10301 Executive Summary and Abstracts Collection
Service Value Networks
— Dagstuhl Perspectives Workshop —

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Abstract. From 25.07.2010 to 30.07.2010, the Dagstuhl Seminar 10301 "Perspectives Workshop: Service Value Networks " was held in Schloss Dagstuhl – Leibniz Center for Informatics. During the seminar, several participants presented their current research, and ongoing work and open problems were discussed. Abstracts of the presentations given during the seminar as well as abstracts of seminar results and ideas are put together in this paper. The first section describes the seminar topics and goals in general. Links to extended abstracts or full papers are provided, if available.

Keywords. Service Value Network, Service Science

Executive Summary - 10301 Perspectives Workshop: Service Value Networks

Services are receiving increasing attention in both economics and computing. This trend is due to two observations:

1. From an economics viewpoint, services today are contributing the majority of jobs, GDP, and productivity growth in Europe and in other countries worldwide. This includes all activities by service sector firms, services associated with physical goods production, as well as services of the public sector.
2. From an ICT viewpoint, the evolution of the Web enables provisioning software-as-a-service (and, services-as-software). Modern software systems are designed as service-oriented architectures consisting of loosely coupled software components and data resources that are accessible as Web services.

The notion of "service" used in the corresponding research communities is different; however, they are not independent but have a strong symbiotic impact on each other. ICT services create and enable new ways of business process management and value co-creation for service providers and service consumers. They enable companies to spread their planning, design, manufacturing, distribution, and delivery functions. The modularization of corporate functions takes place in a wide range of industries (electronics, car manufacturing, aerospace, retail, etc.). Competitive markets evolve best of breed functions, which in turn encourage deconstruction of formerly vertically organized companies and industries into **service systems**, also referred as **value networks**, to capitalize on this advantage. One of the key aspects distinguishing service systems from the traditional product-centric view is the importance of value co-creation, i.e. customers act as co-producers in the service provisioning process or as co-innovators in the evolution of services. The concept of **service value networks** (SVNs) captures this idea by modeling the business structures and inter-relationships and dependencies between service providers, consumers, and intermediaries (or enablers). They facilitate representation of flexible, dynamic supply and demand chains together with their social, technological, and economic context. Thus, service value networks are a promising conceptual framework to better understand and manage the operational, strategic, and technological challenges of business design and business alliance formation.

The goal of the Dagstuhl Perspectives Seminar on Service Value Networks was to bring together researchers and experts from the various relevant fields and discuss the different existing approaches to modeling service value networks, identify shortcomings and open challenges, and to suggest a research agenda that leads to a better understanding of the functioning of complex service systems. This research agenda [1] identifies SVN research challenges. To address these challenges, the Manifesto provides a synthesis of outstanding research questions, with an emphasis on modeling and analysis of SVNs and the role of coordination in SVNs, and presents an outlook to future work to address these outstanding research questions and move the SVN field ahead.

References

[1] Hefley, B. (ed.). (2010). Dagstuhl Perspectives Workshop Manifesto: Service Value Networks Reflections and Future Directions. (Schloss Dagstuhl Perspectives Workshop 10301). Schloss Dagstuhl - Leibniz Center for Informatics, Wadern, Germany.

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The Web of Services

Hans Akkermans (Vrije Universiteit - Amsterdam, NL)

At the cross-section of Web Science and Service Science, we investigate how the Web may develop into an open, common and universal platform of services, such that - ideally - end customers can submit a need/request and then get appropriate service bundle offerings in response.

These offerings may come from existing multi-supplier SVNs or may be formed ad hoc on-the-fly.

What are needed elements to achieve such a Web [Web 4.0] acting as a big service cloud or rather marketplace, as seen from a value perspective?

(a) service semantics: services are to have self-descriptions as socio-economic entities (cf. [1]), either in some form of catalogue or fully decentralized as meta-info in service components themselves.
(b) pragmatics: there must be facilities for interactive, but structured and knowledge-based, customer dialogue [based on service semantics], such that high-level needs are progressively refined, adapted and ultimately matched to actually available service bundles.
(c) network "socio-digital" formation logics: services on the Web need to be modular and self-configurable for automated service bundling triggered by customer interaction.

We have developed a number of ontological theories, computational methods and tools for such an eco-system of self-organizing services. These developments are based on a range of practical and industrial use cases and case studies we work on in different sectors (e.g. W4RA Regreening in Africa, e-health dementia care, smart power grids).

