | Name : G8<br>Type : ESTABLISHMENT<br>Kind : NEW STEP<br>New Step: (LOAD-PL OB1 PL1 ?A4)<br>New Link: (4 (INSIDE-PL OB1 PL1) 1)<br>Open Cond: ((INSIDE-PL OB1 PL1) 1) |
| Name : G3<br>Type : ESTABLISHMENT<br>Kind : NEW STEP<br>New Step: (FLY-PL ?P1 ?A2 $l_d$ )<br>New Link: (2 (AT-PL ?P1 $l_d$ ) 1)<br>Open Cond: ((AT-PL ?P1 $l_d$ ) 1)   | Name : G9<br>Type : ESTABLISHMENT<br>Kind : NEW LINK<br>New Link: (3 (AT-PL PL1 $l_i$ ) 4)<br>Open Cond: ((AT-PL PL1 ?A4) 4)   |
| Name : G4<br>Type : ESTABLISHMENT<br>Kind : NEW STEP<br>New Step: (FLY-PL ?P1 ?A3 ?A2)<br>New Link: (3 (AT-PL ?P1 ?A2) 2)<br>Open Cond: ((AT-PL ?P1 ?A2) 2)  | Name : G10<br>Type : RESOLUTION<br>Kind : PROMOTION<br>Unsafe-link : ((3 (AT-PL PL1 $l_i$ ) 4)<br>Effect : 2 $\neg$ ((AT-PL PL1 $l_i$ ))                             |
| Name : G5<br>Type : ESTABLISHMENT<br>Kind : NEW LINK<br>New Link: (0 (AT-PL PL1 $l_p$ ) 3)<br>Open Cond: ((AT-PL ?P1 ?A3) 3)   | Name : G11<br>Type : ESTABLISHMENT<br>Kind : NEW LINK<br>New Link: (0 (AT-OB OB1 $l_i$ ) 4)<br>Open Cond: ((AT-OB OB1 $l_i$ ) 4)                                     |
| Name : G6<br>Type : ESTABLISHMENT<br>Kind : NEW LINK<br>New Link: (0 (IS-A AIRPORT $l_i$ ) 3)<br>Open Cond: ((IS-A AIRPORT ?A2) 3)   | Key to Abbreviations:<br>PL = PLANE<br>OB = OBJECT   |
| Final Plan: (FLY-PL PL1 $l_p$ $l_i$ ) Created 3<br>(LOAD-PL OB1 PL1 $l_i$ ) Created 4<br>(FLY-PL PL1 $l_i$ $l_d$ ) Created 2<br>(UNLOAD-PL OB1 PL1 $l_d$ ) Created 1<br>Ordering of Steps: ((4 i 2) (3 i 4) (4 i 1) (3 i 2) (2 i 1)) |  |

Figure 2.17 Derivational traces in DERSNLP (Ihrig and Kambhampati, 1997)

In the case of a derivational representation, each planning decision represents as to how to resolve an unachieved goal by means of a partial plan or resolution, which is highlighted in figure 2.18.

|   |   |   |   |
|---|---|---|---|
| Type : ESTABLISHMENT<br>Kind : NEW STEP<br>Preconditions :<br>$\langle p', s' \rangle \in \mathcal{C}$<br>Effects :<br>$\mathcal{S}' = \mathcal{S} \cup \{s\}$<br>$\mathcal{O}' = \mathcal{O} \cup \{s \prec s'\}$<br>$\mathcal{B}' = \mathcal{B} \cup \text{unify}(p, p')$<br>$\mathcal{L}' = \mathcal{L} \cup \{(s, p, s')\}$<br>$\mathcal{E}' = \mathcal{E} \cup \text{effects}(s)$<br>$\mathcal{C}' = \mathcal{C} - \{\langle p', s' \rangle\}$<br>$\cup \text{preconditions}(s)$ | Type : ESTABLISHMENT<br>Kind : NEW LINK<br>Preconditions :<br>$\langle p', s' \rangle \in \mathcal{C}$<br>Effects :<br>$\mathcal{O}' = \mathcal{O} \cup \{s \prec s'\}$<br>$\mathcal{B}' = \mathcal{B} \cup \text{unify}(p, p')$<br>$\mathcal{L}' = \mathcal{L} \cup \{(s, p, s')\}$<br>$\mathcal{C}' = \mathcal{C} - \{\langle p', s' \rangle\}$ | Type : RESOLUTION<br>Kind : PROMOTION<br>Preconditions :<br>$\langle s, p', s' \rangle \in \mathcal{L}$<br>$\langle t, \neg p' \rangle \in \mathcal{E}$<br>$\{t \prec s\}, \{s' \prec t\} \notin \mathcal{O}$<br>Effects :<br>$\mathcal{O}' = \mathcal{O} \cup \{t \prec s\}$ | Type : RESOLUTION<br>Kind : DEMOTION<br>Preconditions :<br>$\langle s, p', s' \rangle \in \mathcal{L}$<br>$\langle t, \neg p' \rangle \in \mathcal{E}$<br>$\{t \prec s\}, \{s' \prec t\} \notin \mathcal{O}$<br>Effects :<br>$\mathcal{O}' = \mathcal{O} \cup \{s' \prec t\}$ |
|---|---|---|---|

Figure 2.18 Planning decisions in DERSNLP (Ihrig and Kambhampati, 1997)

In the figure 2.18 S, O, B, L indicate

- S is the set of plan actions.
- O is an ordering relation on S
- B is a set of binding on variables occurring in the plan
- L is a set of causal links
- C the set of unachieved goals
- p, s are unsatisfied pre-conditions

**Indexed or flat representation:** Indexed or flat representation is relevant for case-based planning systems using an indexing scheme where plans are organized and represented in a specialization hierarchy.

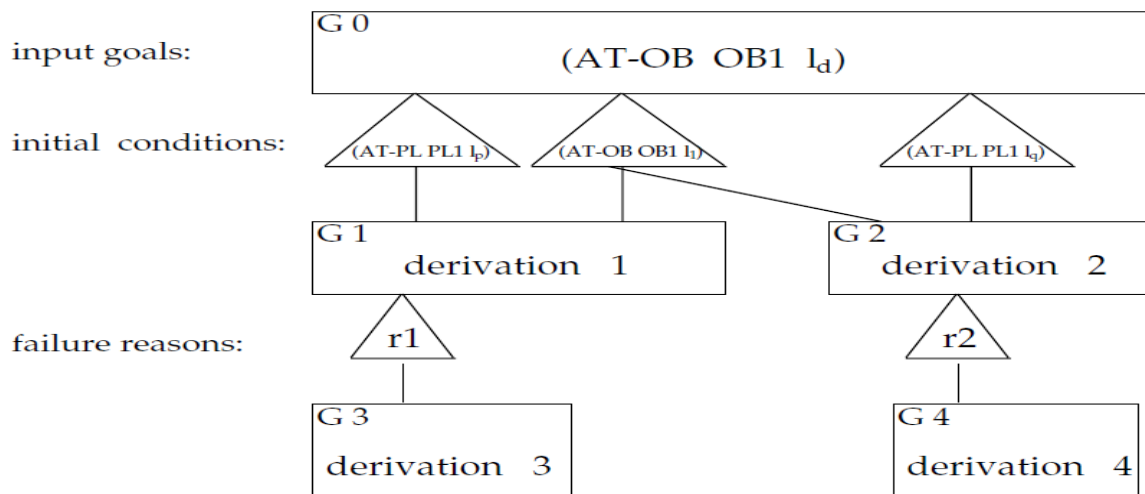


Figure 2.19 Indices in DERSNLP (Ihrig and Kambhampati, 1997)

The plans are indexed according to their input goals, initial conditions, and failure reasons. An example of such a representation is shown in figure 2.19. They are domain and task specific with less flexibility and have a questionable psychological plausibility (Spalzzi, 2001).

**Logic based representation:** employs description logics (DLs) for representing knowledge. DLs consist of two kinds of formalisations i.e. terminological formalism (T-box) and assertional formalism (A-box) (Coupey et al., 1998).

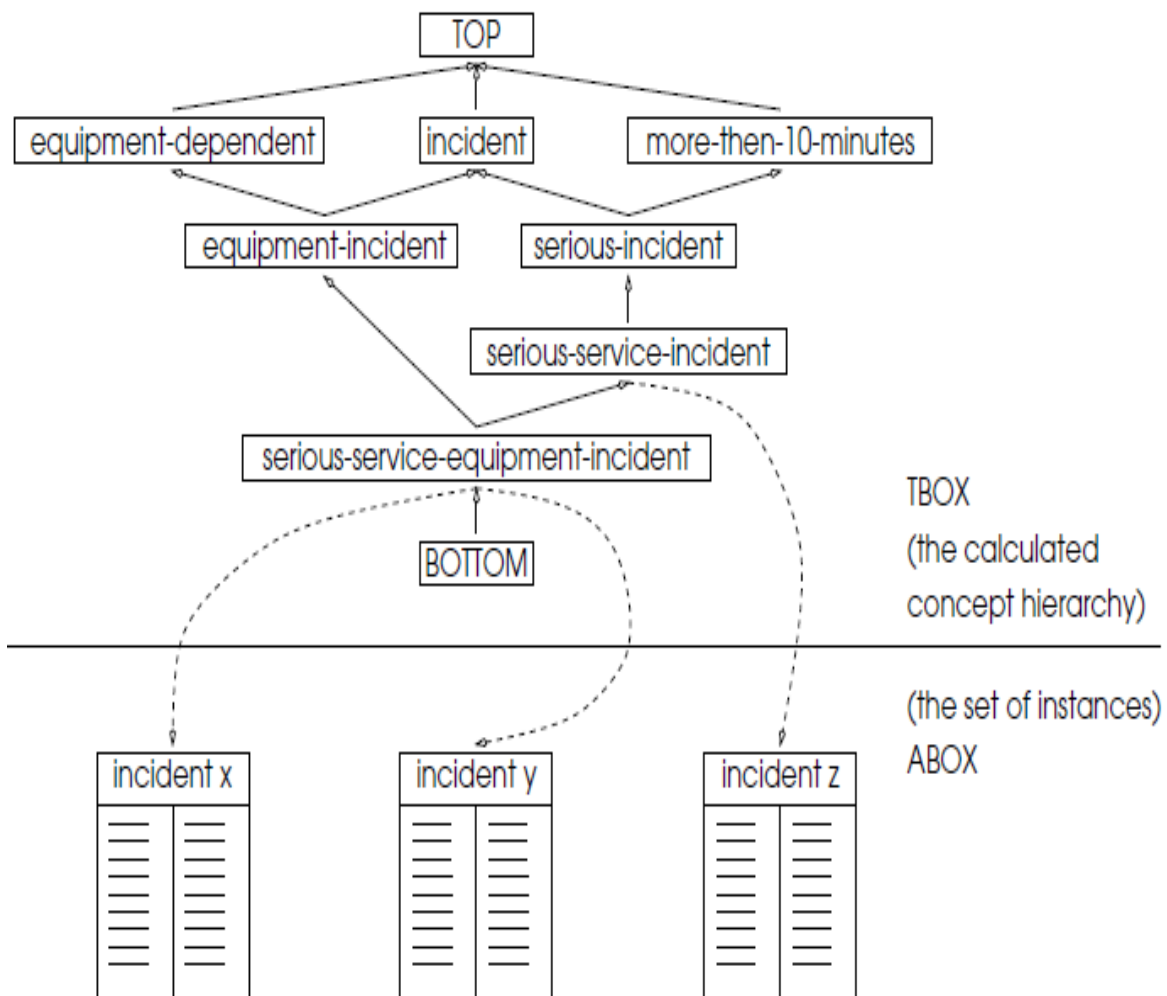


Figure 2.20 A terminological logic to represent a case memory (Coupey et al., 1998)

The terminological formalism or (T-box) describes conceptual knowledge (concepts and their analytic interrelations) e.g.  $A = C$  (A equals C) and assertional formalism or (A-box) describes description of facts representing an individual object as an instance of a concept e.g.  $C(x)$  (x is an instance of C). An example of such a representation is shown in figure 2.20.

An overview of different CBP representation formats identified above has been summarised in the table 2.9.



Table 2.9 Analysis of different representation formats, Spalzzi (2001), with an SEO perspective

| <b>Representation type</b>                      | <b>Representation format</b>   | <b>Case base planner</b>              | <b>Application domain</b>       | <b>Suitability for SEO</b>   |
|---|--|---------------------------------------|---------------------------------|--|
| Pure featural representation                    | attribute-value pairs  | (Ihrig and Kambhampati, 1997)         | Logistics Transportation Domain | Partially suitable for presenting high level information but not for presenting implementation procedures of SEO techniques  |
| Relational representation                       | abstraction / specialization relations (e.g. is-a) and partonomic relations (e.g. part-of) | CAPER (Kettler et al., 1994)          | Logistics                       | Partially suitable for representing the atomic output values resulting from the execution of SEO techniques but not for presenting implementation procedures of SEO techniques |
| Transformational or derivational representation |  | DERSNLP (Ihrig and Kambhampati, 1997) | Logistics                       | Not suitable for presenting a definite path of implementation of SEO techniques  |
| Indexed or flat representation                  | initial goal, initial situations and failure reasons                                       | DERSNLP (Ihrig and Kambhampati, 1997) | Logistics                       | Minimal suitability in terms of similarity of just one parameter of initial goal with SEO techniques but there are no parallels for initial situations and failure reasons     |
| Logic based representation                      | TBOX (the calculated concept hierarchy) and ABOX (the set of instances)                    | Coupey et al. (Coupey et al., 1998)   | Diagnosis / Therapy             | Not suitable for presenting sequential procedures or processes   |

### 2.10.6 Abstracting the represented knowledge and INRECA-II methodology

It is important to investigate the concept of abstraction in knowledge representation as the current research aims to represent knowledge on different levels of abstraction i.e. generic level, conceptual level and project level. Bergmann and Wilke (1995) emphasise the role of abstraction in representation of knowledge in the cases. They introduce the idea of adding abstraction to the concrete knowledge presented in the cases by reducing the level of detail in the presented information. The basic intention for incorporating abstraction is to start resolving problems at a higher level with less effort followed by the granular details of the problem. It bears resemblance to the way humans resolve problems by taking a holistic view of the problem initially and gradually decomposing it.

Abstraction is introduced in CBP by dropping sentences through the application of operators (Knoblock, 1990, 1994; Sacerdoti, 1977, 1974; Tenenber, 1988; Unruh and Rosenbloom, 1989; Yang and Tenenber, 1990). The representation of an example operator is shown in figure 2.21.

Operator: inc  
Precondition: value(X)  
Delete: value(X)  
Add: value(X + 1)

Figure 2.21 Example of increment operator (Bergmann and Wilke, 1995)

Using problem solvers, an abstract solution is found by applying depth-first or breadth-first (Yang and Tenenber, 1990). These problem solvers focus on solving problems by finding the shortest possible solution with no guarantee that the identified solution

is the most efficient and suitable. The limitation of applying abstraction to solve problems is illustrated by the below example.

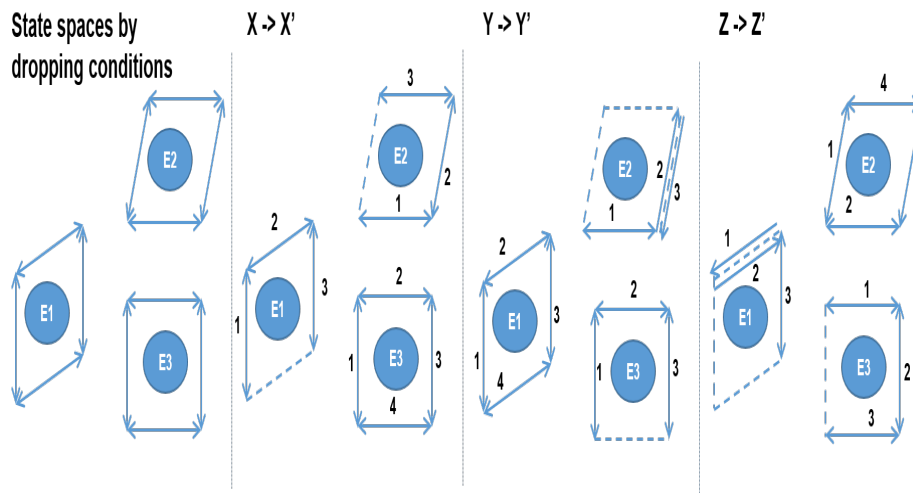


Figure 2.22 Resolving problems by dropping conditions (Bergmann and Wilke, 1995)

Figure 2.22 shows three example problems i.e.  $X$  to  $X'$  (or  $X \rightarrow X'$ ),  $Y$  to  $Y'$  (or  $Y \rightarrow Y'$ ), and  $Z$  to  $Z'$  (or  $Z \rightarrow Z'$ ). For instance, the solution to  $X$  to  $X'$  is a five step path i.e.  $000 \rightarrow 010 \rightarrow 110 \rightarrow 111 \rightarrow 101 \rightarrow 001$ . The nine possible ways of dropping sentences to resolve these problems is shown on the right side of figure 2.22. Each of the possible solutions consists of sequential application of three to four operators. This sequence is indicated by the numbers in the respective figures.

There exists a shorter 0-step or 1-step path solution to resolve these problems, which are not effective and not desired in comparison to the 3-steps or 4-steps path solution, which are effective and desired as shown on the right side of figure 2.22. The shorter path of 0-step or 1-step path solution is found as a solution by the problem solvers that does not solve the problem. This is the problem with abstraction in CBP as it would find the inappropriate solution resulting in no performance improvement.

In contrast to inefficient application of abstraction in CBP by (Bergmann and Wilke, 1995) as explained above, Bergmann (2002); Bergmann et al. (1998a) have deployed the concept of abstraction effectively in a slightly different context but very much in line with preserving and representing knowledge, experience knowledge in this instance. They have developed INRECA-II methodology, an experience management methodology.

The experience is represented within an experience packet which is stored in an experience base. An experience packet consists of software process models and its constituents namely processes, products and/or methods. It is based on the software engineering paradigms of experience factory (Basili et al., 1994a) and software process models (Rombach and Verlage, 1995). Primarily, it provides a framework to store the experience packets in an experience base. The experience base is organized on three levels of abstraction namely, common generic level, a cookbook level and a specific project level.

One of the most influential works in storage and representation of experience that has influenced the current research is the concept of 'experience base' in the experience management model and INRECA-II methodology developed by Bergmann (2002). This model is represented in figure 2.23.

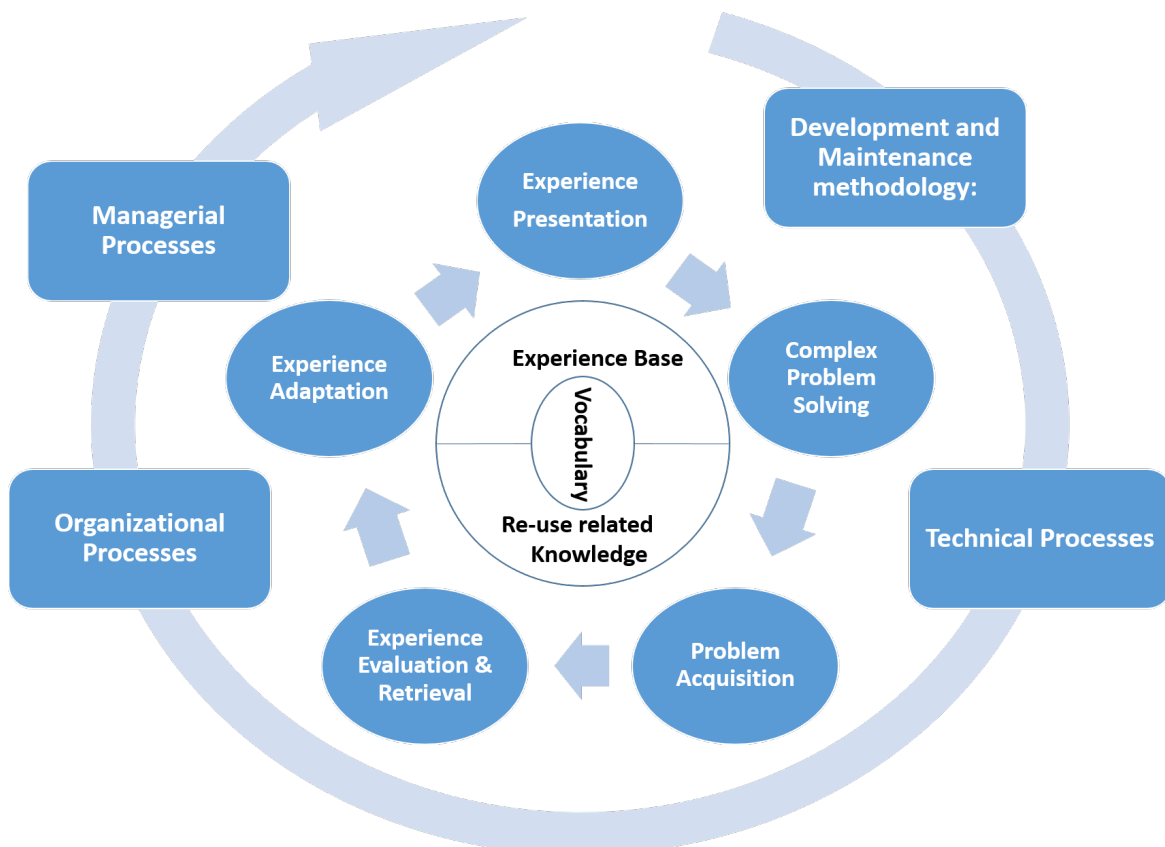


Figure 2.23 Experience management model by (Bergmann, 2002)

As highlighted in this model, the current research has focussed on creating the experience base by creating and representing experience in the form of process models on the principle of INRECA-II methodology.

The main concepts of experience factory and software process modelling that influenced the development of INRECA-II methodology have been identified below. Additionally INRECA's experience base structure, the documentation, maintenance and usage of experience packet have also been discussed below.

### Experience factory

Basili et al. (1994b) state that an experience factory is a logical or physical construct in an organisation, which supports development of projects by synthesising and analysing all kinds of experience, acting as a repository for such experience and supplying that experience on demand. It packages and collects experience in an experience base.

### Software process modelling

In INRECA-II methodology experience is stored in an experience packet using software process models (Rombach and Verlage, 1995). (Figure 2.24) shows its main elements i.e. processes, products and methods.

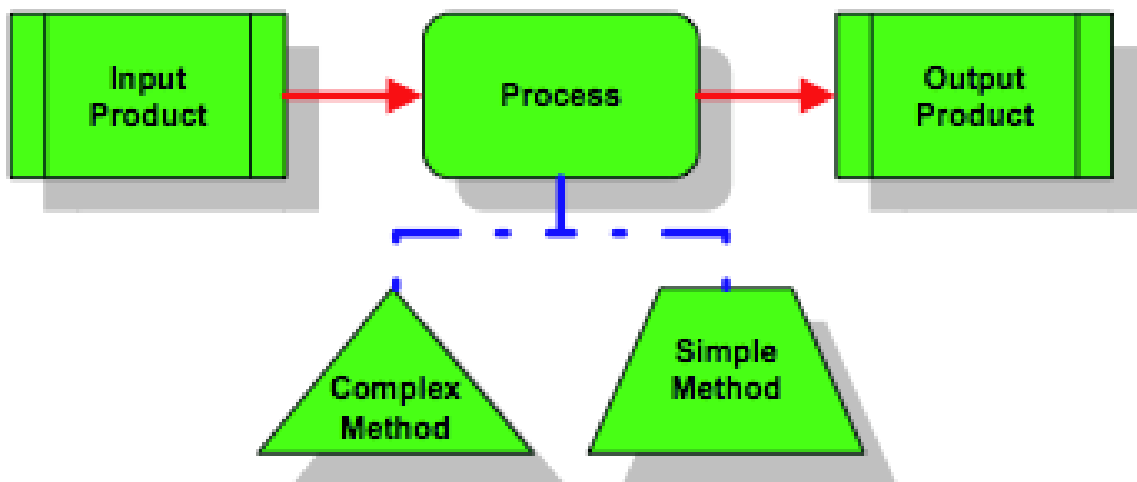


Figure 2.24 Process, model and product (Bergmann and Göker, 1999)

**Process** refers to a systematic activity that takes an input, applies some applicable methods to it and achieves an output. It is characterised by the following properties:

- Every process has a specified goal or output to be achieved.

- A set of different alternative **methods** applicable to achieve the goal of the process.
- During the enactment of a process it takes an input, produces an output and modifies some **products** during its enactment.
- **Resources** are utilised in the form of agents or tools that are required to execute a process.

**Method** contains a thorough specification for executing the process in order to reach the goal of a process. There are two types of methods simple and complex, where simple method contains the details to reach the goal for a process, whereas complex method specifies some sub-processes which are by-products (constituents of the main product) to attain the final goal.

**Product** is the final outcome of a process which may include software system, user manuals etc.

**Resource(s)** can be agents (human resources) or tools (programmed tools) required to perform the task. In case of human resources the possessed skills are important whereas for programmed tools, the functionality is critical.

### **INRECA-II's experience base structure**

Bergmann et al. (1998a) explain the storage of experience in INRECA-II's experience base as segregated into three different levels. They believe that the experience gained from solving problems can be stored in a very specific or detailed manner, recording all minute details or on a broad level in the form of general guidelines. Different IT companies or knowledge-based organisations could construct such experience base(s) on their own which they can refer for solving new problems as they occur.

There are three levels of abstraction of experience stored in INRECA-II's experience base i.e. Common generic level, Cookbook level, or Specific project level as shown in (Figure 2.25).

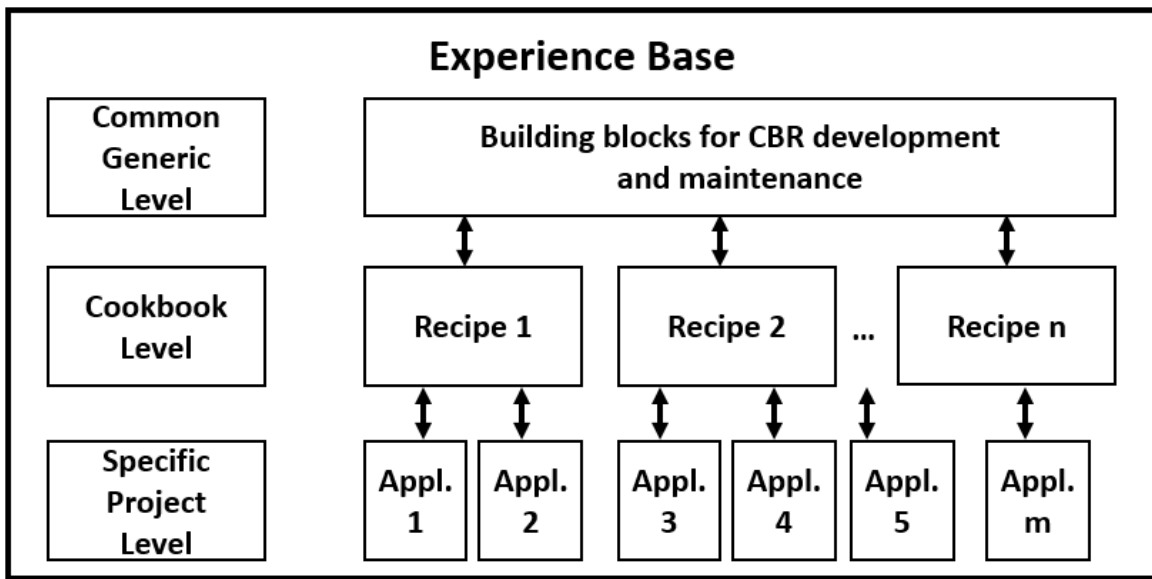


Figure 2.25 Levels of abstraction in INRECA-II's experience base (Bergmann and Göker, 1999)

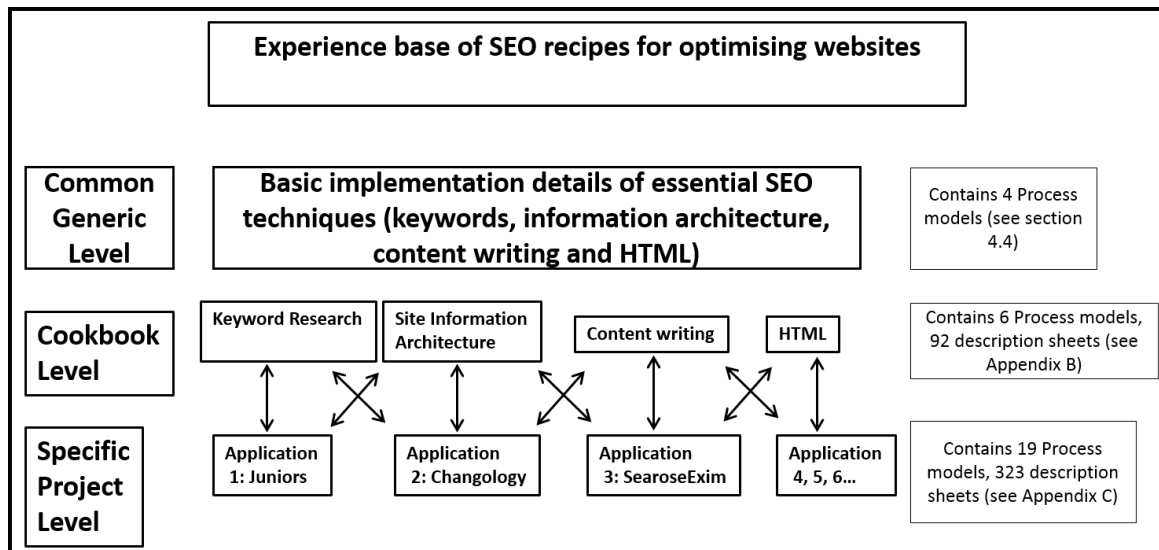


Figure 2.26 Structure of the created SEO experience base

Based on the concept of INRECA-II's experience base structure, the current research has created an SEO experience base as shown in figure 2.26. This experience base contains process models representing the procedures for implementing the on-page SEO techniques of keyword research, site information architecture, content writing and HTML code optimization. The process models contain knowledge on

different levels of abstraction. The Common Generic Level represents high level information for implementing the specified techniques, the Cookbook Level represents procedural information in detail critical for implementing the specified techniques and Specific Project Level represents information deployed for implementing the specified techniques in the specific projects. In effect the Specific Project Level is the application of Cookbook Level process models.

Given below is a brief overview of the details of experience as stored in INRECA-II's experience base at different levels (Bergmann and Göker, 1999).

**Experience stored at common generic level** consists of the processes, products and methods defined at a very high level, which are applicable to a large spectrum of CBR application development projects. Some of the processes at this level give details and are presented as isolated entities, not connected to other methods or products.

**Experience stored at cookbook level** stores the processes, products and methods covering recipes pertaining to a specific class of CBR application(s) e.g. product catalogue (aiding searchers' in the selection of products), help desk (aiding operators in finding the solution to problems), technical maintenance, etc. The process models at this level are termed as recipes. Such a recipe describes how an application of that type can be developed. These process models are more concrete in comparison to common generic level process models. Moreover, they are inter-connected and form a product flow so as to develop a specific project plan.

**Experience stored at specific project level** this level contains experience relevant to a particular project that has already been executed. It contains information regarding the particular processes that were carried out, methods that were implemented, as well as resources used, products produced, and the personnel involved.

#### **Documentation of experience packet in INRECA-II**

A textual description is recorded for all processes, products, methods, agents and tools that are stored in an experience packet. The textual description is documented in a sheet. There is a particular form, filling which creates a sheet (Bergmann and Göker, 1999). Each sheet contains pre-defined fields with links to other sheets related to that particular sheet. An example description sheet for a product has been shown in figure 2.27. There are generic and project specific description sheets created at cookbook and specific project levels respectively.



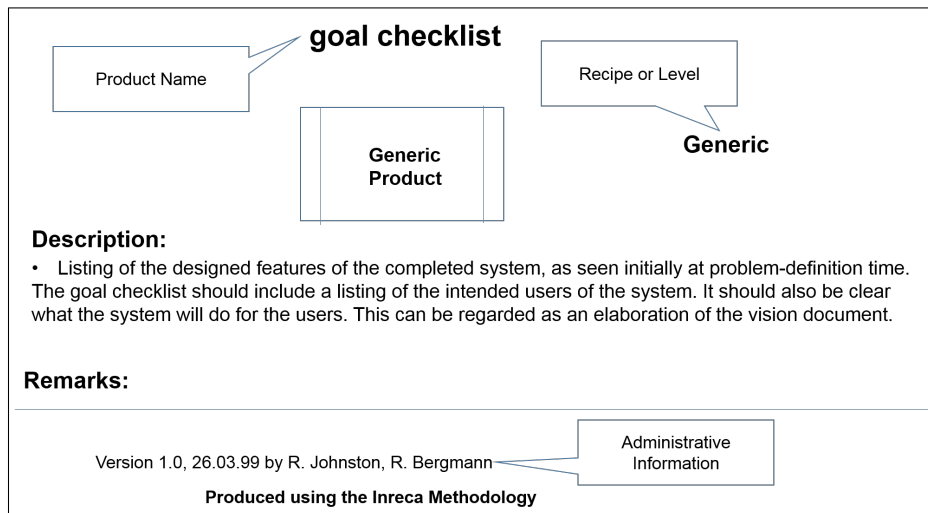


Figure 2.27 Example of product description sheet (Bergmann, 2002)

The generic process sheet contains information and references to relevant input, output, and altered products of the process. The detail of every product is documented in a separate generic product description sheet. As created for the SEO experience base an example of cookbook level and project level description sheet is shown in figure 2.28 and figure 2.29 respectively. In addition to the products-sheets, process description sheets also contain links to relevant methods-sheets.

|   |  |  |
|---|--|--|
| Identify product / service  |  | Generic  |
| Product name  | Input Product:<br>Identify<br>product /<br>service | Level of experience  |
|   |  | <a href="#">&lt;&lt; Previous element</a><br><a href="#">Next element &gt;&gt;</a><br><a href="#">Back to Home</a> |
| <p><b>Description:</b></p> <ul style="list-style-type: none"> <li>- This input identifies the website's product or service being sold.</li> <li>- The website or business owner defines the product or service as per his/her understanding.</li> <li>- The aim is to find the keywords used by searchers to find the current product or service.</li> </ul> <p><b>Remarks:</b></p> |  |  |
| Version 0.1 as on 02.01.16 by VA  |  | Administrative information   |
| Produced by using INRECA Methodology  |  |  |

Figure 2.28 Cookbook level product description sheet created in SEO experience base

|  |   |   |
|--|---|---|
| Identified main service: Indian wedding photography  |   | SaiDigital.co.uk  |
| Product name   | Identified main service: Indian wedding photography | Level of experience   |
| <p><b>Description:</b></p> <ul style="list-style-type: none"> <li>- This input identified the website's service as Indian wedding photography.</li> <li>- The website or business owner defined this product per his understanding.</li> <li>- The next aim was to find the keywords used by searchers in search engines to search for Indian wedding photography.</li> </ul> <p><b>Remarks:</b></p> |   | <p>◀◀ Previous element</p> <p>▶▶ Next element</p> <p>🏠 Back to Home</p> |
| Version 0.1 as on 02.01.16 by VA   |   | Administrative information  |
| Produced by using INRECA Methodology   |   |   |

Figure 2.29 Project level product description sheet created in SEO experience base

*In the current research, the usage of experience packet has been facilitated via webpages. The experience recorded in webpages is organised at three levels in the experience base i.e. common generic level, cookbook level and project specific level. All the elements of the experience packet (input, process and output) are hyper-linked to their respective description sheets. The user can navigate through the experience base by clicking via the hyper-links.*

### **Tool support for documenting the experience**

INRECA-II methodology used Visio (a tool from Visio Corporation) in order to document the CBR application development experience at the generic level, recipes at the cookbook level or specific projects' information at the specific project level.

*In the current research, constituents of the process models i.e. process(es), product(s), method(s), tools and agent(s) were stored in an experience packet and were documented using description sheets. Each of the elements in description sheets was linked to the database containing its information. These sheets were compiled and published as webpages and a website was launched consisting of these webpages, thus compiling all the information centrally accessible to any project member, via the SEO experience base. It was also accessible to participants of focus group who evaluated the knowledge created within the current research. In the current research, all the constituents of process models i.e. process(es), product(s), method(s), tool(s) and agent(s) have been stored in the experience packet and explained in the description sheets. These description sheets have been published as webpages and interlinked to facilitate navigation in the SEO experience base.*

### **2.10.7 Comparing and evaluating representation between CBR, CBP and INRECA- II**

It is interesting to see the importance of experience in CBR, CBP and INRECA-II methodology. These paradigms emphasise the role of experience in solving recurring problems. CBR and CBP follow a different mode of representation as compared to INRECA-II. CBR and especially CBP mainly rely on pure featural or relational representation, transformational or derivational representation, indexed or flat representation and logic based representation (Spalzzi, 2001). Whereas INRECA-II represents knowledge via process models consisting of processes, products and/or methods (Bergmann et al., 1998a).

Bergmann and Wilke (1995) assert the importance of simplicity, understandability and maintainability in knowledge-engineering for developing a domain representation. The knowledge engineers should rely on the representations that are considered most natural for solving certain kinds of problems in the specified domain.

The current research aims to represent the experience knowledge of implementation procedures of SEO techniques. As reflected by the term procedure, these techniques

are implemented as a process. These techniques are implemented in a sequential manner following a structured process. Execution of certain processes might require the complementary support of simple or complex methods.

The implementation framework of these techniques maps to the representation of knowledge in the form of process model of INRECA-II, as displayed in the figures 2.30 and 2.31. The format of a process model is shown in figure 2.30 and its instantiation is shown in the figure 2.31 as an example of one of the process models created in the current research. It is a structural mapping because the implementation procedure follows the same structure as of the process model of INRECA-II. Additionally, it is a semantic mapping as well because each of the constituents or symbols in the process model conveys an appropriate meaning and is fit for representing the different parts or execution-points of the implementation procedure of the stated SEO techniques.

It means there is an identical mapping of INRECA-II's process, product and method mapping to SEO's process, product and method. Boisot (1983) states that the process of codification of information involves a loss of information in the transmission process. Hence the current research has minimised the risk of losing the information by choosing the right symbols and populating it with the appropriate content. Additionally the current research has explained each of the constituents created as part of the process model by using the description sheet of INRECA-II. An example of the description sheet has been highlighted in the figure 2.27.

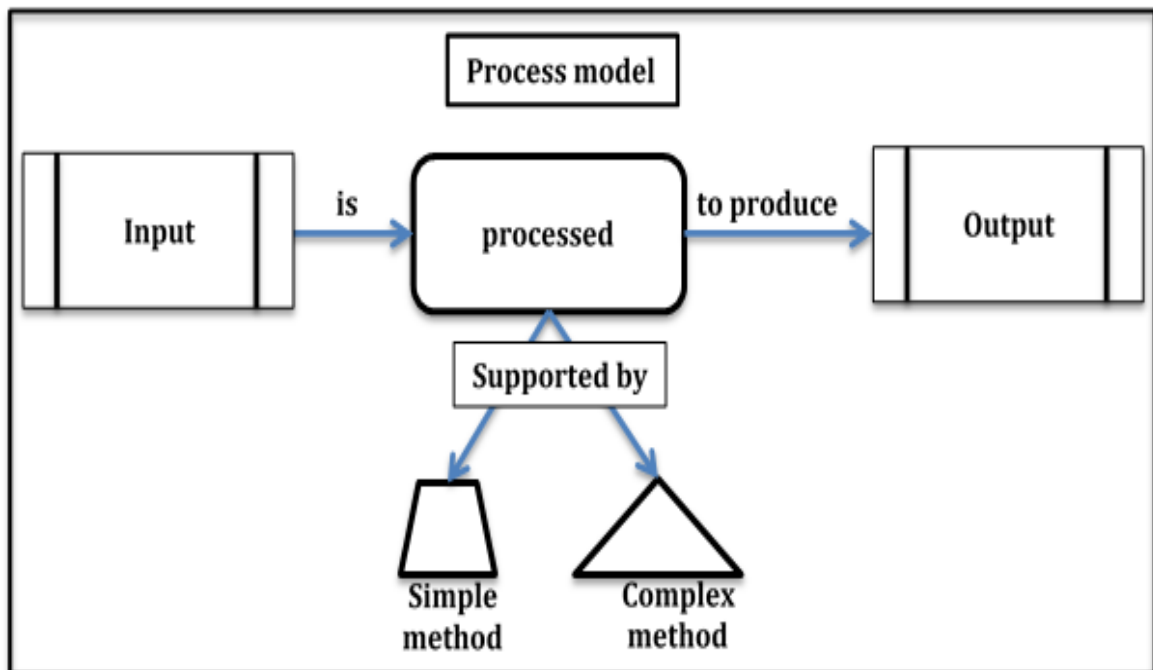


Figure 2.30 Process, model and product (Bergmann and Göker, 1999)

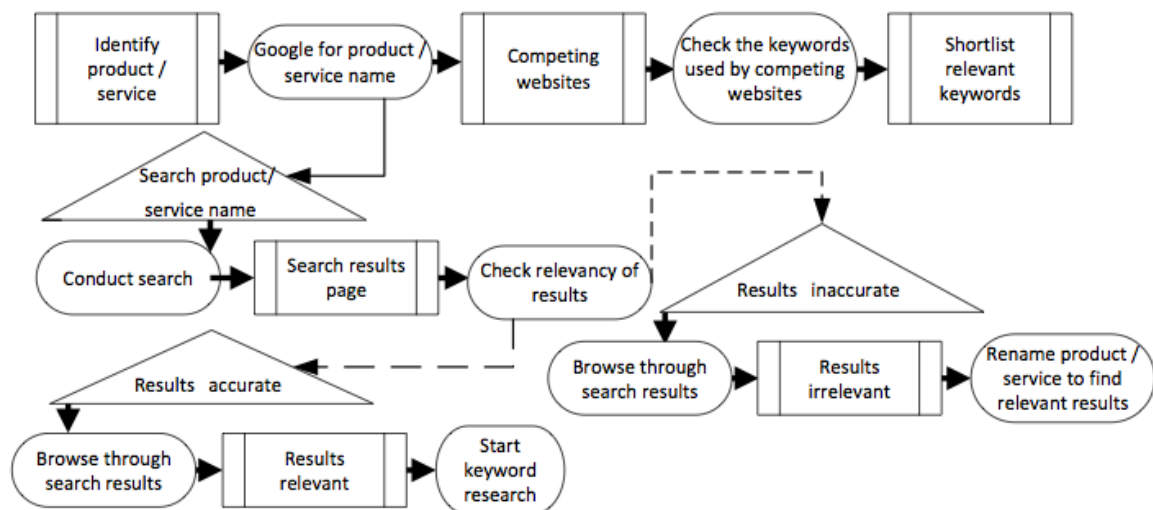


Figure 2.31 Process model for researching keywords using Basic search method

In addition to INRECA-II, it is worth examining the different representation formats offered by CBP and critically evaluating its suitability for representing experience that the current research aims to create. The different representation formats of CBP and their suitability has been explained below:

**CBP's Pure featural representation** involves representation of information based on the features of the plan in the format of attribute-value pairs as shown in the figure 2.15.

The values of attribute-value pairs are finite and are pre-defined for representing a case (Plaza, 1995). In terms of planning, it identifies the essential attributes of a plan. It describe the initial situations, identifies a set of actions to be executed in the plan, the goal to be attained along with possible failures. It is a flat representation useful in simple scenarios that involve brief and precise descriptive values of attributes as highlighted in figure 2.15. An application of this representation format has been attempted for SEO in figure 2.32.

**Goal: Visibility in SERPs**

**Initial: Un-optimized state of current website**

**Failure: Re-implement SEO techniques**

**Plan: Implement keyword research, content writing, information architecture, HTML code optimization**

Figure 2.32 Attempt: Implementing SEO as a pure featural case (Ihrig and Kambhampati, 1997; Spalzzi, 2001)

It has not been found appropriate for SEO. From the perspective of current research, analysing its suitability for SEO, this representation format would only be suitable for representing basic information of SEO techniques in the form of attributes like Goal of SEO campaign, initial state of website, steps to be taken in case of failure and overall plan. But this does not fulfil the motive of this research, as there is no format for specifying implementation procedures for essential on-page SEO techniques. Therefore this representation format is deemed as unfit for the purpose.

**CBP's Relational representation** focusses on highlighting and representing the relations between the features of a plan in terms of specialisation or abstract relations i.e. is-a or partonomic relations i.e. part-of, as highlighted in figure 2.16. This figure is an example of a planning case as stored in the memory of the case based planner

called CAPER (Kettler et al., 1994). The representation of such information is useful in cases where the execution of plans take into account the relational information of represented objects. An application of this representation format has been attempted for SEO in figure 2.33.

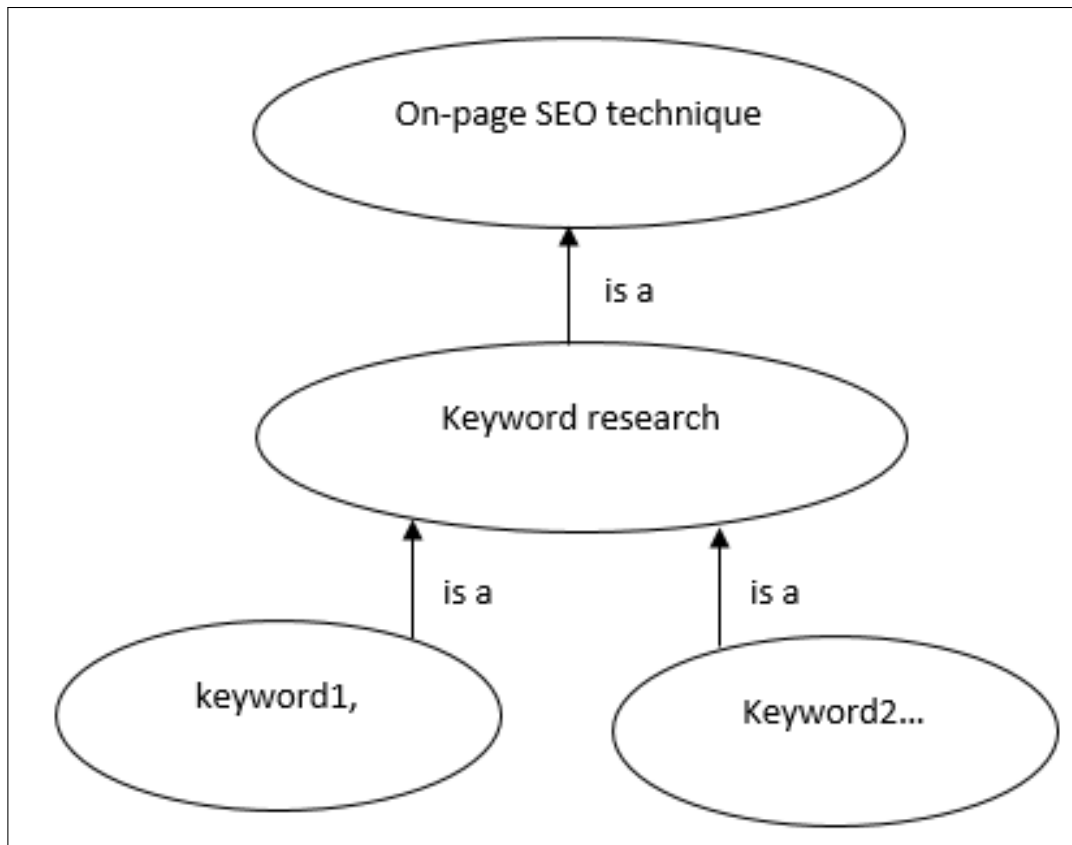


Figure 2.33 Attempt: SEO memory organisation in CAPER (Kettler et al., 1994; Spalzzi, 2001)

It has not been found appropriate for SEO. With respect to current research, such representation could be suitable for representing the atomic output values resulting from the execution of SEO techniques. For instance, for keyword research the shortlisted keywords could be included in the representation along with their relations. But unfortunately, that is not the focus of this research. This research aims to represent implementation procedures of SEO techniques for which the relational representation is not suitable.

**CBP's Transformational or derivational representation** primarily focusses on presenting a trace of planning starting from a problem to a solution by taking into



account all the plans considered and steps taken for resolving the problem and formulating a resolution or a partial plan. As shown in figure 2.17, it provides a trace mainly using the attribute value representation. An application of this representation format has been attempted for SEO in figure 2.34.

**Name:** P1

**Type:** Optimization plan

**Kind:** Keyword research technique

**New step:** Identify product/service being sold by website

**New link:** Find relevant keywords (Goal)

Figure 2.34 Attempt: SEO derivational traces in DERSNLP (Ihrig and Kambhampati, 1997)

It has not been found appropriate for SEO. Although it is suitable for enlisting relevant steps but it is not possible to represent it as a process of interlinked steps where complex steps are supported by sub-steps. Moreover, for current research, the aim is to present a definite path of execution for the implementation procedures of SEO techniques.

**CBP's Indexed or flat representation** As shown in figure 2.19 this form of representation follows a hierarchical format (Ihrig and Kambhampati, 1997) and represents planning cases only on three parameters of input goals, initial situations and failure reasons.

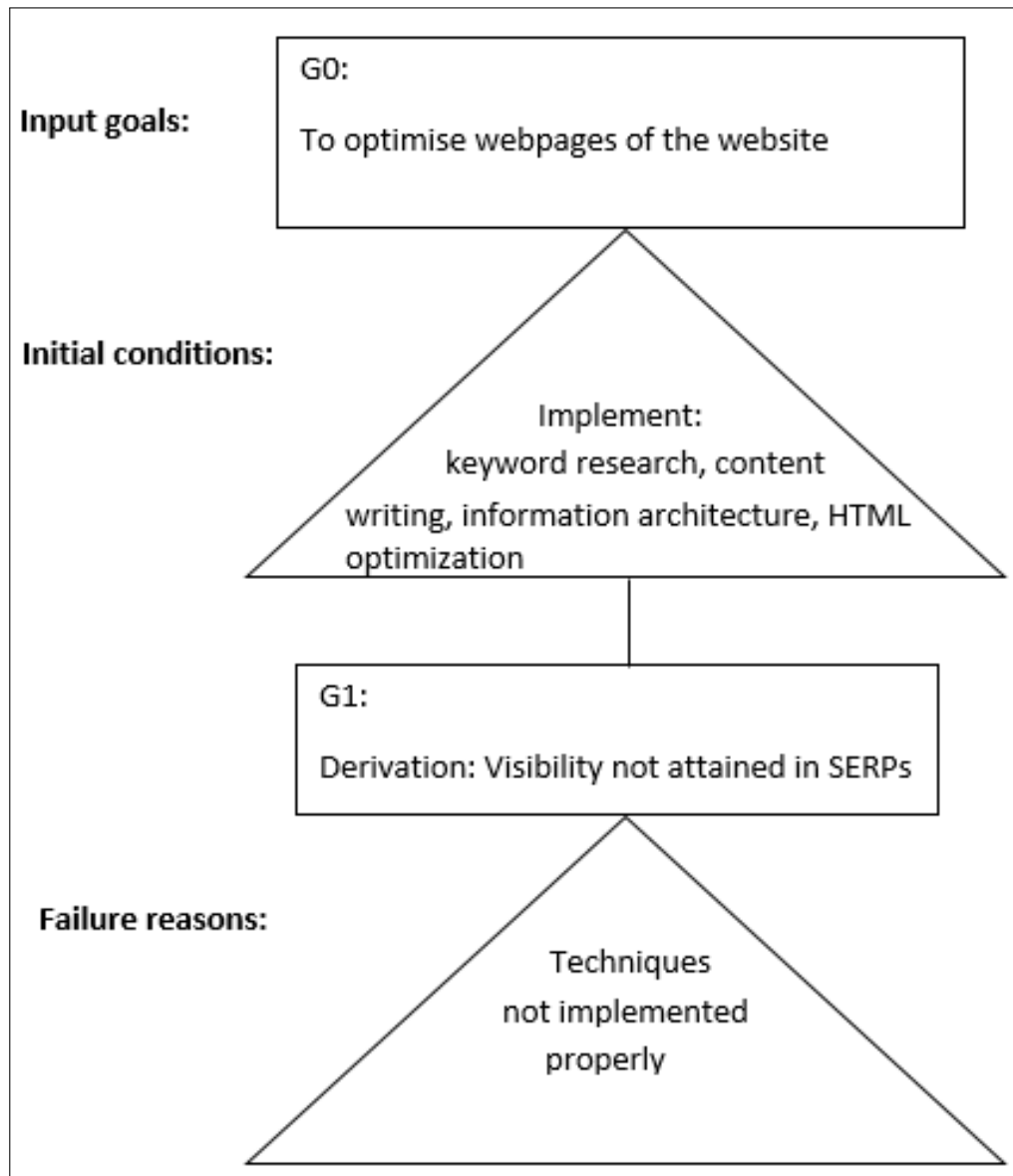


Figure 2.35 Attempt: SEO indices in DERSNLP (Ihrig and Kambhampati, 1997)

An application of this representation format has been attempted for SEO in figure 2.35, and it has not been found appropriate for SEO. The parameter of initial goal and initial conditions resonates with the current research where each of the SEO technique has an initial goal, and the initial conditions, but the value for the parameter of failure reasons does not have a parallel in implementation procedures of SEO techniques. There may be failure reasons found in the review process after the execution of SEO techniques (at a post-implementation stage), in case the desired

result is not achieved but not at the time of execution. Therefore this mode of representation is not suitable for knowledge representation of current research.

**CBP's Logic based representation** is suitable for presenting descriptive information on individual and interrelated concepts Coupey et al. (1998), as shown in the TBox and ABox sections of figure 2.20. An application of this representation format has been attempted for SEO in figure 2.36.

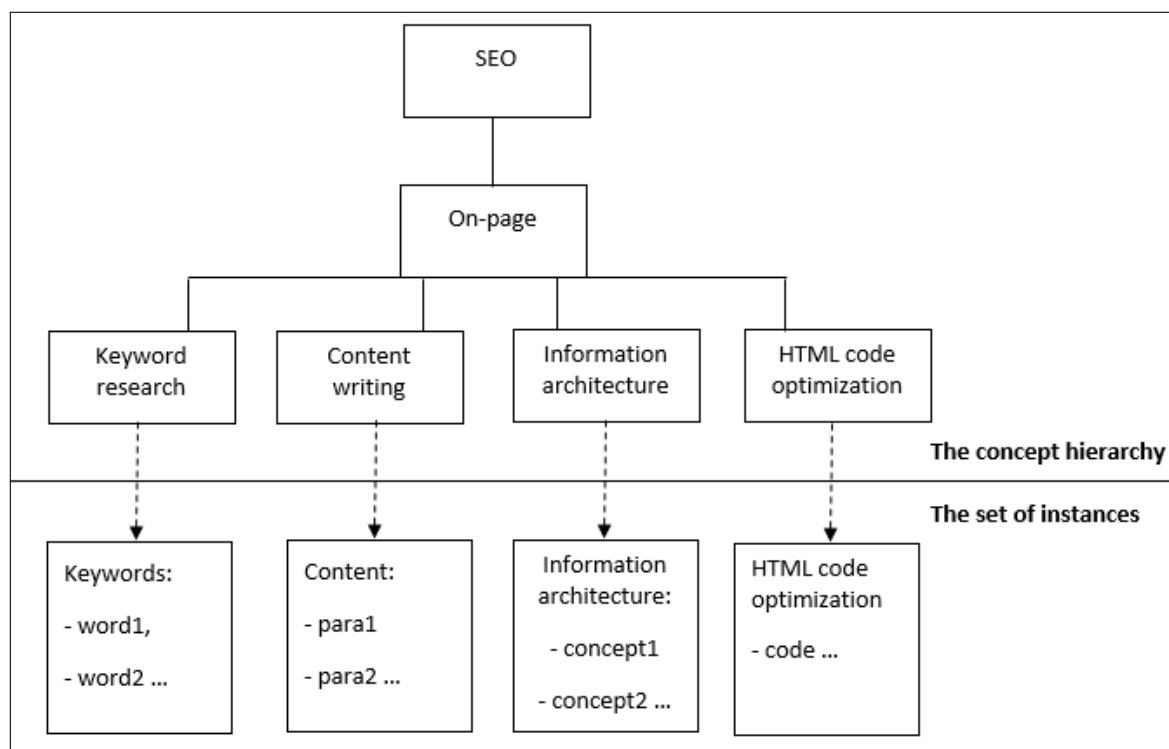


Figure 2.36 Attempt: SEO terminological logic to represent a case memory (Coupey et al., 1998)

It has not been found appropriate for SEO as the current research is interested in representing information on sequential procedures or processes, and not on the conceptual level. Therefore, such representation would not be suitable for the purpose.

From the above discussion we conclude that CBP representation formats are not suitable for representing the implementation procedures of SEO techniques whereas INRECA-II's representation format is found to be fit to represent the SEO techniques' implementation procedures in the format of process models. Furthermore, as defined by Feldmann et al. (1998), it is found that the knowledge represented via

process models in INRECA-II methodology, adheres to the principles of completeness, correctness and consistency of the knowledge based system as opposed to the knowledge representation formats offered by CBP.

## **2.11 Summary**

In this chapter the state of art in the field of SEO was reviewed. It investigated the essential techniques of on-page SEO and identified the knowledge gap in terms of explicitly specified implementation procedures of the specified techniques.

Experience based problem solving paradigms of CBR, CBP and INRECA-II were reviewed for identifying a suitable methodology for representing knowledge. Particularly, a focus was laid on plans in CBP and process models in INRECA-II methodology, where the latter was found to be suitable for representing the knowledge to be created within the current research.



# Chapter 3

## Methodology

In this chapter the methodology adopted for executing the current research is discussed. It ranges from a positivist to post positivist paradigm utilising both quantitative and qualitative research methodologies. The scope and perspective of the current research is reviewed.

### 3.1 Overall research scope, paradigms and design

The area of the present research is within the field of computing and information systems (Oates, 2005). Multiple approaches have been examined to undertake this research and a mixed methodology approach has been adopted (Wisker et al., 2007). This research project began deductively, developed inductively, continued empirically and concluded by summarising the findings. This research has used a mixed methodology approach involving qualitative and quantitative methodologies. The different research methods used are descriptive, exploratory, experimental, inductive and summative. The two variables studied are a. Essential SEO techniques with a scope to store experience-knowledge for their implementation b. Search engine visibility of a website in SERPs. The first variable is independent and the latter is a dependent variable. Finally as an outcome after studying these variables an SEO experience base was created which is dependent on the two mentioned variables. This research extends the previous research in the field with its new findings. Lubbe (2003) points out that if the findings acquired from the results of the conducted research extend the boundaries of existing research then the outcome of the conducted research can be termed as valid-research. The main focus of this

research is to create an SEO experience base consisting of the implementation procedures of essential on-page SEO techniques. For undertaking this research the Internet, and case study websites have been used. This research study has been executed in the premises of The University of West London, London, UK. Following section discusses the research design designed for executing the current research.

## **3.2 Research design**

This section provides the rationale and explanation of the research design.

### **Rationale for research design**

Guided by the first two research questions, the current research has employed an exploratory phase to develop a proposition (i.e. identifying essential on-page SEO techniques along with their implementation procedures in existing SEO literature and five case study websites) for undertaking further inquiry.

Yin (2009) states that exploratory studies involve 'What' questions. He states that these types of question provide a justifiable rationale for developing propositions for further inquiry.

### **Explanation of research design**

This section explains the design adopted for undertaking the current research. An overview of the research design has been highlighted in the figure 3.1.

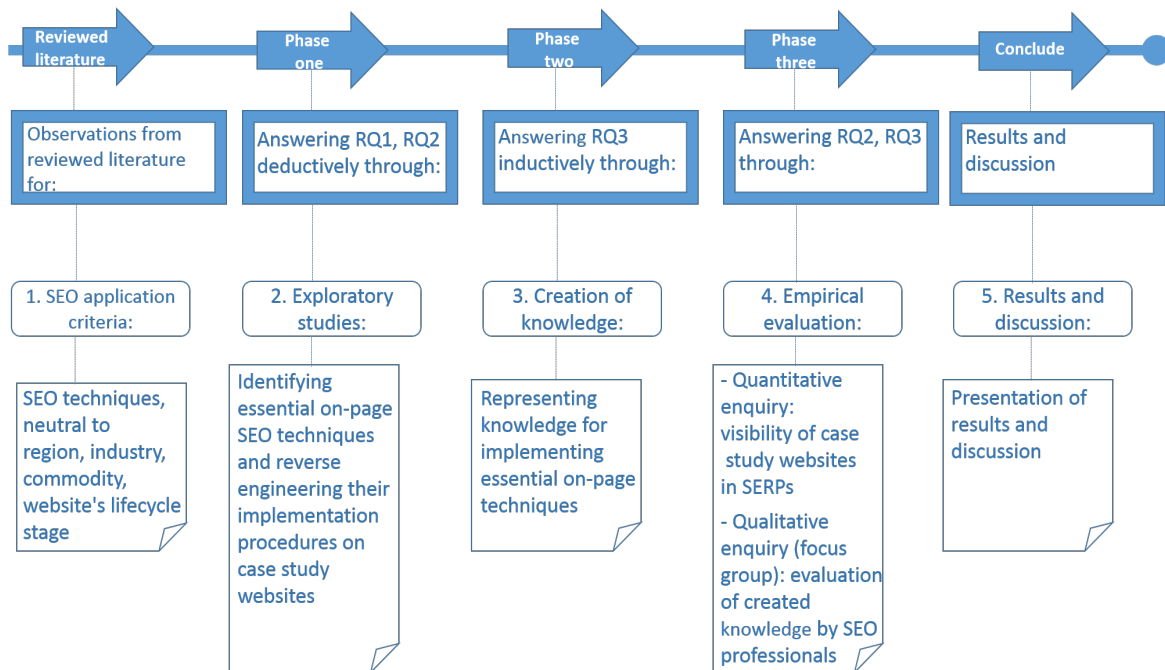


Figure 3.1 Research design for executing current research

1. SEO application criteria (observed from reviewed literature): Firstly, observations for SEO application criteria made from reviewed literature have been identified.

As per reviewed literature (e.g. Hoque et al., 2018; Killoran, 2013; Zhang and Cabage, 2017) it has been observed that similar or identical SEO techniques are applicable to a website from any:

- region
- industry
- selling any commodity or non-trading
- at any stage of its life cycle (if un-optimized)

These variables are quite important with respect to websites, which can be termed as SEO application criteria. This criteria has been presented in a tabular format as well in table 3.1.



Table 3.1 Heterogeneous SEO application criteria

| SN | Heterogeneous SEO application criteria           |
|----|--|
| 1  | region   |
| 2  | industry   |
| 3  | selling any commodity or non-trading             |
| 4  | at any stage of its life cycle (if un-optimized) |

Additionally it has been observed in the current literature that on-page SEO is more important than off-page (Jain, 2013), with the following techniques identified as essential (Hoque et al., 2018; Ur Rehman and Khan, 2013; Zhang and Cabage, 2017):

- keyword research
- content writing
- website structure
- code

These observations helped in initiating the current research by undertaking the exploratory studies as explained below.

#### 2. Exploratory studies (Phase one, answering RQ1, RQ2 deductively)

Exploratory studies would be undertaken for deductively answering RQ1 and RQ2. They would involve:

- Selecting case study websites that implemented one or more essential on-page SEO techniques and achieved visibility in SERPs. The visibility in SERPs would have been tracked in past, using a snap shot method, (captured at two points of time) in comparison to a longitudinal study (Allan and Skinner, 1991). The minimal period for attaining and tracking the visibility was a time span of one month after implementation of one or more specified on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization.
- Reverse engineering of on-page SEO implementation in case study websites in terms of identifying the implemented essential on-page SEO techniques and procedures used for implementing these techniques.

**Rationale for case study selection criteria (exploratory studies)**

- Heterogeneous vs homogeneous cases based on SEO application criteria

Until now researchers have considered homogeneous websites for conducting SEO experiments. Zhang and Cabage (2017) studied the visibility impact resulting from implementation of selected on-page and off-page SEO techniques on three homogeneous websites. Similarly, Hoque et al. (2018) studied application of SEO techniques for oral and maxillofacial surgery industry and developed an SEO model for it. The current research will study application of SEO techniques on heterogeneous websites. As identified in literature (Killoran, 2013), the same on-page SEO techniques are applicable irrespective of their homogeneity. Therefore by investigating the application of SEO techniques on five heterogeneous websites, it would confirm the homogeneous application of SEO techniques on heterogeneous websites. This heterogeneous nature of case study websites has been highlighted in table 3.3.

To answer the first research question, the on-page SEO techniques implemented in case study websites are identified, (shown in table 3.2). In the current literature these techniques have also been identified as essential by (Hoque et al., 2018; Ur Rehman and Khan, 2013; Zhang and Cabage, 2017).

To answer the second research question (RQ2), the current research investigates the implementation procedures of the identified essential on-page SEO techniques in the case study websites. As shown in table 3.2, the identified on-page SEO techniques were implemented for each of the case study websites. Hence by identifying the techniques it would be helpful in identifying the procedures of implementation adopted for implementing these techniques in each of the case study websites. The current research emphasises that the implementation procedures of these essential on-page SEO techniques follow a similar procedure of implementation. By identifying the implementation steps, it will become possible to identify the similarity in the steps required for implementing each of the identified techniques.

Table 3.2 On-page SEO techniques implemented in case study websites (Exploratory studies)

| SN | Case studies   | Basic keyword research | Key word research using keyword tool | Key word research using search queries report | Content writing | Info. architecture | HTML code optimization |
|----|----------------|------------------------|--------------------------------------|---|-----------------|--------------------|------------------------|
| 1  | Searose Exim   | Y                      | Y                                    |   | Y               | Y                  | Y                      |
| 2  | Changology     | Y                      | Y                                    |   | Y               | Y                  | Y                      |
| 3  | Sai Digital    | Y                      | Y                                    | Y   |                 | Y                  |                        |
| 4  | Bankaholic.com |                        |                                      |   | Y               |                    |                        |
| 5  | Juniors.net    | Y                      | Y                                    |   |                 |                    |                        |

### Rationale for number of cases

In the current research, the rationale for analysing five case study websites deductively is to identify information, determine the pattern of recurrence in information along with the saturation point (Boddy, 2016).

The pattern of 'recurrence and recurrent information' in the implementation procedures of essential on-page SEO techniques for case study websites would potentially indicate a similarity in the implementation procedures of the techniques. Whereas, the saturation point would indicate that existing information had already been discovered in previous case study websites, with no scope of new information to be discovered.

Following this pattern, the first case study would provide information, and if there is no new information discovered in the second case study then it would identify the pattern of recurrence in information. If the third case study would also confirm the discovery of no-new information then it would identify and confirm the point of data saturation after second case study (Boddy, 2016). Thus in order to assure information discovery by reaching a saturation point is to use minimal two case study websites, where the pattern of discovered information is identical or near-identical (Boddy, 2016). In order to sufficiently meet the sample size criteria, the

current research considers five heterogeneous case study websites meeting the heterogeneous SEO application criteria as shown in table 3.3.

Table 3.3 Case study selection criteria (Exploratory studies)

|    |                | Heterogeneous SEO application criteria |               |  |                  |
|----|----------------|--|---------------|--|------------------|
| SN | Case studies   | Region                                 | Industry      | Commodity  | Life cycle stage |
| 1  | Searose Exim   | India                                  | Bicycle       | Product (Front bicycle basket)                         | New website      |
| 2  | Changology     | UK                                     | IT consulting | Service (IT change management)                         | New website      |
| 3  | Sai Digital    | UK                                     | Photography   | Service (Wedding photography service)                  | Existing website |
| 4  | Bankaholic.com | USA                                    | Banking       | Information (certificate of deposit rates in USA)      | Existing website |
| 5  | Juniors.net    | UK                                     | Education     | Information (Online primary education for Key Stage 2) | Existing website |

### 3. Creation of knowledge (Phase two, answering RQ3 inductively)

Identification of the implementation procedures undertaken to implement the essential on-page SEO techniques would confirm the information on implementation procedures of the specified techniques. As the steps in the implementation procedures are assumed to be incremental in nature and inter-connected, therefore its presentation in a process model would be an appropriate format for presenting this information as shown in the figure 1.5. The process model displayed in figure 1.5 provides an overview of the presentation format, which is based on the principle of INRECA-II methodology. The justification and suitability for using this methodology has been provided in section 2.10.7 of chapter 2.

The identification and consolidation of implementation procedures of the SEO techniques in the form of process models would result in creation of new knowledge, which would need to be verified. Thus it indicates the need for undertaking experiments (quantitative and qualitative).

