Conceptualizing a Bottom-up Approach to Service Bundling

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Abstract. Offering service bundles to the market is a promising option for service providers to strengthen their competitive advantages, cope with dynamic market conditions and deal with heterogeneous consumer demand. Although the expected positive effects of bundling strategies and pricing considerations for bundles are covered well by the available literature, limited guidance can be found regarding the identification of potential bundle candidates and the actual process of bundling. The contribution of this paper is the positioning of bundling based on insights from both business and computer science and the proposition of a structured bundling method, which guides organizations with the composition of bundles in practice.

Keywords: Service, service-orientation, bundling

1 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 [1]. Generally, a bundle represents a package that contains at least two elements and presents a value-add to potential consumers.

While a considerable amount of literature addressing the process of service design or new service development can be found today, less is known about approaches that facilitate the creation of superior service bundles. Despite the fact that companies across all industry sectors with increased market pressures are challenged by the issue of service bundling [2], Moreover, little guidance has been provided so far for the identification of potential bundle candidates and for the actual process of bundling. The single work that specifically targets service bundling is from Baida [3].The author used an ontology-based approach "*to facilitate the automation of the service bundling task"*. Using a given customer demand by expressing required resources, the

configuration method ("Serviguration") creates service bundles that satisfy the demand and adhere to the predefined set of dependencies between services.

In this paper, we provide insights into the foundation and the process of bundling. We propose a new service bundling method that supports organizations in identifying potential service bundles that they could offer to consumers.

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 from business and computer science to explicate the underlying understanding of the concept of bundling for this work. Subsequently, core aspects and foundations of a proposed approach are presented. The paper ends with a conclusion and directions for further research.

2 Positioning Service Bundling

In order to be able to elaborate further on what service bundling entails, 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. Fig. 1 provides an overview of how the concepts denoted by these terms relate.

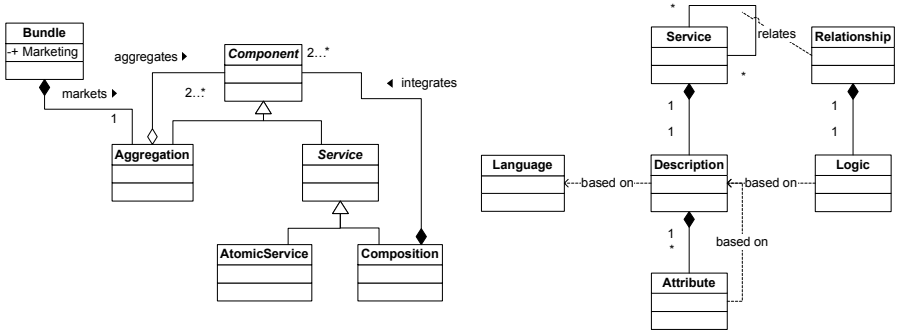

Fig. 1. Conceptual Relationships (in Unified Modeling Language notation)

Service: 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 [4]. Taking a marketing perspective, the most cited service characteristics are intangibility, inseparability (of production and consumption), heterogeneity (or non-standardization), and perishability (or exclusion from inventory) [5]. However, these characteristics are more and more critiqued. Therefore, Edvardsson et al. [6] 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." They conclude that at a general level, a service is better conceived as a 'perspective' on value creation.

Aggregation: The generic term "aggregation" is defined as "a group, body or mass composed of many distinct parts or individuals" [7]. 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. Elements may be ordered along a process or integrated to a certain extend as long as the elements are still distinctively identifiable. The typical understanding in the computer science domain is that an aggregation will still exist, even if component services are removed from the aggregate [8]. That also relates to the business domain, where an aggregation comprises multiple services and provide access to them in a single location [9].

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" [10]. 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 still exists if one component element is removed from the aggregation, a composition ceases to exist in case a constituent component service is removed, based upon structural dependencies between these elements [8]. A composition refers to a tightly-coupled integration of sub-services, thus adding value not present in the individual constituent services [9].

Bundle: The generic definition of a bundle is "a collection of things bound or otherwise fastened together" [11]. 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 Stremersch and Tellis [12], who 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 tightly integrates its components to form a single new service.

3 Conceptual Framework for a Service Bundling Method

The proposed method is targeted at the identification of possible service bundles by supporting the early stages of the bundle creation process. 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 is in particular relevant with a large number of services and, therefore, many bundling options. The proposed approach leverages existing service descriptions and does not necessitate a time-consuming step of (manually) explicating

relationships between services as it is the case with the method described by Baida [3]. Instead, commonalities of attributes 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. Moreover, Baida [3] relies on a given customer demand to drive the creation of service bundles. While useful for situations where customer demand is well known and understood, poor performance can be expected from this approach 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.

Herrmann et al. [13] 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"*. The proposed method builds upon these findings and the conjecture that other commonalities or relationships between services can also indicate potentially useful bundles. We define the term relationship as *a connection, whose existence can be evaluated by a logic expression* utilizing service description attributes. 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. The right side of Figure 1 illustrates the corresponding conceptual model using UML.

We distinguish 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 specific relationship only applies to certain domains and can be tailored for concrete bundling scenarios. In this context the notion of domains refers to distinguishable spheres of knowledge that have their own distinct terminologies and semantics. Thus, generic relationships relate to concepts that are similar across existing domains.

Based on given service descriptions and derived relationships, the vast amount of possible service bundles can be filtered in a structured manner to finally extract the most promising bundling candidates. Service bundling can be seen as a configuration task [3] assembling a bundle from a set of services that can only be connected together in certain ways. Ten Teije et al. [14] 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 approach of constraining a solution space by adding requirements in multiple steps (Fig. 2) adequately supports the act of service bundling.

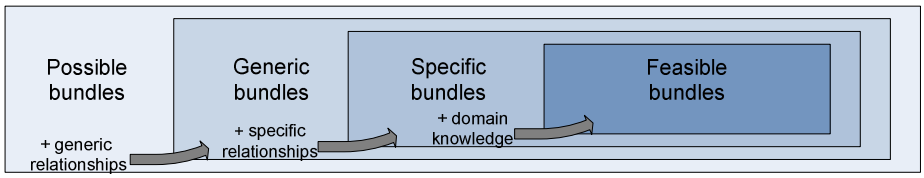

Fig. 2. Constraining the Solution Space

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* 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. 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. 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.

4 Conclusion

This paper defines service bundling and related concepts and proposes a novel approach for service bundling that identifies service bundle candidates. 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 approach. The developed method builds on service bundling concepts from both the marketing and the technological literature, thereby addressing the increased need for multi-disciplinary approaches and business-IT alignment. Multiple directions for further research can be identified. First, research in the area of service descriptions has to be conducted to develop a universal language that is applicable across industries and covers business as well as software services. Second, 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. 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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