Chapter 11

A New Brief Creation Process to Improve Design Innovations in Home Healthcare

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11.1 Introduction

This paper presents research findings and conclusions which investigated the strengths and weaknesses of innovation management strategies of small and medium sized enterprises (SMEs) in the home healthcare (HHC) field. It explores how to improve opportunities for innovation by better understanding the needs of all stakeholders, particularly users and carers, in the design and development process.

The demand for well-designed home healthcare products (HHCPs) and services (HHCSs) grows whilst product and service development strategies adopted by many suppliers have not matured to realise innovative solutions which adequately address the real needs and requirements of end users. Working collaboratively with companies in the sector, this research identifies that the shortcomings are most prominent in the front end phases of the development cycle. It suggests an improved brief creation process model which addresses the factors which have significant influence on innovation success but are generally missed. This new model focuses on addressing end users' real needs, adapting to changing environments, fostering greater stakeholder engagement, and managing information processing in a formal and structured manner.

Health systems worldwide have been actively exploring ways to improve the quality of care so that it is cost-effective, often with a focus on people with long term health conditions and the aim of providing people with care in their own homes (Steventon and Bardsley, 2012). HHC is viewed as one of the potential solutions, and is a fast developing sector. In England, the 3Million Lives Project launched recently in January 2012, aims to support three million people with long term health conditions.

With the increasing demand for HHC, the market in HHCPs and HHCSs is expanding, particularly in areas where healthcare resources for hospitals and society are barely enough. HHCPs include a wide range of equipment and systems, from the simple weight scale and thermometers to complex equipment such as

oxygen generators and home dialysis machines. They are widely used for home diagnostics, patient care, daily living aids and mobility aids. Recent advances in technology and medical equipment design have greatly simplified the operation of equipment. This has enabled people without advanced medical training to operate the equipment, eliminating the need for a full time care giver.

The satisfactory performance of HHCPs and HHCSs is the premise to bring about the benefits above. However, as pointed out by the Design Council (2007), many HHCPs on the market are poorly designed and have poor functionality. This is unsurprising as HHCP and HHCS innovation is more complex and relatively new compared with many other industries. This complexity is present in many aspects, for example, the diversity, unpredictability and fluctuation in users' profiles and abilities. Such situations are further complicated as a large percentage of users suffer long term health conditions and disabilities, which may impair their ability to operate the equipment. Consequently, the design of HHCPs is expected to accommodate the dynamic, uncertain and complex profile of the widest range of users and environments. However, the sector is dominated by SMEs who have minimal resources to carry out user centred design studies and design research, which in turn limits their abilities to innovate. All these factors lead to the conclusion that there is a need to support suppliers in developing HHCPs and HHCSs to improve their HCCP and HHCS offers to the benefit of users.

11.2 Business Strategies and Development Direction

Responding to the pressure from competitors and powerful customers, one common strategy adopted by SMEs in the sector is to improve their operational efficiency. Techniques such as the Stage-Gate Innovation Process, the Product Development Funnel and Six-Sigma are widely employed for this purpose. However, the focus on operational efficiencies offers limited space for improvements related to the actual product-service offer to end users.

11.2.1 Types of Innovation

Our literature review and study on twenty home healthcare product and service suppliers suggests that innovations carried out by SMEs in this sector are generally incremental. They rarely offer new products or services which are significantly improved compared with the existing ones, or create new product categories or industries. This applies not only to new entrants to the market but also to those SMEs who have already established a strong foothold and even to leaders in specific areas. For example, in one company where they had a total of more than 1,000 "projects" of various sizes in the last ten years, they had developed only three main categories of product throughout this period.

The question then is should SMEs radically innovate or incrementally improve their market offer? Radical innovation is generally defined as an out-of-the-blue

solution which creates new industries, avenues and markets. However, there is no absolute distinction between radical innovation and incremental innovation as innovation is wholly contextual to the individual SME. That is to say, completely new knowledge, skills and resources for one company, which is required for them to radically innovate, can be familiar to another. Therefore, it is essential for individual SMEs to define the constraints and challenges from the outset of a new project, and to review its managed development against the levels of innovation that the SME can achieve. An adjustment on the innovation management technique must not be neglected as the development processes suited to managing incremental innovations often fail to manage the complex and uncertain environment of radical innovation projects (Williams, 2005).