In our experience, Service research poses challenges to interdisciplinary scientific method. Neither the typical CS engineering science approach nor the social science empiricist schools are up to this challenge. Recent MIS attempts at defining a design science, rooted in H. Simon's views on researching artefacts, are also too narrow and found wanting.

References

[1] Hans Akkermans, Ziv Baida, Jaap Gordijn, Nieves Peña, Ander Altuna, Iñaki Laresgoiti: Value Webs: Using Ontologies to Bundle Real-World Services. IEEE Intelligent Systems 19(4): 57-66 (2004)

Macro and micro Service Value Networks based on an IT Outsourcing example

Kamal Bhattacharya (IBM Research - New Delhi, India)

Considering a Service Value Network as set of connected nodes representing the interaction of services to co-create value delivered to a client raises the question on the semantics of each entity, both nodes as well as links connecting nodes. What does it mean that two services are co-creating value? For example, IT outsourcing is a tool for an enterprise to hand off the management of IT infrastructure and applications to a specialized provider. From a business perspective outsourcing in general is an approach to reduce cost and improve the ability of the company to concentrate on its core strengths. An interesting example is Bharti-Airtel, India's largest Telecom service provider. In a highly publicized agreement, Airtel signed deals with service providers to outsource strategically important aspects of their business, such as IT infrastructure, network and network management to service providers such as IBM, Ericsson and NSN. Airtel's intent was to focus on driving significant growth in subscription in the Indian market and hence achieve an even better focus on market penetration rather than managing IT, despite IT's importance for the business. The entire value chain from Bharti-Airtel's client base to local service stations, local business selling subscriptions in rural areas, ad agencies, suppliers, etc. has been thus fine-tuned with respect to value creation for Bharti's clients. This is the macroscopic view of a SVN, in which each node represents a service provider and each link a (directional) dependency between the connected services.

Zooming into actual exchange between Airtel and its outsourcing provider however demonstrates the inherent complexity of the network. First, there are various models that determine the architectural control of an outsourcing provider. For example, an enterprise can sell all its relevant assets and create an agreement with the service provider on service levels and value based pricing. An alternative model is to outsource the management of infrastructure but retain the assets on the enterprises own books. The level of architectural control can have a tremendous impact on how value is created in the macro SVN as described above. It is thus important to understand the implications on the how the nodes will organize themselves at the micro level. Micro level refers to SVN that represents the organizational structure down to how people collaborate to deliver the services promised to the clients. The implications of micro and macro behavior of value co-creation will require research to eventually understand how to abstract aspects such as architectural control, agreement types, incentive structures etc with the goal to create simple yet semantically rich macro SVN models.

Challenges in Service Value Network Analytics

Stephan Bloehdorn (KIT - Karlsruhe Institute of Technology, DE)

A Service Value Network serves the purpose of fulfilling complex customer requests through a coordinated set of interconnected services. Service Value Networks are based on a framework of mutual agreements between service providers and characterized by the systematic use of Information and Communication Technology for coordination and/or delivery.

Service Value Networks are and need to be subject of analysis and data mining for highlighting interesting features, for predicting future developments, for optimizing the setup of the network with respect to given Key Performance Indicators (KPIs) and for supporting coordinative actions? However, given the decentralized nature of Service Value Networks, complete information on the entire network will usually not be available and might even be withheld strategically by individual actors. This raises multiple challenges with respect to the employed analytical techniques. How can robust analysis techniques be devised that can deal with limited amounts of available data? How can analysis techniques be devised to actively interact with actors in the SVN and make them disclose missing information most relevant for the analysis task at hand, possibly by providing appropriate compensation? How can monitoring infrastructures be devised which can capture relevant information in a decentralized environment?

Links to state of the art and related fields include the areas of data mining (specifically graph/network mining), privacy-preserving data mining, active learning, agent negotiation, game theory but also business process monitoring.

Keywords: Service Value Networks Analytics Mining

Service Value Networks

Olha Danylevych (Universität Stuttgart, DE)

A Service Value Network (SVN) represents the interconnections between a number of (independent) actors, i.e. the participants, cooperating and co-creating value. The participants in an SVN are either humans or organizations. The granularity of organizations may span from entire enterprises to single departments, according to the needs of the modeler. Cooperation between the participants in an SVNs is expressed in terms of exchanges of services. The realization of the service exchanges requires a combination of IT capabilities and human intervention.

Research on the SVNs is multidisciplinary in nature. SVNs are at the crossroad of fields including, but not limited to, Supply Chains, Business Webs, Organizational Theory, Business Process Management and Service Oriented Computing. The variety of the scientific fields that meet in SVNs imposes the need of

taking into account a diversity of research perspectives. Among the several aspects that require shared understanding among practitioners and researchers are fundamental issues like how SVNs are defined, modelled, managed and enacted.

