CHAPTER 6
General discussion

6.1 Introduction

In professional services, it has become an ever more pressing challenge to answer the heterogeneous and complex customer demands, while at the same time reduce costs. More specifically, in healthcare this challenge refers to the political pressure healthcare organizations face to deliver person-centred care, while at the same time budgets are limited. The concept of modularity has been proposed as a partial answer to this challenge. Modularity in its most abstract sense refers to the degree to which it is possible to separate and recombine a system’s parts (Schilling, 2000). It is widely applied and studied within the context of product and production process design (Starr, 2010). Within the context of professional service offerings, modularity is an emerging concept that lacks conceptual clarity (Voss & Hsuan, 2009; Rajahonka, 2013). In both research and in practice, the term ‘module’ is used for a wide variety of constituents. Explanations of the conceptual reasoning as to why these service parts are labelled ‘modules’ are mostly lacking. This lack of conceptual clarity is the first research gap that has been addressed in this thesis.

The second research gap addressed in this thesis concerns the feasibility of modularity in the design of professional service offerings. The specific professional service characteristics, notably the high levels of uncertainty, challenge the application of modularity in terms of pre-specifying a set of relatively independent possible service parts upfront. A further challenge lies in the refractory socialization (Argyris, 1992) of the professionals engaged in the service delivery who highly value their professional autonomy (Taylor, Hawley & Ebrary, 2010; Von Nordenflycht, 2010). Therefore, it is relevant to consider how a managerial concept like modularity is and can be applied within such a professional context. The influences of the contingencies, i.e., the characteristics of the service and its institutional context, at the way in which modularity is applied in professional service design have never been systematically addressed. Moreover, why and whether some applications appear to be more modular than others has also never been reflected upon.

Our analyses of the lack of conceptual clarity and of the feasibility of modularity in professional services design raise considerations about modularity’s contributions to balancing variety and costs in professional services. When it is actually unclear what constitutes a module and a modular service design within the context of professional
services, no conclusions can be drawn about the effects. Especially within the context of healthcare, modularity had been proposed as a means to achieve person-centred services for relatively low costs (Bohmer, 2005; De Blok et al., 2012; De Blok et al., 2010a; 2010b; Chorpita, Daleiden & Weisz, 2005; Meyer, Jekowsky & Crane, 2007). Nevertheless, it was still unknown how the concept of modularity might best be applied to achieve such a balance. Therefore, the third research gap addressed in this thesis involved the limited understanding of how each of the various identified applications of modularity will contribute to balancing variety and costs in a professional services context. More specifically, I focused on this gap within a healthcare context, in which this aim is translated as balancing person-centred care and costs. Person-centred care involves striking a better balance between the heterogeneous clients’ needs and their consumption of scarce healthcare supplies (Mead & Bower, 2000; Michie, Miles & Weinman, 2003; Auerbach, 2001; Kiesler & Auerbach, 2006; Rijckmans et al., 2007).

These three interrelated gaps in the literature, namely a.) the lack of conceptual clarity of what constitutes a module in professional service settings; b.) the feasibility of modularity in the design of professional service offerings in view of the specific service and institutional characteristics; and c.) the forms of modularity which can be translated to and implemented in professional services, if it is to help balancing (person-centred) variety and costs, have been addressed in Chapters 2 through 5 of this thesis. In this final chapter, I provide a summary of the main findings and then reflect upon the thesis’ findings by discussing their theoretical and practical implications. Finally, I discuss the limitations of this thesis and provide suggestions for future research.

6.2 Summary of main findings

This summary of the main findings is structured according to the four research objectives of this thesis. The first research objective was formulated as follows:

Research Objective 1: Enrich service modularity theory and practice by: a.) surveying the different options available to break down service offerings into modules, b.) by identifying the design choices underlying them, and c.) by developing contingency-based arguments for these design choices in decomposing service offerings.

To this end, a systematic literature review of empirical research papers on service modularity led to a design framework consisting of three consecutive, though partly iterative, design steps to break down a service offering into modules. The three design steps were labelled as follows: 1.) defining the boundaries of the service offering that
will be decomposed; 2.) determining the decomposition level(s) at which functional service parts will be identified; and 3.) identifying the most relevant interdependencies between functional service parts and isolating them. Together the design choices made within these three steps reflect decomposition logic.

The review showed that most empirical research papers pay no explicit attention to the design choices described in our design framework. That is, no explicit attention is paid to the boundary setting, the decomposition level, and how dependencies between modules are minimized. I argued that the determination of the decomposition logic is essential in designing a modular service offering. Without an explication of the decomposition logic, what is labelled as a service module might, might not, or might only partly, fulfil the requirements of a module. Indeed, in the empirical literature, we came across many ‘service modules’ that apparently did not deserve that label. Because of the lack of explicit design choices in the empirical literature, we decided to proceed by deducing the theoretically possible decomposition logics in services. That is, guided by our design framework, we explicated the choices per design step, and could thus identify six decomposition logics: 1.) a single level, process-oriented decomposition logic; 2.) a single level, outcome-oriented decomposition logic; 3.) a single level, combined outcome-process logic; 4.) a multilevel, outcome-oriented decomposition logic 5.) a multilevel, process-oriented decomposition logic and 6.) a multilevel, combined outcome-process logic.