11.2.2 The Business Driver and Lack of Appropriate Data

The driver of innovations in the HHC field varies in different scenarios. In terms of business drivers, there are generally two main types of innovations: user driven and customer driven. End users are not always consumers. For example, the main customer of the e-health and telemedicine are public sectors, such as the local authorities and housing associations in the UK. These public sectors usually provide the equipment to the residents for free. They may charge the end users to maintain monitoring services. In this case, customers and users are diverse groups.

Business success is based mainly on factors such as the relationship with stakeholders in the sale, the delivery of service, added value and business flexibility. However, suppliers, especially SMEs rarely engage in user research with the purpose of exploring users' real needs in the outset of innovations (Figure 11.1 left). In user-driven projects, consumers are end users.

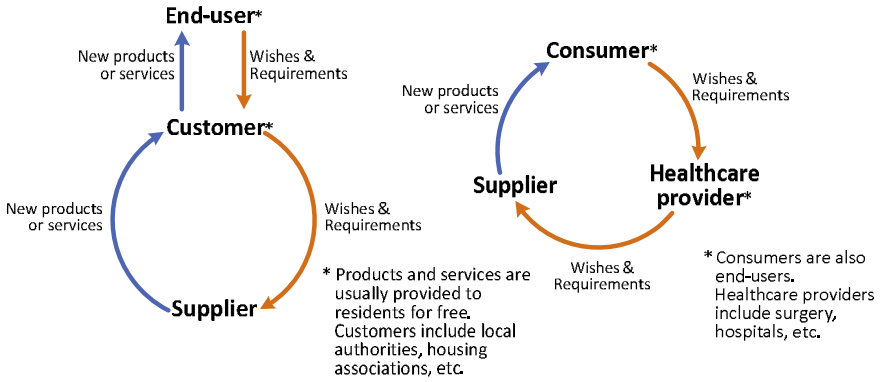

Figure 11.1. Customer-driven innovation (left) and user-driven innovation (right)

The user performance of products weighs heavily on determining their commercial success. Even in this situation, suppliers do no always approach the users. Instead, users' demands for new solutions are often collected by the medical

institutions and distributors (Figure 11.1 right). This lack of early user input into the design process can explain why the design and the user performance of many home healthcare products and services are unsatisfactory.

Engaging users prior to the generation of solutions assists in minimising the overall development risks, discovering new business opportunities, and gathering rich user information to feed into generating design solutions. Although all five SMEs interviewed in this project claimed that they applied users' insights in developing new products and services, they conducted user research solely during the later phases of the development process- to evaluate prototypes amongst the target groups. These activities generally focused on moving established prototypes forward into production or delivering ready products onto the market, rather than providing a thorough understanding of people's life and behaviour in its broader social context.

The 'user' insights that HHCP 'suppliers' use in forging strategies and generating solutions are often based on "second hand" information from public organisations, medical institutions and distributors (Figure 11.2).

Figure 11.2. The knowledge transfer relationship

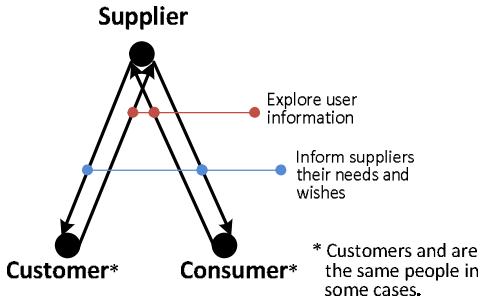

Figure 11.3. The gap between the real user data and the knowledge received by suppliers

There is no guarantee that users' essential needs and requirements have been collected. Using second hand data can lead to false information being used, whilst, valuable information is missed during the information translation and transfer, since neither the healthcare providers nor public organisations involved are specialised in research and design (Figure 11.3).

