From IT Providers to IT Service Brokers: The Future of Enterprise IT in the Cloud World

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Abstract:

Enterprise IT has witnessed a series of changes over the past decades from mainframe to personal computing, and from scaling out dozens of IT systems to hundreds and thousands. However, with the current rapid move towards cloud services, the impact of changes on enterprise IT has never been more profound. IT has always had the traditional role of providing (developing and operating) and supporting IT systems and services for the enterprise. This role is now rapidly evolving towards becoming a broker of IT services, and integrator and manager of a hybrid portfolio of IT services that includes internally developed and externally acquired services. This new role brings up a set of challenges to enterprise IT. Much of IT service innovation and advances in cloud services have mainly focused on the service provider side with the aim of providing scalable platforms, scalable delivery and business models, operations and support, etc. Not much attention has been given to the challenges at the service consumer side (here enterprise IT) for designing, acquiring, operating and managing a diverse portfolio of services, often consisting of legacy in-house IT systems, and internal and external services, which we refer to as a hybrid service portfolio. In this article, we first discuss the trends and the changes that cloud services bring to enterprise IT highlighting the fact that the role of enterprise IT is fundamentally shifting from a provider of IT services to a broker and manager of hybrid IT service portfolios. We discuss challenges and present a framework for a novel technology solution supporting the service consumer role of IT.

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Abstract

Enterprise IT has witnessed a series of changes over the past decades. With the rapid move towards adoption of cloud services, the impact of changes on enterprise IT has never been more profound. This is changing the traditional role of enterprise IT as the main entity for *providing* and *supporting IT systems and services* to becoming a *broker and manager* of IT services for a *hybrid portfolio of IT services* acquired externally or provisioned internally. Currently, much of IT service innovation in cloud services domain is focused on the service provider side. Not much attention has been given to the challenges at the service consumer side for designing, acquiring, operating and managing a portfolio of services. In this article, we discuss the trends and the changes that cloud services bring to enterprise IT and present a framework for a novel technology solution that supports the service consumer role of IT.

Keywords

Cloud computing, Enterprise IT, Cloud Services, IT Service Management

Introduction

Enterprise IT has witnessed a series of changes over the past decades from mainframe to personal computing, and from scaling out dozens of IT systems to hundreds and thousands. However, with the current rapid move towards cloud services, the impact of changes on enterprise IT has never been more profound. IT has always had the traditional role of *providing (developing and operating)* and *supporting IT systems and services* for the enterprise. This role is now rapidly evolving towards becoming a *broker* of IT services, an integrator and manager of a *hybrid portfolio of IT services* that includes internally developed and externally acquired services. This new role brings up a set of challenges to enterprise IT. We envision this trend to transform the traditional role of CIO in the enterprise, which is focused on managing the provision of IT to a new role, referred also as Master Operational Strategist [10], which is responsible for managing people, process and technology for sourcing a hybrid portfolio of IT services.

Much of IT service innovation and advances in cloud services have mainly focused on the service provider side with the aim of providing scalable platforms, scalable delivery and business models, operations and support, etc. Not much attention has been given to the challenges at the service consumer side (here enterprise IT) for designing, acquiring, operating and managing a diverse portfolio of services. This portfolio consists of legacy in-house IT systems and services and external services, the reason why we refer to it as a *hybrid service portfolio*.

In this article, we first discuss the trends and the changes that cloud services bring to enterprise IT highlighting the fact that the role of enterprise IT is fundamentally shifting from a provider of IT services to a broker and manager of hybrid IT service portfolios. We discuss challenges and present a framework for a novel technology solution supporting the service consumer role of IT.

IT Trends

There is a growing pressure on IT in the enterprise to adapt to a new operation model. The pressure has been building up as more IT solutions become available, and also as businesses become increasingly demanding. There are three major technology trends converging in IT, which require new approaches. For many decades, enterprise IT was largely shielded inside an enterprise, driven by internal business needs and traditional ways to map those needs into IT processes and systems that were built, operated and maintained in-house. A whole industry of IT vendors is in place and catering to this ecosystem of closed enterprises. The new trends, however, break this fundamental assumption of shielded IT in a closed enterprise creating a set of new challenges.

