How Relationships Can Be Utilized For Service Bundling

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ABSTRACT

The phenomenon of organizations offering service bundles can typically be observed in dynamic markets with heterogeneous customer demand. Available literature broaching the issue of service bundling covers strategic considerations for organizations related to their respective market position as well as their pricing options for different bundle configurations. However, little guidance can be found regarding the identification of potential bundle candidates and the actual process of bundling. In this paper, we present an approach to service bundling that can be utilized by organizations to identify services that are suitable for bundling. The contribution of the paper is twofold. Firstly, the proposed method represents a structured conceptualization approach for organizations to facilitate the creation of bundles in practice based on empirical findings. Secondly, from a Design Science research perspective, the proposed method represents an innovative artifact that extends the academic knowledge base related to service management.

Keywords

Service, service-orientation, bundling.

INTRODUCTION

The creation of bundled offers of services and goods with distinguishing and superior characteristics compared to existing offers has long been recognized as an opportunity for companies to increase their competitive advantages over rival contenders in the market (Lawless 1991). Generally, a bundle represents a package that contains at least two elements and presents some kind of value-add to potential consumers. In the travel industry, for example, bundling is common and well-known. For instance, a travel business might offer a service bundle that combines three nights of accommodation in a hotel on a tropical island together with a one-day diving trip. Consumers might perceive the diving trip as a distinguishing characteristic of the offer and decisive factor for selecting this bundle.

Bundling as a concept has been analyzed from the provider perspective as well as from the consumer perspective in order to describe and explain the phenomenon (for example Gordijn, de Kinderen and Wieringa 2008; Stremersch and Tellis 2002). The former perspective aims at providing insights into different strategies that can be pursued by organizations to bundle different products and services. The second perspective focuses on customer demand to identify bundles and measure their utility for customers. The rationales for choosing a bundling strategy as well as the specific types of bundles selected can vary based on the given environmental conditions.

While a considerable amount of literature addressing the process of service design or new service development can be found today (e.g. Froehle and Roth 2007; Menor, Tatikonda and Sampson 2002), much less is known about approaches that facilitate the creation of adequate service bundles. Despite the fact that companies across all industry sectors with increased market pressures are challenged by the issue of service bundling (Akkermans, Baida, Gordijn, Peiia, Altuna and Laresgoiti 2004), only little guidance has been provided so far for the identification of potential bundle candidates and for the actual process of bundling, whereas much has been written about strategic objectives and pricing strategies for bundling decisions.

In this paper, we aim to address this gap. Not only do we provide insights into foundational aspects and the process of bundling, we also propose a new service bundling method that will support organizations in finding service bundles that could potentially be offered to service consumers. This research can be positioned in the area of Design Science: by proposing a new service bundling method, the objective is to develop an "artifact" to "solve a contemporary problem"

(Hevner, March, Park and Ram 2004). However, the evaluation of the artifact, although it is a constituent part of Design Science, is not in scope of this paper, since we report on research in progress.

The remainder of this paper is structured as follows. Based on the problem description that has been provided in this section, we first define and clarify the term bundling along with related terms to explicate the underlying understanding of the concept of bundling for this work. Secondly, we describe different approaches found in the academic body of knowledge that could potentially be used to support the process of bundling, which also helps us to clearly position the approach described in this paper. Subsequently, core aspects and foundations of the proposed approach are presented. In addition, a first set of relationships derived from existing bundles is presented. The paper ends with a conclusion and directions for further research.

POSITIONING SERVICE BUNDLING

Terminological and Conceptual Clarifications

In order to be able to elaborate further on what service bundling entails, it is imperative to clarify our view on related terms that are used in different research communities, such as marketing and computer science. Although these worlds more and more coalesce, we derive the meaning of the terms service and bundle mainly from marketing, while we refer to the field of computing for characterizing the terms aggregation and composition. Figure 1 provides an overview of how the concepts denoted by these terms relate.