To improve the user experience of innovative HHC products and services, the development team must perform primary and formal user research, for discovery, planning and reviewing (Figure 11.4). Although the extra work requires time and money investment, it will pay off through benefiting the overall development of suppliers.

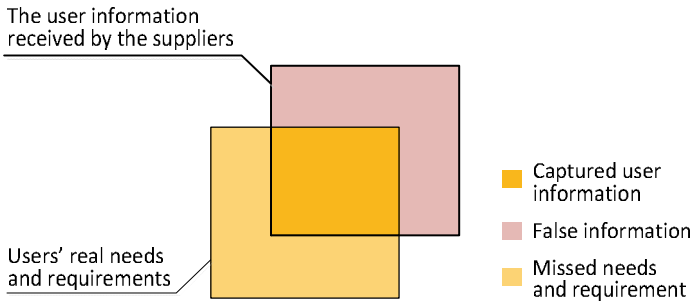

Figure 11.4. The ideal situation

11.2.3 Business Focus: Product Based, Service Based or a Hybrid?

HHC suppliers can be categorised as product based, service based and product-service hybrids. Most SMEs in the sector are based on delivering products. Service-based SMEs are more frequently seen in the telemedicine area. In home healthcare, product and service are frequently present as two essential and interrelated components of realising the intended functions. Furthermore, unlike cars or computers, many HHCPs are required to be operated by end users and other stakeholders including the medical institutions and public sectors in different stages of operations, which creates opportunities of service development.

SMEs usually take the first step by supplementing their products with services to address users and customers' wishes and requirements that cannot be incorporated by products alone. These services include product maintenance, user support, training, product customisation for specific customers' needs, *etc.* Product-service hybrid SMEs with experience and resources may take a step further, to take over customer operations that are related to the use of products. With service's increasing share in the overall business, the time comes for SMEs to choose a business focus but should that focus be on product or on service? It is wise for most SMEs to do so as the two modes of innovation are actually pulling against each other, and running the two modes in parallel may create unbearable challenges. Before shifting the business focus, SMEs need to assess both the internal and external challenges carefully. If a company decides to make a choice, new or revised development processes and approaches are required which usually leads to changes in the driving force behind the business, its culture and organisational structure.

11.2.4 The Impact of Changing Business Strategy on Innovation Management

Management challenges are more evident in those companies of the product and service hybrid type. The more rigid and disciplined stage-gate processes generally suit new product development, especially projects with the aim of providing variations on existing products (incremental improvement). In contrast, developing new services requires a process which embraces a more flexible, inclusive and relational context, in which service innovation flourishes (Susman *et al*., 2007). In addition, the implementation of new innovation management techniques may demand adjustments in company operations, culture, organisation structure, techniques and skills.

Some of the differences in innovation management considerations between running product-focused, service-focused and product-service hybrid project are described in the table below:

Table 11.1. Differences in innovation management considerations

Business mode / Consi-derations	**Product based**	**Product-service hybrid**		**Service based**
		Product focused	**Service focused**	
Customer satisfaction	Customer satisfaction is based on the product.	Customer satisfaction is based on both the product and the service-correlated considerations. The weight of the product in determining customer satisfaction depends on specific market and business.	Customer satisfaction is based on both the product and the service-correlated considerations. Those factors determine the success of service development tend to have more significant influence.	Customer satisfaction is based on service delivery, added value, relationship and reputation, flexibility, customisation, *etc*.
Modes of operation	The more rigid and disciplined stage-gate approaches.	A formal and adaptive overall process which is designed with full considerations of different innovation types.	A formal and adaptive overall process which is designed with full considerations of different innovation types.	A more flexible, inclusive and relational approach.
Driving force and culture	Show a high priority on new product development and time-to-market; Emphasise the end user experience and performance.	Show a high priority on product customisation and providing product variations; Values time-to-market and relationship with customers.	Values customer relationship, flexibility and customisation; Eager to improve the product design to mitigate the cost of related services.	Values customer relationship and satisfaction, flexibility, variety, responsiveness, speed and customisation.