Modelling of SVNs aims at facilitating the management and optimization of the relationships and interactions among the participants of SVNs. The suitability of modelling languages for SVNs is not limited to providing adequate, expressive and unambiguous constructs to describe the state of an SVN, i.e. a static perspective. It is of paramount importance to treat the dynamic perspective of SVNs, i.e. how they evolve in behaviour and structure over time, as a first-class citizen. In particular, SVN models should be able to specify both (1) short-lived, agile parts characterized by frequently occurring short-termed relationships, as well as (2) fixed, rigid parts, e.g. involving business relationships regulated by long-term contracts. The task grows even more challenging when considering that SVN modelling must account for agile (unreliable and unpredictable) resources such as humans to provide services with fixed, predictable quality characteristics.

SVN modelling is not limited to representing how SVNs occur. It must also support their optimization, which is dependent on how the value is defined and measured. As a matter of fact, the very definition of value in the scope of SVNs is still an open question, in particular when faced its intangible aspects. Value measurement is a complex issue which must combine estimations from both the human and social perspectives (e.g. trust), as well as measurements of value from the businesses side, e.g. financial value for stakeholders. Interesting challenges arise from the convergence of the different aspects of value in SVNs, e.g. how the social aspect of value is accounted for in enterprise value measurements.

Furthermore, the challenges of SVNs go well beyond value measurement. In the nowadays IT landscape populated by a variety of technologies and possibilities, the enactment of SVNs needs a ubiquitous, agreed-upon, streamlined underlying technological stack. Service Oriented Architecture (SOA) provides a solid foundation to build upon. For example, SVNs could be enacted by the means of Service Compositions executed at each participant's site. And, as it always happens when software technology is called upon, the first deployment is but the beginning. Change management in SVNs is quintessential. It is necessary to estimate in advance the implications of changes to the implementation of parts on one SVN and how they ripple through the network, i.e. the horizontal propagation. Moreover, due to the stacks of technologies that will be employed (SVNs, BPM, SOA, etc.) vertical propagation through the technology layers is also a factor to appraise and manage.

The varied nature of SVNs and the multitude of stimulating research challenges makes SVNs an exciting field. When the SVN field comes of an age, we expect it to partner up with other white-hot topics the likes of Cloud Computing, continuous BPM and Green IT. We can't wait to get there.

Keywords: Service Value Networks, Service Networks, Business Process Management, Service Oriented Computing

A microscopic view on Service Networks

Schahram Dustdar (TU Wien, AT)

In Service Networks we distinguish at least two categories of participants: On a *macro* level there are organizations and legal entities as the main actors and on a *micro* level, individuals. In this paper I will focus on individuals as the main entity of interest. However, we need to also consider the interactions between those individuals in Service Networks. The goal of this paper is to discuss the main building blocks from the microscopic perspective: Metrics and mechanisms for finding, building, maintaining and governing relationships in such Service Networks. We have a number of assumptions for Service Networks:

Open and dynamic Web-based environment. Service Networks are open and dynamic in the sense that Humans and resources (e.g., Web services) may join and leave the environment dynamically. Tasks are worked on by humans as well as software-based services.

Massive collaboration in Service Networks. Service Networks consist of large sets of humans and other resources, which can be put together in dynamic compositions. Thus, distributed communication and coordination prevails.

Keeping track of the dynamics to control. A paramount goal includes keeping track of future interactions, resource selection, the compositions of actors, and the disclosure of information in Service Networks.

The microscopic view on Service Networks considers Human Provided Services (HPS) and Software-based Services (SBS) as first class citizens [1], claiming that the traditional perspective on SOA is not sufficient anymore. Furthermore, considering the massive collaboration aspect mentioned above, we need to establish social relationships (based on Trust) thus establishing emerging network structures and communities and utilizing novel discovery mechanisms based on social metrics as well as performance metrics.

In virtual communities, where people dynamically interact to perform activities, reliable and dependable behavior promotes the emergence of trust. As collaborations are increasingly performed online, supported by service-oriented technologies, such as communication-, coordination-, and resource management services, interactions have become observable. By monitoring and analyzing interactions, trust can be automatically inferred.