In applying this classification to the available empirical research papers, we found that non-routine service offerings were mainly decomposed at a single decomposition level, whereas routine and semi-routine service offerings were hierarchically decomposed. We interpreted this as follows: in non-routine service settings with their many reciprocal interdependencies (Thompson, 1967), it is apparently more difficult to isolate interdependencies within service parts that can then be designated as modules. As a result, the more fine-grained multilevel decompositions are harder or indeed impossible to attain. Our second finding was that when the modularization aim emphasized providing variety, this always brought an outcome-based orientation. This can be understood in the way that outcome-oriented decomposition logic makes the variety more transparent to customers than a process-oriented one (Pekkarinen & Ulkuniemi, 2008).

As the Chapter 2 findings showed that in most empirical research explicit design steps and underlying design choices had been neglected, I decided to research a modular design process with more explicit steps and did so within a healthcare context. This modular design process involved two trajectories: a.) a pre-design one in which we analysed the heterogeneity of demands; and b.) the actual design process by a multidisciplinary group of professionals. Chapter 3 describes the pre-design trajectory
and Chapter 4 the actual design process. Below, I first elaborate on the results of Chapter 3. The research objective of Chapter 3 was the following:

**Research Objective 2: To develop a characterization of the heterogeneity in demands that forms the input for designing a person-centred modular supply within the context of healthcare.**

The specific focus of Chapter 3 was the heterogeneity in demands. The general modular systems theory of Schilling’s (2000) states that a moderate level of heterogeneity is essential to the feasibility of a modular design (Schilling, 2000; Schilling & Steensma, 2001). Too little heterogeneity in demands implies that customers would accept a single configuration, and thus there is no use of defining different modules (Schilling, 2000). Too much heterogeneity in demands implies that customers require unique configurations and that they do not accept configurations consisting of pre-specified parts. The heterogeneity in demand can be analysed in many different ways, though a critical requirement is that the heterogeneity is recognizable. Only then can a modular supply that answers this heterogeneity be developed (Schilling, 2000). Within the context of healthcare, limited attempts have been made to characterize heterogeneity in demands with the aim to develop modules that can answer this heterogeneity.

In Chapter 3, we performed a population segmentation study, focusing on the elderly population living in the Northern part of The Netherlands. Chapter 3 shows that it is empirically possible to reduce heterogeneity of demands that older adults face into five meaningful segments: ‘feeling vital’, ‘difficulties with psychosocial coping’, ‘physical and mobility complaints’, ‘difficulties experienced in multiple domains’, and ‘feeling extremely frail’. Our findings offer convincing empirical validation for earlier proposals to segment populations based on experienced demands (Lynn et al., 2007), translated in our case as ‘unfulfilled health-related needs’. Moreover, the same segments were found in two other population-based studies. The assumption is that within each segment, individuals will have a percentage of shared difficulties or complaints. This communality in demands may render the development of re-usable modules that answer these demands in a cost-efficient manner. Our results also suggested a relationship between need-based segments and the resource used per segment. That we found such segmentation for a non-routine professional service such as healthcare for elderly is a first step in demonstrating the feasibility of modularity in the design of professional service offerings.

In Chapter 4, we describe and analyse a modular design process in which two of the above mentioned segments, i.e., ‘difficulties with psychosocial coping’, ‘physical and mobility complaints’, were used as a starting point for a modular services design: the design process intended to develop care and service offerings for a newly established
primary care centre. This design process involved a bottom-up approach to develop modules each answering a portion of the shared demand. The design framework provided in Chapter 2 was used to systematically analyse the design choices made during the design process. The third research objective of this thesis was formulated as follows:

Research Objective 3: To a.) provide insights into how professionals craft the concept of modularity in the design of their service offering and b.) uncover through which arguments they legitimize or reject the modular design principles.

In the service modularity literature, limited attention is paid to the process of designing a modular service offering. Also, Chapter 2 raised the question of why the three modular design principles are not explicitly addressed in most studies, leading to professional service designs that are not really or not fully modular. A contextual factor which might explain why the modular design principles are only partially applied in professional services design is their institutionalized professional context. The institutional context refers to the specific culture, rules and identity that are reinforced through institutions like the educational system, the professional codes and the professional associations (Taylor, Hawley & Ebrary, 2010).

The data revealed three partly overlapping modular design phases: ‘the sense-making phase’, ‘the decomposition phase’ and ‘the module design phase’. The focus of the activities and design choices involved in these phases moved from the outcome dimension of the service offering towards the process dimension of the service offering. During ‘the sense-making phase’, the professionals elaborated on specifying functions that clearly reflected customer benefits (i.e., the service outcome dimension), whereas during ‘the module design phase’, the focus was more on deciding which disciplines fulfil which tasks and how interdependent tasks should be aligned and coordinated (i.e., the service process dimension). Also, during these different design phases, the arguments used by the professionals differed in terms of institutions they relied on. At the beginning of the design process, the professionals relied more on ‘new professionalism’, whereas at the end of the design process the professionals relied more on ‘old professionalism’. How we interpreted this finding was that the more the professionals focused on the service outcome dimension during the modular design process, the more they relied on the idea of providing value by means of transparent choice options answering different clients’ needs, which legitimized the application of modularity in the design of their service offering. However, the more the professionals focused on the service process dimension during the modular design process, the more they relied on their current practices, on their professional autonomy, and the less legitimation they sensed for the application of modularity in the design of their service offering. Thus, it seems that the more the design activities
and choices affected the day-to-day practices of the professionals, the less the professionals legitimated the modular design. Another explanation for the finding that professionals relied more on old professionalism during the later stage of the design process can be found in the context of change management. It might be that the more the design process progresses, the less challenging (intrinsically motivating) the design activities and the more the attention for a transformational design process faltered.