11.3 Can We Improve SME Innovation Strategies?

11.3.1 Developing a Formal and Adaptive Development Process

In business and engineering, new product development (NPD) and new service development (NSD) are the terms used to describe the complete process of bringing a new product or service to the market. Both product innovation and service innovation can be viewed as a process. Like other processes, they can be managed in a formalised and structured way within the overall framework of the NPD cycle. Adopting a well-forged development management process is the key to leveraging companies' innovation capacity and operational efficiency and it enhances SMEs' strength in competition with larger companies.

As described previously, an adjustment of an SME's innovation process is essential when carrying out different types of innovations. The use of linear and rigid processes may restrict the creativity and flexibility required for radical innovation and new service development. In contrast, a very flexible structure may decrease the operational efficiency of incremental projects. Hybrid companies therefore need techniques adapted for different types of innovation.

11.3.2 Forging Better Project Briefs and Design Briefs

Project and design briefs should set the course for the entire SME project development process. Forging briefs of high quality is critical. The creation of briefs is at the front end stages of the development process, which is full of uncertainties and activities often involving iterative feedback loops between marketing, design, manufacturing and other functions. These iterations may not be amenable to project management techniques. However, a level of structure and control is necessary to ensure success and to avoid unexpected risks.

11.3.3 The Brief, Establishing Early Requirements

Project requirements and constraints from diverse aspects must be explored from the start of a project, and be updated continuously. The purpose of doing this is not limited to evaluating project proposals or design ideas. It sets boundaries which aids the 'project developers' in determining a more correct direction which is fit for purpose. It also reminds the developers to consider the practical measures of commercialisation from the start of the design work. Further, it helps to address diverse considerations throughout design and engineering. Also, it helps to achieve the consistency of work between development phases and between the development team, which frequently presents as a challenge in collaborative projects, especially if a third party is involved. Most of the initial requirements and constraints will be set to be flexible and fuzzy, commonly known as the 'Fuzzy

Front End' (of the product development process) and must evolve with the progress of a project to become more transparent and rigid as the project matures.

It is essential to ensure that all key players understand the requirements and constraints which have connections with their own functions in time, and any revision made during the development cycle. It is also necessary to provide all players equal and easy access to all identified requirements and constraints. As observed and concluded in this project, several approaches can help to achieve this goal:

- Transparency: Centralised information management that has open access to all involved in the project development.
- Consensus and understanding: Giving thorough consideration to diverse factors, for example, the economic feasibility of an idea, and achieving a consensus between all involved when writing the project design briefs.
- Presentation and access: Providing rich information instead of that which supports 'abstract' written briefs using techniques *e.g.* image, video and collage.

At this early stage of exploration, it is believed that these three complementary areas can provide the framework for underlying tools and methods to create briefs that are written with common data, built upon a consensus and are presented in ways that are engaging and informative.

11.3.4 Fostering Greater Engagement in the Brief Creation

Fostering greater engagement in the brief creation process between all developers, increases the opportunities for generating new solutions, importantly, with a consensus in place. It also ensures that essential tasks have been considered and addressed early in the development, which helps to avoid unpleasant surprises in the later phases of projects and reduce risks.

Involvement of all the stakeholders ensures that innovations are not led by a single business, design or manufacturing objective, and helps design teams consider and capture every essential aspect of the design problem.

In highly innovative projects, it is more frequent to find design features and requirements which are difficult to foresee in the early phases of project. This makes it even more important that all stakeholders are engaged. The risks produced by the uncertainties in projects can be dramatically reduced by fostering greater stakeholder engagement and consistent communications. All need to be aware of diverse aspects, including market segment and positioning, functionality, aesthetics, technical feasibility, manufacturability and sales - in the front end phase of projects. Each stakeholder should be kept updated with the latest findings and conclusions equally. When making major decisions on specific functions, stakeholders of other functions should participate and provide their feedback. To make design modifications in the late stage of projects less costly, designers and engineers should address those uncertainties in their daily work, such as leaving space for modifications when designing a product's structure and inner space or

saving 3D models in an easy to edit format. Compared with most other arenas, taking HHC products into markets requires suppliers to be compliant with complex and strict regulations and policies, that can be complicated by regional differences.