### 4. Empirical evaluation (Phase three, quantitative and qualitative evaluation)

- (1) Experiments on case study websites (quantitative experiments, answering RQ2 inductively)

In the quantitative experimental studies of phase three, the implementation procedures of essential on-page SEO techniques would be implemented on two case study websites to verify their effectiveness in attaining visibility in SERPs. For these experiments to be successful, the case study websites should become visible in SERPs.

### **Case study selection criteria and observation period (for quantitative experimental studies)**

In order to assure that meaningful data is generated from the undertaken experiments it is appropriate to undertake experiments on heterogeneous case study websites on the basis of heterogeneous SEO application criteria as shown in table 3.4. This will assure the generalisation and application of generated results to a wider range of websites.

A snap shot method would be employed to track the visibility of case study websites (at two points of time) in SERPs within a time span of one month of implementation (Allan and Skinner, 1991) of specified essential on-page SEO techniques as shown in table 3.5.

Table 3.4 Case study selection criteria (Experimental studies)

|    |                   | Heterogeneous SEO application criteria |          |                                    |  |
|----|-------------------|--|----------|------------------------------------|--|
| SN | Case studies      | Region                                 | Industry | Commodity                          | Life cycle stage                             |
| 1  | Rachel's Roastery | UK                                     | Beverage | Product (coffee roasting)          | Existing fully functional e-commerce website |
| 2  | Bedslinen         | India                                  | Bedding  | Product (beds linen manufacturing) | New website                                  |

Table 3.5 On-page SEO techniques implemented (Exploratory studies)

| SN | Case studies      | Basic keyword research | Key word research using keyword tool | Key word research using search queries report | Content writing | Info. architecture | HTML code optimization |
|----|-------------------|------------------------|--------------------------------------|---|-----------------|--------------------|------------------------|
| 1  | Rachel's Roastery | Y                      | Y                                    | Y   |                 |                    |                        |
| 2  | Bedslinen         | Y                      | Y                                    |   | Y               | Y                  | Y                      |

## (2) Focus group (Qualitative evaluation, answering RQ3 inductively)

In addition to quantitative, qualitative evaluation would also be undertaken. The primary motive for undertaking qualitative evaluation would be to get the evaluation of created knowledge by the experienced professionals in the field of SEO who have been exposed to the process models and had spent a trial period using them (Denzin, 1978). Moreover, it would involve data collection from multiple sources, thus reflecting the views of major stakeholders (Patton, 1990).

For undertaking qualitative evaluation, a focus group would be conducted where experienced SEO professionals will evaluate the created knowledge i.e. implementation procedures of SEO techniques, represented as process models on the principle of INRECA-II methodology. At least one month prior to conducting the focus group, the SEO professionals would be informed about and trained to use the process models. Details of the participants and the focus group procedure has been explained in chapter 6.

The format of the focus group is selected over individual semi-structured interviews as it would provide an opportunity for critical peer-evaluation of the created process models in a group. As in a natural setting, the SEO professionals would participate in a group discussion highlighting the strengths, weaknesses and required improvements in the created process models (Sim, 1998). Sim (1998) observes that participants are more at ease when participating in a group as opposed to individual interviews.

### 3.3 Assumptions and beliefs underlying this research

Firstly it is assumed that search engines employ an algorithm to calculate the relevance of websites and rank them accordingly in SERPs. Secondly, it is assumed that the implementation of techniques in a website is favoured by 'search engines ranking algorithms' leading to a better ranking and visibility for the website(s) in SERPs. Furthermore, it is assumed that there is some **similarity** in the implemented **techniques** along with the **procedures** used for implementing them. Finally, it is assumed that the experience knowledge of implementing these techniques can be represented.

The scope of research methodologies as employed in conducting the current research has been shown in figure 3.2 along the axis from positivism to post positivism.

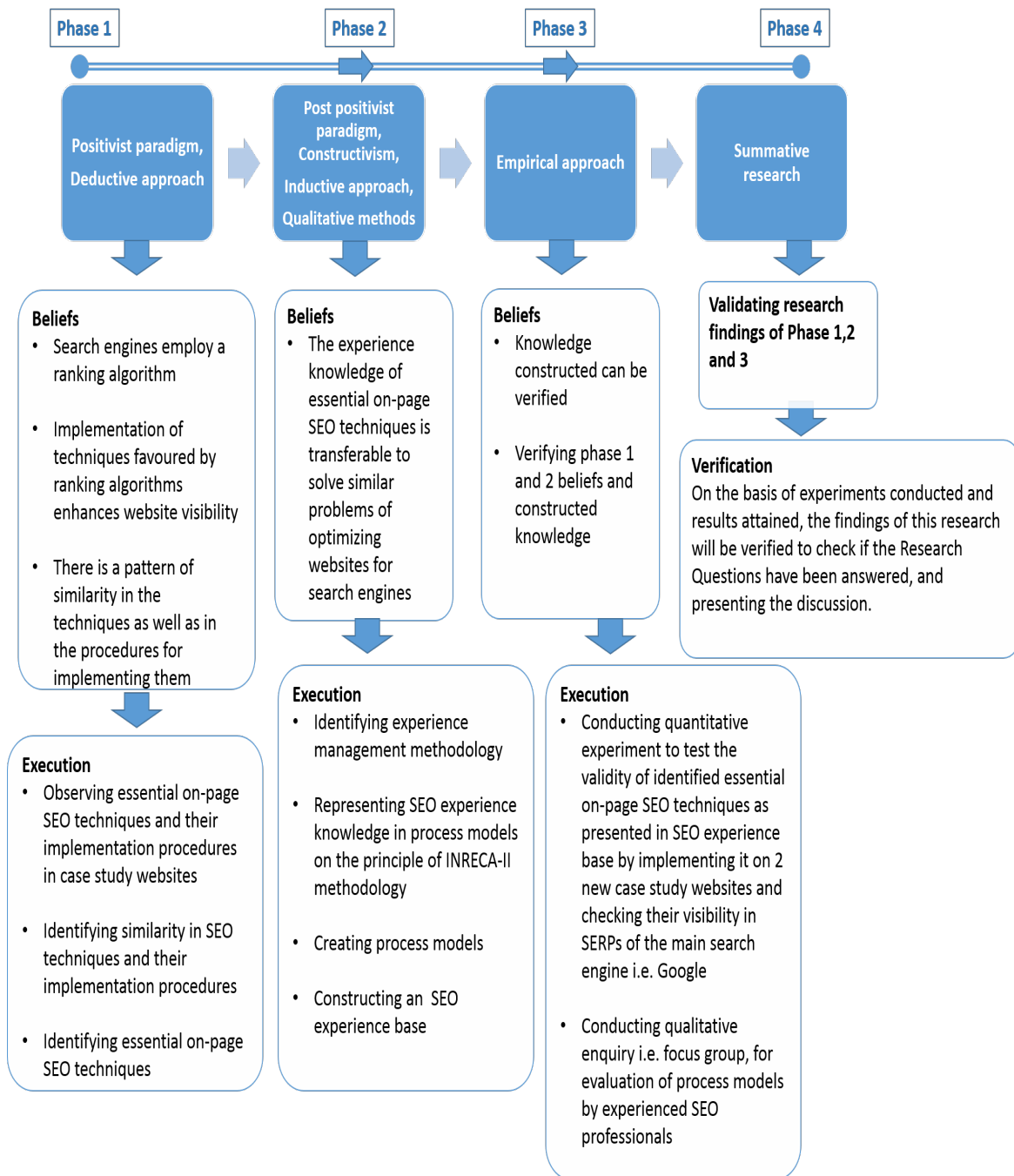


Figure 3.2 Methodologies covered within the research scope of this thesis

## 5. Results and Discussion

Finally the results and discussion will be presented.



## 3.4 Methodological resources

This section provides an explanation on the quantitative research methodology and the methods applied for executing this research. A research methodology can be described as the overall approach implemented to undertake the research, whereas research methods are simply the tools utilised for conducting research (Catherine, 2002). Quantitative research methodology involves a study approach that involves the measurement of quantity or amount or position (Van der Riet and Durrheim, 2006).

A quantitative research methodology has been used for conducting phase 1 of the present research. To answer the first research question: "Which SEO techniques are absolutely essential for executing the SEO campaign to achieve visibility in organic/free results of SERPs?", it concentrates on quantitatively measuring ranking position of websites in SERPs of Google.

Cooper et al. (2003) as well as Stead (2001) state that the most frequently used research methods for undertaking quantitative research include descriptive, experimental and exploratory approaches. The details of employing these approaches in the current research have been described in the sections below.

### 3.4.1 Descriptive research

According to Stead (2001) descriptive research studies describe the existing condition of the variables that are directly or indirectly related to the research being undertaken. Additionally it can be used for organising, simplifying and summarising data.

In the present research study, descriptive research was employed for identifying the similarity of essential SEO techniques, along with the similarity in their implementation procedures, determining the visibility of websites in the SERPs of Google mainly, existing problem solving approaches and the methodologies for maintaining the experience knowledge by answering the following questions:

- Amongst on-page and off-page SEO techniques which ones are similar and which are essential for gaining visibility on search engines?
- Is there a pattern of similarity in implementation of these techniques?

- Implementation of which on-page SEO techniques made the case study websites visible in search engine results pages (mainly Google)?
- Which techniques and technologies exist for problem solving governed by experience?
- Are there any methodologies established governing the representation of experience?

The main benefit of employing descriptive research methodology is that it enables the researcher to get a clear and complete analysis of the variables involved in the research (Kothari, 2004). Descriptive research usually involves research methods such as case studies and statistical methods, which are explained below.

### 3.4.2 Case study

This is a research technique that is used for getting a complete overview of certain variables in a given environment or situation. This research technique is used before starting the research to understand relevance and state of the specified research topic. Case study method is specifically relevant for conducting research on a small group of subjects (Kothari, 2004).

For undertaking the present research, websites meeting the case study selection criteria (see section 3.6) would be considered as case studies. The present study would employ research on seven case study websites. On the basis of SEO implementation in the past, five case study websites (Juniors.net<sup>1</sup>, Bankaholic.com<sup>2</sup>, Searose Exim<sup>3</sup>, Changology<sup>4</sup> and Sai Digital<sup>5</sup>) would be used to identify the experience-knowledge of essential on-page SEO techniques along with their implementation procedures.

Further experiments would be conducted on two case study websites (Beds Linen<sup>6</sup> and Rachel's Roastery<sup>7</sup>) to check the validity of experience-knowledge as contained in the designed process models.

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<sup>1</sup><http://juniors.net>

<sup>2</sup><http://cdrates.bankaholic.com>

<sup>3</sup><http://www.searoseexim.com>

<sup>4</sup><http://www.changology.co.uk>

<sup>5</sup><http://saidigital.co.uk>

<sup>6</sup>[www.bedslinen.com](http://www.bedslinen.com)

<sup>7</sup><https://rachelstroastery.com/>

### 3.4.3 Exploratory research

Cooper et al. (2003) state that a research study can be considered either as exploratory or as formal. Stead (2001) believe that exploratory research is an investigation that is facilitated and assisted by the hypotheses and/or research questions regarding a problem with little or no information for its future-research. For executing the present research, exploratory research has been employed for identifying the implementation of essential on-page SEO techniques in selected five case study websites along with their implementation procedures.

It was observed that the existing literature provided information on identification of SEO techniques to optimize websites for search engines but did not differentiate between essential and non-essential techniques nor provided their implementation details. Secondly the literature covered on representation of experience knowledge presented knowledge in other fields, but did not cover knowledge domain of SEO.

As supported by the hypotheses and research questions, the current research would be undertaken to represent SEO experience knowledge in process models, to be stored in an SEO experience base.

### 3.4.4 Experimental research

A research setting, entails the study of the influence of independent variables on dependent variables whilst answering the research questions. Cooper et al. (2003) state, "experimentation provides the most powerful support possible for a hypothesis of causation". There are different methodologies relevant for executing experimental research, for instance; control group of pre-test and post-test, randomised post-test only, etc. The selection of methods for conducting the research is influenced by type of research questions and moreover the control over independent variables of the researcher.

The present research studies the effect of the independent variable i.e. SEO techniques on the dependent variable i.e. website's visibility in SERPs. It involves implementing SEO techniques (the independent variable), to enhance the website's visibility in SERPs (the dependent variable), where experimentation would be done over implementation of SEO techniques and resulting website visibility. The main objective would be to find if the implementation of essential on-page SEO techniques enhance the visibility of the website on the most popular search engine i.e. Google.

Further the implementation procedures of these techniques would be represented in process models and stored in an SEO experience base. Subsequently by using these process models, two more case study websites would be optimized, whose visibility would be tracked in SERPs primarily of the main search engine i.e. Google.

### **3.5 Empirical investigation and work plan chronology**

Initially the academic literature on CBR was referred to study the possibility of using it to solve the recurring problems in SEO domain. In parallel, SEO literature was referred to identify the problem-solution pairs and the recurring nature of such problems for almost all websites. Additionally, essential SEO techniques alongwith the procedural implementation required for these techniques was identified.

After conducting research in the CBR area, INRECA-II (an experience management methodology) was deemed suitable to store SEO experience knowledge. The process models were created on the generic, cookbook and project specific levels on the principle of INRECA-II methodology to create the SEO experience base. The process models were created on the cookbook level by extracting the implementation procedures from five case study websites, which were optimized in the past. The operational periods of five case study websites are as follows, Juniors.net (operational 2000-2009), Bankaholic.com (operational 2006-present), SearcoseExim.com (operational 2011-2012), Changology.co.uk (operational 2011-2012)and SaiDigital.co.uk (operational 2009-present). Quantitative and qualitative evaluations were undertaken and research questions were answered which validated the findings of this research. Quantitative experiments were undertaken in January 2016 and February 2016 on two case study websites (Bedslinen.com and RachelsRoastery.co.uk). Qualitative evaluations were undertaken by conducting a focus group in April 2018.

The research was undertaken in chronological order as shown in appendix F.

### **3.6 Case study and sampling (Quantitative experiments)**

The primary criteria for selection of case study websites was that first and foremost they should have an interest to gain visibility on the web and promote their respective

website via search engines using the mode of SEO. Both types of websites were considered i.e. already existing and newly launched websites. The advantage of such an approach was that the created knowledge would be valid and applicable in a wider set of situations. Firstly the websites (not previously having a website) will be able to build their web presence from scratch. Secondly, already existing websites will be able to enhance their visibility further by promoting their targeted keywords as relevant to their business(es).

Five case study websites would be used to collect experience knowledge for which one or more essential on-page SEO techniques had been implemented in the past which became visible in SERPs (post-implementation).

The implementation procedures of the essential on-page SEO techniques would be represented in the process models of SEO experience base at the cookbook level and specific project level. The details of these case study websites are presented in table 3.6.

Table 3.6 Details of the case studies used for recording experience in process models

| <b>S.No.</b> | <b>Website name</b> | <b>About website</b>   |
|--------------|---------------------|--|
| 1.           | Searose Exim        | A bicycle products manufacturing firm based in India. This company had no web presence. Hence a new website <a href="http://www.searoseexim.com">www.searoseexim.com</a> was created (using HTML & CSS) and search engine optimization was done for this website to make it visible on Google.com.   |
| 2.           | Changology          | A consultancy firm providing consultation services to organisations for implementing I.T infrastructure. This company had no web presence. Therefore, a new website <a href="http://www.changology.co.uk">www.changology.co.uk</a> was created (using HTML & CSS) and search engine optimization was done for this website to make it visible on Google.com. |
| 3.           | Sai Digital         | An independent Asian wedding photographer covering Asian marriages operating in all regions of UK.   |
| 4.           | Bankaholic          | USA based website providing information on interest rates offered by credit unions operating in different states   |
| 5.           | Juniors             | An online education website teaching English, Numeracy and Science at Keystage 2 level (grades 3, 4, 5 and 6).   |

For conducting the experiment to verify the information contained in process models, essential on-page SEO would be implemented on two new case study websites, the details of which are presented in table 3.7.

Table 3.7 Details of the case studies used to conduct experiment by applying process models

| S.No. | Website name      | About website   |
|-------|-------------------|---|
| 1.    | Beds Linen        | A small-scale set up in India manufacturing custom bed linen. A website was created, essential on-page SEO techniques were implemented and results were observed. |
| 2.    | Rachel's Roastery | A coffee roaster, selling hand roasted coffee in all regions of UK. Some essential on-page SEO techniques were implemented on already existing website.           |

## 3.7 Technical tools and method

### 3.7.1 INRECA-II

As stated in chapter 2, section 2.10.6, the primary instrument used to create process models was based on the specification of INRECA-II methodology.

### 3.7.2 Output of the research design

The primary output of the research design are process models representing the experience-knowledge for implementing essential on-page SEO techniques to make websites visible in SERPs. These process models would be presented in the form of HTML pages. The details of process models would be discussed in greater detail in chapter 4.

## 3.8 Data collection and analysis

Forms as displayed in tables 3.8 and 3.9 would be filled to record the data.

Based on the undertaken experiments, quantitative data would be collected. Firstly data would be collected to track the visibility and ranking positions of new case study

websites on search engines after implementing on-page SEO techniques, using the websites visibility report form as shown in table 3.8. Further the website ranking positions would be compared pre and post optimization and recorded in the form as shown in table 3.9. As shown in table 3.8 and 3.9 the first column (Key phrase) lists the key phrase for which the website has attained ranking, second column (Ranking position pre optimization) shows the ranking position of website in SERP before optimization, third column (Ranking as on specific date) specifies the date of tracking the ranking position, fourth column (Pre and post ranking comparison) would compare the ranking position for pre and post optimization and graphically and represent the upward or downward movement, fifth column (Average monthly searches) represents the average searches conducted by the searchers as reported by <sup>8</sup> and sixth column (Webpage ranking) lists the web address or URL of the webpage that is ranking in the SERPs. The primary motive for tracking data on the website level is to check the effectiveness of the implementation procedures of SEO techniques as represented in the process models created within current research for optimizing and improving the visibility of websites.

Table 3.8 Form for recording website ranking positions

| <b>Recording website ranking positions</b> |                                   |                             |                                 |                          |                 |
|--|-----------------------------------|-----------------------------|---------------------------------|--------------------------|-----------------|
| Key phrase                                 | Ranking position pre optimization | Ranking as on specific date | Pre and post ranking comparison | Average monthly searches | Webpage ranking |
|  |                                   |                             |                                 |                          |                 |
|  |                                   |                             |                                 |                          |                 |
|  |                                   |                             |                                 |                          |                 |
|  |                                   |                             |                                 |                          |                 |

<sup>8</sup>as per Google Keyword Planner [https://ads.google.com/intl/en\\_uk/home/tools/keyword-planner/](https://ads.google.com/intl/en_uk/home/tools/keyword-planner/)



Table 3.9 Comparing website ranking positions at pre- and post-optimization stages

| <b>Comparing pre- and post-optimization stages</b> |                                     |                                      |                                 |                 |
|--|-------------------------------------|--------------------------------------|---------------------------------|-----------------|
| Key phrase   | Ranking as on pre-optimization date | Ranking as on post-optimization date | Pre and post ranking comparison | Webpage ranking |
|  |                                     |                                      |                                 |                 |
|  |                                     |                                      |                                 |                 |
|  |                                     |                                      |                                 |                 |
|  |                                     |                                      |                                 |                 |

### 3.9 Data interpretation

The quantitative experiments (i.e. SEO implementation on case study websites) the data would be interpreted for case study websites in terms of their visibility and ranking positions in SERPs mainly on Google. Their visibility and ranking positions would be checked for their targeted keywords for which they had been optimized.

In qualitative evaluations (i.e. focus group) the collected data would be evaluated using thematic analysis. The feedback from the focus group participants would be analysed to identify the emerging themes.

### 3.10 Sampling procedure (Qualitative evaluation)

To conduct a semi-structured focus group, experienced SEO professionals were recruited to evaluate the process models created within the current research. A systematic procedure was followed to recruit these participants to assure that they have sound SEO experience and implement SEO techniques in their day to day jobs details.

The inclusion and exclusion criteria (also highlighted in appendix A) for selecting the participants is explained below:

## **Inclusion and exclusion criteria of participants**

### **Inclusion criteria**

- Working in SEO profession
- Minimum 3-5 years of SEO experience
- Executed a minimum of 10 SEO projects
- May belong to any global geographical location

### **Exclusion criteria**

- Search Engine Advertising (SEA) or Pay Per Click professionals implementing paid marketing
- Web designers and web developers not responsible for implementing SEO

### **Explanation for the specified inclusion and exclusion criteria**

The inclusion criteria ensured participants have an indepth knowledge of SEO by specifying the requirements for the execution of sufficient number of SEO projects along with experience of certain number of years in this field.

Core focus was laid on recruiting SEO professionals only and excluding similar profiles of paid marketing, web designers and web developers, by following the guidelines specified by Stewart and Shamdasani (2014), for recruiting focus group participants.

#### **3.10.1 Participants**

Ten SEO professionals were approached and trained on using the created process models (seven of them holding senior position of managing director of SEO agencies, two of them working in the SEO department in a large organization and one working in a digital agency providing SEO and copywriting services). The details of all the participants' characteristics have been highlighted in table 3.10.

The author demonstrated the created process models to all these participants at least one month prior to conducting the focus group. A one-hour demonstration was made to the selected ten SEO professionals by following the agenda as highlighted in figure 3.3. All of the created process models were demonstrated and explained in detail. Further, the author was available for any queries or guidance required by the participants subsequent to the training session.

Table 3.10 Participants details

| <b>SN</b> | <b>Alias name</b> | <b>About</b>  |
|-----------|-------------------|---|
| 1.        | K1                | 20 years of web and SEO experience, founder of web marketing, design agency and a full-service digital agency in London   |
| 2.        | A1                | 12 years of digital marketing and web development experience, CEO & Co-Founder of a web marketing, design and development agency in India, with client list including some of the fortune 500 companies |
| 3.        | R1                | 12 years of digital marketing experience, SEO Manager and founder of a digital marketing specialist company in India  |
| 4.        | R2                | 12 years of content writing and SEO experience in UK  |
| 5.        | A2                | 3 years of SEO experience in UK   |
| 6.        | P1                | a Google certified digital marketing specialist with 3 years of digital marketing experience, CEO of web marketing and design company in Greater London   |

|     |   |   |
|-----|---|---|
| 7.  | A | 3 years of experience as English SEO Copywriter and SEO engineer at a digital agency providing web marketing, translation, localization and content services in Cyprus  |
| 8.  | F | 6 years of digital marketing experience, Managing Director at an award winning SEO digital agency in London   |
| 9.  | K | 7 years of digital marketing experience, Designer and web marketer for a small web marketing and design agency in London  |
| 10. | C | 7 years of digital marketing experience, providing digital marketing services to B2B companies having a turnover of between £5M and £100M. Also teaches marketing, as a guest lecturer, and a mentor to post graduate students at UCL (University College London) |

| <b><u>Agenda for demonstration to participants</u></b>   |                   |
|--|-------------------|
| <b>1. Meet and greet</b>   | <b>10 minutes</b> |
| <ul style="list-style-type: none"><li>• Overview given by researcher about the research</li><li>• Participants outline their profile</li></ul> |                   |
| <b>2. Demonstration of created process models</b>  | <b>40 minutes</b> |
| <ul style="list-style-type: none"><li>• Step by step explanation by the researcher</li></ul>   |                   |
| <b>3. Question and answer session</b>  | <b>10 minutes</b> |

Figure 3.3 Agenda for demonstration to participants

### **3.11 Summary**

This chapter identified the research paradigms and methodology used for undertaking the current research. An overall research design was created for executing the current research. A combination of quantitative and qualitative research methodologies was found suitable for executing the experiments effectively.

# Chapter 4

## Designing SEO process models

As discussed in chapter 2, section 2.10.7, process models of INRECA-II methodology have been found appropriate for representing the implementation procedures of essential on-page SEO techniques. As per the structure of INRECA-II methodology, the current research has created an SEO experience base by designing the process models on three levels, namely *Common Generic Level*, *Cookbook Level* and *Specific Project Level*.

The Common Generic Level experience represents highly abstract experience-knowledge at the domain level. The cookbook level experience represents experience-knowledge with less abstraction providing more details within the domain. The project level experience provides detailed information and represents concrete experience-knowledge gained from executing projects within the domain (Bergmann et al., 1998a). The structure of the created SEO experience base has been highlighted in figure 4.1.

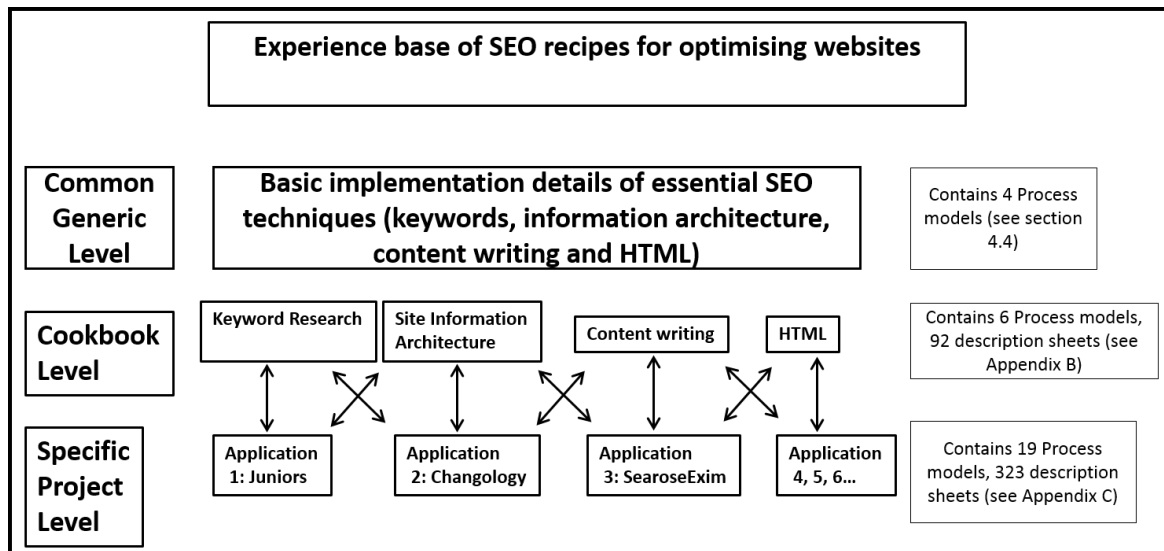


Figure 4.1 Structure of the created SEO experience base

This chapter begins by identifying the need for creating SEO experience base followed by identifying a pattern of recurrence in steps used for implementing the specified essential on-page SEO techniques. As designed within the current research, subsequently, it presents the process models on common generic level, followed by cookbook level and the specific project level. Finally, it presents the details and results obtained for case study websites in the past, the implementation-details of which had been presented in the process models designed at the specific project level.

## 4.1 Need for SEO experience base

SEO literature just mentions SEO techniques, but the details on the process to implement these techniques in the specified context are missing (Hoque et al., 2018; Killoran, 2013). Various researchers have emphasised the important techniques of SEO but not shared the implementation process (Hoque et al., 2018). This is clearly a big knowledge gap. The concept of SEO has been highlighted in section 1.1 of chapter 1. It is a process that customises and improves the characteristics of a website to improve its ranking and visibility in search engines (Malaga, 2010). SEO implementation requires prior research and knowledge to envision and create an SEO plan or strategy to be executed in different phases. This is a procedural technique involving a phased implementation such as a recipe. Considering the

## 4.2 Recurrence pattern in implementation of essential on-page SEO techniques 127

fact that it is a process which has to be implemented as a structured approach therefore sharing its experience knowledge is extremely helpful for the novice (Aul and Roth-Berghofer, 2015).

The current research has designed process models representing the implementation procedures of essential on-page SEO techniques and stored them in an SEO experience base. There is an urgent need for SEO experience knowledge due to its absence in the current state of literature on the topic. More importantly, the experience gained from the application of SEO techniques has not been shared. Therefore this research has addressed this gap by creating an SEO experience base constituted from the SEO experience knowledge as gained from the optimization of case study websites as described in section 4.7 of this chapter.

## **4.2 Recurrence pattern in implementation of essential on-page SEO techniques**

There is a pattern of recurrence in the steps of implementation of essential techniques of on-page SEO (Aul and Roth-Berghofer, 2015, 2016). This pattern of recurrence was found whilst implementing the essential on-page SEO techniques for websites in the past (Aul and Roth-Berghofer, 2015, 2016). A generic procedure of implementation was followed with specific customisations for each website (Head, 2012; Tarabasz, 2016).

As shown in table 3.2, one or more essential on-page SEO techniques were implemented in the mentioned five case study websites, which established and/or enhanced their visibility in the SERPs. In the following section, the primary objective is to identify a pattern of recurrence in steps used for implementing the specified techniques of SEO.



## 4.3 Recurring steps in implementation of essential on-page SEO techniques

This section presents the recurring steps followed in the implementation of essential on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization.

### 4.3.1 Recurring steps in implementation of keyword research

For executing the technique of keyword research, the current research has identified three different techniques of basic search, keyword tool and search queries report. The recurring steps in executing these techniques have been identified below:

#### Keyword research using basic search technique

The process of keyword research begins with applying the basic search technique, followed by keyword tool technique or search queries report technique.

As presented in table 4.1 the recurring steps for executing the basic search technique have been identified in terms of its goal and steps undertaken to achieve the stated goal.

Table 4.1 Recurring steps for executing basic search technique

|   |  |
|---|--|
| <b>Technique:</b>                                   | Keyword research using basic search technique  |
| <b>Goal:</b>  | Identify relevant keywords used by competitors in the target market  |
| <b>Steps undertaken to achieve the stated goal:</b> | Google for few relevant keywords and check the keywords used by competing websites to discover keywords that are relevant for the website to be optimized. |

#### Keyword research using keyword tool technique

After executing the basic search technique, the process of keyword research is continued by applying the keyword tool technique and/or search queries report technique.

As presented in table 4.2 the recurring steps for executing the keyword tool technique have been identified in terms of its goal and steps undertaken to achieve the stated goal.

Table 4.2 Recurring steps for executing keyword tool technique

|   |   |
|---|---|
| <b>Technique:</b>                                   | Keyword research using keyword tool technique   |
| <b>Goal:</b>  | Identify keywords that are relevant, searchable (keywords being searched by searchers) and not highly competitive (less number of competing websites) |
| <b>Steps undertaken to achieve the stated goal:</b> | Search seed keywords in Google keyword planner tool and shortlist the ones with low search volume and less competition                                |

**Keyword research using search queries report technique**

After executing the basic search technique, the keyword research process is continued by applying the search queries report technique.

As presented in table 4.3 the recurring steps for executing the search queries report technique have been identified in terms of its goal and steps undertaken to achieve the stated goal.

Table 4.3 Recurring steps for executing search queries report technique

|   |  |
|---|--|
| <b>Technique:</b>                                   | Keyword research using search queries report technique   |
| <b>Goal:</b>  | Identify keywords that are relevant for which the website is already ranking in SERPs in Google.co.uk  |
| <b>Steps undertaken to achieve the stated goal:</b> | Extract the search queries report and combine it with the keywords list generated through Google keyword suggestion tool. Shortlist the keywords for which the website is already ranking and that meets the criteria of relevancy, low searchability and low competition. |

### 4.3.2 Recurring steps in implementation of content writing

In the keyword research process, relevant keywords are allocated to each of the webpages of the website. By using these keywords, content is written for respective pages of the website.

As presented in table 4.4 the recurring steps for executing content writing have been identified in terms of its goal and undertaken steps to achieve the stated goal.

Table 4.4 Recurring steps for executing content writing

|   |   |
|---|---|
| <b>Technique:</b>                                   | Content writing   |
| <b>Goal:</b>  | Create content for conveying products' information being sold by the website(s).                                  |
| <b>Steps undertaken to achieve the stated goal:</b> | Use relevant keywords for creating keyword rich and informative content for each of the respective website pages. |

### 4.3.3 Recurring steps in implementation of information architecture

Based on the scope of the website's product(s), service(s) and/or information, the relevant concepts and sub-concepts are identified to define the information structure of the website.

As presented in table 4.5 the recurring steps for executing information architecture have been identified in terms of its goal and undertaken steps to achieve the stated goal.

Table 4.5 Recurring steps for executing information architecture

|   |  |
|---|--|
| <b>Technique:</b>                                   | Information architecture   |
| <b>Goal:</b>  | To define information hierarchy of the website based on the categories of shortlisted keywords.              |
| <b>Steps undertaken to achieve the stated goal:</b> | Identify concepts and sub-concepts within keywords' categories and create information hierarchy accordingly. |

### 4.3.4 Recurring steps in implementation of HTML code optimization

Based on the shortlisted keywords, the HTML code is contextualised by adding keywords, in appropriate places.

As presented in table 4.6 the recurring steps for executing HTML code optimization have been identified in terms of its goal and undertaken steps to achieve the stated goal.

Table 4.6 Recurring steps for executing HTML code optimization

|   |   |
|---|---|
| <b>Technique:</b>                                   | HTML code optimization                                    |
| <b>Goal:</b>  | Contextualise specified HTML code.                        |
| <b>Steps undertaken to achieve the stated goal:</b> | Add keywords to file names, alt tags, URL structure, etc. |

## 4.4 Designing SEO process models at the Common Generic Level

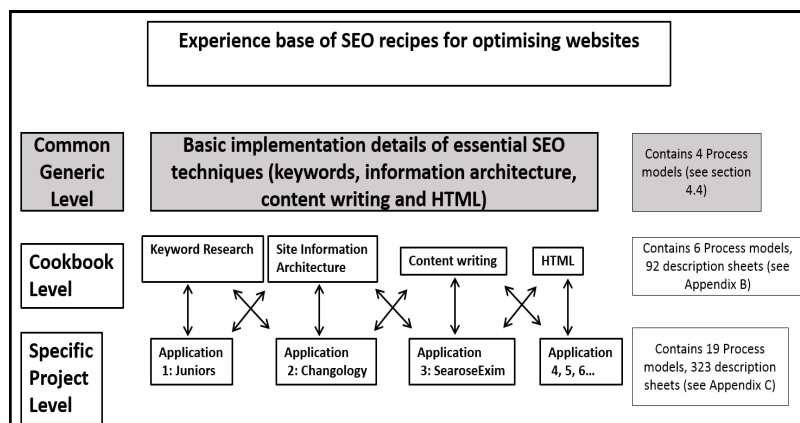


Figure 4.2 Recording experience at generic level

As highlighted in figure 4.2, in this section four process models are designed to represent the implementation procedures of essential on-page SEO techniques

of keyword research, content writing, information architecture and HTML code optimization on the *Common Generic Level* of the SEO experience base created within the current research on the principle of INRECA-II methodology (as identified in section 2.10.6 of chapter 2). Generic level process models define experience packets (processes, products and methods) at a very high level, which are applicable to a large spectrum of projects in the specified domain (Bergmann, 2002).

#### 4.4.1 Designing a generic process model for executing keyword research

From the discussion in section 2.3 on the on-page technique of keywords it is observed that for finding appropriate keywords, research needs to be undertaken systematically. It needs to be implemented as a structured process of discovering keywords (Zhang and Cabage, 2017), followed by analysing their characteristics (Moreno and Martinez, 2013; Zhu and Tan, 2012), preparing a keyword list (Gandour and Regolini, 2011), deploying keywords (Killoran, 2013) and as a result, implementing the keywords. Hence for executing the technique of keyword research, this process has been represented in the process model highlighted in figure 4.3.

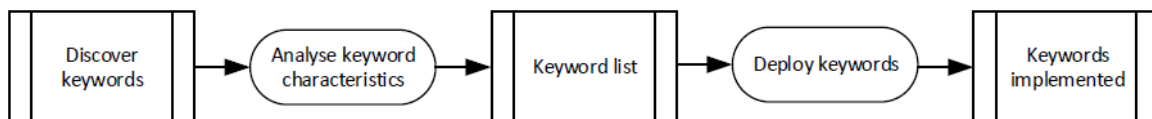


Figure 4.3 Generic process model for keyword research (source: author)

As highlighted in the above process model figure 4.3, each of the identified steps have been covered in the keyword research process models designed at the cookbook level (in section 4.5) within current research. The discovery of keywords has been covered in the process model named as 'Basic search technique' as displayed in figure (4.9). The analysis, selection and deployment phases have been covered in the process models named as Keyword tool technique displayed in figure (4.10) and Search Queries Report technique displayed in figure (4.11) and has been implemented in specific projects as shown in section 4.7.

### 4.4.2 Designing a generic process model for executing content writing

As identified in section 2.4, another on-page technique of content writing has been discussed. Generally, a webpage consists of a main heading, followed by introduction, body consisting of paragraphs or subsections, and conclusion as shown in figure 2.6. Appropriate keywords need to be used for writing high quality content for favourable rating by search engines. It requires following a systematic procedure where the keyword list is expanded by identifying the concept related keywords, synonyms and co-occurring keywords on the topic (Berger and Lafferty, 2017; Metzler and Croft, 2005; Shen et al., 2015). By using the comprehensive keywords list, it is advisable to write thematic content for the specified webpage (Fishkin and Høgenhaven, 2013).

A generic process model to create content for a webpage has been designed as shown in figure 4.4 to create the generic constituents of a webpage.

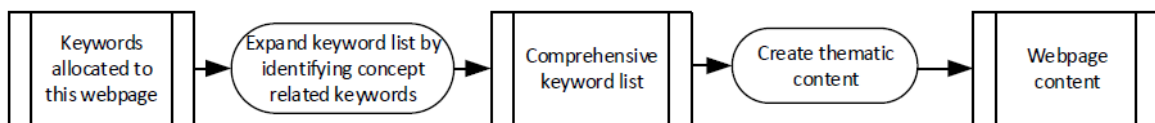


Figure 4.4 Generic process model for content creation (source: author)

As highlighted in the above process model in figure 4.4, each of the identified steps have been covered in the content writing process model designed within the current research at cookbook level in section 4.5 and has been implemented in specific projects as shown in section 4.7.

### 4.4.3 Designing a generic process model for executing information architecture

As identified in section 2.5, another on-page SEO technique of Information Architecture (IA) has been discussed. The important constituents of IA have been mentioned in figure 2.8. It has been observed that a systematic procedure should be followed for creating the information architecture for a website. Depending on the scope of a website, appropriate concepts and sub-concepts need to be identified (Song et al., 2011). For the concepts, identified a top to bottom hierarchy needs to be created

and defined with appropriate terminology (Wang et al., 2014). It would result in creation of appropriate context (Song et al., 2011). From this information, a generic process model for creating information architecture for a website has been designed as shown in figure 4.5.

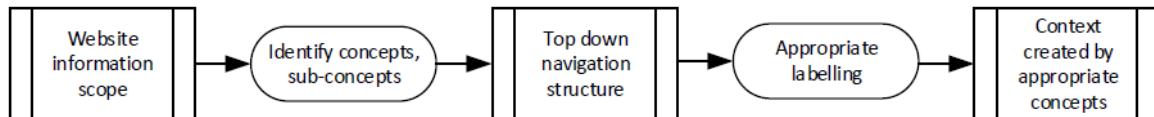


Figure 4.5 Generic process model for defining information architecture (source: author)

As highlighted in the above process model figure 4.5, each of the identified steps have been covered in the information architecture process model designed at the cookbook level within the current research in section 4.5 and had been implemented in specific projects as shown in section 4.7.

#### 4.4.4 Designing a generic process model for executing HTML code optimization

As identified in section 2.6, another on-page SEO technique of HTML code optimization has been discussed. For optimizing the HTML code a systematic procedure needs to be followed involving externalising the CSS and Javascript code (Hui et al., 2012) and adding keywords for file names and appropriate HTML tags (like alt tags, etc.) (Patil Swati et al., 2013). Based on the discussion, a generic process model for optimizing the source code of the webpage has been designed as shown in figure 4.6.

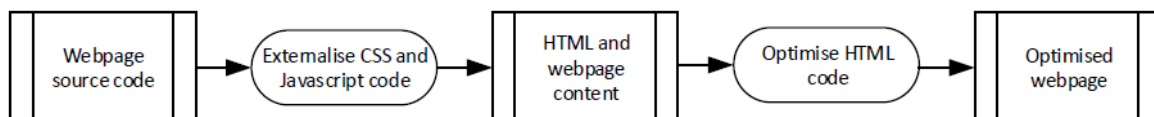


Figure 4.6 Generic process model for source code optimization (source: author)

As highlighted in the above process model figure 4.6 each of the identified steps have been covered in the HTML code optimization process model created within the current research in section 4.5 and has been implemented in specific projects in section 4.7.

## 4.5 Designing SEO process models at the Cookbook Level

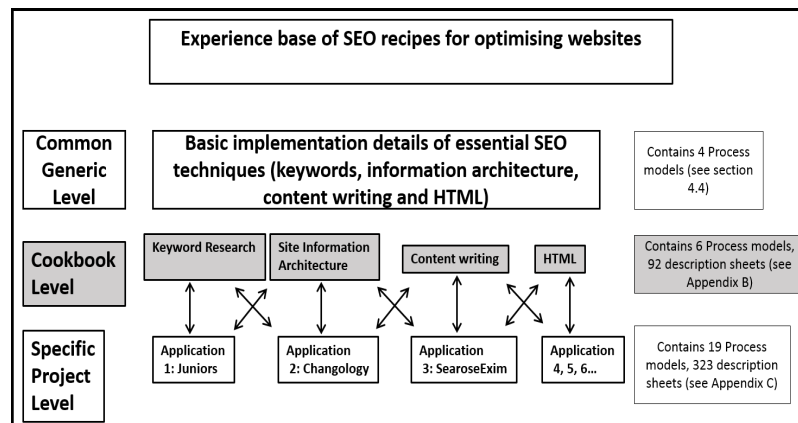


Figure 4.7 Highlighting the cookbook level of the SEO experience base created within the current research

As highlighted in figure 4.7, in this section six process models are designed to represent the implementation procedures of essential on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization on the *Cookbook Level* of the SEO experience base created within the current research on the principle of INRECA-II methodology (as identified in section 2.10.6 of chapter 2). Cookbook level process models are found to be appropriate to share the SEO experience knowledge required to implement SEO techniques for the websites (Bergmann, 2002). As compared to the process models at common generic level (see section 4.4), the process models at cookbook level represent concrete information in the form of inter-connected steps.

Knowledge representation at this level provides comprehensible information (Chandrasekaran, 1986). The experience knowledge gained from successful implementation of on-page SEO techniques implemented for case study websites has been abstracted to a generic level and stored in these cookbook level process models (Aul and Roth-Berghofer, 2015, 2016). For case study websites details, refer to tables 3.2 and 3.3.

Each of the mentioned methods and products in the designed process models represent a great level of detail and are critical in implementation of the specified



techniques. Ninety-two description sheets are created to represent and explain each element mentioned in the process models. They contain respective information and implementation details. These sheets had been interlinked and stored in the experience factory of SEO experience base at the cookbook level and presented in Appendix B. The designed process models have been highlighted and explained in detail in the following sections.

#### 4.5.1 Designing keyword research process model

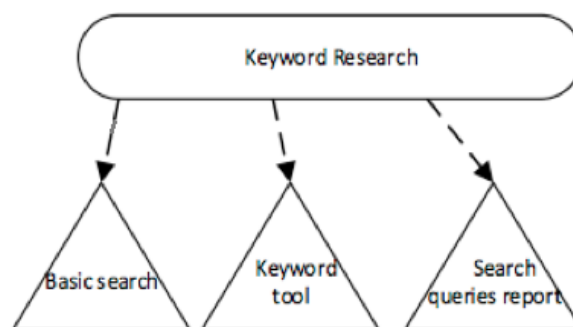


Figure 4.8 Keyword research process supported by three techniques

The process model in figure 4.8 shows that keyword research process is supported by three techniques namely:

- Basic search technique (figure 4.9)
- Keyword tool technique (figure 4.10)
- Search queries report technique (figure 4.11)

For executing keyword research, executing *Basic Search technique* is mandatory whilst *Keyword Tool technique* or *Search queries technique* could be executed alternatively or jointly. As created within current research the implementation procedures of these techniques are represented in process models and explained in the following sections.

### 4.5.2 Keyword research via basic search technique

This section presents the figure and explanation of the process model created for executing the technique of keyword research via basic search technique. The following sections present the progression and characteristics of the process model.

#### Process model: figure and overall explanation

Figure 4.9 presents the process model designed for researching keywords using basic search technique, followed by its explanation.

#### Figure of the designed process model

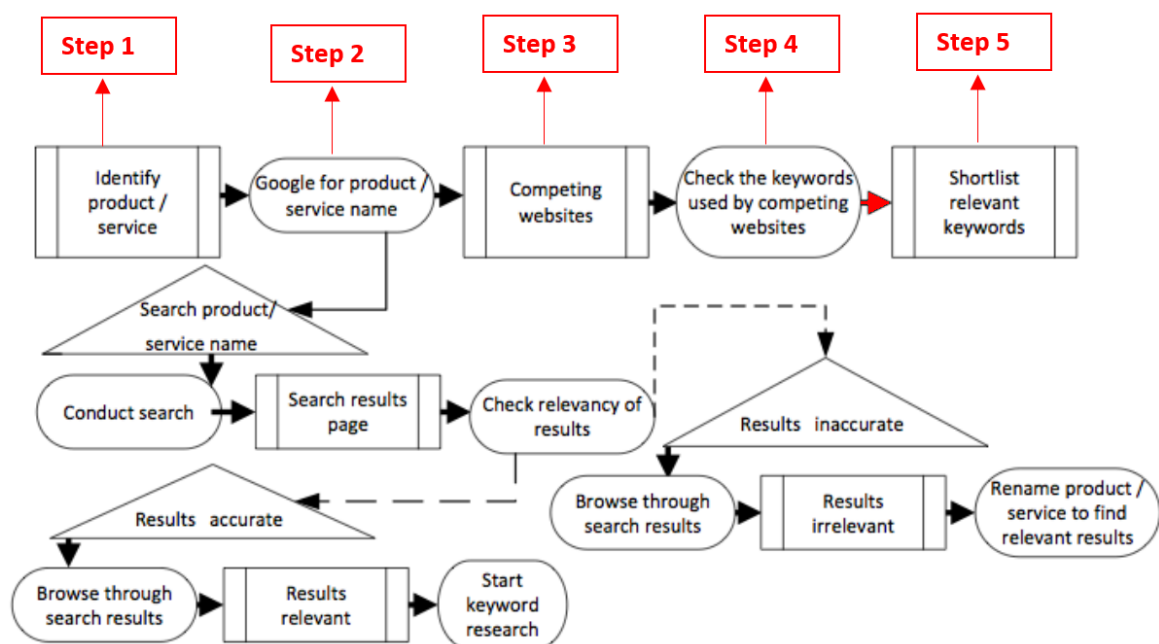


Figure 4.9 Keyword research via basic search technique<sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

#### Overview of the designed process model

As shown in figure 4.9, the basic search technique involves identifying the specific product or service and googling (searching in Google) for it (Zhang et al., 2007). The process of searching in Google involves conducting a search and checking the

relevance of search results to assure the identified or shortlisted keywords retrieve the intended results (Edmonds et al., 2013).

If it doesn't then the keywords are rephrased until the intended results are displayed in the search results page. Once the desired results are displayed, the keywords used in the competing websites (Gandour and Regolini, 2011) (listed in SERPs) are checked to get the keyword ideas or actual keywords to be used (Zhu and Tan, 2012). As discussed in the *characteristics of keywords* section of chapter 2, this process model enables one to obtain the characteristic of relevancy i.e. selection of relevant keywords (Zhang et al., 2007). The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of the designed process model**

The benefits of identified steps in the process model (steps 1-5) have been explained below:

#### **Benefits of basic search technique (listed step by step as per the process model):**

##### **(1) Step 1:**

- By identifying the product or service it helps to define the main deliverable of the business and initiate the process of communicating with the searchers. For example, the main deliverable of a 'digital cameras' store would be 'digital cameras'. The store might identify its main product as 'cameras' or 'digital cameras'.

##### **(2) Step 2:**

- About Query Auto Completion:
- "Query auto-completion (QAC) is a common interactive feature that assists users in formulating queries by providing query-completion suggestions as they type" (Whiting and Jose, 2014).
- By Googling for respective product or service name it provides further keyword suggestions through its 'Query Auto Completion' feature.

- Whilst typing the product or service name into the Google search box, it provides keyword suggestions through Google's function of 'Query Auto Completion', which might provide further clues and insight into the targeted keywords.
- The keywords-suggestions listed in the Query Auto Completion list provide useful hints because it lists the keywords that convey the query-intent of the searchers which might be generic or temporal in nature. Generic keywords refer to those keywords, the search for which remains static over time e.g. Google, Youtube, Facebook, Twitter or BBC, whereas temporal keywords are those keywords the search for which spikes at certain time points under the influence of occurrence of some event, e.g. election results, sports match results, american idol, hurricane or earthquake) (Whiting and Jose, 2014).
- In addition to the benefit of 'Query Auto Completion', Google lists websites that are similar and competing for the specified product/service.

**(3) Step 3:**

- The benefit of getting a listing of competitor websites and checking their keywords and key-phrases is that it provides ideas for keywords to define the targeted product or service as well as it reveals the keywords being targeted by the competitor websites. For example, the digital cameras store might shortlist 'P900' as the perfect keyword to be targeted on one of its pages. 'P900' might be assumed to be an excellent keyword choice because it represents the code of 'Nikon COOLPIX' camera (Gandour and Regolini, 2011).
- Additionally, this process also observes cultural differences and caters for providing appropriate suggestions for specific language and geographic location. For example, the interpretation of the term bike refers to bicycles in UK and motorcycles in India. Hence, a search for the keyword 'bike' in UK and Indian version of Google fetches results specific to the respective regions.

**(4) Step 4 and Step 5:**

- The benefit of checking the keywords is that it provides an opportunity to identify and shortlist the keywords that provide an overlap between the

searchers' intention, product definition in the digital world and competing websites (Broder et al., 2009).

To conclude, stating the overall benefit of the Basic Search technique we can say that by following the above process it is possible to identify context specific, on-topic keywords accounting for the linguistic and geo-location variation of the targeted products or services (Azimi et al., 2015). It helps to find the right balance between attracting the right search-audience and avoiding the failure by selecting and targeting inappropriate keywords, which would be difficult to match by the potential clients and attract the right target audience.

### Progression of the designed process model

The progression of the designed process model along with details on pitfalls avoided have been identified in the tabular format below.

Table 4.7 Progression of the designed process model of keyword research via basic search technique

| <b>Technique name</b>        | <b>Keywords: Basic search technique</b>  |
|------------------------------|--|
| Starting point               | Identify product/service   |
| Subsequent progressive stage | Search the product/service in Google   |
| Subsequent progressive stage | Checking relevancy of results  |
| Subsequent progressive stage | Check the keywords used by competing websites  |
| Final goal attained          | Shortlist relevant keywords  |
| What are pitfalls?           | Targeting irrelevant keywords  |
| Why pitfalls may arise?      | optimizer may optimize website for keywords that do not align with the terminology of searchers and competing websites |

|                        |  |
|------------------------|--|
| How to avoid pitfalls? | By googling for the targeted product/service until the Google search results feature the target product/service. Checking keywords used by competing websites. |
| Closing discrepancy    | Bridging the knowledge gap between the optimizer, searchers and competing websites   |

### **Characteristics and inter-relation with other designed process models**

#### **Characteristics of basic keyword search technique**

- It identifies basic keywords/phrases related to the target website

#### **How it builds on subsequent techniques?**

- Its final output of basic keyword ideas, provides input for keyword tool technique to search the basic keywords using the keyword tool
- It also provides input for search queries report technique to undertake keyword research at an advanced level

#### **Technically how it is different from other techniques?**

- It provides basic ideas of relevant keywords to start keyword research

### 4.5.3 Keyword research via keyword tool technique

This section presents the figure and explanation of the process model created for executing the technique of keyword research via keyword tool. The following sections present the progression and characteristics of the process model.

#### Process model: figure and overall explanation

Figure 4.10 presents the process model designed for executing the specified technique followed by its explanation.

#### Figure of the designed process model

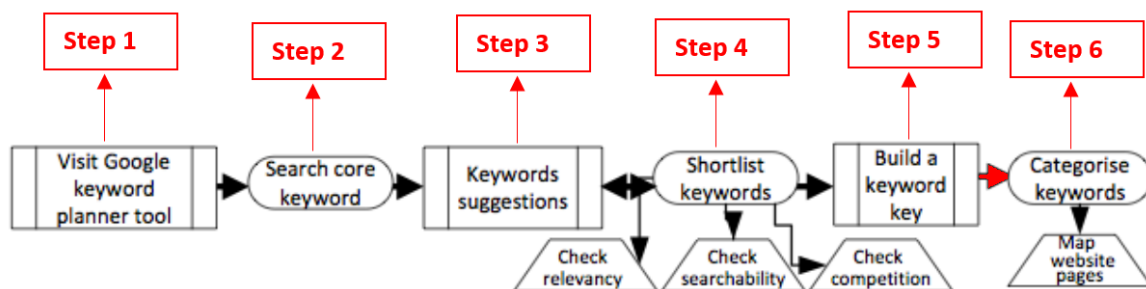


Figure 4.10 Keyword research via Keyword tool technique<sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

#### Overview of the designed process model

As shown in figure 4.10, the keyword tool technique involves using a keyword suggestion tool i.e. Google keyword planner in this instance. The keywords identified in the basic search technique are searched using the keyword planner for getting keyword suggestions (Gandour and Regolini, 2011).

The bi-directional arrow between (step 3 and step 4) Keyword Suggestions and Shortlisted Keywords indicates that the shortlisted keywords would modify the suggested keywords. The shortlisted keywords would be searched to generate more keyword suggestions (Matošević, 2015).

In order to shortlist the keywords the relevancy of the keywords (Broder et al., 2009; Moreno and Martinez, 2013) is checked, as well as the search-ability (to find if the

shortlisted keywords are searched by the searchers) and the competition is checked (to avoid keywords having huge competition).

From the shortlisted keywords, a keyword key is created in order to categorise the shortlisted keywords into respective categories which are further mapped to the website pages. As discussed in the *characteristics of keywords* section 2.3 of chapter 2, this process model enables one to obtain the characteristic of specificity i.e. selection of specific keywords. The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of Keyword tool technique**

The benefits of identified steps in the process model (steps 1-6) used for researching keywords using the keyword tool have been explained below:

#### **Benefits of keyword tool technique (listed step by step as per the process model):**

##### **(1) Step 1:**

- Google provides keyword suggestions through its keyword tool (Fuxman et al., 2008). Currently, Google is the most popular search engine receiving more than 4 million queries a minute (Rathi et al., 2016). The primary benefit of using its keyword tool is that it provides keyword suggestions based on trillions' of search queries received from the searchers on an annual basis.
- Google provides this tool to help websites generate keywords for optimizing their websites on the identified keywords. It also provides additional information on the suggested keywords including the average monthly searches and an estimate on the competition.

##### **(2) Step 2 and Step 3:**

- The primary benefit of searching the core keyword is that it provides keyword suggestions related to the primary keyword(s) of the website, whilst providing other key information including different versions of the product/service, established brands, geographic information, etc. which would



be applicable uniquely for different businesses (Gandour and Regolini, 2011).

- For example, for the website selling digital cameras, the core keyword would be 'digital cameras'

### (3) Step 4:

- The primary benefit of shortlisting keywords is that it filters out keywords which are not directly related to the website, might have a very high search frequency and are highly competitive for which it would be very difficult to establish initial visibility and build the rankings for the target website (Moreno and Martinez, 2013; Yih et al., 2006).

In fact it enables the target website to shortlist keywords which are directly related, have low search frequency and low competition. Hence it facilitates the process to choose the keywords very cautiously that have high probability for establishing initial visibility for the target website.

- For example if the digital cameras website is selling digital cameras of different brands then, the directly related keywords would include Nikon digital camera, Olympus digital camera, Sony digital camera, Fujifilm digital camera, and so on.

Since these keywords would be highly competitive therefore it would be advisable to look for keyword variants which have search frequency between 10 and 30 average monthly searches. For example, instead of Nikon digital camera, it is recommendable to target long tail keywords with low search frequency and low competition such as nikon d3400 mount, flash nikon d3400, nikon bluetooth digital camera, etc.

### (4) Step 5:

- The primary benefit of building the keyword key is that it identifies the semantic categories for the shortlisted keywords (Wilson and Pettijohn, 2006). These categories provide a good overview of the scope of information of the website and helps to define the information architecture of the website.
- For instance, in the case of a digital cameras website the keyword categories would be according to the brands e.g. *Digital cameras by Nikon*,

*Digital cameras by Olympus, Digital cameras by Sony, and Digital cameras by Fujifilm.*

(5) **Step 6:**

- The primary benefit of categorising keywords is that it groups the short-listed keywords into their respective semantic categories. Semantically the keywords belonging to a certain concept co-occur in textual information which provide an indication to search engines of the covered theme. Hence, the semantic categorisation of keywords provide a good clue for the theme of the website to the searchers as well as the search engines (Goel et al., 2010).
- For instance, the presence of keywords such as *nikon d3400 mount, flash nikon d3400, nikon bluetooth digital camera*, would indicate the theme as ***Nikon digital cameras*** to the search engines.

### Progression of the designed process model

The progression of the designed process model along with details on pitfalls avoided have been identified in the tabular format below.

Table 4.8 Progression of the designed process model of keyword research via keyword tool technique

| Technique name               | Keyword tool technique                            |
|------------------------------|---|
| Starting point               | Visiting Google Keyword Planner Tool              |
| Subsequent progressive stage | Getting keyword suggestions                       |
| Subsequent progressive stage | Shortlisting keywords                             |
| Subsequent progressive stage | Identifying relevant categories to group keywords |
| Subsequent progressive stage | Categorising keywords under respective categories |

|                         |  |
|-------------------------|--|
| Final goal attained     | Shortlisting relevant, searchable and competitive keywords and categorising them in respective categories  |
| What are pitfalls?      | Ignoring optimization for keywords that fall within the scope of the targeted website. optimizing website for keywords that are irrelevant, not searched by searchers or are highly competitive.   |
| Why pitfalls may arise? | If the target keyword list is not expanded and evaluated for relevance, searchability and competition then the whole optimization-campaign would not deliver the desired results and lead to under-performance of the website in the Search Engine Results Pages |
| How to avoid pitfalls?  | Expanding the keywords list and focussing on building ranking for keywords that are relevant, searchable and have low competition. Categorising the short-listed keywords in respective categories to create information silos.                                  |

|                     |   |
|---------------------|---|
| Closing discrepancy | Creating information silos to provide a clear indication to search engines for indexing the optimized website in the appropriate category of product/service alongwith its geographical location, where applicable. |
|---------------------|---|

### **Characteristics and inter-relation with other designed process models**

#### **Characteristics of keyword tool technique**

- It expands the target keywords list through keyword suggestions provided by keyword tool

#### **How it builds on subsequent techniques?**

#### **Content writing technique**

- Its final output of a keywords list provides relevant, searchable and competitive keywords to create content

#### **Information architecture technique**

- The identification of categories of keywords identifies the concepts and sub-concepts falling within the scope of the website

#### **HTML code optimization technique**

- The specification of keywords to the HTML code adds context to the code

### Technically how it is different from other techniques?

- It filters keywords on basis of relevance, searchability and competitiveness

#### 4.5.4 Keyword research via search queries report technique

This section presents the figure and explanation of the process model created for executing the technique of search queries report technique. The following sections present the progression and characteristics of the process model.

#### Process model: figure and overall explanation

Figure 4.11 presents the process model designed for executing the specified technique followed by its explanation.

#### Figure of the designed process model

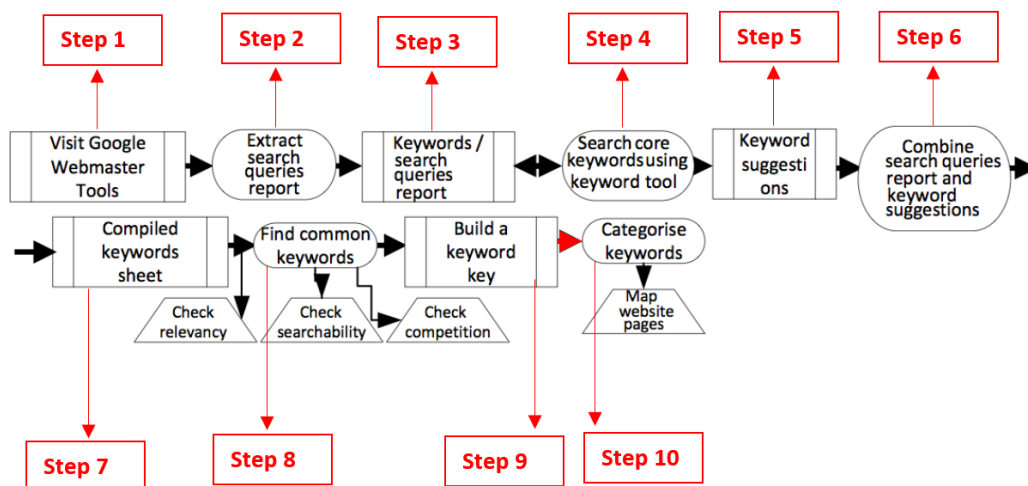


Figure 4.11 Keyword research via Search queries report technique<sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

#### Overview of the designed process model

The search queries technique makes the assumption that the website is registered with Google webmaster tools.

As shown in figure 4.11, to begin with the execution of the process, Google webmaster tools or Google search console is accessed and the search queries report is extracted (Killoran, 2013; Yih et al., 2006).

As an output the keywords list is extracted that reveals the keywords which were searched by the searchers in Google for which the website was listed in SERPs (Pan, 2015).

The core keywords from search queries report are used to conduct further keyword research by using the keyword tool.

As shown between the third and fourth step of the process displayed in figure 4.11, the bi-directional arrow between the *Keywords/Search queries report* and *Conduct keyword search in keyword tool (using your core keyword)* indicates that the *Keywords / Search queries report* would be modified based on the suggested keywords.

The output of this step is a keyword suggestions list, which is derived by extracting keywords suggestions as suggested by the keyword suggestion tool.

In the next step, the keyword suggestions list is combined with the search queries report. From the compiled keywords sheet, the common keywords are spotted. The common keywords indicate that the keywords exist in the search queries report (extracted via Google webmaster tools) as well as the suggested keywords (via the Google's keyword tool).

For the common keywords the relevance of the keywords (i.e. keywords are related to the website), searchability of the keywords (i.e. keywords are actually being used by the searchers), and the competition (i.e. competition is not too high) is checked (Killoran, 2013; Yih et al., 2006).

Further on the basis of keywords' categories a keyword key is created, the common shortlisted keywords are categorised according to the key. Finally the keywords are mapped and allocated to the website pages.

As discussed in the *characteristics of keywords* section 2.3.3 of chapter 2, this process model enables one to interpret the deployed keywords and assists in selecting the right keywords. The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of the designed process model**

The identified steps in the process model (steps 1-10) have been explained below:

#### **Benefits of search queries report technique (listed step by step as per the process model):**

**(1) Step 1, Step 2 and Step 3:**

- Google webmaster tool provides an insight on the keywords for which the website is visible in SERPs, its average ranking position and the traffic generated from this visibility. It provides this report in Search queries report or Query Analytics.
- The primary benefit of extracting the search queries report is that it reveals the keywords for which the website got listed in the search results page, its average ranking position and the traffic generated from this visibility. It reveals the keywords for which the target website is already listed in Google's index. Hence it helps to identify keywords having a high probability for improving the website's visibility and ranking in SERPs.

**(2) Step 4 and step 5:**

- The primary benefit of searching core keyword in Google keyword tool is that it reveals keywords, that are related to the primary keyword for expanding the keywords list (Killoran, 2013).

These keyword suggestions can be combined and compared with the search queries report (extracted in previous step) to find the common keywords in these two reports.

**(3) Step 6, step 7 and step 8:**

- The search queries report extracted from Google Webmaster Tools is combined with the keyword suggestions provided by Google Keyword Tool to find the common keywords.
- The keywords that are common indicate an important characteristic in the terms that Google has indexed the website for those keywords and importantly these keywords are also being searched by the searchers.

- The primary benefit for optimizing the target website for these keywords is that it would probably result in increased ranking for the target website.
- Overall the core benefit of steps 6, 7 and 8 is to identify low hanging fruit of keywords for which Google already recognises the target website and work towards building the website ranking for these keywords after filtering them for relevance, low search frequency and low competition.
- For example, if the common keywords between Search Queries Report and Keyword Suggestions provided by keyword tool were found to be: nikon d3400 mount, flash nikon d3400, nikon bluetooth digital camera, etc., then the optimization for these keywords would probably result in improved ranking for the target website.

(4) **Step 9 and Step 10:**

- (a) **Benefits of step 9 of 'Build a keyword key' and step 10 of 'categorise keywords' have been explained in Keyword Tool technique.**

### Progression of the designed process model

The progression of the designed process model along with details on pitfalls avoided have been identified in the tabular format below.

Table 4.9 Progression of the designed process model of keyword research via search queries report technique

| <b>Technique name</b>        | <b>Search queries report technique</b>  |
|------------------------------|---|
| Starting point               | Visiting Google Webmaster Tools or Google Search Console                        |
| Subsequent progressive stage | Extracting search queries or search analytics report from Google search console |
| Subsequent progressive stage | Searching core keywords using keyword tool to get keyword suggestions           |



|                              |  |
|------------------------------|--|
| Subsequent progressive stage | Combining search queries report and keyword suggestions  |
| Subsequent progressive stage | Identifying common keywords  |
| Subsequent progressive stage | Identifying keyword categories   |
| Subsequent progressive stage | Categorising keywords under respective categories  |
| Final goal attained          | Find common keywords between keyword suggestions provided by Google keyword tool and search queries report (search analytics) provided by Google Webmaster Tools |
| What are pitfalls?           | The optimizer may optimize the target website for keywords which do not get recognised by Google   |
| Why pitfalls may arise?      | The optimizer might interpret some keywords to be directly relevant to the target website but Google may deem those keywords irrelevant                          |
| How to avoid pitfalls?       | By identifying and optimizing for keywords being searched by searchers for which the website is already indexed in Google  |

|                     |  |
|---------------------|--|
| Closing discrepancy | Mitigating the risk of optimizing for inaccurate keywords by identifying keywords that are common between searchers and Google-index |
|---------------------|--|

### **Characteristics and inter-relation with other designed process models**

#### **Characteristics of search queries report technique**

- It identifies keywords having the scope of attaining higher ranking

#### **How it builds on subsequent techniques?**

- It is a parallel technique to the keyword tool technique providing input for information architecture, content creation and HTML code optimization technique as identified in keyword tool technique

#### **Technically how is it different from keyword tool techniques?**

- In addition to searchability and competitiveness of keywords, it identifies keywords indexed in Google as well as being searched by the searchers

### **4.5.5 Designing information architecture process model**

This section presents the figure and explanation of the process model created for executing the technique of information architecture. The following sections present the progression and characteristics of the process model.

### Process model: figure and overall explanation

Figure 4.12 presents the process model designed for executing the technique of creation of information architecture for the website followed by its explanation.

### Figure of the designed process model

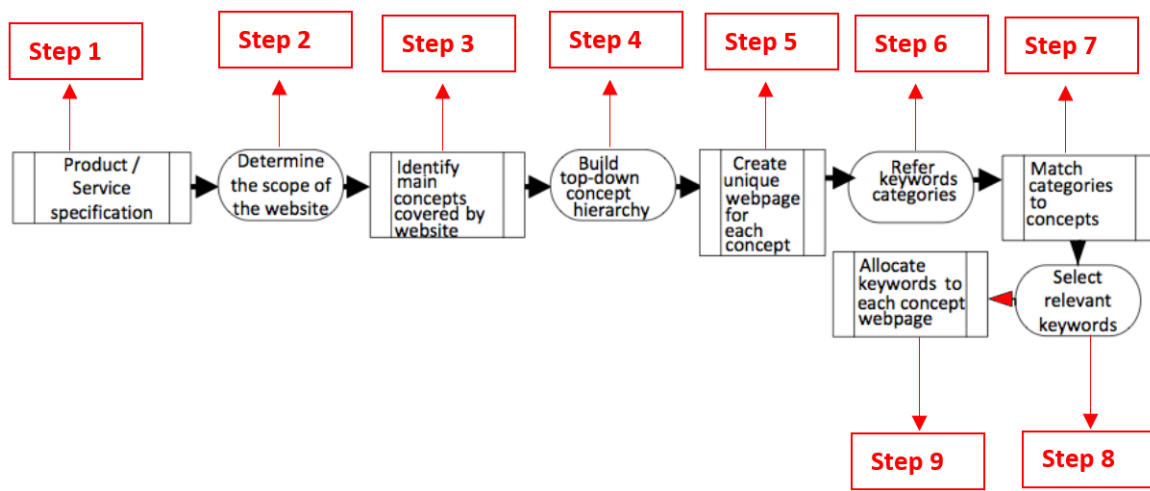


Figure 4.12 Site information architecture model <sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

### Overview of the designed process model

As shown in figure 4.12, the product or service specific information is used to determine the scope of the website. From the scope and information of the website, the main concepts and sub-concepts to be covered by the website are identified (Wang et al., 2017).