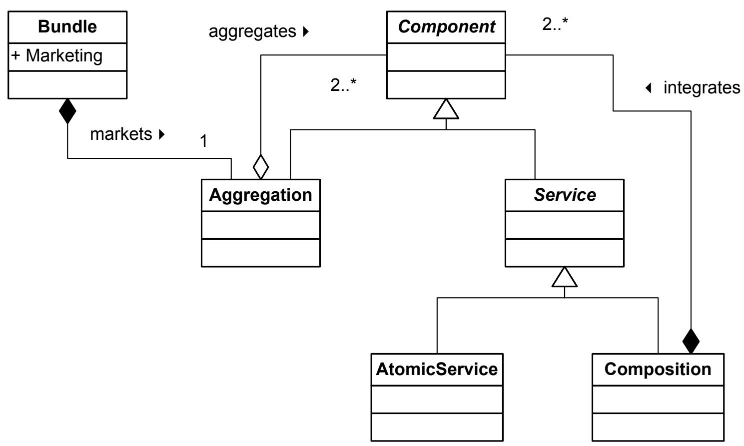

Figure 1: Conceptual Relationships (In Unified Modeling Language notation)

Service: Nowadays, the term "service" is loaded with different meanings depending on the specific context and universe of discourse. There is no overall standardized definition of service (Baida, Gordijn and Omelayenko 2004). Taking a marketing perspective, Grönroos (2007) states that a service is "a process consisting of a series of more or less intangible activities that normally, but not necessarily, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems.". The most cited service characteristics are intangibility, inseparability (of production and consumption), heterogeneity (or non-standardization), and perishability (or exclusion from inventory) (Zeithaml, Parasuraman and Berry 1985). However, these characteristics are often seen as a negative view upon service (e.g. as non-goods) and emphasizing the view of the provider (Vargo and Lusch 2004). They do not adequately capture the essence of services, in particular their process and interactive nature (Edvardsson, Gustafsson and Roos 2005). Therefore, Edvardsson et al. (2005) conclude that "we should not generalize the characteristics to all services, but use them for some services when they are relevant and in situations where they are useful and fruitful."

Aggregation: The generic term "aggregation" is defined as "a group, body or mass composed of many distinct parts or individuals" (Anonymous 2009). Hereby, the distinct elements may be loosely associated with each other or share certain attributes. However, the elements within are distinctively identifiable, only sharing certain commonalities in their characteristics. The generic understanding of aggregation is also found in literature related to computer and business science. For example, in object-oriented modeling and programming it is used to express specific relationships and ownership considerations between multiple objects. The typical understanding in that domain is that an aggregation will still exist, even if component services are removed from the aggregate (Evermann and Wand 2005). That also relates to the business domain, where an aggregation would comprise multiple services and provide access to them in a single location (O'Sullivan, Edmond and ter Hofstede 2002). As visualized in Figure 1, the class "Aggregation" puts together two or more "Components", which in turn can either be aggregations themselves or services.

Composition: A service can either be an atomic service, which is not composed of other services, or it can be a composite service, which comprises other services. Thus, a composition can be regarded as a "condition consisting in the combination or union (material, practical, or ideal) of several things" (Anonymous 1989b). Similar to the term "aggregation", the term "composition" can be found in the domain of software engineering as well. However, in contrast to an aggregation, which will still exist if one component element is removed from the aggregation, a composition would cease to exist in case a constituent component service is removed, based upon structural dependencies between these elements (Evermann and Wand 2005). A composition refers to a tightly-coupled integration of sub-services, thus adding value not present in the individual constituent services (O'Sullivan et al. 2002). Particular emphasis should be placed on the notion of integration and its relation to composition. A composition, a new whole, emerges through the integration of multiple (at least two) components. Integrating different components means to put them in a certain order and combine them. This notion is different to an aggregation, where components do not need to be ordered or combined. As compositions are also components (they represent a new whole), they can be part of aggregations.