The professional service design resulted in modules with functions that reflected specific customer benefits as ‘stay fit and mobile’, ‘stay safe and in balance’. The level of detail in which the different modules were pre-specified differed. The basic diagnostic modules, delivered by a nurse, were pre-specified in a great level of detail, whereas the intensive diagnostic and treatment modules delivered by ‘elite professionals’ were pre-specified on a more general level. The latter modules, therefore, offered more opportunities for personalization during delivery compared to the basic diagnostic modules. The modular service design contributed to a more person-centred variety as the different options available were made transparent by means of clear customer benefits. As such, elderly clients could be involved in configuring their own care and shared decision-making was promoted. Also, by mixing and matching the appropriate modules, an individualized treatment can be provided (Mead & Bower, 2000; Michie, Miles & Weinman, 2003; Auerbach, 2001; Kiesler & Auerbach, 2006; Rijckmans et al., 2007). At the same time, costs were reduced as a fixed number of modules were pre-specified, and thus elderly clients could not freely specify what they would like to receive. Also, the professionals formulated some mix and match rules that restrict the mixing and matching and thus the level of variety. Specifically, the basic diagnostic modules could be aligned with the other modules by using low bandwidth coordination mechanisms. As such, coordination costs were kept low. Moreover, staffing costs were reduced by handing over these modules to one, relatively cheaper, discipline: a nurse.

The identified potential of balancing person-centred care and costs by means of pre-specifying modules and standardizing these modules’ interfaces in Chapter 4, triggered the further exploration of this potential in the wider field of professional services. In Chapter 5 the main focus is on how modules are being combined to provide variety for relatively low costs. This focus on combining modules provides a nice addition to Chapter 2, where the focus was more on decomposing a service offering. The fourth research objective was formulated as follows:

*Research Objective 4: To identify how modularity in the design of professional service offerings can contribute to balancing variety and costs*

In Chapter 5, based on recent research (Spring & Bonomi Santos, 2014; De Blok et al., 2014), we propose a theoretical distinction between functional interfaces and
organizational interfaces. Functional interfaces consider the outcome-dimension of a service offering and describe the mix and match rules that guide how functional service parts can be mixed and matched in order to provide an integral answer to specific customers’ demands. Organizational interfaces refer to the process-dimension of a service offering and are the coordination mechanisms through which interdependent tasks between modules performed by different professionals (and the customer) or units are integrated. Theoretically, both types of interfaces between modules can be standardized, which may contribute to the cost-efficient recombination of modules in a variety of configurations.

The results of our multiple case studies in Chapter 5 reveal three main types of professional service architectures: ‘loosely specified, professional-oriented’, ‘mediumspecified, customer-oriented’ and ‘tightly specified, professional-oriented’. These three main types of professional service architectures differ in foci concerning balancing variety and costs. This balancing issue has been worked out in different detail levels and perspectives at which functional parts are pre-specified, in different types of interdependencies between pre-specified service parts, and in the degree to which interfaces are standardized. In the ‘tightly specified, professional-oriented’ a limited set of functional service parts are pre-specified on a high level of detail, referring to specific activities to be performed by the professional. Due to the high level of detail in which parts are pre-specified, limited freedom exists for the professional to adapt these service parts during delivery. The functional interfaces of the service parts are highly standardized and as such, the functional parts can be easily recombined in a wide variety of configurations. Therefore, variety is mainly provided by means of customizations, and costs are kept low by offering a limited set of pre-specified modules.

In contrast, in the ‘loosely specified, professional-oriented’ service architecture functional service parts are specified at a low level of detail and as such, these architectures reflect less fine-grained decompositions (Chapter 2). The functional service parts refer to stages a professional goes through, and the customer and service provider co-created the functional parts and both had a pivotal role in creating a customized service offering. The functional interfaces are limitedly standardized and were (re)formulated per customer and rather high bandwidth coordination mechanisms were used to create a coherent service offering. Thus, relatively costly ad-hoc customization is provided by professional services that applied this type of professional service architecture. The third ‘mediumspecified, customer-oriented’ professional architecture differed from the other two types in terms of level of detail in which functional parts were pre-specified, but mainly in the perspective that was used to describe the service parts. The professional services that applied this third type of professional service architecture applied a customer perspective (rather than a
professional perspective) in making variety transparent. The resulting service parts reflected clear customer benefits, and within these parts there was still freedom to slightly adapt the module during delivery. Also, much effort was put into standardizing organizational interfaces to keep coordination costs low. Thus, person-centred variety was provided at relatively low coordination costs.

6.3 Theoretical contributions

Based on the summary of this thesis provided in Section 6.2, in this section, I discuss the theoretical contributions of this thesis structured around the three main research gaps presented in Chapter 1 and in Section 6.1 of this Chapter, namely a.) the lack of conceptual clarity of what constitutes a module in professional service settings; b.) the feasibility of modularity in the design of professional service offerings considering the contingencies service characteristics and the institutional context; and c.) how modularity in professional service design could contribute to balancing variety and person-centred care with costs.