11.3.5 Addressing the Operational Requirements at the Outset

There is practical value in carrying out extensive research on market segmentation and positioning, and on clarifying and understanding potential customers from both strategic and design levels in the early phases of development processes. Addressing the requirements of the sales plans and strategies carefully in the creation of briefs aids in making projects less uncertain. When potential customers and markets are identified during the development cycle, consideration must be given immediately to whether new design requirements or revisions to preset requirements will be necessary. In case major changes in design are required, teams in options, service and installations need to be notified quickly to address the changes in downstream applications such as plans for tooling, manufacturing, installation and maintenance. The earlier the changes at strategic level are absorbed into designs, the less negative influence they will have on the whole project.

11.4 An Improved Brief Creation Process Model

The brief creation process model proposed in this paper focuses on addressing end users' real needs, adapting to changing environments, fostering greater stakeholder engagement, and managing information processing in a formal and structured manner. This model suggests intimate collaboration across functions from the outset of the brief creation. The players should represent all business functions to address considerations of diverse aspects. It is essential to adjust the team structure after the type and the drive of a project has been defined to reflect and adapt to the features of specific projects. Efficient cross functional team work is a requirement of sorting out complex data to find a practicable development direction.

The process model has four main development phases and two main freezing phases. The three development phases are 1. data organisation, 2. data screen 3., development, definition and clarification, and 4. process planning. The two freezing phases are strategic review and design brief review (Figure 11.5).

Data Organisation, the first phase, is to analyse, translate and group the data collected in the discovery stage. Earlier sections have highlighted the importance of developing an adaptive management technique. This is why the team must consider the nature of innovations that potential opportunities will lead to in the front end. This will lead to the adjustment of the overall development process, as well as the plan of detailed methods and activities to apply throughout a project. This model suggests defining data based on the source of opportunities. This should be 1. user knowledge, 2. new technology, 3. customer requests and 4. strategic demand. A large volume of qualitative data from field interviews, open-

ended survey responses, support call logs, or other channels may be received from the discovery stage, particularly from user research. To review these data efficiently, the use of an affinity diagram is an easy but efficient technique. This technique helps to sort numerous ideas into groups, based on the given criteria. It also creates an opportunity for active interactions between players, thus fostering greater engagement.

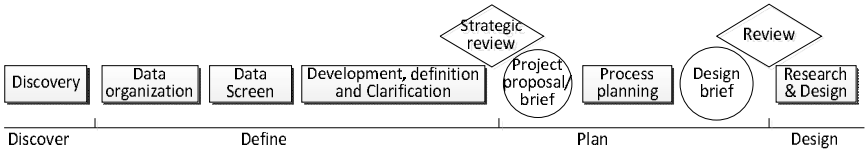

Figure 11.5. The structure of the brief creation process model

The values of the information are reviewed based on considerations from facets of 1. technical feasibility, 2. saleability, 3. economic feasibility, 4. market fit, and 5. user fit. This identifies the most promising opportunities from all those uncovered in the previous stage. Different criteria should be applied to assess data from different groups. For example, needs and wishes from product end users, technical feasibility, saleability and economic feasibility will need to be considered (Figure 11.6).