The driving technology trends today are: (i) cloud services, (ii) mobile consumer devices, and (iii) the increasing need for cross-enterprise collaboration.

Cloud services have widely been touted as a trend that is leading to breaking up integrated stacks of enterprise infrastructure and applications and restructuring them into services that are fulfilled by internal or external service providers, mainly external service providers that are comprising "the cloud". While SOA described the restructuring of applications into composable services addressing the application integration problem in enterprises, cloud services expand services from architectural, design and implementation patterns into business relationships between service consumers and providers at all levels of the IT stack: infrastructure (-as a service, IaaS), platform (-as a service, PaaS), and software (-as a service, SaaS), where infrastructure, platforms or software functions are provided, owned and operated by service providers. IT's role is changing from "providing" IT to "brokering" and overseeing services delivered from providers. New skills and functions are needed in IT while the need for the traditional skills decreases.

Another trend is ***consumerization of IT***. We are witnessing more and more that the employees bring their own devices to work, use consumer services such as personal instant messaging networks and social networking in a work-related context and use their private applications for business purposes, from desktop search to connectivity suites. End users' attitude towards consuming IT services has changed, too. An example is the pervasive use of mobile devices and mobile networks for exchanging business information up to a point that they may cover a significant portion of business data exchange in the enterprise. The boundary between personal applications and business application is disappearing fast as these application sit next to each other on personal and business devices.

Not much as an IT trend, but as a business necessity, the effective collaboration of a business with customers, suppliers or partners is becoming a factor as well. Enabling ***cross enterprise collaboration*** requires allowing the sharing, exchange and management of information relevant to a collaboration across enterprise IT walls. Collaboration for projects or engagements across enterprises expands beyond

virtual meeting rooms and conference calls including temporary, controlled access to internal information systems, knowledge bases or information distribution systems which usually are only accessible to employees. Now those systems become more opened allowing sharing, participation and benefit in mutual interest with a collaboration partner. Creating collaborations platforms that are suited for joint research, development, manufacturing, distribution and support contexts with suppliers, distributors and consumers will create new ecosystems that rely on the ability to effectively and selectively enable access to the required systems and services with a granular and subjective access control mechanism to avoid IT leakage. The trend of collaboration across enterprises will lead to enterprises that need to be more open and accessible with respect to their IT ecosystems.

It is our believe that the culmination of these trends creates an environment in which enterprises have a choice to respond defensively by deferring and preventing changes, but they can also respond on the offense embracing new opportunities and benefits for their competitive advantage. For guiding this decision it is essential to develop a deeper understanding of the challenges, which we present in the following.

Challenges for Enterprise IT

Consuming IT Services in the Enterprise

The enterprise computing experience has changed dramatically in the past few years. IT departments are no longer a leader of innovation in the enterprise. Often it is not the IT department but the end user who drive the computing experience in the enterprise. With the trend of IT consumerization in the enterprise, the separation between private and professional life dilutes in the modern work force of knowledge workers, and the role and function of tools they use changes with it. Corporate email already is widely been made available to employees on their private devices, and private email is delivered to corporate devices as well. Access to enterprise applications is still mostly limited within the enterprises network – another barrier to fall soon. This trend of mobile consumer devices again is linked to opening up the old shielded enterprise creating a number of challenges for IT. The challenge for the enterprise IT is not how to control this trend but how to enable and allow this safely and manageably.

Managing the IT Service Provider Explosion

In early 2000s, there were was a relatively small number of large IT suppliers such as HP, IBM, Microsoft, SAP and Oracle for enterprises. Enterprise IT departments were handling a relatively manageable number of IT supplier. Contracts and the expectations were defined and measured based on SLAs. In such an environment, CIOs were tracking 80% of the enterprise IT spend.