6.3.1 Conceptual clarity

This thesis demonstrates that what constitutes a module in professional services is even more unclear than is often assumed (Voss & Hsuan, 2009; Rajahonka, 2013). This thesis shows that a lack of clarity exists in:

- What is decomposed: what is actually modularized is limitedly discussed in most research and a clear conceptualization and boundary setting of the service system to be modularized is lacking. Next to decomposing the service offering, which is the service system that was the object of modularization in this thesis, some studies also included coordination processes (Chorpita, Daleiden & Weisz, 2005), management processes (Geum, Kwak & Park, 2011; Meyer, Jekowsky & Crane, 2007) or resources and facilities (Voss & Hsuan, 2009; Geum, Kwak & Park, 2011) in conceptualizing the service system to be modularized.

- How the three modular design principles are applied: it often remains unclear what design choices are made with respect to the modular design principles specific function, relative independence and standardized interface. Service modules’ functions refer to a wide variety of constituents (i.e., process steps, activities, facilities and customer aims) and are specified on different levels of detail. The interdependence, both within and between, identified or denominated service modules is hardly identified nor is it discussed how interdependencies between modules are minimized. Finally, the conceptualization of interfaces is only recently
discussed in the literature (Spring, Bonomi Santos, 2014; De Blok et al., 2014), yet how interfaces can be standardized is limitedly reflected upon.

In order to create more conceptual clarity concerning what involves a module within the context of professional service offerings, a ‘design orientation’ (Salvador, Forza & Rungtusanatham, 2002) was applied throughout this thesis. In applying such a design orientation, I did not assume that a modular supply ‘just happens/evolves naturally’ nor did I treat modularity in service design as a given characteristic. Rather, I assumed that modularity is the result of a set of (deliberate) design choices concerning the three core modular design principles: specific function, relative independence and standardized interfaces. Throughout this thesis, I unravelled the design choices following from the three modular design principles and discussed the different ways to interpret these design choices. In other words, I did not only provide ‘open’ design choices, I also discussed the choice options. Table 6.1 provides an overview of the modular design choices identified throughout this thesis and the design questions that can be used for further interpretation of the design choices.

Table 6.1 – Overview design choices to provide conceptual clarity

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<th>Design choice</th>
<th>Design questions</th>
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| 1. Identify and characterize the heterogeneity in demands of the target group | 1a. For whom to develop a modular service offering? (Ch. 3 & 4)  
1b. How to minimize heterogeneity in demands (for professional service offerings?) (Ch. 3)  
1c. To what extent is the resulting heterogeneity feasible for a modular offering? (go/no go) (Ch. 3 & 4) |
| 2. Delineating the boundaries of the service system                           | 2a. Focus on service offering: along which dimensions to define the service system to be modularized (i.e., include the outcome dimension, include the process dimension, include both)? (Ch. 2 & 5)  
2b. Which service functions need to be considered given the demand? (Ch. 2 & 5) |
| 3. Determine how a module’s functions need to be specified                   | 3a. At what levels of detail can modules’ functions be specified? (Ch. 2 & 5)  
3b. How to define module functions, i.e., define functions in terms of customer benefits or in terms of process stages or activities (Ch. 2, 4 & 5) |
| 4. Determine the type of dependence allowed between modules (i.e., pooled,   | 4a. What types of dependencies are allowed between modules? (Chapter 2, 4 & 5)  
4b. Analyse the dependencies from a customer perspective or from a provider perspective? (Ch. 4 & 5) |
| 5. The degree of interface standardization                                  | 5a. To what extent can functional interfaces (i.e., mix and match rules) be standardized? (i.e., apply a slot, bus or sectional architecture?) (Ch. 5)  
5b. To what extent can organizational interfaces be standardized (Ch. 4 & 5) |
For reasons of both conceptual clarity and transparency to the customer, I suggest identifying target groups for whom to develop a modular service offering (Design Choice 1). Without an explanation of the heterogeneity in demands, it is hard or even impossible to develop modules that reflect functions that answer the heterogeneity in demands. As a consequence, module’s functions tend to often reflect rather general process descriptions (e.g., diagnosis, treatment, aftercare), which may be too general to comply with the modular design principle ‘specific function’ (Design Choice 3). I further suggest only including the service activities to the client, i.e., the ‘direct’ service components whose common outcomes constitute a function for the client (Design Choice 2). In other words, I conceptualized services by having an outcome, and a process dimension (Grönroos, 2000), and I did not distinguish between ‘coordination’ or ‘management’ modules directed at supporting supply processes. This thesis shows that, due to the process dimension of service offerings (Grönroos, 2000), there often tends to be a sequential dependency between the (professional) service parts (Design Choice 4). This sequential dependence, in turn, results in functional mix and match rules involving entry requirements (i.e., a client has to finish module A before starting with module B, and process descriptions for the purpose of coordination (Design Choice 5).

Furthermore, this thesis shows that the design choices explicated in Table 6.1 are at least partially related and together reflect different decomposition logics (Chapter 2) and professional service architectures (Chapter 5). Based on the design choices explicated in Table 6.1, I identified six theoretically possible decomposition logics and three professional service architectures. These decomposition logics and professional service architectures are also partially related. Professional services that reflect a ‘loosely specified, professional-oriented’ architectures apply a ‘single level, process-oriented’ decomposition logic. Professional services that reflect a ‘mediumspecified, customer-oriented’ architecture apply a ‘multilevel, combined-orientation’ decomposition logic. A ‘tightly specified, professional-oriented’ architectures applies a ‘multilevel, outcome-oriented’ decomposition logic. Figure 6.1 represents the combined overview of the decomposition logics identified in Chapter 2 and the professional service architectures identified in Chapter 5. The placement of the three professional service architectures in Figure 6.1 shows that both the vertical and the horizontal axes can be considered as continuums. The vertical axis of Figure 6.1 reflects the level of detail at which service parts are pre-specified. The horizontal axis reflects a continuum with on the one extreme the functions of modules reflecting outcome’s and clear benefits for the customer, whereas on the other end of the continuum the modules reflect process-steps, or stages from a provider’s perspective.
By unravelling and explicating the design choices underlying a modular (professional) service design, this thesis provides transparency concerning the different ways the three modular design principles can be applied in (professional) service design. This transparency structures the service modularity debate, and contributes to uniformity in terminology. As a result, this thesis facilitates comparative studies by preventing researchers from comparing apples and oranges.