A top-down concept hierarchy is built from the available information and a unique webpage is created for each concept and the sub-concept (Chen et al., 2014).

The keywords' categories are referred which were created during the keyword research process.

Each of the concepts and sub-concepts are matched to the keyword categories and relevant keywords are selected and allocated to the respective webpages. As discussed in the *information architecture* section 2.5 of chapter 2, this process model

enables to create the context and structured navigation in the website. The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of the designed process model**

The benefits of identified steps in the process model (steps 1-9) have been explained along with the realised benefits.

### **Benefits of information architecture technique (listed step by step as per the process model):**

#### **(1) Step 1, Step 2 and Step 3:**

- It helps to identify the semantic concepts covered by the website to provide sufficient information to search engines for indexing the website in the appropriate category (Han and Fu, 1994). Additionally, it uses language which is common to the searchers' terminology. For instance the concepts covered by digital cameras store could be: *Camera brands, Digital SLRs (Single Lens Reflex Cameras), Compact Digital Cameras, Bridge Cameras, Camera accessories, Digital camera reviews, Digital camera features*
- The primary benefit of this step is that it accounts for the functionality (entity-based indexing and ranking) of information retrieval systems, which is favourable for indexing and ranking of the target website.

#### **(2) Step 4:**

- By building top-down concept hierarchy, the website information is arranged in a structured order using high level conceptual terms which expresses the relationship between these concepts, that enables accurate interpretation by search engines and awarding appropriate visibility to the website (Song et al., 2011). For instance in case of digital cameras website the top-down concept hierarchy is displayed in figure 4.13.

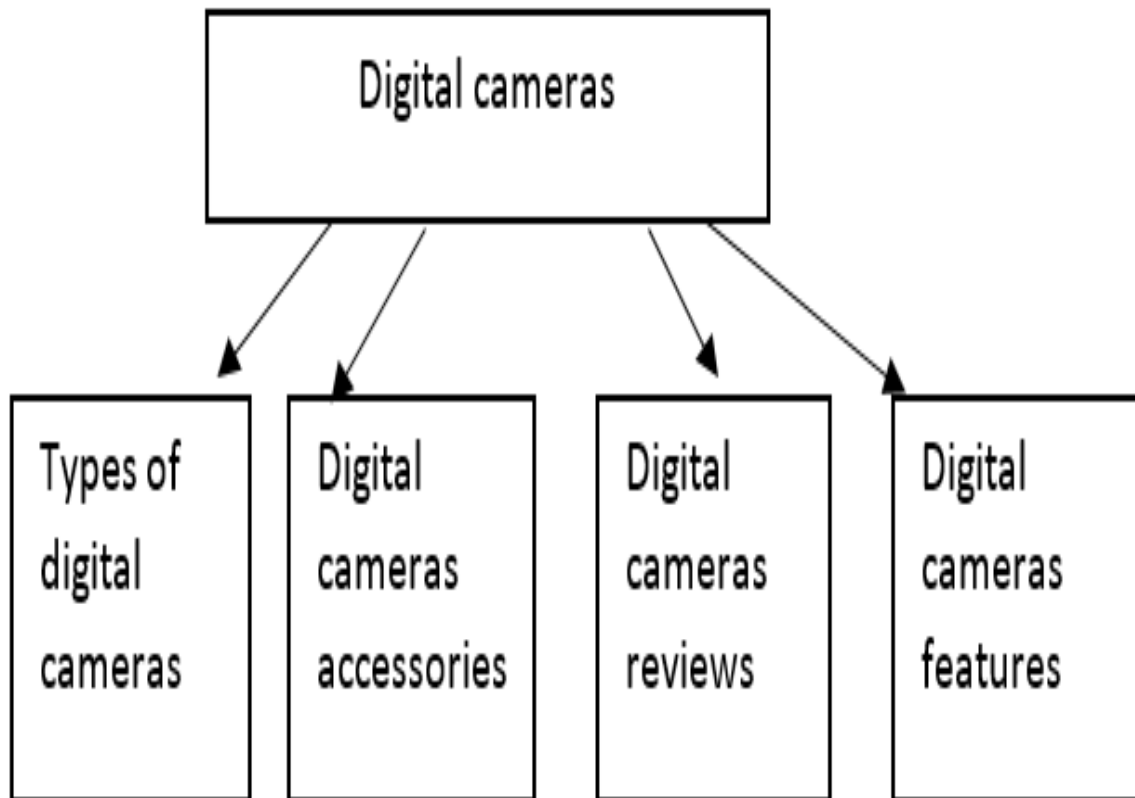


Figure 4.13 An example of top-down concept hierarchy

**(3) Step 5, step 6, step 7, step 8 and step 9:**

**(a) Benefits of these steps:**

- The primary benefit of these steps is to create an effective information architecture for the website. It semantically maps the keyword-categories to the concepts covered by the website (Rahim and WMI, 2006). The search engines' website-interpretation is guided by the information architecture of the website. Further the scope of each covered concept is conveyed by the semantic meaning of keywords used in each of the website pages

**Progression of the designed process model**

The progression of the designed process model along with details on pitfalls avoided have been identified in tabular format below.

Table 4.10 Progression of the designed process model of keyword research via information architecture technique

| <b>Technique name</b>  | <b>Information architecture model</b>  |
|--|--|
| Starting point   | Product/service specification  |
| Subsequent progressive stage   | Determine the scope of website   |
| Subsequent progressive stage   | Identify main concepts covered by website  |
| Subsequent progressive stage   | Build top down concept hierarchy   |
| Subsequent progressive stage   | Create unique page for each identified concept and sub-concept                                   |
| Subsequent progressive stage   | Refer keyword categories   |
| Interlink with keyword research process models (keyword tool and/or search queries report technique) | The keyword categories are referred to match the identified concepts with respective categories. |
| Subsequent progressive stage   | Select relevant keywords   |
| Subsequent progressive stage   | Allocate keywords to each concept webpage  |
| Final goal attained  | Build concept hierarchy and allocate keywords to each concept webpage                            |

|                         |  |
|-------------------------|--|
| What are pitfalls?      | Not aligning to the product/service scope of the website which may result in dis-integrating the theme and information hierarchy of the website and its interpretation by search engines. It may also affect the usability and accessibility of website.                                   |
| Why pitfalls may arise? | Not optimizing for keywords shortlisted in the keyword research process due to inappropriate understanding and identification of concept of the product/service being provided by the website, which may lead to ineffective website structure and mis-representation of core information. |
| How to avoid pitfalls?  | Covering the scope of target website by clearly defining its concept hierarchy. By optimizing for the keywords shortlisted under each semantically-relevant concept  |
| Closing discrepancy     | Creating a semantic website structure instead of a flat structure  |

**Characteristics and inter-relation with other designed process models****Characteristics of information architecture process model**

- It identifies the main concepts and sub-concepts covered by the website

**How it builds on subsequent techniques?**

- It semantically aligns the identified concepts and sub-concepts of the website with the categories of keywords

**Technically how it is different from other techniques?**

- It creates the information architecture of the website

**4.5.6 Designing content writing process model**

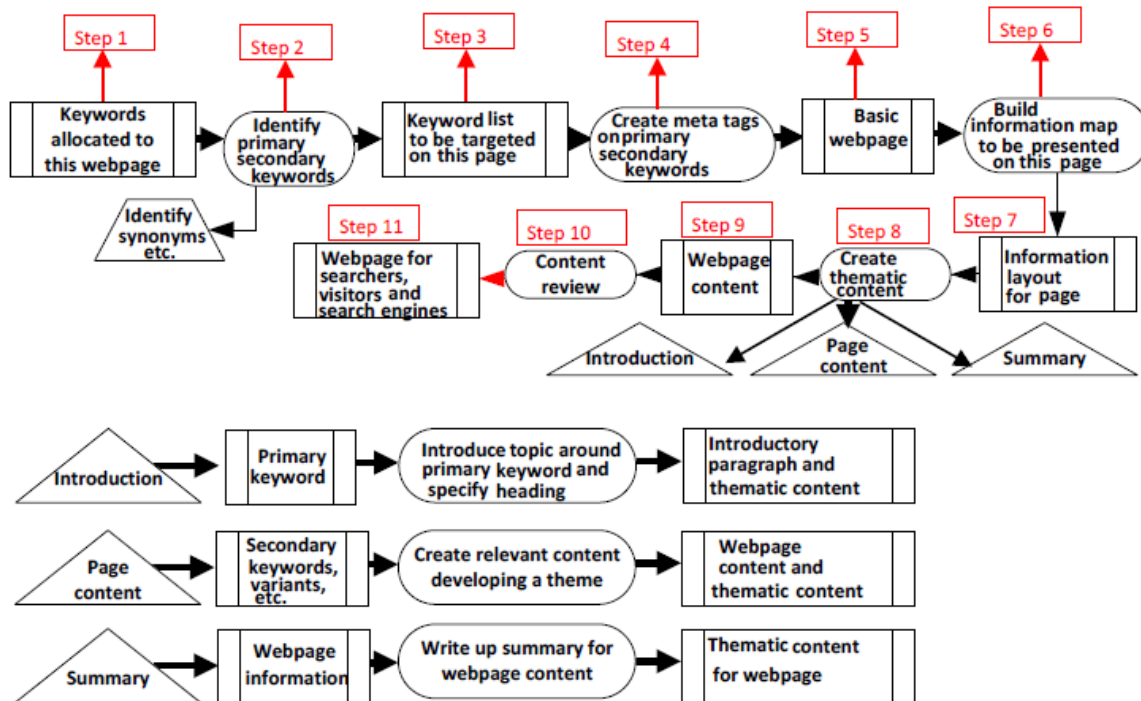
This section presents the figure and explanation of the process model created for executing the technique of content writing. The following sections present the progression and characteristics of the process model.

**Process model: figure and overall explanation**

Figure 4.14 presents the process model designed for executing the specified technique of content writing followed by its explanation.



Figure of the designed process model

Figure 4.14 Content writing model and content writing methods<sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

### Overview of the designed process model

As shown in figure 4.14, the keywords allocated to the respective webpage are referred. Depending on the information and concepts to be presented on the page, the primary and secondary keywords are identified from the allocated keywords to this page.

By considering the allocated keywords, a keywords list is created consisting of the synonyms, topic related words, and word variants of the primary and secondary keywords (Shen et al., 2014).

Further an information map is created that has to be presented on this page. Depending on the information map, content is created for this webpage. The introduction is created by including the information on the primary keyword and the following content of the page is created by using the secondary keywords, word variants etc. Subsequently a summary of the page is presented, in the concluding paragraph

(Everdell, 2014) of the webpage. As discussed in the *content creation* section 2.4 of chapter 2, this process model enables one to select the topic related keywords to create content and deploy them in suitable places within the webpage. The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of the designed process model**

The identified steps in the process model (steps 1-11) have been explained below:

#### **Benefits of content writing technique (listed step by step as per the process model):**

##### **(1) Steps 1, 2, 3, 4, 5:**

- The primary benefit of these steps is that it creates thematic content for the webpage using primary and secondary keywords which indicates the webpage-theme to search engines. For example, if a webpage contains the keywords such as America, president, Republicans, Trump, etc. then the likelihood is that the page is about US president Donald J. Trump. Including these keywords in a webpage, gives a good clue about the theme of the webpage (Matošević, 2015).

##### **(2) Steps 6, 7, 8, 9, 10, 11:**

- The primary benefit of these steps is that it feeds search engines' with the most important information relevant to the web page which helps in building website's visibility on the theme of the specified keywords (Fishkin and Høgenhaven, 2013; Zhang and Cabage, 2017).
- It creates content in an inverted pyramid providing most important information in the introduction followed by less important details in the subsections and concluding with general and background information.

### **Progression of the designed process model**

The progression of the designed process model along with details on pitfalls avoided have been identified in the tabular format below.

Table 4.11 Progression of the designed process model of content creation

| <b>Technique name</b>   | <b>Content writing model</b>  |
|---|---|
| Interlink with keyword re-<br>search process models<br>(keyword tool or search<br>queries report technique) | The final output of keyword<br>tool or search queries re-<br>port technique is the in-<br>put required for the starting<br>point of this process model            |
| Starting point  | Consider keywords allo-<br>cated to the specified web-<br>page. These keywords are<br>shortlisted by executing the<br>keyword research process<br>model(s)        |
| Subsequent progressive<br>stage   | Identify main keywords (pri-<br>mary keywords) alongwith<br>the variants (secondary<br>keywords) to be targeted<br>on this webpage                                |
| Subsequent progressive<br>stage   | Create meta tags using the<br>identified keywords   |
| Subsequent progressive<br>stage   | Create an information map<br>or layout to be presented<br>on this webpage   |
| Subsequent progressive<br>stage   | Create thematic content ac-<br>cording to the information<br>layout specified for the web-<br>page consisting of introduc-<br>tion, page content and sum-<br>mary |
| Subsequent progressive<br>stage   | Review the created content  |

|                         |  |
|-------------------------|--|
| Final goal attained     | Creating keyword rich webpage for effective indexing by search engines and reference by searchers  |
| What are pitfalls?      | Creating generic content without including relevant keywords, minimizing the chances of building desired rankings for target keywords                  |
| Why pitfalls may arise? | Exclusion of relevant keywords would not build the information theme that aligns with the terminology of searchers and functionality of search engines |
| How to avoid pitfalls?  | By creating thematic content, focussed on the semantic theme of the keywords shortlisted for the specified webpage                                     |
| Closing discrepancy     | By using appropriate keywords in content which aligns with the terminology of searchers and search engines indexing process                            |

### **Characteristics and inter-relation with other designed process models**

#### **Characteristics of content writing process model**

- It creates keyword rich content relevant for searchers and search engines

**How it consumes information from other techniques?**

- It creates content using the keywords shortlisted via keyword research process models

**Technically how it is different from other techniques?**

- It creates contextual content to provide relevant information

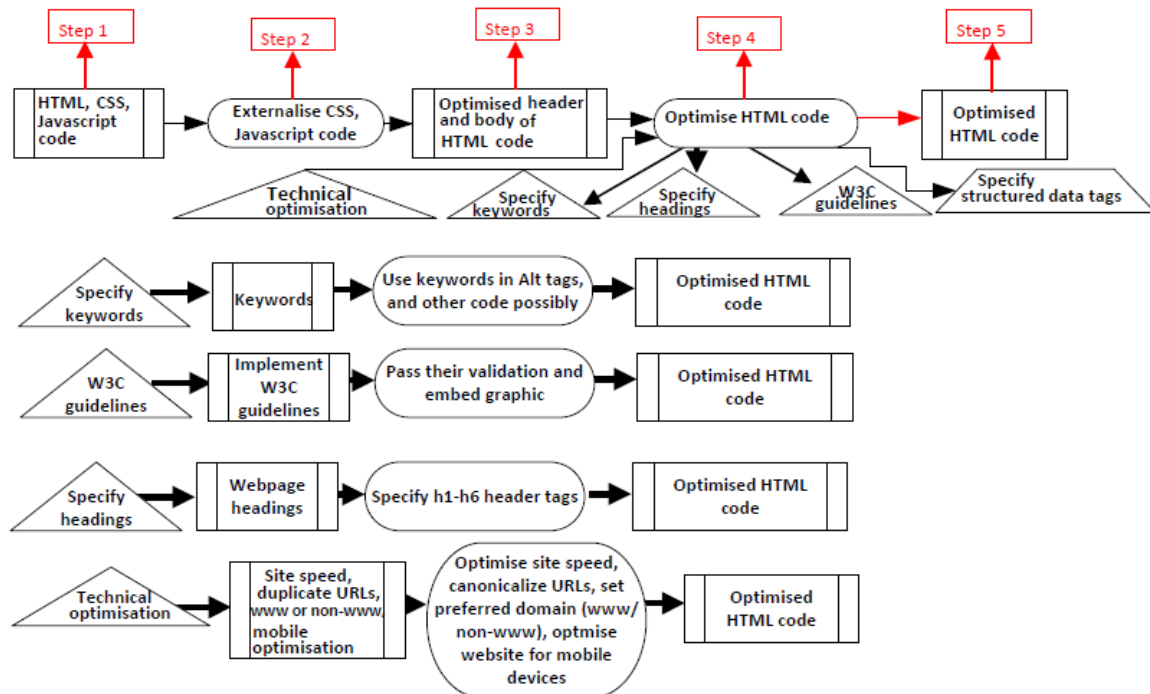
**4.5.7 Designing HTML code optimization process model**

This section presents the figure and explanation of the process model created for executing the technique of HTML code optimization. The following sections present the progression and characteristics of the process model.

**Process model: figure and overall explanation**

Figure 4.15 presents the process model designed for executing the technique of HTML code optimization followed by its explanation.

Figure of the designed process model

Figure 4.15 Optimization of HTML code model and methods<sup>1</sup>

<sup>1</sup>Key: Red arrow indicates decision point

### Overview of the designed process model

As shown in figure 4.15, the webpages consisting of HTML, CSS and Javascript code need to externalise the CSS and Javascript code. Subsequently the HTML code is optimized by specifying keywords in alt Tags, file names, etc. (Patil Swati et al., 2013). The headings are created for important sections of the page. Further, the World Wide Web Consortium (W3C) guidelines are implemented and validated. Their validation badge is published on the webpages. As discussed in the *webpage HTML code optimization* section of chapter 2, this process model enables to optimize the source code of the webpage. The next section identifies the benefits of the steps identified in the figure of the process model.

### **Step by step explanation of the designed process model**

The benefits of identified steps in the process model (steps 1-5) have been explained below:

#### **Benefits of HTML code optimization technique (listed step by step as per the process model):**

**(1) Steps 1, 2, 3:**

- The primary benefits of steps 1, 2 and 3 are that they reduce the amount of technical-code which is ignored by the search engine crawlers (Hui et al., 2012).

**(2) Steps 4 and 5:**

- The primary benefit of steps 4 and 5 are that it optimizes the code as per W3C guidelines which adds credibility to the webpage. Further, it contextualises the code by specifying keywords in file names, headings, etc. (Fuxman et al., 2008) used the keywords in webpage address or URLs for identifying the context of the webpage. Search engines try to decode the context of the webpage(s) in a similar manner.

#### **Progression of the designed process model**

The progression of the designed process model along with details on pitfalls avoided have been identified in the tabular format below.

Table 4.12 Progression of the designed process model of HTML code optimization

| <b>Technique name</b>   | <b>HTML code optimization model</b>   |
|---|---|
| Interlink with keyword re-search process models (keyword tool and/or search queries report technique) | Interlink with the keywords process model for specifying keywords in HTML code like alt tags, file names, etc. Also interlinked with the content writing process mode for specifying heading in webpage content |
| Starting point  | HTML, CSS, Javascript code  |
| Subsequent progressive stage  | Externalise CSS, Javascript code  |
| Subsequent progressive stage  | optimize HTML code by specifying keywords, headings and implementing W3C guidelines   |
| Final goal attained   | optimized HTML code   |
| What are pitfalls?  | Providing unnecessary code to search engine robots that may hamper the interpretation and indexing of website by search engines   |
| Why pitfalls may arise?   | Adding code within the webpage which could well be externalised to the webpage e.g. CSS and Javascript  |
| How to avoid pitfalls?  | By externalising the CSS and Javascript code  |



|                     |   |
|---------------------|---|
| Closing discrepancy | Adding context by specifying keywords in the HTML code via alt tags, file names, etc. |
|---------------------|---|

## Characteristics and inter-relation with other designed process models

### Characteristics of optimization of HTML code process model

- It optimizes and contextualises the webpage code to facilitate interpretation and indexing of website by search engines

### How it consumes information from other techniques

- It specifies keywords in HTML code shortlisted via keyword research process models.

### Technically how it is different from other techniques

- It optimizes HTML code

## 4.6 Intra-relation and inter-relation between different process models designed

The explanation of each of the process model highlights its relation to the other process models. This intra-relation (relation within process models of the same technique i.e. keyword research) and inter-relation (relation between process models of different techniques i.e. keyword research, content writing, information architecture and HTML code optimization), has been highlighted in figure 4.16.

**Intra-relation within specified techniques**

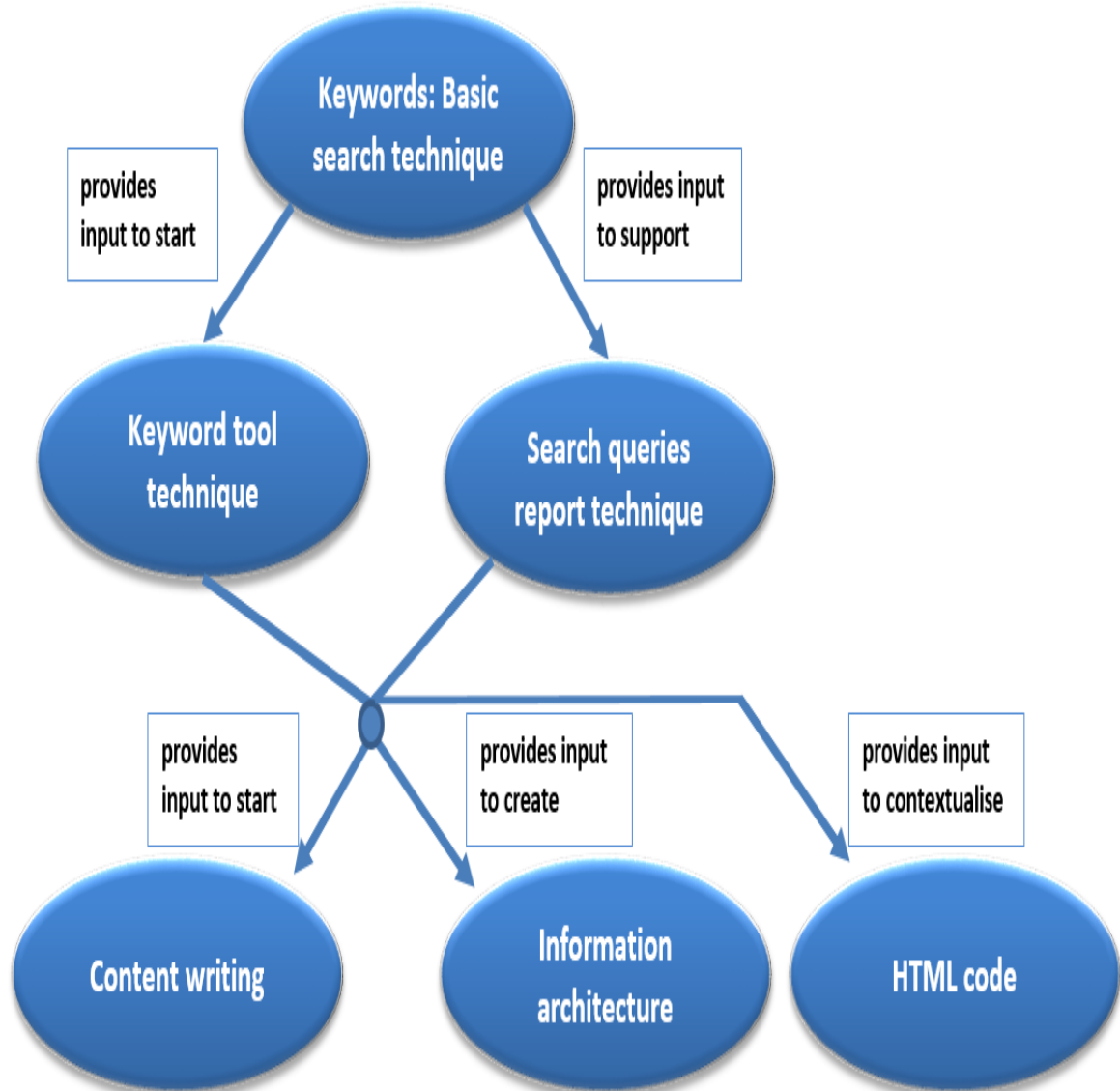


Figure 4.16 Highlighting the intra and inter relation between techniques

Figure 4.16, highlights the intra and inter relation between the different techniques of keyword research. The keywords' information shortlisted via basic search technique provides a basis to advance the keyword research via keyword tool technique or search queries report technique. Further, the keywords shortlisted via keyword tool and search queries report technique(s), provide input for creating the information

architecture of the website and to start the content writing for different pages of the website. Further keywords are used to contextualise the HTML code of the website.

### Unique characteristics of the specified techniques

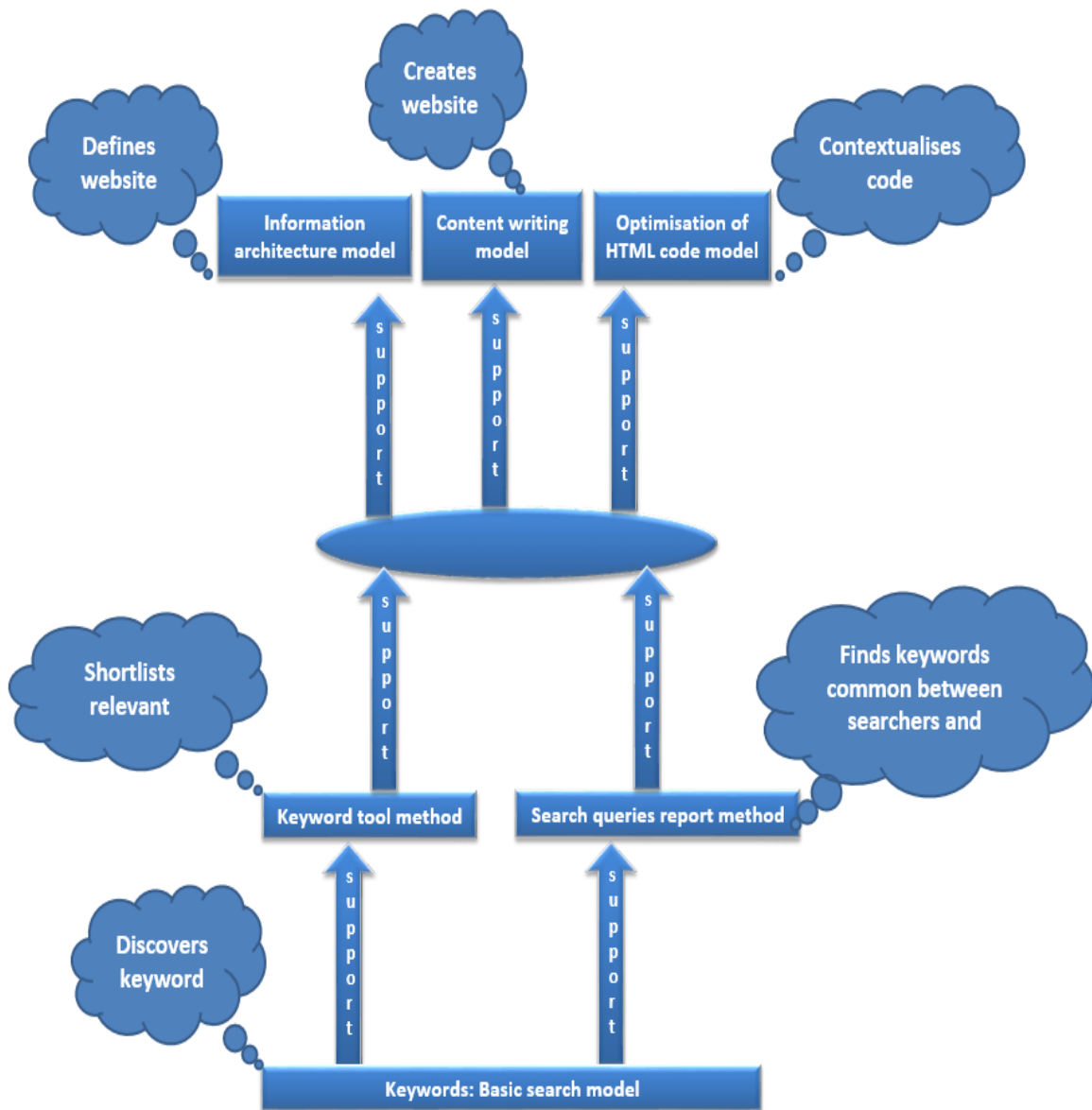


Figure 4.17 Highlighting the unique characteristics

As highlighted in the respective sections of each of the techniques (keyword research, information architecture, content writing and HTML code optimization), the figure 4.17 identifies their unique characteristic or final output.

## 4.6 Intra-relation and inter-relation between different process models designed 171

- the basic search technique discovers keyword ideas
- the keyword tool technique shortlists relevant keywords by analysing their searchability and competition
- the search queries report technique finds keywords common between searchers and search analytics and analyse their searchability and competition
- the information architecture technique defines website structure
- the content writing technique creates website information
- the optimization of HTML code technique contextualises code

### SEO taxonomy and covered techniques

Considering the overall taxonomy of SEO, the current research has covered the on-page techniques of keyword research, information architecture, content creation and HTML as highlighted in figure 4.18.

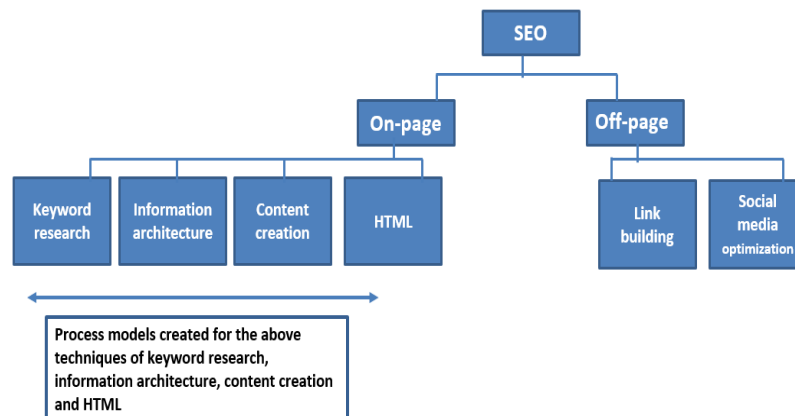


Figure 4.18 On-page SEO techniques covered in current research

## 4.7 Recording experience in process models at the Specific Project Level

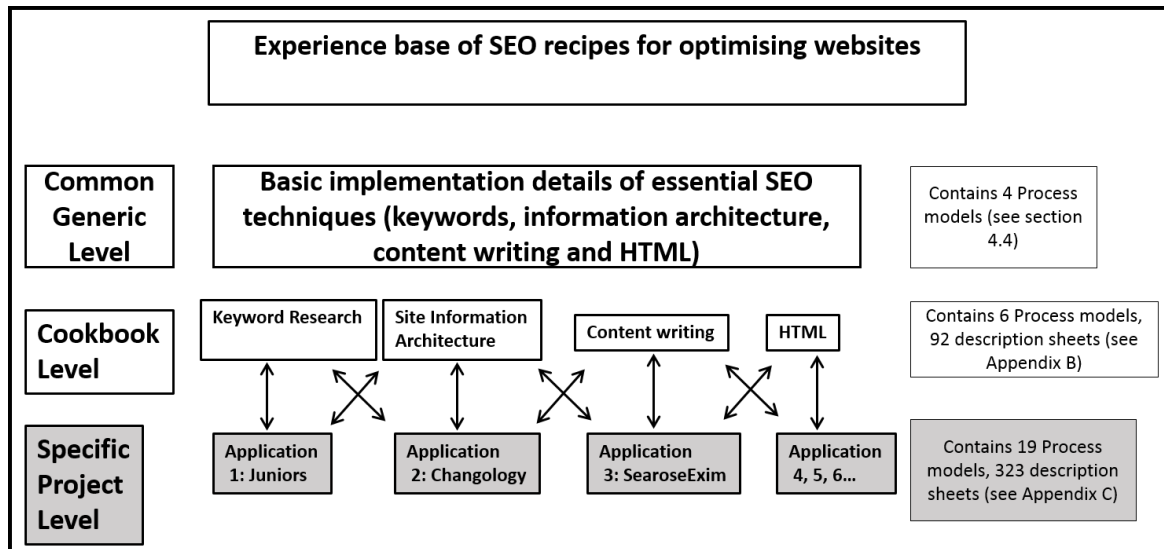


Figure 4.19 Highlighting the project specific level of the created SEO experience base

As highlighted in figure 4.19, in this section the experience is recorded in the process models

In the previous section, 4.5, the process models were created on the cookbook level. In this section, the cookbook level process models have been initiated at the project level i.e. application of implementation procedures to specific projects. The project specific process models represent the specific implementation details used for implementing one or more essential on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization for case study websites explained in tables 3.2 and 3.3.

To represent experience knowledge, the current research has composed the cases in the form of process models and stored in the experience base on the basis of individual case studies for which some or all essential on-page SEO techniques (keywords, information architecture, content writing, and optimization of HTML code) were implemented in the past and positive long-term results were achieved on the main search engine, i.e. Google.

As these projects were implemented in the past therefore in this chapter the process models have been initiated (inputs, processes, outputs, methods, agents, etc.) with project specific information used to execute the projects for case studies as explained in the *case studies section 4.8 of chapter 4*.

Description sheets were created for each mentioned element in the process models containing their information and implementation details. These sheets had been interlinked and stored in the experience factory of SEO experience module at the specific project level and presented in the appendix C. The composed process models for case study websites are stored and organised as per the on-page technique as briefly explained in the sections that follow.

### **4.7.1 Keyword research process models**

Different keyword research techniques including basic keyword research technique, keyword planner tool technique and search queries report technique have been implemented for the case study websites including SaiDigital.co.uk, Searoseexim.com, Changology.co.uk, and Juniors.net. The implementation process of the implemented techniques for these case study websites has been recorded in the process models.

## 4.7.2 Basic keyword search process model applied for SaiDigital.co.uk project

### Project level process model

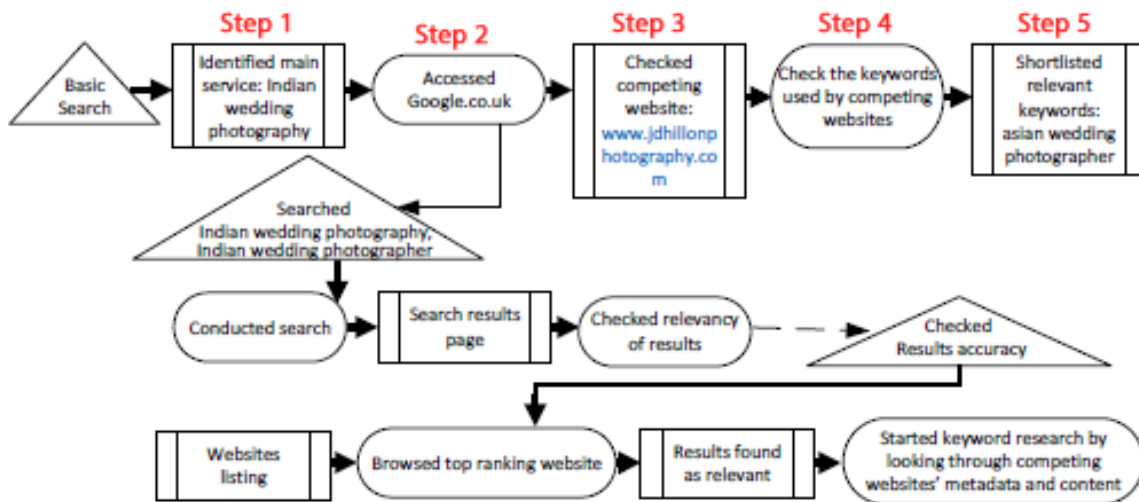


Figure 4.20 Basic keyword search process model applied for SaiDigital.co.uk project

The process model represented in figure 4.20 explains the implementation procedure used for applying the basic keyword search technique for SaiDigital.co.uk. It follows the implementation procedure represented in figure 4.9.

Whilst executing this process model, by following step 1, the main service was identified as 'indian wedding photography'.

By executing step 2, the keyphrases, 'indian wedding photography' and 'indian wedding photographer' were searched in Google.co.uk and the process model got the output of the main competitor i.e. [www.jdhillonphotography.com](http://www.jdhillonphotography.com), which is highlighted in step 3. Further by executing step 4, competing websites ([www.jdhillonphotography.com](http://www.jdhillonphotography.com) and other top ranked websites) were checked for shortlisting the relevant keywords.

By executing step 5, the primary relevant keyphrase was shortlisted as asian wedding photographer.

### Lessons learnt

From an optimizer’s perspective it is not advisable to target the keywords or key phrases of product or service as defined by the website owner. Instead it is advised to use the description of product or service as provided by the website owner and use it to find the corresponding relevant keywords or key phrases by reviewing competitive websites listed in SERPs. SaiDigital defined its services as ‘indian wedding photography’, but by applying the basic search technique, it was found that ‘asian wedding photographer’ was the appropriate key phrase to be targeted by the website.

### 4.7.3 Basic keyword search process model applied for Searosexim.com project

#### Project level process model

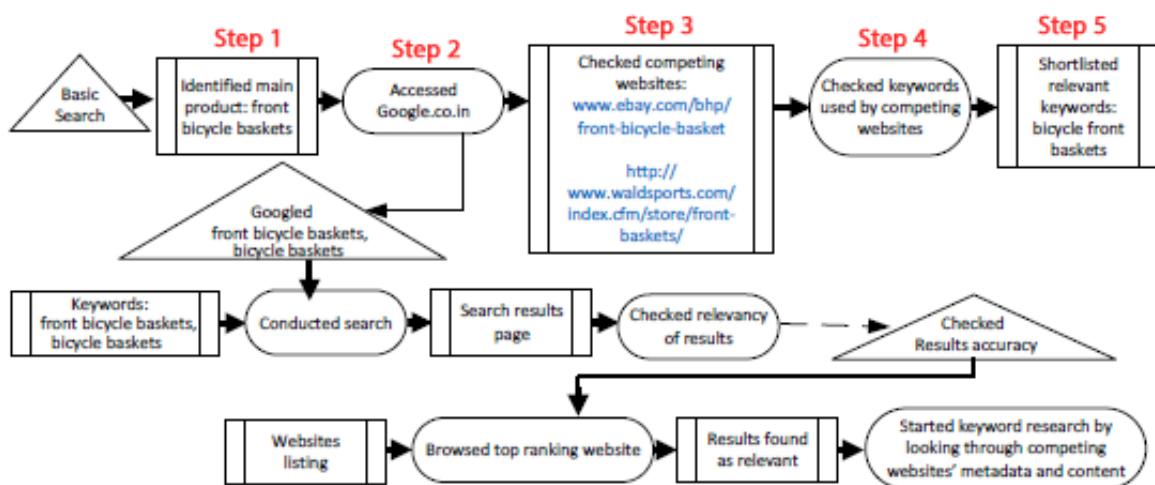


Figure 4.21 Basic keyword search process model applied for Searosexim.com project

The process model represented in figure 4.21 explains the implementation procedure used for applying basic keyword search technique for Searosexim.com. It follows the implementation procedure represented in figure 4.9.



Whilst executing this process model, by following step 1, the main service was identified as 'front bicycle baskets'.

By executing step 2, the keyphrases, 'front bicycle baskets' and 'bicycle baskets' were searched in Google.co.in and the process model got the output of the main competitors i.e. [www.ebay.com/bhp/front-bicycle-basket](http://www.ebay.com/bhp/front-bicycle-basket) and <http://www.waldsports.com/index.cfm/store/front-baskets/> which is highlighted in step 3. Further by executing step 4, competing websites ([www.ebay.com/bhp/front-bicycle-basket](http://www.ebay.com/bhp/front-bicycle-basket), <http://www.waldsports.com/index.cfm/store/front-baskets/> and other top ranked websites) were checked for shortlisting the relevant keywords.

By executing step 5, the primary relevant keyphrase was shortlisted as bicycle front baskets.

### **Lessons learnt**

The terminology of customers in the local market of the website is different from the terminology of online searches of that region, when referring or searching for the identical product. The local market identified this website's primary product as 'pvc basket' or 'polyvinyl chloride basket' as this basket is coated with polyvinyl chloride, whereas online searchers phrased this basket on a generic level as 'bicycle front basket'.

### 4.7.4 Basic keyword search process model applied for Changology.co.uk project

#### Project level process model

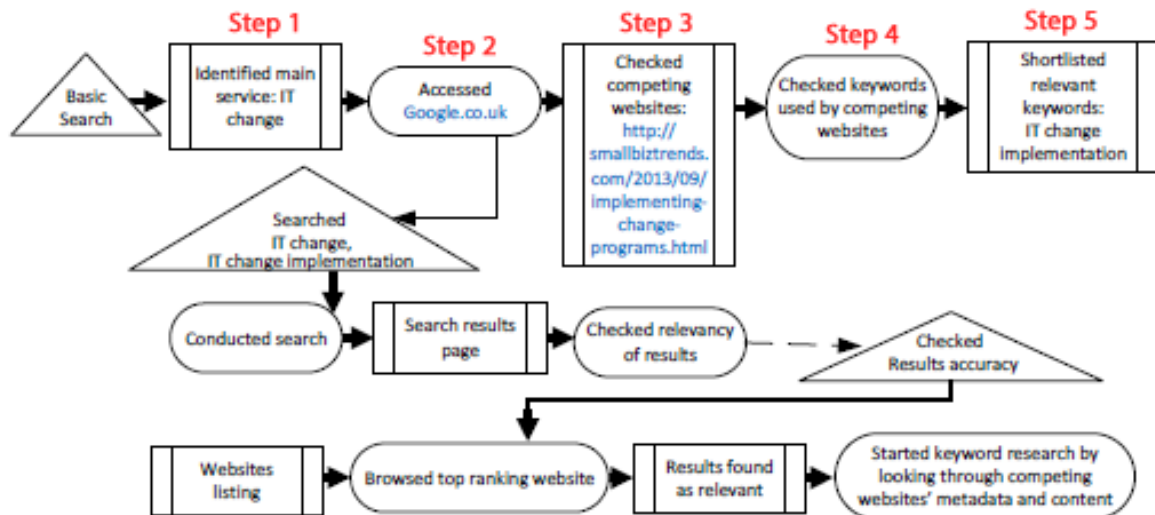


Figure 4.22 Basic keyword search process model applied for Changology.co.uk project

The process model represented in figure 4.22 explains the implementation procedure used for applying basic keyword search technique for Changology.co.uk. It follows the implementation procedure represented in figure 4.9.

Whilst executing this process model, by following step 1, the main service was identified as 'IT change'.

By executing step 2, the keyphrases, 'IT change implementation' and 'IT change' were searched in Google.co.uk and the process model got the output of the main competitor i.e. <http://smallbiztrends.com/2013/09/implementing-change-programs.html> which is highlighted in step 3. Further by executing step 4, competing websites (<http://smallbiztrends.com/2013/09/implementing-change-programs.html> and other top ranked websites) were checked for shortlisting the relevant keywords.

By executing step 5, the primary relevant keyphrase was shortlisted as including IT change implementation.

## Lessons learnt

Whilst applying the basic search technique and on searching for the main service provided by this website i.e. 'IT change implementation', it was found that there was very less competition on this topic. Perhaps, this area looked very lucrative and comparatively easier for establishing the visibility of the website in SERPs of Google.

### 4.7.5 Basic keyword search process model applied for Juniors.net project

#### Project level process model

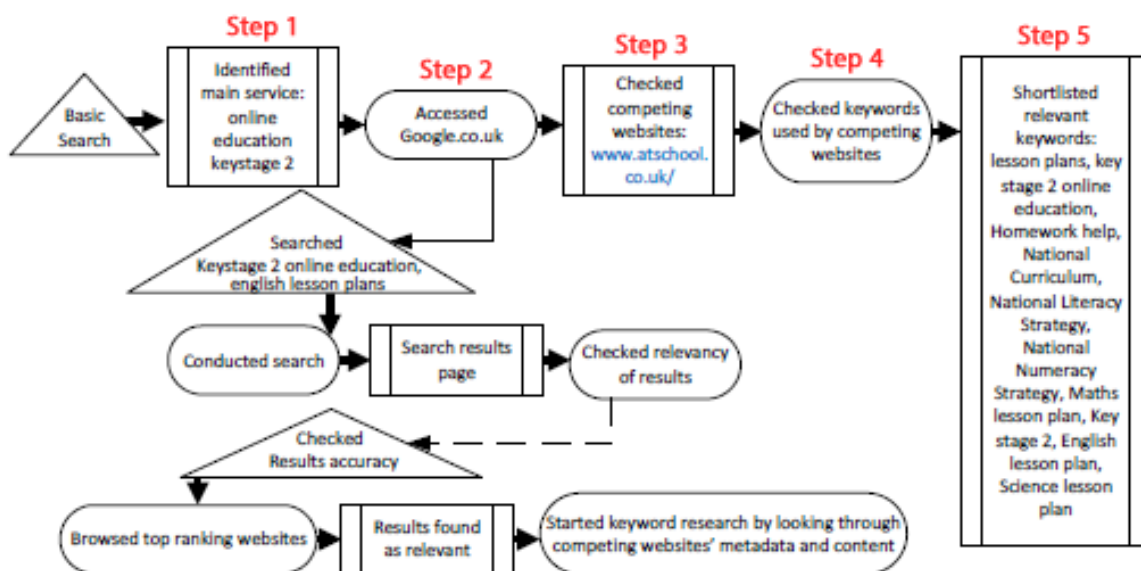


Figure 4.23 Basic keyword search process model applied for Juniors.net project

The process model represented in figure 4.23 explains the implementation procedure used for applying basic keyword search technique for Juniors.net. It follows the implementation procedure represented in figure 4.9.

Whilst executing this process model, by following step 1, the main service was identified as 'online education keystone 2'.

By executing step 2, the keyphrases, 'online education keystone 2' and 'english lesson plans' were searched in Google.co.uk and the process model got the output of the main competitor i.e. [www.atschool.co.uk](http://www.atschool.co.uk) which is highlighted in step 3. Further by executing step 4, competing websites ([www.atschool.co.uk](http://www.atschool.co.uk) and other top ranked websites) were checked for shortlisting the relevant keywords.

By executing step 5, relevant keywords were shortlisted including lesson plans, key stage 2 online education, homework help, national curriculum, national literacy strategy, national numeracy strategy, maths lesson plan, key stage 2, english lesson plan, science lesson plan.

### **Lessons learnt**

While applying the basic search technique it was found that the competing websites were targeting the key phrase of 'lesson plans' i.e. english lesson plans, maths lesson plans, whereas Juniors.net was considering to optimize for the keyword of tutorials e.g. english tutorials, maths tutorials, etc. The word tutorials was not the jargon used in the industry instead it was 'lesson plan'. Consequently, in targeted key phrases of Juniors' as lesson plan instead of tutorial.

## 4.7.6 Keyword planner tool process model applied for Searoseexim.com project

### Project level process model

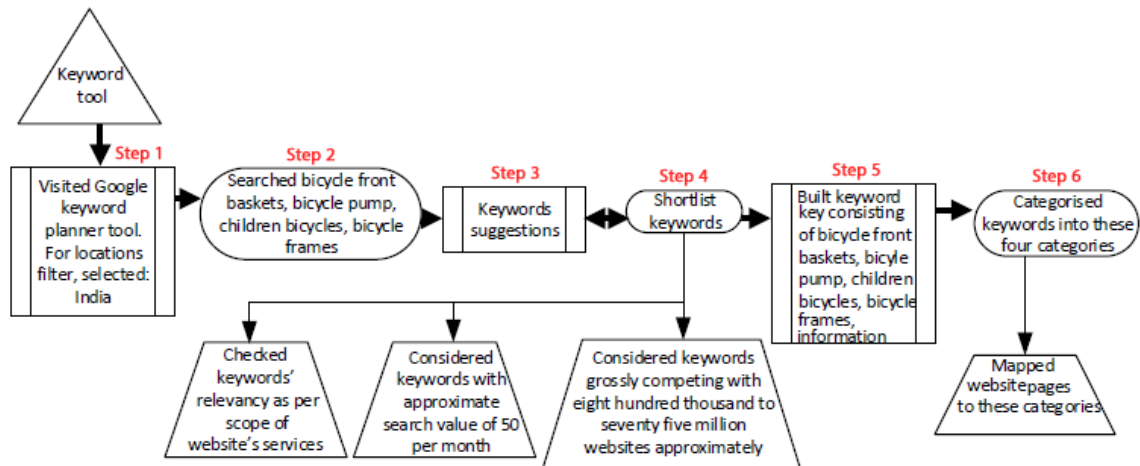


Figure 4.24 Keyword planner tool process model applied for Searoseexim.com project

The process model represented in figure 4.24 explains the implementation procedure used for researching keywords by applying keyword tool technique for Searoseexim.com. It follows the implementation procedure represented in figure 4.10.

Whilst executing this process model, by following step 1, Google keyword planner tool was accessed and for locations filter, India was selected as that was the targeted region.

By executing step 2, the core keyphrases, 'bicycle front baskets', 'bicycle pump', 'children bicycles' and 'bicycle frames' were searched and the process model got the output of keywords and key phrases suggestions from the keyword tool which is highlighted in step 3.

Further by executing step 4, keywords and keyphrases suggested by keyword planner tool were shortlisted on the basis of relevance (as per scope of website's product range), searchability (having an approximate search volume of 50 per month) and competition (competing websites ranging from eight hundred thousand to seventy five million websites approximately).

By executing step 5, a keyword key was created identifying the categories of keywords i.e. bicycle front baskets, bicycle pump, children bicycles and bicycle frames. By executing step 6, shortlisted keywords and key phrases were categorised into the identified four categories of keywords (bicycle front baskets, bicycle pump, children bicycles and bicycle frames) and relevant website pages were mapped to these categories.

### 4.7.7 Keyword planner tool process model applied for Changology.co.uk project

#### Project level process model

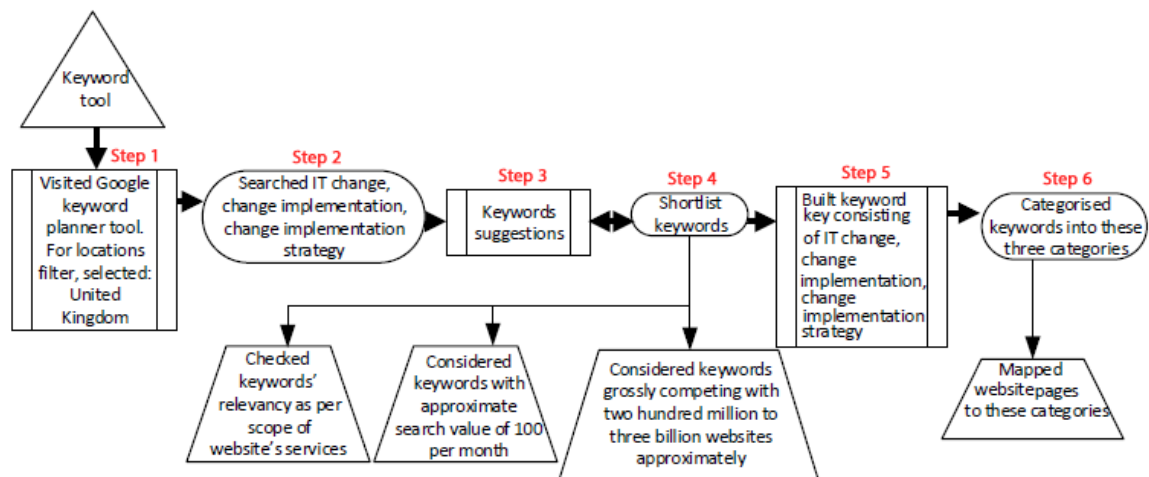


Figure 4.25 Keyword planner tool process model applied for Changology.co.uk project

The process model represented in figure 4.25 explains the implementation procedure used for researching keywords by applying keyword tool technique for Changology.co.uk. It follows the implementation procedure represented in figure 4.10.

Whilst executing this process model, by following step 1, Google keyword planner tool was accessed and for locations filter, United Kingdom was selected as that was the targeted region.

By executing step 2, the core keyphrases, 'IT change', 'change implementation' and 'change implementation strategy' were searched and the process model got the

output of keywords and key phrases suggestions from the keyword tool which is highlighted in step 3.

Further by executing step 4, keywords and keyphrases suggested by keyword planner tool were shortlisted on the basis of relevance (as per scope of website's services' range), searchability (having an approximate search volume of 100 per month) and competition (competing websites ranging from two hundred million to three billion websites approximately).

By executing step 5, a keyword key was created identifying the categories of keywords i.e. IT change, change implementation and change implementation strategy.

By executing step 6, shortlisted keywords and key phrases were categorised into the identified three categories of keywords (IT change, change implementation and change implementation strategy) and relevant website pages were mapped to these categories.

#### 4.7.8 Search queries report process model applied for SaiDigital.co.uk project

##### Project level process model

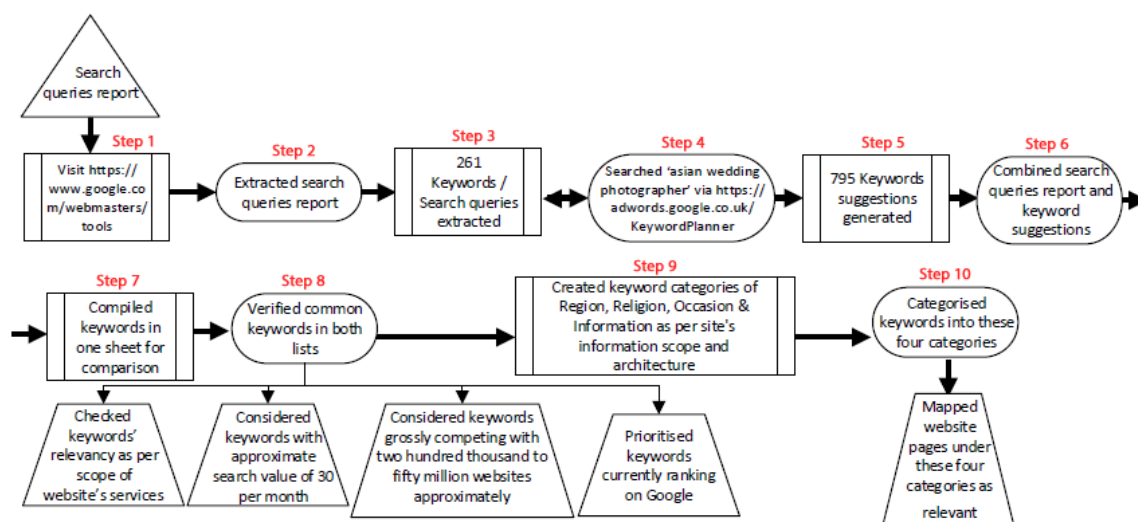


Figure 4.26 Search queries report process model applied for SaiDigital.co.uk project

The process model represented in figure 4.26 explains the implementation procedure used for applying search queries report technique for SaiDigital.co.uk, provided by Google Webmaster Tools. It follows the implementation procedure represented in figure 4.11.

Whilst executing this process model, by following step 1, Google Webmaster Tools were accessed.

By executing step 2, search queries report were extracted where the process model got the output of 261 Keywords and key phrases, which is highlighted in step 3.

By executing step 4, the key phrase 'asian wedding photographer' was searched in the Google keyword planner tool and resulted in suggestions of 795 Keywords and key phrases, which are highlighted in step 5.

By executing step 6, 261 Keywords and key phrases reported by Google Webmaster Tools (generated in step 3) and 795 keywords and key phrases suggested by Google keyword planner tool (generated in step 5) were combined.

By executing step 7, 261 keywords and key phrases report (reported by Google Webmaster Tools) were compared with 795 keywords and key phrases suggestions (suggested by Google keyword planner tool).

By executing step 8, the common keywords were found in both the sources (keyword tool and search queries report) and filtered on the basis of relevance (as per scope of website's services), searchability (approximate search volume of 30 per month), competition (from two hundred thousand to fifty million websites approximately) and prioritised keywords and key phrases for which the website was already visible and ranking in Google.

By executing step 9, a keyword key was created including the categories of region, religion, occasion and information.

By executing step 10, categorised keywords and key phrases into the identified four categories of keywords (region, religion, occasion and information) and mapped the relevant website pages to these categories.



### 4.7.9 Information architecture process models

The information architecture technique has been implemented for the case study websites including SaiDigital.co.uk, Searoseexim.com and Changology.co.uk. The implementation procedure of this technique as implemented for these case study websites has been recorded in the process models.

### 4.7.10 Information architecture process model applied for Saidigital.co.uk project

#### Project level process model

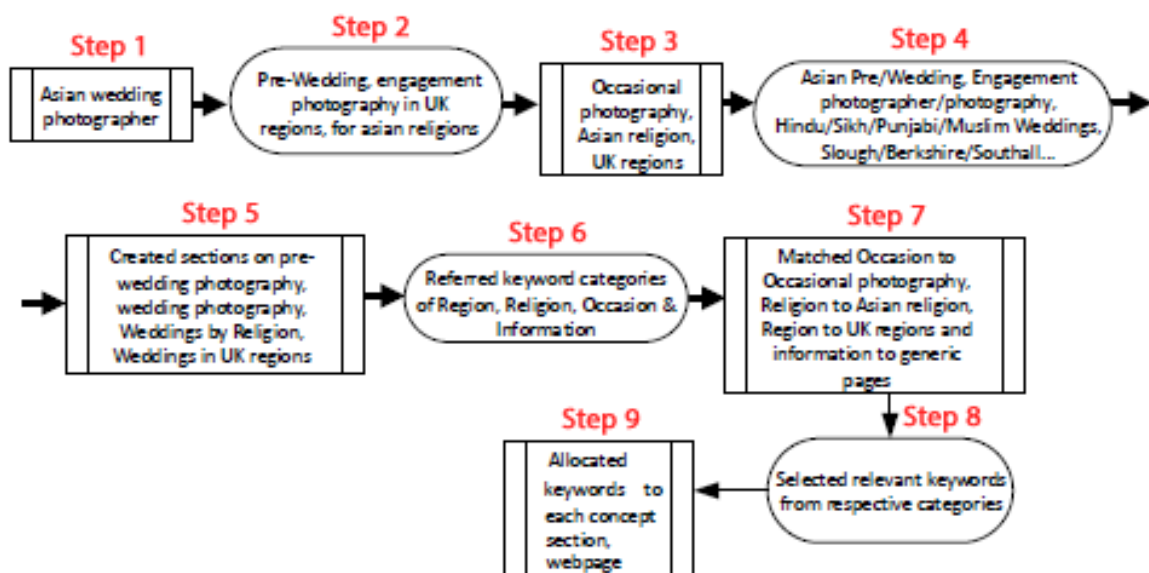


Figure 4.27 Information architecture process model applied for SaiDigital.co.uk project

The process model represented in figure 4.27 explains the implementation procedure used for applying information architecture technique for Saidigital.co.uk. It follows the implementation procedure represented in figure 4.12.

Whilst executing this process model, by following step 1, the main service category was specified as 'Asian wedding photographer'.

By executing step 2, the scope of providing photography services was determined as pre-wedding, engagement photography in UK regions, for asian religions.

By executing step 3, the main concepts (related to the scope of the website's services) were identified as occasional photography, asian religion, uk regions.

By executing step 4, a top-down concept hierarchy was created as asian pre /wedding, engagement photographer /photography, hindu / sikh / punjabi / muslim weddings, slough / berkshire / southall...

By executing step 5, a unique section was created for concepts including pre-wedding photography, wedding photography, weddings by religion, weddings in UK regions

By executing step 6, the keywords' categories were referred of region, religion, occasion & information created whilst executing the keywords research technique(s)

By executing step 7, considered the main concepts (occasional photography, asian religion, uk regions) of the website as created by executing step 3 of this process model and keywords' categories (occasion, religion, region & information) identified by executing step 6 of the process model. Subsequently, matched keywords' categories to concepts i.e. matched occasion to occasional photography, religion to asian religion, region to uk regions and information to generic pages

By executing step 8, selected relevant keywords from respective categories

By executing step 9, allocated keywords to each concept section and webpage

### 4.7.11 Information architecture process model applied for Searoseexim.com project

#### Project level process model

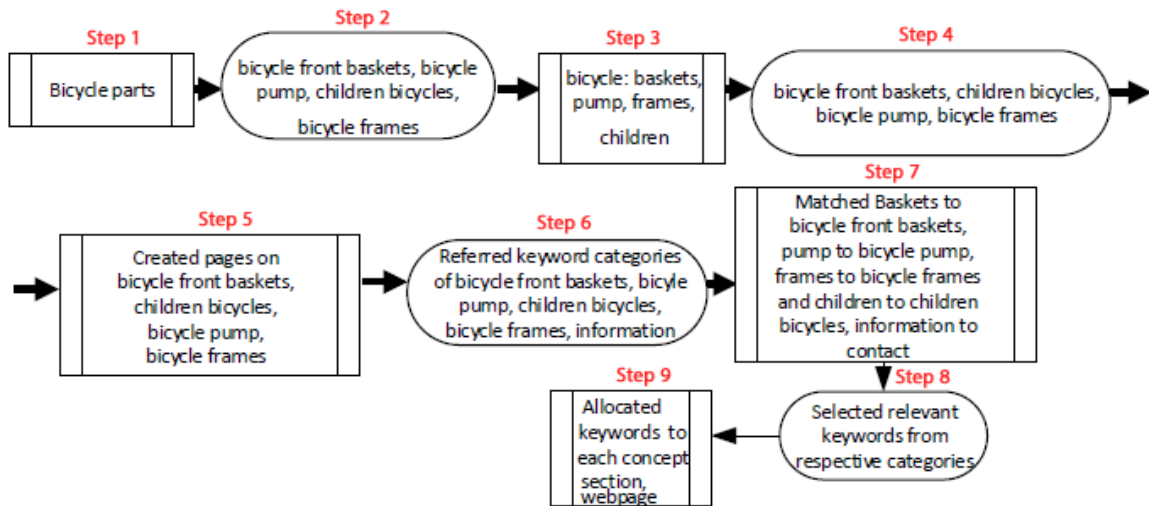


Figure 4.28 Information architecture process model applied for Searoseexim.com project

This process model represented in figure 4.28 explains the implementation procedure used for applying information architecture technique for Searoseexim.com. It follows the implementation procedure represented in figure 4.12.

Whilst executing this process model, by following step 1, the main product category was specified as 'Bicycle parts'.

By executing step 2, the scope of products range was determined as bicycle front baskets, bicycle pump, children bicycles, bicycle frames.

By executing step 3, the main concepts (related to the scope of the website's products) were identified as bicycle: baskets, pump, frames, children.

By executing step 4, a top-down concept hierarchy was created as bicycle front baskets, children bicycles, bicycle pump, bicycle frames

By executing step 5, unique webpages section were created for concepts including bicycle front baskets, children bicycles, bicycle pump, bicycle frames

By executing step 6, the keywords' categories were referred i.e. bicycle front baskets, bicycle pump, children bicycles, bicycle frames, information created whilst executing the keywords research technique(s)

By executing step 7, considered the main concepts (bicycle: baskets, pump, frames, children) of the website as created by executing step 3 of this process model and keywords' categories (bicycle front baskets, bicycle pump, bicycle frames, children bicycles, information) identified by executing step 6 of the process model. Subsequently, matched categories to concepts i.e. matched baskets to bicycle front baskets, pump to bicycle pump, frames to bicycle frames and children to children bicycles, information to contact.

By executing step 8, selected relevant keywords from respective categories

By executing step 9, allocated keywords to each concept section and webpage

### 4.7.12 Information architecture process model applied for Changology.co.uk project

#### Project level process model

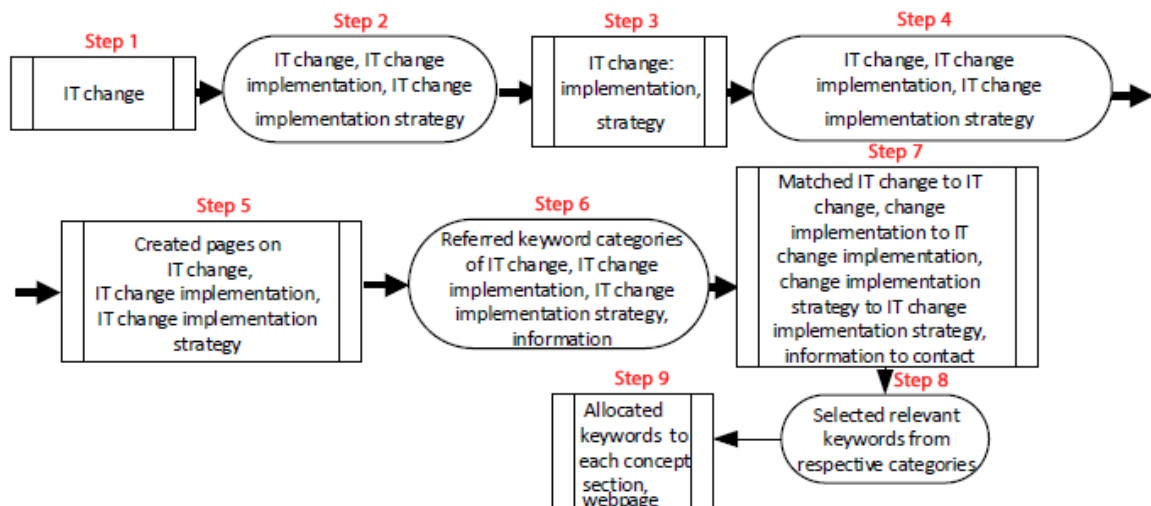


Figure 4.29 Information architecture process model applied for Changology.co.uk project

The process model represented in figure 4.29 explains the implementation procedure used for applying information architecture technique for Changology.co.uk. It follows the implementation procedure represented in figure 4.12.

Whilst executing this process model, by following step 1, the main service category was specified as 'IT change'.

By executing step 2, the scope of services range was determined as IT change, IT change implementation, IT change implementation strategy.

By executing step 3, the main concepts (related to the scope of the website's services) were identified as IT change: implementation, strategy.

By executing step 4, a top-down concept hierarchy was created as IT change, IT change implementation, IT change implementation strategy

By executing step 5, unique webpages section were created for concepts including IT change, IT change implementation, IT change implementation strategy

By executing step 6, the keywords' categories were referred i.e. IT change, IT change implementation, IT change implementation strategy, information created whilst executing the keywords research technique(s)

By executing step 7, considered the main concepts (IT change: implementation, strategy) of the website as created by executing step 3 of this process model and keywords' categories (IT change, IT change implementation, IT change implementation strategy, information) identified by executing step 6 of the process model. Subsequently, matched categories to concepts i.e. matched IT change to IT change, change implementation to IT change implementation, change implementation strategy to IT change implementation strategy, information to contact

By executing step 8, selected relevant keywords from respective categories

By executing step 9, allocated keywords to each concept section and webpage

### **4.7.13 Content writing process models**

The content creation technique has been implemented for the case study websites including Searoseexim.com, Changology.co.uk and Bankaholic.com. The implementation process of the implemented techniques for these case study websites has been recorded in the process models.