Today, there is an explosion of smaller and more specialized IT service suppliers serving the enterprises. There are hundreds of service providers that employees are consuming. This has a profound impact on the procurement of IT services facing a growing number of external services in addition to the traditional internal IT services. Many decisions for using external services are made outside of IT departments. Individual business units and employees become decision makers about consuming external IT services. Sometimes there is no matching offer for a service in enterprise IT. Or external services are simply better for getting a job done. The challenge for enterprise IT is how to manage

relationships with service providers. There are many implications. One is financial, how to enable the finance department to track service expenses. Other implications affect security, responsibility, support and compliance across this hybrid environment that can no longer be managed centrally.

Managing a Hybrid IT Ecosystem

Today's enterprise IT service portfolio consists of a hybrid ecosystem of IT services, a mix of internally and external IT providers and a mix of private and cloud IT infrastructures. According to a recent survey on enterprise IT strategy by IDC[i], private cloud infrastructures in enterprises mainly host IT management applications, enterprise-wide communication and collaboration tools and business applications such as CRM and ERP. There is a growing trend of outsourcing email services, personal productivity apps, website creation, hosting and management, and on-demand compute and storage services. There are a number of applications such as IT helpdesk, data backup and archival services in between. Different enterprises may choose to host these in house or on public cloud infrastructures. Legacy IT systems in the enterprise support custom enterprise applications and applications with sensitive data. While the composition of internal and external services may differ from one enterprise to another, in all cases IT department manage a hybrid IT service portfolio. IT departments need to understand which types of services are consumed, are needed and how they are provided in a unified view, both from the operational and from the financial perspectives.

Challenge of Marginalized Value

Offering a standardized IT experience across the enterprise was the value that IT provided to the enterprise. This included consolidation, centralization and standardization of IT systems and services. It largely eliminated shadow IT in business functions. In many cases, this is the role that IT continues to play. However, this traditional model of operation can no longer fulfill the demands of the business functions with the need for more customized and flexible IT services. With the growth of external IT service providers, which offer the required services at a relatively cost-effective and reliable manner, business functions now can reach out to external service providers directly. This has brought silos of shadow IT back into the enterprise in some cases (see Figure 1).
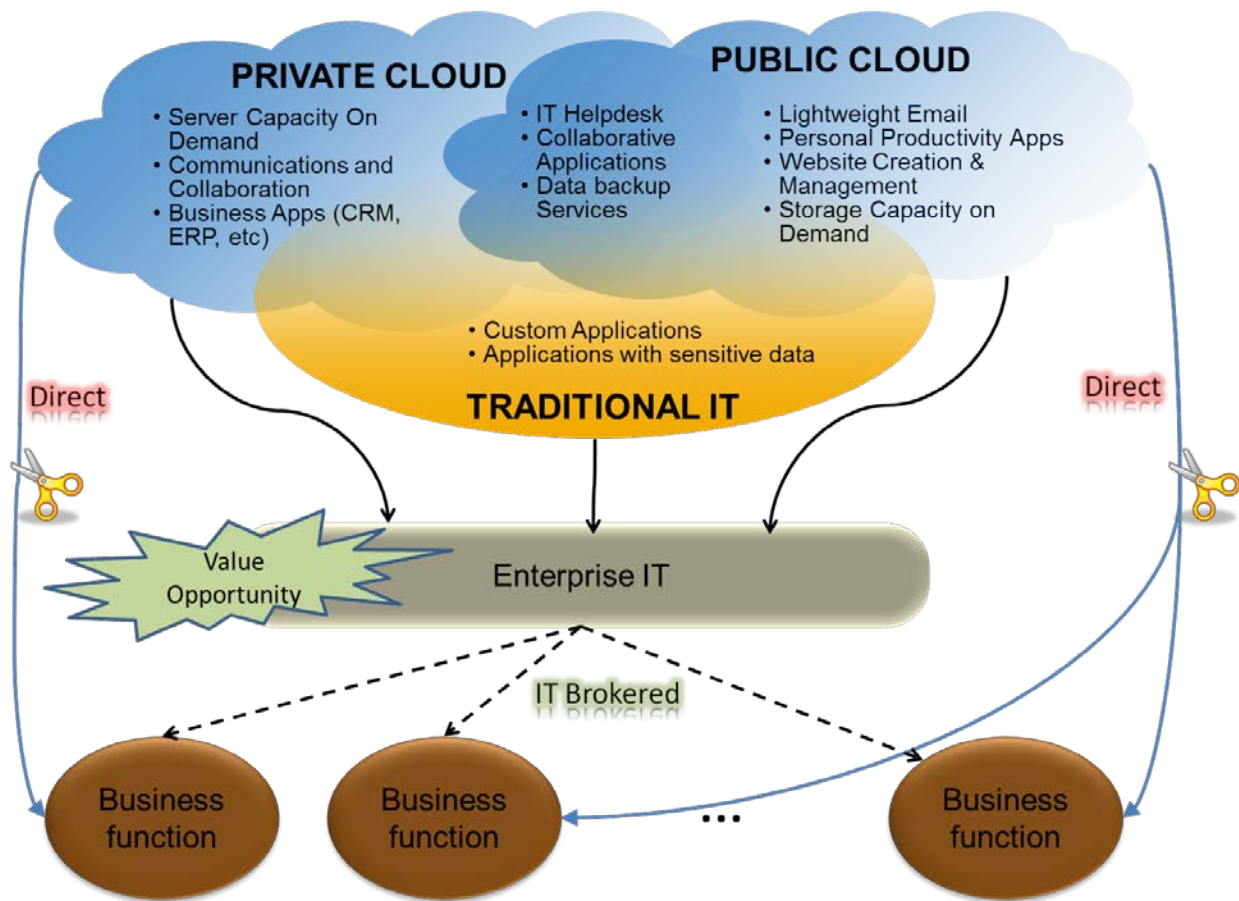
Figure 1. The value opportunity for enterprise IT to play the role of broker, integrator and manager of a hybrid portfolio of IT services