6.3.2 Feasibility of modularity in the design of professional service offerings

In order to analyse the feasibility of modularity in professional services, I used a contingency perspective throughout this thesis. I showed that the decomposition logics and the professional service architecture are (partially) related to the inherent service characteristics customer-induced input uncertainty and throughput uncertainty (Chapters 2 & 5) and the degree of a professionalized workforce (Chapter 5). Chapter 2 shows that service offerings characterized by high levels of input and throughput uncertainties were characterized by less fine-grained decompositions and thus less specific module functions. In Chapter 5, similar findings are presented within the context of professional services, which are generally characterized by high levels of input and throughput uncertainty (Larsson & Bowen, 1989). Chapter 5 shows that...
professional services characterized by medium levels of input and throughput uncertainties and high levels of a professionalized workforce, the service offering is decomposed in a rather fine-grained manner. The highly professionalized workforce implies highly institutionalized codes and rules (Lewis & Brown, 2012; Von Nordenflycht, 2010), which in turn may force the professionals to design a service offering in which service parts are pre-specified in more detail. Thus, this thesis shows that within the context of professional services, the levels of input and throughput uncertainties and the degree of professionalized workforce are related to the level of detail at which service parts can be pre-specified (i.e., the vertical axis of Figure 6.1) and consequently with the feasibility of a modular service design.

The results of Chapter 4 further suggest that the institutional context also has a dominant influence on the feasibility of a modular service design. In Chapter 4, we observed that professionals developed modules that were pre-specified at different levels of detail, i.e., the basic diagnostic modules were pre-specified at more detail compared to the intensive diagnostic and treatment modules. Hence, we propose that high levels of input and throughput uncertainties may render a fine-grained decomposition and detailed pre-specified service parts less feasible unless this uncertainty has been institutionalized in a way that makes much of the heterogeneity and uncertainty analysable for the professionals involved. In other words, there appear to be highly institutionalized professional codes that facilitate the classification of input and throughput uncertainties by means of codifying the client’s problem. This classification of uncertainty by means of codifying in healthcare contexts is often referred to as triage. Consequently, I suggest that professional services with high levels of input and throughput uncertainties and low levels of professionalized workforce are limitedly feasible for a modular service design. However, in professional services with comparatively lower levels of input and throughput uncertainties (i.e., medium) and a professionalized workforce, modularity is a feasible design method.

6.3.3 Modularity and the delivery of person-centred variety at reduced costs

The starting point for researching the concept of modularity was its associated potential to balance (person-centred) variety and costs. This thesis shows that modularity can contribute to this balancing, but that this heavily depends on how modular design choices are made (see Table 6.1 and Figure 6.1). A design choice with a dominant contribution to the design of person-centred care for lower costs is the way in which heterogeneity in demand is characterized, as this design choice also influences later design choices. When heterogeneity in demand is characterized by which service a client is using (profession-oriented), or by specific diseases (pathology-oriented), the starting point is not the client as a person. It follows that the designed modules will not be person-centred. This thesis shows that and how
heterogeneity can be analysed in terms of experienced unfulfilled needs of the client population, which offers a sound starting point for designing person-centred service offerings.

Furthermore, this thesis shows that besides a person-centred characterization of heterogeneity in demand, an outcome/customer-orientation in pre-specifying modules contributes to providing person-centred variety. Modules that are the result of an outcome/customer-orientation involve a combination of components which certain groups of customers always use together. Service modules which reflect a process or professional-orientation (i.e., service provider) involve combinations of process steps or activities which a professional goes generally through. Applying an outcome/customer-orientation in a modular design contributes to the provision of person-centred variety, as the different options available are made transparent by means of clear customer benefits. As such, clients can be involved in configuring their own service offering and shared decision making is promoted. Also, by mixing and matching the appropriate modules, an individualized treatment can be provided (Mead & Bower, 2000; Michie, Miles & Weinman, 2003; Auerbach, 2001; Kiesler & Auerbach, 2006; Rijckmans et al., 2007).

In Chapter 4, I show that professionals did not instantly feel comfortable with applying an outcome/customer-orientation in designing their modular service offerings. However, the outcome/customer orientation in modular service design helps to unfreeze the status quo of how services are offered (Lewin, 1947). Rather than pre-specifying modules that reflect a profession (the physiotherapy module) or a disease (the depression module) orientation, the outcome/customer orientation helped the professionals to pre-specify modules which reflected customer benefits (the ‘become fit and mobile’ module). Moreover, I argue within this thesis that applying an outcome/customer orientation in designing modular service offerings contributes to more deliberate decision making concerning the process dimension of the service modules. An example is the choice to make one professional responsible for the integral delivery of a module that involves tasks which were formerly delivered by multiple disciples. This afforded lower personnel and coordination costs and thus lower overall costs.