### 4.7.14 Content creation process model applied for Page One of Searoseexim.com project

#### Project level process model

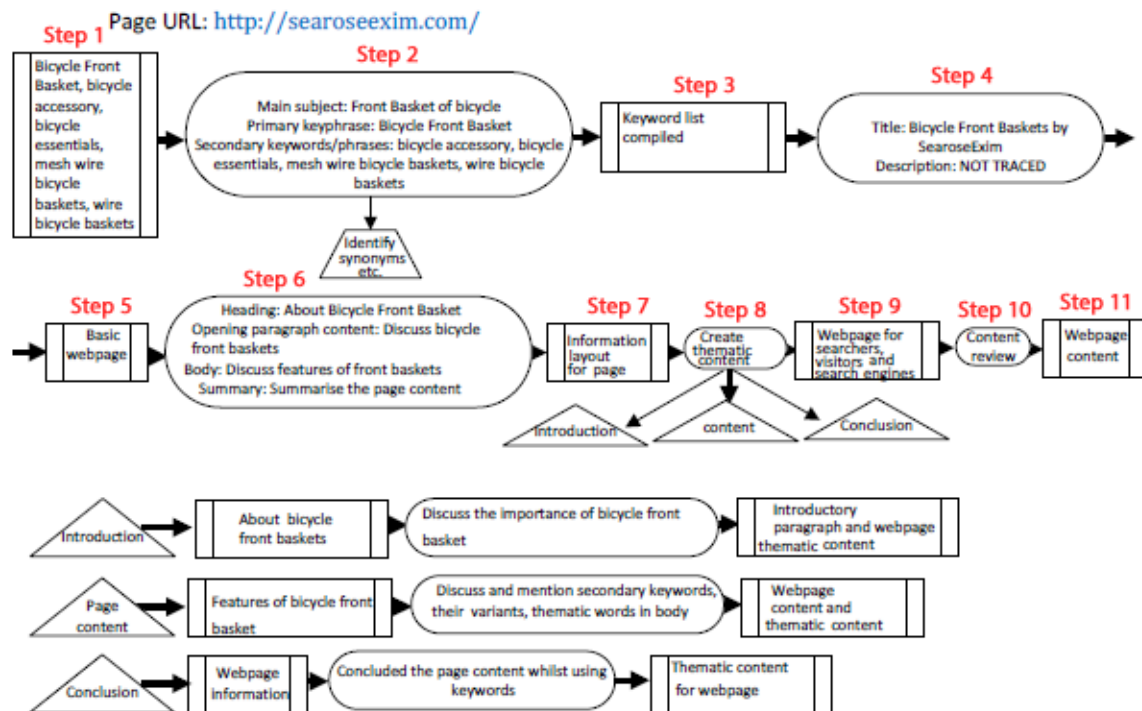


Figure 4.30 Content creation process model applied for Searoseexim.com project

The process model represented in figure 4.30 explains creating content for one of the pages of Searoseexim.com. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Bicycle Front Basket, bicycle accessory, bicycle essentials, mesh wire bicycle baskets, wire bicycle baskets

By executing step 2, the main subject was identified as Front Basket of bicycle, primary keyphrase was identified as Bicycle Front Basket and secondary keywords/phrases were identified as bicycle accessory, bicycle essentials, mesh wire bicycle baskets, wire bicycle baskets

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Bicycle Front Baskets by SearoseExim. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'About Bicycle Front Basket', opening paragraph content discussed about 'bicycle front baskets', the body of the content discussed features of front baskets and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about bicycle front baskets), page content (discussed features of bicycle front basket using secondary keywords) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

### 4.7.15 Content creation process model applied for Page Two of Searoseexim.com project

#### Project level process model

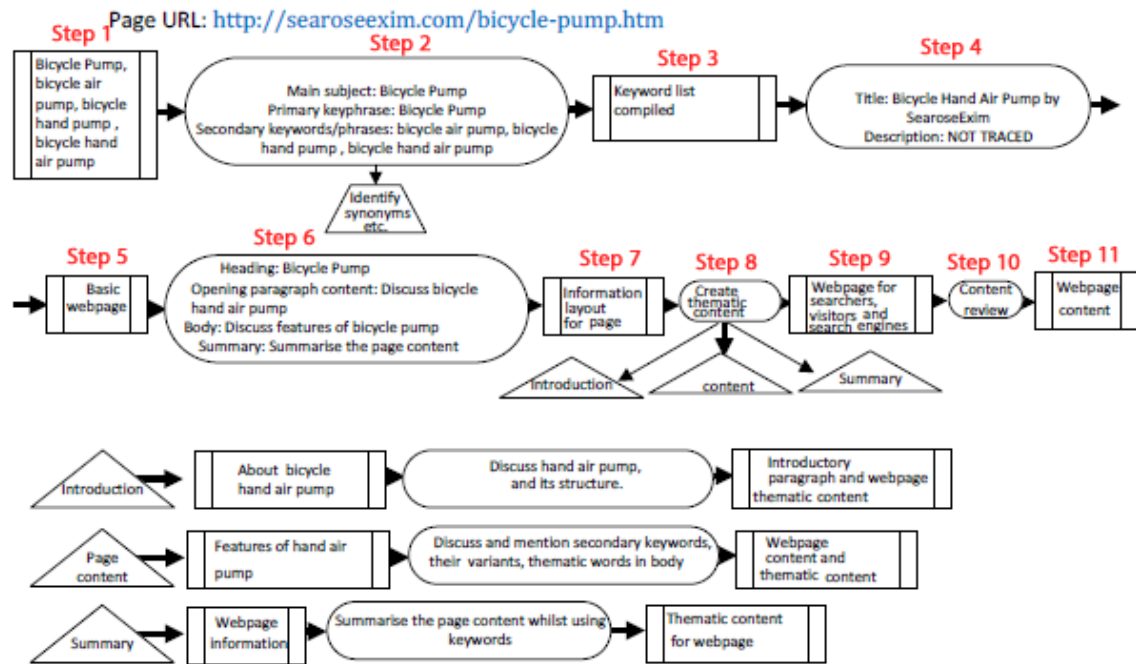


Figure 4.31 Content creation process model applied for Searoseexim.com project

The process model represented in figure 4.31 explains creating content for one of the pages of Searoseexim.com. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Bicycle Pump, bicycle air pump, bicycle hand pump , bicycle hand air pump

By executing step 2, the main subject was identified as Bicycle Pump, primary keyphrase was identified as Bicycle Pump and secondary keywords/phrases were identified as bicycle air pump, bicycle hand pump , bicycle hand air pump

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.



By executing step 4, meta tags were created for this webpage where the title was specified as: Bicycle Hand Air Pump by SearoseExim. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Bicycle Pump', opening paragraph content discussed about 'bicycle hand air pump', the body of the content discussed features of bicycle pump and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about bicycle hand air pump), page content (features of hand air pump using secondary keywords) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

### 4.7.16 Content creation process model applied for Page Three of Searoseexim.com project

#### Project level process model

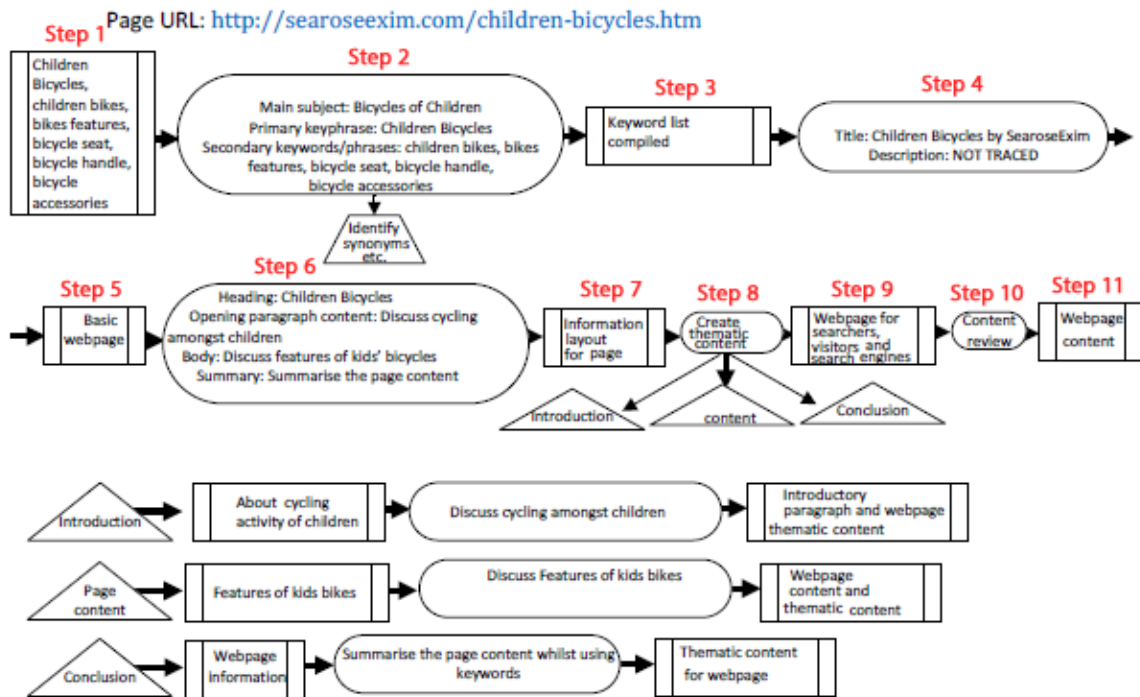


Figure 4.32 Content creation process model applied for Searoseexim.com project

The process model represented in figure 4.32 explains creating content for one of the pages of Searoseexim.com. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Children Bicycles, children bikes, bikes features, bicycle seat, bicycle handle, bicycle accessories

By executing step 2, the main subject was identified as Bicycles of Children, primary keyphrase was identified as Children Bicycles and secondary keywords/phrases were identified as children bikes, bikes features, bicycle seat, bicycle handle, bicycle accessories

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Children Bicycles by SearoseExim. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Children Bicycles', opening paragraph content discussed about 'cycling amongst children', the body of the content discussed features of kids' bicycles and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about cycling activity of children), page content (features of kids bikes using secondary keywords) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

### 4.7.17 Content creation process model applied for Page Four of Searoseexim.com project

#### Project level process model

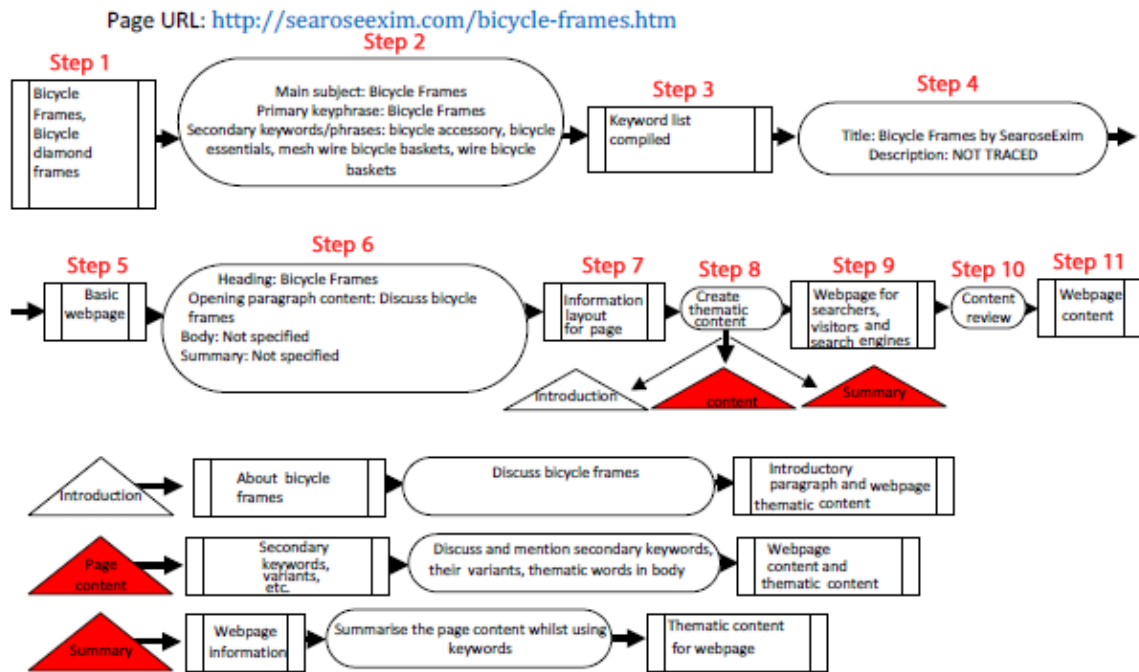


Figure 4.33 Content creation process model applied for Searoseexim.com project

The process model represented in figure 4.33 explains creating content for one of the pages of Searoseexim.com. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Bicycle frames, Bicycle diamond frames

By executing step 2, the main subject was identified as bicycle frames, primary keyphrase was identified as bicycle frames and secondary keywords/phrases were identified as bicycle accessory, bicycle essentials, mesh wire bicycle baskets, wire bicycle baskets

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Bicycle Frames by SearoseExim. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Bicycle Frames', opening paragraph content discussed about 'bicycle bicycle frames', the body and summary of the content was not specified.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about bicycle frames), page content and summary were not specified.

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

#### 4.7.18 Content creation process model applied for Page Five of Searoseexim.com project

##### Project level process model

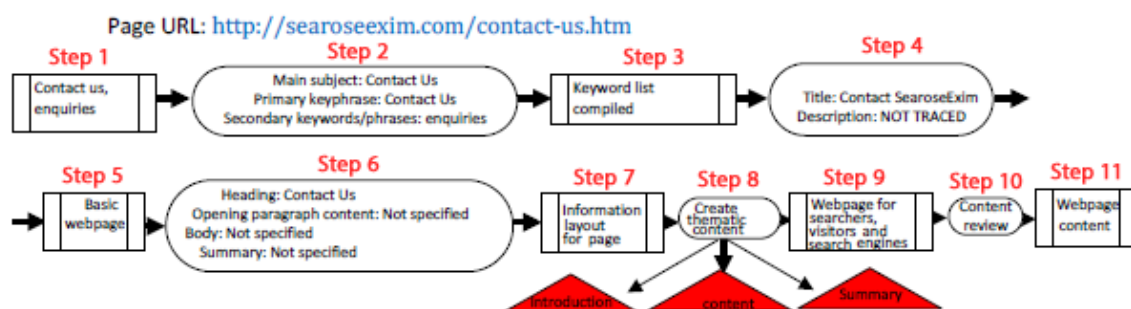


Figure 4.34 Content creation process model applied for Searoseexim.com project

The process model represented in figure 4.34 explains creating content for one of the pages of Searoseexim.com. It follows the implementation procedure represented in figure 4.14.

The main purpose of this page was to provide contact information of the company i.e the email id information. This page had very little content. As highlighted in the figure 4.34, the introduction, content and summary methods were not executed.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered contact us, enquiries

In step 2, by executing step 2, the main subject was identified as contact us, primary keyphrase was identified as contact us and secondary keywords/phrases were identified as enquiries

By identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Contact SearoseExim. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Contact us', opening paragraph, the body and summary of the content was not specified.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was not created, providing just the basic contact information.

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

## 4.7.19 Content creation process model applied for Page One of Changology.co.uk project

### Project level process model

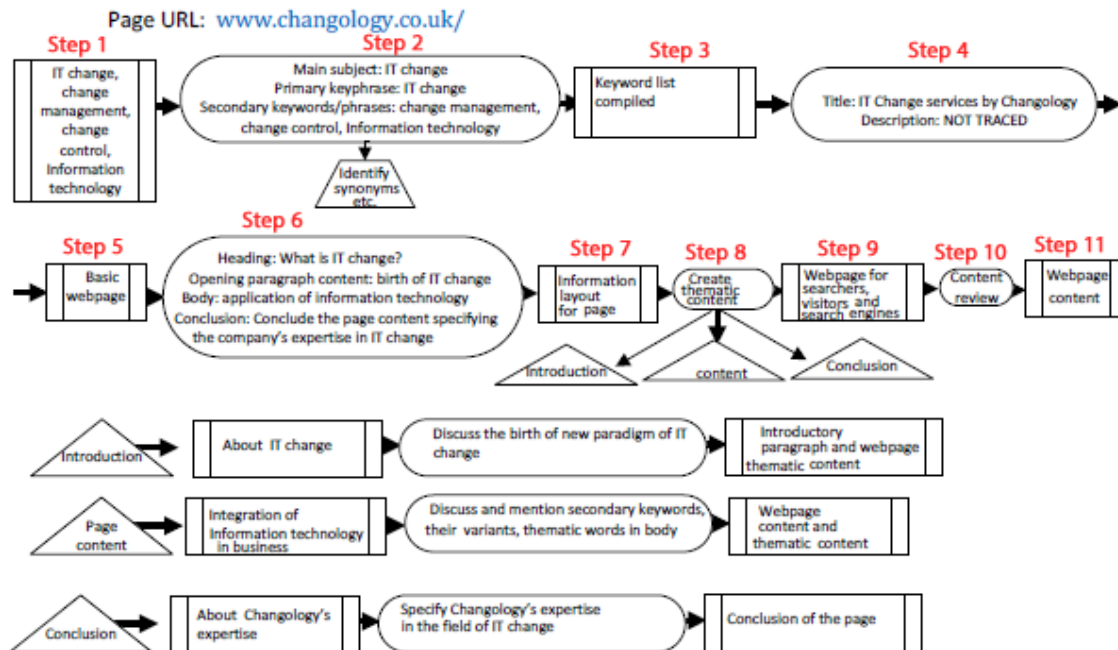


Figure 4.35 Content creation process model applied for Changology.co.uk project

The process model represented in figure 4.35 explains creating content for one of the pages of Changology.co.uk. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered IT change, change management, change control, Information technology

By executing step 2, the main subject was identified as IT change, primary keyphrase was identified as IT change and secondary keywords/phrases were identified as change management, change control, Information technology

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: IT Change services by Changology. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'What is IT change?', opening paragraph content discussed about 'birth of IT change', the body of the content discussed application of information technology and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about IT change), page content (discussed integration of Information technology in business using secondary keywords) and conclusion (specifying webpage information and About Changology's expertise).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.



## 4.7.20 Content creation process model applied for Page Two of Changology.co.uk project

### Project level process model

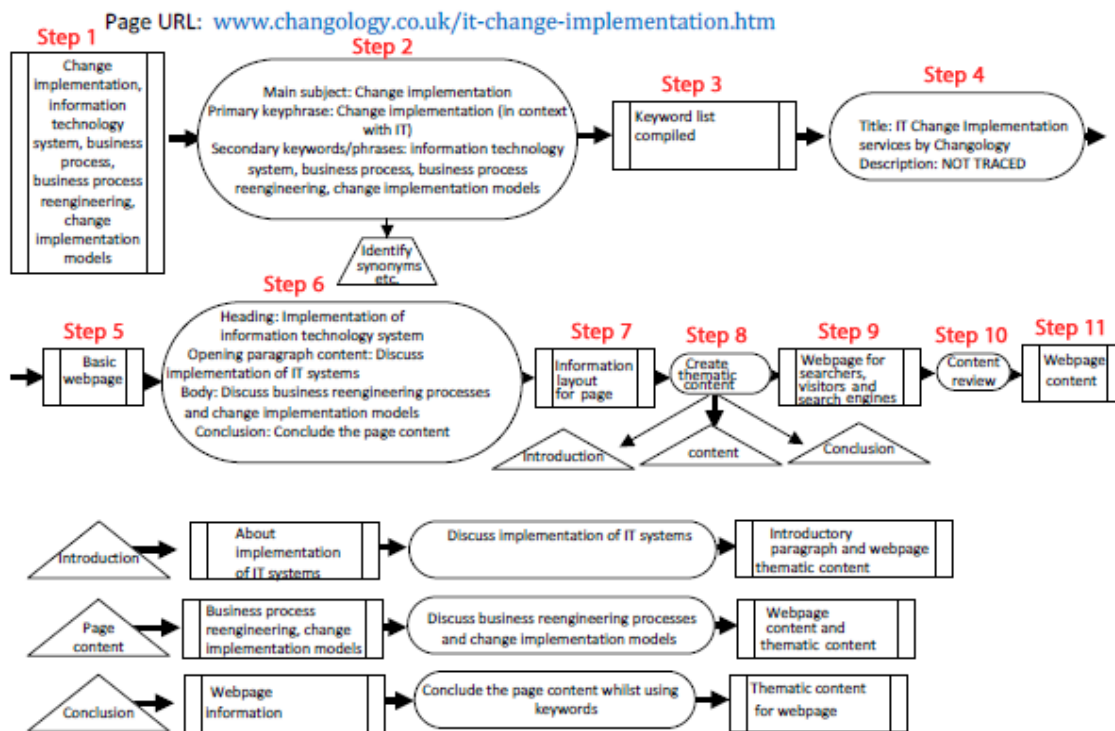


Figure 4.36 Content creation process model applied for Changology.co.uk project

The process model represented in figure 4.36 explains creating content for one of the pages of Changology.co.uk. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Change implementation, information technology system, business process, business process reengineering, change implementation models

By executing step 2, the main subject was identified as Change implementation, primary keyphrase was identified as change implementation (in context with IT) and secondary keywords/phrases were identified as information technology system, business process, business process reengineering, change implementation models

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: IT Change Implementation. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Implementation of information technology system', opening paragraph content discussed about 'implementation of IT systems', the body of the content discussed business reengineering processes and change implementation models and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about implementation of IT systems), page content (discussed business process reengineering, change implementation models) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

## 4.7.21 Content creation process model applied for Page Three of Changology.co.uk project

### Project level process model

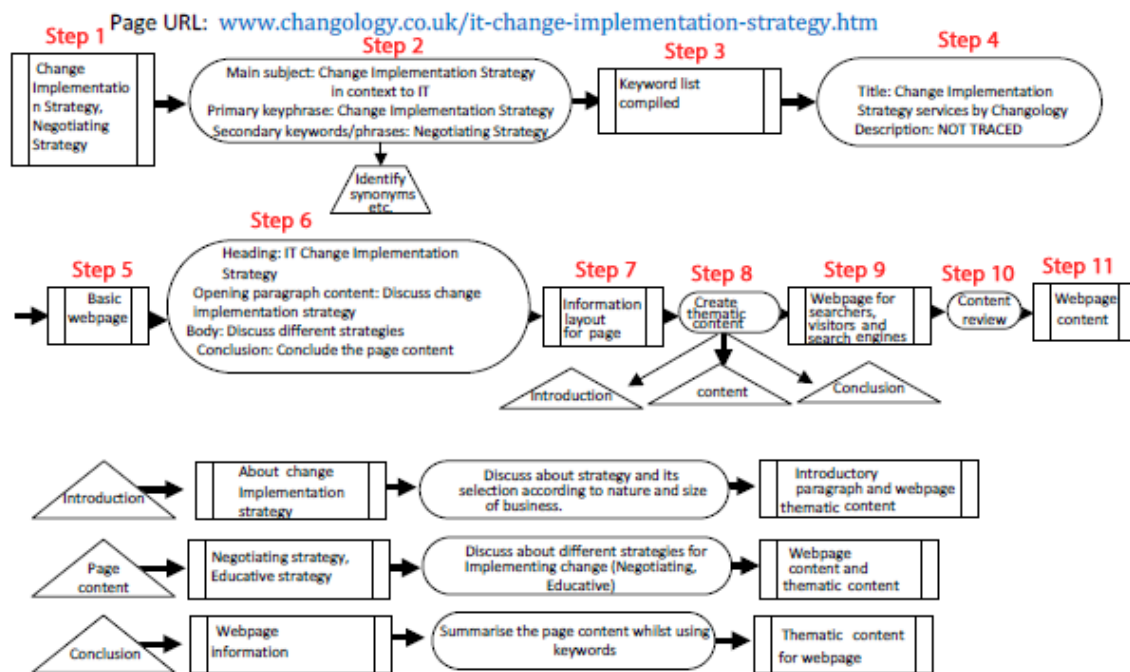


Figure 4.37 Content creation process model applied for Changology.co.uk project

The process model represented in figure 4.37 explains creating content for one of the pages of Changology.co.uk. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered Change Implementation Strategy, Negotiating Strategy

By executing step 2, the main subject was identified as Change Implementation Strategy in context to IT, primary keyphrase was identified as Change Implementation Strategy and secondary keywords/phrases were identified as Negotiating Strategy, Educative strategy

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Change Implementation Strategy services by Changology. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'IT Change Implementation Strategy ', opening paragraph content discussed about ' change implementation strategy', the body of the content discussed different strategies and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about change Implementation strategy), page content (discussed Negotiating strategy, Educative strategy) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

## 4.7.22 Content creation process model applied for Page Four of Changology.co.uk project

### Project level process model

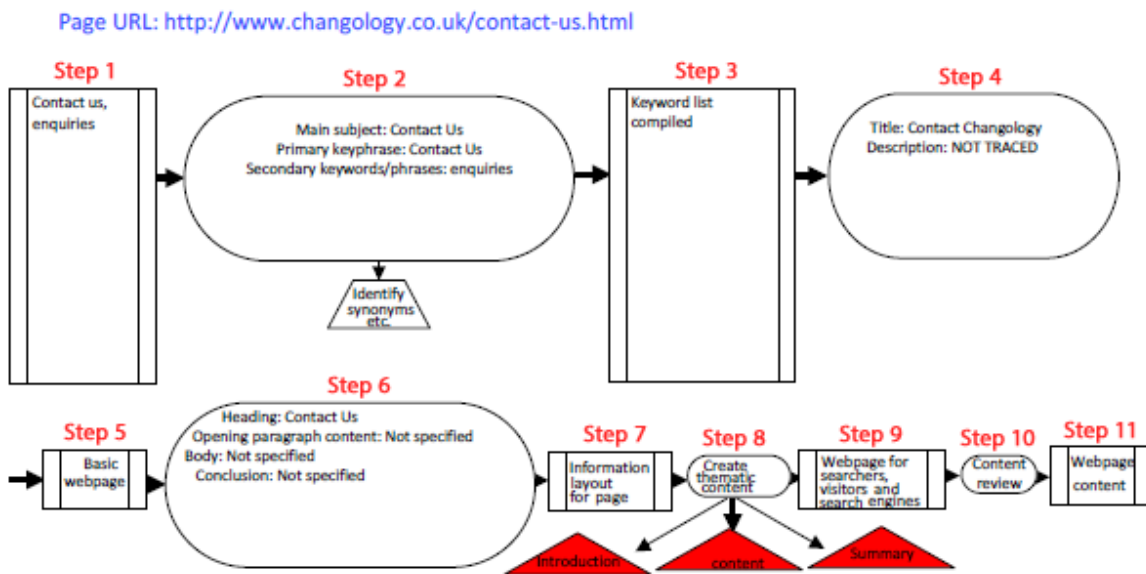


Figure 4.38 Content creation process model applied for Changology.co.uk project

The process model represented in figure 4.38 explains creating content for one of the pages of Changology.co.uk. It follows the implementation procedure represented in figure 4.14.

The main purpose of this page was to provide contact information of the company i.e the email id information. This page had very little content. As highlighted in the figure 4.38, the introduction, content and summary methods were not executed.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered contact us, enquiries

By executing step 2, the main subject was identified as contact us, primary keyphrase was identified as contact us and secondary keywords/phrases were identified as enquiries

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Contact Changology. The specified description was not traced.

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Contact us', opening paragraph, the body and summary of the content was not specified.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was not created, providing just the basic contact information.

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

### 4.7.23 Content creation process model applied for one of the pages of Bankaholic.com project

#### Project level process model

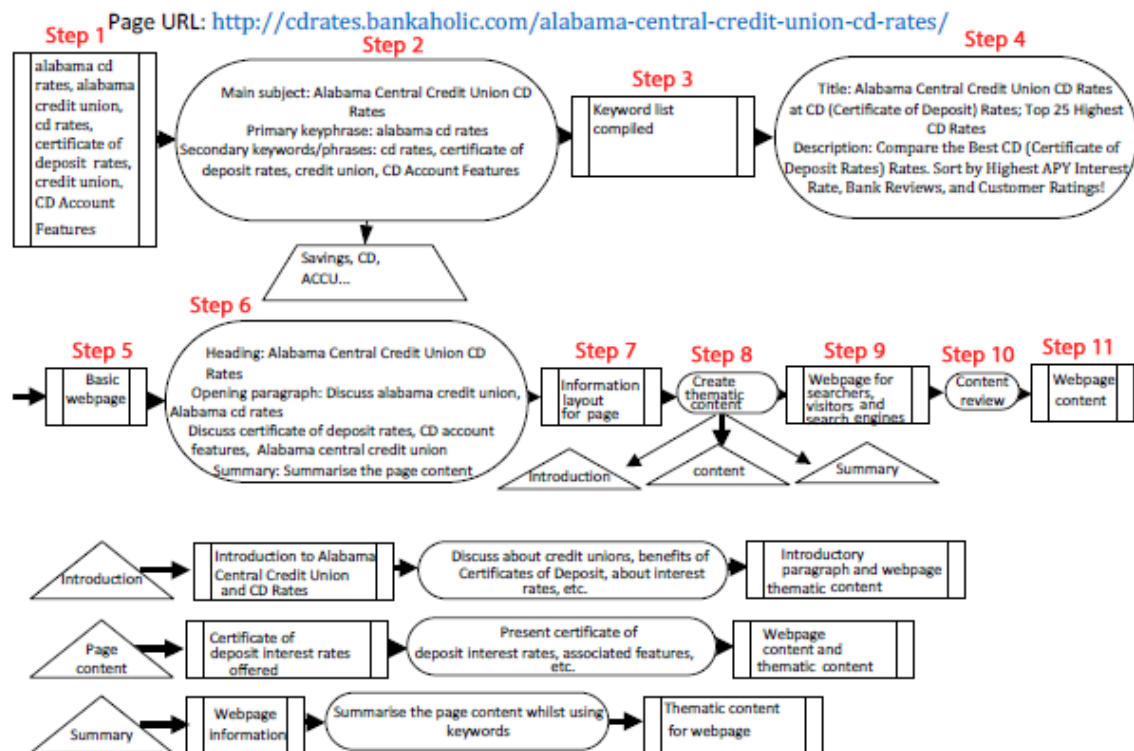


Figure 4.39 Content creation process model applied for Bankaholic.com project

The process model represented in figure 4.39 explains creating content for one of the pages of Bankaholic.com. It follows the implementation procedure represented in figure 4.14.

Whilst executing this process model, by following step 1, the keywords allocated to this webpage were considered alabama cd rates, alabama credit union, cd rates, certificate of deposit rates, credit union, CD Account Features

By executing step 2, the main subject was identified as Alabama Central Credit Union CD Rates, primary keyphrase was identified as alabama cd rates and secondary keywords/phrases were identified as cd rates, certificate of deposit rates, credit union, CD Account Features

In step 2, by identifying the main subject, primary and secondary keywords/phrases of the webpage, the keywords list was created as the output as shown in step 3.

By executing step 4, meta tags were created for this webpage where the title was specified as: Alabama Central Credit Union CD Rates at CD (Certificate of Deposit) Rates; Top 25 Highest CD Rates. The specified description was specified as: Compare the Best CD (Certificate of Deposit Rates) Rates. Sort by Highest APY Interest Rate, Bank Reviews, and Customer Ratings!

By creation of meta tags the basic content for the webpage was created as an output as shown in step 5.

By executing step 6, the information map was created where the heading consisted information about 'Alabama Central Credit Union CD Rates', opening paragraph content discussed about 'alabama credit union, Alabama cd rates', the body of the content discussed certificate of deposit rates, CD account features, Alabama central credit union and the web page content was concluded with the important information of the webpage.

By creating an information map for the webpage, an information layout for the page was created as an output as shown in step 7.

By executing step 8, thematic content was created, consisting introduction (information about Alabama Central Credit Union and CD Rates), page content (discussed Certificate of deposit interest rates offered using secondary keywords) and conclusion (specifying webpage information).

By creating thematic content, a webpage was created for searchers, visitors and search engines as an output as shown in step 9.

By executing step 10, the created content was reviewed.

After reviewing content, the content was created as an output as shown in step 11.

#### **4.7.24 HTML code optimization process models**

The HTML code optimization technique has been implemented for the case study websites including Searoseexim.com and Changology.co.uk. The implementation process of the implemented techniques for these case study websites has been recorded in the process models.



### 4.7.25 HTML process model applied for Searoseexim.com and Changology.co.uk project

The process model represented in figure 4.40 explains the optimization of HTML code in this instance for Searoseexim.com and Changology.co.uk.

#### Project level process model

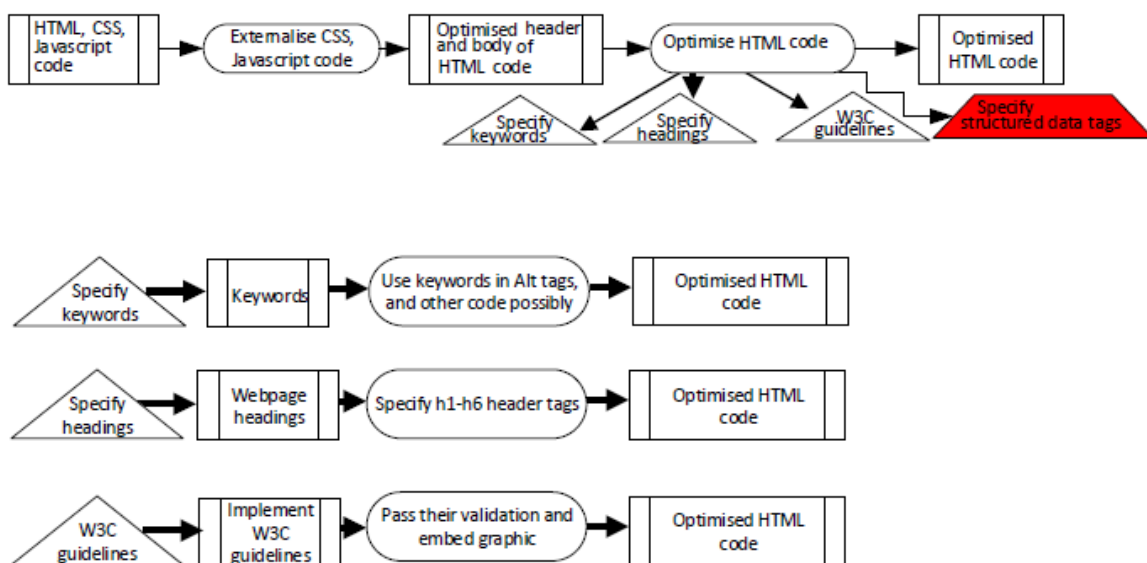


Figure 4.40 HTML process model applied for Searoseexim.com and Changology.co.uk project

By executing step 1, the HTML, CSS and Javascript code was considered. By executing step 2, the CSS and Javascript code was externalised resulting in optimized header of HTML code as shown in step 3. By executing step 4, HTML code was optimized by specifying keywords (in Alt tags, and at other possible places in the code), specifying headings (h1-h6 header tags), and implementing W3C guidelines (pass W3C's validation and embed graphic). As an output of this execution in step 5, the HTML code was optimized.

At the time of optimizing HTML code for these projects, the social media was not as popular as in the present day therefore the structured data tags method was not implemented.

### **4.7.26 Overview of project level case studies development**

On analysing the implemented techniques on case study websites it is found that irrespective of the category, lifestage or functionality of the website(s) the implemented essential on-page SEO techniques and their implementation procedures remain the same.

From the information provided in chapter 3 in table 3.3, it is possible to identify the region, industry, commodity and the lifecycle stage of the case study websites.

It is found that there is a diversity between case studies on these parameters. For instance, these case study websites belonged to different regions including UK, USA and India and established in different industries including bicycle, I.T or Information Technology, photography, finance and education. Their product / service range included front bicycle baskets, IT change management services, wedding photography services, information including interest rates on certificates of deposit and online primary education service.

Moreover, their websites were at different life stages either being a newly launched website or an already existing website.

Despite this diversity in the case study websites, the procedures of implementing on-page SEO techniques were homogeneous for all the case study websites. In other words, the implementation procedures followed for implementing the essential SEO techniques were the same. The knowledge of implementation of these steps had been represented in cookbook level process models (specified in section 4.5) that have been created within the current research.

Thus, it is observed that homogeneous procedures are applicable for heterogeneous websites for implementing essential on-page SEO techniques.

## **4.8 Details of case study websites**

After presenting the process models, the characteristics of case study websites have been identified in terms of their lifecycle stage, objective and purpose of executing the SEO campaign, identified limitations, implemented techniques alongwith identifying the role, impact, of results obtained with further scope of improvement for the implemented techniques. Further, the results obtained for different case study

websites have been analysed, compared and contrasted on two levels in terms of benefits for respective business(es) and attained visibility or ranking positions in SERPs.

It is important to describe case study websites and the 'role and impact' of the implementation of the essential on-page SEO techniques in each of the case study websites. Comparing and contrasting the impact of these techniques in case study websites would provide further insight, revealing what worked, how it worked and what did not work. Further, it would be beneficial to analyse, which case study website benefited the most and why, which one had least improvements and reasons for that.

#### 4.8.1 Details of first case study website Juniors.net

The details of first case study website i.e. Juniors.net has been described in table 4.13. Important information of case study website has been presented including its lifecycle stage, objective and purpose of executing SEO campaign, identified and avoided pitfalls, implemented techniques and results obtained from the implementation.

Table 4.13 Essential on-page SEO techniques implemented for Juniors.net

|                         |   |
|-------------------------|---|
| <b>Case study 1:</b>    | Juniors.net   |
| <b>Lifecycle stage:</b> | already existing website  |
| <b>Objective:</b>       | Identify relevant keywords, keyphrases and enhance the website visibility by improving ranking positions in SERPs in the main search engine i.e. Google.co.uk   |
| <b>Purpose:</b>         | The main purpose of SEO campaign was to attain visibility in SERPs for relevant keywords and use it as an influential factor for facilitating sales. The main target audience of this website was UK primary schools. This website had an overseas call centre whose main focus was to sell the service by calling primary schools different LEAs (Local Education Authorities) of UK and use the attained visibility in SERPs of Google.co.uk as a negotiating factor to influence the purchase decision of the customers. |
| <b>Limitations:</b>     | Existing corporate website with limited rights for content changes or code changes.   |

|   |   |
|---|---|
| Implemented techniques and steps taken:                                     |   |
| Details of first technique implemented:                                     |   |
| <b>Technique:</b>   | Keyword research using basic search technique   |
| <b>Goal:</b>  | Identify relevant keywords used by competitors in the target market   |
| <b>Steps undertaken to achieve the stated goal:</b>                         | Googled for few relevant keywords and checked the keywords used by competing websites to discover keywords that are relevant for the website to be optimized.   |
| Specific information on the undertaken steps are explained in section 4.7.5 |   |
| <b>Pitfalls identified:</b>   | Implementation of off-page SEO would have led to further improvement of attained results.   |
| <b>Pitfalls avoided:</b>  | This website was targeting tutorials, whereas 'lesson plans' was searched by the searchers instead of tutorials, which was rectified by the keyword research undertaken for this website. In case this website, would have continued to target 'tutorials' instead of 'lesson plans', it might have been indexed for the inappropriate category in search engines leading to inappropriate rankings and traffic received.                                     |
| <b>Results obtained:</b>  | Website became visible for the targeted keywords within a span of one month of the implemented techniques.  |
| <b>Role and impact of implemented techniques:</b>                           | The implemented techniques played a critical role for attaining visibility in SERPs for the targeted keywords in the targeted niche to attract the target audience. The attained visibility impacted the selling point, where it became a reference point for showing the reputation and exposure gained by the specified case study website on the main search engine i.e. Google.co.uk. It helped in order to influence its sales to the target customers.  |
| <b>Optimal results obtained:</b>  | It can be argued that this website attained optimal results because it gained visibility and decent ranking positions for its targeted keywords and key phrases within a span of one month after implementation of stated SEO techniques. Additionally, it is important to mention that during this period it procured a link from the home page of another online educational website, which would have influenced the attainment of results to some extent. |

## 4.8.2 Details of second case study website Bankaholic.com

The details of second case study website i.e. Bankaholic.com has been described in table 4.14. Important information of case study website has been presented including its lifecycle stage, objective and purpose of executing SEO campaign, identified and avoided pitfalls, implemented techniques and results obtained from the implementation.

Table 4.14 Essential on-page SEO techniques implemented for Bankaholic.com

|  |  |
|--|--|
| <b>Case study 2:</b>   | Bankaholic.com   |
| <b>Lifecycle stage:</b>                                      | already existing website   |
| <b>Objective:</b>  | Write content to cover and report the interest rates offered on CD (Certificates of Deposit) by different credit unions in different states of USA. The primary purpose was to attain top ranking for the keyphrases in the format of: "Credit union name CD rates" e.g. "Alabama credit union CD rates"   |
| <b>Purpose:</b>  | This website was already very well optimized and had high ranking for its targeted keywords and keyphrases as well as enjoyed high organic traffic from the high rankings attained in SERPs. So/Hence, the purpose was to constantly add content and information to the website in order to expand the list of ranked keywords by getting recognized for the same by search engines mainly Google.com. |
| <b>Limitations:</b>  | The content was written remotely without first hand experience of opening a CD directly with a credit union. Therefore, the limitation was in terms of absence of implicit information, which would have otherwise been included. But the limitation was overcome by providing explicit information in terms of specific interest rates, which was the sole purpose of the written article(s).         |
| Implemented techniques and 'steps taken/procedures adopted': |  |
| Details of first technique implemented:                      |  |
| <b>Technique:</b>  | Content writing  |

|  |  |
|--|--|
| <b>Goal:</b>   | Create content by writing article(s), to report/cover interest rates offered on CDs by different credit unions to gain ranking on key phrases composed as "Credit union name CD rates". The client had already done the keyword research to identify its relevance and searchability by the searchers.   |
| <b>Steps undertaken to achieve the stated goal:</b>                          | Thoroughly, read the specifics on offered CD rates and generic information on respective credit union websites, to cover relevant information in the article.  |
| Specific information on the undertaken steps are explained in section 4.7.23 |  |
| <b>Pitfalls identified:</b>  | First hand experience with the covered product would have enabled slightly better coverage of the presented information.   |
| <b>Pitfalls avoided:</b>   | By having clear process for creating content on targeted information, it became possible to focus and attain results.  |
| <b>Results obtained:</b>   | All the written articles attained top ten rankings for the targeted keyphrases on the main search engine i.e. Google.com, within a few days of publishing. As this website was very popular, it was crawled by Google's spiders multiple times a days, thus discovering new content and ranking it for relevant keywords in a short space of time. |
| <b>Role and impact of implemented techniques:</b>                            | The primary role for writing content was to provide additional information on the website with the aim of diversifying the scope of information and attained ranking for different keyphrases. The implementation of this technique had a positive impact in achieving the desired aim.  |
| <b>Optimal results obtained:</b>   | By all means the implementation of this technique achieved the optimal results.  |

### 4.8.3 Details of third and fourth case study websites Searose-Exim.com and Changology.co.uk

The details of third and fourth case study websites SearoseExim.com and Changology.co.uk have been described in table 4.15. Important information of case study

website(s) has been presented including their lifecycle stage, objective and purpose of executing SEO campaign, identified and avoided pitfalls, implemented techniques and results obtained from the implementation.

Table 4.15 Essential on-page SEO techniques implemented for SearoseExim.com and Changology.co.uk

|   |   |
|---|---|
| <b>Case study 3 and 4:</b>  | SearoseExim.com and Changology.co.uk  |
| <b>Lifecycle stage:</b>   | newly launched websites   |
| <b>Objective:</b>   | Establish basic identity/visibility of these websites in the SERPs of the main search engine i.e. Google  |
| <b>Purpose:</b>   | The purpose of conducting SEO campaign for these websites was to establish the visibility of newly launched websites in SERPs from scratch.                   |
| <b>Limitations:</b>   | These websites had minimal budget for creating their websites and establishing respective visibility in SERPs.  |
| Implemented techniques and 'steps taken/procedures adopted':                        |   |
| Details of first technique implemented:   |   |
| <b>Technique:</b>   | Keyword research using basic search technique   |
| <b>Goal:</b>  | Identify relevant keywords used by competitors in the target market   |
| <b>Steps undertaken to achieve the stated goal:</b>                                 | Googled for few relevant keywords and checked the keywords used by competing websites to discover keywords that are relevant for the website to be optimized. |
| Specific information on the undertaken steps are explained in sections 4.7.3, 4.7.4 |   |
| Details of second technique implemented:  |   |
| <b>Technique:</b>   | Keyword research using keyword tool technique   |
| <b>Goal:</b>  | Identify keywords that are relevant, searchable (keywords being searched by searchers) and low competitive (less number of competing websites)                |
| <b>Steps undertaken to achieve the stated goal:</b>                                 | Searched seed keywords in Google keyword planner tool and shortlisted the ones with low search volume and less competition                                    |
| Specific information on the undertaken steps are explained in sections 4.7.6, 4.7.7 |   |
| Details of third technique implemented:   |   |
| <b>Technique:</b>   | Information architecture  |

|   |  |
|---|--|
| <b>Goal:</b>  | To define information hierarchy of the website based on the categories of shortlisted keywords.  |
| <b>Steps undertaken to achieve the stated goal:</b>                                   | Identified concepts and sub-concepts within keywords' categories and created information hierarchy accordingly.  |
| Specific information on the undertaken steps are explained in sections 4.7.11, 4.7.12 |  |
| Details of fourth technique implemented:  |  |
| <b>Technique:</b>   | Content creation   |
| <b>Goal:</b>  | Create content for conveying products' information being sold by the website(s).   |
| <b>Steps undertaken to achieve the stated goal:</b>                                   | Used relevant keywords for creating keyword rich and informative content for each of the respective website pages. For Searose-Exim.com website, content was created mainly for four product pages including, bicycle front baskets, bicycle air pump, children bicycles, bicycle frames and contact us pages. For Changology.co.uk website, content was created mainly for three service related pages including IT change services, IT change implementation, change implementation strategy and contact us pages. |
| Specific information on the undertaken steps are explained in section 4.7.13          |  |
| Details of fifth technique implemented:   |  |
| <b>Technique:</b>   | HTML code optimization   |
| <b>Goal:</b>  | Contextualise specified HTML code.   |
| <b>Steps undertaken to achieve the stated goal:</b>                                   | Added keywords to file names, alt tags, URL structure, etc.  |
| Specific information on the undertaken steps are explained in section 4.7.24          |  |
| <b>Pitfalls identified:</b>   | Implementation of off-page SEO and integration of e-commerce functionality to the websites would have further enhanced the scope and results of the websites respectively.   |
| <b>Pitfalls avoided:</b>  | Avoided targeting irrelevant and unsearchable keywords, creating a flat non-informative hierarchical structure of the website, creating plain content unfocussed on relevant targeted keywords and creating purely technical HTML code instead of contextualised code, which would not have resulted in gaining visibility in SERPs.   |



|   |   |
|---|---|
| <b>Results obtained:</b>                          | By implementing the above stated techniques, SearoseExim.com website attained ranking positions in top ten ranking positions for most of its key phrases except three key phrases attaining top sixty for two of them and one hundred and fifty-fourth (164th) ranking positions respectively for the third one. For Changology.co.uk website it attained top ten ranking positions for all three primary focussed key phrases. |
| <b>Role and impact of implemented techniques:</b> | The primary role of implemented techniques was to attain basic visibility for targeted key phrases and the desired visibility was attained as a direct impact of the implemented techniques.  |
| <b>Optimal results obtained:</b>                  | It was found that the implementation of stated techniques attained optimal results. Additionally, it is important to mention that a third party website created a link to both the websites (Searose-Exim.com and Changology.co.uk), which would have influenced the results to some extent.  |

#### 4.8.4 Details of fifth case study website SaiDigital.co.uk

The details of fifth case study website SaiDigital.co.uk has been described in table 4.16. Important information of case study website has been presented including its lifecycle stage, objective and purpose of executing SEO campaign, identified and avoided pitfalls, implemented techniques and results obtained from the implementation.

Table 4.16 Essential on-page SEO techniques implemented for SaiDigital.co.uk

|                         |   |
|-------------------------|---|
| <b>Case study 5:</b>    | SaiDigital.co.uk  |
| <b>Lifecycle stage:</b> | already existing website  |
| <b>Objective:</b>       | Identify relevant keywords, keyphrases and enhance the website visibility by improving ranking positions in SERPs in the main search engine i.e. Google.co.uk |

|  |   |
|--|---|
| <b>Purpose:</b>  | The main purpose of implementing the SEO campaign was to attain high ranking positions for targeted keywords and key phrases in SERPs and compete effectively with the competitors already listed in top ranking positions in the SERPs of Google.                              |
| <b>Limitations:</b>  | Lack of sufficient budget to get a new design for website as the present design of the website lacked in providing a good user experience.  |
| Implemented techniques and 'steps taken/procedures adopted':                 |   |
| Details of first technique implemented:                                      |   |
| <b>Technique:</b>  | Keyword research using basic search technique   |
| <b>Goal:</b>   | Identify relevant keywords used by competitors in the target market   |
| <b>Steps undertaken to achieve the stated goal:</b>                          | Googled for few relevant keywords and checked the keywords used by competing websites to discover keywords that are relevant for the website to be optimized.   |
| Specific information on the undertaken steps are explained in section 4.7.2  |   |
| Details of second technique implemented:                                     |   |
| <b>Technique:</b>  | Keyword research using search queries report technique  |
| <b>Goal:</b>   | Identify keywords that are relevant for which the website is already ranking in SERPs in Google.co.uk   |
| <b>Steps undertaken to achieve the stated goal:</b>                          | Extracted the search queries report and compiled it with the keywords list provided/found through Google keyword suggestion tool. Shortlisted the keywords for which the website was already ranking and that met the criteria of relevancy, low searchability and competition. |
| Specific information on the undertaken steps are explained in section 4.7.8  |   |
| Details of third technique implemented:                                      |   |
| <b>Technique:</b>  | Information architecture  |
| <b>Goal:</b>   | To define information hierarchy of the website based on the categories of shortlisted keywords.   |
| <b>Steps undertaken to achieve the stated goal:</b>                          | Identified concepts and sub-concepts within keywords' categories and created information hierarchy accordingly.   |
| Specific information on the undertaken steps are explained in section 4.7.10 |   |

|   |  |
|---|--|
| <b>Pitfalls identified:</b>                       | Implementation of off-page SEO would have led to further improvement of attained results.  |
| <b>Pitfalls avoided:</b>                          | By identifying relevant keywords and identifying the main competitors, it became possible to compete in the right niche and attract targeted clients. This website had no clue about the real players in the field.  |
| <b>Results obtained:</b>                          | The website attained top rankings for its targeted keywords. The ranking positions varied for different keywords in the top twenty positions. As a result of these top rankings, the website witnessed an increased number of enquiries for availing the wedding photography service being provided by the website. The website had a contact form for availing the service by providing enquiry details. This contact form was frequently filled by increased number of visitors to the website resulting/referred by the top ranking positions in SERPs. |
| <b>Role and impact of implemented techniques:</b> | The implemented techniques played a key role in enhancing the visibility of website in SERPs. It had a direct impact in referring potential clients to the website, thus providing increased business opportunities.   |
| <b>Optimal results obtained:</b>                  | It can be argued that optimal results were obtained from the implementation of the stated techniques. Firstly the website was able to establish its identity in the target niche and secondly, enjoy an increased number of clients as well.   |

#### 4.8.5 Comparison of results attained for different case study websites

From the presented case studies it is clear that the purpose and objective for executing SEO campaign was very different for each of the websites. Although, SearoseExim.com and Changology.co.uk had the same objective.

Depending on the difference in objectives, the results looked very different for each one of them but it is important to mention that each website successfully attained its defined motive of implementing the specified essential on-page SEO techniques.

If we look at the results attained for each of the case studies then, it can be argued that SearoseExim.com and Changology.co.uk attained the basic visibility only and not any targeted customers as compared to other websites like SaiDigital.co.uk, Bankaholic.com and to a lesser extent Juniors.net.

In this scenario, it is worthwhile to mention that the motive of SearoseExim.com and Changology.co.uk was limited to just attain the basic visibility in SERPs and those websites did not have a provision for converting visitors into clients. Therefore, it indicates that the results attained are dependent to a large extent on the infrastructure created and supported within the respective website(s).

Further, it can also be stated that given that all other things are equal in the lifecycle stage, popularity as well as reputation on the web does make a significant difference towards the impact generated from the implemented techniques. For instance, amongst all the case study websites Bankaholic.com was the most influential. The implementation of the stated techniques was most impactful and fruitful for this website because it already had a great reputation and web traffic generated from its SERPs rankings. In this scenario, on the other end of the spectrum were the case study websites i.e. SearoseExim.com and Changology.co.uk that established just the bare visibility within the SERPs.

In line with Bankaholic.com, Saidigital.co.uk, also reaped significant benefits from attained visibility in SERPs in terms of increased website visitors and business referrals. We can state that the visibility attained for Juniors.net yielded a slightly better returns from its results as compared to SearoseExim.com and Changology.co.uk. It is due to the fact that the attained visibility was used as a negotiating factor in the sales pitch to show case the gained exposure for the website.

The results are now presented graphically and discussed on two levels, firstly, the benefits realised for the respective objectives or business(es) of case study websites had been mentioned and secondly, the benefits in terms of visibility in SERPs.

In order to display the benefits and results of each of the websites graphically two images are presented in figures 4.41 and 4.42.

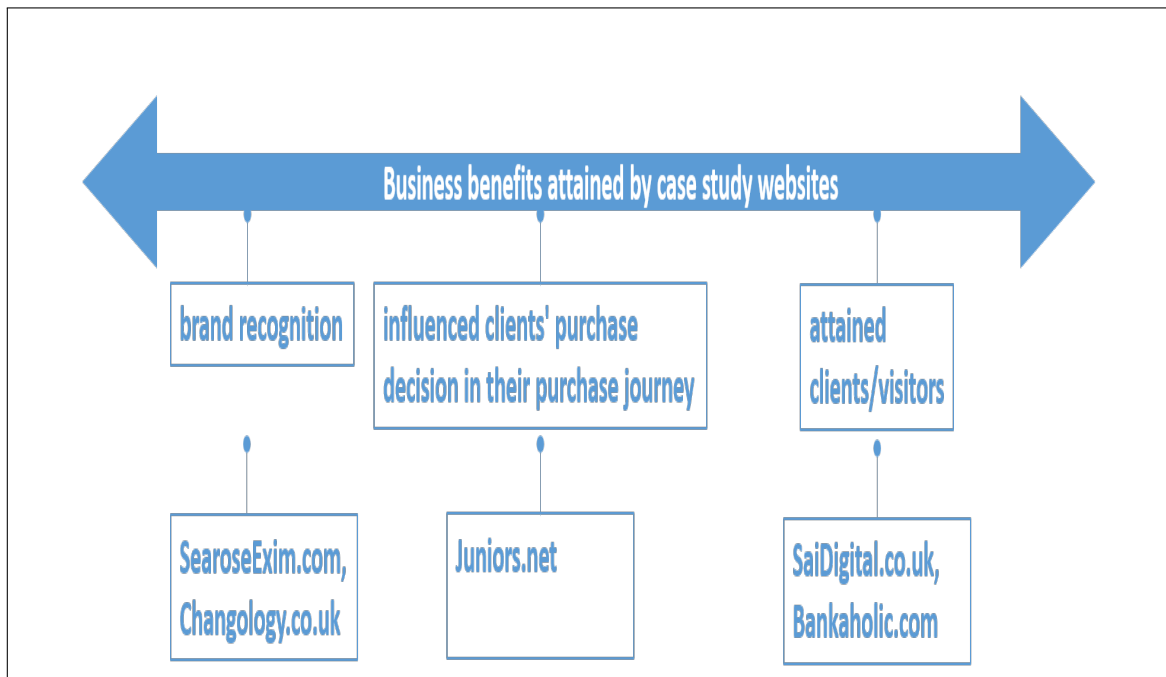


Figure 4.41 Different types of benefits realised by case study websites

As displayed in the above image 4.41 the benefits attained by the respective case study websites can be grouped in three categories i.e.

1. aiming to attain basic visibility
2. aiming to influence clients' purchase decision
3. aiming to attain website visitors and/or clients

It can be argued that the websites *SearosExim.com* and *Changology.co.uk* belong to first category (attained brand recognition), *Juniors.net* belongs to second (influenced clients' purchase decision) and *SaiDigital.co.uk* and *Bankaholic.com* belongs to the third category (attained website visitors and/or clients). These categories have been highlighted in figure 4.41.

The results attained for the case study websites can further be analysed according to the implemented techniques for each of the case study websites and the ranking positions attained for each one of them. This relationship has been highlighted in graphical format in figure 4.42.

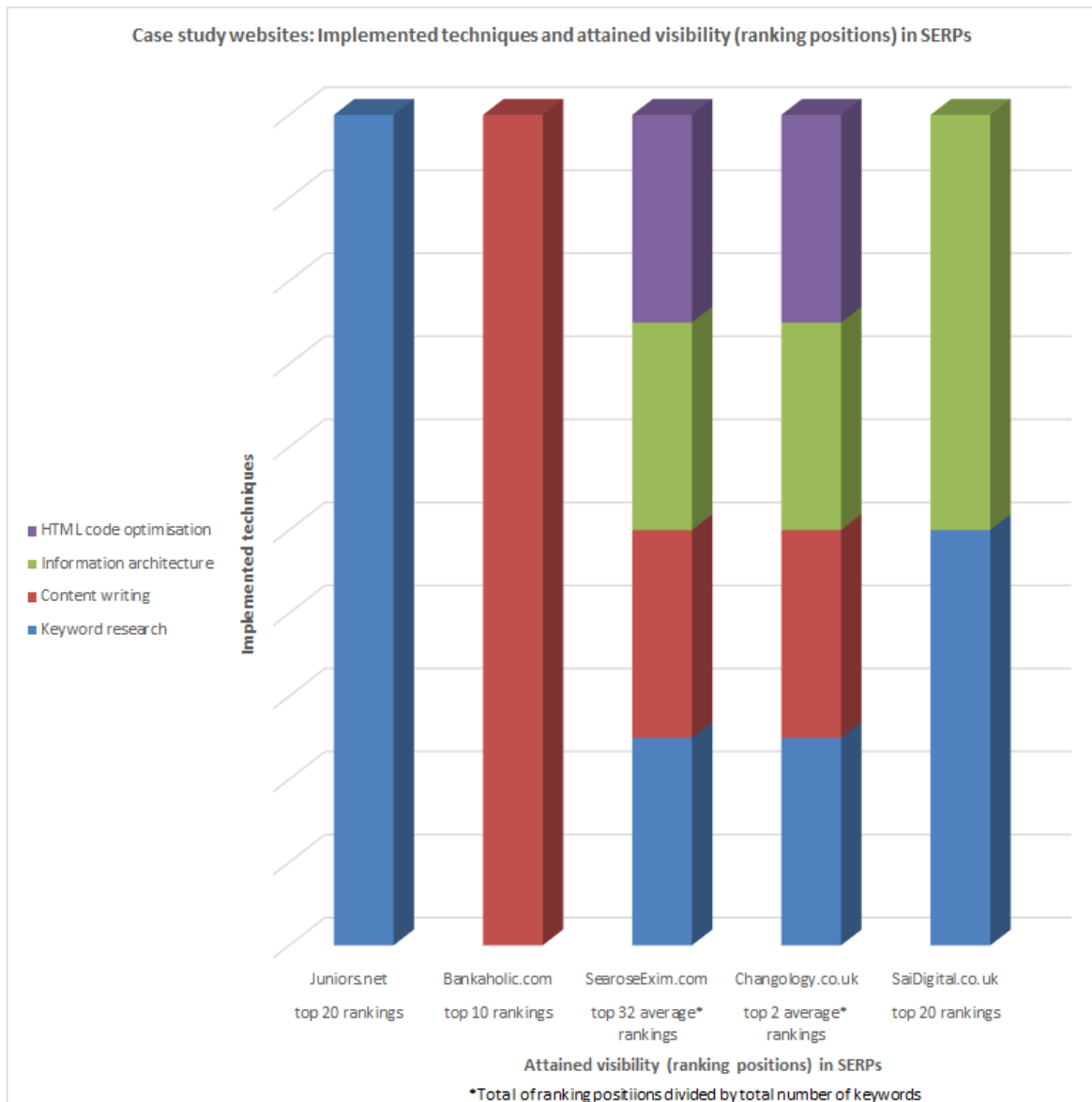


Figure 4.42 On-page SEO techniques implemented and rankings attained for case study websites

As highlighted in figure 4.42, all the case studies became visible in the SERPs of the most important search engine i.e. Google. The purpose of implemented techniques was achieved respectively i.e. establishing or enhancing visibility in SERPs. At the same time, an emphasis needs to be laid on the fact that each website attained different results depending on their objective for the implementation of a SEO campaign. To conclude, we can state that although there is a high degree of similarity in the procedures of implementing the essential on-page SEO techniques the re-

sults and impact generated from implementation of these techniques on respective websites is unique for each of the websites. This peculiarity of heterogeneity (varied characteristics in terms of their life cycle stage, regions and commodity) made them good candidates for selection as case studies (Boddy, 2016).

## 4.9 Summary

In this chapter the pattern of recurrence was identified in the implementation procedures of essential on-page SEO techniques. Based on this information and past experience gained from optimizing case study websites, process models were designed at the *Common Generic Level*, *Cookbook Level* and *Specific Project Level* of SEO experience base on the principle of INRECA-II methodology (Bergmann, 2002).

At the *Cookbook Level*, the intra and inter relation between specified techniques was identified and the SEO taxonomy of the techniques covered within the current research was created.

From the implementation procedures recorded in the process models at *Specific Project Level*, it was found that irrespective of the heterogeneity in the nature of website(s), the procedures for implementing the essential on-page SEO techniques remain the same. In the next chapter 5, on-page SEO techniques were implemented by following the implementation procedures created at the cookbook level in chapter 4.5 for undertaking quantitative experiments for two case study websites within current research.

Further the case study websites' results (considered at Specific Project Level) were analysed to identify the results and benefits obtained from implementation of essential on page SEO techniques with a comparative analysis of the obtained results.

# Chapter 5

## Quantitative experiments and results

In this chapter the quantitative experiments, undertaken on two case study websites have been presented along with the results attained for each one of them. These case study websites were chosen on the basis of heterogeneous SEO application criteria as described in Table 3.1 in Chapter 3. The aim of undertaking these experiments were twofold. Firstly, to investigate the essential nature and role of identified on-page SEO techniques in establishing and enhancing the visibility of websites in SERPs. Secondly, to check the validity and applicability of the implementation procedures of on-page SEO techniques represented in the process models created on the cookbook level of the SEO experience base as presented in section 4.5 in chapter 4. These process models were developed by consolidating the implementation procedures of on-page SEO techniques implemented on case study websites in the past (ahead of the trial of process models on case study websites).

### 5.1 Quantitative experiments

The essential on-page SEO techniques were implemented by following the respective implementation procedures as suggested and conceived within the current research (see sections 4.5 & 4.7) in order to verify if they could have a positive impact on establishing and enhancing the visibility of the case study websites.



### 5.1.1 Quantitative experiment on first case study website: Beds Linen

The on-page SEO techniques of basic keyword research (figure: 4.9), keyword tool method (figure: 4.10), information architecture (figure: 4.12), content creation (figure: 4.14) and HTML optimization (figure: 4.15) were implemented for optimizing this website. The implementation procedures of these techniques represented in cookbook level process models (in section 4.5) were applied in order to implement these techniques to gain visibility in SERPs.

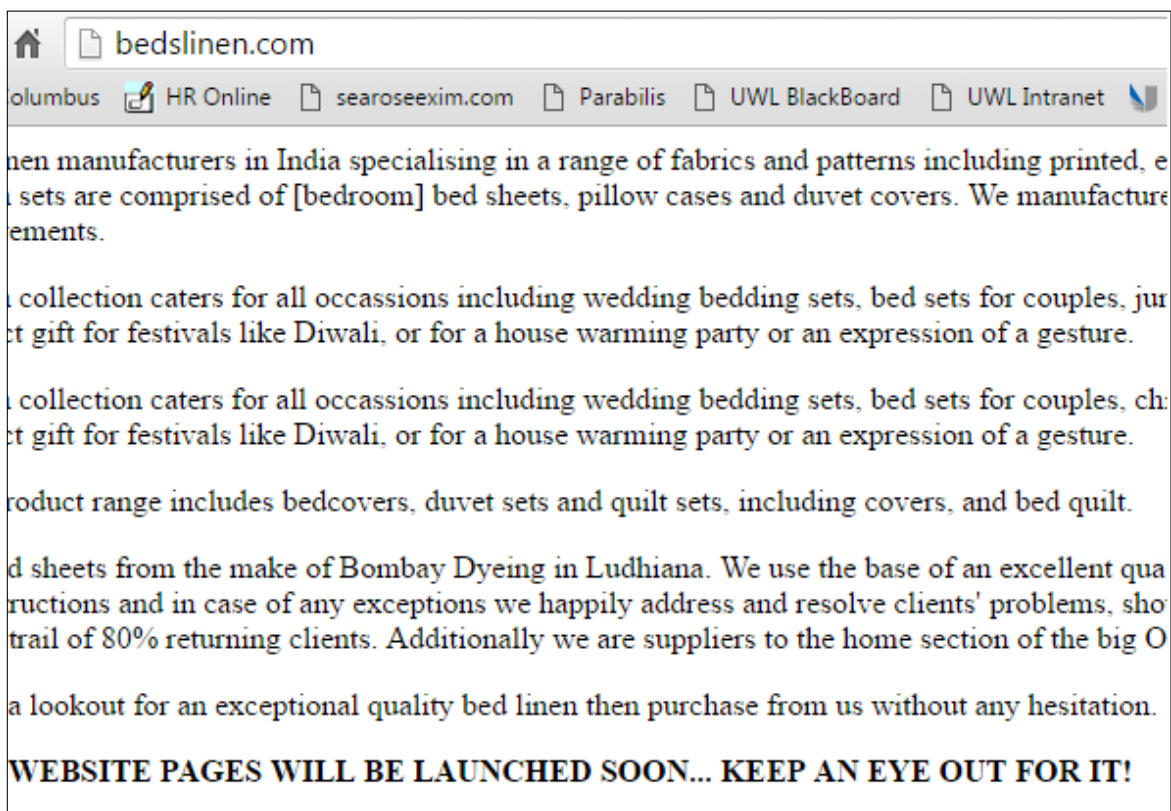


Figure 5.1 Snapshot of beds linen website

**About Beds Linen** Beds Linen<sup>1</sup> is a small-scale business in India manufacturing custom bed sheets, bed covers, duvets, pillows, baby sheets, baby quilts, etc. This business did not have any web presence before. In this experiment a basic website presented in figure 5.1 consisting of eight pages was created. These pages featured textual information on the product range covered by the company. Please note, that

<sup>1</sup>www.bedslinen.com

the product images and online ordering functionality is still to be added which will enable the website visitors to instantly pay and purchase online.

As this company has a very low budget allocated to digital marketing, every incremental step in setting up their web presence will be evaluated in terms of additional cost incurred and added value generated for the business. Added value for business could be seen in terms of expanding its popularity, generating more customers, etc.

As a result of implementation of essential on-page SEO techniques (keyword research, information architecture, content creation, HTML optimization), this website has achieved the desired visibility in the main targeted search engine (Google page ranking within top 150 search listing results for its targeted keywords), which is a very positive outcome for a new website, gone from having zero or no visibility to some visibility in top 150 ranking positions in SERPs for its targeted key phrases therefore potentially selling targeted products. As on 18th Aug, 2016, for the key phrase: *bed linen manufacturers india*, the homepage<sup>2</sup> of this website is ranked at 63rd position on google.co.in and 43rd position on google.co.uk. Similarly, each product page of this website is ranked for its targeted key phrase.

The implementation of on-page SEO techniques for Beds Linen was done as a precursor to investigate and analyse its impact on a brand new website. Based on the promising results attained for this website i.e. 63rd position on google.co.in and 43rd position on google.co.uk, it was decided to replicate these techniques to investigate if the SEO techniques' implementation could enhance the ranking positions of an existing e-commerce website in this case Rachel's Roastery.

### **5.1.2 Quantitative experiment on second case study website: Rachel's Roastery**

The on-page SEO techniques of basic keyword research (figure: 4.9), keyword tool method (figure: 4.10), Search queries report method (figure: 4.11) and information architecture (figure: 4.12) were implemented for this website. The implementation procedures of these techniques represented in cookbook level process models (4.5) were applied to optimize this website.

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<sup>2</sup>[www.bedslinen.com](http://www.bedslinen.com)

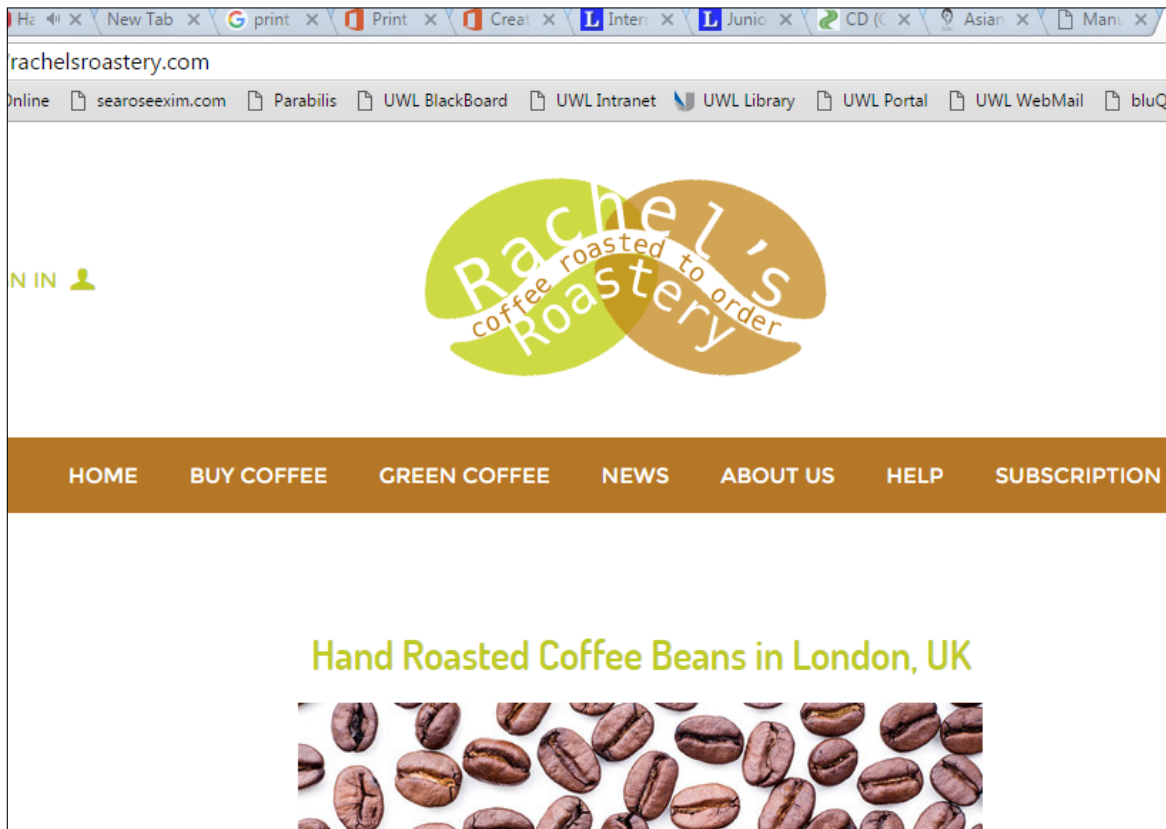


Figure 5.2 Snapshot of Rachel's Roastery website

**About Rachel's Roastery** Rachel's Roastery<sup>3</sup> is operated by a coffee roaster who is passionate about coffee and is a work-from-home mother. It imports specialist region specific coffee from different locations such as Brazil, Costa Rica, Colombia, Kenya, etc. This business mainly roasts coffee for its customers as per their desired roast levels (specified in their orders) and delivers it to them free of charge within the UK.