Bundle: The generic definition of a bundle is "a collection of things bound or otherwise fastened together" (Anonymous 1989a). For this paper, we will specifically analyze the concept of service bundles. While the generic definition basically forms no constraints on the elements within the bundle, the marketing literature is more specific and generally agrees on the definition by Guiltinan (1987), who states: "*Broadly defined, bundling is the practice of marketing two or more products and/or services in a single 'package' for a special price.*" Stremersch and Tellis (2002) define bundling as "*the sale of two or more separate products in one package*". The authors further define separate products as products for which separate markets exist. With this definition they try to draw a distinct line between compositions and bundles to preserve the strategic importance of bundling. Thus, bundling adds marketing aspects to aggregations. A bundle is not equivalent to an aggregation, as an aggregation does not possess additional properties (e.g. price) for the whole. Although a pure composition is also characterized by additional properties, it is not equivalent to a bundle, as a bundle consists of distinguishable components and a composition integrates its components to form a single new service.

Related Work and Alternative Approaches

The objective of this research is to provide a service bundling method. A review of the academic knowledge base yields various possible approaches that can be utilized to identify service bundles.

For example, the area of artificial intelligence (AI) research offers techniques that can potentially support the design of solutions to the service bundle identification problem. Particularly, machine learning solutions are conceivable that can "learn" from existing successful service bundles to identify or propose new service bundles (e.g. Russell and Norvig 2002). A general problem of machine learning is that it usually does not yield absolute guarantees of the performance of algorithms. Moreover, in spite of many successes, AI research in general has been the target of fundamental criticism (e.g. Dreyfus 1979). To the best of the authors' knowledge, comprehensive AI approaches to identify and analyze new service bundles are not existent in the academic knowledge base.

Business Intelligence (BI) employs systems that "*combine data gathering, data storage, and knowledge management with analytical tools to present complex and competitive information to planners and decision makers*" (Negash and Gray 2003). Hence BI is used to analyze existing data to support future decisions. Within BI, the area of Association Rule Mining can be employed to identify bundle candidates. This mining approach analyses basket data type transactions, for example receipts from a supermarket, to identify items that are frequently bought together within one transaction (Agrawal, Imielinski and Swami 1993). The identified so called *frequent item sets* are used for recommender systems to offer customers related products, hence enabling cross-selling potentials (e.g. Amazon.com).

The ideas of Semantic Web approaches can be utilized as well. These approaches generally require three sorts of machine-understandable information: "*ontologies to define vocabulary, data about observations of the world, and theories that make predictions on such data*" (Poole, Smyth and Sharma 2008). An ontology specifies an explicit, simplified view of the world (Gruber 1993). Berners-Lee et al. (2001) explain that "*the Semantic Web will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users*". Using these artifacts, it is possible to model the relations between services and reason about them. This has been done for web services in the Web Service Modeling Ontology (WSMO) (Roman, Keller, Lausen, de Bruijn, Lara, Stollberg, Polleres, Feier, Bussler and Fensel 2005) and for real-world services using the OBELIX (Ontology-Based Electronic Integration of Complex Products and Value Chains) service ontology (Akkermans et al. 2004).

A different semantic approach utilizes Latent Semantic Indexing (LSI), also called Latent Semantic Analysis (LSA). Latent semantic indexing is an "*information retrieval technique based on the spectral analysis of the term-document matrix*" (Papadimitrou, Raghavan, Tamaki and Vempala 2000). This is done through the creation of vector spaces using a mathematical technique called singular value decomposition (SVD). The created vector spaces can be queried for the semantic distance (usually expressed as a vector) between two terms or service descriptions, and the so found semantic relationships can be utilized to identify clusters or bundles of services. LSI requires no formal ontology that classifies the different elements of a service (Prokopp 2006) and uses unstructured text documents as the only source of information. Several limitations to LSI restrict its usage, the main drawback being that the underlying vector space model "*is unable to convey any relationship [...] existing between the terms*" (Chu 2007).

All of the introduced identification approaches can be expected to provide interesting results for a bundling method. As motivated in the next section, this method is based on service descriptions. Thus, a semantic approach has been chosen. Instead of employing a formal ontology, the notion of relationships is used to discover semantics between services. This ensures the simplicity of the method and its utility across a range of different service descriptions.