The question IT faces today is whether enterprise IT still matters for in an enterprise where business functions are beginning to acquire services from outside fitting their needs best? The answer can be no, unless enterprise IT changes it operating model to become the broker and integrator of IT and business services and retain their central role in this new function. There is an opportunity for IT to be a valuable partner for business by shifting the way they operate. IT can re-invent itself by playing the same role that it played two decades ago by standardizing IT experience provided to its business partners. IT needs to master new functions such as acquiring, integrating and overseeing IT service delivery into the enterprise.

The changing function naturally mandates a shift in the skill set of IT staff, from designing, building and operating IT services to contracting, integrating and managing relationships with service providers. It results in managing a hybrid IT service portfolio to ensure a smooth enterprise operation and meeting the expected business outcomes.

The Need for a Systematic Approach to Managing a Hybrid IT Service Portfolio

Creating, maintaining and optimizing hybrid service portfolios is a challenge for future IT landscapes in enterprises. The vision of the "industrialization of IT Services" [1] seems to be at a far distance. And yet, the trend towards cloud services changes IT more fundamentally than ever before.

In contrast to traditional IT outsourcing, which required deep and long-term integration with the outsourcing contractor, cloud services in IT are lighter weight and more flexible making them easier to procure, integrate, use and adopt. As an example, what started with relatively isolated light-weight CRM functionality (e.g. Salesforce.com) is now spreading into other domains of classic enterprise IT services.

As the role of enterprise IT shifts from providing IT services towards brokering, integrating and managing services, there is a need for the design and development of mechanisms and frameworks that support the end to end lifecycle of services through their acquisition, integration, consumption, financial management, and termination stages. Supplier selection and substitutions are issues. The service portfolio management in organizations is a new function that needs to govern this lifecycle and to ensure that the service portfolio is aligned with the business strategy. In the new function of service portfolio management, the role of a service portfolio manager needs to be created who owns the sourcing decision and whether a service is to be developed internally or acquired from an external provider (see Figure 2). The service portfolio managers may take inputs from end users and final service consumers as well as enterprise business functions.