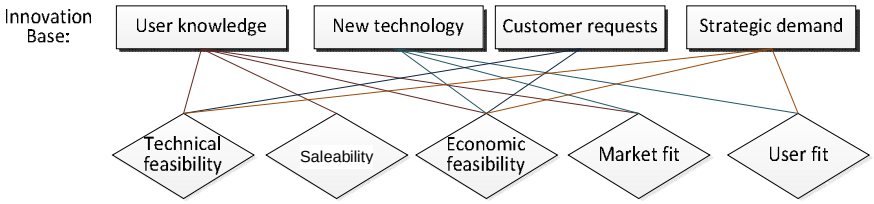

Figure 11.6. Screen data of different groups based on different criteria

The third phase is “development, definition and clarification”. The screened data will be further analysed and developed in this phase to become richer information to feed the project brief. The team needs to investigate the potential of opportunities from 1. market segmentation and positioning, 2. potential customer exploration, 3. regulatory requirements, 4. competitor review, and 5. capacity in innovation. They should also refine the type of the project, to see if it will lead to a highly innovative project or a variation to existing products and services. In addition, they must review all the work carried out, and clarify the core value, business opportunities, and challenge and risks from diverse perspectives. Ideas from all functions must be addressed in this step (Figure 11.7).

The conclusion and results of previous work will be summarised into project briefs to go through business hierarchy for review. If they pass, the proposed opportunities will be taken into formal development.

The formal development starts with process planning. This is the time for the development team to consider whether the in-house development processes will suit specific projects. They must forge a project-focused process which addresses all considerations in the project brief. Four activities – 1. exploring constraints, business considerations, 2. determining design functions (abstract level), 3. forging design strategy, and 4. mapping the players onto a project timeline to move forward in parallel.

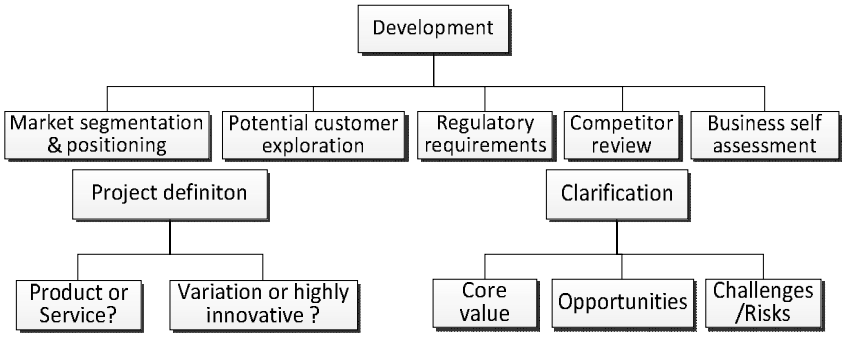

Figure 11.7. Development, definition and clarification

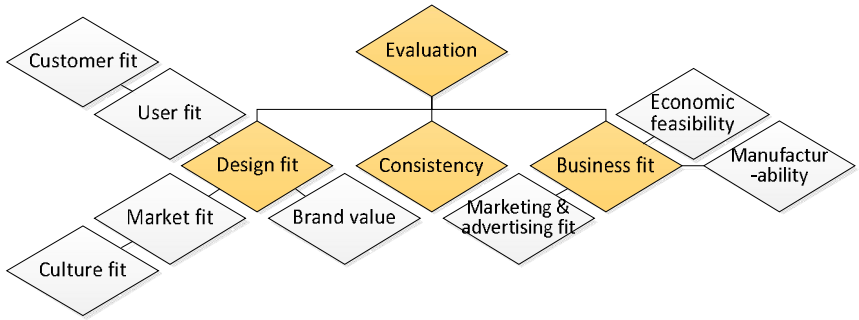

Figure 11.8. Evaluation of the functions

This model suggests that the development team determine the functions of the outcome in terms of both practical and aesthetics at this stage, which is earlier than in most of the existing development processes. The purpose is to promote an early consideration of the design needs. It also helps to ensure that a design agency understands the companies' requirements properly when the design will be carried out by a third party, which happens frequently in the sector.