The website is built on the ecommerce platform, Shopify. It features its products on the website presented in figure 5.2 and accepts online orders and payment online. Therefore this website has full e-commerce functionality. It has been operating since September 2015. The on-page SEO techniques of keyword research, information architecture and content creation were implemented for this website and as a result its ranking positions have been enhanced in SERPs for some of its targeted keywords and key phrases.

<sup>3</sup><https://rachelsroastery.com/>

As on 13 April 2016, the website has secured top twenty rankings in google.co.uk for generic keywords such as 'santa lucia estate coffee' ranking on 9th position, 'lake tawar coffee' ranking on 14th position, 'arusha coffee beans' ranking on 13th position, etc. Although it is a common practice for searchers not to browse beyond top 10 results (Cutrell and Guan, 2007) suggest searchers with a buying intent do browse search results beyond top 20, 30 or even further. This is also evident from the search analytics report of this website where a keyword having an average ranking of 51st position has received one click and that page was selling a specialist Costa Rican coffee variety i.e. tarrazu coffee beans. This has been highlighted in the figure 5.3.

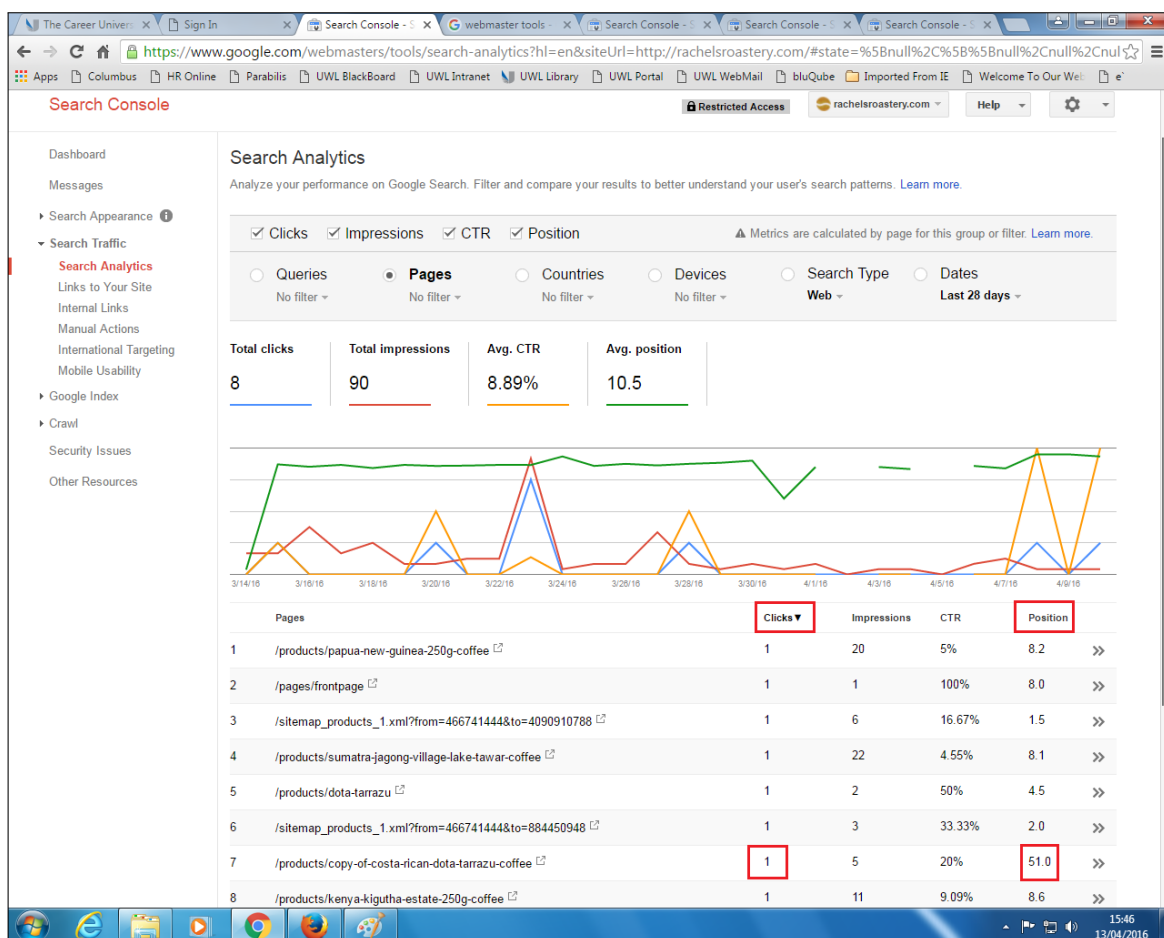


Figure 5.3 Highlighting traffic received via key phrase ranking at an average position of 51st

### Traffic generation for Rachel’s Roastery

From the search analytics report generated on 13th April, 2016, for the last 28 days it shows that the website received 8 clicks for different keywords with an average ranking position of 10.5 as shown below in figure 5.4 and the report for last 7 days shows that it received 2 clicks with an average ranking position of 7.3 as shown below in figure 5.5. Hence from the above pattern we can conclude that for this time period, the website started receiving 2 visitors (referred via ranking in SERPs) on a weekly basis as a result of implementing the on-page SEO techniques.

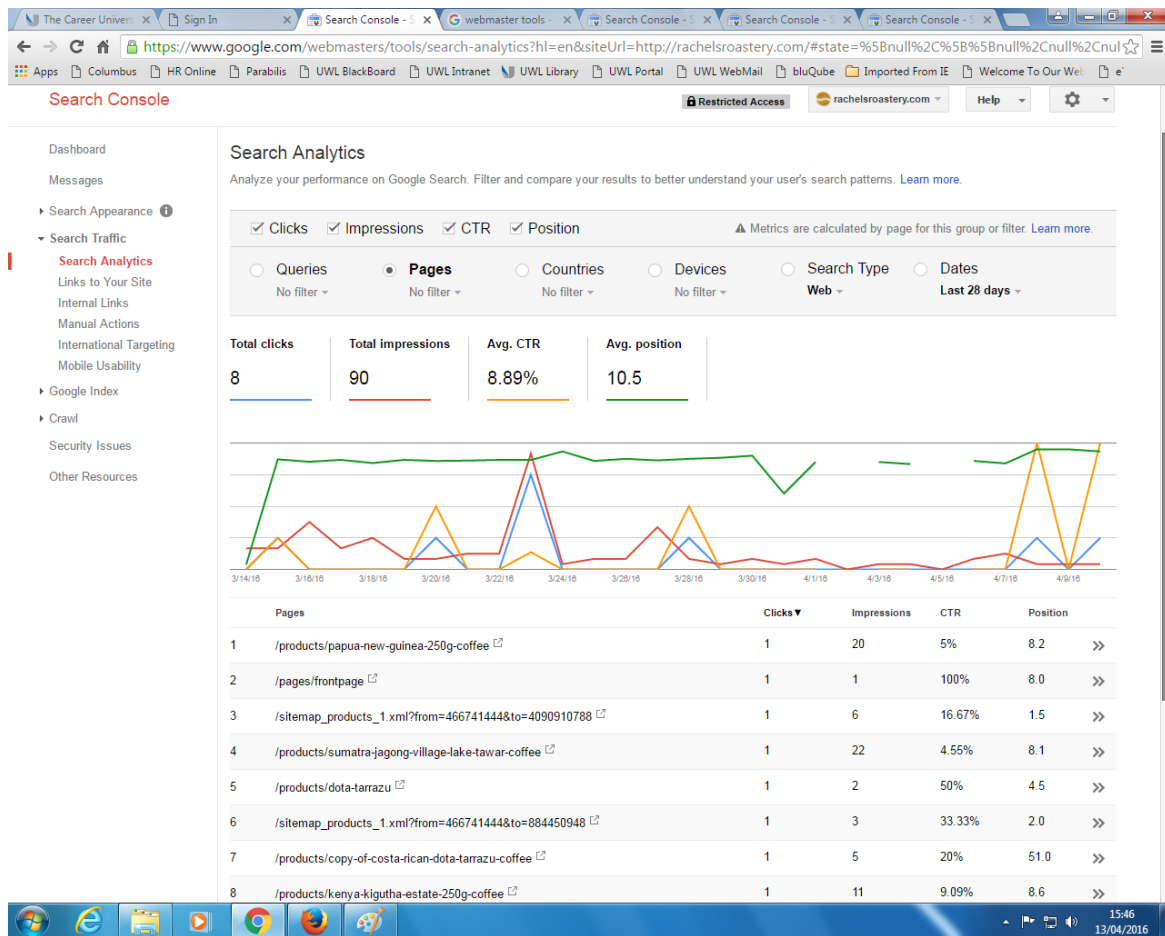


Figure 5.4 Snapshot of Rachel’s Roastery for the last 28 days as on 13th April, 2016

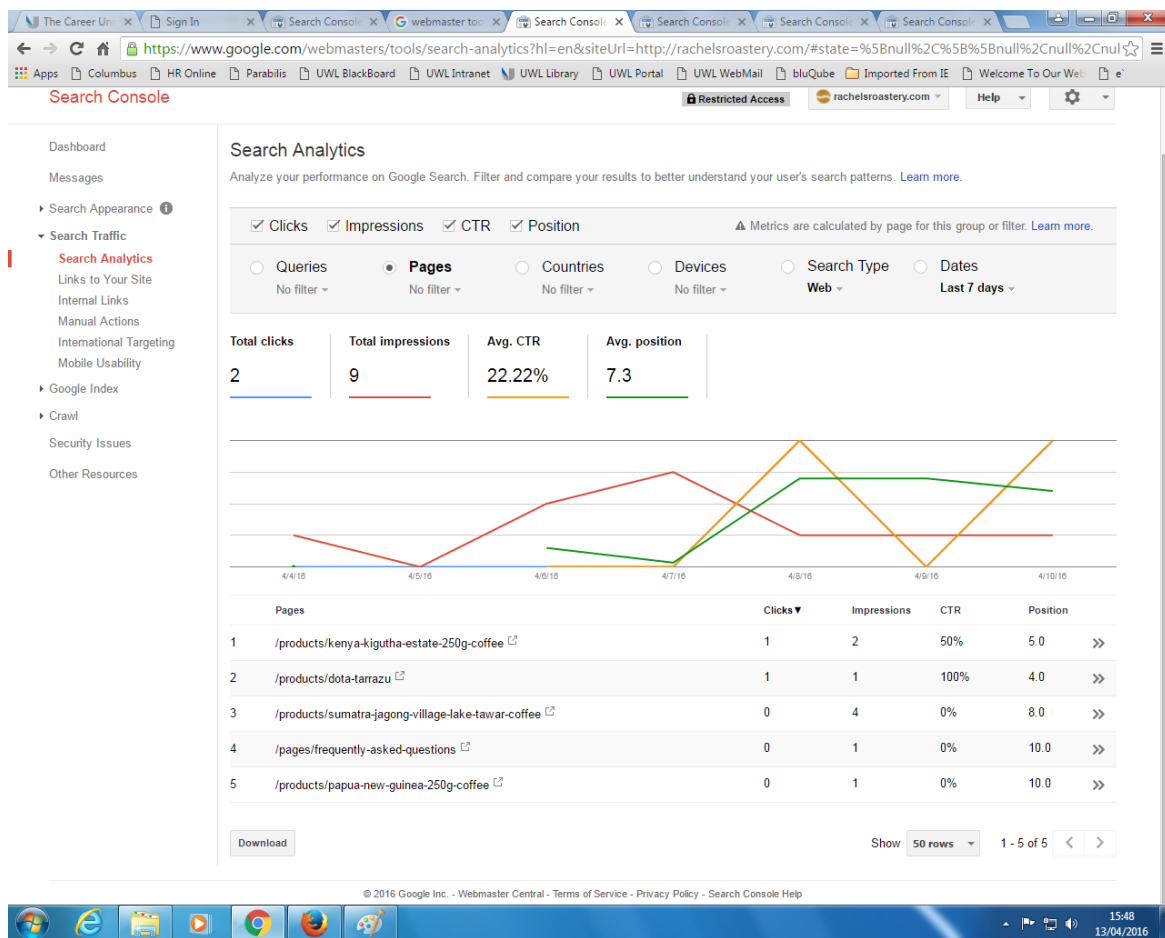


Figure 5.5 Snapshot of Rachel's Roastery for the last 7 days since 13th April, 2016

## 5.2 SEO experiments results

The visibility obtained in SERPs from the quantitative experiments for two case study websites i.e. Beds Linen<sup>4</sup> and Rachel's Roastery<sup>5</sup> have been explained below.

### 5.2.1 Results for case study 1: Beds Linen website

As a result of the implementation of essential on-page SEO techniques this website has been indexed in Google.co.in, in the appropriate category of bed linen and gained visibility for its theme related keywords i.e. bed linen, keywords containing

<sup>4</sup>www.bedslinen.com

<sup>5</sup>www.rachelsroastery.com

geographic location of India, etc. The theme related keywords for which this website gained visibility and ranking positions in SERPs has been presented in table 5.1.

From, the keywords presented in table 5.1, it can be stated that Beds Linen website<sup>6</sup> has established its ranking for the targeted keywords which are highly relevant to the theme and subject of this website.

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<sup>6</sup>[www.bedslinen.com](http://www.bedslinen.com)

Table 5.1 Beds Linen website ranking positions attained on Google.co.in as on 18th Aug 2016

| Key phrase                           | Ranking position pre optimization | Ranking position as on 18th Aug 2016 | Pre and post ranking comparison | Average monthly searches | Webpage ranking                             |
|--------------------------------------|-----------------------------------|--------------------------------------|---------------------------------|--------------------------|---|
| bed linen manufacturers india        | 0                                 | 63rd                                 | ↑ 63                            | 10                       | www.bedslinen.com                           |
| duvets online India                  | 0                                 | 37th                                 | ↑ 37                            | 490                      | www.bedslinen.com/duvets.html               |
| Indian Bedspreads                    | 0                                 | 82nd                                 | ↑ 82                            | 20                       | www.bedslinen.com/bedspreads.html           |
| quilt filler                         | 0                                 | 149th                                | ↑ 149                           | 10                       | www.bedslinen.com/bolster-filler.html       |
| Bolster filler                       | 0                                 | 34th                                 | ↑ 34                            | 10                       | www.bedslinen.com/bolster-filler.html       |
| Bed linen size chart                 | 0                                 | 86th                                 | ↑ 86                            | 10                       | www.bedslinen.com/bed-linen-size-chart.html |
| kids bedding sets india              | 0                                 | 25th                                 | ↑ 25                            | 10                       | www.bedslinen.com/junior-bed-linen.html     |
| junior bed linen                     | 0                                 | 146th                                | ↑ 146                           | 10                       | www.bedslinen.com/junior-bed-linen.html     |
| baby quilts india                    | 0                                 | 61st                                 | ↑ 61                            | 30                       | www.bedslinen.com/junior-bed-linen.html     |
| wholesale bed in a bag manufacturers | 0                                 | 15th                                 | ↑ 15                            | 10                       | www.bedslinen.com/bedding-wholesalers.html  |



As this website had no web visibility and ranking in search engines previously, therefore an establishment of the above ranking and visibility in the search engines is highly favourable to further promote these rankings and start generating website visitors via SERPs and ultimately generate revenue for the business by converting these website visitors/referrals to clients (Christian, 2001; Pan, 2015).

Based on the SEO implementation on this website, all of its primary pages have become visible. As displayed in the table 5.1, all of its relevant keywords from different categories have attained ranking. These keywords are ranking for their corresponding category pages. It signifies the fact that they have been indexed in Google under the appropriate theme and category which lays a strong foundation for further enhancing its ranking.

The attained rankings on Google are in top 150 positions which is a significant visibility establishment for the website considering the fact that previously it had no web visibility at all. The average monthly searches for these keywords range between 10 and 490 where majority of the keywords have 10 searches per month and one of them has 490 searches per month. The keyphrase *duvets online India* is searched 490 times a month on an average for which this website is ranking at 37th position. A further boost to this ranking position can prove to be beneficial for the website in the longer run. In order to establish the initial ranking keywords and key phrases having low Google competition were targeted. Particularly keywords with competition varying between 367,000 to 3,640,000 were selected for optimizing this website.

In addition to Google, this website has also been indexed and ranked for relevant keywords in Bing and Yahoo. The follow up checks for rankings in SERP made on 4th May, 2017 reveal that for the keyphrase 'wholesale bed in a bag manufacturers', the ranking is now 13th position in Bing and 15th position in Yahoo. For the keyphrase 'bed linen manufacturers india', the ranking is now 48th position in Bing and 33rd position in Yahoo. For the keyphrase 'Bolster filler', the ranking position is now 44th position in Bing and 113rd position in Yahoo. This has been presented in table 5.2.

Table 5.2 Beds Linen website ranking positions attained on Bing and Yahoo as on 4th May, 2017

| Key phrase                           | Ranking position in Bing | Ranking position in Yahoo |
|--------------------------------------|--------------------------|---------------------------|
| wholesale bed in a bag manufacturers | 13th                     | 15th                      |
| bed linen manufacturers india        | 48th                     | 33rd                      |
| Bolster filler                       | 44th                     | 133rd                     |

### 5.2.2 Results for case study 2: Rachel's Roastery website

This site has gained visibility in search engine results (Google) for its theme related keywords i.e. coffee roasters, keywords containing geographic location of London, coffee varietals, etc. A snapshot of its ranking in Google has been displayed in table 5.3.

Rachel's roastery website<sup>7</sup> has enhanced its ranking considerably for the relevant keywords it was already ranking for and established ranking for the keywords for which it was not ranking earlier. These keywords along with their ranking positions and webpage URLs have been highlighted in the table 5.3. The table 5.4 shows a comparison of the ranking that presents a comparison of the ranking positions pre and post optimization of the website. It indicates an improvement in ranking positions post optimization of the website.

<sup>7</sup>[www.rachelsroastery.com](http://www.rachelsroastery.com)

Table 5.3 Rachel's Roastery website ranking positions attained on Google.co.uk as on 12th Aug 2016

| <b>Key phrase</b>                | <b>Ranking positions as on 12th Aug 2016</b> | <b>Average monthly searches</b> | <b>Webpage ranking</b>  |
|----------------------------------|--|---------------------------------|---|
| london coffee roaster            | 102nd  | 170                             | <a href="https://rachelsroastery.com/pages/frequently-asked-questions">https://rachelsroastery.com/pages/frequently-asked-questions</a>                                 |
| Carmo coffee                     | 43rd   | 10                              | <a href="http://rachelsroastery.com/products/brazil-carmo-estate">http://rachelsroastery.com/products/brazil-carmo-estate</a>   |
| Santa lucia estate coffee        | 3rd  | 10                              | <a href="http://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee">http://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee</a> |
| caturra coffee beans             | 29th   | 10                              | <a href="http://rachelsroastery.com/products/colombia-las-brisas-250g-coffee">http://rachelsroastery.com/products/colombia-las-brisas-250g-coffee</a>                   |
| Arnulfo Leguizamo coffee         | 9th  | 10                              | <a href="http://rachelsroastery.com/products/colombia-primavera-250g-coffee">http://rachelsroastery.com/products/colombia-primavera-250g-coffee</a>                     |
| Primavera coffee                 | 102nd  | 10                              | <a href="http://rachelsroastery.com/products/colombia-primavera-250g-coffee">http://rachelsroastery.com/products/colombia-primavera-250g-coffee</a>                     |
| tarrazu coffee beans             | 41st   | 10                              | <a href="http://rachelsroastery.com/products/costa-rican-coffee">http://rachelsroastery.com/products/costa-rican-coffee</a>   |
| raw green coffee beans           | 112nd  | 10                              | <a href="http://rachelsroastery.com/products/dota-tarrazu">http://rachelsroastery.com/products/dota-tarrazu</a>   |
| Guatemala green coffee beans     | 57th   | 10                              | <a href="http://rachelsroastery.com/products/guatemal-el-guatalan-250g-coffee">http://rachelsroastery.com/products/guatemal-el-guatalan-250g-coffee</a>                 |
| SL28 coffee                      | 59th   | 20                              | <a href="http://rachelsroastery.com/products/kenya-kigutha-estate-250g-coffee">http://rachelsroastery.com/products/kenya-kigutha-estate-250g-coffee</a>                 |
| arusha coffee beans              | 13th   | 10                              | <a href="http://rachelsroastery.com/products/papua-new-guinea-250g-coffee">http://rachelsroastery.com/products/papua-new-guinea-250g-coffee</a>                         |
| Lake Tawar coffee                | 16th   | 10                              | <a href="http://rachelsroastery.com/products/sumatra-jagong-village-lake-tawar-coffee">http://rachelsroastery.com/products/sumatra-jagong-village-lake-tawar-coffee</a> |
| Hand Roasted Coffee Beans        | 77th   | 10                              | <a href="https://rachelsroastery.com">https://rachelsroastery.com</a>   |
| Hand roasted coffee beans london | 10th   | 0                               | <a href="http://rachelsroastery.com">http://rachelsroastery.com</a>   |

As a result of the implementation of specified on-page SEO techniques for this website, all of its product pages have become visible. As displayed in the table 5.3, all its coffee variety keywords have attained ranking. These keywords are ranking in Google.co.uk for their relevant product pages. It signifies the fact that they have been indexed in Google under the appropriate theme and category which lays a strong foundation for further enhancing its ranking position in SERPs. For example, for the keyphrase *hand roasted coffee beans london* it is ranking on 10th position in Google, which reveals that it has got indexed for appropriate region and geographic location of London.

All of the attained ranking positions are in top 120 positions on Google which is a significant visibility improvement for the website. Although the average search volume for the keywords / key phrases for which this website is visible in SERPs is 10, which seem to be low in volume, but the fact that needs to be emphasised is that for optimizing this website, keywords with low searchability are deliberately selected to establish its initial visibility and ranking positions (Abhishek and Hosanagar, 2007; Killoran, 2013). Keywords with low searchability tend to have a lower competition generally. The competition for the keywords for which this website is ranking varies between 1,980 to 1,760,000 on Google.

In order to establish the rankings of a new website it is always important to target low hanging fruits in the form of less searched and less competitive keywords in phase one of optimization and then gradually build on rankings after achieving positive results as identified in phase of SEO implementation shown in figure 1.8 in chapter 1.

Another important point that needs to be highlighted is that whilst selecting the keywords, three key characteristics of uniqueness, relevance and specificity were taken into account for shortlisting the best possible keyword options.

Table 5.4 Ranking comparison on Google.co.uk as on 12th Aug 2016

| Key phrase                | Ranking as on 12th Jan 2016 | Ranking as on 12th Aug 2016 | Pre and post ranking comparison | Webpage ranking   |
|---------------------------|-----------------------------|-----------------------------|---------------------------------|---|
| sumatra lake tawar        | 150                         | 65                          | ↑ 85                            | <a href="https://rachelsroastery.com/products/sumatra-jagong-village-lake-tawar-coffee">https://rachelsroastery.com/products/sumatra-jagong-village-lake-tawar-coffee</a> |
| hand roasted coffee beans | 140                         | 77                          | ↑ 63                            | <a href="https://rachelsroastery.com">https://rachelsroastery.com</a>   |
| santa lucia coffee        | 40                          | 34                          | ↑ 6                             | <a href="https://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee">https://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee</a> |
| carmo coffee              | 210                         | 43                          | ↑ 167                           | <a href="https://rachelsroastery.com/products/brazil-carmo-estate">https://rachelsroastery.com/products/brazil-carmo-estate</a>   |
| santa lucia estate coffee | 14                          | 4                           | ↑ 10                            | <a href="https://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee">https://rachelsroastery.com/products/brazilian-santa-lucia-estate-250g-coffee</a> |

As represented in the table 5.4, the results reflect a clear improvement in the Google ranking positions of key phrases when comparison is made between the pre-optimization results and post-optimization results. Table 5.4 shows a considerable improvement for all the keywords which were ranking earlier. For instance, the keyphrase *carmo coffee* was ranking at 210th position which has risen to 43rd position, key phrase *sumatra lake tawar* was ranking at 150th position which has risen to 65th position, and *hand roasted coffee beans* was ranking at 140th position which has risen to 77th position. The key phrase *santa lucia estate coffee* is ranking in at 4th position which reflects a top ten ranking, which is the most desirable ranking position. It was ranking at 14th position earlier which has risen to 4th position.

Top ten rankings drive the maximum traffic to a website (Brossard and Scheufele, 2013). Most of the searchers tend to focus their attention on and visit top ten ranking websites. As Rachel's Roastery is ranking amongst the top ten positions post implementation for one of its targeted keywords, hence it is in a stronger position to receive targeted traffic via that top ten ranked key phrase (*santa lucia estate coffee*).

Therefore the changes in ranking are both highly desirable from a commercial perspective in terms of potential of receiving new clients and generating business revenue but as also evidence to support the efficacy of using SEO process models to improve website visibility (Christian, 2001; Pan, 2015).

Furthermore, in addition to Google, this website has also been indexed and ranked for relevant keywords and key phrases in Bing and Yahoo. The follow up checks for rankings in SERPs made on 4th May, 2017 reveal that for the keyphrase 'Arnulfo Leguizamo coffee', the ranking is now 5th position on Bing and Yahoo, for the keyphrase 'Lake Tawar coffee', the ranking is now 6th position and for the keyphrase 'Hand roasted coffee beans london', the ranking is 9th position on Bing and 7th position on Yahoo. This has been represented in table 5.5.

Table 5.5 Rachel's Roastery website ranking positions attained on Bing and Yahoo as on 4th May, 2017

| Key phrase                       | Ranking position in Bing | Ranking position in Yahoo |
|----------------------------------|--------------------------|---------------------------|
| Arnulfo Leguizamo coffee         | 5th                      | 5th                       |
| Lake Tawar coffee                | 6th                      | 6th                       |
| Hand roasted coffee beans london | 9th                      | 7th                       |

## 5.3 Summary

In this chapter two quantitative SEO experiments and the results obtained from them were presented. From these results it was observed that the optimization of a website depends on its current state and visibility in SERPs and also upon the overall goals of the website. The optimized case study websites were at different life stages i.e. one being a 'newly launched website (Beds Linen) with no existing visibility in SERPs and another site (Rachel's Roastery), which was already existing with some established visibility in SERPs. It was found that there was an improvement in visibility in SERPs after implementation of respective essential on-page SEO techniques (Hoque et al., 2018; Zhang and Cabage, 2013).



# Chapter 6

## Evaluation (via focus group)

### 6.1 Introduction:

The results obtained from the quantitative experiments previously described were promising and thus far indicated that the *implementation procedures of essential techniques* are effective in improving the visibility of websites in SERPs. An accurate implementation of identified techniques (i.e. keyword research, content creation, information architecture, and HTML code optimization) is mandatory in an SEO campaign as it indicates the website's semantics for its appropriate indexing and interpretation by search engines. These techniques do the ground work of providing the essential information to search engines. They establish the semantic-layer of visibility on the platform of search engines and implicitly support other relevant techniques, which aim to enhance the visibility of websites in SERPs as mentioned in prior research as well (Jain, 2013; Ur Rehman and Khan, 2013).

It has been found in the state of the art of SEO that the majority of SEO experiments report implementation of different SEO techniques without specifying their implementation procedures (Moreno and Martinez, 2013; Raiber et al., 2013; Zhang and Dimitroff, 2005; Zhang and Cabage, 2013), *see chapter 2*. This may be due to the perception that there exists a prior understanding of SEO amongst the target audience i.e. experienced SEO professionals. But the category of *experienced SEO professionals* does not cover all the stakeholders of SEO. The current research identified three categories of stakeholders i.e. searchers, websites and SEO professionals.



Amongst these categories, the novel SEO professionals as well as some websites might not have the expertise and experience required to implement the SEO techniques and replicate the SEO experiments (Ghandour, 2018; Giomelakis and Veglis, 2018; Gudivada et al., 1997). Furthermore, they might not have access to external expertise to guide the replication of reported SEO techniques. In such cases, self-training (from the available knowledge) is one of the viable options. Although currently there is SEO knowledge captured in contemporary academic and professional sources, which can be used to gain SEO knowledge, there is evidence that suggests otherwise. Such research (Ghandour, 2018), identifies websites, that are still unable to take advantage and monetize the search engine channel. This might explain the incomprehensibility of the current SEO knowledge, as reviewed in chapter 2 of this thesis (Bing, 2013; Google, 2013; Killoran, 2013).

Hence, there clearly exists a need for a better source of SEO knowledge for reference by anyone who wants to self-learn and implement the essential techniques of SEO. This knowledge would enable to implement the SEO basics to establish the visibility of a website in SERPs (Aul and Roth-Berghofer, 2015). As noted above, currently there exists SEO knowledge in the academic and professional fields of SEO, however, there exist weaknesses in their current state. The professional knowledge has not been subject to peer review and the academic knowledge whilst peer reviewed sources largely contain results based only on quantitative validation (Hoque et al., 2018; Zhang and Dimitroff, 2005; Zhang and Cabage, 2013, 2017). Few studies (Ahmed et al., 2013; Dick, 2011) have reported qualitative results but they are limited to interviews to find if B2B (business to business) and B2C (business to consumer) companies utilise SEO techniques and do not adequately address the transfer of SEO knowledge to the novice. The current research has created SEO knowledge by representing the implementation procedures of essential SEO techniques and is interested in finding whether it would be helpful for the identified stakeholder websites.

Patton (1990) states that the best way to ensure that the collected data reflect the views of all the major stake holders is through employing a mixed methods approach. The current research has employed mixed methods i.e. a combination of the quantitative (optimizing two case study websites) and qualitative methodology (conducting focus group) in order to address gaps in the existing knowledge. The visibility of websites in SERPs (indicated by a ranking position), indicates the quantitative evaluation of created knowledge (discussed in chapter 5), whereas the evaluation of

created knowledge by experts in the field (to be undertaken in this chapter), would point towards a qualitative evaluation. For the evaluation, a benefit of employing methodological triangulation (Denzin, 1978), is that the qualitative aspect gives a chance to obtain evaluate the knowledge created from the lens of experts in the field.

Feldmann et al. (1998) specified that the created knowledge should be complete, correct and consistent. Although, the quantitative experiments confirm these characteristics, verification of these characteristics via qualitative enquiry will provide necessary strength to the findings, internal validity and credibility to the results obtained for the study (Patton, 1990). Therefore the aim of the current chapter is to report a qualitative study conducted for soliciting feedback from SEO professionals on the effectiveness of the created SEO process models previously described in chapter 4.

### **6.1.1 Design**

The qualitative data on feedback of SEO professionals on the effectiveness of the created SEO process models was collected from one focus group. A focus group was run on April 23rd, 2018 for this purpose. The focus group was audio-taped, transcribed verbatim, and then analysed by using thematic analysis (Boyatzis, 1998).

### **6.1.2 Method**

#### **Participants**

As described in section 3.10, the process models were demonstrated to ten participants. All of the participants were SEO experts with specialist knowledge in the field and one of the participants was certified by Google. Four out of ten professionals had more than ten years of experience in the field of digital marketing. One of them had over twenty years of experience. All of them were well versed in SEO techniques with indepth knowledge, experience and insight of what works and what does not work.

Out of the ten participants, only six were able to attend the focus group whereas four sent their written and oral feedback (for complete details, see appendix G). This feedback has been provided along side their details in table 6.1 and detailed

feedback of focus group participants has been analysed and discussed in results section (6.1.5) and discussion section (6.1.6) respectively.

Table 6.1 Participant details with quick feedback from demonstration attendees

| <b>SN</b> | <b>Alias name</b> | <b>About</b>  | <b>Demo., focus group, both</b> | <b>Quick feedback</b> |
|-----------|-------------------|---|---------------------------------|-----------------------|
| 1.        | K1                | 20 years of web and SEO experience, founder of web marketing, design agency and a full-service digital agency in London   | both                            | attended focus group  |
| 2.        | A1                | 12 years of digital marketing and web development experience, CEO & Co-Founder of a web marketing, design and development agency in India, with client list including some of the fortune 500 companies | both                            | attended focus group  |
| 3.        | R1                | 12 years of digital marketing experience, SEO Manager and founder of a digital marketing specialist company in India  | both                            | attended focus group  |
| 4.        | R2                | 12 years of content writing and SEO experience in UK  | both                            | attended focus group  |
| 5.        | A2                | 3 years of SEO experience in UK   | both                            | attended focus group  |
| 6.        | P1                | a Google certified digital marketing specialist with 3 years of digital marketing experience, CEO of web marketing and design company in Greater London   | both                            | attended focus group  |

|    |   |  |       |   |
|----|---|--|-------|---|
| 7. | A | 3 years of experience as English SEO Copywriter and SEO engineer at a digital agency providing web marketing, translation, localization and content services in Cyprus | demo. | Thank you ever so much for your presentation! It's always helpful hearing in-depth information about SEO, especially when it is presented and explained in a clear manner such as yours. I'm pleased we have you to turn to for advice or SEO tips :)   |
| 8. | F | 6 years of digital marketing experience, Managing Director at an award winning SEO digital agency in London  | demo. | Good insights about on-page SEO. We can do an Webinar and you explain the slides and I can ask any questions and add my thoughts to make it a good on page SEO webinar. I will go through each of your pages on <a href="http://www.bedslinen.com/survey/fifth.html">http://www.bedslinen.com/survey/fifth.html</a> and get an better idea tomorrow. The webinar will be done online and I will send you an invitation to join link and you just need a good internet connection and headset. We should do it very well and I will probably want to sell it online as On Page SEO mastery course. |
| 9. | K | 7 years of digital marketing experience, Designer and web marketer for a small web marketing and design agency in London   | demo. | Great stuff, will use it in day to day work practice  |

|     |   |   |       |  |
|-----|---|---|-------|--|
| 10. | C | 7 years of digital marketing experience, providing digital marketing services to B2B companies having a turnover of between £5M and £100M. Also teaches marketing, as a guest lecturer, and a mentor to post graduate students at UCL (University College London) | demo. | A very interesting meeting. Thanks for sharing this. |
|-----|---|---|-------|--|

### Demonstration procedure

The demonstration was essential to the process to ensure parity of implementation and understanding by all the participants. It was done face to face for the participants based locally whereas for overseas participants it was done via skype.

As highlighted in the figure 3.3 in section 3.10 of chapter 3, the first ten minutes were utilised for introducing the purpose of process models and understanding the day to day job profile of the participants. Subsequently, the process models were then explained to the participants, step by step. Finally, the questions from participants were taken to facilitate their understanding for trialling the use of the process models in their work-based setting prior to the focus group evaluation.

### Focus group procedure

Focus group was preferred over individual semi-structured interviews for gathering data. The protocol of this focus group was designed to verify the integrity of process models at two levels i.e. educational level (to aid in SEO learning) and professional level (to guide the implementation of SEO techniques). This method was more likely to put the focus group participants at their ease to evaluate the process models. Moreover, Sim (1998) asserts that participants are more relaxed in a group and hence willing to express their opinions and explore them further in comparison to when being interviewed alone.

The focus group took place on the premises of The University of West London and was conducted as a combination of real world setting and virtual focus group (Bloor et al., 2001). Three participants were present in the room and three participants participated via Skype. The room was laid out in boardroom style, an audiotape recorder and a webcam on a tripod. All the participants in the room were visible to the virtual participants on Skype and the virtual participants were audible to everyone in the room.

**Facilitators:** Two facilitators took part in the focus group (the researcher and her academic supervisor). Both facilitators had lengthy experience of working with professionals in a professional and academic setting respectively. The researcher had intensive experience of working with the SEO professionals. Additionally, the researcher's supervisor had an intensive experience of conducting focus groups and working with psychologists in an academic setting for more than 25 years. For the effective functioning and elicitation of responses from participants, the researcher focused on the SEO aspect and the researcher's supervisor took field notes and tackled the participation aspect to assure an equal opportunity of participation for all participants.

**Materials: Focus group questions:** The focus group questions are shown in the table 6.2. Questions 1-9 were phrased with the intention of encouraging the participants to share their perspective of the knowledge being provided by the process models and their experience of having used them with the prospect of continued usage in the future. Additionally, prompt-questions were designed to enquire specific features of process models. The questions were created to investigate if the process models incorporated the educational and technical elements. On the educational front, it was validated if they were appropriate to be used to train and educate the novice on the implementation procedures of essential SEO techniques (Clarke and Clarke, 2014). On the technical aspect, the purpose was to check if they were technically robust in terms of being correct, complete and consistent for implementing the SEO techniques (Ur Rehman and Khan, 2013).

Table 6.2 Focus group questions

| SN | Focus group questions   |
|----|---|
| 1. | Can you describe your experience of seeing the demonstration of the process model(s)?   |
| 2. | How do you think the identified steps support you in executing SEO techniques?          |
| 3. | How does this differ from your usual technique?   |
| 4. | Are the process model(s) easy to understand?  |
| 5. | Why is this?  |
| 6. | Is there anything you feel that could be improved?                                      |
| 7. | Going forward do you feel you will use these techniques/ will change your own practice? |
| 8. | If so why?  |
| 9. | If not why not?   |

## Prompt questions

|    |   |
|----|---|
| 1. | Do the process models provide step-by-step guidance for implementing the stated SEO techniques?   |
| 2. | Can any step in the process model(s) be referred depending on the SEO needs of a website.   |
| 3. | Do the shortlisted keywords provide information for executing the related on-page SEO techniques of Information Architecture, Content Creation and HTML code optimization?  |
| 4. | Do you think the websites will attain visibility in SERPs if the specified SEO techniques of (keyword research, website's information architecture, content writing and HTML optimization) are implemented as per the process models?                         |
| 5. | Do you think the implementation of specified SEO techniques as per the process models (keyword research, website's information architecture, content writing and HTML optimization) will effect the visibility of website in the Search Engine Results Pages? |

**Focus group protocol:** The full focus group protocol and transcript can be found in Appendix A. The focus group had two facilitators, one asking the questions, who was the lead facilitator and the other facilitator taking field notes.

An oral consent was sought from the participants for their details to be included after anonymising their names in the report included in the thesis.

The facilitators then introduced themselves and explained their role. An introduction round was done as an ice breaker with the intention of familiarising participants with each other. The lead facilitator then introduced the format to be adopted for the focus group. The participants were informed that they will be asked six main questions and each question would be allocated ten minutes. The audiotape recorder was switched on from the beginning of the introduction round and the lead facilitator commenced asking questions.

The focus group lasted no more than sixty minutes as this was thought to be the optimum time duration for keeping participants' attention focussed considering their commitment to their work-schedule. Once the participants had their say, the audio tape was switched off. The participants were encouraged to ask any questions they had regarding the purpose of the research project.

### **6.1.3 Data analysis**

The audiotape was transcribed verbatim and analysed using thematic analysis (Boyatzis, 1998; Braun and Clarke, 2006; Bryman, 2016).

#### **Thematic analysis**

For qualitative analysis, thematic analysis has been described as the foundational method (Braun and Clarke, 2006, p. 78) as it is equipped with generic skills (Strauss and Corbin, 1998) i.e. thematic coding with further epistemological qualitative approaches like grounded theory and (Smith, 2004) Interpretative Phenomenological Analysis (IPA). It is used to generate and explore themes by employing a top down approach for addressing certain pre-determined questions about the data (Boyatzis, 1998) or a data driven, bottom up approach e.g. grounded theory (Strauss and Corbin, 1998). Since thematic analysis is not focussed on one particular theory, it tends to offer much more flexibility, thus, providing a detailed and rich analysis well suited to adapt to the requirements and complexity of the type of personal experiential data, generated and gathered by conducting the focus group (Braun and Clarke, 2006).



### 6.1.4 Coding and inter-coder reliability of the data

The transcript was read completely multiple times by the researcher and the second facilitator who has prior experience of running focus groups e.g. (Ohl, 2009). The participants' responses to the questions posed in the focus group (sentences and phrases) were used as the units of coding. These responses were analysed for their apparent and latent content and as a result, five themes were derived from the data:

1. **Identified techniques cover on-page SEO:** Participants identified that the techniques focussed in the current research cover primary on-page SEO techniques.
2. **Process models provide complete details for implementing the specified SEO techniques:** Participants identified in their responses that process models provide complete details for implementing the SEO techniques.
3. **Process models provide training, knowledge and comprehension on specified SEO techniques:** Participants identified the educational value of the process models for providing on-page SEO training.
4. **Implementation of process models attain visibility:** Participants identified the potential for attaining website visibility after implementing these techniques.
5. **Suggested changes:** Participants made suggestions in their responses for enhancing the process models through addition of decision pointers, approval stages, an overall summary model, technical SEO, video and animation and off-page SEO.

The transcript was subjected to an iterative process for determining the inter-coder reliability by using a method as described by (Hruschka et al., 2004).

A random sample of six sheets was taken from the transcript and independently coded by both coders using the coding categories listed above. After these sheets were fully coded they were compared for items of agreement and the inter-coder reliability was tested by using Cohen's Kappa (Cohen, 1960).

The primary reason for selecting Cohen's Kappa was that it adjusts for the agreement made by chance (Cohen, 1960; Hruschka et al., 2004), instead of comparing the 'coefficients of agreement' that assesses the proportion of only the actual inter coder agreement. The range of Kappa varies between 1 (i.e. perfect agreement) to 0 (i.e. agreement which is no better than chance).

A Kappa statistic of 0.71 was generated indicating the inter-coder reliability, which has been described as substantial in the convention for Kappa defined by (Landis and Koch, 1977). This level of inter-coder reliability was considered to be acceptable, therefore, the researcher proceeded for coding the entire data set by using the themes identified and previously described.

The emergent themes along with their descriptions have been highlighted in table 6.3.

Table 6.3 Table of themes for focus group data:

|         | <b>Themes</b>   | <b>Example</b>  |
|---------|---|---|
| Theme 1 | Identified techniques cover on-page SEO   | K1: The overall impression that I got from your presentation and the work that you've done is very good, is very detailed and I think it's structured the process for on-page optimization very well [ . . . ] Excerpt from line 13   |
| Theme 2 | Process models provide complete details for implementing the specified SEO techniques | A2: I would say the same thing, I would agree with K1, when I update the courses on a daily basis, all the pages that we optimize do follow pretty much all of the models what you have got up here and pretty much the same process so I would say yes it's very well put up here. Line 37 |

|         |  |  |
|---------|--|--|
| Theme 3 | Process models provide training, knowledge and comprehension on specified SEO techniques | K1: In regards to whether this influences the way our business works, I have taken parts of this (parts of the process models) and I have put it into a wiki page on our intranet so it has definitely helped me come up with a process for my team and also on a training course I did (facilitated). It helped me cover everything that should have been covered on that training course. So there were elements that I took from this into it and then a session that I then presented to a client so there are two influences it had on our SEO business. Line 175 |
| Theme 4 | Implementation of process models attain visibility                                       | R2: [. . .] I think certainly if you follow this you would see benefits, but that would be constrained by the competition and so on. I think on-page particularly has the primacy if there is not a huge amount of competition or if you've got a good niche what if you're in a high competitive area you will need some off-site [. . .] Excerpt from line 169   |

|         |  |   |
|---------|--|---|
| Theme 5 | Suggested changes (Decision pointers, an overall summary model, and Technical SEO) | <p><b>Decision pointers:</b> A1: So I think what we can expect some decision-making pointers [...], excerpt from line 134. <b>Overall summary model:</b> K1: [...] Maybe it needs an overall summary process model, looking at which someone can have the whole picture visually. That might help it [...], excerpt from line 140. <b>Technical SEO:</b> R1: I mean apart from these things there are more things like speed optimization very important, redirection is very important because the whole world has www or non-www and if it affects very heavily they do not know but if they see these gaps and improve the gaps they will see the improvement [...], excerpt from line 173. P1: [...] mobile optimization of websites [...], excerpt from line 21.</p> |
|---------|--|---|

### 6.1.5 Results:

Five dominant themes were identified in the process of coding the focus group transcript as identified in the table 6.3. The themes are illustrated and outlined by verbatim extracts of SEO focus group attendee contributions. The following sections show the transcript-examples that influenced the creation of these themes.

The themes related to the participants' feedback from evaluating and/or using the process models. The participants were digital marketing professionals providing SEO agency services or working in SEO department of large organisations.

### Identified techniques cover on-page SEO:

The first theme identified that the on-page SEO primarily consists of keyword research, content creation, information architecture and HTML code optimization or technical optimization. The first three questions of the focus group were designed to investigate whether participants thought that the range of techniques covered in the process models, cover the scope of on-page SEO. Many of the statements made by the participants' (shown below) revealed that they identify the techniques as on-page SEO:

### Participant responses

1. *K1: The overall impression that I got from your presentation and the work that you've done is very good, is very detailed and I think **it's structured the process for on-page optimization very well** [...]*  
Excerpt from line 13
2. *R1: **In the situation the website owner or the business owner is a layman who does not know much about SEO and in this situation the demonstration of process models can be very helpful.** To understand how actually this game is played of SEO and what they should check on their website if things are really right or not. I think from every aspect one-by-one whether it is basic search method, search queries method. It can be very easy for them to understand if they follow this [...]*  
Excerpt from line 15
3. *P1: [...]* **The techniques that you have specified are very core** [...] (excerpt from line 21). *The process models are amazing [...]* (excerpt from line 28)  
Excerpts from lines 21, 28
4. *R2: [...]* It is a very **accurate account of** how we go about our jobs in **SEO** [...]  
Excerpt from line 18
5. *K: [...]* will use it in day to day work practice.  
Feedback from K

6. *F: Good insights about on-page SEO [...]*

Feedback from F

From the above it can be construed that the participants thought that the information covered in the process models was quite detailed, accurate and structured the implementation process of the core on-page SEO techniques very well.

### **Process models provide complete details for implementing specified SEO techniques**

The second theme addresses if the specified steps in the process models provide information required for complete implementation of the identified techniques. This theme emerged from participants' responses to question 2 of the focus group (shown below), which queried if they thought that the identified steps in the process models would support the execution of SEO techniques. The responses reflected a reassurance in the integrity of identified steps in the process models.

#### **Participant responses**

1. *K1: [...]* **the potential in documenting such process has been very useful for any business to have in their operations [...]**

Excerpt from line 13

2. *K1: yes absolutely the **steps are** very important because they are the **methodical repetitive** approach to each part of the process, **anyone implementing** these changes **would need to go through each step**. So in short it **ensures consistency in the method and the execution of the work**.*

Line 31

3. *K1: [...]* **Create a checklist that actually becomes a process for someone who is actually implementing the work, has to follow this process as specified in the process model to the box and tick off the items as specified in the process model so that everything is done.**

Excerpt from line 19

4. *K1: [...]* **you need every element of that process all of them together to get the result so you need to show that everything is done in order to end outcome**

Excerpt from line 35

5. A2: *I would say the same thing, I would agree with K1, when I update the courses **on a daily basis**, all the pages that **we** optimize do **follow** pretty much **all of the models what you have got up here and pretty much the same process** so I would say yes it's very well put up here*

Line 37

6. R1: *yeah the process, I would like to input the same, it is sure that anyone who want to understand, I mean how they can rank their website, so whatever the product and services, they are related with their website to promote. They need to check what are the competitor websites are coming there in the SERPs what relevant keyword they have used and to make a list of key variation and conduct the search, it's really necessary to do.*

Line 39

7. R1: *And I have made so much progress by checking the competitor, analyse my website my client website, what are the weaknesses in my website and what the top competitor are using that we have not been, along the way it should surely correlate with the keywords*

Excerpt from line 41

8. *Excerpts from 3 different lines (highlighting a brief conversation):*

- P1: *[...] for example it's an e-commerce website, that you do follow the process model, you leave the competition and all that stuff. For example, Google will take the signals based on the content that you have on the website and you got the rankings based on the keywords and the content on the website. So on an e-commerce store let's say digital product or let's say Swimwear for example, what kind of content can you actually provide?*

Excerpt from line 54

- Author (primary facilitator): *[...] as all of us know if you want to gain ranking on swimwear. You answered your question yourself actually, you said not only adding the keywords to meta tags but building the content as well, how you write the content. So again we have to follow **not only just writing the plain content as mentioned in the process models it has to build a theme.***

Excerpt from line 55

- *Author (primary facilitator): So it is about building context it is about building theme, it's about creating the concept of swimwear in your website and looking at not only the concept of swimwear but other semantically related sub concepts as well that falls within the scope of your website, if that makes sense.*

Line 57

The participants' viewpoint was that the execution of identified steps in the process models ensure a complete implementation of SEO techniques, where one of them felt that the steps of the process models could serve as a guiding checklist or a framework to ensure execution of SEO techniques in their entirety, which makes the process models suitable for novice and expert alike.

### **Process models provide training, knowledge and comprehension**

The third theme identified the educational value of the process models. This theme emerged from participants' responses to question 4 of the focus group script, which specifically queried if the process models were easy to understand and why was this?

### **Participant responses**

1. *K1: [...] The potential in documenting such process has been very useful for any business [...] **become more efficient in training people and as a reference tool***  
Excerpt from line 13
2. *K1: [...] It is **very useful for educating and training***  
Excerpt from line 19
3. *K1: In regards to whether this influences the way our business works, **I have taken parts of this (parts of the process models) and I have put it into a wiki page on our intranet so it has definitely helped me come up with a process for my team and also on a training course I did (facilitated). It helped me cover everything that should have been covered on that training course. So there were elements that I took from this into it and then a session that I then presented to a client so there are two influences it had***



*on our SEO business.*

Line 175

4. A1: *The overall process is **very easy to understand** [ . . . ]*  
Excerpt from line 14
5. R1: *Yes, yes it's easy to understand, it's really easy I, from my perspective yes it is **very easy to understand***  
Line 109
6. K1: *Absolutely I think it's clear when you talk us through the process models and you already know the subject, **it's quite clear** but the presentation could be done in a number of different ways and I think it's just the presentation could be better, but it is clear, when you talk it through [...]*  
Line 117
7. R2: *[...] The **information in process models is certainly very clear** is jargon free, it's straightforward it's not waffly, so it's certainly very clear*  
Excerpt from line 121
8. P1: *If you're talking to us who do SEO then your presentation was **very easy to understand**. Even somebody who is not a good listener even he or she can understand your presentation. Your presentation was actually very clear*  
Line 125
9. P1: *your presentation Vani was **very clear actually**, it's all about SEO and anyone can understand you, as everyone in the room has said*  
Line 123
10. A: *[...] in-depth information about SEO, especially when it is presented and explained in a clear manner such as yours [...]*  
Feedback from A
11. C: *Very interesting and useful demonstration [...]*  
Feedback from C

The participants felt that the information in process models was very easy to understand. Moreover they reported using it to train their team of SEO professionals as well as clients. All the participants had a unanimous viewpoint that the information presented in process models is easy to understand and a useful tool for providing training and knowledge.

### Implementation of process models attains visibility

The fourth theme identified achievement of websites' visibility in SERPs.

This theme emerged from participants responses (shown below) to a prompt question that queried if the websites will attain visibility after implementation of SEO techniques as per the process models.

#### Participant responses

1. *R1: **yes it will affect positively***

Line 165

2. *R1: Steps in process model is quite, follow how the SEO process should be and you have made the steps very easy and proper way how it should be. So **yes it will surely influence positively and if we apply these techniques I mean steps according to your process model***

Line 168

3. *R2: [...] I think certainly **if you follow this you would see benefits**, but that would be constrained by the competition and so on. I think on-page particularly has the primacy if there is not a huge amount of competition or if you've got a good niche what if you're in a high competitive area you will need some off-site [...]*

Excerpt from line 169

The participants' responses affirmed that the implementation of on-page SEO techniques according to the identified steps will result in visibility of websites in search engines. Moreover, they felt that on-page SEO has a primacy over off-page SEO. This point of view supports findings of the current research as well as other studies in the literature (Ur Rehman and Khan, 2013) in prioritising on-page SEO techniques.

#### **Suggested changes (Decision pointers, approval stages and an overall summary model, Technical SEO, video and animation and off-page SEO)**

This theme emerged from the last four questions, which enquired how the participants felt the process models could be extended or improved and if it will influence their professional practice. The final four questions (No. 6, 7, 8, 9) of the focus group

script asked:

Q6. Is there anything you feel that could be improved?

Q7. Going forward, do you feel you will use these techniques, will change your own practice?

Q8. If so why?

Q9. If not why not?

This gave the SEO professionals the opportunity for expressing their views about any elements that they felt should be enhanced or supplemented in the process models for their continued use in day to day professional practice.

The transcript was read thoroughly to identify and interpret suggestions which would have been made not only as a response to these particular questions but in answering other questions as well. Mainly the suggestions were grouped under four sub-categories, with relevant suggestions/feedback included under each sub-category.

From the perspective of suggested changes, the participants made suggestions on five different levels. As explained below, the first three themes (i.e. 5.1, 5.2 and 5.3) would be considered in the current research and the last two themes (i.e. 5.4 and 5.5) would be considered in the future work, due to their scope and implications.

## Participant responses

### 1. Theme 5.1: Decision pointers (recommendation has been implemented in current research)

Responding to the query of how process models could be improved, the participants made the following suggestions:

- (1) A1: So I think what we can expect some **decision-making pointers** where do I start as there are multiple activities that we are doing, maybe at one point, when I am saying ok that keyword selection is done so so they can be decision making points. So each decision making point directly because you have used rectangles triangles in the symbols of process models and all of these symbols mean something so where the decision maker needs to start and take a **decision that can be highlighted to**

**say** that the **step one is over of keyword discovery**, we discover the keyword then we select the keyword, so different decision-making pointers can be added

Line 134

- *Reflection: By decision making pointers, A1 means that decision-pointers need to be added to indicate the successful culmination of execution of a technique. These have been added in the process models (in the current research) by highlighting the arrow towards the final output in red as presented in section 4.5 of chapter 4.*

(2) K1: **that's a very good point** it needs, **approval from** either **senior people** in the team **or the client**. So they should be **approval stages** in there (in the model)

Line 137

(3) K1: So for approvals yes, you need **sign off from** either someone internally in a **higher management** position **or the client**, ultimately the client should sign it off as well because otherwise you may go ahead and optimize the website for keywords that the client has not agreed to or that are not relevant

Line 142

- *Reflection: By approval stages, K1 means to use the decision-pointers as approval stages which can be referred and approved by the senior management and the client. Thus decision pointers effectively would make provision for approval stages and would be used uniquely within each organization. As a generic reference point, the direction towards final output in each of the cookbook level process models (in section 4.5) has been added in red in the process models, which could be referred by the senior management and the client for giving their respective approval.*

## 2. **Theme 5.2: An overall summary model (recommendation has been implemented in current research)**

Responding to the query of how process models could be improved, the participants made the following suggestions:

- (1) K1: I don't know forgive me it's a while since I looked at it I don't know if there is an overall model, like a summary model which highlights each of the main areas of process models and bring them together because each process has a lot of detail, so maybe it needs an **overall summary process model**, looking at which **someone can have the whole picture visually**. That might help it.

Line 140

- *Reflection: K1 is suggesting an overall summary model that would highlight the inter-relation between different techniques. It would play the role of an overall execution map which would show the inter-linking between different techniques. This has been highlighted (in the current research) and presented in the section 7.2.5 of chapter 7. The stated recommendations would enrich and enhance the purpose and functionality of process models. Moreover, these suggestions fall within the scope of the current research, therefore these recommendations had been implemented to enhance the process models, which have been created.*

### 3. Theme 5.3: Technical SEO (recommendation has been implemented in current research)

Responding to the query of how and why or why not, the process models would improve the professional practice, participants made the following comments, which mainly belonged to the category of technical optimization:

- (1) R1: It will improve (*the professional practice*) but why not because from my end I think there are more on-page things that falls under this process model I think you have mentioned the keyword, content, meta tag, I mean coding: Javascript, h1, images, I mean apart from these things there are more things like **speed optimization** very important, **redirection** is very important because the whole world has **www or non-www** and if it affects very heavily they do not know but if they see these gaps and improve the gaps they will see the improvement.

Line 171

- (2) R1: I like to add one more thing about canonical any new website or any current running website, there is everywhere content they do not know how it causes, the same amount of content is being shown on other pages like

categories it accidentally creates same content on **duplicate content** on other pages we have to make sure you, **no duplicated content** shouldn't be caused that impact should be **taken care by canonical way**

Line 173

- (3) P1: [...] **mobile optimization of websites** [...]

Excerpt from line 21

As stated above, participants suggested that in order to continue using the process models in day to day professional practice, they would add the technical steps in the process e.g. increasing the site speed, mobile optimization, addressing content duplication via canonical tags and addressing www, non-www issue of the website. Although these issues won't be prevalent in all the websites but the identification of these issues by the participants was deemed as important and worthy of inclusion to the process models within the current research as it falls within the scope of current research. This has been added (in the current research) within the HTML code optimization process model presented in the subsection 4.5.7 of chapter 4.

#### 4. **Theme 5.4: Video and animation (future work)**

Responding to the query of improving the process models the participants made the following recommendations. These suggestions concentrated on the aspect of adding interactivity and animation to the process models.

- (1) A2: [...] So if you were going to present it to a **younger audience** [...] (excerpt from line 111) [...] who are **new to employment in SEO** [...] (First excerpt from line 113) [...] who already know what SEO is, so for them perhaps some **visuals would be beneficial** and there was an earlier suggestion of animation, it's just **easier to absorb information that way** (Second excerpt from line 113)

Excerpts from lines 111 and 113

- (2) R1: I think **process models should be created as videos and infographics** that will be more easy for audience and all those younger people to understand. Infographic can be quite easy. I think each model like basic search method, search queries method, state step by step for as you can easily mentioned I mean infographic can be a good thing and video can be amazing

Line 129

- (3) A1: [...] as digital marketing professionals we all can understand the processes of keyword research content writing but for a new person it would be helpful to follow the **step-by-step guidance with the help of a video to explain that better**

Excerpt from line 14

- (4) K1: [...] I think if you did create a video it will be almost like a **training video** and it **would need some animation** to bring this to life in a way. I think it will definitely benefit but it's not your job to present in such a way that episode guide or training guide that's another job in itself but if it was put forward in that way it will be very useful for both clients for educating the clients and your team who you are training up as well

Excerpt from line 17

- (5) R2: [...] So the value I think is in the education and the training clients or other marketing managers who don't necessarily know the ins and outs that would need some sort of development from an educational point of view and **that's the video and interactive stuff**

Excerpt from line 18

On this level, there was a unanimous suggestion from the participants to add interactivity to the process models via the use of videos and animation. They thought that adding such interactivity to presented information would enhance the information absorption by its users.

At the same time, they also acknowledged that adding interactivity and animation is just related to presentation of information, which in itself is a completely new project which falls outside the scope of the current research (line 17). Considering the nature and scope of this suggestion, it was considered as future work.

##### 5. Theme 5.5: Off-page SEO (future work)

Highlighting the missing information in the process models, the participants made the following comments:

- (1) Excerpts from lines 21 and 28:

- P1: Can I say something about the process model what I like about your process models is that you are following the techniques to do the SEO but there is much more that needs to be done for getting the

rankings I do believe that it is not enough and there is definitely more things that needs to be done in order to make sure to increase the rankings of the websites [...]

First excerpt from line 21

- P1: [...] and I do believe that there are some missing links like backlinks of websites, mobile optimization of websites those small details I do believe that add to 2, 3, 4 or maybe 5 steps to your process model it will actually create a strong model

Second excerpt from line 21

- P1: [...] what I want to say is that she can actually add some extra steps she actually knows already about backlinks. I know that's on page and off page but I do believe that actually no business owner actually cares about on page and off page what they care is to rank to get the organic traffic

Excerpt from line 28

- Author's retrospection: *These comments are interpreted as* P1 is highlighting the missing information in relation to off-page SEO. He states that a business owner does not care about on-page or off-page SEO, instead, organic traffic is the main concern of a business. P1 is aware about the segregation of on-page and off-page in SEO but inappropriately, highlighting the importance of off-page SEO, when the subject of discussion is on-page SEO. He was appropriately countered and corrected by another participant as shown below:

- (2) K1: Ok so P1 I feel you have a very good point in fact in SEO there are over a 100 different ranking signals I think the focus here on this particular process is on on-page SEO [...]

Excerpt from line 26

Finally, one of the participants highlighted the importance of off-page SEO and its exclusion from the process models (lines 21 and 28).

Correcting/Responding to this observation, another participant accurately highlighted that SEO has over 100 factors which could have been considered, but the focus of the current research is on-page SEO (line 26). The author agrees to this viewpoint, and although, the focus of current research is on-page SEO, nevertheless, off-page SEO is important and very much a part of overall SEO, which would be considered



for future work to progress the findings of the current research and development of process models.

The qualitative data for this theme provides valuable information that SEO professionals found the process models useful and applicable to professional practice. The recommendations of adding decision-pointers / approval stages, and technical optimization as indicated above have been implemented in the current research by tweaking the current state and information presented in the process models. However, the suggestion of adding video and animation is a completely new project (as also highlighted by one of the participants, transcript line 17), which will be considered in future work. The concern of missing off-page information, falls beyond the scope of the current research. It was considered critical by one of the participants (i.e. P1, transcript lines, 21 and 28) but was rightly corrected by another participant (i.e. K1, transcript line, 26), that it was beyond the scope of the current research. However, this suggestion will also be considered for future direction.

### **6.1.6 Discussion:**

In this study, qualitative methodology was used for the purpose of triangulation of the results of the previously undertaken quantitative study 5, thus strengthening its validity and credibility (Patton, 1990). The current study qualitatively investigated, the SEO professionals' evaluation of created SEO process models.

Primarily, five dominant themes were identified in the data by using an iterative approach where each of the identified themes related to a different perspective of the SEO professionals on the process models.

#### **Theme 1: Identified techniques cover on-page SEO:**

The process models are based on the implementation procedures of on-page SEO techniques, *see* (Aul and Roth-Berghofer, 2015). The purpose of this theme was to find if the identified techniques (presented in sections 4.5 and 4.7), belong to the category of on-page SEO and secondly, to find if they cover the spectrum of on-page SEO.

Overall participants reported that the identified techniques and their implementation procedures as specified in the process models structured the process for on-page optimization very well.

Furthermore, they highlighted process models as a reference tool that a business could refer to in order to understand how an SEO agency could implement on-page SEO techniques.

In addition, emphasising the criticality of the identified techniques, they highlighted, the adoption of the same execution processes in their daily work, which reflected the professional implication of the created process models. Overall, they found the process models to be effective and helpful to their practice and in some cases their staff and colleagues. The identification of the identified SEO techniques concur with the findings of (Moreno and Martinez, 2013; Ur Rehman and Khan, 2013; Zhang and Cabage, 2017) who found that implementation of on-page SEO techniques is elementary for achieving effective results from an SEO campaign.

**Theme 2: Process models provide complete details for implementing the specified SEO techniques (keyword research, content creation, information architecture and HTML code optimization):**

The second theme suggests that the steps utilised in the process models provide a good level of detail for implementation of specified SEO techniques. This theme provided support for the findings of the quantitative study reported in chapter 5 (which achieved effective results by following the stated implementation procedures of the specified on-page SEO techniques), reporting the effectiveness of implementation procedures of on-page SEO techniques.

The participants in the focus group observed that the identified steps are very important as they represent the methodical repetitive approach of the implementation process.

Additionally, they reported that implementation of every step as specified in the process models was mandatory to achieve a satisfactory outcome. It ensured consistency in the implementation method and execution of work.

Additionally, there was also a suggestion of referring to these process models as a checklist. A checklist, where the identified steps can be ticked-off to ensure

a complete execution of techniques by following all the steps as specified in the process model.

### **Theme 3: Process models provide training, knowledge and comprehension:**

The third theme identified the potential of providing training and education through the process models. The participants of the focus group observed the process models to be very useful for education and training purposes. Furthermore, one of the participants (the managing Director of an SEO agency), reported the current use of process models (created within current research) to train their inhouse SEO team members as well as the clients. This participant also stated the inclusion and publication of these process models in the company wiki. Other participants reported the use of the process models as a reference tool which are very easy to understand for both novices and professionals alike.

### **Theme 4: Implementation of process models attain visibility:**

The participants felt that the implementation of SEO techniques as per the process models would attain visibility for websites. They reported that on-page SEO (as covered within current research) is very important and its implementation would be beneficial for optimizing a website.

### **Theme 5: Suggested changes:**

The final theme addresses how the participants felt that the process models could be improved. The participants were analytical in providing their suggestions.

Firstly they suggested the addition of decision-making pointers in process models to indicate the successful culmination in execution of the process under implementation. Along these lines, they also suggested the addition of approval stages within the process models, that could reflect the approval by senior management and/or the client(s). Secondly, they made a suggestion for creating an overall summary model representing the relation between the different process models representing different techniques.

Thirdly, they made some suggestions for inclusion of technical optimization of website.

Finally, there was a unanimous suggestion for presenting the information in an interactive manner via the use of videos and animation.

It was observed that the first three suggestions fall within the scope of current research and had been implemented in the current research and the last suggestion would be treated as future work.

Although not directly related to the scope of the current research one of the participant highlighted the importance of off-page SEO and recommended its inclusion, but it was deemed outside the scope of current research, and it was considered as future work as well.

Thus from the obtained peer-review feedback and discussion, it can be stated that the knowledge created in the current research complies to knowledge-based requirements specified by (Feldmann et al., 1998) of being complete, correct and consistent as well as meeting the aims and objectives of the current research.

### **6.1.7 Summary:**

This qualitative study in the form of semi-structured focus group had the objective of determining the views of the SEO professionals who had attended the demonstration of SEO process models created within the current research. The demonstration was provided at least a month before conducting the focus group. Overall the SEO professionals evaluated their experience of SEO process models positively and the benefits reported by them closely reflected the aims and objectives of the current research project.

To summarise, the themes that emerged from this qualitative study provided further evidence of the efficacy and suitability of the created process models for implementing the essential on-page SEO techniques created within the current research.

The inclusion of SEO professionals in the evaluation of the created process models serves to augment the validation of the created knowledge. Moreover, the usage of triangulation validates and strengthens the results of both the qualitative and quantitative components within the current research programme.



# Chapter 7

## Discussion and conclusion

This Chapter discusses the results of the three studies carried out in this doctoral project in relation to investigating the impact of the process models containing the representation of the implementation procedures of essential on-page SEO techniques.

### 7.1 Introduction

The overarching aims of the current research were threefold. It sought to:

- (1) identify the core SEO techniques
- (2) extract the implementation procedures of SEO techniques from past case study websites
- (3) consolidate and represent the extracted implementation procedures

To achieve these aims the following research questions were addressed:

- (1) Which SEO techniques are absolutely essential for executing the SEO campaign to achieve visibility in organic/free results of SERPs?
- (2) Which implementation procedure of SEO techniques can result in visibility of websites in SERPs?
- (3) How can the experience knowledge of implementing these techniques be represented?

Both quantitative and qualitative methods were used for achieving the research aims. This enabled the impact of the created knowledge to be investigated from both the point of view of the application of implementation procedures in case study websites (RachelsRoastery.co.uk and BedsLinen.com) through quantitative experiments (Research Questions 1 and 2) as well as the review of the implementation procedures by the experienced SEO professionals through qualitative enquiry, via the thematic analysis of a focus group. Furthermore, the knowledge created was represented in the process models and consolidated in an SEO experience base (Research Question 3).

Support was provided by the results of all three studies for the efficacy and suitability of the implementation procedures as a guide for implementing the essential on-page SEO techniques as an intervention to support the optimization of websites for search engines. Evaluation of the findings of these studies will be addressed in this chapter. Additionally the implications of the created process models will be modelled on SEO practice and its application in major search engines exploring present and future provision.

## 7.2 Overview of results

The visibility and ranking position of case study websites was used to measure any change in Google's SERPs. The implementation of on-page SEO techniques (as per the implementation procedures represented on process models) aims to establish and enhance the visibility of websites in SERPs. Therefore the a priori predictions for the current research posited that visibility of case study websites (in quantitative experiments) selected for implementing on-page SEO techniques would be established and/or enhanced in SERPs at the point of review.