The single work that specifically targets service bundling is from Baida (2006). The author used an ontology-based approach "*to facilitate the automation of the service bundling task*". The created ontology includes the notion of resources as prerequisites or outcomes of service elements and so-called functions and relationships that define dependencies between two service elements (e.g. enhancing, excluding, and substituting). Using a given customer demand by expressing required resources, the method can create service bundles that satisfy the demand and adhere to the predefined set of dependencies between services. The author named his approach "Serviguration" to express his view of service bundling as a configuration task. A detailed discussion of the differences and distinguishing characteristics of the "Serviguration" approach and the proposed approach will follow in the next section.

CONCEPTUAL FRAMEWORK FOR A SERVICE BUNDLING METHOD

Preliminary Considerations

The purpose of this method is the identification of possible service bundles. It is designed to support the process of bundle creation in its early stages. The method therefore focuses on limiting the solution space of possible bundles, using indicators that express some form of bundling motivation.

It is important to point out that this method is not supposed to omit the evaluation of bundles by a domain expert. It has to be acknowledged that the domain expert is still needed to evaluate the overall feasibility of bundles, since this requires complex analysis, often utilizing tacit knowledge across a range of different disciplines (e.g. economy, marketing, legal). Rather, the aim of this method is to limit the scope of the necessary evaluation for the domain expert.

This approach is particularly useful when a large number of services are available, which is a common scenario particularly in business networks or service ecosystems (Riedl, Boehmann, Rosemann and Krcmar 2009). Since a human expert would be overwhelmed by the task, the proposed method could be applied in an automated way using a corresponding support tool in order to quickly constrain the solution space of possible bundles. Consequently, the domain expert can focus on evaluating only the short-listed bundles that somehow indicate a bundling opportunity.

Baida (2006) relies on a given customer demand to drive the creation of service bundles. While this approach can be useful for situations where customer demand is well known and understood, poor performance can be expected when demand is hard to capture or anticipate. Furthermore, the economically desirable situation where customer demand is induced by a new service offering is not supported at all. Our proposed method explicitly targets the latter case by focusing on the creation of new and innovative service bundles. Therefore, customer demand is not utilized to reason about the suitability of potential bundles in this method. Instead, the driving source of this method is a repository of services that are available for bundling. Depending on the given context, this repository might consist of the services of a single provider, a provider network or even contain all available services in a service ecosystem.

The bundling method created by Baida (2006) identified six distinct relationships that define dependencies between two services: core/enhancing, core/supporting, bundled, substitute, excluding, optional bundle. The (manual) evaluation of all services regarding these relationships is a prerequisite for the actual bundling process, as the feasibility of bundles is determined by the existing relationships. This evaluation is a time consuming task, one that becomes practically impossible to handle for a large set of services.

The proposed approach is therefore based on a service description which does not necessitate the step of explicating relationships between services. Instead, this method uses commonalities of attributes that indicate such a relationship. As long as services are consistently described and attributes relevant for this bundling approach are present, the proposed method can be employed.

The following sections will explain different aspects of the proposed method in detail. First, the term relationship, as used in this method, is introduced and detailed. Moving on, the idea of treating service bundling as a configuration task is outlined. Building upon these foundational aspects of the method, the last section is concerned with deriving a first set of generic relationships.

Leveraging Relationships between Services

Herrmann et al. (1999) found that functionally complementary components in a bundle lead to high intentions to purchase compared to bundles in which no complementary components are present. The authors state that, "*as the relationship among the components increased from "not at all related" through "somewhat related" to "very related", intention to purchase also increased".*

This method builds upon these findings and the conjecture that other commonalities or relationships between services can also indicate potentially useful bundles. For the remainder of this section, an example of a bundle is used to illustrate the different core concepts of the method. The bundle contains a flight from Brisbane to Frankfurt on the 15. November 2010 with Qantas Airways in Business Class and a one night stay in a deluxe suite at the 5-star Hilton-Hotel in Frankfurt's Central Business District. It is assumed that both services are described in as much detail as necessary for the particular scenario. For this method the term relationship is defined as *a connection, whose existence can be evaluated by a logic expression.*

A relationship builds upon attributes from services' descriptions. Every relationship refers to previously specified attributes (e.g. location of the hotel, destination of the flight) and evaluates them using a given logic (e.g. distance between destination airport and location of the hotel). This evaluation can be realized ranging from simple value comparisons of single attributes to complex algorithms using multiple attributes. Figure 2 illustrates the coherence between the mentioned terms using UML.