We motivate our work with a scenario [2] showing discovery of experts and flexible interaction support as depicted in Figure 1. In this use case, a higher level process model may be composed of single tasks assigned to responsible persons, describing the steps needed to produce a software module. After finishing a common requirements analysis, and in parallel a reusability check of existing software artifacts produced in related projects, a software architect designs the actual software framework. The implementation task is carried out by a software developer, and additionally software test cases are generated with respect to functional properties (e.g., coverage of requirements) and non-functional properties (e.g., performance and memory consumption). We assume that this task is deployed in a global enterprise spanning multiple departments and locations.

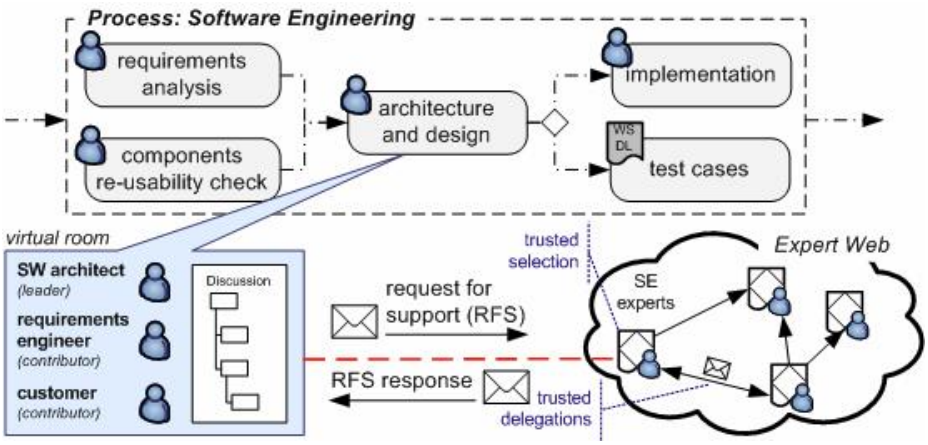

Figure 1: The Expert Web example as a Service Network

Thus, the single task owners in this process exchange only electronic files and interact by using communication tools. While various languages and techniques for modeling such processes already exist, for example BPEL, we focus on another aspect in this scenario: interactions with trusted experts. A language such as BPEL demands for the precise definition of flows and input/output data. However, even in carefully planned processes with human participation, for example modeled as BPEL4People activities, ad-hoc interactions and adaptation are required due to the complexity of human tasks, people's individual understanding, and unpredictable events. In Figure 1, the software architect receives the requirement analysis document from a preceding step. But if people have not yet worked jointly on similar tasks, it is likely that they need to set up a meeting for discussing relevant information and process artifacts. Personal meetings may be time and cost intensive, especially in cases where people belong to different geographically distributed organizational units. Various Web 2.0 technologies, including forums, Wiki pages and text chats, provide well-proven support for online-work in collaborative environments.

Several challenges remain unsolved: (i) If people, participating in the whole process, are not able to solve problems by discussion, who should be asked for support? (ii) How can experts be flexibly involved in ongoing collaborations? (iii) What are influencing factors for favoring one expert over others. (iv) How can we support trusted interactions in such dynamically changing environments and how can this situation be supported by service-oriented systems?

Traditionally, discovering support is simply done by asking third persons in the working environment, the discussion participants are convinced they are able to help, namely trusted experts. In an environment with a limited number of people, persons usually tend to know who can be trusted and what data has to be shared in order to proceed with solving problems of particular nature. Furthermore, they easily find ways to contact trusted experts, e.g., via phone or e-mail. In case requesters do not know skilled persons, they may ask friends

or colleagues, who faced similar problems before, to recommend experts. The drawbacks of this approach are that people need extensive knowledge about the skills of colleagues and internal structures of the organization (e.g., the expertise of people in other departments). Discovering support in such a manner is inefficient in large-scale enterprises with thousands of employees and not satisfying if an inquiry for an expert becomes a major undertaking. Today's communication and collaboration technologies cannot fully address the mentioned challenges because many existing tools lack the capability of managing and utilizing dynamic trust.

The Expert Web. We propose the expert web, consisting of connected experts that provide help and support in a service- oriented manner. The members of this expert web are either humans, such as company employees offering help as online support services, or software services encapsulating knowledge bases. Such an enterprise service network, spanning various organizational units, can be consulted for efficient discovery of available support. Users, such as the engineer or drawer in our use case, send requests for support (RFSs). The users establish trust in experts' capabilities based on their response behavior (e.g., availability, response time, quality of support). This trust, reflecting personal positive or negative experiences, fundamentally influences future selections of experts. As in the previous case, experts may delegate RFSs to other experts in the network, for example, when they are overloaded or not able to provide satisfying responses. Following this way, not only users of the enterprise service network establish trust in experts, but also trust relations between experts emerge.