The results of the current research provide support for the above prediction with establishment or improvement in visibility and ranking positions of case study websites in SERPs shown in the two quantitative experiments and from feedback provided by the SEO professionals in the focus group qualitative enquiry. These findings were consistent with both Zhang and Cabage (2013) and Hoque et al. (2018) whose studies both showed post-optimization results of enhancement of the visibility of websites in SERPs. The details of the quantitative experiments conducted within the current research are described in the following section.

### 7.2.1 Quantitative experiment: case study 1

**Discussion of results attained for the Beds linen Website** The newly established website attained visibility in SERPs for all of its targeted keywords and key phrases as shown in table 5.1.

**Analysis of attained rankings** As shown in table 5.1, on average the keywords for which the Beds linen website is ranked have an average 'searchability' of 10 searches per month. As there are 10 keywords for which the website is ranked, it can be summarised that potentially the website has 100 chances of receiving a potential visitor. The attained rankings are beyond the first page of search results which means reduced chances of receiving the majority of visitors. Malaga (2008) reports that less than 10% of searchers go beyond the first search results page. Therefore, realistically, there is a potential of receiving about 10 targeted visitors only. In this situation it is possible to draw an analysis from the prospect of receiving only a few visitors. From amongst those visitors, if a minimal number of one or two get converted into clients then it can prove beneficial for the business.

A review of the results for the Beds Linen website's indexing, ranking and business generation has been displayed in figure 7.1

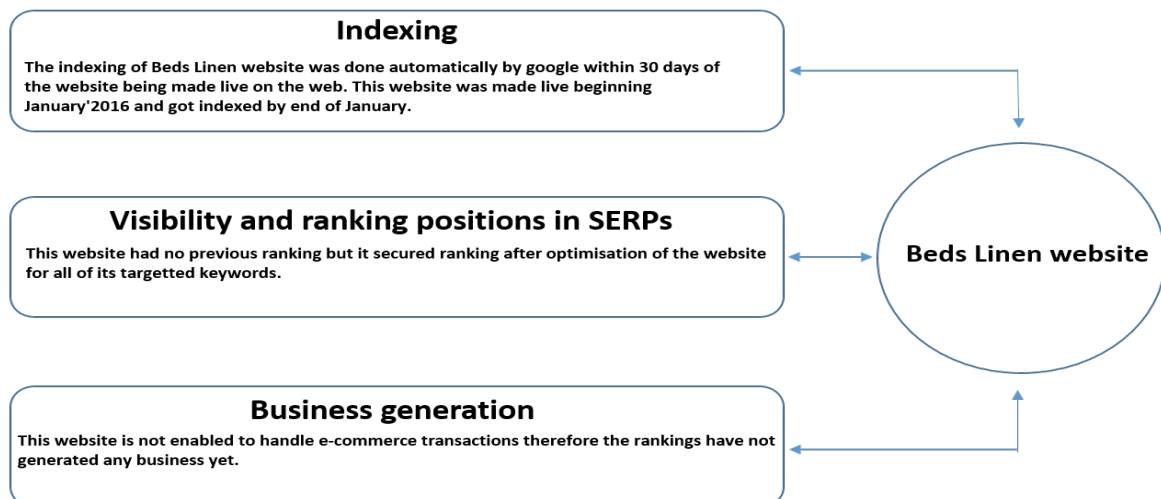


Figure 7.1 An overview of Beds Linen website's results



Following the promising nature of these results a second experiment was carried out using an established website in order to monitor changes in ranking pre and post optimization.

## 7.2.2 Quantitative experiment: case study 2

**Discussion of results attained for Rachel's Roastery website** The website attained visibility in SERPs for all of its targeted keywords and key phrases as shown in table 5.3.

**Analysis of attained rankings** Rewardingly, a similar trend was shown in the second case study of the quantitative studies, as shown in table 5.3, Rachel's Roastery website is ranked for more than 10 keywords and most of these keywords have minimum searchability of approximately 10 per month. These keywords are ranking within top 120 positions in the search engine results pages. Importantly two of its keywords (Santa Lucia estate coffee and Arnulfo Leguizamo coffee) are ranked in the top 10 ranking positions, which should result in generated revenue for this business. Four of its keywords (carmo coffee, caturra coffee beans, tarrazu coffee beans, arusha coffee beans, lake tawar coffee beans) are ranked in the top 50 ranking positions, and six other keywords (london coffee roaster, primavera coffee, raw green coffee beans, guatemala green coffee beans, SL28 coffee, hand roasted coffee beans) are ranking in top 120 ranking positions post optimization, which have some scope of driving targeted visitors to the website.

Additionally, post optimization the Rachel's Roastery website was recognised for its location specific keywords, i.e. key phrases containing the location of London. For instance it secured 10th ranking position for the keyphrase of 'hand roasted coffee beans london,' which reflects its appropriate demographic indexing and listing in Google. However, pre-optimization this was not the case. It did not rank for keywords for the location of London.

A review of the results using Rachel's Roastery website is shown below in figure 7.2:

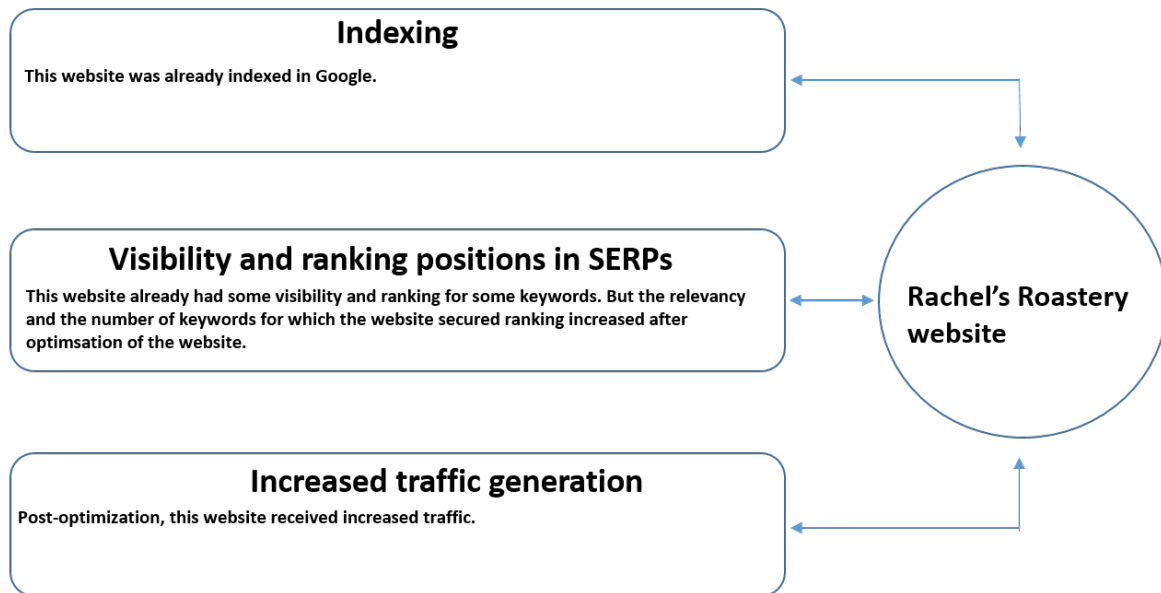


Figure 7.2 An overview of Rachel's Roastery website's results

The results of both these case studies relating to the impact on the case study websites was measured post optimization (i.e. post-implementation of the specified implementation procedures of essential on-page SEO techniques) and in the case of Rachel's Roastery compared to pre-implementation rankings. Whilst it is important to establish that the specified implementation procedures establish and/or enhance the websites' visibility in SERPs, it is also necessary to ensure that they are considered effective by experienced SEO professionals.

In order to address the question of whether the created process models representing the implementation procedures are deemed as effective by experienced SEO professionals, a focus group was conducted. The process models were first demonstrated to the participant SEO experts and then they trialled the models for a minimum period of one month prior to attending the focus group.

The focus group study provided a necessary triangulation of the quantitative experiments through the use of thematic analysis to interpret SEO professionals' self

reported experiences of using and/or evaluating the process models. This was important not only from the methodological perspective of the research but also because it provided an opportunity for the views of the users to be expressed and professional review to be received. In the following sections, a discussion is presented on the effectiveness of process models along with their implications for the major search engines and SEO practice and a model has been created for implementing SEO as a process.

### **7.2.3 Discussion on effectiveness of the process models created in current research**

The process models represent knowledge for implementing essential on-page SEO techniques of keyword research, content writing, information architecture and HTML code optimization. They contain step by step implementation procedures for implementing these techniques.

Each of these process models represent an SEO technique that is highly relevant towards fulfilling a specific purpose in optimization of a website. To reiterate; the specific purpose of keyword research method(s) (figure: 4.9), (figure: 4.10) and (figure: 4.11) is to identify and shortlist relevant keywords to be targeted (Jerath et al., 2014). The information architecture method (figure: 4.12) is to create an information hierarchical model easily interpretable by website users and search engine robots (Killoran, 2013). The content creation method (figure: 4.14) is intended to create content in a thematic manner depending on the topics or sub-topics covered by the website (Onaifo and Rasmussen, 2013). Finally, the HTML optimization method (figure: 4.15) is to optimize the source code of the website (Killoran, 2013) for search engines.

As a result of using the above, the specified aims of this research have been met in the optimization of case study websites as shown in the results of quantitative experiments presented in chapter 5.

As identified in chapter 2, the state of the art in SEO does not explicitly specify the implementation procedures of identified SEO techniques. Hoque et al. (2018) has recently published an SEO model which specifies just the SEO techniques. Similar attempts of creating SEO models and framework have been made in the past by Chambers (2005); Visser (2006) and Malaga (2007). These models and framework

do not specify the implementation procedures of the specified techniques. However, it is likely that alternative ways might exist for implementing these techniques, which might or might not be effective in achieving visibility in SERPs. The implementation procedures as generated in this thesis have proven to be effective in achieving the desired purpose(s) in the case studies used and this in itself contributes to future practice of SEO.

### **Implementation procedure**

Further it is important to note that the implementation procedure of the stated techniques (keyword research, creation of information architecture, content creation and HTML code optimization) as represented in the process models created in this thesis could be replicated either in part or whole depending on the requirements of the current website(s). In fact depending on the life cycle stage and visibility-state of the website in SERPs, the implementation procedures as represented in process models could be adopted and enacted accordingly. This is exemplified by the optimized case study websites in the undertaken quantitative experiments. In optimizing the two case study websites, different process models were applied as the optimization requirements for both the case study websites were different.

**For example** for the case study named Rachels Roastery explained in (section 5.1.2), in order to conduct *keyword research* basic search method (figure: 4.9), keyword tool method (figure: 4.10) and search queries report method (figure: 4.11) were applied. Search queries report method (figure: 4.11) was implemented because this website was already registered with Google Webmaster Tools and its keyword report data was already being monitored. Therefore it was possible to extract the keyword reports from Google Webmaster Tools and use it for fine tuning the keyword research.

Conversely, for conducting *keyword research* for Beds Linen explained in (section 5.1.1), for conducting keyword research basic search method (figure: 4.9) and Keyword tool method (figure: 4.10) were referred. Search queries report method (4.11) was not implemented as this was a new website and had not been registered in Google Webmaster Tools at all. On the other hand the Keyword tool method (figure: 4.10) was implemented in order to locate relevant keywords for this new website. However the use of basic search method (figure: 4.9) was common for

both the case studies since it is an essential and mandatory starting point to initiate the keyword research in order to verify the relevant keywords to be targeted for a website.

## **7.2.4 Implications of current research on major search engines**

**Discussion of results attained in major search engines (Google, Bing and Yahoo)** The functionality of search engines is empowered by their respective algorithms (Haveliwala, 2003). Although the internal working of each of these algorithms is very unique, there are some commonalities in these algorithms. In the current research, this has become obvious by the fact that the implementation of essential on-page SEO techniques have made the case study websites visible in the SERPs of not only the targeted search engine i.e. Google, but all three major search engines i.e. Google, Yahoo and Bing.

Google being the most popular search engine, the main aim of the current research was to attain visibility or website rankings in Google (Yang et al., 2015). But the results show that overtime, the case study websites have attained rankings for their relevant keywords in Bing and Yahoo as well.

Hence, it is observed that the implementation of on-page SEO techniques results in visibility in all the major search engines. Although, the attained visibility or ranking positions in the search results of Google, Bing and Yahoo would be different, it is worthwhile to mention that the results attained for Bing and Yahoo would be similar because Yahoo's search functionality is powered by Bing (Killoran, 2013).

## **7.2.5 Implications of current research on current SEO practice, contribution to knowledge and future direction**

### **Discussion in relevance to SEO**

It is important to note that the essential nature of on-page SEO techniques as identified in this thesis has also been recognised in the SEO literature. Mager (2012), recommends implementation of content creation and information architecture for optimizing a website. Furthermore, Mager (2012), Visser and Weideman (2011), confirm that the implementation of essential on-page SEO helps to gain visibility.

Further they state that SEO techniques and strategies help to improve the visibility and ranking of websites in the search engines and this is supported by the results of the research in this thesis. A higher website ranking has the potential of generating significant numbers of visitors referred by SERPs. The optimization of websites involves their adaptation and optimization to be indexed in search engines and thus becoming visible in SERPs.

From the website's on-page optimization perspective the process of targeting relevant keywords involves providing suitable content, creating the website's information hierarchical structure, and suitable code of the website to suit the requirements of the ranking algorithms of search engines. All this has been evident in the results shown in chapter 5 of this thesis.

Killoran (2013), suggests the SEO techniques as stated by the research in this thesis should be treated as heuristics for optimizing a website for search engines in order to gain visibility and rankings. He highlights the importance of using the relevant keywords into the web content in serving the search intention of the searchers and recognition gained by search engines. As informative content serves the searchers' information needs therefore they would value their experience of accessing the website and would re-visit the website in future. He states that if these techniques are applied diligently then they would contribute positively to establish a website's visibility and rankings in SERPs over a medium to long term time period.

The results of the research in this thesis provides support for this practice, that is to implement the identified essential on-page SEO techniques in a sequential order. The sequence of implementation procedures generated within the current programme of research have been highlighted in the hierarchy of SEO techniques figure 2.9 originally presented in chapter 2, (and reproduced here for emphasis as figure 7.3). The SEO implementation begins by applying the keyword research process represented in the process models in figures ( 4.9, 4.10, 4.11), followed by writing content in figure ( 4.14), followed by defining the information architecture of the website in figure ( 4.12), and optimization of the HTML code of the individual webpages of the website in figure ( 4.15). The process models thus created have then been stored in an SEO experience base as represented in figure 7.4.

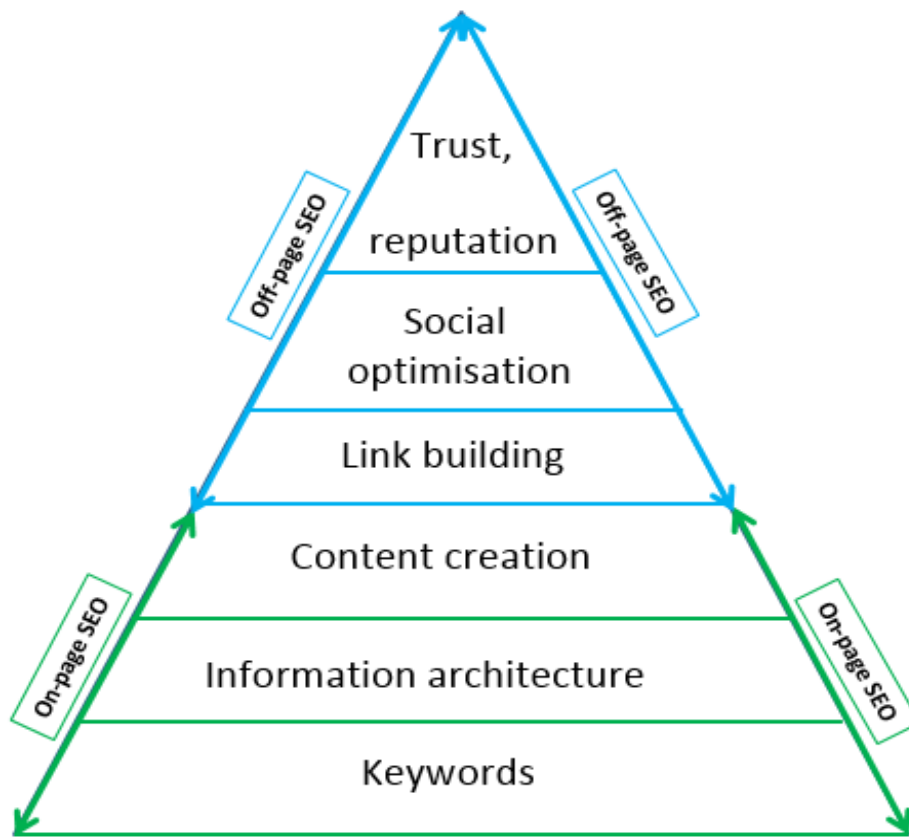


Figure 7.3 Hierarchy of SEO techniques (Clay, nd)

In addition, the current research has contributed to the knowledge base of the field by creating an SEO experience base represented in figure 7.4 originally specified in chapter 2, (and reproduced here for emphasis).

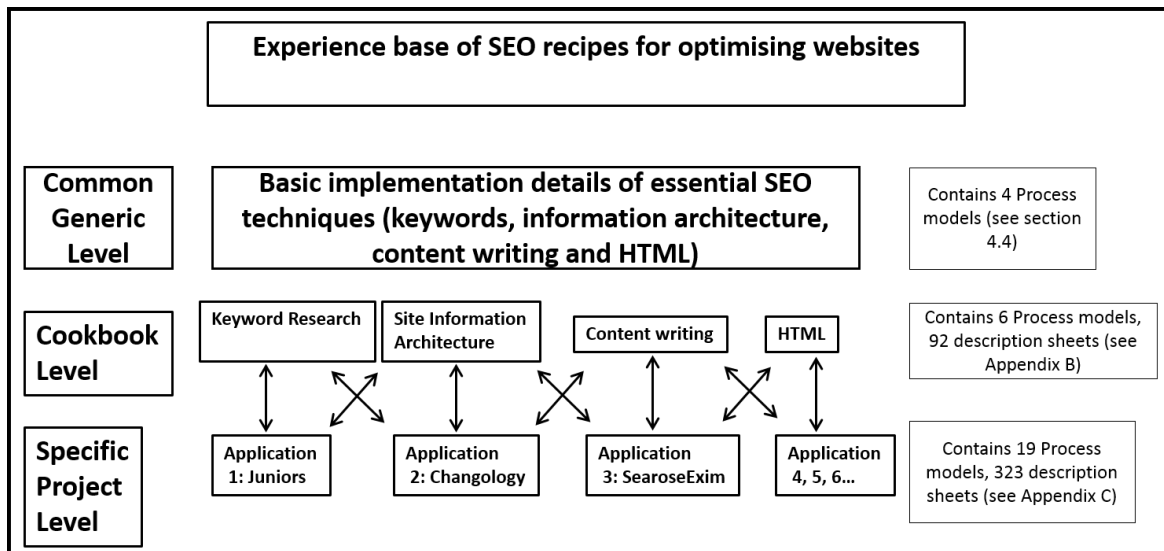


Figure 7.4 SEO experience base

### Generation of the Overarching Summary Model explained

The current research has created process models representing implementation procedures of SEO techniques as proposed in the figure 7.3. Based on the indicated hierarchy, it suggests that ideally these techniques should be implemented in a sequential manner. Therefore the efficacy of these models have subsequently been tested using the identified hierarchical sequence in the quantitative experiments described in chapter 5.

At this point it was felt prudent to involve SEO professionals as their evaluation of the designed process models would be based on its real value and application in the professional world. Therefore, a focus group was conducted where SEO professionals who had previously been trained to use the process models and had run a trial prior to the focus group discussed the importance and application of process models on their day to day professional practice. As a result of the analysis of this professional peer review an overarching summary model has been generated representing this sequence of implementation and is shown in figure 7.5.



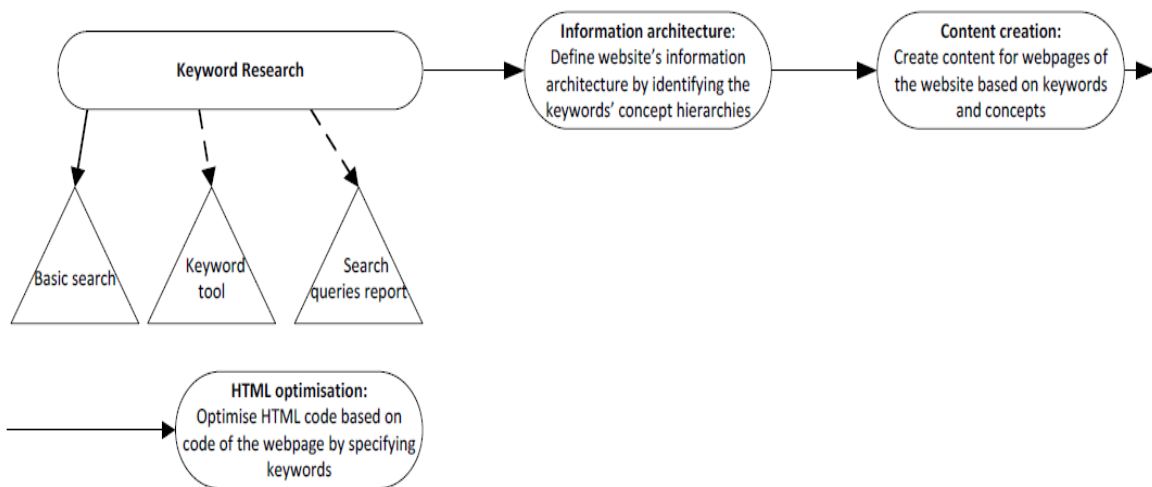


Figure 7.5 Summary model of on-page SEO implementation

The figure 7.5 can be interpreted as an overarching summary model guiding the implementation of SEO. The application of the keyword research process model provides the output of keywords to define the information architecture of the website by identifying the semantic concepts to which the keywords belong. Further, the information architecture process model, provides the output of the concepts covered and transfers the keywords identified via keyword research to the content writing process model. The content is written for the webpages using the keywords and concepts. Finally, the code of the webpage is contextualised and optimized by specifying shortlisted keywords.

Considering the future implication of SEO practice, the current research has adapted the figure of SEO taxonomy (originally mentioned in figure 4.18 in section 4.5), for accounting for future practice by covering the overall techniques of SEO and implementing SEO as a hierarchical process and this is shown in figure 7.6.

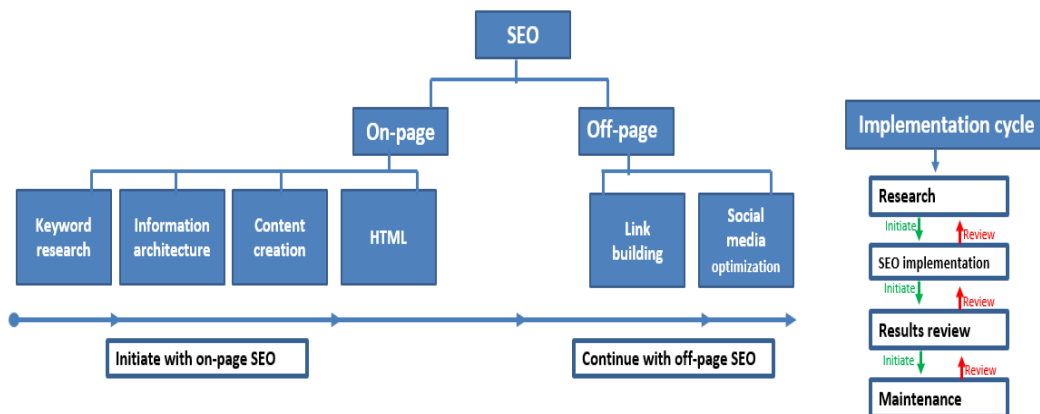


Figure 7.6 Overall SEO techniques accounting for future and implementing SEO as a process

However, it is important to note that this taxonomy is not rigid and that dependent upon the life cycle stage of the website the process models can be flexible. This flexibility has been demonstrated in the current research wherein for BedsLinen the whole overarching summary model was applied as previously this website had no visibility. However for Rachel's Roastery the process model used only the Key Word research and Information Architecture techniques as it already had visibility in SERPS.

### Importance of not only attaining SEO results but more importantly in maintaining

SEO is implemented as a process. Killoran (2013) states that search engines provide a common intersection point and serve common interests of the three primary stakeholders (search engine companies, search engine practitioners and search engine users). The current research identifies these three categories as search engines, searchers and websites. It fuses the category of search engine practitioners and website owners into a common category of websites because these two categories of stakeholders have a common aim of attaining visibility of websites in SERPs.

Considering the ever changing nature of the above stakeholders it is important to keep track of the changes in the nature and practice of each of these stakeholders. This involves continually monitoring the search engine rankings to check the rating of website awarded by search engines and awareness of the current competition.

The search engines change their ranking algorithms constantly which has a direct impact on the ranking websites (Sen, 2005).

Weischedel and Huizingh (2006) recommend conducting a periodical analysis of website usage logs or website analytics to learn how the website visitors are interacting with the website, identify the most and least popular pages of the website, the maximum and minimum orders for product types etc. The current research recommends this practice in the SEO implementation cycle in the phases of results review and maintenance, for implementing SEO as a process as identified in figure 7.6.

By analysing the above factors it is quite obvious that the optimization of the website needs to be implemented as a process which involves initial research, implementation, review and maintenance. This is a continuous process cycle relevant for optimization of almost all the websites which has been highlighted in figure 7.7.

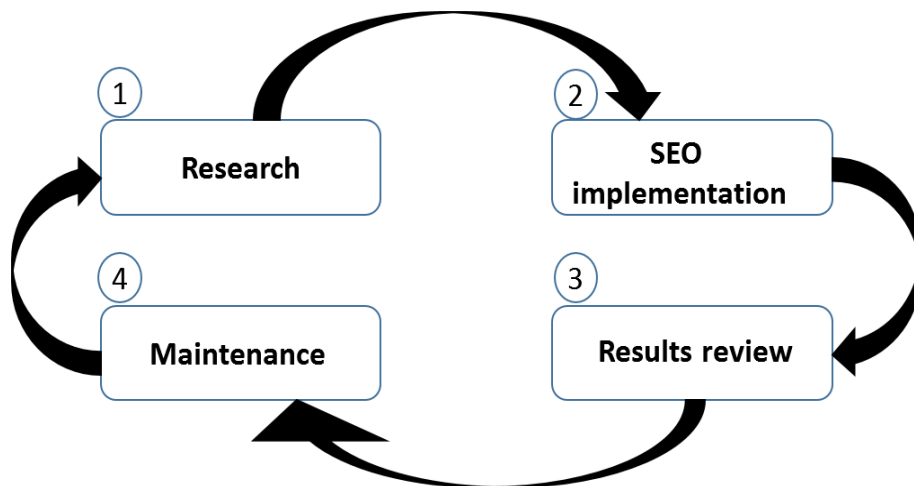


Figure 7.7 SEO implemented as a process

This approach is required in order to create an iterative process of website optimization. As shown in figure 7.7, for website optimization the phase of *research* corresponds to doing all the ground research required to optimize the website. The *SEO implementation* phase corresponds to initialising the optimization project by identifying the techniques to be implemented and allocating the researched data required to implement the shortlisted techniques. The *results review* phase corresponds to reviewing the results attained from applying the techniques in the optimization of the website. The *maintenance* phase corresponds to reviewing the

results attained for the optimized website as a result of the implementation, maintain the achieved results and devise a plan for any identified gaps between the desired and actual results attained.

**Different market categories have different competition** Killoran (2013) professes it is important to note that Google uses different ranking algorithms in different niches. Different ranking factors are applied in categories such as real estate, online gambling, travel, e-commerce, etc. It means that the SEO efforts and results may vary across different categories.

But the on-page SEO techniques as mentioned in the current research are valid and applicable to most of the websites belonging to different market categories and this is a strength of the current research. However, such variances might have to be addressed in off-page SEO campaign. To cater for such different ranking factors of Google, it may be necessary to implement a customised off-page SEO campaign for websites in highly competitive categories and this is a direction for future research.

### 7.2.6 Limitations of this research

This study has certain limitations that need to be considered. As discussed in the beginning of chapter 2, primarily, search engine marketing can be free (implemented via SEO) or paid (PPC, CPI, etc.) (Rani and Garg, 2014). The current research has looked into SEO. The SEO techniques can broadly be segregated in two categories of on-page and off-page (Jain, 2013). It is reported that the process of SEO implementation begins with on-page SEO to establish the website's semantics in the respective search engines' index followed by off-page SEO to establish the website's network on the Web, where both are critical in the overall SEO campaign (Heiler, 2012; Lewandowski, 2015).

A limitation of the research in this thesis is that it has only covered the on-page SEO techniques and not off-page SEO techniques. The decision was made to focus on the implementation procedures of presented on-page techniques because it is the starting point that helps a website to establish its semantics and finetune its interpretation by search engine algorithms, which is similar for most of the websites (Jain, 2013).

As identified earlier (in section 7.2.5), the on-page SEO primarily include the techniques of keyword research, content writing, information architecture and HTML code optimization (Killoran, 2013; Mager, 2012; Visser and Weideman, 2011). Primarily, the off-page SEO techniques include link building and social media optimization (Killoran, 2013; Kritzinger and Weideman, 2013; Malaga, 2009; Zhang and Cabage, 2013).

However the implementation of off-page SEO is tailored to the individual website and dependent on its marketing budget. Therefore the focus of the current research was to create a generic knowledge base which could be used as a common reference point by a large percentage of websites. The off-page SEO was out of the scope of the current research. It may be implemented and results can be reported in the future. However it should certainly be a consideration for future research.

In respect of the qualitative enquiry undertaken, a negative aspect of the focus group was that it was a combination of virtual (Bloor et al., 2001) and 'face-to-face/in-person' focus group. But the balancing factor to this demerit was that it allowed a diverse range of participation from around the globe from three different countries (i.e. UK, Greece and India), which added to the cultural richness of data in terms of possible diverse practices of each region. Secondly, the style of focus group followed a structured format of top-down approach, which might have resulted in losing some richness of data. However, this potential cost was weighed against the need for elicitation of information from participants in a structured manner reflecting their thoughts on process models (Sim, 1998) and in order to evaluate the findings of the quantitative study of this thesis.

Finally, the primary facilitator of focus group was already known to the participants, at the time of giving the demonstration (which was arranged as a pre-requisite for participants prior to attending the focus group), which might have introduced an unintentional source of bias, but this risk was weighed against the advantage that they were all known to the primary facilitator which would have increased their ease of participation and what was lost in terms of rigour was gained in ecological validity.

### **7.3 Summary**

It has been widely acknowledged in the existing literature that SEO is a complex area (e.g. Olsen and Viglas (2014) and Mărginean and Cernea (2012)), therefore the

current research has focussed upon identifying which techniques are fundamental for implementing on-page SEO by distinguishing the essential on-page SEO techniques to be implemented by websites for establishing and/or enhancing their visibility in SERPs. Additionally, it has addressed the question of how to implement the essential techniques by designing novel process models for representing their implementation procedures and storing them in an SEO experience base created on the principle of INRECA-II methodology, and thus contributing to the existing knowledge within the field.

The designed process models have been empirically investigated through quantitative experiments where they have been applied to two experimental case study websites, which have both shown positive results in terms of both establishing web presence and increases in Search Engine rankings. Additionally, through qualitative enquiry they have been tried and evaluated by experienced SEO professionals. Both methods have shown positive results for the application of process models in the professional area with positive implications for the SEO practice and search engines also. Finally this thesis has acknowledged how this research and its implications can be used to develop future SEO practice.



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# **Appendix A**

## **Focus group: protocol and transcript**

## **Focus group protocol:**

### Table of Contents

|  |   |
|--|---|
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### Overview:

The purpose of the process models is to educate and implement SEO techniques. Therefore the focus group protocol has been divided into two sections, educational and technical. For each section the learning objective has been defined followed by questions to explore those objectives that is whether the process models do indeed incorporate the educational objectives of knowledge, comprehension, and application (Bloom et. al, 1956) and are promising in terms of being effective in the implementation of the specified SEO technique(s). Bloom's taxonomy has been used by (Clarke, et. al, 2014) to teach SEO in an academic setting. The overall research objective is to find if the process models define the procedure for implementing the specified SEO techniques.

The learning objectives along with the questions have been presented in the table below:

Table with learning/implementation objectives and questions:

| Educational aspect  |   | SEO techniques aspect  |   |
|---|---|--|---|
| <b>Learning objectives (LO) (knowledge, comprehension, and application)</b>   | <b>Questions (Q)</b><br><i>Presumption of these questions is that participants have been introduced to the <u>process models</u> for some time (minimum 1 month) before attending the focus group</i>   | <b>Implementation objectives</b>   | <b>Questions</b>  |
| <b><u>LO knowledge:</u></b><br>The users will identify the steps for executing the specified SEO technique(s)   | <b><u>Q for checking knowledge acquisition:</u></b><br><br>- Can you describe your experience from seeing the demonstration of the process model(s)?<br><br>- How did the identified steps support you in executing SEO techniques?<br><br>- How did it differ from your usual technique? | The primary objective of the process models developed in the current research is to provide step-by-step execution guidance for implementing SEO techniques. | Do process models provide step-by-step guidance for implementing the stated SEO techniques? |
| <b><u>LO comprehension:</u></b><br>The users will interpret the knowledge/information presented in process models to implement the specified SEO technique(s) | <b><u>Q for checking the comprehension of process models:</u></b><br><br>- Is the process model easy to understand?<br><br>- Why is this?<br><br>- Is there anything you feel that could be improved?   | The process models' access can be customised. Any step can be accessed at random without following a sequential order.                                       | Can any step in the process model(s) be referred depending on the SEO needs of a website?   |
| <b><u>LO application:</u></b><br>The users will apply the presented information/knowledge   | <b><u>Q for checking the application of process models:</u></b>   | Interlink the keyword research process model with other process models to establish  | Does the shortlisted keywords provide information for executing the related on-page         |

|  |   |   |   |
|--|---|---|---|
| of SEO techniques to optimise their own websites | <p>- Going forward do you feel you will use these techniques/ will change your own practice?</p> <p>- If so why?</p> <p>- If not why not?</p> | coherence in the implemented techniques   | SEO techniques of Information Architecture, Content Creation and HTML code optimisation?  |
|  |   | Process models establish/enhance website visibility in SERPs by implementing SEO techniques | <p>- Do you think the websites will attain visibility in SERPs if the specified SEO techniques of (keyword research, website's information architecture, content writing and HTML optimization) are implemented as per the process models?</p> <p>- Do you think the implementation of specified SEO techniques as per the process models (keyword research, website's information architecture, content writing and HTML optimization) will effect the visibility of website in the Search Engine Results Pages?</p> |

### Inclusion / Exclusion criteria of participants:

#### Inclusion criteria:

- Working in SEO profession
- Minimum 3-5 years of SEO experience
- Executed a minimum of 10 SEO projects

- May belong to any global geographical location

**Exclusion criteria:**

- Search Engine Advertising (SEA) or Pay Per Click professionals implementing paid marketing
- Web designers and web developers not responsible for implementing SEO

**Focus group conversation:**

Semi-structured conversation guided by majority of closed and some open questions as presented above.

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## **Transcription:**

We are going to start the group discussion now

1 V1: Hi P1 hi R1 hi A1

and we have in the room K1 R2 A2 And we have M1

2 M1: yes I am taking field notes I am not participating in the discussion

you can see all of us

So shall we start then

3 M1: Yes

4 V1: The purpose of this group discussion is To discuss the process models created as part of my PhD research knowledge creation

Thanks to all for joining

We will have 6 questions Each question will have 10 minutes And then after 10 minutes We will have to skip to next question And then in between I will just ask sub questions or Prompts

So shall we start with the round of introduction Ok we start with A2 And then we go to R2 K1 and then we come to Skype

5 V1: hi A2

6 A2: hi I am A2 and I work for the University of West London Within the web marketing team And I update the courses For us SEO is really important We need to make sure that we do all the right things

7 R2: Hello I am R2 I also work for the University of West London As web content producer And I started quite recently Before that I was working as a digital Copywriter and doing some content strategy As well for the websites

8 K1: Hi there I am K1 Oliver, the managing director of Zebedee creations a digital Full service agency we design and develop websites and apps and part of our offering is SEO and ongoing Search engine marketing

9 R1: Hi this is R1 From India I am I digital marketing expert I am working at agile Continental as the SEO manager And I also run an SEO agency SEObooklab.com I have been involved and helping a number of Agencies Like momentum cyber fR1e I am working with a leading SEO company they are making SEO tool Pagerank watch

10 A1: Hi this is IG, I run a digital marketing agency We have around 750 people in our team We take care of end to end digital marketing and digital Implementation infrastructure We work in India and UK I keep visiting UK Unfortunately I could not make to the presentation But I will be visiting in the summer Hopefully next month

11 P1: Hello everybody my name is P1 I am the founder of Horuswebex digital agency focusing on increasing sales of small businesses we do search engine optimisation It's not a main service but we do provide this service Our main goal is to increase sales whether it is through SEO Or marketing

12 VA: Thanks everyone for your introduction No we start with the first question You can respond to and linked to each others viewpoints As if it was a natural group discussion So the first question is Can you describe your experience from seeing the demonstration of process models The SEO process models that I showed you about keyword research, Content creation and these process models that I have also given to you in the printouts so regarding those process models how was your experience What did you feel about it What was your perception About it What do you think it is or What was your overall experience

13 K1: The overall impression That I got from your presentation And the work that you've done is very good, Is very detailed And I think it's structured the process for on page optimisation very well and I can see The potential In documenting such process Has been very useful For any business to have in their operations To help them become more efficient in training people And as a reference tool

14 A1: The overall process is very easy to understand but then one of the problems we all can face as digital marketing professionals we all can understand the processes of keyword research content writing but for a new person it it would be helpful to follow the step-by-step guidance with the help of a video To explain that better

15 R1: I would like to just add I have gone through each of the processes that you have demonstrated It is easy for anyone to understand From a layman's perspective For instance if I do not know anything about SEO I run commercial business I want to hire an agency I want to give an example hires an agency to do the SEO but that agency is not giving the real value to the client In order to get sales In the situation the website owner are the business owner is a Layman who does not know much about SEO and in this situation the demonstration of process models can be very helpful To understand how actually this game is played of SEO and what they should check on their website if things Are really right or not. I think from every aspect One-by-one whether it is basic search method, search queries method, It can be very easy for them to understand if they follow this And IG is really right if Video can be given along the way then it will be very easy to get the point acR2 or information acR2

16 M1: Is he saying that if you made the video You could show it to the client to give their clients Greater understanding Of the service they are providing that is what I took from that am I wrong

17 K1: I think that was mentioned and that is a good idea. I think if you did create a video It will be almost like training video and it would need some animation to bring this to life in a way. I think it will definitely benefit But it's not your job to present in such a way That episode guide or training Guide that's another job in itself But if it was put forward in that way It will be very useful for both clients for Educating the clients and your team Who you are training up as well

18 R2: Yes I think that is where I saw it being used. it is a very accurate account of how we go about a jobs in SEO So the value I think is in the Education And the training Clients or other Marketing managers Who don't necessarily know the ins and outs That would need some sort of development from educational point of view And that's the video and interactive stuff

19 K1: yeah I think On a high level it is very useful For Educating and Training but actually you could take it a step further And create a checklist That Actually becomes a process For someone who is actually implementing The Work has to follow this Process As specified in the process model to the box and tick off the items As specified in the process model so that Everything is done.

20 VA retrospection: It'll Make sure but the process has been implemented in entirety

21 P1: can I say Something about the process model What I like about your process models is that you are following the techniques to do the SEO But there is much more that needs to be done for getting the rankings I do believe that it is not enough and there is definitely more things that needs to be done In order to make sure to increase the rankings of the websites The techniques that you have specified are very core And I do believe that there are some missing links like backlinks Of websites, Mobile optimisation of websites Those small details I do believe that Add to 2, 3, 4 or maybe 5 steps to your process model It will actually create a strong model

22 VA: When you say 2 3 4 5 steps can you give an example

23 P1: Well actually I believe that Backlinks for example Are very important So I believe you need to add the steps People who go through any website the need to have a sense for backlinks

24 M1: I think K1 want to say something

25 VA: Someone else wants to point out something P1, let us listen to her

26 K1: Ok so P1 I feel You have a very good point In fact in SEO there are Over a 100 different ranking signals I think the focus here on This particular process is on on page SEO So I think Vani has left out all those external factors or off page factors And focus purely on the process for on page SEO

27 VA: I would actually

28 P1: The process models are amazing what I want to say is that she can actually add some extra steps She actually knows already about backlinks. I know that's on page and off page But I do believe that actually No business owner Actually cares About on page and off page what they care is To rank to get the Organic traffic

29 VA: Thank you P1 for your input, That's a good input P1. because the scope of this research is quite minimal This is on page because we are not seeing it from the business Owners perspective we are Concentrating on step Zero or step one and this is step zero, and step one concentrating on on page SEO If that makes sense. thanks a lot to all of you for your input on this question. We will move on to next question if that is fine with all of you

30 VA: The next question is how do you think The identified steps In the process models would Help in executing the SEO techniques. Just to elaborate on the question so every SEO Process model had the steps in it. for instance The basic search process model had The step of identify the product or service, Google for that product service name, Find the competing websites, check the keywords used by competing websites and Shortlist relevant keywords. So each of these different steps Had been identified in order to execute different techniques. So how do you feel about That each of these steps If they will help in executing the respective techniques. That is the question if I am Clear.

31 K1: yes absolutely The steps are very important because they are the methodical Repetative approach To each part of the process So anyone implementing these These changes would need to go through Each step. so in short It ensures consistency In the method and the execution Of the work.

32 VA: And then it relates to your viewpoint as well. It becomes Very much A checklist

33 K1: yes absolutely absolutely, the steps could be check points

34 VA: if any person who is executing the technique Will have a very clear guideline If The steps have been executed and if These steps have been executed then it can become a paRtler, That, That process has been executed.

35 K1: Exactly because you need every Element of that process All of them together To get the result So you need to show that everything is done in order to end outcome

36 VA: I get your point yeah, Anyone else who wants to Have an input on that please On that question

37 A2: I would say the same thing, I would agree with K1, When I update the courses on a daily basis, All the pages that we optimise do follow Pretty much all of the models But you have got up here and pretty much the same process So I would say yes It's very well Put up here

38 VA: yes I am getting back to you sorry to interrupt you earlier , Please say what you wanted to say

39 R1: Yeah the process, I would like to input the same, It is sure that anyone Who want to Understand I mean how They can rank their website So whatever the product and services they are related with their website To promote They need to check what are the competitor websites Are coming there in the serps what relevant keyword They have used And to make a list of key variation And conduct The search, It's really necessary To do

40 VA: yeah yeah

41 R1: And I have made so much progress by checking the Competitor, analyse my website my client website, What are the weaknesses in my website and what the top competitor are using that We have not been, Along the way it should surely correlate with the key words

42 VA: retrospection: R1 is correlating the his work process with the steps of the process models and identifying the strength and positives, advantages he has secured by following these steps

43 VA: I got your point yes

44 A1: so when we are doing the keyword analysis I think one of the Step To understand here is the business goal Is the businesses looking for sales or the businesses looking for quantifying cost of acquisition, If the business is looking for sales vendor method for looking for keywords will be around certain keywords that are oriented to sales And building on top of it so it is very important To understand the reason why they are doing the keyword research I think that can be added to it, This can be more strategy oriented

45 V1: Because when we see the Just adding on to your point A1, Because with the strategy or the mindset with which the person is doing the keyword research Because the competing website That will be considered as competition That will change, For instance if I was to compete with the price, Compete at price model, Then my competition will change and Over here in basic search method, the third step that says competing websites, My competition my definition and identification of competition Will change accordingly If that makes sense Because that will very much depend on my strategy, If my strategy was to compete on price or brand Equity or geographical coverage, etc. , so the Scope of the competing websites will be covered In the step of Competing websites if that makes sense

46 A1: Exactly, I will give you an example one of my clients, we just built traffic for certain keywords that the website gets only 500 extra traffic but out of the this extra traffic they get

Additional 100 to 177 Leads per month out of this extra traffic of 500. So traffic wise the traffic has not increased much, but sales wise It has been a very very much successful campaign. So that is why in the starting itself when we are looking at the keywords, we have to focus on the keywords and align it to the strategy for which we are conducting the SEO campaign. In some instances it does not the competition that is important but it is sometimes the location that is important to generates the sales. Because for some SMEs they will not be able to sustain even for one year, without Traffic, so they will have to go for only those keywords that can generate traffic And sales maybe it can be even 10 sales more And then after more than 10 and increasing therefore. So understanding the overall purpose can be defined a little better In terms of the Business

47 V1: and that will very much depend on the Business itself, How Much input they want to give to their SEO campaign, The optimizer or these process models can't exert this pressure or to increase the intensity of the pressure, Yeah, yes R2

48 R2: yes I would agree with That, that for SMEs that I have worked At before, When we are looking at competing websites, If you are going to succeed in an industry with much bigger competitors Often you will be doing that not just to identify the keywords To compete on but to find niches How to find things or gaps that are missed And so on so I think the process for these SMEs are a bit different, than if you're working with a big clients Or if you are an another big operator where you want to go head to head I don't think it Really affects your model it's just that The context of that changes a lot depending on the Campaign

- 49 V1: yes the context will change if I understand that right
- 50 R2: yes
- 51 V1: Thanks a lot for all your input and thanks R2 For following it up. Anyone else who wants to say something
- 52 P1: I want to ask something
- 53 V1: Yes go on please
- 54 P1: the incentives/acceptance/implementing of search engine optimisation For example its an e-commerce website, that you do Follow the process model, You leave the competition and all that stuff. For example, Google will take the signals based on the content that you have on the website And you got the rankings based on the keywords and the content on the website. So on an e-commerce store let's say digital product or let's say Swimwear for example, What kind of content you can actually, what are you going to do as Vani, so lets say, you have a project that focusses on selling Swimwear. Are you going to focus only on the Product description On the title or you need to create the content For example you create pages With plain content and maybe you had some figures.
- 55 V1: I can start answering the question And someone else can join in. As all of us know if you want to gain ranking on swimwear You answered your question yourself actually, You said not only adding the keywords To meta tags but building the content As well, How you write the content, So again we have to follow Not only just writing the plain content As mentioned in the process models it has to build a theme.
- 56 R1: yes in the process models you have clearly mentioned that
- 57 V1: So it is about building Context it is about building theme, It's about creating the concept of swimwear In your website And looking at not only the concept of swimwear But other semantically related sub Concepts as well That falls within the scope of your website If that makes sense.
- 58 P1: So you will, if you have a project like this You will create web pages with just content In order for you to increase the sale through the rankings yeah.
- 59 V1: Obviously if you think that specifying the keyword in the meta tag Will do the job that won't do the job. Ok if that answered your question P1. We need to move on to next question now. The next question is how does these process models or the steps identified differ from your usual technique Or practice that you follow in in your day-to-day job or The team that works for you They follow a different day-to-day practice. So just to elaborate my question So how does it differ So how these process models or these identified steps From your day-to-day job the way you Execute your own techniques or the way you execute your own processes Are the people that work for you they execute different processes How do you define that if I made myself clear.
- 60 P1: Can I start,
- 61 V1: Yes
- 62 M1: Yes please go on

63 P1: We add three more steps to your process model, like We check backlinks. What you said we do research Otherwise we are not able to find the keywords On what to target and rank, But we do some extra bit, uninterpretable sound, take it to the next level, We don't even backlinks we do send messages to related websites to create a link and they will create a link to us. Those Those are the things that we are doing additionally.

64 V1: Ok we're looking within the scope of these process models within the scope of on page SEO. Anyone else who wants to say something

65 R2: I think there are a couple of things That stuck out for me, so firstly I think the emphasis on keywords here I think, Might be a time stamp on it for instance Google is getting better and better at understanding synonyms And so on And I think when I start Often its with an Intent, It's a map of intent rather than a map of keywords, And we all know that Google's ability to understand semantics is still limited one example we have in our field is Google doesn't understand a BSC degree is a bachelor's degree And it doesn't understand the undergraduate is the same as the bachelor's degree Search this kind of keywords, that questions Google's ability

66 V1: So you tend to map the key words understanding the intent but do you still think Your main goal comes from Intent, You still look at the keywords still, Because if you start from the Intent, Where do you jump from intent, so after Intent,

67 R2: The benefit of intent Is that you think you will have one piece of content for 1 intent or address that Intent And you can have couple of synonyms within That

68 V1: So after intent you tend to come to some keywords isn't it or no

69 R2: Yeah, yeah, i come to the keywords and you measure your rankings via keywords, But I wouldn't necessarily arrange the architect of the site via keywords, I would arrange it around intents

70 V1: Yes yes and that will again depend on the concept and the sub concepts How you want to serve the target audience

71 R2: yeah, but I mean like the Orders of having one keyword per page or piece of content, Those days are long gone really. So I think there might be some space To think about where intent fits within that And the other thing Is that I think it's maybe I don't know if you can get around that because its the on-page model we are discussing about And I think your off-site or off-page SEO Strategy is so close to the So closely intertwined with your on site or on-page SEO So for example if I am developing Content I have developed content before Basically to bring links and auto generate links and collaboration. So your content is there not to sell a product directly but to raise the authority of your site, To kind of give your site a Boost

72 V1: Oh yes, definitely, And that defines the quality, quality You don't have to write quantity You don't want 10 pages talking the same thing, You want five good pages that defines authority And as you said

73 R2: It's not just quality, I think some types of content Will be much better like collaborative content Is very good for bringing in links

74 V1: yes,

- 75 R2: So there are other types of high quality content that won't really bring in links as well like
- 76 V1: When you say collaborative content but will again transcend the boundary Of this research Because that will involve bringing in Content from other people
- 77 R2: yeah
- 78 V1: or from this two way, Web 2.0
- 79 R2: Yes involving other people Or other companies
- 80 V1: Yes, In terms of comments in terms of feedback, In terms of follow-up yes,
- 81 R2: yes
- 82 V1: So that will become collaborative content So at the moment the focus of this research is to look at how you can define your content
- 83 R2: Yeah
- 84 V1: On what principles you can, What principles can you follow to create your content, Just as you said Intent, Intent will translate into a keyword
- 85 R2: Yes I don't know if it does, in that sort of a linear though, Like of course, Keywords are an expression of intent But they don't just
- 86 V1: When you say that expression of intent, what does the expression of intent, again a keyword
- 87 R2: No no not a keyword, It could be a collection of key words
- 88 V1: Yes yes, a key phrase, a keyword won't be searched, or a group of keywords
- 89 R2: yeah
- 90 V1: So intent will be translated into keywords, Again then you will have to identify Keywords, But if you say your target audience is students Who are looking for BSC course, Then you will look at BAC course in London, Whatever your page is selling,
- 91 R2: yeah
- 92 V1: So then you will have to use that relevant keyword if that makes sense Because from my viewpoint I will see you in a view that, You are right that optimisers or people start with intent, I start with Intent, So everyone starts with an information need, Which can be phrased as an intent or an information need. So whatever you have an information need or an Intent it will have to be Eventually into a keyword or a key phrase
- 93 R2: yeah,
- 94 V1: If that makes sense
- 95 R2: yeah, it does, but we have to Remember that Google is trying to minimise Keywords so Google is Trying to understand intents So I think if you want to have a model That is going to survive for the future But has to account for that Google wants to understand what you want from searching something



96 V1: Yes definitely

97 R2: And keywords is the best way it still has. I don't know if someone else want to say something

98 K1: yes it's a tricky one, Because at the moment Google crawl the site, and it will read the keywords and look at the structure, It only understands the keywords it can't interpret Any other related As far as I know it won't bring up related pages That don't include that keyword, Yes I see where you are going with it, You need to future proof it

99 R2: yeah, One example how I see it can get it is the link text and the content of other pages how they link it You might not use the keyword on the page Like there was a classic example of a George W Bush's autobiography when it came out There was a campaign to link to it From other sites Using the phrase complete unmitigated failure So after a little while if you Search for complete unmitigated failure it brought up George W Bush

100 V1: There are various competitions like that as I understand Your viewpoint actually When you say what you Are trying to define over here, I am trying to interpret your viewpoint correctly You are trying to see the search journey, The search Intent, so Google is Talking from the perspective of a searcher, And this process model we're talking from the perspective of an optimiser, So we're not talking from the perspective of the audience, So I think you are transcending the line for you are trying to see that Google is trying to understand the searcher Yes definitely And it tries to understand the searcher From different perspectives, like searcher's geography from its IP, From the previous searches, from its search session, So what you're trying to do is you're trying to Model your viewpoint On the basis of your understanding that Google is trying to understand the searcher Definitely but From the optimizer's perspective the optimizer has to Express what the website covers So I think we have tried to Transcend the boundary for your viewpoint on Google's interpretation of the searcher.

101 R1: Optimiser also tries to understand How intent should relate with From the service end for what the user is looking for From service perspective or informative content searching perspective. Intent will be further classified in two variations one is service and second informative content. Like if I have a website of shoes, If users are looking for kids shoes So they can be landed on a kids shoes landing page, What features should be there for kids shoes I mean good features for the baby shoes are Kids shoes So those can be informative content Which can be created as an article or a blog post And will be posted in the same domain Or website

102 V1: Just to add to your viewpoint, So when the optimiser creates the content At that point he or She has to address the Intent of the searcher which will happen in the future

103 R1: yes,

104 V1: If that makes sense

105 R1: yes, It has to, it has to

106 V1: So the intent will be addressed, Of what is happening at the moment that is Optimisation of the site if that's correct, If I am understanding what you're saying

- 107 R1: yes yes, We have to make sure what are the related, service variation keyword will be, What are the other information related keyword Variation will be because while We will be doing keyword research there will be all sorts of keywords Will be featured or suggested Because Informative keywords I have seen many times Have high search volume Like I would like to give an example of hair transplant is a service term. If I search how to grow hair It is informative it has high volume than service Of hair transplant
- 108 V1: yeah, yeah. Ok now, Because of the time shall we move on to the next question if all of us are fine. So the next question is: Are the process models easy to understand.
- 109 R1: yes yes it's easy to understand, it's really easy I, from my perspective yes it is very easy to understand
- 110 V1: Ok anyone else, Yes A2
- 111 A2: I just want to say it depends Who your target audience are, Depends who you're trying to Present this information to. So if you were going to present it to A younger audience I would say
- 112 V1: No younger audience we're not trying to address the younger audience
- 113 A2: I'm not saying school children, What I am saying teenagers people who are new to Employment in SEO so maybe in early 20s twenties, So not those people who have got lots of experience Who already know what SEO is, So for them perhaps some visuals would be Beneficial and There was an earlier suggestion of animation, It's just easier to absorb information that way
- 114 K1: Yeah I agree I think it is
- 115 P1: can I add something, Prezi.com is an interactive Interactive presentation facility it's not a video but It's presentation so I think For small kids and for big kids This kind of interactive presentation is much more effective
- 116 V1: Got your point
- 117 K1: absolutely absolutely I think it's clear When you talk us through the process models and you already know the subject, It's quite clear but The presentation could be done in a number of different ways And I think it's just the presentation Could be better, But it is clear, When you talk it through
- 118 Author's retrospection: K1 wants to say that the information presented in the process, models is quite clear and easy to understand and it's just the presentation of the process models that can be improvised
- 119 R2: it's quite difficult to look at from the perspective of someone else doing it
- 120 A2: we all have a lot of experience so it's very difficult to Trying to understand what it would be like for someone To implement SEO who has never done SEO Before
- 121 R2: But the information in process models is certainly very clear is jargon free It's straightforward It's not waffly, so it's certainly very clear
- 122 V1: Anyone else who wants to say something

123 P1: your presentation Vani was very clear Actually, It's all about SEO and anyone can understand you as everyone in the room has said

124 V1's retrospection: P1 is trying to say that anyone can understand the SEO information through the process models And he is trying to convey that everyone in the room has this opinion.

125 P1: I don't know if someone who doesn't have any experience in SEO how they will interpret and react. But if you're talking to us who do SEO then your presentation was very easy to understand. Even somebody who is not a good listener even he or she can understand your presentation. Your presentation was actually very clear.

126 V1: ok thank you shall we move on to the next question please. Is there anything you feel could be improved.

127 R1: are you saying in terms of adding to the process model

128 V1: yeah apart from the viewpoint of adding interactivity to the process model For Younger audience for people who are not trained adding more interactivity to the presented information, Something else within the scope of process models. Is there something else That you feel can be added To improve in that

129 R1: I think process models should be created as videos and infographics That will be more easy For audience and all those younger people to understand. Infographic can be quite easy. I think each model like basic search method, Search queries method, state step by step for as you can easily Mentioned I mean Infographic can be a good things and video can be amazing

130 V1: I get your point

131 Author's introspection: R1 is trying to say that by following the steps in the process models you can easily perform these techniques. Presenting this information in an Infographic can be a good thing whereas presenting it in a video will be really amazing

132 A1: Vani I can add something.

133 V1: Ok yes please A1

134 A1: So I think what we can expect some decision-making pointers Where do i start As there are multiple activities that we are doing, Maybe at one point, When I am saying ok that keyword selection Is done so So they can be decision making points so each decision making point Directly because you have used Rectangles triangles in the symbols of process models and all of these symbols mean something So where the decision maker needs to start And take a decision that Can be highlighted To say that the step one is over of keyword Discovery, We discover the keyword then we select the keyword ,So different decision-making pointers can be added

135 Author's introspection: A1 is trying to say that there can be some some decision-making pointers for the optimisers to help them identify where do i start

136 V1: I see

137 K1: that's a very good point it needs, Approval from either senior people in the team or the client. so they should be approval stages in there

138 V1: I get Your point

139 M1: yeah

140 K1: I don't know forgive me it's a while since I looked at it I don't know if there is an Overall model, Like a summary model Which highlights each of the main areas of process models And bring them together Because each process has a lot of detail, So maybe it needs an overall summary Process model, Looking at which someone can have the whole picture Visually. That might help it.

141 V1: Just to understand that from the execution Perspective in a team level So something that can correspond between the executor and The higher management

142 K1: so for approvals yes, You need sign off from Either someone internally in higher management Position Or the client Ultimately client should sign it off As well Because otherwise you may go ahead and optimiser the website for keywords That client has not agreed to or not relevant

143 V1: Is there anyone who wants to add something

144 R2: Is there any I think you have covered a bit in the search queries report a lot of SEO is about iterating, Testing and learning, Is there somewhere that you can close that Loop in your models, So how it is done in an ongoing way

145 V1: I think if I'm understanding your perspective correctly you are If you are referring to the proficiency of a professional

146 R2: No So you make a piece of content, And you check how it is ranking, You do search queries report, You might go to another text to see how much traffic Has converted

147 V1: But that will go beyond the scope of these process models

148 R2: yes, but does it though Because a lot of content That an existing

149 V1: checking and tracking will go Beyond the

150 K1: I think I agree with this But we have a life cycle So if we have what I was saying a moment ago About an overall summary Of the process models It will indicate the life cycle in That, Just to show you have to go back again And iterate

151 R2: Because that is where a lot of improvements can be made In the team commitment

152 A2: These things change after a few years don't they, I agree with everyone else, The only thing I would say, For me personally there is a step for me beforehand which is establishing Who your target audience are And then that feeds into The kind of research that you do

153 V1: Because that'll again come from the business owner, How they understand their target audience

154 A2: exactly, You start From that cycle by understanding who your target audience are, In two years time has your target audience changed Or what's happening So for me that is one of the things that are Important

155 V1: so from the process models or from the SEO perspective We can say that the business has to understand it's question

156 A2: it's customers you mean

157 V1: yeah, So that is the question. so if I as the business owner or an SME owner Don't understand if I don't have a clear idea about my target audience then I am confusing you and not only confusing you But confusing myself, So that is what I stick my viewpoint at or the strength of any activity With respect to the process model of any marketing activity

158 A2: exactly you need to know your target audience

159 V1: if That makes sense

160 A2: yes it does

161 R2: Pointing to K1's viewpoint earlier about an overall summary model. R2 says, It feeds into your point as well To have an overall model if you could To give some sense of how it is embedded within a business, Within the marketing.

162 V1: Thanks everyone for your input on that Shall we move on to the next question. The last one. Going forward do you feel you will use These techniques or the steps identified in the process models or Do you think it will change your practice or influence your practice. If so why, if not why not. The floor is open to you please, anyone who wants to say something. I can ask you some pointers before I ask you to answer the last question. So do you think that the Implementation of keyword research feeds into Other techniques as well Like content creation. So we can say that the different techniques are interlinked with each other. so keywords are interlinked, if keyword research is done properly, They are interlinked with content, Information architecture, HTML code optimisation and so on. Do you feel that is the case. That the SEO techniques are interlinked. Do you feel that is the case.

163 R1: yes yes it is interlinked.

164 V1: And do you think the techniques the on page SEO techniques That have been identified in the research The techniques of keyword research, information architecture, Content writing and HTML code optimisation, If they have been implemented correctly As per the steps indicated in the process models they affect the visibility of websites in search engine results pages. Do you think that will be the case.

165 R1: yes yes it will affect positively

166 V1: anyone wants to add anything

167 R2: obviously to an extent

168 R1: Steps in process model is quite, follow the how SEO process should be and you have made the steps very easy and proper way how it should be. So yes it will surely

influence positively and if we apply these techniques I mean steps according to your process model

169 R2: Oh it's actually about the Effect that implementing a model will have the effect on ranking. I think certainly if you follow this You would see benefits, But that would be constrained by the competition and so on. I think on-page Particularly has the Primacy if there is not a huge amount of competition Or if you've got A good niche What if you're in a high competitive Area you will Need some off-site. So (the need for offsite SEO or off page SEO) that is more of a client education side of a thing, I think that then don't need to expect too much

170 V1: I come to the last question, because of the time. Going forward do you feel you will use These techniques or the steps identified in the process models or Do you think it will change your practice or influence your practice. If so why, if not why not.

171 R1: it will improve but why Not Because from my end I think there are more On page things that falls under This process model I think you have mentioned the keyword, Content, meta tag, I mean coding: JavaScript, H1, images, I mean apart from these Things there are more things like speed optimisation Very important, Redirection is very important Because the whole world has www or non-www And if it affects very heavily they do not know but if they see these gaps and improve the gaps they will see the improvement.

172 V1: I got your point anyone else who wants to say something

173 R1: I like to add one more thing about canonical Any new website or any current running website, There is everywhere content They do not know how it causes, The same amount of content is being Shown on other pages like categories It accidentally creates same content on duplicate content on other pages We have to make sure you, no duplicated content Shouldn't be caused That impact should be taken care by canonical way

174 V1: yes got it, Yes K1

175 K1: in regards to Whether this influence the way of business works, I have taken parts of this ( parts of the process models) And I have put it into a wiki page On our intranet So it has definitely helped me come up with a process for My team And also on a training course I did It helped yes it is me cover everything that Should have been covered on that Training course So there were elements that I took From this into it And then a session that I then presented To a client So there are two influences it had one our (SEO) business

176 V1: yes that is a big motivation for the research

177 K1: yes exactly, and that is why I thought I would mention that

178 V1: Ok we come to the end of this session, I really want to thank you each one of you For participating and taking your valuable time, I really thank each one of you and I hope to see you sometime In person or in conferences Please stay in touch all of you. I wish you all the best and God bless you all. Thank you A1 P1 R1. Shall we hang on then. Thank you thank you.



## **Appendix B**

### **SEO experience base - Cookbook level**

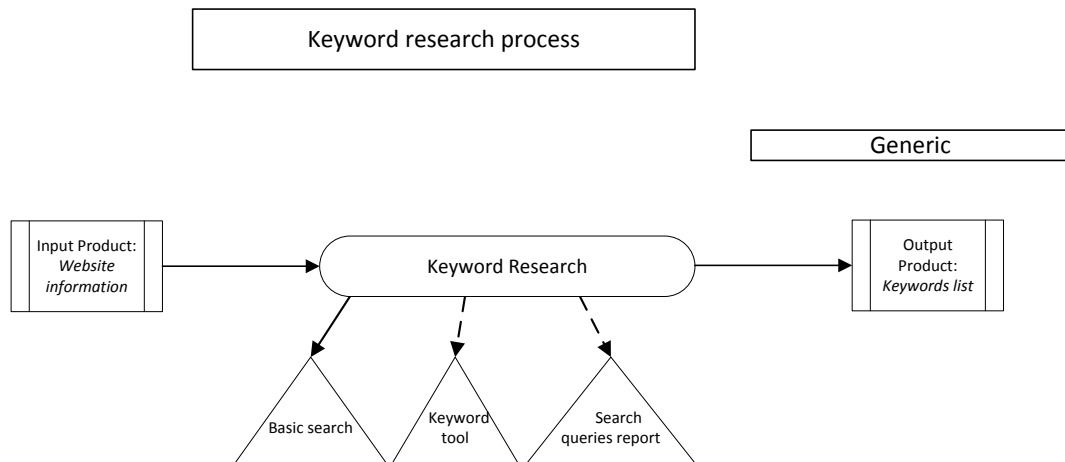


# **Cookbook level process models and Description sheets**

**Cookbook level:**

## **Keyword research process**

**This process model explains the different processes for researching keywords.**

**Process goal:**

- To compose a keywords list for targeting in the SEO campaign.

**Applicable methods:**

- Basic search (mandatory)
- Keyword tool (optional)
- Search queries (optional)

**Agents / Resources:**

- Website information
- SEO engineer

**Tools:**

- Google's Keyword Planner (for Basic search method)
- Google's Keyword Planner (for keyword tool method)
- Google's Webmaster Tools (if applying Search queries method)

**Remarks:**

- This process focusses on selecting relevant keywords.

Version 0.1 as on 02.01.16 by VA


Produced by using INRECA Methodology

Website information

Generic

Input Product:  
*Website  
information*

 Previous element

 Next element

 Back to Home

**Description:**

- This input provides information on a website's product or service.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keywords list

Generic

Output  
Product:  
*Keywords list*

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- This output provides a list of relevant keywords to be targetted in the Search Engine Optimisation (SEO) campaign of the website.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Basic search method

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- This method introduces the process to search for keywords using Google search engine.
- The implementation of this method is mandatory.

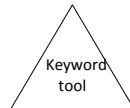
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keyword tool method

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- This method introduces the process to search for keywords using Google's Keyword Planner tool.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search queries report method

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- This complex method introduces the process to search for keywords using Search Queries Report provided by Google Webmaster Tools.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

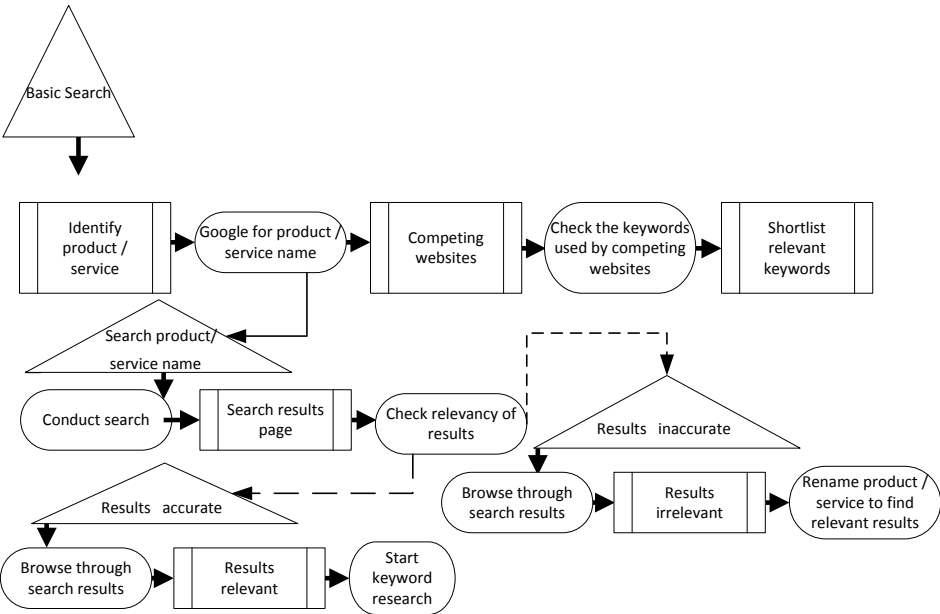
Produced by using INRECA Methodology



# Basic search method

This process model explains the basic process for researching keywords.

Keyword research: Basic search method



Identify product / service

Generic

|  |
|--|
| Input Product:<br>Identify<br>product /<br>service |
|--|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- This input identifies the website's product or service being sold.
- The website or business owner defines the product or service as per his/her understanding.
- The aim is to find the keywords used by searchers to find the current product or service.