Essentially, the same questions are now arising for IT-related services that have emerged when enterprises made decisions about the depths of their manufacturing capabilities, decisions about which parts they made themselves and which parts they procured from outside suppliers and how they managed relationships and logistics with their suppliers.

Another interesting area here is multi-supplier management, whether it is the same service that is acquired from multiple suppliers, e.g. in different geographic regions or with the purpose of mitigating risks, or the more common case where a business function uses multiple providers for each business segment. Another area is that IT departments need to have methods in place for service demand and supply management. Finally, in business terms, there is a need for new metrics based on which IT departments can quantify the values that they provide.
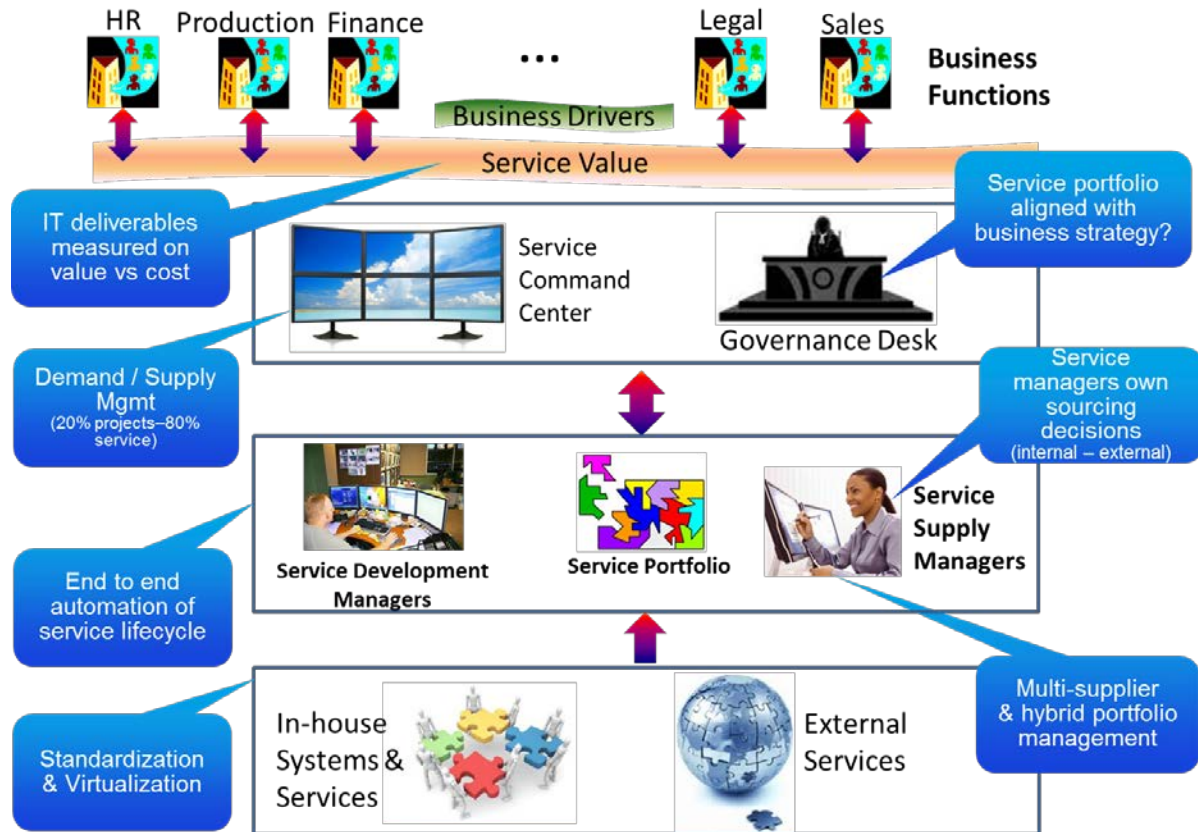
Figure 2.The Service Centric IT Ecosystem

Any move towards developing frameworks for managing service portfolios should consider the following questions:

- How does the framework enable end users and consumers (employees) to influence the enterprise service portfolio?
- How does it allow monitoring the usage of a diverse set of services?
- How are relationships managed with service providers?
- How are incidents addressed across service providers?
- Who is responsible for defining and monitoring the service level agreements, and imposing consequences in case of violations?
- Who is responsible for maintaining a level of standardization across services and business functions?
- What's the right financial management construct to use for an "on-demand" service ecosystem where the conditions are more directly related to markets and planning and forecasting can be difficult?
- How can a return in investment be calculated from a multi-supplier strategy, based on objective measures?
- What are the implications on compliance and regulations that need to be met?

- How company's confidentiality requirements still be met when access to data is fully or partially granted to contracting service providers in a fine granular and per need basis?

Service Operating Environment for Hybrid IT Service Portfolios

Existing approaches and tools in the space of service portfolio management mainly enable managing inventory information about services, such as names and descriptions of service assets, contact information, contractual information, etc. This passive "repository"-approach is mainly limited to bookkeeping and accounting. We believe that the issue of managing a hybrid portfolio of supporting and providing support for active IT service portfolio management is getting more important. This issue exhibits new challenges, some of which are identified earlier, for the research community to address going forward.

As a first step in this direction, we present a framework for managing hybrid IT service portfolios to address part of the challenges identified earlier. In particular, the framework focuses on addressing the issue of managing a hybrid IT service portfolio, and answers questions related to monitoring and managing the usage of IT services for the enterprise, managing the relationships of the IT service supplier-consumers, and the alignment and management of business demands with IT service supply. This framework goes beyond offering a passive repository-based approach, and supports the vision of covering the whole lifecycle of service consumption (strategy, design, implementation, operation, continuous improvement). The environment is also "active" in a sense that it allows people who are involved in service management processes to perform active management tasks such as service procurement, service operation analysis, replacement or termination based on the alignment of operational information with strategic and business-level information.

We introduce the metaphor of an *Operating Environment for Hybrid IT Service Portfolios*. Such an operating environment supports the customer's perspective for services. The operating environment allows the service consumer to procure and manage externally provided services, cluster and transform them into higher-level abstractions that are relevant for their business. This transformation may involve including specific provisions into contracts with service providers with the goal of providing an as homogeneous and seamless view onto a set of services as possible. For example, changing an email service provider should not result in a disruption of service nor in a changed end user experience, unless it brings improvement with it.

In our approach, inspired by advances in enterprise architecture [6] and IT service management [2], we introduce a service management methodology for enterprise IT. The methodology is adapted from ITIL (specifically Vol. 2 Service Design, Section 4.7 Supplier Management [2]). It starts from identifying business needs and driving them down to defining service capabilities and parameters needed to support the business. In the second phase, the services need to be identified followed by a selection of potential service providers offering the identified services. This includes conventionally produced in-house services (e.g. by internal IT departments), but is mainly directed towards external service providers. The third phase includes the negotiation, contracting and assembly (or integration) of

services. The next phase addresses ongoing maintenance of business and technical relationships with service providers to account for changes in the business and technology landscapes. The final phase is an ongoing effort to manage relationships with service providers so that maximum business benefit can be achieved. This includes assessing risks and devising strategies for cases of disruption or failure. Today, little technical support exists for handling these complex issues.