To conclude, within the presentation to this abstract I discussed the main building blocks required for establishing a novel programming model where HPS and SBS are the main ingredients as well as some initial metrics and mechanisms to deal with compositional aspects thereof.

References:

[1] D. Schall, S. Dustdar, B. M. Blake. A Programming Paradigm for Integrating Human-Provided and Software-Based Web Services, IEEE Computer, July 2010
[2] F. Skopik, D. Schall, S. Dustdar. Modeling and Mining of Dynamic Trust in Mixed Service-oriented Systems. Information Systems 35 (2010), 735-757, November 2010. Elsevier.

Keywords: Service Networks, Human Provided Services, Trust Computing, Service-oriented Computing

See also: http://www.infosys.tuwien.ac.at/Staff/sd

Continuous Value Management in Service Value Networks

Robin Fischer (KIT - Karlsruhe Institute of Technology, DE)

Exploring the phenomenon of Service Value Networks requires interdisciplinary efforts to observe, understand, and shape composite value co-creation and value distribution over time. Therefore, concepts stemming from research in disciplines like network science, social sciences, organizational science, management science, and computer science must be assembled into a toolset that allows for continuous management of value from the phase of conceptually modeling value composition through value enactment to value analysis and optimization.

In our research, we focus on Service Value Networks that arise around keystones in service ecosystems. We furthermore target only on Service Value Networks that offer and deliver value through Web technologies (e.g., Web APIs, Web Protocols). Real-world examples for these kind of Service Value Networks are e.g. Salesforce.com, Facebook and Google's App Engine.

Based on the assumption that keystones provide a platform for emerging business models of service provider in the ecosystem, we identify the challenge of monitoring and analyzing the evolution of these platform-driven Service Value Networks to shape the platforms value at a given point of time and over time. With our focus on service delivery through Web technologies, we are particularly researching concepts, methods and tools to continuously trace value co-creation in distributed enactment environments (e.g. the Web). Our concepts therefore need to relate business value to incomplete data streams that can be observed while service enactment, e.g. what aspects of value can be monitored and measured from e. g. SOAP messages? Eventually, we aim at providing an approach that allows tracing value at service enactment and building bottom-up value generation models as a representation of the highly dynamic relationships that form temporarily in platform-based Service Value Networks.

Why a Perspectives Workshop on Service Value Networks?

William E. Hefley (University of Pittsburgh, US)

As the Industrial Revolution continues to morph into the Services Revolution, the impact of several factors are being felt: the growth of services and its importance to the economy, increasing impact of specializations as organizations (and individuals at the macro level) focus on their strengths/core competencies, rely on external expertise for specialist services, and extend their reach into globally integrated enterprises. These demands are bringing us the deployment and use of extensive service value networks. Whilst you may have flown Lufthansa into Germany, aircraft servicing came from another firm, catering and food services similarly, and reservations and post-flight ticket reconciliations may be performed by yet again another set of actors - all to deliver value by transporting you. Architecting, designing, composing, executing, monitoring, and managing these

service value networks to deliver optimum value for all participating entities is a complex challenge. Given the rate of change in technologies and business models, coupled with market and organizational demands for innovation, this complexity is becoming increasingly important to understand and manage. The study of Service Value Networks provides us insights into theory and practice addressing these complex mashups of technology and people - these socio-technical systems composed of networks of rational, socio-economic actors to deliver services and co-create value with their consumers.

Keywords: Service value networks, SVN, eSourcing, value, sociotechnical systems

Challenges in modelling service value networks

Peep Kuengas (University of Tartu, EE)

Relations between service value networks, business networks, business processes, services and Web services have not yet been systematically studied making it virtually impossible to understand which issues and how in SVN could be solved with mentioned models. Neither is it clear whether and in which extent it is possible to automate design, analysis and evaluation of value given a network of particular type. The mentioned deficiencies partly origin from the fact that there is no commonly accepted formalization of service value networks. Therefore one thread of future research should be targeted towards formalization of service value networks after which mappings between different formalisms, models and approaches can be created for further systematic studies.