Chapter 4 also shows that it is hard for professionals to apply an outcome/customer orientation throughout the entire modular design process. The more design discussions about the outcome dimension were interwoven with discussions about ‘who’ delivers what and about how coordination between professionals could be achieved (i.e., process dimension), the less person-centred the resulting modular design choices. During these intertwined discussions, the focus was no longer on developing modules with a clear customer benefit, but rather on ‘turf wars’ (Mintzberg, 1980) and thus
back to a professional orientation. As a result, these choices barely resulted in person-centred service offerings or in lower costs.

6.4 Practical contributions

The findings of this thesis indicate that modularity is feasible in professional service design. Moreover, I demonstrated how modularity in professional service design can contribute to balancing variety and costs, yet I also showed that this balancing strongly depends on how underlying modular design choices are made and that there may be limits as to the degree of modularity attainable. Table 6.1 provides an overview of the underlying design choices identified throughout this thesis. Below I will elaborate on these design choices in terms of a roadmap towards modularizing a professional service offering. The presented roadmap involves six design steps, and their description includes pitfalls and points for attention. The roadmap presented in this section aims at developing a modular service offering that facilitates the delivery of person-centred care at lower costs and is based upon the design processes described in Chapter 3 and 4.

Step 0: Determine modularization aims

Before starting with a modular design process, professional service organizations should formulate aims that they would like to achieve by modularizing their service offering. Although the overall aim of applying modularity in (professional) service design is to balance variety and costs, it is a matter of degree as to whether the aim emphasizes more at providing variety or at lowering costs, and the emphasis may be path dependent (Mahoney, 2000). Within the context of professional services, modularity focusses on providing variety in a more cost-efficient manner by rationalizing the options in a hitherto unstructured supply system, where any client wish is answered. As such, transparency for clients as well as the professionals themselves can be enhanced.

Step 1: Identify target groups and their demands

A first step in developing a modular service design is to identify the target group(s). Within this thesis, I presented five elderly segments that can be used as target groups for which to develop person-centred modular elderly care (Chapter 3).

Pitfall: Using perceived unfulfilled needs of target groups as a starting point is relatively new in healthcare. Care professionals are used to providing care and services based on a specific medical problem or disease that a client brings forward, such as diabetes, a hip fracture, or high blood pressure. This thesis shows that care
professionals did not feel instantly comfortable with developing care for target groups with less supply-oriented needs specifications and instead more person-centred formulated unfulfilled needs they experienced, such as: "I feel gloomy and tense instead of content and happy with my life".

**Focus of attention:** Get a clear overview of the demands of the target groups and in what dimension(s) the demands of target groups differ from each other. Heterogeneity in demands can be analysed and explicated by means of a population segmentation study, which are commonly based on survey data. In order to gain a more in-depth overview of heterogeneity in demands, the population segmentation could be extended with interviews and panel discussions with individuals from the different segments. During these interviews the following questions could be addressed: what do you still need; what needs can you fulfil yourself; what are your particular strengths; what services would add value for you that you otherwise would miss?

**Step 2: Compose (multidisciplinary) taskforce**

It is important that representatives of care professions, management and clients that have a say are involved in the design of modules. These representatives can ensure that the ideas discussed at the meetings are fed back to their constituencies and vice versa. Care professionals need to be involved in the design process in order to create a sense of ‘ownership’ of the new service design. Also, it is important to involve a representative of the management, in order to make sure that the ideas discussed at the meetings match the organizations’ strategy. Clients should be involved in order to make sure that the developed modules are valuable answers to their unfulfilled needs.

**Pitfall:** A pitfall is that during the design process the members of the taskforce find that certain disciplines that had not yet been involved should have been involved. While representatives of these disciplines may join the taskforce at this later stage during the design process, they will have missed important meetings and may have difficulty in catching up and actively contributing.

**Focus of attention:** Before starting with the actual design process, management or the directors of the organization need to set the stage, clarify their expectations and identify goals to be met. These goals and expectations must guide the choice for the disciplines and professionals to be involved in the taskforce. The taskforce may also involve disciplines from other organizations. It is important to pay specific attention to how the goals and expectations of management correspond with the expectations and goals of the professionals who are candidates for joining the taskforce. The modular design will only reach its full potential when the members of the taskforce are motivated and willing to contribute to the overall goal of the modular design process.
A stakeholder analysis, including an analysis of the goals and motivation of the potential members of the taskforce, may help at this stage.

**Step 3: Explain the concept of modularity and specify module’s objectives**

During the first meeting, management presents their goals like, for instance, why modularize and their choices concerning delineation (Step 2). Also, an expert in the field of modularity presents the core ideas of a modular design, i.e., modules should have a specific function, modules are relatively independent and have standardized interfaces. Modularity is an abstract concept, so it is important that good examples are provided (see for example: www.riksjatravel.nl). By visualizing appealing examples of the concept, modularity will appeal to the imagination of the care professionals (and participating clients). Subsequently, care professionals need to formulate (sub)functions in terms of person-centred objectives that meet the needs of the target market. For example, for the target group ‘difficulties with psychosocial coping’, the following functions could be formulated: ‘better cope with loss’ and ‘enhance self-reliance’.

*Pitfall:* Formulating person-centred objectives that answer the needs of the target market requires care professionals to identify with the target group and to let go of their professional orientation and domain. This is difficult. Many professionals formulate objectives based on their own profession or are used to solving concrete problems.