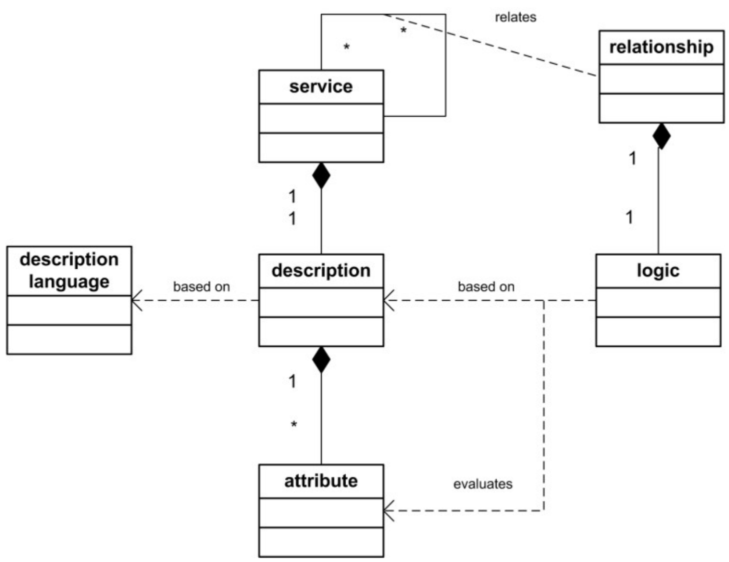

Figure 2: Concept of a Relationship

Relationships can display varying degrees of strength. In the given example, the distance between arrival airport and hotel determines the strength of this relationship. It depends on the concrete scenario and type of involved services as to whether a certain distance translates into a strong or weak relationship. Therefore the domain expert can configure the logic, where this is applicable. In the given example the distance is 12 km, which might be seen as a strong relationship.

A relationship can play two different roles (or even both roles) within a service bundle. As an *enabler*, a relationship can be used to explain the strategic reasoning of the bundle. For example, reasons for offering the given example might be that both services target a certain customer segment, the possibility of high discounts on the hotel due to economies of scale and the convenience aspect for the customer buying both services from one provider. An enabling relationship can be connected to a strategic reason to bundle.

On the other hand, as a *constraint*, a relationship expresses certain constraining factors. For example, in a bundle comprising a flight and a hotel at the arrival location, dependencies cover aspects of spatial and temporal availability and the sequence of consumption amongst others. Thus, relationships between services can be utilized to determine the feasibility of a service bundle. A relationship cannot per se be classified as an enabler or a dependency. Instead, the concrete situation determines which role a relationship plays.

Furthermore, this method makes a distinction between two types of relationships, namely generic and domain-specific relationships. A generic relationship is used independently of a concrete domain. These relationships evaluate connections of a general nature that can be found across a range of different domains. The evaluation of generic relationships does not require a domain-specific awareness.

A relationship (called specific relationship hereafter) only applies to certain domains. These relationships are therefore domain-specific and can be tailored for concrete bundling scenarios. The distinction between enabling and constraining relationships can help to find specific relationships. Enablers might be derived from strategic objectives, while constraints could be derived from existing requirements towards service offerings. Figure 3 shows that the combination of possible roles and types lead to four distinct relationship shapes. The following paragraphs will discuss the four possible combinations.