Keywords: Service value networks, challenges, modelling

ICT-Coordinated service value networks for managing large-scale, technical infrastructures

Steffen Lamparter (Siemens - München, DE)

Recent advances in information and communication technologies facilitate new forms of coordination and control mechanisms that can be used for managing and automation of complex value networks. Particularly, the abstraction of real-world functions through a services layer with standardized interfaces and protocols enables higher flexibility and thereby also customer-driven configurations of value networks. For Siemens such ICT-coordinated Service Value Networks are an important research topic, as Siemens provides a wide range of technical infrastructures and solutions that implement complex, inter-organizational value networks. Examples range from smart energy grids where a broad range of different service providers (distribution system operators, metering service providers, prosumers, etc.) participate in providing a stable and efficient power

supply to flexible production as well as logistics networks that support dynamic reconfigurations and lot sizes down to one. Research in Service Value Networks may therefore contribute to the goal of efficiently managing these distributed infrastructures by providing suitable coordination and control mechanisms as well as ICT management platforms.

Keywords: Service Value Networks

Service Value Networks

Christine Legner (European Business School - Oestrich-Winkel, DE)

Information technology, and specifically the Internet as a widely-accepted, global communication infrastructure, are considered key drivers of networked forms of organizing. They reduce coordination costs within and across organizations, thereby fostering the division of labor in a global economy. While the trend towards enterprise networks has been intensively discussed and analyzed over the last decades, service value networks (SVNs) represent an interesting new form (and extension) of enterprise networks: Since SVNs focus on the co-creation of services, interdependence of the single actors is much higher than in the case of supply-chain networks which are mostly flow-oriented. In contrast to our understanding of enterprise networks, SVNs comprise not only organizations, but also individuals in their role as service co-creator or customer. The heterogeneity of these actors, however, imposes particular challenges when designing and managing SVNs. Lastly, dynamic SVNs call for flexible and distributed coordination mechanisms, which seem to be often implemented by means of service platforms.

Service value networks are still understudied, but some insights from enterprise networks might also hold true for SVNs. In order to clarify the "mechanics" of SVNs, it is valuable to analyze and model SVNs based on architecture concepts, with strategic, organizational, and technical layers, that have been developed in the context of enterprise networks. However, much will depend on integrating the motivational and social factors that drive the participation of individuals in SVNs.

Service Value Networks, definition and research direction

Jens Lemcke (SAP Research CEC - Karlsruhe, DE)

A service value network (SVN) model explicates legally binding service offers between concrete human or institutional participants. A service offer may have properties, such as being realized mechanically or through human labor, its geographical location, necessary interaction workflows or protocols, and pricing information. All participants of and all parties affected by the service offers are stakeholders of the SVN. Value is related to each pair of one stakeholder and one service offer. Value is the utility of the service offer to the stakeholder. Value

may depend on the other participants of the service offer, other stakeholders, and even other service offers in the SVN. For example, the economic value of opening a new shop in a mall depends on geographically related services such as city beautification that creates a appealing surrounding or complementary shops already in the mall whose customers are potential customers to the new shop. Change of both the network and the values accelerates over time due to increased competition caused by external forces, such as globalization and technology innovation. Therefore, an important purpose of an SVN model is to understand trends in the SVN, especially future value propositions and threats. The understanding builds the basis for a stakeholder's decision to create a new, change, or discontinue a service offer. A change in the SVN is likely to result in further adaptation of other stakeholders. Hence, what-if analysis is relevant before performing a change. What-if analysis should incorporate the costs and the benefits of change. In particular for service offers managed by ICT systems, the co-evolution of the ICT systems with the transformation of the SVN is a major cost factor. Analysis of SVN should therefore support the estimation of ICT-related costs.

Keywords: SVN, network transformation, value modeling, business to IT

The future of Service Value Networks

Christos Nikolaou (University of Crete - Heraklion, GR)

Service Value Networks could become a powerful paradigm and tool to understand, model, analyze and design/deploy systems of composed services provided by economic entities (organizations, people, etc.). Business objectives and performance goals are usually associated with these service systems. The problem is to ensure that these constraints are satisfied, even with dynamically varying market conditions, by the service value network. To address this problem, an interdisciplinary approach is needed and synergy with related research fields such as service oriented computing, business models development, supply chains logistics, business process modeling, semantic web technologies, etc. Successful address of the above problem could boost innovation in services and deepen our understanding of how societies and economies work.

Keywords: Service value network, service science, service engineering

System-based Considerations for Building Service Value Networks

Gerhard Satzger (KIT - Karlsruhe Institute of Technology, DE)

Service Value Networks (SVNs) are means to co-create value between different actors. In this talk, three particular system considerations are outlined as a contribution towards the further development of SVNs. First, the service-dominant logic (system) perspective is introduced strongly suggesting the inclusion of the customer into the network and the abandoning of a provider-customer distinction. Second, a system perspective in service engineering is postulated requiring the search for effective solutions from a system point of view – thus negating the meaningfulness of a fixed "customer request". Third, the perspective of the inclusion of human work into socio-technical systems is emphasized. Innovative options are illustrated by the application of human-based eServices towards people clouds. Research questions derived from the three viewpoints are raised as a base for mapping out the future SVN agenda.