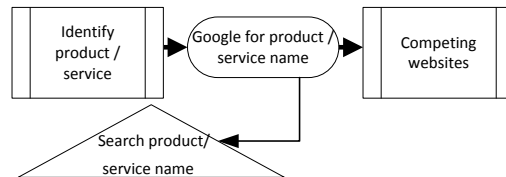
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Google for product / service name

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- In this process the product or service name is googled to find if the listed results match the targeted website.
- This process helps to find the exact keywords to describe the product or service being sold by the website.
- This process is supported by the 'Search product / service name' method to find the relevant keywords for describing product or service.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search product/service name

Generic

Search product/  
service name

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The aim of this method is to find the relevant keywords for describing product or service being sold by the website

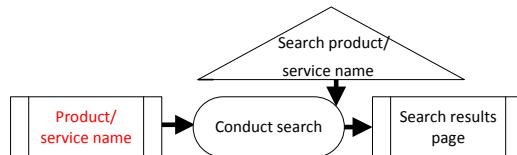
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Conduct search

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The Conduct search process takes an implicit input of product or service name which is used to conduct search on Google for getting an output of Search results page.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Product/service name

Generic

Product/  
service name

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The **Product/service name** is an implicit input for conducting the Google search.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search results page

Generic

Search results  
page

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

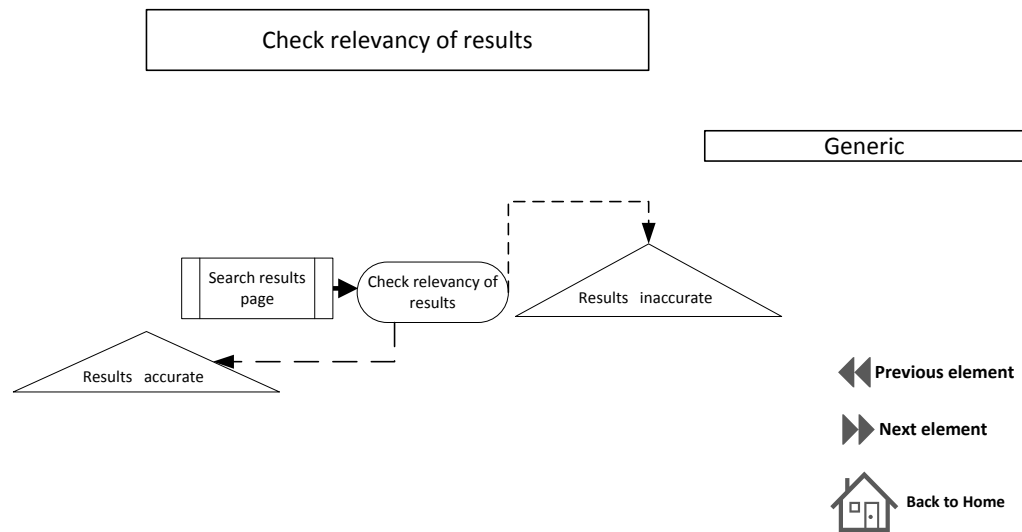
- The Search results page is the output of conducting the search on Google for getting an output of Search results page.
- The listed websites indicates the relevance and accuracy of the chosen keywords to represent or define the product or service.
- In the next process we check the relevancy.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



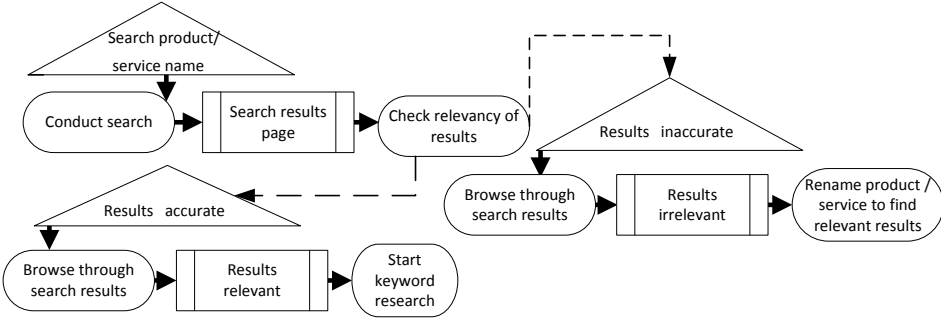
**Description:**

- In this process we check and verify the relevancy and accuracy of keywords used to represent the product or service.
- If the listed websites are found to be selling similar products that indicates the chosen keyword or key-phrase is appropriate or vice-versa.
- This process is supported by two methods named as Results accurate and Results inaccurate.
- The dotted lines used to connect these two methods of 'Results accurate and Results inaccurate' indicate that one of these methods will be applicable.

**Remarks:**

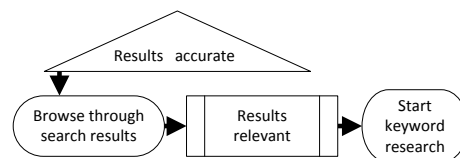
Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Results accurate

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The aim of this method is to verify if the results are accurate, by visiting the listed websites to find their accuracy.

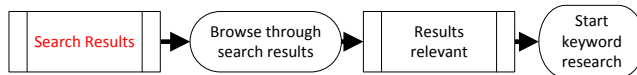
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Browse through search results

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Browse through search results' process has an implicit input of 'Search Results'. By implicit we mean that this input has not been explicitly mentioned in the diagram but implicitly is a part of the process.
- Further it has an output of a finding of the results to be relevant

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search results

Generic

Search results

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- 'Search results' is an input to enable the process of browsing through the search results.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Results relevant

Generic

Results  
relevant

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- The 'Results relevant' is an output decision after the process of browsing through search results, which indicates that the keyword research can be started.
- This output indicates that the original keywords used by the website or business owner were relevant to the keywords being used by searchers and Google to specify the current product or service.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Start keyword research

Generic

Start  
keyword  
research

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Start keyword research' process indicates that the search results have been found to be relevant and the keyword research can be started.

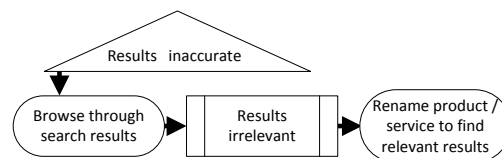
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Results inaccurate

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The assumption of this method is that the results are inaccurate, which is found by visiting the listed websites to find their inaccuracy.

**Remarks:**

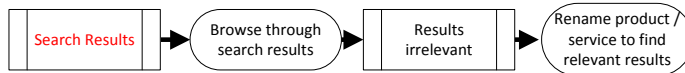
Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Browse through search results

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Browse through search results' process has an implicit input of 'Search Results'. By implicit we mean that this input has not been explicitly mentioned in the diagram but implicitly is a part of the process.
- Further it has an output of a finding of the results to be irrelevant

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search results

Generic

Search results

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- 'Search results' is an input to enable the process of browsing through the search results.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Results irrelevant

Generic

Results  
irrelevant

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Results irrelevant' is an output decision after the process of browsing through search results, which indicates that the keyword research cannot be started and there is a need to 'Rename product / service to find relevant results'.
- This output indicates that the original keywords used by the website or business owner were not relevant to the keywords being used by searchers and Google to specify the current product or service.

Remarks:

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Rename product / service to find relevant results

Generic

Rename product / service to find relevant results

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- The 'Rename product / service to find relevant results' process indicates that the search results have not been found to be relevant and the keyword research cannot be started. Therefore there is a need to Rename the product or service until the search results are found to be relevant.
- When relevant search results would be found then the keyword research can be started.

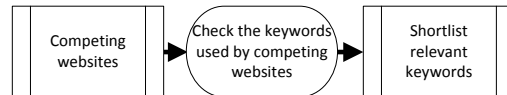
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Competing websites

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- After getting relevant search results via the selected keywords or key-phrases, the competing listed websites in search results are visited.
- The list of competing websites is an input to the process for checking their information.

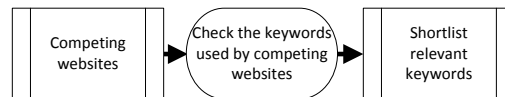
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Check the keywords used by competing websites

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- During this process, the competing websites are browsed through to check their content in terms of keywords, meta description, meta title and content body of the page.

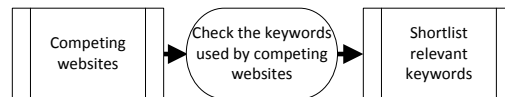
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Shortlist relevant keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The output of the process of checking the competing websites' information is a list of keywords and key-phrases being used by competing websites.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

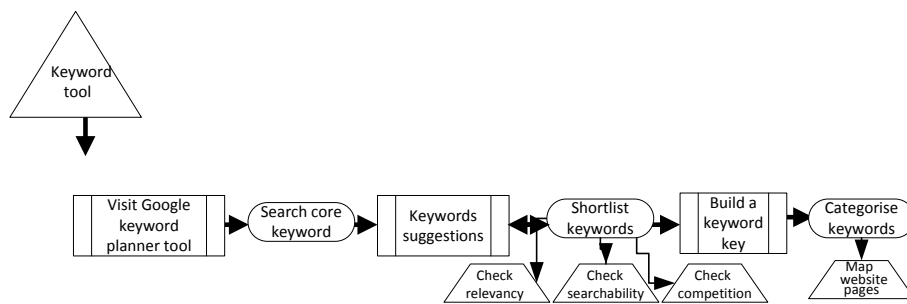
Produced by using INRECA Methodology

# Keyword tool method

This process model explains researching keywords using keyword tool < <https://adwords.google.co.uk/KeywordPlanner>>.



## Keyword research: Keyword tool method



N.B: The presumption is that information architecture of the site has been already mapped out

Visit Google keyword planner tool

Generic

Visit Google  
keyword  
planner tool

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Visit Google keyword planner tool' is an input to start the keyword research using Google's keyword suggestion tool.

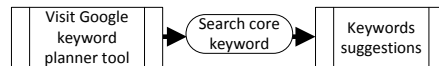
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search core keyword

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Search core keyword' indicates the process of searching the core or seed keyword in Google's keyword suggestion tool so as to find relevant keyword variants.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keywords suggestions

Generic

Keywords  
suggestions

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Keywords suggestions' is an output where the Google's keyword suggestion tool provides more keyword suggestions to be targeted by the website.
- The keywords suggestions can be updated by running multiple keyword-searches to get appropriate keyword suggestions. It is a good practice to run multiple searches for shortlisting the best possible and most appropriate keywords.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

## Shortlist keywords

Generic



◀ Previous element

▶ Next element

 Back to Home**Description:**

- In the 'Shortlist keywords' process the keywords are verified against three parameters before shortlisting:
  1. if the keywords are relevant
  2. if they are used by searchers
  3. if the competition is not too high
- The above three parameters are executed by the different methods of this process.
- Multiple searches are conducted using the keyword tool to shortlist appropriate keywords.
- The keywords suggestions can be updated by running multiple keyword-searches to get appropriate keyword suggestions. It is a good practice to run multiple searches for shortlisting the best possible and most appropriate keywords.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Build a keyword key

Generic

Build a  
keyword  
key

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- After executing the process of shortlisting, the keyword key is created representing the various categories under which the shortlisted keywords can be categorised.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Categorise keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The 'Categorise keywords' involves the process of categorising the shortlisted keywords under respective categories.
- This process is supported by the method of 'Map website pages' which involves the mapping of keyword-categories to respective pages of the website.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

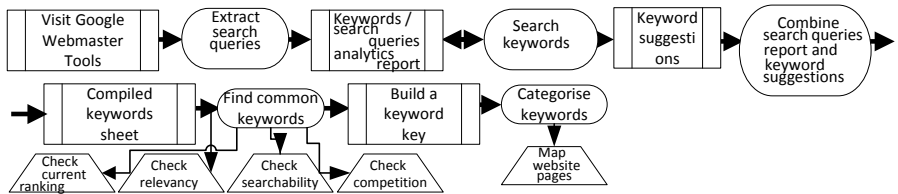
Produced by using INRECA Methodology

# Search queries report method

This process model explains researching keywords using search queries report provided by Google Webmaster Tools.




Keyword research: Search queries report method




Visit Google Webmaster Tools

Generic

Visit Google  
Webmaster  
Tools

 Previous element

 Next element

 Back to Home

**Description:**

- The 'Visit Google webmaster tools' is an input to start the keyword research using Google webmaster tools' search queries or search analytics report.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Extract search queries report

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The search queries are extracted which contains report on various parameters including number of clicks, impressions, average rank, ranked pages etc.
- This report gives a good indication on the keywords where the website is currently ranking.
- It also reveals under which categories Google has indexed the site.
- Generally Google webmaster tools provide the reports up to past 90 days.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keywords / search queries analytics report

Generic

Keywords /  
search  
queries  
analytics  
report

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- By extracting the search queries or search analytics report the output is in the form of keywords or search queries for which the site was ranked.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Search keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- After extracting search queries / analytics report, the seed keywords are searched in the 'Google keyword planner tool' to get keyword suggestions from the tool.
- A number of keyword suggestions is the output of this process based on which the search queries / analytics report could be updated.

**Remarks:**

Version 0.1 as on 02.01.16 by VA


Produced by using INRECA Methodology

Keyword suggestions

Generic

|                        |
|------------------------|
| Keyword<br>suggestions |
|------------------------|

 Previous element

 Next element

 Back to Home

**Description:**

- A number of keyword suggestions is the output of the process of searching the seed keyword in the 'Google keyword planner tool' as explained in the description of previous element.

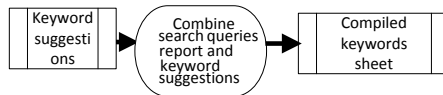
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

## Combine search queries report and keyword suggestions

Generic

[◀ Previous element](#)[▶ Next element](#)[🏠 Back to Home](#)**Description:**

- In this process the keyword suggestions and keywords from 'search queries/analytics report' are collated or combined in an excel sheet in an organised format.
- As an output there is a compiled keywords sheet from keyword suggestions tool and search queries/analytics report.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Compiled keywords sheet

Generic

|                               |
|-------------------------------|
| Compiled<br>keywords<br>sheet |
|-------------------------------|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- As an output of the process explained in previous page, there is a compiled keywords sheet containing keywords from keyword suggestions tool and search queries/analytics report.

**Remarks:**

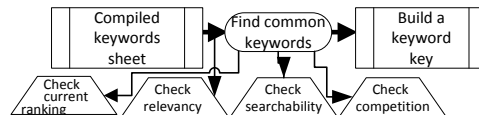
Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Find common keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

#### Description:

- The compiled keywords sheet is processed to find the common keywords.
- After finding or highlighting the common keywords, few parameters are checked for those keywords.
- Firstly it is checked if the keyword is relevant. If it is found to be relevant then following parameters are checked.
- Secondly it is checked whether the website is currently ranking for it. If it is ranking then the ranking position is recorded.
- Thirdly, it is checked if that keyword or key-phrase is searched by the searchers. If it has a search-ability of more than 10 searches a month then it is considered.
- Finally it is checked if the competition is not too high e.g. 10 digits. It is advisable to choose keywords with moderate competition ranging between 5 to 7 digits. This competition is reported by the search engine. For instance Google lists this competition on the top right hand corner of the search results page.
- Hence the shortlisted keywords are categorised as explained in the next page.

Version 0.1 as on 02.01.16 by VA

#### Remarks:

Produced by using INRECA Methodology

Build a keyword key

Generic

Build a  
keyword  
key

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- The keywords are analysed to understand the different categories to which they belong
- A keyword key is created representing the categories of keywords

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Categorise keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The shortlisted keywords are categorised or clustered under the defined categories.
- The website pages are assigned/allocated/mapped to these categories

**Remarks:**

Version 0.1 as on 02.01.16 by VA

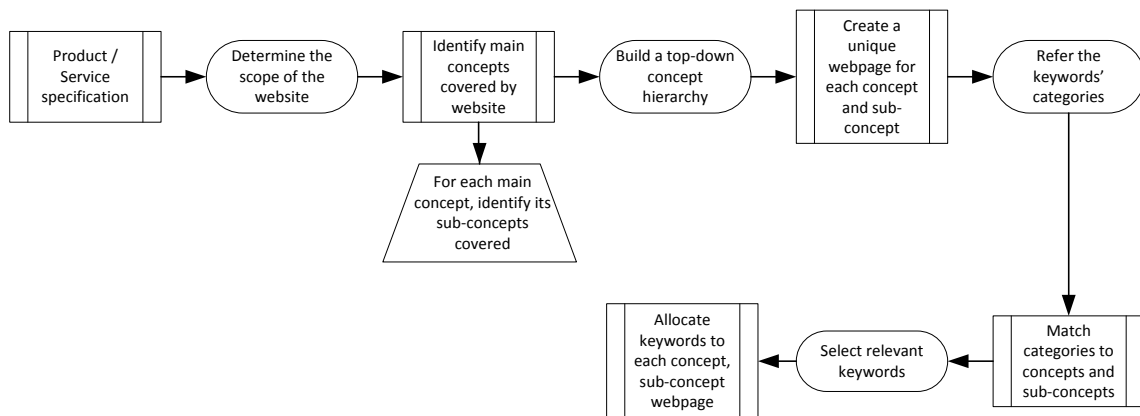
Produced by using INRECA Methodology



# Information architecture method

This process model explains creating the information architecture for a website.

## Information architecture method



Product / Service specification

Generic

Product /  
Service  
specification

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- The product or service being sold by the website are specified

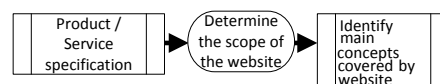
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Determine the scope of the website

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Process goal:**

- Identify scope of the website

**Applicable methods:**

- None

**Agents:**

- SEO engineer
- Domain Specialist
- Website owner

**Tools:**

- Business website
- Competitors' websites

**Remarks:**

- Business owner, SEO engineer and domain specialist identify the scope of the website while focussing on the competitors' offerings and the current environment.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Identify main concepts covered by website

Generic

Identify  
main  
concepts  
covered by  
website

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- As a result of determining the scope the main concepts covered by the website are identified

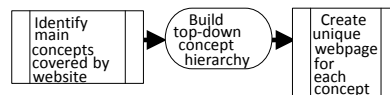
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Build top-down concept hierarchy

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Process goal:**

- Create a concept hierarchy

**Applicable methods:**

- None

**Agents:**

- SEO engineer
- Domain Specialist
- 

**Tools:**

- Website
- Internet

**Remarks:**

- A top-down hierarchy is created on the basis of the concept covered by the website. For example, an educational site would create a top down hierarchy Higher Education > Subjects Covered > Specialist Branches of Subjects

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Create unique webpage for each concept

Generic

Create  
unique  
webpage  
for  
each  
concept

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- A unique page is created for every identified concept as covered within the scope of the website

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Refer keywords categories

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Process goal:**

- Categorise the website pages

**Applicable methods:**

- None

**Agents:**

- SEO engineer
- Domain Specialist
- Website owner
- 

**Tools:**

- Keywords' categories
- Website

**Remarks:**

- The keywords' categories are referred which had been created for categorising the keywords during implementation of keyword research process diagram.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Match categories to concepts

Generic

|                                       |
|---------------------------------------|
| Match<br>categories<br>to<br>concepts |
|---------------------------------------|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- The keywords' categories are matched to the concepts covered by the website

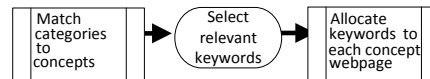
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Select relevant keywords

Generic



◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Process goal:**

- Selection of relevant keywords corresponding to each concept or category covered by the website

**Applicable methods:**

- None

**Agents:**

- SEO engineer

**Tools:**

- Website
- Shortlisted Keywords

**Remarks:**

- The relevant keywords are selected relating to the concepts covered by the website.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Allocate keywords to each concept webpage

Generic

|  |
|--|
| Allocate<br>keywords to<br>each concept<br>webpage |
|--|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- The keywords are allocated to the each of the specified concepts' webpage

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

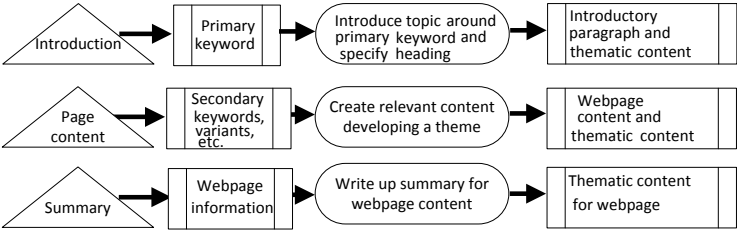
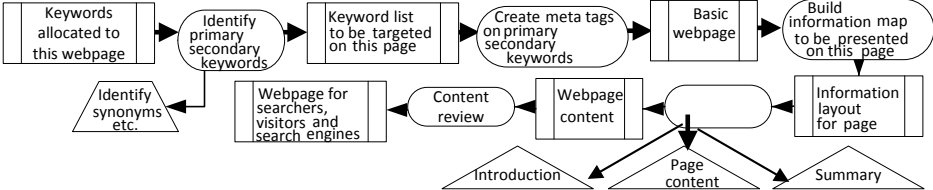




# Content creation method

This process model explains creating content for a website.

# Information architecture method



Keywords allocated to this webpage

Generic

Keywords  
allocated to  
this webpage

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

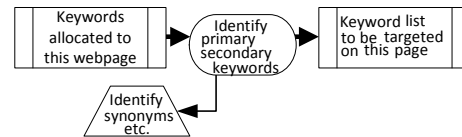
- The shortlisted keywords are mapped to the webpages during the keyword selection process.
- These keywords are referred for writing content for the webpage.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

## Identify primary, secondary keywords



Generic

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

### Process goal:

- To identify primary and secondary keywords from the allocated keywords.

### Applicable methods:

- Identify synonyms, keywords variants, topical keywords etc. (Basic method)
- By executing this basic method synonyms, keywords variants, topical keywords are shortlisted

### Agents / Resources:

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

### Tools:

- Possibly dictionary, thesaurus, and other thematic keywords

### Remarks:

- This process focusses on identifying the primary and secondary keywords based on the main theme of the webpage.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keyword list to be targeted on this page

Generic

Keyword list  
to be targeted  
on this page

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

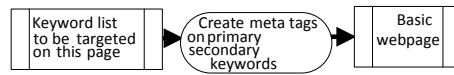
- After shortlisting there is a list of keywords to be targeted.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

## Create meta tags on primary, secondary keywords



Generic

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

### Process goal:

- To create meta tags (Title and description) using the allocated keywords.

### Applicable methods:

- None

### Agents / Resources:

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

### Tools:

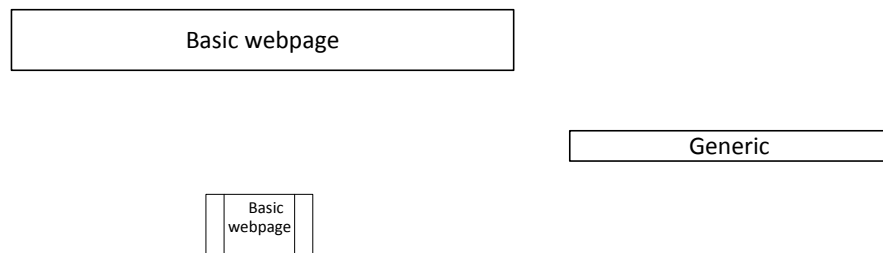

- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

### Remarks:

- This process focusses on creating meta tags following the character limit specifications of search engines.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

 Previous element Next element Back to Home**Description:**

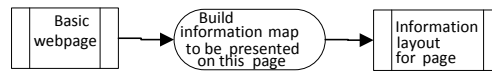
- After specifying meta tags, it creates the basic webpage, ready for content presentation.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Build information map to be presented on this page



Generic

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Process goal:**

- To create information map to be presented on this page

**Applicable methods:**

- None

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

- Related websites competing in the same domain

**Remarks:**

- This process focusses on creating an information map to be presented on the webpage.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Information layout for page

Generic

Information  
layout  
for page

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

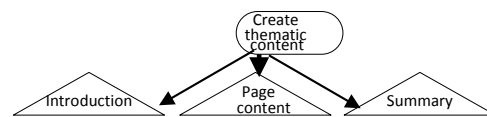
- As a result the information to be presented is laid out.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Create thematic content



Generic

◀◀ Previous element

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🏠 Back to Home

**Process goal:**

- To create thematic content for the webpage.

**Applicable methods:**

- Introduction (complex method)
- Page content (complex method)
- Summary (complex method)

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

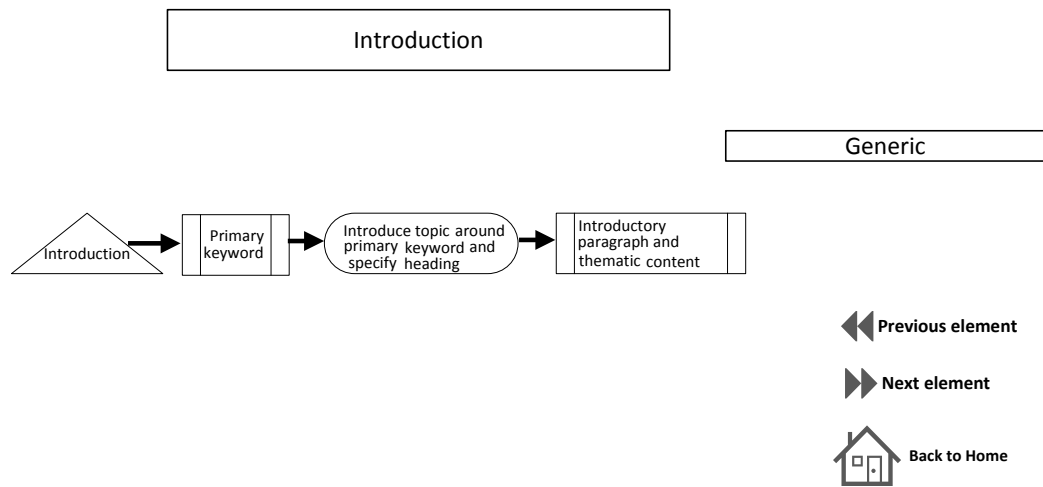
- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

**Remarks:**

- This process focusses on creating informative and interesting content for the webpage.

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Produced by using INRECA Methodology

**Complex method:**

- This method focusses on writing the introduction for the webpage.

**Remarks:**

- 

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Primary keyword

Generic

|                    |
|--------------------|
| Primary<br>keyword |
|--------------------|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

- As an input to writing introduction the primary keyword(s) are selected.

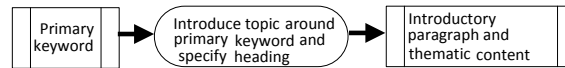
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Introduce topic around primary keyword and specify heading

Generic



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🏠 Back to Home

**Process goal:**

- To introduce the topic or subject around primary keyword(s).

**Applicable methods:**

- None

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

**Remarks:**

This process focusses on creating introduction for the webpage.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Introductory paragraph and thematic content

Generic

Introductory  
paragraph and  
thematic content

◀◀ Previous element

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 Back to Home

**Description:**

- As a result the introduction is prepared for the webpage.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Page content

Generic



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🏠 Back to Home

**Complex method:**

- To create content for the webpage.

**Remarks:**

- 

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Secondary keywords, variants, etc.

Generic

|   |
|---|
| Secondary<br>keywords,<br>variants,<br>etc. |
|---|

◀◀ Previous element

▶▶ Next element

 Back to Home

**Description:**

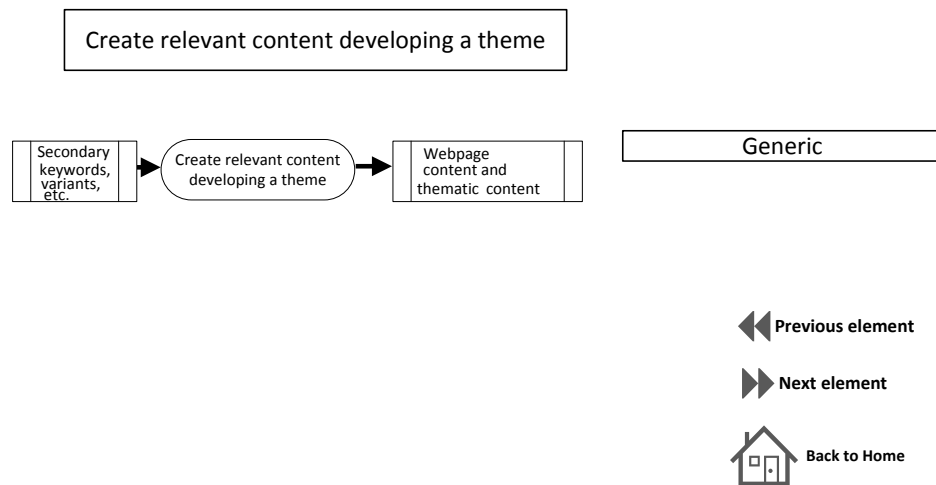
- The secondary keywords, and other on-topic keywords are selected to provide information on the topic.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



**Process goal:**

- To create informative content on the topic of the webpage.

**Applicable methods:**

- None

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

**Remarks:**

This process focusses on creating content body for the webpage.

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Produced by using INRECA Methodology

Webpage content and thematic content

Generic

Webpage  
content and  
thematic content

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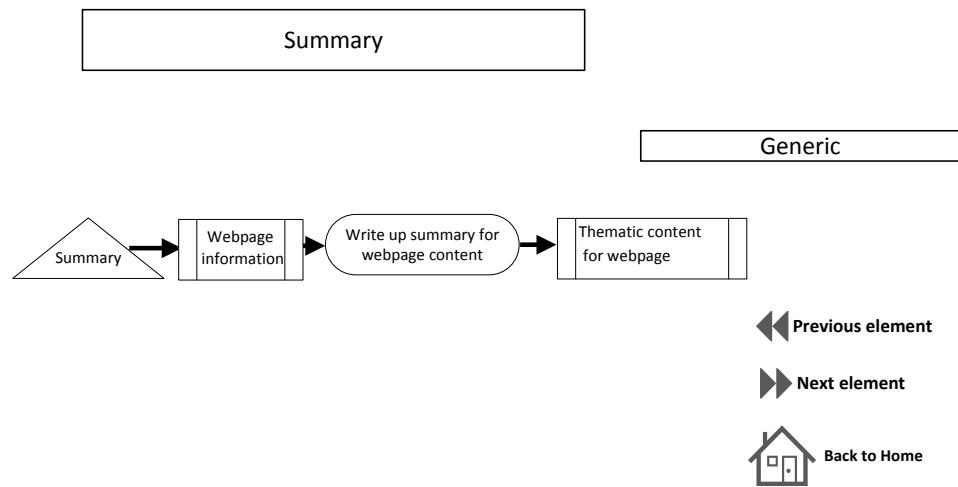
**Description:**

- As a result the webpage content building a theme is created.

**Remarks:**

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Produced by using INRECA Methodology

**Complex method:**

- To create a summary of the webpage.

**Remarks:**

- 

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Webpage information

Generic

|                        |
|------------------------|
| Webpage<br>information |
|------------------------|

◀◀ Previous element

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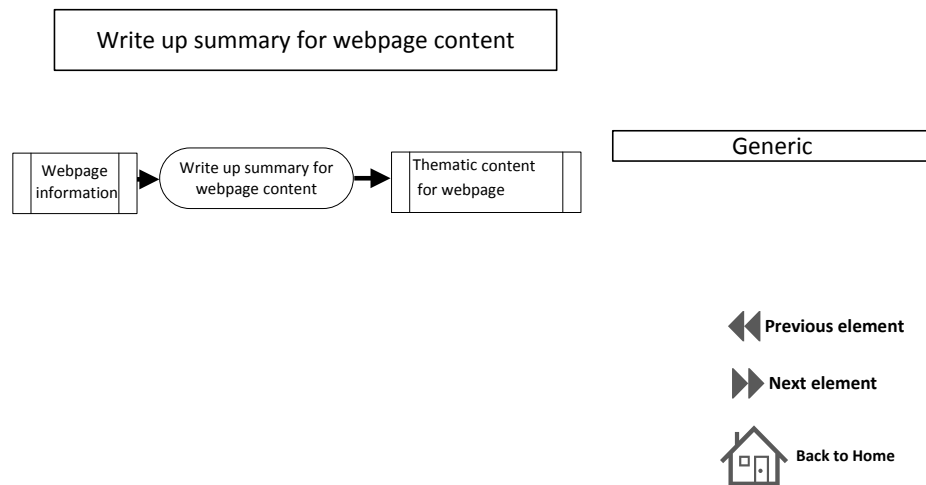
**Description:**

- The webpage information is skimmed through, noting the main points covered.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

**Process goal:**

- To create summary for the webpage.

**Applicable methods:**

- None

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

**Remarks:**

This process focusses on summarising the content body of the webpage or concluding the webpage with Call to Action or relevant message.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Thematic content for webpage

Generic

Thematic content  
for webpage

◀◀ Previous element

▶▶ Next element

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**Description:**

- As a result, thematic content is prepared for the webpage.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Webpage content

Webpage  
content

Generic

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

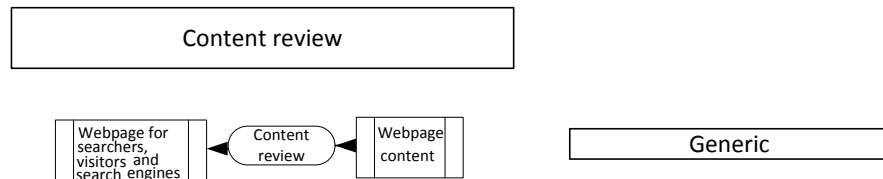
**Description:**

- After following the steps in the mentioned methods, consequently webpage content is created.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Previous element

Next element

Back to Home

**Process goal:**

- To review the content of the webpage.

**Applicable methods:**

- None

**Agents / Resources:**

- Content writer
- Domain specialist equipped with on-topic knowledge to pass relevant information to content writer

**Tools:**

- Related websites competing in the same domain
- Possibly dictionary, thesaurus, and other thematic keywords

**Remarks:**

This process focusses on reviewing the content relevance and quality.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Webpage for searchers, visitors and search engines

Webpage for searchers, visitors and search engines

Generic

◀◀ Previous element

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🏠 Back to Home

**Description:**

- After reviewing and proof reading a webpage is created for the searchers, website visitors and search engines.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

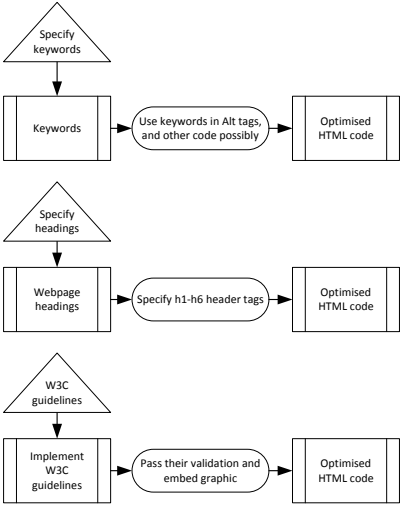
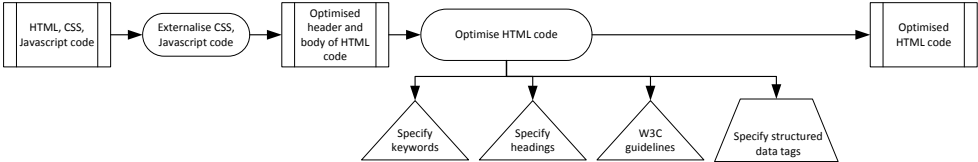
Produced by using INRECA Methodology



## HTML method

This process model explains the optimisation of HTML code of a website.

# HTML method



guidelines

HTML, CSS, Javascript code

Generic

HTML, CSS,  
Javascript  
code

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

- HTML, CSS and Javascript code of the webpage is considered .

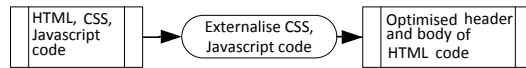
**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Externalise CSS, Javascript code

Generic



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🏠 Back to Home

**Process goal:**

- Optimise source code

**Applicable methods:**

- None

**Agents:**

- SEO engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- The CSS and Javascript code is externalised

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Produced by using INRECA Methodology

Optimised header and body of HTML code

Optimised header  
and body of  
HTML code

Generic

◀◀ Previous element

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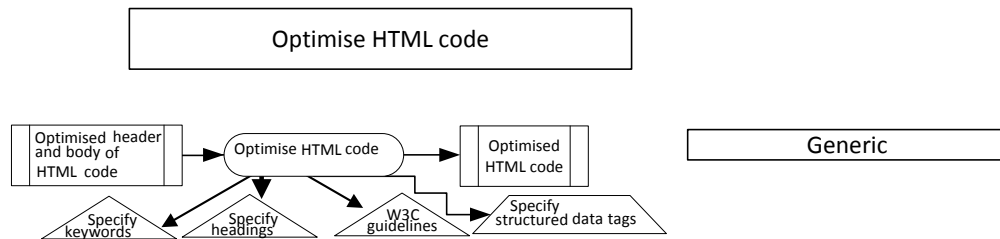
**Description:**

- As a result of the process explained in previous page, the header and body of HTML code is optimised.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



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**Process goal:**

- HTML code optimisation

**Applicable methods:**

- Specify keywords
- Specify headings
- W3C guidelines
- Specifying structured data tags

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

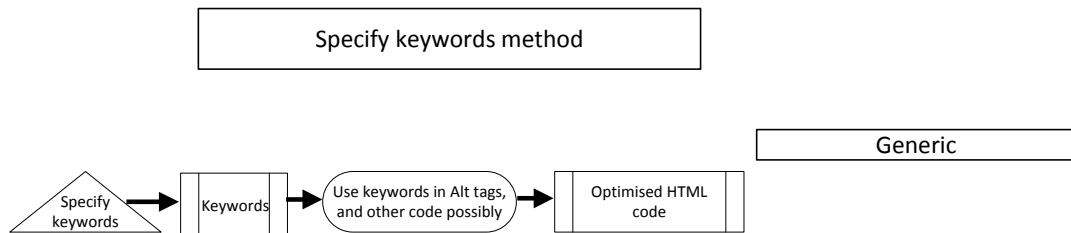
**Remarks:**

- The specified methods are executed to optimise the HTML code.
- Additionally, structured data tags are specified.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



[◀◀ Previous element](#)[▶▶ Next element](#)[🏠 Back to Home](#)**Method goal:**

- Specify keywords in HTML code

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- The keywords are specified in the HTML code.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Keywords

|          |
|----------|
| Keywords |
|----------|

Generic

◀◀ Previous element

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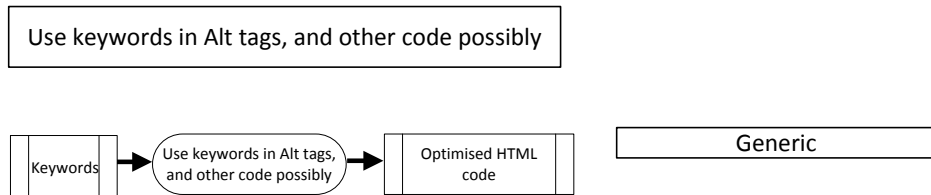
**Description:**

- The shortlisted keywords are considered.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

[◀◀ Previous element](#)[▶▶ Next element](#)[🏠 Back to Home](#)**Process goal:**

- Specifying keywords in HTML code

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- The keywords are specified in the Alt tags, file names, directory names etc.

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Optimised HTML code

Optimised HTML  
code

Generic

◀◀ Previous element

▶▶ Next element

 Back to Home

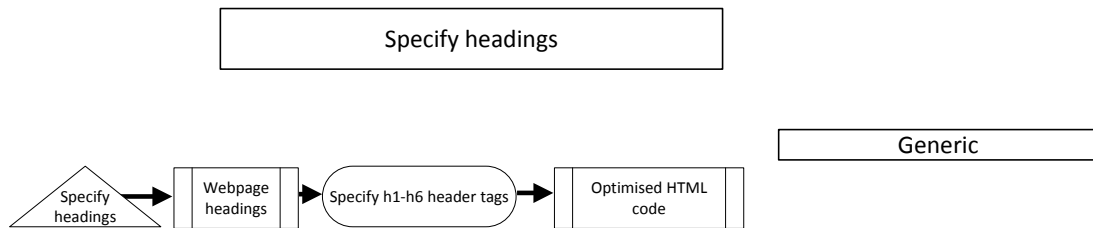
**Description:**

- As a result of the process explained in the previous page, the HTML code is optimised

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



Previous element

Next element

Back to Home

**Method goal:**

- Specify headings ranging from h1 to h6 in the webpage

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- Main heading and other section headings are specified in the content of the webpage

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Webpage headings

Webpage  
headings

Generic

◀◀ Previous element

▶▶ Next element

 Back to Home

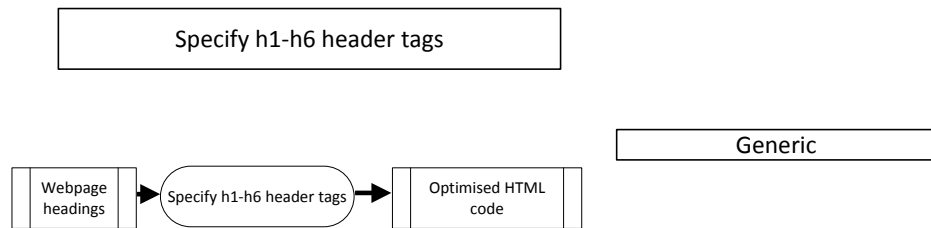
**Description:**

- Depending on the content of the webpage, main and section headings are specified.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



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▶▶ Next element

🏠 Back to Home

**Process goal:**

- Specifying header tags where applicable

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- Header tags ranging from h1 to h6 are specified in the content of the webpage
- 

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

Optimised HTML code

Optimised HTML  
code

Generic

◀◀ Previous element

▶▶ Next element

🏠 Back to Home

**Description:**

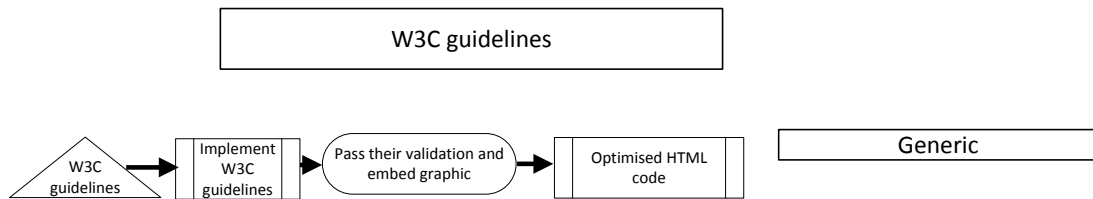

- As a result of the process explained in the previous page, the HTML code is optimised

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



 Previous element Next element Back to Home**Method goal:**

- Following W3C guidelines

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- W3C guidelines are followed so as to optimise the code as per W3C standards

Version 0.1 as on 02.01.16 by VA


Produced by using INRECA Methodology

Implement W3C guidelines

Implement  
W3C  
guidelines

Generic

 Previous element

 Next element

 Back to Home

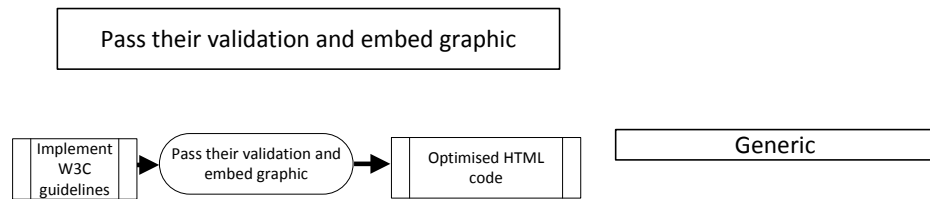
**Description:**

- Implementing W3C guidelines.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology



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**Process goal:**

- Pass the W3C validation test

**Applicable methods:**

- None

**Agents:**

- SEO Engineer
- Web developer

**Tools:**

- Website

**Remarks:**

- W3C friendly HTML code is written so as to pass their validation test and consequently embed their validation graphic in the webpage
- 


Version 0.1 as on 02.01.16 by VA


Produced by using INRECA Methodology

Optimised HTML code

Optimised HTML  
code

Generic

 Previous element

 Next element

 Back to Home

**Description:**

- As a result of the process explained in the previous page, the HTML code is optimised

**Remarks:**

Version 0.1 as on 02.01.16 by VA


Produced by using INRECA Methodology

Optimised HTML code

Optimised HTML  
code

Generic

 Previous element

 Next element

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**Description:**

- As a result of implementing all the different methods the HTML code of the webpage is optimised.

**Remarks:**

Version 0.1 as on 02.01.16 by VA

Produced by using INRECA Methodology

## **Appendix C**

### **SEO experience base - Specific project level**

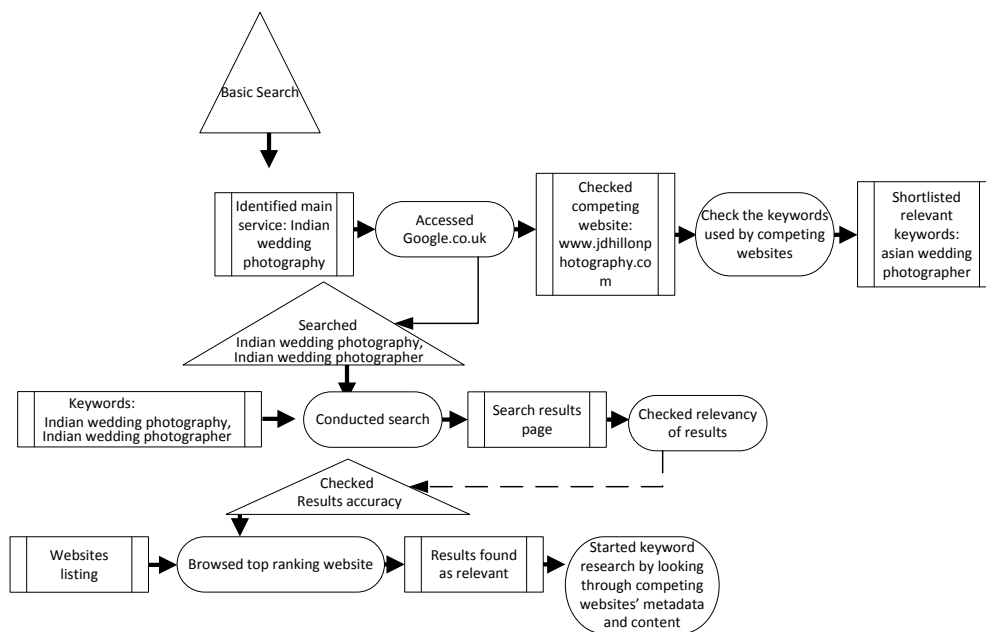
Explanation of  
**Keyword research  
processes**  
implemented at project  
level

Keyword research processes  
implemented for  
[SaiDigital.co.uk Project](http://SaiDigital.co.uk)



## SaiDigital.co.uk Project: Basic keyword research method

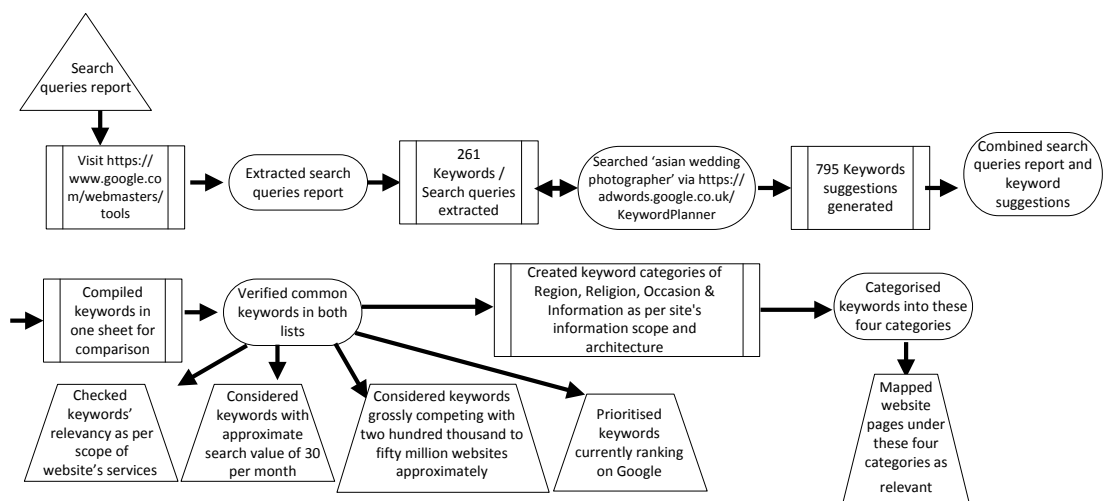
This process model explains the basic process used for researching keywords for this website



## SaiDigital.co.uk Project:

### Search queries report method

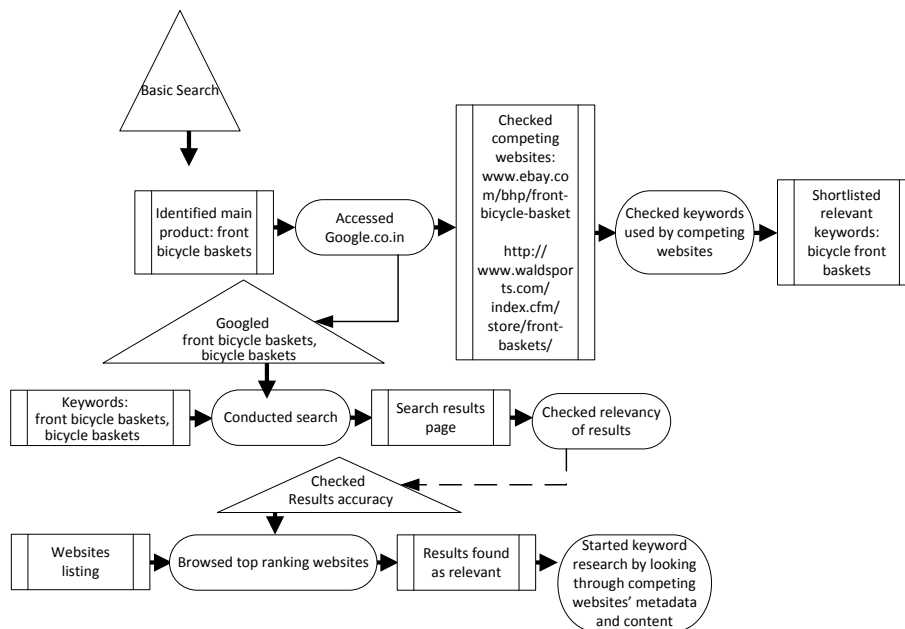
This process model explains researching keywords for this website using search queries report provided by Google Webmaster Tools.



## Searoseexim.com Project:

### Basic keyword research method

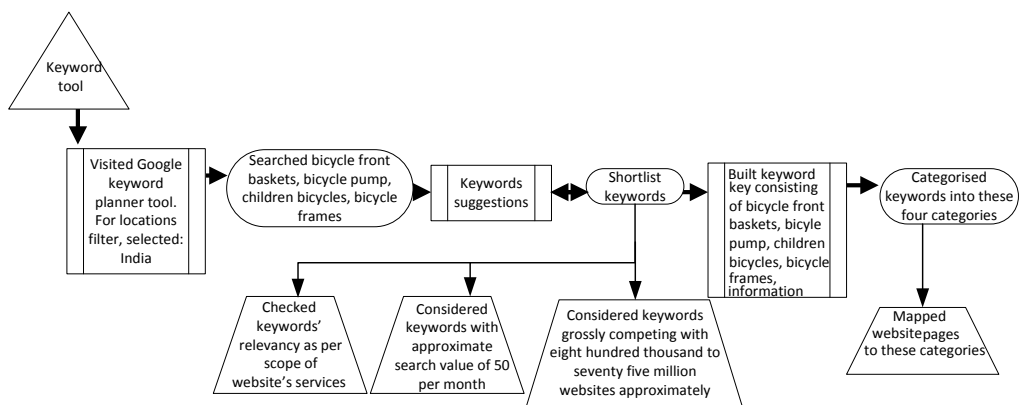
This process model explains the basic process used for researching keywords for this website



# Searosexim.com Project:

## Keyword planner tool method

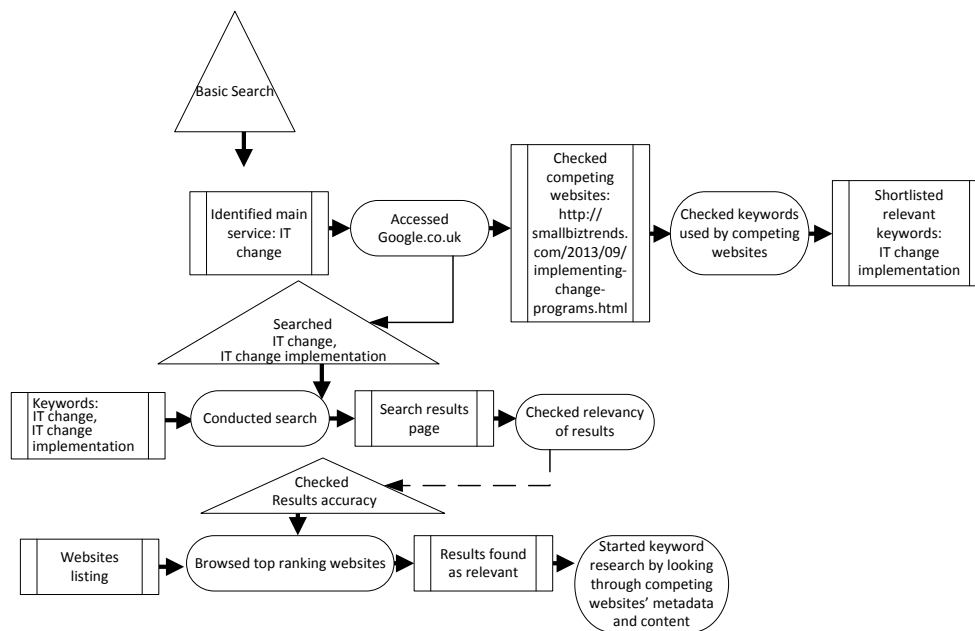
This process model explains researching keywords for this website using Google keyword tool.



## Changology.co.uk Project:

### Basic keyword research method

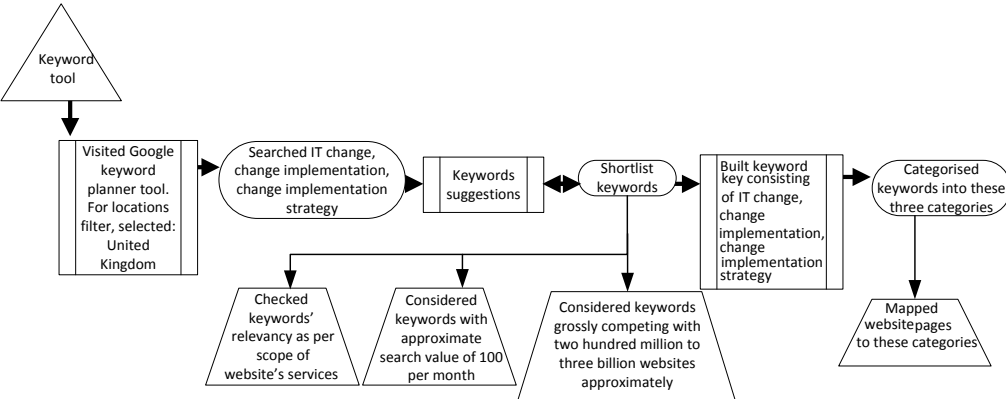
This process model explains the basic process used for researching keywords for this website



# Changology.co.uk Project:

## Keyword planner tool method

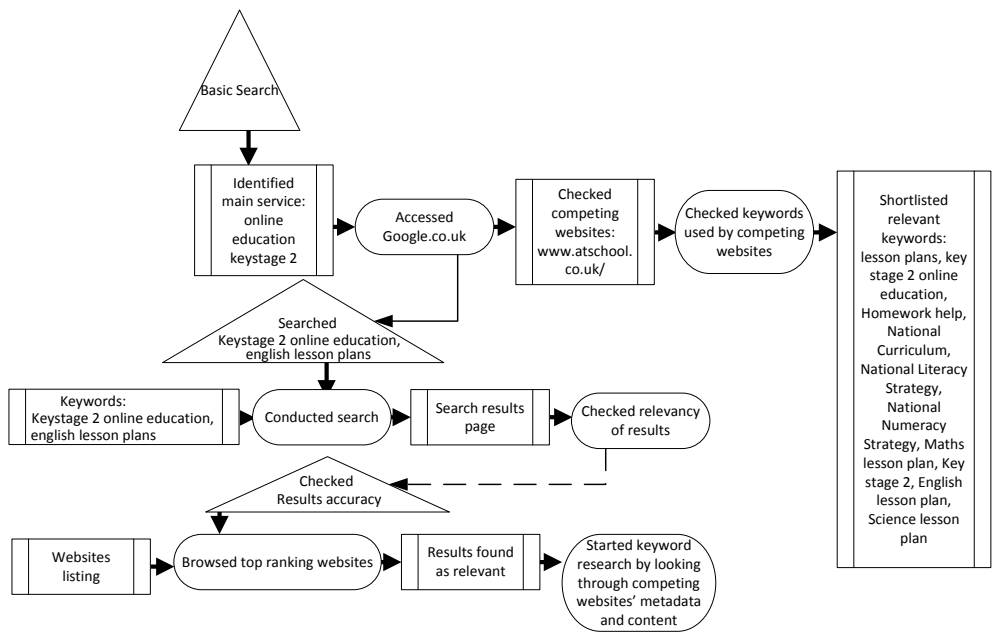
This process model explains researching keywords for this website using Google keyword tool.



# Juniors.net Project:

## Basic keyword research method

This process model explains the basic process used for researching keywords for this website



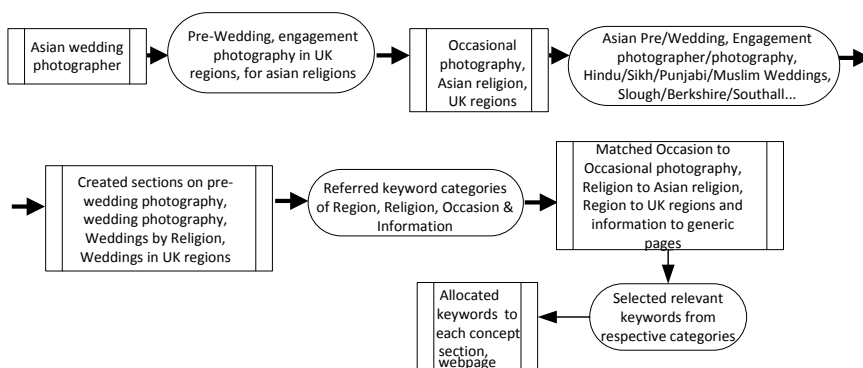
Explanation  
of **Information**  
**architecture** processes  
implemented at  
project level



## SaiDigital.co.uk Project:

### Information architecture method

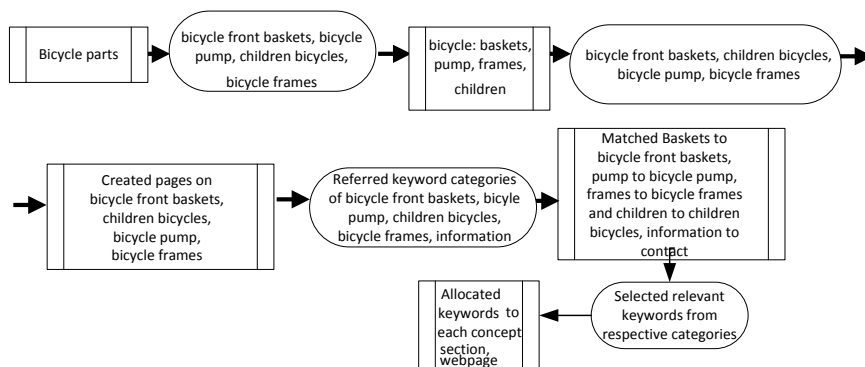
This process model explains creating the information architecture for this website.



# Searosexim.com Project:

## Information architecture method

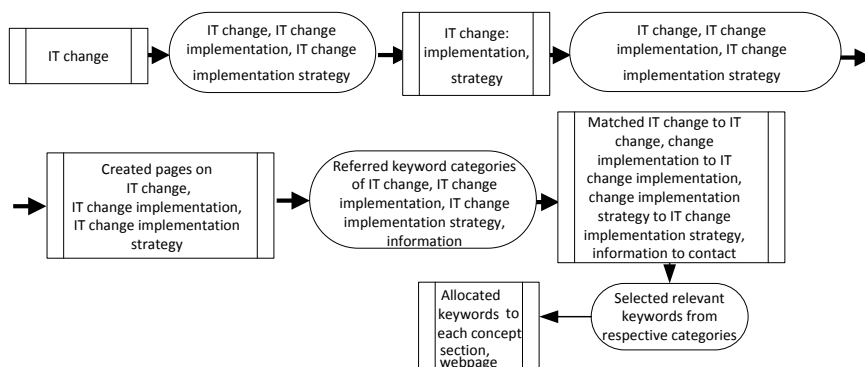
This process model explains creating the information architecture for this website.



## Changology.co.uk Project:

### Information architecture method

This process model explains creating the information architecture for this website.

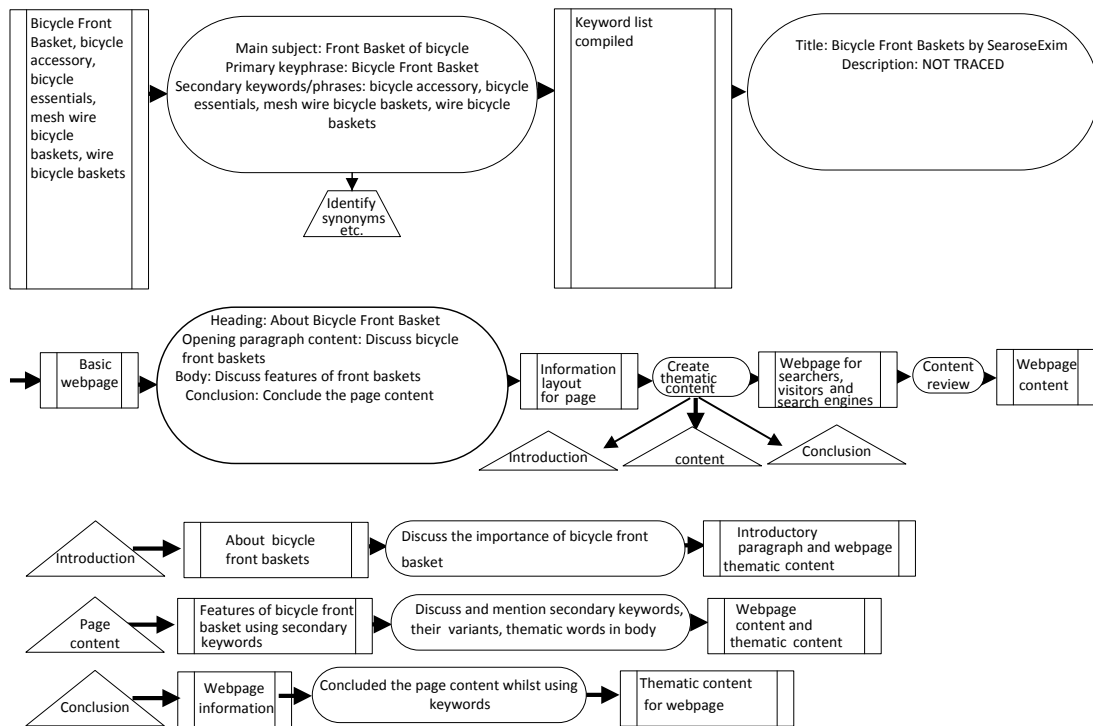


Explanation of **Content  
creation processes**  
implemented at  
project level

# Searoseexim.com Project:

## Content creation method

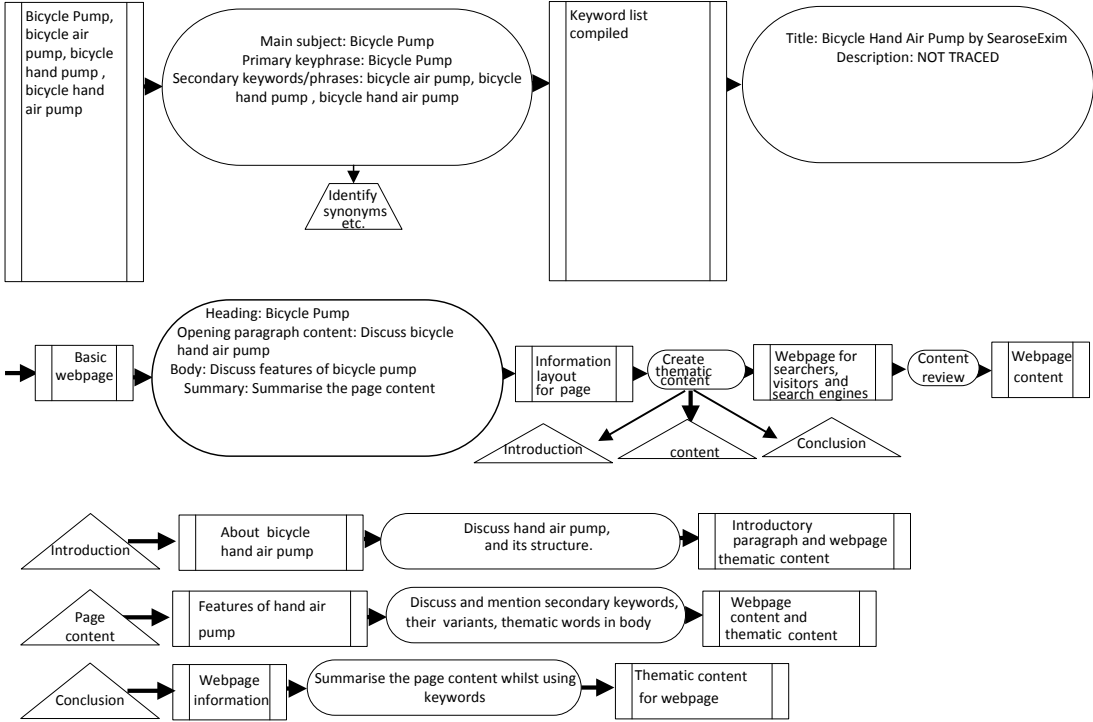
This process model explains creating content for one of the pages of this website.



# Searoseexim.com Project:

## Content creation method

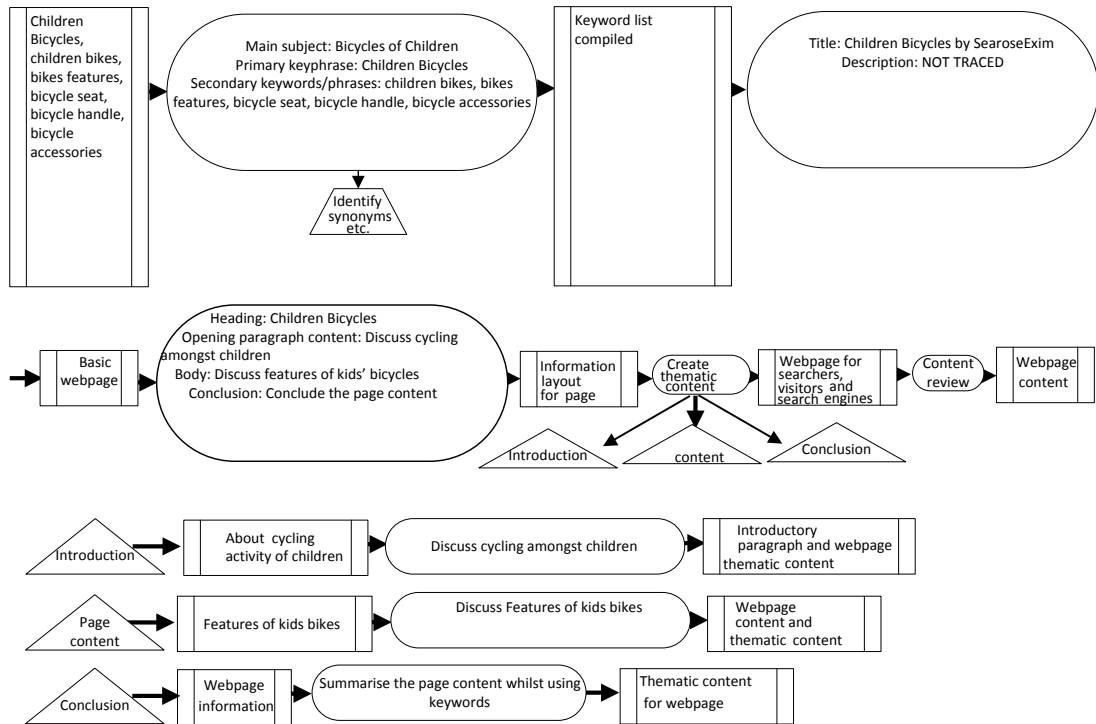
This process model explains creating content for one of the pages of this website.