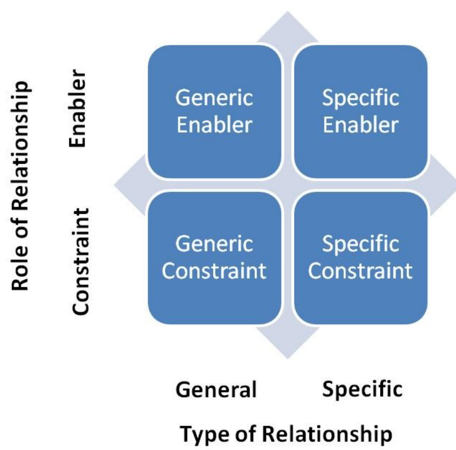

Figure 3: Roles and Types of a Relationships

Generic Constraint A generic constraint limits the amount of possible combinations of bundles without regarding a specific domain. For this example, the destination of the flight and the location of the hotel have to match, otherwise the bundle is not a valid bundle and cannot be offered to the market.

Generic Enabler A generic enabler can be used to reason about the existence of a bundle, while disregarding a specific domain. In this example, a generic enabler might be the relation that both services target senior business travelers and are in the upper price segment.

Specific Constraint A specific constraint limits the amount of possible combinations within a specific domain. In the example, this might be the ability to earn miles for the same frequent flyer program for both services. Therefore the hotel has to credit Qantas Frequent Flyer points for the stay for the bundle to comply with this constraint.

Specific Enabler A specific enabler can be used to reason about the existence of a bundle within a specific domain. For this example, one might think of the possibility that Qantas receives a high discount on the hotel's standard rates for a previously agreed amount of stays. This could enable the bundle as Qantas is able to offer the bundle at a competitive price and/or extract a high margin.

Constraining the Solution Space

This section shows how, based on identified relationships and given service descriptions, the vast amount of possible service bundles can be filtered in a structured manner to finally extract the most promising bundling candidates. To understand the following approach, the notion of configuration has to be introduced. Configuration is defined as

"a special type of design activity, with the key feature that the artifact being designed is assembled from a set of pre-defined components that can only be connected together in certain ways" (Mittal and Frayman 1989).

For this service bundling method the artifact being designed would be the service bundle and the *pre-defined components* are the available services.

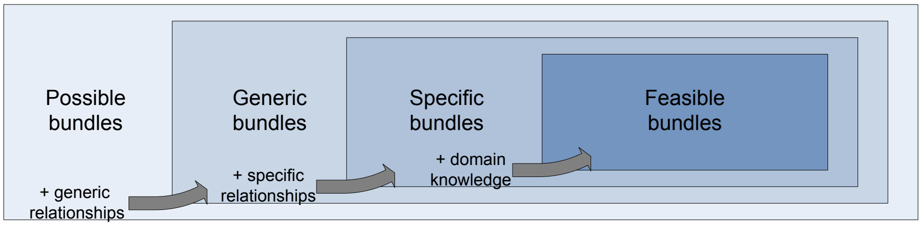

Figure 4: Constraining the Solution Space

ten Teije et al. (1998) consider a configuration task as a search problem. The authors state that the configuration space can be restricted in multiple steps. Restricting the configuration space by the possible connections leads to the *possible configuration space*. Applying further constraints leads to the *valid configuration space*. Based on this, user requirements are applied to form the *suitable configuration space*.

The act of bundling can be seen as a configuration task, along the lines as it has been utilized inter alia by Baida (2006) to model service bundles. Hence, the approach of constraining a solution space by adding requirements in multiple steps adequately supports the act of service bundling. Figure 4 illustrates these steps, which are explained in detail in the following paragraphs.

Possible Bundles The service repository containing all available services serves as a starting point to form the overall solution space. *Possible bundles* refers to all possible combinations of these services, regardless of validity or feasibility.

Generic bundles *Generic bundles* are a subset of all possible bundles which have generic relationships. Since generic relationships do not have to be created or tailored for a specific scenario or domain, they can be easily applied. These bundles are called *generic*, as the indication to bundle is of general nature and oblivious of the domain. Bundles that do not fulfill the requirements of applied generic relationships (e.g. a bundle containing two services that are offered in different cities) are excluded from this set.