This operating environment supports the methodology including the aspects of strategic planning, service design, procurement, integration, operation and continuous improvement from of a hybrid portfolio of IT services [7]. The environment provides workspaces through which people involved in IT service portfolio management can collaborate. To support the methodology in the prototype environment, we represent information from the methodology, its phases and operational guidelines as a knowledge graph that can be interpreted by our system. Interpretation of this knowledge graph makes the system "active" in a sense that it can actively guide people through steps. It also provides workspaces related to steps where people can find necessary work materials, e.g. documents, spread sheets, etc. Based on roles and involvement, the system creates different views making that material and the processes visible depending on particular roles.
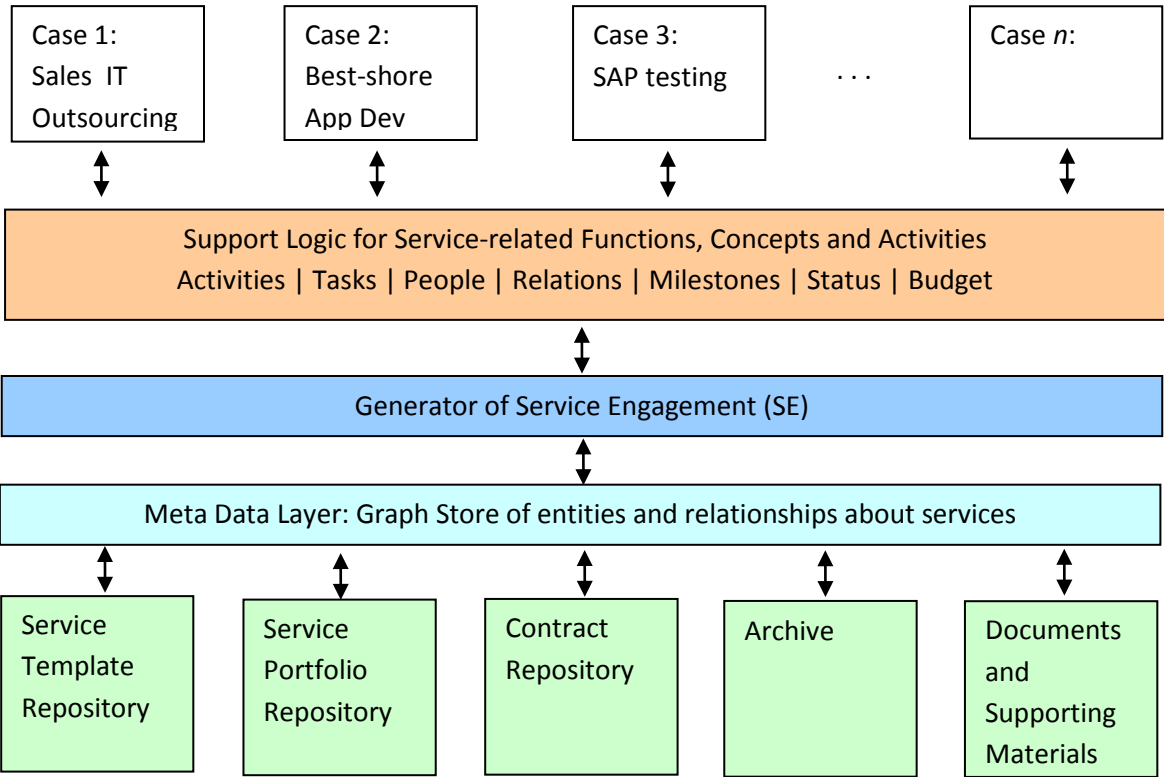

Figure 3: Conceptual Architecture of the Service Operating Environment for Hybrid IT Service Portfolios.

Figure 3 shows the conceptual architecture of the operating environment for hybrid IT service portfolios. Its goal is to connect the various teams that work on aspects of a service engagement and places where information, contacts, documents, materials related to a service engagement are managed, to backend

systems that exist. The lifecycle management of services in the IT portfolio is supported regardless of whether they are sourced in-house or from external providers.

The bottom layer in Figure 3 shows the actual data sources that are managed in the operating environment. Since multiple business units in an organization may be involved in service definition, design, sourcing/construction, use and management, management data related to a service may be scattered across units. Traces of service-related information can be found in numerous repositories, each providing only a partial view of particular aspects, such as a budgeting view, a process view or an operational view. The goal of the operating environment for hybrid IT service portfolios is to aggregate this information in form of a meta-data Layer, which describes aspects and relationships related to a service as a graph structure following a similar philosophy as used in the Resource Description Framework (RDF).