Keywords: SVN, Service Value Networks, System, Human-based eServices, People Cloud

Mixed Service-Oriented Systems

Daniel Schall (TU Wien, AT)

The Web is evolving rapidly by allowing people to publish information and services. At the heart of this trend, interactions become increasingly complex and dynamic spanning both humans and software services. The transformation of how people collaborate and interact on the Web has been poorly leveraged in existing service-oriented architectures (SOA). In SOA, compositions are based on Web services following the loose coupling and dynamic discovery paradigm. We argue that people should be able to define interaction interfaces (services) following the same principles to avoid the need for parallel systems of software-based services (SBS) and Human-Provided Services (HPS). The fundamental questions addressed by the HPS approach are: which aspects of users' activities are most relevant for provisioning expertise and how can people provide personalized services? The benefit of this approach is a seamless service-oriented infrastructure of human- and software services.

Keywords: Human-Provided Services, Mixed Systems

See also:
http://www.infosys.tuwien.ac.at/prototyp/HPS/HPS_index.html

Control Mechanisms for Platform Ecosystems

Ulrich Scholten (KIT - Karlsruhe Institute of Technology, DE)

One challenging aspect within the context of SVN coordination is the control and assurance of quality and goal coherence from the perspective of an intermediary (e.g. Apple App Store, Salesforce, SAP ByD).

As SVNs are characterized through the relation of autonomous players, hierarchical control mechanisms can only reflect a small fraction of possible control options. Based on explorative research, we derived a set of control mechanisms, which allow categorizing control within platform ecosystems.

Keywords: Control quality assurance goal congruence

Automating Participant Behavior in Service Value Networks

Sebastian Speiser (KIT - Karlsruhe Institute of Technology, DE)

Enabled by ICT, it is today possible to fulfill complex customer needs by composing and integrating services from various specialized providers. The service offers and the cooperations between different providers are subject to the autonomous and self-interested decisions of individual service providers. The lack of central control leads to dynamic and open networks of services that are provided and combined in order to create value by fulfilling customer needs. Providers must understand and analyze such Service Value Networks (SVNs) as a whole, in order to optimize their behavior and decisions, which cannot be done in isolation. Successful behavior leads to frequent participation in one or more SVNs, which poses challenges in terms of technical integration with heterogeneous partners, and automating repetitive parts of contract negotiation. Human effort for technical integration can be minimized by formal descriptions of services and interfaces. For negotiation automation, a SVN participant needs formal policies, representing his business rules, regulating things such as privacy statements, usage restrictions of services and pricing information. Challenges arise in the development and utilization of formal models that help providers to keep up with the dynamism of SVNs.

Keywords: Service Value Network; Policy; Service Description

Formation of Adaptive Service Value Networks

Rudi Studer (KIT - Karlsruhe Institute of Technology, DE)

We study the formation of adaptive service value networks and consider three different ways of forming them:

1. Request driven SVN formation considers the ad-hoc formation of SVNs based on individual customer requests.
2. Parametrized SVN formation considers the long term formation of SVNs for a range of parametrizable usage scenarios.
3. Assisted service innovation supports designing new service offerings that meet new market demands.

We consider the formal specification of services in building up SVNs, and take into account non-functional aspects and user preferences.

In addition, we consider the role of usage policies including privacy policies, data policies and service policies. An approach based on nested rules is investigated to provide means to also address the issues of providing justifications for the users.

Service Value Networks: A software systems architectural perspective

Stefan Tai (KIT - Karlsruhe Institute of Technology, DE)

We study Service Value Networks from the software systems architectural perspective: the structure or structures of the system comprising components, component relationships, overall system properties, and the system's evolution over time. SVNs have more than one architecture, and architectural abstractions are needed for modeling and managing the business architecture, the (software service) application architecture, and the underlying infrastructure (platform) architecture. We explore concepts and mechanisms in support of design and enactment of SVNs as software service systems. These include feedback loops, process modeling across abstraction layers and architectures, and overall fault-tolerance and recovery techniques. Yet, the systematic integration of these and other concepts and their validation in the context of concrete, real-world scenarios is subject to ongoing and future work.