Specific bundles Based on the set of generic bundles, *specific relationships* that are specific to the domain are evaluated, which leads to a set of *specific bundles*. These bundles are called *specific*, as domain-specific relationships are strong indicators for bundling (compared to generic relationships), since they take a specific environment into account.

Feasible bundles Once specific bundles are identified, further domain knowledge has to be applied to extract a set of *feasible bundles*. This includes the validation of the bundles with regard to internal and external requirements. Internal requirements might include the strategic alignment of the bundle, quality, service level and risk assessments and other aspects along these lines. External requirements, for example customer demand, market saturation and legislation, also have to be evaluated. The value of a bundle increases with each step-up into a smaller subset of the solution space. As this work focuses on the identification of bundling candidates, the creation of feasible bundles is out of the scope of this work. While *generic* and *specific* bundles can be identified using the presented notion of relationships, feasible bundles require a domain expert, as the final compilation of a bundle requires complex analysis, which can only be supported to a certain extent by analyzing the relationships between services. It has to be acknowledged that the proposed steps to constrain the solution space, shown in Figure 4, are only one out of multiple possible ways to derive feasible bundles. Depending on the situation and the bundling objective it might be appropriate to change the order of applied relationships or to make a further distinction between enabling and constraining relationships. This would consequently lead to different and/or more subsets than previously described.

EMPIRICAL DERIVATION OF AN INITIAL SET OF GENERIC RELATIONSHIPS

Analysis of Existing Service Bundles

The previous sections have introduced the notion of relationships in a bundling context and explained the difference between generic and specific relationships. This section aims at deriving a first working set of generic relationships that can be used to constrain the solution space.

An empirical approach was chosen to analyse existing service bundles and to identify relationships that exist between the components of the bundle. For this purpose, a questionnaire was designed listing a total of 28 bundles. These bundles were either concrete existing real-world bundles (e.g. Flight Brisbane to Frankfurt + Accommodation in Hotel Savigny**** Frankfurt City) or generic representations for common combinations (e.g. Phone Landline + ADSL). Since it is possible that relationships between goods might be identified that are also valid for services, the questionnaire is not limited to services. Instead it contains bundles that are composed of services, goods or a combination of both.

The questionnaire was completed by five people from different research backgrounds. The participants had no prior exposure to the bundling topic in order to gain unbiased results. Since the requested task was not easy to describe generically, an example answer was provided. For the first bundle of the questionnaire *Flight Brisbane to Frankfurt + Hotel Savigny**** Frankfurt City* the example was given that both bundle components have a common location, since the arrival city of the flight is the same as the location of the hotel.

General Findings

Since the questionnaire was highly explorative, the results varied strongly in terms of quality and creativity. Some participants were biased by the given example and evaluated the bundles mostly with regard to the relationships already provided by the example. Some participants focused on customer demand. While it is obvious that most of the bundles relate to a certain customer demand, this information is not available in a service repository. Positioned as a bottom-up approach, this method does not require a previously defined customer demand and findings related to customer demand were disregarded.

Identified Generic Relationships

Location: Apart from the given example, all participants identified other bundles with location relationships. This was mainly found in service bundles that included a transportation service. In one instance a location relationship was also identified for a service bundle that required the customer's physical presence for service invocation and consumption. One participant also noted varying degrees of the relationship stating that within one bundle the locations are 120km apart.

Time: Two participants indicated that relationships in terms of timing are also present. The mentioned bundles contain services that are consumed in a certain order. Therefore, along the lines of the location relationship, the time relationship indicates temporal availability, a requirement for the sequential consumption of bundle components.

Resource: Three participants found relationships regarding the resources of a bundle. For example in the bundle *Phone Landline + ADSL* it was noted that both components share the same transport medium. For the bundle *Phone Landline + Unlimited Local & Nation Calls* and the bundle *Wii Gaming Console + Game Wii Sports* one person noted that the first component is a required resource for the second component. Along these lines, two participants identified that all products in the Bundle *Multi Purpose Cleaner, Windscreen Wash, Wash & Wax, Paint Protector, Glass Wipes, Bucket, Sponge* target the same object, a customer's car. These findings are all based on the fact that services can require external resources. Hence this relationship is called Resource relationship.