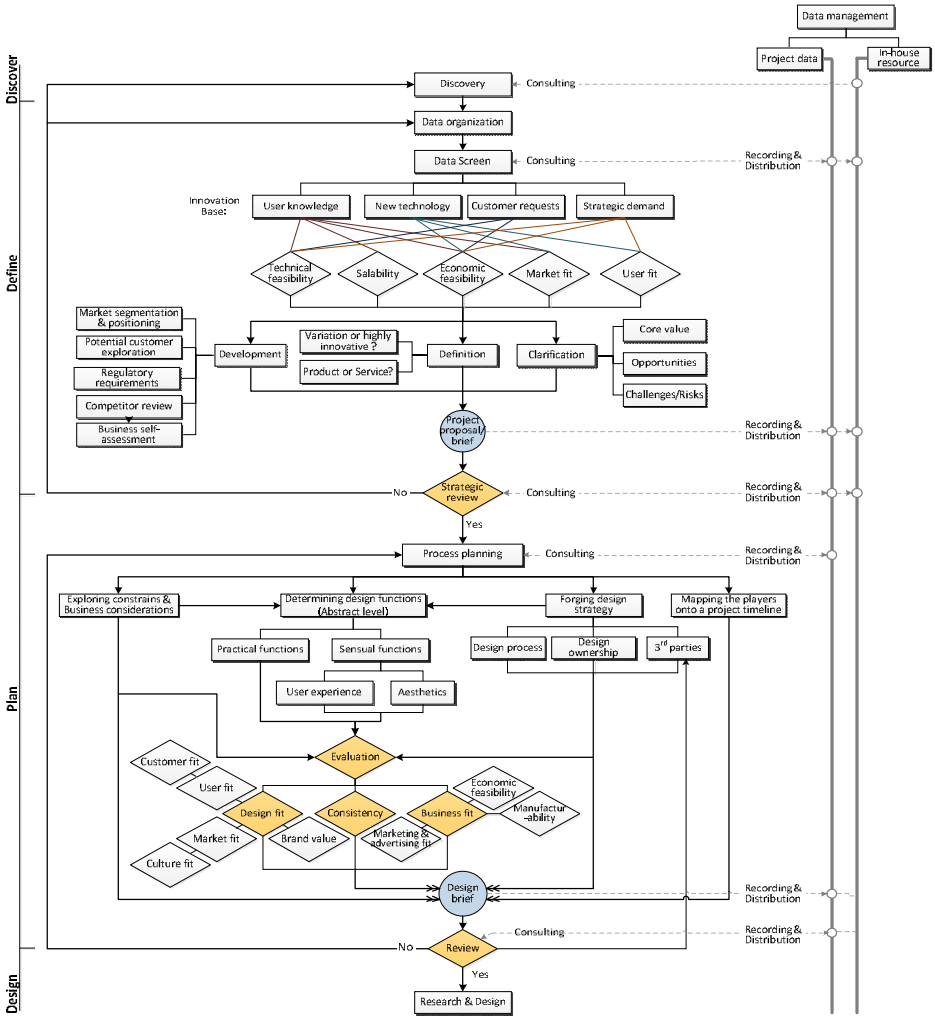

Figure 11.9. The complete brief creation process model

The design functions are evaluated from the facets of 1. design fit, 2. business fit, and 3. the consistency with the requirements and features defined in the previous work (Figure 11.8). The complete process model is illustrated as Figure 11.10. A larger version of Figure 11.9 can be obtained from: https://skydrive.live.com/redir?resid=71798F57E3A585F4!1056&authkey=!AMehFoMGAgNKXVo&v=3&ithint=photo%2c.jpg.

11.5 Conclusions and Next Steps

Our current analysis has shown that an improved brief creation process has the potential to significantly help SMEs in the HHC sector to deliver products and service of higher quality. We now need to further revise and develop the process model which has been presented in this paper, and to test its strengths and weaknesses in collaboration with companies in the sector. An interactive tool which can be applied to assist their daily work can then be fully developed.

There are two major issues which now need to be addressed:

- How should the effectiveness of this model be tested? In an ideal situation, it should be evaluated in real projects, but this may not be possible within the constraints of available time.
- In what format should the brief creation tool be presented? Should it be web-based, a tool kit, or something else?

11.6 References

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