*Focus of attention:* It is important that during the discussion, there is someone who constantly brings forward the voice of the client, the older adult. This can be done by asking questions during the group discussions such as: "do you think that these older adults think this is important / do they really need this?" This person-centred thinking should be encouraged by continuously bringing forward the voice of the older adults from a certain target group. Also, older adults can be involved during the design process by means of consultation, or letting a representative of the target group actively participate in the taskforce.

**Step 4: Explicate content-wise components of care and their interrelation**

Once the taskforce agreed upon the objectives, they need to explicate what needs to be delivered content-wise to achieve this objective. The members of the multidisciplinary taskforce form smaller groups around specific objectives. In these smaller groups, they define which components jointly meet the objective. For example, the module with the objective 'become fit and mobile’ consists of the content-wise components 'muscle strengthening' and 'advice about nutrition'. Also, the taskforce should explicate how different modules are related in terms of content. For example, the relationship between
diagnostic modules and treatment modules could be explicated by means of rules, i.e., in case of diagnosis \( A \), refer to treatment module \( A \); in case of diagnosis \( B \), refer to treatment module \( B \).

**Pitfall 1:** The pitfall in this step is that "who" delivers something is regarded as a component (e.g., physiotherapist). Who provides something is not a component; a component includes what is delivered to a client content-wise.

**Focus of attention 1:** The role of the expert in the field of modularity is to clarify what exactly is meant by components. Components refer to the smallest identifiable parts that still fulfil a function, but that cannot be offered individually. Modules are the central building blocks of a modular design and components the identifiable but not separately deliverable parts in modules.

**Pitfall 2:** A second pitfall in this step is that modules can be formulated that consist of many different components and that for every client, a different combination of components is selected. A module is not a shop from which appropriate components per client can be selected. A module consists of components that are always offered together.

**Focus of attention 2:** The role of the expert in the field of modularity to raise the question: “are these components always offered together for this target group?”This usually means that a module involves multiple touch points between the expert in the field of modularity and the taskforce. The members of the taskforce are responsible for the content of the modules, but it is the task of the expert in the field of modularity to ensure that the modules reflect the modular design principles as far as possible.

**Step 5: Optimizing the pre-specified modules and define organizational interfaces**

When the modules are described in terms of content-wise components, the next step is to optimize the work organization within the module. The level of input and throughput uncertainties determine the degree in which the work organization (i.e., who does what and when) within a module can be pre-specified. To do so, the taskforce starts with deciding which disciplines need to involved in module delivery. This decision can be made quite deliberately because the content of the modules is defined in the previous step. Subsequently, the disciplines that play a role in a module can together optimize the module in terms of service delivery specification. The level of detail in which this optimization is possible, depends on the level of input and throughput uncertainties. A tool for mapping service delivery specification is ActorActivityDiagrams (AADs). These diagrams list which activities are undertaken and in what order and who is responsible for these activities. Dependencies can also be
very explicitly described in AAD schemas. Figure 6.2 shows an example of an AAD diagram. Appendix 5 provides a legend of the symbols used in AADs.

![Figure 6.2 – Example of AAD](image)

Besides defining dependencies between tasks within a module, within this step, dependencies between modules also need to be explicated. AADs can also help in visualizing the dependencies between modules and how these dependencies are managed.

**Pitfall:** A pitfall during this phase is that domain discussions/turf wars play a dominant role. Some professionals want to emphasize their role in the care processes that need to be described, thereby inducing a supply-orientation instead of offering customer value and reducing (coordination) costs.

**Focus of attention:** The expert in the field of modularity needs to rely upon the content-wise descriptions of the modules as explicated in the previous step. Moreover, the expert can raise questions like: "Who can best deliver this combination of components?" By relying on the content-based descriptions of the modules, more deliberate design choices concerning who delivers can be made.

**Step 6: Closure of development process**

The formulated modular offering, for example in the form of a module book, can be presented by members of the multidisciplinary taskforce to their constituencies and to the clients.
The presented road map, including six design steps and their pitfalls and points for attention, provides managers and other practitioners within the context of professional services with a practical tool to develop person-centred modular service offerings. More specifically, this roadmap describes how a client-orientation can be used during a design process. The population segmentation, described in Chapter 3 is of course a key starting point in applying a customer-orientation in designing modular service offerings. As such, the practical contribution of this thesis lies in a description of person-centred elderly segments and a roadmap reflecting a customer perspective to develop modular service offerings, which together contribute to the development of person-centred variety for lower costs. This roadmap is one way to design person-centred, cost-efficient modular service offerings and there are certainly more ways to skin a cat. I, nevertheless, hope that my roadmap will inspire practitioners to make deliberate design choices about decomposing and recombining their service offerings.

6.5 Limitations and future research opportunities

As every research, this thesis also has its limitations and these form the start of and provide opportunities for future research. Below, I will first address some of the limitations of this thesis and the difficulties I encountered during this research process. Second, I will elaborate on further research opportunities.

6.5.1 Limitations

This thesis discusses the feasibility of a modular design in balancing person-centred variety and costs. However, I do not provide empirical evidence that a modular design actually results in person-centred variety for lower costs. It is difficult to provide empirical evidence that a modular service design actually results in person-centred variety for lower costs, as developing a (paper-based) modular service design is one thing, yet to put this into practice is another. Putting a modular service design into practice involves, for example, marketing activities that contribute to a transparent overview of the available modules on a website or in a brochure so that clients will be informed about the options available. Without a transparent overview of the modular supply, clients can never take control and will be less involved in decision making. Another example involves planning activities arising from the notion of shared resources. A combination of service modules can be delivered by (in part) the same professionals. This dependency arising from shared resources can be managed by the development of planning rules concerning the selection and prioritizing of these modules. Certain planning activities are also limitedly discussed in this thesis. A direction for future research is to involve these planning and the earlier mentioned
marketing activities in researching how service modularity can contribute to the delivery of person-centred variety for lower costs.