Event: Two participants found that the components in some bundles support certain Events. In the bundle *Cup of Coffee + Cake of the Day* the events *Break* or *Snack* were seen, while the bundle *2 Pizzas + 2 Movie Tickets* might apply for the events *Night with friends* or *Going out*. The notion of an event can be seen as a generic type of customer demand, since a general context is applied.

Customer group: Two participants also identified bundles with components targeting a certain customer segment or group. For example the bundle Wii *Gaming Console + Game Wii Sports* was classified as targeting *gamers*. One participant indicated that most bundles target either a business or leisure customer segment.

Compensation: Two participants stated that some bundles contain components to counterbalance disadvantages of another component. This relationship was seen in the bundle *Flight Brisbane to Frankfurt + Single-Trip Essentials-Travel Insurance Worldwide*, where the insurance is a means to compensate for the risk of international travel. Within the bundle *Flight Brisbane to Frankfurt + Expedia Global Calling Card*, the calling card was seen as a means to ease communication challenges imposed by the long distance and within the bundle *Flight Brisbane to Frankfurt + FlyGreen with Terrapass (Carbon Offset Program)*, the carbon offset program was seen as a countermeasure to the increased personal carbon footprint due to the flight.

Capability: Two participants also found bundles with components related to their purpose, usage or capability. For example, the components in the bundle *Multi Purpose Cleaner, Windscreen Wash, Wash & Wax, Paint Protector, Glass Wipes, Bucket, Sponge* were all identified as serving the purpose of cleaning a car.

Complementarity: Four participants also indicated some form of general complementarity relationship between the components.

Compatibility: One participant evaluated the bundles in terms of the compatibility of the components. He stated that within multiple bundles the components are technically compatible.

Customer demand: One participant indicated that nearly all bundles have related components, as they satisfy a certain customer demand.

Category: Two participants also indicated that most bundle components reside in the same or a similar category.

The set of generic relationships derived from existing service bundles will have to be supplemented by domain-specific relationships. The identification of the latter type of relationships, however, is beyond the scope of this paper and remains subject to future work.

CONCLUSION

This paper describes a novel approach to identifying service bundle candidates and proposed a method for service bundling. We relate this approach to a defined terminology and clearly position bundling to avoid ambiguous interpretations. Because of its potential to combine innovation with cost-effective re-use of existing services, we envision that service bundling will become as important as new service development as, for example, can be seen in the growing attention for mash-ups. However, while the process of new service development has been extensively researched and conceptualized, the process of finding suitable service bundling candidates is still ill-defined.

The proposed method facilitates the creation of bundles by providing organizations with systematic and practical guidelines. The method is a contribution to Design Science research in the field of Information Systems. It represents an innovative artifact that extends the academic knowledge base related to service management. The developed method builds on service bundling concepts from both the marketing and the technological literature, thereby addressing the increased need for business-IT alignment. As such, it also is an example of a multi-disciplinary approach that builds on existing research in different areas and extends this research in new directions.

Based on the descriptions and explanations in the previous sections, multiple directions for further research can be identified. First, the “service bundling” task needs to be positioned as part of a management discipline. First insights suggest to position service bundling as a key task of service portfolio management, but further research needs to be conducted. Second, research in the area of service descriptions has to be conducted to develop a universal service description language that is applicable across industries and covers business as well as software services. Alternatively, extant service description languages need to be analyzed to determine in how far they accommodate the identified relationships and provide possibilities to be extended. Third, strategies and rationales of service bundling need to be analyzed further, to provide valuable insights for the internal and external validation of initially identified bundles. While we have shown that generic relationships can be derived from existing service bundles, it also remains further work to validate the general utility of these relationship constructs and to derive specific relationships for different domains. At this stage, the proposed relationships have to be seen as a working set, which will evolve as additional studies and evaluations are carried out.

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