# Searoseexim.com Project:

## Content creation method

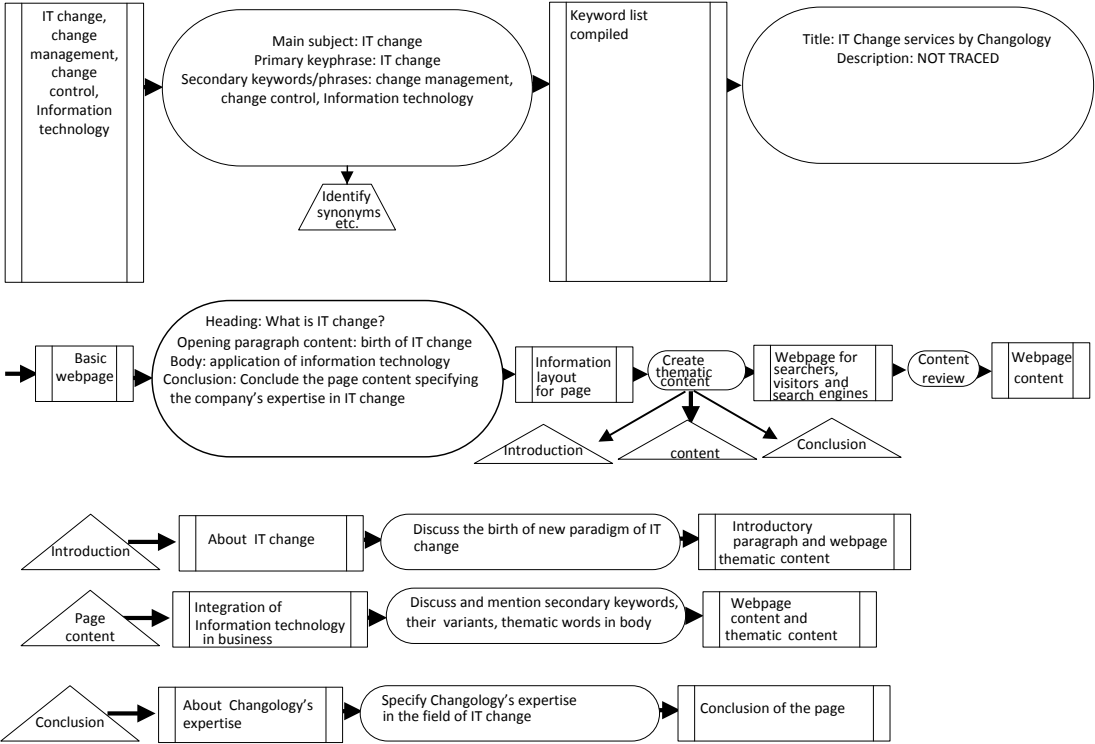
This process model explains creating content for one of the pages of this website.



# Changology.co.uk Project:

## Content creation method

This process model explains creating content for one of the pages of this website.

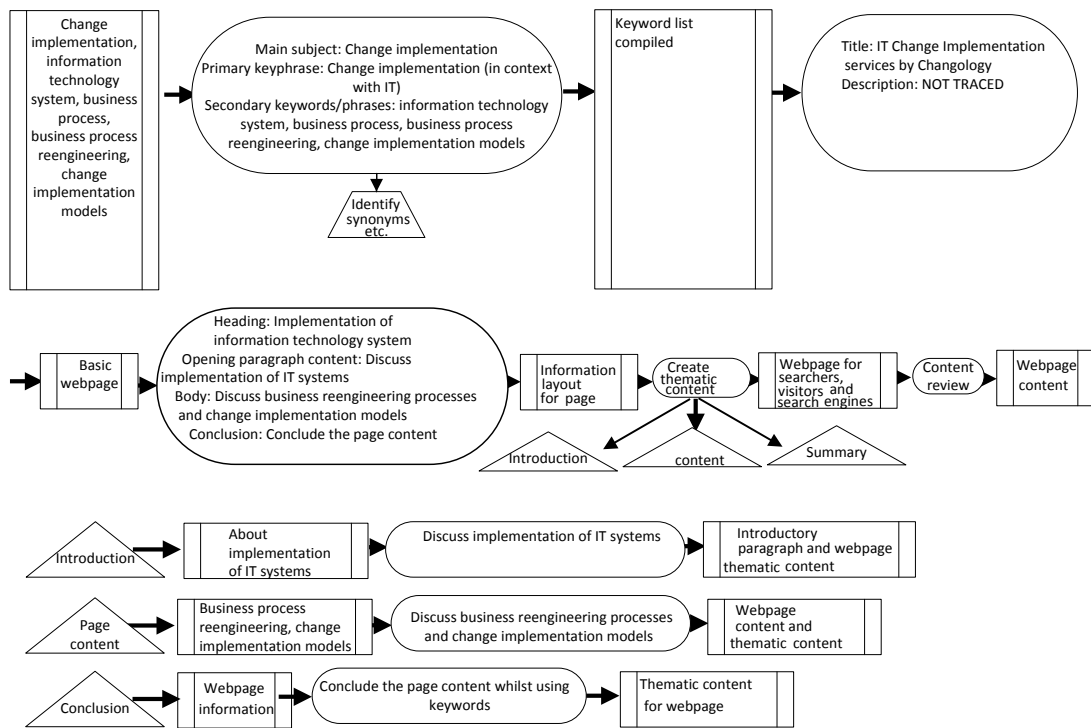




# Changology.co.uk Project:

## Content creation method

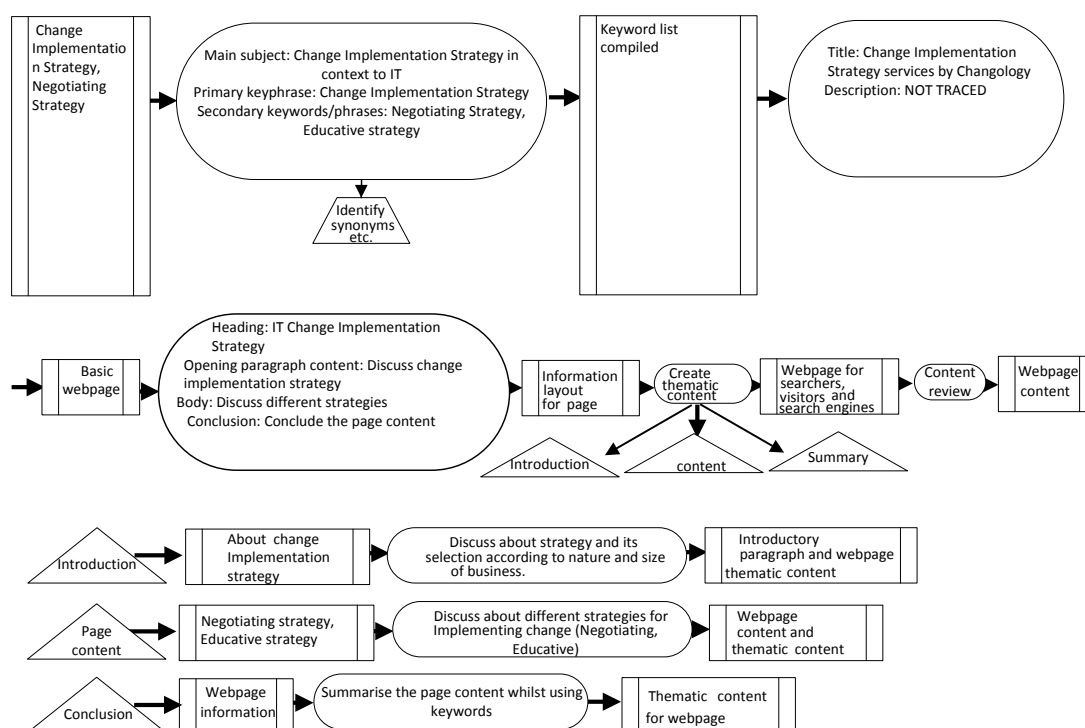
This process model explains creating content for one of the pages of this website.



# Changology.co.uk Project:

## Content creation method

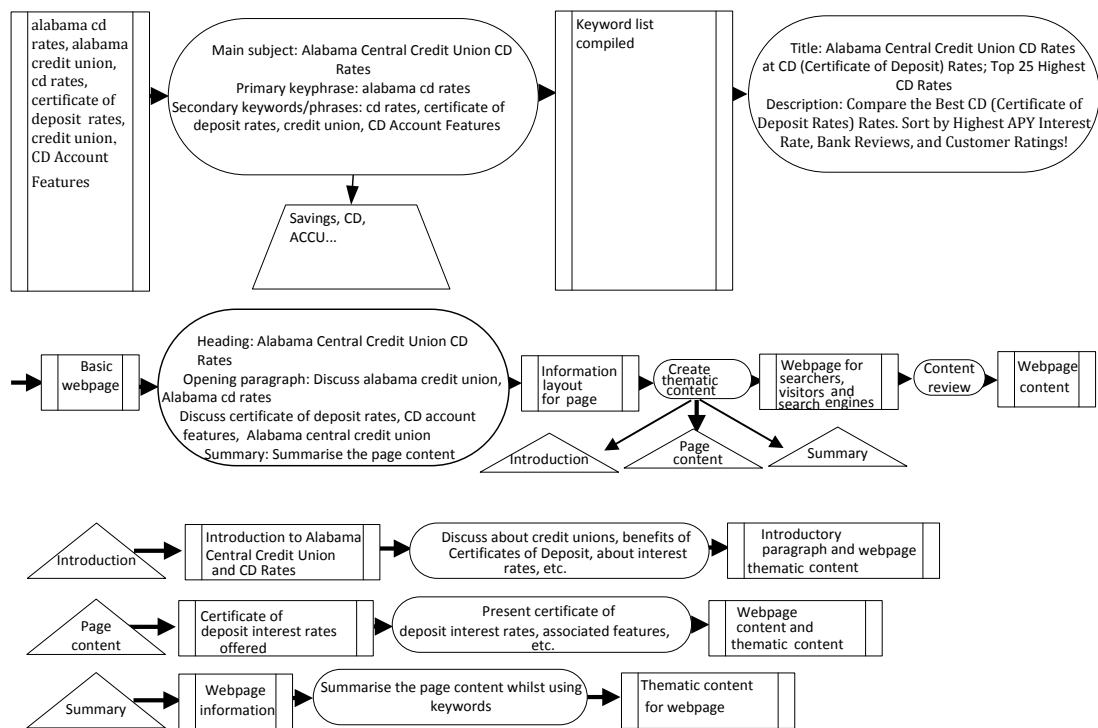
This process model explains creating content for one of the pages of this website.



# Bankaholic.com Project:

## Content creation method

This process model explains creating content for one of the pages of this website.

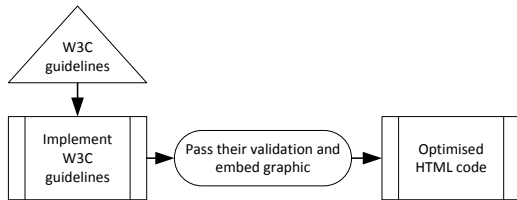
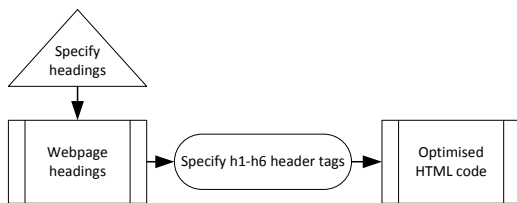
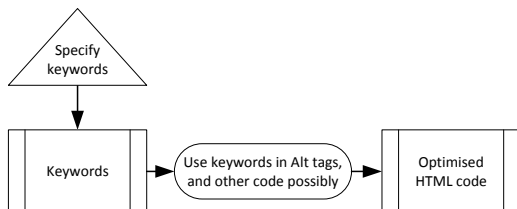
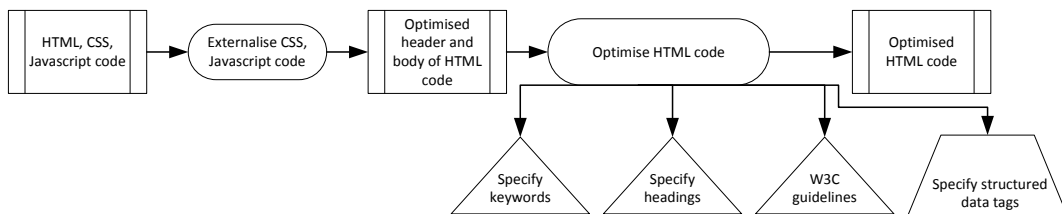


Explanation of **HTML**  
processes  
implemented at  
project level

# Searosexim.com and Changology.co.uk Project(s):

## HTML method

This process model explains the optimisation of HTML code of this website.



## **Appendix D**

### **Published Paper 1: Towards Experience Management for Search Engine Optimisation**

## Towards Experience Management for Search Engine Optimisation

Vani Aul and Thomas Roth-Berghofer

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**Abstract.** Websites of Small and Medium-sized Enterprises (SMEs) can gain an added advantage by getting listed in the search engine's results page during the search sessions of the searchers. The Search Engine Optimisation (SEO) enables websites to become visible in search engines during search sessions for its featured products or services. It generates additional revenue for the websites. SEO is a complex technique. Its knowledge and experience gained from optimising websites in the past is highly valuable and applicable to optimise websites. This paper discusses the problem of optimisation of websites based on the experience gained by the authors from optimisation of several case study websites. Process models have been generated in order to capture experience of implementing essential elements of SEO and to explain the procedure of implementation of the fundamental on-page SEO techniques that yielded results for the case study websites.

**Keywords:** SEO, experience management, keyword research

### 1 Introduction

SEO experience management involves sharing of knowledge and experience of effective techniques by SEO engineers with others tasked with search engine optimisation of their websites. Experience management [3] mainly involves the transfer of knowledge and experience by a more experienced SEO engineer with less experienced SEO engineers. This research has attempted to build SEO recipes, providing experience and knowledge for implementing essential elements of on-page SEO (as described later). The SEO experience module has been created based on the future work recommendation of the INRECA methodology [4], which has been adapted to become suitable for the dynamic characteristics of such a domain as SEO.

Search engine algorithms constantly evolve. There is a constant increase in growth of competing websites due to which a website's visibility and ranking varies constantly [11]. This makes it difficult to understand SEO and implement its techniques. Moreover SEO is not just a set of techniques implementing which would lead to desired results, but it is a process that starts and continues with a phased implementation of its techniques. It doesn't have an end, and is a continuous process. Given all these factors make the whole situation volatile.

In such an unstable and unpredictable scenario there is an unsolved problem for website owners to plan and optimise their websites. Which techniques are more likely to provide long term results [9]? How can SEO process be designed and individual techniques be implemented, monitored and maintained [11]? The answer is, with the help of the past SEO experience.

This research identifies and explains implementation details of individual SEO techniques that are likely to provide long-term results and crafted SEO as a process to be implemented in phases. SEO is the technique to optimise websites for search engines so as to increase their visibility in search engine results. It allows the websites to become indexable and findable by search engine robots [7]. Further it optimises the site to meet the recommended criteria for all search engines and increases the likelihood of individual sites becoming visible and ranking higher in comparison to their competitors. When a search request is made (via search engines) for the product or service offered by the site, all other things being equal, the sites, which feature on the first search results page attract customers and are beneficial to the vendor. Another direct benefit of being listed high up in search engines' results is the increased brand awareness for the featured companies. Traditionally companies used print, television and other media to increase brand awareness and promote sales. In the present information age, the search engines offer great power to capture clients' attention and promote sales<sup>1</sup>.

A series of steps are followed in the implementation of different phases of SEO. In this research we focus on the implementation of basic on-page SEO so as to lay the foundation to make a website visible in the search engine's results page. We focus on Google as it the most popular and widely used search engine<sup>2</sup>. The phases for implementing on-page SEO are explained below.

*The process: Phase I* Appropriate keywords describing the business's product or service and are being used by searchers are defined, searched, analysed and selected. Depending on the keyword-concept hierarchy (as applicable to the website), an information architecture is planned for the website. It directly influences the navigational structure of the website. The information architecture generally follows a top-down approach, with the main concept at the top navigation followed by sub-concepts. Further, the content is written based on these concepts. For instance, if a website is selling books then the main concept can be of books, which in turn can be further divided into sub categories of subjects like languages, technology, law, etc. In order to be recognised as valuable content, it needs topic-modelling and build a theme on the topic or sub-topic it is about. The content should complement to its neighbouring content, i.e. other content pages in the same section. Additionally the synonyms, or complementary words need to be utilised where appropriate. The analysis of competition is very important and can be carried out in the beginning or at any stage of SEO

<sup>1</sup> <http://www.marketingweekly.com/seo-sem/the-emergence-of-a-new-branding-platform-seo>

<sup>2</sup> <http://www.ebizmba.com/articles/search-engines>



implementation. It provides evidence of the keywords targeted by competing websites, topics or products covered, general layout and functionality of those websites, their establishment in the specified niche, and a rough observation of the SEO strategy adopted.

*The process: Phase II* Shortlisted keywords are implemented. In this phase the chosen keywords are allocated to the respective pages and implemented on those pages by including them and their variants in URLs, HTML code, alt tags, headers, actual content, linking text to internal pages, etc. The information architecture is drawn based on the chosen keyword concept hierarchy. Further content is added retrospectively. Moreover competitors' websites are also studied and a strategy is devised to gradually overcome/overpower/outrun the competition.

*The process: Phase III* This is the post-implementation stage during which the actual SEO implementation is reviewed to check if it is executed properly and attained desired results. The results expected from the implementation are monitored over a regular period of time. This can be done manually or by using automated tools. An effort is made to maintain the achieved results. In case the expected results are not achieved then the implementation details are analysed to identify the gaps. Subsequently the implementation plan is revised and re-implemented. This human intervention is a critical stage in the optimisation process. SEO implementation should follow a sequential order for a new or an existing un-optimised website. In a real time scenario every website has different needs and requirements at different stages of SEO implementation. Therefore these steps can be analysed, implemented randomly, extended or customised to suit the needs of a respective website.

The rest of the paper is organised as follows: Section 2 describes motivation for this research work. Section 3 presents related work. Section 4 identifies case studies, describes the work undertaken and results achieved. Section 5 shows the SEO process models as built to share the SEO experience. Section 6 concludes the paper with our observations about SEO field.

## 2 Motivation: Knowledge Involved in SEO

The main motivation behind this work is to share the critical SEO experience which is gained from the application of SEO knowledge. On observing SEO, we can see that different kinds of knowledge play an important role, namely:

- Knowledge about on-page SEO elements: an understanding of important elements (keywords, content writing, etc.). Further the actual implementation of these elements is a knowledge intensive activity.
- Knowledge about search engines: an insight into the ranking algorithms of search engines to identify how SEO elements are inferred and to differentiate between the ethical and un-ethical practices as allowed by the search engines. This knowledge is critical to obtain results from any SEO campaign.

- Strategic knowledge: involving the conception and formulation of SEO strategy along with its phased implementation and customisation at a later stage to align with the actual results achieved and other requirements (if any).

Typically it is only the experienced SEO engineers who actually possess this knowledge about SEO elements. This knowledge is relevant to the promotion of websites on search engines. Not surprisingly, (given the specialist nature of this knowledge) the owners of SME websites are not even aware of the concept or technique of SEO and its potential in yielding positive results for their business(es). We term website owners' ignorance of SEO knowledge as *SEO knowledge gap*. However this gap can be bridged by making SME owners aware of the SEO technique to be implemented on their respective website(s). The SEO knowledge gap exists due to the complex nature of SEO as it is highly dynamic and ever evolving technique. Moreover as the search engines' ranking algorithms define the rules to implement SEO, this makes its interpretation and implementation even more difficult without a specialised knowledge of this technique.

SEO is a technique that has emerged from the functionality of the search engine ranking algorithms (elements rated positively by algorithms are favourable for SEO implementation) but it is not directly or easily inferable. It is obscure in nature and difficult for businesses to implement. The search engines and SEO exist independently of the website, where the SME owners have to make additional efforts to interpret and incorporate SEO elements to become visible on search engines for their targeted keywords. It is not a mandatory step for bringing a website into existence like registering a domain name to host a website, therefore its implementation can be completely ignored by the website owners.

The biggest problem arising from the lack of SEO implementation is the missed opportunity for SME websites. If a website is not visible on search engines for its products/services during the search session of the web searchers or prospective customers, then it loses the selling opportunity. To most of the SME website owners, SEO is a complex problem. The primary cause of this problem is the dynamic nature of SEO and the existence of tough competition in almost every industry niche. Historically, techniques like keyword stuffing (repetitive use of keywords), link spamming (procuring website links from any and every website, irrespective of its quality and niche) worked very well in order to feed the search engine spiders with information about one's site so as to rank well on the chosen keywords. But these techniques were not fool-proof and misled the search engine spiders in evaluating the websites erroneously and thus compromising the quality of search results. In the beginning the search engines focussed on a very few parameters to evaluate a site. But the rules of the game are changing constantly with the evolution and improvement in the search engines' algorithms. Major search engines like Google and Bing are becoming user centric by keeping their results relevant and improving user friendliness and fulfilment of users' information needs. Personalisation and localisation of search results, whilst including a mix of content from different media like news, web pages, maps, knowledge graph etc., has given a new set of rules to play the SEO game. SEO rules have evolved constantly overtime. This makes its interpretation very difficult and al-

most impossible for the novices that lead to the failure and shut down of many ecommerce websites. Although the SEO guidance material is available on the web, the guidelines to interpret, assess and implement it are lacking. Hence the inexperienced SME website owners get easily lost. This leads to the realisation for a need for straightforward and easy to understand sharing and management of SEO experience.<sup>3</sup>

### 3 Related Work

Pellucid is a framework to use past experience for aiding the workers in public organisations in performing their respective jobs [8]. An intelligent assistant was built that is activated within the work environment or workstation of a worker. The basic aim behind building this framework is to support and enhance performance of employees by providing them the knowledge or active hints in context to the activity they are performing at the time they are actually performing that activity. Pellucid supports context based information retrieval. *The triggering of active hints on the basis of users' workflow influenced the possible future direction of the current research which would result in building a desktop application and triggering SEO hints based on the users' activity and workflow.*

Literature on SEO just mentions SEO techniques without giving the context and details for its implementation. For non-technical SME website owners it is very difficult to apprehend and implement SEO for their websites. Various researchers have emphasised the important elements of SEO.

On-page and off-page SEO optimisation techniques are addressed in [10] while distinguishing between white hat (recommended by search engines) and black hat (abhorred by search engines) techniques. It specifies the usage of keywords in Title tag, URL, meta tag, anchor text and achieving a keyword density of up to 8 percent, etc. Further it mentions the variants of the technique of link building (link popularity, incoming-outgoing links, etc.).

Similar techniques of SEO i.e. keywords, link building, etc. are emphasised on in [6]. The authors also make a distinction between white hat and black hat practices. Further they notify the evolving SEO practices as a side effect of algorithm updates of major search engine (Google in this case).

A study was undertaken in [5] titled: 'Search engine strategies: A model to improve website visibility for SMME websites' in which the author studied the use of SEO on-page factors in the top 144 ranking websites. He devised a SEO model consisting of on-page techniques (inclusion of meta tags, prominent link popularity, etc.) to be implemented for optimising a website. Other researchers have also undertaken research in the SEO field with similar results and recommendations.

The INRECA methodology supports the development process of Case Based Reasoning (CBR) applications [3]. It consists of a collection of CBR development experience (experience packets), represented as software process models, which

<sup>3</sup> <http://searchengineland.com/evolution-seo-trends-25-years-223424>

are stored in an experience base of an experience factory [1]. An experience packet consists of software process models or parts of it such as processes, products, or methods. The experience base is organised at three levels of abstraction namely generic level, cookbook level and specific level [2].

- Experience stored at the Common Generic Level: consists of the processes, products and methods defined at a very high level.
- Experience stored at cookbook level: stores the processes, products and methods covering recipes pertaining to a specific class of CBR application(s) e.g. product catalogue
- Experience stored at specific project level: this level contains experience relevant to a particular project that has already been executed.

Research reported here has composed process models at the cookbook level to record essential elements of on-page SEO namely keyword research, content writing, HTML code and website information architecture.

#### 4 Case Studies

We share our experience on the basis of individual case studies for which SEO was implemented in the past and positive long-term results were achieved:

- Juniors.net<sup>4</sup>: an online education site for primary school (grades 3-6, keystage 2 students) in UK.
- Bankaholic.com<sup>5</sup>: a US based financial portal providing information on interest rates, credit card reviews, insurance quotes, and personal finance tips.
- Searose Exim<sup>6</sup>: a bicycle basket manufacturer, selling PVC coated front bicycle baskets in India.
- Changology<sup>7</sup>: an independent consultant providing IT change management services for integrating information technology into businesses.
- Sai Digital<sup>8</sup>: an independent Asian wedding photographer providing photography services for Indian Asian weddings held in UK.

For the above-mentioned case studies we mainly implemented the essential elements of on-page SEO. The SEO techniques that were implemented include keywords, information architecture, content writing, and optimisation of HTML code. Keywords refer to the words that searchers use to conduct their search on search engines [12]. Therefore it is very important for webmasters to include those specific keywords in the webpage's content having high likelihood to be searched by the searchers and are also relevant to their specific product or service. Site Information Architecture (IA) involves the science and art of organising

<sup>4</sup> <http://juniors.net> [Last access: 03/2006] [Operational 2000 - 2009]

<sup>5</sup> <http://cdrates.bankaholic.com> [Last access: 06/2008] [Operational 2006-present]

<sup>6</sup> <http://www.searoseexim.com> [Last accessed 08/2012] [Operational 2011 - 2012]

<sup>7</sup> <http://www.changology.co.uk> [Last accessed 07/2012] [Operational 2011 - 2012]

<sup>8</sup> <http://saidigital.co.uk> [Last accessed 06/2015] [Operational 2009 - present]

website's information in a structured format that is easy to understand, navigate and act upon. It must address the user's or website visitor's information needs as well as business goals. The IA must follow a logical and intuitive structure so as to address the Why's and How's of the presented information<sup>9</sup> Content writing refers to the process of creating content for conveying the information on products or services as provided by the website. It should be written by using the terminology or words and phrases as used by the intended audience. Additionally a focus should be laid on using the keywords allocated to the webpage. Optimisation of HTML code refers to externalising the code, which can be referred to via external files e.g. CSS, Javascript, etc. Further it involves inclusion of keywords in file names, alt tags, usage of structured data etc.

We implemented some or all essential SEO elements on case study websites and got promising results in terms of improving their visibility on the main search engine i.e. Google. For two case study websites i.e. Changology and Searoseexim we built their web presence from scratch by creating websites for those SMEs and optimising them to build their visibility on Google. For these two websites all the listed essential SEO Elements were implemented i.e. Keyword research, information architecture, content writing and optimised HTML. As a result we were able to gain visibility to these website in Google for their brand name.

*Bankaholic* content was created for the blog of this website. Since the main target key phrases for this website revolved around Certificates of Deposit (CD) rates for credit unions in USA, therefore a content outline or blue print was drawn out following which the content was written informing on the CD rates offered by the credit unions in different states of USA. In the content frame: firstly the credit union was introduced, followed by the interest rates offered with special features with some important information (if any) and a summary was written in the concluding paragraph. As a result we were able to gain visibility for every written article in Google for key phrases like: CD rates offered by *New Jersey Credit Union*. Since other sections of the website were already highly optimised and visible on Google, gaining high ranking for blog articles did not require a lot of effort.

*Juniors.net* Keyword research was conducted and meta tags were created and implemented for this website. This website was already existing before optimisation was undertaken. Additionally, some off page techniques like link building were conducted for this site. As a result high visibility was gained for this website on Google for its related keywords and key phrases.

*Sai Digital* Similar to Juniors.net, keyword research was conducted and meta tags were created and implemented for this website. This website was already existing but did not rank very well for its related keywords as it was lacking optimisation. As a result of optimising this website, it gained higher rankings

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<sup>9</sup> <http://conversionxl.com/website-information-architecture-optimal-user-experience>

for its targeted keywords. Due to these search engine rankings there was a 50 percent increase in the number of leads generated from the website. This SME owner provided Wedding photography services and was able to win more clients from these rankings.

## 5 Capturing SEO Experience

In order to facilitate reuse of SEO experience on the basis of INRECA-II methodology, an SEO experience module was created. Common elements were observed from SEO implementation on case study websites. Experience was formalised and represented via process models.

Software process models represent the interaction between processes, products and methods required to create the desired output [3]. An input is processed to produce output, supported by methods (simple or complex). In this research, process models have been created for the essential elements of SEO.

The keyword research model is supported by three different methods namely, Basic search method (Figure 1), Keyword tool method (Figure 2) and Search queries report method (Figure 3).

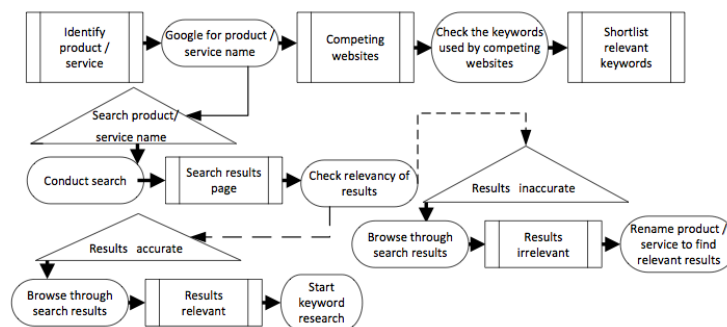


Fig. 1. Basic search method

The basic search method (Figure 1) involves identifying the specific product or service, googling (searching it in Google) for it. The process of searching in Google involves conducting a search and checking the relevance of search results to assure the identified or shortlisted keywords retrieve the intended results. If it doesn't then the keywords are rephrased until the intended results are displayed in the search results page. Once the desired results are displayed, the keywords deployed in the listed competing websites are checked to get the keyword ideas or actual keywords to be used.

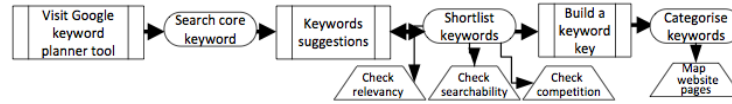


Fig. 2. Keyword tool method

The keyword tool method (Figure 2) involves using a keyword suggestion tool i.e. Google keyword planner in this instance. The basic keywords are searched using the keyword planner for getting keyword suggestions. The bi-directional arrow between Keyword Suggestions and Shortlisted Keywords indicates that the shortlisted keywords would modify the suggested keywords. The shortlisted keywords would be used to generate more keyword suggestions. In order to shortlist the keywords the relevancy of the keywords are checked, as well as the searchability (to find if the shortlisted keywords are searched by the searchers) and the competition is checked as well to avoid keywords having huge competition. From the shortlisted keywords, a keyword key is created in order to categorise the shortlisted keywords which are further mapped to the website pages.

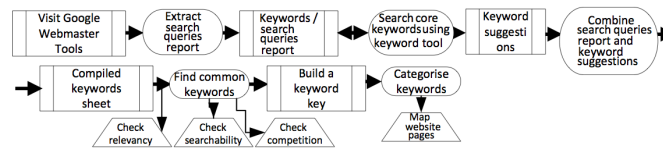


Fig. 3. Search queries report method

The search queries method (Figure 3) makes the assumption that the website is registered with Google webmaster tools. To begin with visit Google webmaster and extract the search queries report. As an output the keywords list is extracted that reveals the keywords which were searched by the searchers in Google for which the website was listed. The core keywords from search queries report are used to conduct further keyword research for the core keywords by using the keyword tool. The bi-directional arrow between the *Keywords/Search queries report* and *Conduct keyword search in keyword tool (using your core keyword)* indicates that the *Keywords / Search queries report* would be modified based on the suggested keywords. The final output of this process is keyword suggestions list, which is derived by extracting keywords suggestions as suggested by the keyword suggestion tool. As the next step, combine the keyword suggestions list with search queries report. From the compiled keywords sheet, find the common keywords. The common keywords indicate that the keywords exist in the search queries report as well as the suggested keywords (via the keyword tool). For the

common keywords list, check the relevance of the keywords i.e. keywords are related to the website, searchability of the keywords i.e. keywords are actually being used by the searchers, and the competition i.e. competition is not too high. Further build a keyword key, categorise the common shortlisted keywords according to the key. Finally allocate or map the keywords to the website pages.

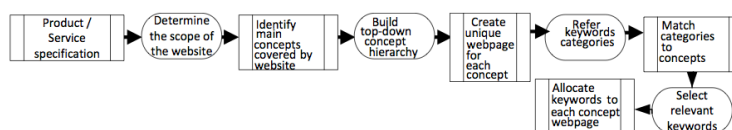


Fig. 4. Site information architecture model

The product or service specific information is used to determine the scope of the website (Figure 4). From the scope and information of the website, the main concepts and sub-concepts to be covered by the website are identified. A top-down concept hierarchy is built from the available information. A unique webpage is created for each concept and the sub-concept. The keywords key/categories are referred which were created during the keyword research process. Each of the concepts and sub-concepts are matched to the keyword categories. Relevant keywords are selected and allocated to the respective webpages.

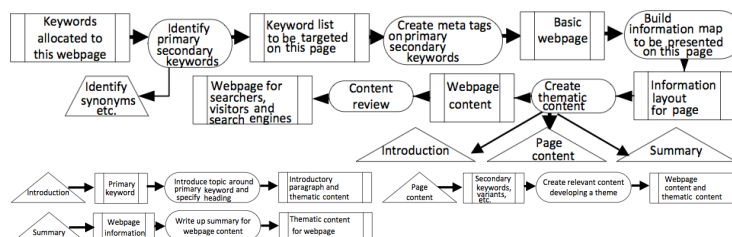


Fig. 5. Content writing model and content writing methods

The keywords allocated to the respective webpage are referred (Figure 5). The keywords are allocated while laying out the information architecture for the website. Depending on the information/concept to be presented on the page, the primary and secondary keywords are identified from the allocated keywords to this page. A keywords list is created consisting of the synonyms, topic related



words, and word variants of the primary and secondary keywords. An information map is created that has to be present on this page. Depending on the information map, content is created for this webpage. The introduction is created by including the information on the primary keyword and the following content of the page is created by using the secondary keywords, word variants etc. Subsequently a summary of the page is presented, in the concluding paragraph. The basic information is created by composing the meta tags for this page.

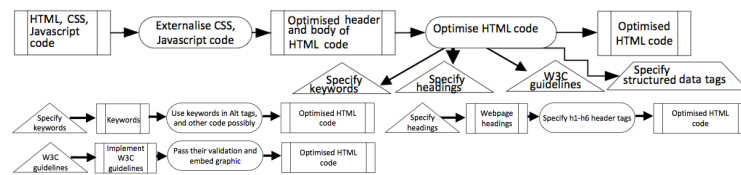


Fig. 6. Optimisation of HTML code model and methods

The webpages consisting of HTML, CSS and Javascript code need to externalise the CSS and Javascript code (Figure 6). Subsequently the HTML code is optimised by specifying keywords in Alt Tags, file names, etc. The headings are created for important sections of the page. Further, the W3C (World Wide Web Consortium) guidelines are implemented and validated. Their validation badge is published on the webpages.

## 6 Discussion and Outlook

The implementation of essential SEO elements has proven to be very helpful for laying the foundation to obtain higher visibility of websites on search engine's results pages. It must be noted that SEO needs to be implemented as a process of techniques [11] rather than just implementing individual techniques in isolation. Each element feeds information into the other element and is a part of the whole process. For implementing on-page SEO an in-depth keyword research is essential to shortlist the right keywords, followed by laying out the information architecture of the website. Further content is written and HTML code is optimised. Hence to summarise we can say that SEO is a procedural technique, which needs to be implemented as a recipe, as shown in this paper in the form of process models.

SEO is a complex technique, and it requires a lot of experience to implement it successfully. This paper is a first attempt at capturing SEO experience with the help of the INRECA methodology. We will investigate how transferable this captured knowledge is next and whether this methodology is fit for purpose as search engines quickly and constantly evolve. The next step will be to reuse knowledge of process models to implement SEO for two more case study websites.

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## **Appendix E**

### **Published Paper 2: Managing Search Engine Optimisation Experience Using the INRECA Methodology**

## Managing Search Engine Optimisation Experience Using the INRECA Methodology

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**Abstract.** This paper describes the reuse of Search Engine Optimisation (SEO) experience. The SEO domain is characterised by more than 200 factors leading to an obscurity of important factors. Such complex domains require experience-knowledge to enable the novice users adopt the domain. The Case Based Reasoning (CBR) approach is well suited to train new users in using this relatively new SEO technique to improve the visibility of their websites. Based on the principle of similarity, CBR enables the solution of similar recurring SEO problems for optimising websites for search engines. New users can effectively rely on SEO experience knowledge to solve new problems. Moreover, SEO techniques follow a similar procedure of implementation. Such procedural knowledge can be generalised and stored for future reference. For this purpose an experience base has been created to store SEO experience knowledge based on the principle of INRECA methodology. The experience is described using software process models. Until now the INRECA experience base has stored CBR system building experience. This research has extended the INRECA methodology for storing and retrieving SEO experience, taking into account the dynamic nature of the domain of SEO. An experiment illustrates the approach.

**Keywords:** INRECA methodology, case-based reasoning, search engine optimisation

### 1 Introduction

SEO has evolved constantly with a continuous development of search engine technology. Over a period of time many new factors have been introduced under the umbrella of SEO adding to the already existing factors. The formulation of a strategy to select the right factors and implement them accordingly requires specialist skill and knowledge, which is often resource and time intensive as well as heavily depends on previous experience.

Every SEO campaign executed for a specific website incorporates some implicit knowledge which could be useful for similar future SEO projects. Therefore it is quite useful to store the experience gained from successful SEO campaigns and make it available for its reuse for solving similar SEO problems. Such knowledge is particularly beneficial for SMEs as they usually lack the budget and time to hire such expertise or train themselves.

This paper describes the use of Case Based Reasoning (CBR) [4] as a novel form of experience-knowledge management to facilitate solution of recurring SEO problems faced by SME website owners. For this purpose an SEO experience base has been created based on INRECA methodology [3], to facilitate the reuse of SEO experience. The primary motive of the experience base is to provide implementation knowledge for essential on-page SEO elements for making websites visible in the search engines.

## 2 Background and Motivation

Search Engine Optimisation (SEO) is a complex technique, which has resulted from a constant amalgamation of different techniques. It consists of more than 200 factors<sup>1</sup>. These factors can be segregated as on-page (implemented directly on a webpage) and off-page (implemented on third party websites). From the identified categories, on-page is essential as it lays the foundation of an SEO campaign. Further, the implementation process of on-page SEO elements is largely similar in different instances, therefore CBR proves to help.

In this research we focus on the implementation process of on-page techniques. Furthermore, we focus on Google<sup>2</sup> as it is the most popular and widely used search engine. Amongst on-page techniques we focus on the most essential that forms the basis for implementing an SEO campaign irrespective of size, budget or category of the website.

We have enabled the reuse of our experience-knowledge by storing it in an experience base created on the principle of INRECA methodology. This experience-knowledge is gained from implementation of on-page SEO elements for five case study websites in the past [1]. Further, the authenticity of stored experience-knowledge has been verified by implementation on two case study websites for gaining visibility in the current search engine's (Google's) environment.

In the experience base we have presented the experience-knowledge on two levels of abstraction i.e. generic and project specific. The generic experience level can be referred to solve SEO problems of similar nature whereas the project specific experience level is particularly useful for solving SEO problems of websites in the same niche. For instance websites falling in the education category can directly take inspiration by referring the process models of the online educational website in our experience base i.e. Juniors.net and so on.

The SEO experience base addresses the information needs of novice and mid-level users. The cases in the experience base store the experience information that has proven to work and provided desired results. Such information has real value and can provide the intended benefit to the advantage of the user and his website. Hence such an information resource could prove very beneficial for providing information to SMEs and training needs of new users. Gradually, with the addition of new cases the case base will continue to expand and grow in information, further enhancing its utility.

<sup>1</sup> <http://backlinko.com/google-ranking-factors>

<sup>2</sup> <http://www.ebizmba.com/articles/search-engines>

The INRECA methodology supports the development process of Case Based Reasoning (CBR) applications [3]. It consists of a collection of CBR development experience (experience packets), represented as software process models, which are stored in an experience base of an experience factory [2]. An experience packet consists of software process models or parts of it such as processes, products, or method(s). As the implementation of SEO follows this simple process structure, the INRECA process model is well suited for representing SEO implementation techniques.

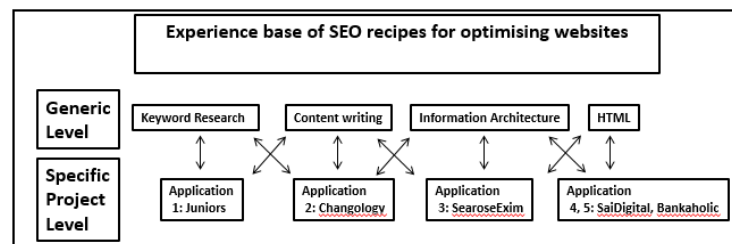


Fig. 1. Structure of the SEO experience base

The implementation of essential on-page techniques namely keyword research, information architecture, content writing and HTML code have been presented as process models and stored as cases in the experience base at the generic level and specific project level. The specific project level process models contain the implementation details of the certain case study projects. The proven experience-knowledge gained from case study websites has been abstracted into a generic level to facilitate SEO techniques implementation for a website that has a different niche from the websites stored at the specific project level. These process models can be retrieved and reused by potential users. The structure of the SEO experience base is shown in Figure 1.

### 3 Related Work

Literature on SEO just mentions SEO techniques without giving the context and details of its implementation. For non-technical SME website owners it is very difficult to apprehend and implement SEO for their websites.

Pellucid is a framework to use past experience for aiding the workers in public organisations in performing their respective jobs [10]. An intelligent assistant was built that is activated within the work environment or workstation of a worker. The basic aim behind building this framework is to support and enhance performance of employees by providing them the knowledge or active hints in context

of the activity they are performing at the time they are actually performing that activity. Pellucid supports context based information retrieval.

On-page and off-page SEO optimisation techniques are addressed in [15] distinguishing between white hat (recommended by search engines) and black hat (abhorred by search engines) techniques. It specifies the usage of keywords in Title tag, URL, meta tag, anchor text and achieving a keyword density of up to 8 percent, etc. Further it mentions the variants of the technique of link building (link popularity, incoming-outgoing links, etc.).

Similar techniques of SEO, e.g., keywords, link building, etc. are emphasised on in [8]. The authors also make a distinction between white hat and black hat practices. Further they notify the evolving SEO practices as a side effect of algorithm updates of major search engine (Google in this case).

A study looking at search engine strategies for small, medium and micro enterprise (SMME) websites reports the use of SEO on-page factors in the top 144 ranking websites at that time [5]. The author devised a SEO model consisting of on-page techniques (inclusion of meta tags, prominent link popularity, etc.) to be implemented for optimising a website. Other researchers have also undertaken research in the SEO field with similar results and recommendations.

## 4 Experience Base

This section briefly describes those case study websites for which some or all on-page SEO techniques (keywords, information architecture, content writing, and optimisation of HTML code) have been implemented by first author:

- Juniors.net<sup>3</sup> was an online education site for primary school (grades 3-6, keystone 2 students) in the UK.
- Bankaholic.com<sup>4</sup> is a US based financial portal providing information on interest rates, credit card reviews, insurance quotes, and personal finance tips.
- Searose Exim<sup>5</sup> was a bicycle basket manufacturer, selling PVC coated front bicycle baskets in India.
- Changology<sup>6</sup> was an independent consultant providing IT change management services for integrating information technology into businesses.
- Sai Digital<sup>7</sup> is an independent Asian wedding photographer providing photography services for Indian Asian weddings held in the UK.

### 4.1 Creating Process Models

The experience base was represented as HTML pages consisting of cases as process models. The experience-knowledge was formalised into process models

<sup>3</sup> <http://juniors.net> [Last access: 03/2006] [Operational 2000 - 2009]

<sup>4</sup> <http://cdrates.bankaholic.com> [Last access: 06/2008] [Operational 2006-present]

<sup>5</sup> <http://www.searoseexim.com> [Last accessed 08/2012] [Operational 2011 - 2012]

<sup>6</sup> <http://www.changology.co.uk> [Last accessed 07/2012] [Operational 2011 - 2012]

<sup>7</sup> <http://saidigital.co.uk> [Last accessed 06/2015] [Operational 2009 - present]



at two levels of abstraction. At the generic level, six process models were created and explained via 92 description sheets published as HTML pages. The specific level contains 19 process models, explained via 323 description sheets. One such generic model is explained in (Figure 2).

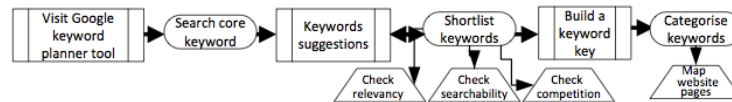


Fig. 2. Generic keyword tool method [1]

The main aim of keyword tool method (Figure 2) is to find keywords using a keyword suggestion tool, i.e., Google keyword tool in this case. The basic keywords are searched using the keyword planner for getting keyword suggestions. The bi-directional arrow between Keyword Suggestions and Shortlisted Keywords indicates that the shortlisted keywords would be used to generate more keyword suggestions. In order to shortlist the keywords, the relevancy of the keywords are checked, as well as the searchability (to find if the shortlisted keywords are searched by the searchers) and the competition is checked as well to avoid keywords having huge competition. From the shortlisted keywords, a keyword key is created in order to categorise the shortlisted keywords which are further mapped to the website pages.

A specific version of the keyword tool method was implemented for shortlisting keywords for the Changology website (Figure 3).

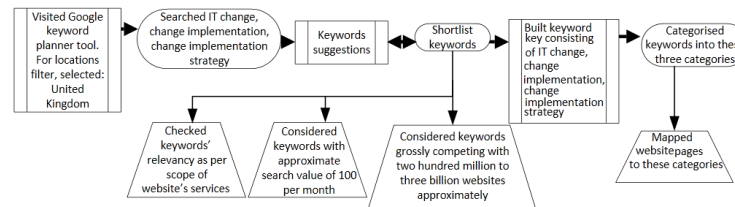


Fig. 3. Specific keyword tool method

This version of the keyword tool method involved using the Google keyword suggestion tool. The location filter of the tool was set to United Kingdom as this website was targeting the UK audience. The key phrases searched for getting keyword suggestions included 'IT change', 'change implementation', and 'change implementation strategy'. Further, the keyword suggestions were provided for

6

each of these phrases. The suggested keywords were shortlisted on the basis of relevancy, average monthly search frequency, and competing websites. For relevancy it was checked that the considered keyword falls within the scope of the website's services. For average monthly search the considered keyword needed to be searched for at least 100 times a month.

The experience-knowledge enabled the implementation of on-page SEO elements for two case study websites Beds Linen<sup>8</sup> and Rachel's Roastery<sup>9</sup>, and it provided SEO information to an SME owner from the created SEO experience base. On-page SEO techniques including keyword research, information architecture and content creation were implemented for these websites.

## 5 Experiment Setup

An empirical evaluation was conducted at two levels via technical experiment and user-testing session. On the technical level, the on-page SEO techniques information presented in the process models was implemented on two new case study websites to check if it yields the desired results in the current search engine (Google) environment. Further a user testing session was conducted to check if the information presented in the process models is legible to the intended target audience i.e. SME website owner.

### 5.1 Case study 1: Beds Linen

Beds Linen is a small-scale set up in India manufacturing custom bed sheets, bed covers, duvets, pillows, baby sheets, baby quilts, etc. This business had not have any web presence before. In this experiment a basic website consisting of eight pages was created. These pages featured textual information on the product range covered by the company. Please note, that the product images and online ordering functionality is still to be added which will enable the website visitors to instantly pay and purchase online.

As this company has a very low budget allocated to digital marketing, every incremental step in setting up their web presence will be evaluated in terms of additional cost incurred and added value generated for the business. Additional value generated for business could be seen in terms of expanding its popularity, generating more customers, etc.

As a result of implementation of on-page SEO elements (keyword research, information architecture, content creation), this website has achieved the desired visibility in the main targeted search engine (Google page ranking within top 500 search listing results for targeted keywords), which is a very positive outcome for a new website having zero to some presence for its targeted phrases for potentially selling targeted products. For example, for the key phrase: bed linen manufacturers india, this website is ranking on 63rd position on google.co.in

<sup>8</sup> [www.bedslinen.com](http://www.bedslinen.com) [Last access: 03/2016] [Operational 2016 - Present]

<sup>9</sup> [www.rachelsroastery.com](http://www.rachelsroastery.com) [Last access: 04/2016] [Operational 2015 - Present]

and 43rd position on google.co.uk. The homepage is ranking for this key phrase. Similarly, each web page is ranking for its targeted key phrase. Earlier this website had absolutely no rankings.

## 5.2 Case study 2: Rachel's Roastery

Rachel's Roastery is operated by a coffee roaster who is passionate about coffee and is a work-from-home mother. It imports specialist region specific coffee from different regions like Brazil, Costa Rica, Colombia, Kenya, etc. This business mainly roasts coffee for its customers as per their desired roast levels specified in their orders and delivers it to them free of charge within UK.

The website is built on the ecommerce platform, Shopify. It features its products on the website and accepts online orders and payment online. Therefore this website is fully functional. It has been operating since September 2015, which is less than a year. The on-page SEO elements of keyword research, information architecture and content creation were implemented for this website and as a result this website has enhanced in ranking for some of its targeted keywords. Additionally the improved search engine rankings (in Google) has won more clients for this website. The implementation was done at the end of February 2016. The changes were interpreted positively by the targeted search engine, Google, and within a span of one month this SME website was enjoying increased business leads, customers and revenue.

As on 13 April 2016, the website has secured top twenty rankings in google.co.uk for such generic keywords as 'santa lucia estate coffee' ranking on 9th position, 'lake tawar coffee' ranking on 14th position, 'arusha coffee beans' ranking on 13th position, etc. Although it is a common practice of searchers not to browse beyond top 10 results [7] searchers with a buying intent do browse beyond top 20, 30 or even further results. This is also evident from the search analytics report of this website where a keyword ranking at 144th position has received one click and that page was selling specialist Costa Rican coffee.

From the search analytics report generated for the last 28 days it shows that the website received 8 clicks for different keywords with an average ranking position of 10.5 and the report for last 7 days shows that it received 2 clicks with an average ranking position of 7.3. Hence from the above pattern we can conclude that this website has started receiving 2 visitors (referred via ranking on search engine) on a weekly basis who are potential clients from the search engine rankings built by implementing the on-page SEO elements.

The feedback received on 12 April 2016 from this business shows that they have generated new clients. It is evident that some of the visitors generated through search engine rankings are certainly being converted into clients for this website thus increasing their revenue stream. Hence it can be concluded that by incurring no additional cost but implementing essential on-page SEO techniques has increased the popularity and clients of this business.

### 5.3 User Testing Session With Target Audience

SME website owners are the main target audience for this experience base with whom a usability testing session was conducted. The usability testing has been found to be quite efficient to find existing problems and shortcomings. Therefore it has been particularly adopted for improving the usability of applications. 'Usability is a quality attribute that evaluates how easy a user interface is to use' [13]. Usability is defined by the following five key characteristics: learnability, effectiveness, memorability, error tolerance, and user satisfaction.

- a Learnability: how easy does a new user find to accomplish required tasks while using the application for the first time [11].
- b Effectiveness: the design of applications should offer increased productivity in relation to the increased level of performance of the user, with high speed and fewer errors [11, 18].
- c Memorability: how easy is it for the user to re-use the system after periods of non-use.
- d Errors: the number of errors made by the user while using the application, the severity of these errors and the feasibility to recover from these errors. The application design should facilitate the users to recover from errors without much difficulty [12, 17].
- e User Satisfaction: how pleasant is it was for the user to use the application. A balance should be created between the user satisfaction and effort by the individual to cause a constant and increased usage of the application [11].

The usability characteristics explained above should be evaluated in a usability test in order to improve the design and quality of interactive application. For checking the effectiveness of experience base it was important to evaluate if it offers learnability and memorability to its user(s).

There are various methods for usability testing serving different purposes which are used appropriately in different circumstances. There are six conventional methods of usability testing [6], i.e., heuristic evaluation, formal design analysis, formal usability inspection, pluralistic walkthrough, cognitive walkthrough and empirical method as explained in Table 1.

The cognitive walkthrough evaluates an application for its ease of learning, specifically by exploration [16]. Generally users prefer learning a software via exploration [9]. Therefore this usability inspection method was found suitable in this situation, as it involved learning the SEO implementation methods by exploring the software process models as stored in the experience base to support the users for implementation of these techniques.

The technique of cognitive walkthrough embeds the characteristics of learnability and memorability hence it was implemented. The user accessed some of the process models independently and provided feedback on the interpretation of the information. Table 2 and Section 6 contains information on the usability testing session conducted.

**Table 1.** Usability testing methods

| Method  | Advantage   | Disadvantage   |
|---|---|--|
| <b>Heuristic Evaluation:</b> involves the usage of pre-defined list of heuristics in order to spot the problems in usability. | Helps in identifying problems in early stages of development.                                   | Necessity to have debriefing for finding out how to fix the spotted problems.                |
| <b>Formal Design Analysis:</b> involves the testing of understanding of how to perform the required tasks.                    | Helps in finding problems in the initial evolving stages.                                       | It's difficult in learning and using it.   |
| <b>Formal Usability Inspection:</b> the testing as per the user profiles and the pre-defined goals.                           | Helps in finding obstacles as well as solutions for improving usability.                        | The non-involvement of end users.  |
| <b>Pluralistic Walkthrough:</b> involves the evaluation of the product with an aspect of the end-user.                        | It allows iterative testing.  | Difficult to find the accurate context of task executed in the process of usability testing. |
| <b>Cognitive Walkthrough:</b> involves the testing of feasibility in learning to use the application by exploring it.         | Helps in depicting problems via exploration.  | Only skilled evaluator can conduct this method.  |
| <b>Empirical Methods:</b> involves an experiment for proving/disproving a hypothesis.   | Helps in finding cause and effect relations which is effective for addressing specific problem. | Time consuming and expensive to undertake.   |

## 6 Usability Testing Session

This section presents the usability testing results and evaluation of the SEO experience base. The purpose of this usability testing was to find if the users could understand the information as presented in process models for implementing on-page SEO techniques.

The first task was to decide if generic or specific project level process models are to be viewed. Accordingly, the links were clicked in the presented user interface. The experience base contains the process models. The details of actual usability testing have been presented below.

### 6.1 Environment, Application Prototype Tested and Method Used

1. Environment: The Usability Test was conducted with one participant at the Graduate School at the University of West London.
2. Application prototype: The usability test was conducted for the prototype of an SEO experience base. As this application is in its early stages of development so the findings of the usability test had been extremely useful for

its development. The prototype contained information in the form of process models to enable the participant to implement on-page SEO techniques.

3. Method: A Cooperative Usability Testing (CUT) technique had been implemented for conducting the usability test which helped in understanding usability problems and identifying the 'gulfs of execution' through Norman's Seven Stages of Action [14]. In this test, there is a conversation between the user and evaluator to uncover the problems existing in the application.
  - a Interaction session (IAS): The interaction session was led by the user while performing the tasks. He thought aloud and asked relative queries. As it was an electronic mock up the evaluator also played an active role in the session.
  - b Interpretation session (IPS): This session was conducted in cooperation between the user and the evaluator with an objective of identifying and understanding the most common usability problems as found in IAS.

## 6.2 Conducting the Usability Test

**Profile of Participants** One participant was selected to conduct this usability test who operates an SME website and has some basic SEO know how with a keenness to learn and implement this technique for the website.

**Tasks** The tasks are presented in the sequential order in Table 2.

**Data Collection for the Usability Test** The participant viewed 9 process models (6 generic and 3 specific).

**Interpretation of Results** The overall feedback was positive which shows that the candidate was able to interpret the process models' information. The candidate's learning experience illustrated that the experience base integrates the characteristic of learnability as the candidate was able to understand the information presented in the process models, which was evident from the 'Further comments' column of the feedback form. Further the characteristic of memorability tests if the application is easy to use after an interval of non-use. As the experience base has just been used for the first time by the users, therefore we have not been able to measure the characteristic of memorability yet.

Moreover, the presentation of techniques in the form of a process model using input-process-output method of INRECA methodology was particularly appreciated. As evident from the interpretation of the usability testing session, we can say that the experience base has made a qualitative difference in terms of transferring SEO knowledge to its targeted audience, i.e., SME website owner(s).

## 7 Summary, Conclusion and Future Work

To sum up the above experiment, we conclude that the implementation of on-page SEO elements for a new or an existing website does result in increased

**Table 2.** Cognitive walkthrough session details

|  |   |
|--|---|
| <b>Website name</b>                              | SEO Experience Base   |
| <b>URLs</b>                                      | ..\user testing\omsite\third.html<br>..\user testing\omsite\fourth.html<br>..\user testing\omsite\fifth.html  |
| <b>User Group Name</b>                           | SME Owner   |
| <b>Sample tasks for evaluation</b>               | 1. Read the instructions on the homepage of experience base<br><br>2. Click 'General explanation' for seeking information on generic level <b>OR</b> Click 'Project level explanation' for seeking information on project level<br><br>3. Click on respective process models to get the information on that process model<br>3.1 Navigate through the sub-pages of the process model<br>3.2 After going through the process model fill in the feedback form for each of the process models<br><br>4. Browse through the next process model and repeat the above steps (until viewing all the generic process models) and optionally looking at project level process models |
| <b>Action sequences for each of the task</b>     | The user is presumed to walk through the tasks effectively as it involves navigating through a software process model. It instructs the user on the implementation implementation of SEO on-page techniques.  |
| <b>User knowledge requirements / assumptions</b> | The users are expected to have an existing SME website and a basic familiarity of SEO.  |

visibility in the search engine results. Further this enhanced visibility in search engine generates more visitors or potential visitors to the website which means increased revenue for the website.

However it is important to emphasise that the implementation of essential on-page SEO elements lays the foundation of optimisation for promoting a website in the search engines, which needs further input on a constant basis in terms of off-page promotion which involves promoting on third party websites, etc. the description of which also lays within the scope of the future work of this research. As per the feedback from the user testing session it was emphasised that a better design of the HTML pages containing the process models would enhance the usability of the created experience base, which could be implemented in the future. In nutshell the implementation of SEO, results in business revenue.

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## **Appendix F**

**Chronological progress between  
January 2013 - August 2018**

| <b>Date span</b>           | <b>Research progress</b>   |
|----------------------------|--|
| January to July'13         | Research methods module  |
| September'13 - February'14 | Started literature review  |
| March'14 - August'14       | Case study experience collection, Modelling of INRECA process model components, presented at UWL Doctoral Conference in May 2014   |
| September'14 - February'15 | Abstracted case studies' experience on a generic level, created generic level process models for SEO experience base, Presented paper (Towards experience management for Search Engine Optimization) at 20th UKCBR workshop  |
| March'15 - August'15       | Created process models on cookbook and project level of SEO experience base, worked on SEO experiments, presented at UWL Doctoral Conference in May 2015   |
| September'15 - February'16 | Paper presentation (Managing search engine optimization experience using the INRECA methodology) at 21st UKCBR workshop, wrote mini-thesis for transfer, MPhil to PhD transfer completed successfully. Undertaken quantitative experiments on two case study websites i.e. Bedslinen.com and RachelsRoastery.co.uk |
| March'16 - August'16       | Wrote thesis (Technique design, empirical validation chapters), presented at UWL Doctoral Conference in May 2016   |
| September'16 - August'18   | Undertaken qualitative experiments (focus group). Wrote, finalised thesis  |
| August'18                  | Submitted thesis   |

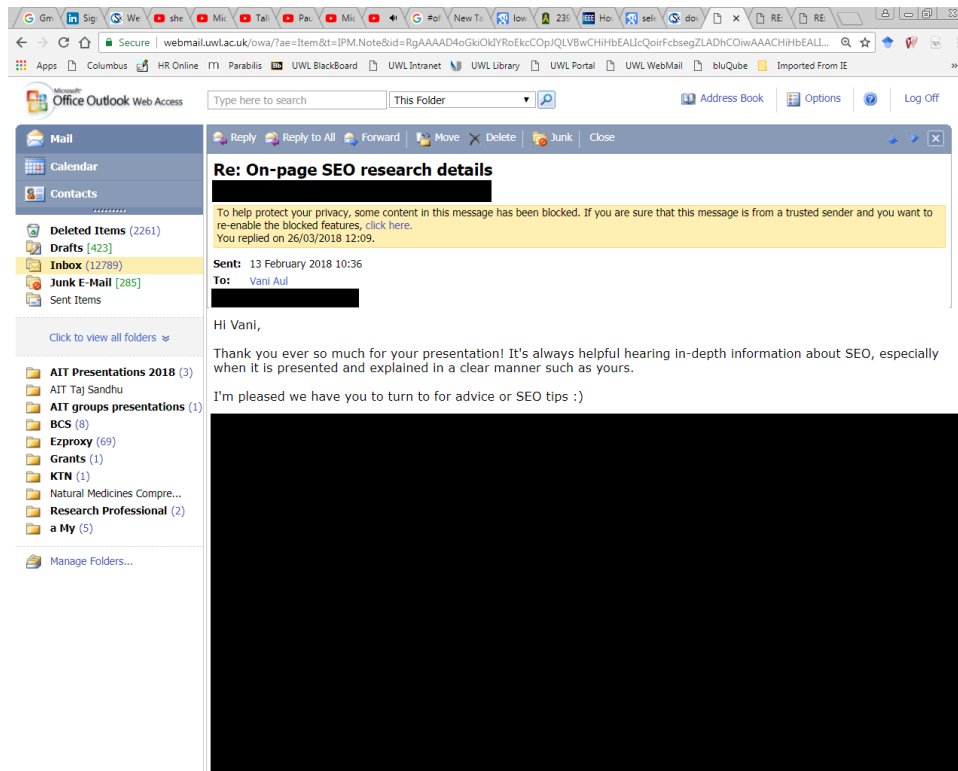
## **Appendix G**

**Feedback (email and verbal) from  
focus group participants who  
attended the process models  
demonstration**

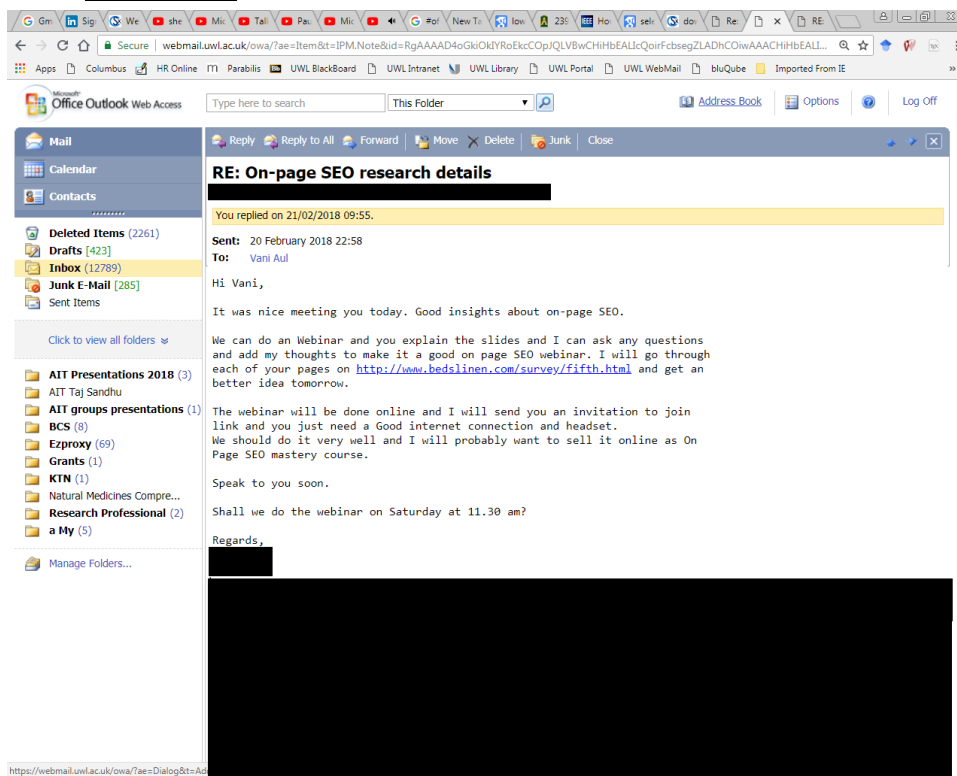


**Below are email and verbal responses from participants who attended only the demonstration of process models:**

**1. Email feedback from a participant (alias name A) for process models after attending demonstration:**



## 2. Email feedback from a participant (alias name F) for process models after attending demonstration:



The screenshot displays the Office Outlook Web Access interface. The browser address bar shows a URL from webmail.uwl.ac.uk. The left sidebar contains a navigation menu with folders such as Deleted Items (2261), Drafts (423), Inbox (12789), and Junk E-Mail (285). Below these are several sub-folders including AIT Presentations 2018 (3), AIT Taj Sandhu, AIT groups presentations (1), BCS (8), Ezproxy (69), Grants (1), KTN (1), Natural Medicines Compre..., Research Professional (2), and a Hy (5). The main content area shows an email with the subject 'RE: On-page SEO research details'. The email header indicates it was sent on 20 February 2018 at 22:58 to Vani Aul. The body of the email contains the following text:

You replied on 21/02/2018 09:55.

Sent: 20 February 2018 22:58  
To: Vani Aul

Hi Vani,

It was nice meeting you today. Good insights about on-page SEO.

We can do an Webinar and you explain the slides and I can ask any questions and add my thoughts to make it a good on page SEO webinar. I will go through each of your pages on <http://www.bedslinen.com/survey/fifth.html> and get an better idea tomorrow.

The webinar will be done online and I will send you an invitation to join link and you just need a Good internet connection and headset. We should do it very well and I will probably want to sell it online as On Page SEO mastery course.

Speak to you soon.

Shall we do the webinar on Saturday at 11.30 am?

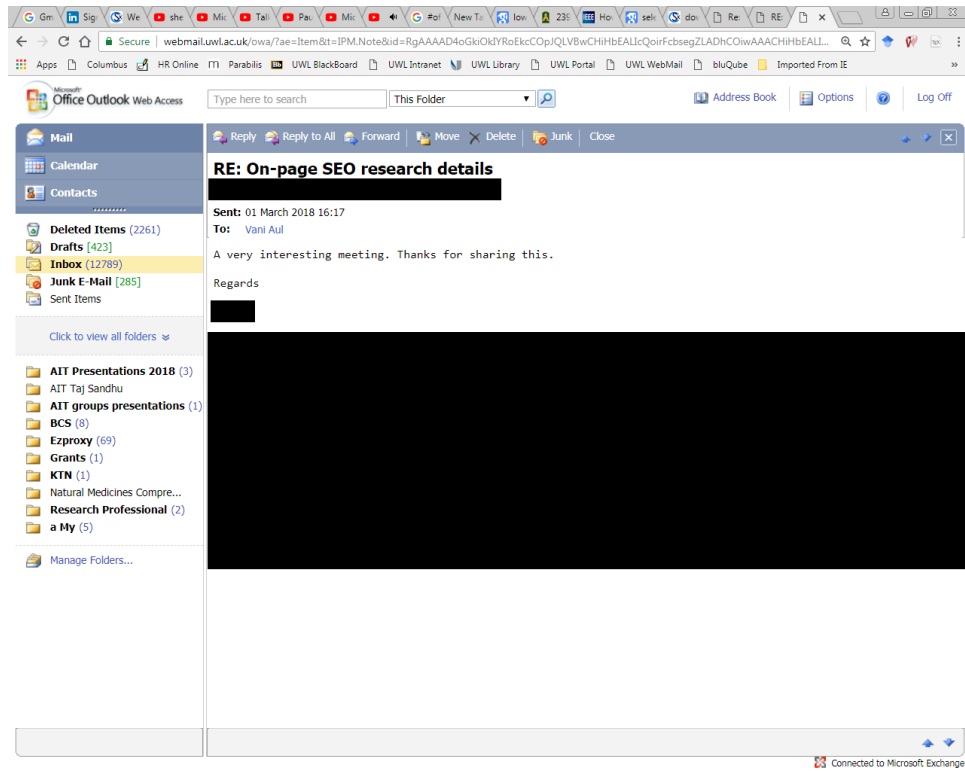
Regards,

[Redacted signature]

[Redacted content]

https://webmail.uwl.ac.uk/owa/?ae=Dialog&tc=Ac

**3. Email feedback from a participant (alias name C) for process models after attending demonstration:**



**4. Verbal feedback from participant (alias name K) for process models after attending demonstration:**

Great stuff, will use it in day to day work practice