Another limitation of this thesis is that it does not discuss the financing of the person-centred modules. During the modular design process described in Chapter 4, we observed that the financing of healthcare limitedly matched a person-centred modular services offering. The financing is disease-oriented and based on care operations performed by a single discipline, rather than on multidisciplinary input directed at producing client value. The health insurance company was not keen on financing person-centred modules that involve the input of multiple disciplines. I limitedly researched the influence of the health insurance company on the development of person-centred modules. Therefore, my suggestion for future research is to also actively involve health insurers during the design process and examine their reasoning and influence on the development of person-centred modular service offerings.

Also, this thesis provides primary data of only one modular design process. Although multiple design processes were followed during this research project, only one resulted in a modular design. Other design projects I observed were either not completed, or the results did not focus on service offering redesign. This limitation is probably the result of modularity being an emerging concept in (professional) service design and only a few studies researched a modular design process within a professional service setting (Chorpita, Daleiden & Weisz, 2005; Meyer & DeTore, 2001; Meyer, Jekowsky & Crane, 2007). I tried to overcome this limitation by using additional data on six other cases that already (partly) applied modularity in the design of the service offering (Chapter 5). Against a theoretical design framework that explicates the design choices, I compared the ways in which the emergent concept of modularity was applied in practice. It stands that the results would have been stronger when data of multiple case studies describing modular design processes in the context of professional services could have been compared (Yin, 2009).

Related to the constraints met in finding cases that provide insight into modular design processes was the difficulty that modularity and other associated concepts discussed in this thesis were not explicitly used in practice. A modular way of working was deliberately chosen by only one case organization (i.e., the case organization where I also researched the modular design process). All other cases did not deliberately design their service offering in a modular fashion. As the service providers were not familiar with the concepts used in this thesis, misinterpretation was a risk. We provided the interviewees with figures and examples of modular service designs to (at least partly) overcome this risk. Also, after explaining the interviewees the concept of modularity, we carefully checked whether they understood the main modular design principles.
6.5.2 Future research directions

An opportunity for future research would be to compare different decomposition logic and design approaches to modularize a service offering. Within this thesis, I focus on a design approach which involves a multidisciplinary group of professionals whom together develop a modular supply. Another design approach is described by Chorpita et al. (2005), who compared treatment protocols for different psychological conditions and identified a set of common parts. The different design approaches can be compared in terms of design process and outcomes. The approach described in Chapter 4 of this thesis can be characterized as a ‘bottom-up’ approach, as the modular service offering is developed from scratch. The approach described by Chorpita et al. (2005) can be characterized as more ‘top-down’ as they describe the decomposition of a given set of treatment protocols. It would be interesting to compare a relatively more ‘bottom-up’ approach with a relatively more ‘top-down’ approach. It would be interesting to see how the resulting modular designs differ. Do all roads lead to Rome, i.e., equifinality, or does the design method affect the resulting service architecture/offering and constituting modules and mixing and matching rules?

Another opportunity for future research involves investigating the relationship between a modular service design and service performance. This thesis shows that multiple types of decomposition logics and professional service architectures are possible, and it would be interesting to study how these different types actually contribute to performance, in terms of affording person-centred variety and lower costs. As modularity has been associated with performance dimensions such as management of complexity and innovativeness (Ulrich, 1995; Baldwin & Clark, 2000; Ethiraj & Levinthal 2004b), it would be interesting to also consider the effect of modularity on these performance dimensions. More specifically, the performance of modular designs generated by a bottom-up versus a top-down approach could be compared. Different kinds of decomposition logics and professional modular architectures could be compared. For instance: does an outcome oriented modular design indeed result in relatively more person-centred service delivery?

Also, a deeper analysis of the fit between service characteristics input and throughput uncertainties and the type of modular design requires further research. In this thesis, I compared the application of the three modular design principles: specific function, relative independence and standardized interface in different professional services. In this comparison, I did not involve professional services characterized by a high level of input uncertainty and a low level of throughput uncertainty, or at low levels of input uncertainty and a high level of throughput uncertainty. As a result, I cannot comment on the individual effects of input uncertainty nor throughput uncertainty on the application of the modular design principles. Therefore, my suggestion for future
research is to select multiple cases that are characterized by extreme levels of either input- or throughput uncertainty and to analyse their effect on the application of the modular design principles.

6.6 Concluding remarks

This thesis contributes to a.) a sharper conceptualization of what modularity involves within the context of professional service offerings and b.) a better understanding of the merits and of the boundaries in applying modularity in professional services. By explicating the central design choices underlying a modular service design, I stress that modular service design is not something that just ‘happens’ or slowly ‘evolves’. In contrast, it is the result of a complex and time-consuming design process involving choices that are contingent upon one another. In order to apply modularity in a way that facilitates person-centred variety at low(er) costs, I stress the importance of starting with a person-centred segmentation, use this segmentation as the input for a bottom up design of modules for the service offering, and to distinguish between service-outcomes and service-processes during this modular design process. This design process thus proposed facilitates a discussion among professionals about the reframing of their combined offerings. I hope I inspired professional service providers to critically reflect upon the extent to which their designs comply with modular design principles and that they consider this thesis helpful in designing care that will be more efficient and more person-centred.