Keywords: Software service architecture

An Economic View on Service Value Networks

Christof Weinhardt (KIT -Karlsruhe Institute of Technology, DE)

With our contribution we try to give an insight into an economic/business perspective on Service Value Networks (SVN) which only will be successful if there are business models and incentive systems available which allow for win-win situations for almost all stakeholders of the game. Therefore, participants' interests need to be aligned with the network's global objectives in an incentive engineering approach. Classical economic theories and approaches already offer basic ideas to meet these challenges, such as, e.g., mechanism design and network economics or game theory in general.

Starting from the idea that modularized and specialized services will be composed in a plug-and-play fashion through service value networks one has to tackle with the coordination of self-interested service providers of a SVN in a co-opetitive environment by designing adequate mechanisms. "Classic" mechanism design focuses on design goals like (among others) allocative efficiency, incentive compatibility and budget balance whose mere consideration does not hit all targets in service networks. Incorporating the requirements that are imposed by newly arising networked scenarios where a set of agents must cooperate to create value for the customers resulting in a complex service, an extension of the classic mechanism design seems reasonable and leads to a co-opetition mechanism which is also aiming at more network-related goals such as network growth, a high degree of interconnectedness of the services being involved, their readiness to deliver, and fairness.

Value-Driven Mashup Engineering

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In recent years the Web has transformed from a hypertext medium into a programming platform where a broad variety of providers is offering resources and services that might be described, published, discovered, selected, bound and accessed by means of software systems in an automated way. Driven by service-oriented software technologies like REST or WS*, a likewise broad variety of clients is leveraging the programmable Web to assemble service-oriented information systems to suite their individual needs. Currently, this trend is fundamentally changing the practices of software engineering in terms of the roles involved, the tools they use and the resulting development lifecycle.

In particular, Web applications are now often developed as mashups by end-users in the context of communities utilizing high-level tools in ad-hoc, agile and explorative ways with many iterations of trial and error. While such mashup engineering approaches are easy to learn and start with, one of their biggest challenges is to achieve an adequate quality of results, which translates into

keeping functional and non-functional characteristics to a vitally required minimum. The problem is that in the case of mashups, such requirements are mostly implicit and hard to track.

Moreover, the qualitative characteristics of such Web applications depend upon the selection of individual providers and their combination into service value networks (SVN). In other words, the development of a mashup results in the formation of an organizational network of service providers that – together with the client – co-create value. The overall value of the network doesn't only depend on the characteristics of the individual providers but also on the structure of the network, which determines coordination efforts and synergy effects.

Overall, mashup engineers enjoy the power of high-level IDEs that eliminate low-level programming efforts in the course of composing arbitrary Web resources and services. They are however facing the challenge of discovering, selecting and structuring these assets in such a way that a corresponding network of providers creates the optimum value with respect to a given goal. Currently there is no simple way, tool or methodology that would help with this matter and thus most mashup tools are easy to use but useless.

To cope with this situation we seek to develop concepts, methods and tools to assist end-users in creating mashups that provide adequate solutions for their problems. The fundamental idea is to create a dynamic and synchronous link between the perspectives of software systems and value networks that allows for mutual optimization. Building on costing and valuation models for service delivery networks, we create a framework to assess mashup requirements and analyse the economic effects of mashup design choices. Thereby, engineers will gain indicators to assess the value of their designs and refactor them towards an optimum solution.

Beyond the generic perspective, we concretise our approach in the context of a particular domain and investigate scenarios, use cases and technologies in the upcoming area of crowdsourcing. More concrete, we provide means for value-optimised engineering of semi-automatable business processes as mixed mashups of machine-based as well as human-based Web services.

Keywords: Service engineering, mashups, value analysis

Service Value Network Analytics

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The growth of services economies, coupled with the evolution of powerful Internet technologies help transform service companies from regional businesses to globally integrated service networks. Service networks are open, highly dynamic and complex systems of service systems that bring together service providers and consumers for their mutual benefits, relying on distributed computing infrastructures – typically cloud environments – that allow seamless integration of software services and back-end systems.

In this presentation I introduce a multi-dimensional performance analytics model and associated toolset, based on system dynamics to evaluate the long-term impact of changes of software service levels and human service levels and predict the performance of end-to-end service processes at the business network level.

Keywords: Service value networks, performance analytics

Service! Value? Networks ...

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The analysis and design of service value networks can be undertaken from both a technical and an economic perspective. Economics can help in understanding the value that affects nodes joining and leaving an SVN. Technical approaches can help us understand the mechanisms and interactions among SVN components. In this presentation I showed how agent-based simulation could be used to study the formation of networks over time, in particular the attachment of individual service providers to tasks that need to be performed.