The data and the meta-data layer provide the core information upon which an active layer resides that creates so-called Service Engagements (SE) cases. A Service Engagement case is a container in which people involved in a case can use to find the right information about a service engagement. An SE does not only provide views on information that are related to particular service engagements, but also provides active functions that assist service management tasks such as managing budgets or monitoring service-related processes. An SE offers an active work environment where people can enter and perform tasks that are related to services cases. People can share information in an SE about the service. They can create and delegate tasks, set milestones and store and retrieve material that needs to be passed.

The operating environment supports the definition of business functions and the mapping of procured IT services to business functions. This complements other tasks related to metering the usage or budget management for internal and external services. It gathers information in a dashboard for the purpose of tracking and comparing expenses for accounting purposes [9]. The SE layer takes an active role by guiding work processes, such as, for instance, an approval process for a service contract renewal. A repository of templates enables the SE to lay out the overall structure for such a process, gather all needed material and instruct all involved people what to do and how to proceed. To support these functions technically, the operating environment provides an activity manager for the orchestration of management activities. It manages the supplier management process in the portfolio [8].

We adapted the supplier management processes from ITIL in our methodology, and accordingly prepared process templates stored in the repository of the operating environment. When a given process template is used to initiate an operation, the corresponding process definition is instantiated and deployed in a backend process engine, which supports the enactments of ad-hoc and flexible processes [8]. The activity manager supports process flexibility so that supplier management processes can be updated during the enactment as result of the team's decision to make changes to the corresponding activity template (e.g., adding or removing a task). Given that the supplier management process is a best practice process, we impose no strict ordering between tasks in the template unless they are mandated by explicitly defined dependencies. It allows us to provide people with flexibility when they work on tasks. Our goal is to rather define what needs to be done and leave the decision

about the how to individual and teams who are involved in a case. As said, we provide this flexibility in cases where no explicit dependency between tasks exists.

The presented *operating environment for hybrid IT service portfolios offers basic components for managing service portfolios for an IT service customer, and in this case, enterprise IT.* This is a first step and attempt towards a systematic approach for managing hybrid IT portfolios. Among the possible directions, we plan to expand the scope of the prototype to managing the relationships among services, with service providers, and between end consumers and employees in the enterprise.

Outlook

Trends and challenges force fundamental change in how IT is organized and delivered in enterprises. Factors play a role that are similar to what has revolutionized modern industrial production with its supply and distribution chains where enterprises effectively coordinate flows of raw materials, parts and products across a number of suppliers, manufacturers and distributors. Modern industrial production has created an environment in which specialized suppliers have turned out to be the most efficient form of organization in which forces of competition and collaboration can interact, and specialization can balance with innovation resulting in an overall efficient system of production and distribution.

We are at the beginning of a similar revolution in enterprise IT where a shift is occurring from the individual "manufacturing" of IT services in house towards specialized "industrial production" of IT services from external service providers. As a result, *IT service supply chains* are emerging that are connecting specialized IT service providers and consumers. Management of these services supply chains is a new challenge IT faces in enterprises.

Anticipating this new world of service IT requires a deeper understanding of how service supply chains work for services as opposed to parts and materials, which has been well studied and practiced in modern manufacturing. Despite some similarity, service supply chains are of a different nature than material supply chains. Questions of supply chain planning, design, execution, and improvement need to be re-answered for IT services. Consideration is also needed in the academic fields of supply chain theory [3] and practices [4, 5]. Last not least, in our research, we are asking the question how support systems be developed for supply chain management for services. We expect that new models and practices will emerge as IT transitions from provision to brokering of IT services.

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Biographies

Jamie Erbes *is an HP Fellow and the director of the Services Research Lab at HP Labs. In this role, she champions a blend of research and business outcome to brings forward-looking cloud and social service vision into viable enterprise solutions.Prior to the HP Labs, she was HP's Chief Technology Officer for Software & Solutions where she supported the company-wide software strategy for Business Technology Optimization (BTO), HP's IT management software, and Communications & Media Solutions In this role she helped create a forward-looking vision for cloud services and their impact on Enterprise IT management.*

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