Sustainable Service Innovation Model: A Standardized IT Service Management Process Assessment Framework

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Abstract. This paper presents the Sustainable Service Innovation Framework that is used in the Public Research Centre Henri Tudor in Luxembourg as a generic framework supporting innovation, and promoting multi disciplinary activities It is demonstrated with the Tudor's IT Service Management Process Assessment (TIPA)'s case: the Tudor's IT Service Management Process Assessment, with the value, design, promotion, management and capitalization of TIPA's services.

Keywords: Process assessment, service innovation, IT service management, process models, standardization, sustainable service innovation process.

1 Introduction

As confirmed by leading institutions, services play a key role in economies. Representing more than 70 percent of gross value added in the European countries in 2006 [1], services also account for almost all employment growth in the OECD (Organization for Economic Cooperation and Development) countries and are the major contributor to productivity growth [2]. Recent figures for Luxembourg indicate that the service sector accounts for above 85% percent of total value added in 2006, granting Luxembourg with the first place in the European landscape. Within the service sector, the financial sector, with more than 150 banks populating the country, is a major component of Gross Domestic Product (GDP) and GDP growth and is an extensive user and provider of so-called knowledge intensive services. With increased competition, accelerated changes in markets needs and technology evolution, organizations have to continuously generate new services and to succeed in their commercialization [3][4][5]. This innovative capability is also considered as a vector of competitiveness.

In this service context of Luxembourg, and in the multi-disciplinary approach featuring Services Science, the Public Research Centre Henri Tudor (CRPHT) has developed a Sustainable Service Innovation Process (S2IP), providing a framework for services managed in a living lab, and then all facilities for several interacting disciplines. This paper firstly presents this service innovation design model called S2IP

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and secondly illustrates it by the case of a specific Assessment and Improvement integrated Approach developed by CRPHT. A particular attention is paid on standardization aspects in Luxembourg and at an international level.

In fact, in 2003, a research project (AIDA, standing for Assessment and Improvement integrated Approach) was defined in order to develop an IT Service Management (ITSM) framework for assessing ITSM processes. The innovative ideas of the project were born from many issues in companies where the need for improving ITSM processes appeared but there was a lack of an objective and repeatable approach for assessing processes and a lack of a very structured improvement path. Moreover, similar approaches combining the improvement of software development processes and ITSM ones were missing. In CRPHT, the ISO/IEC 15504 standard has been studied and used since the mid-nineties for assessing software processes (and using the assessment results for improvement programmes). From the year 2003, the ISO/IEC 15504 [6] has been revised as a generic process assessment standard [7]. It was then possible to assess any kind of process, in any company whatever the activity sector. At the same time the IT Infrasctructure Library (ITIL®) de facto standard was developing quickly and rising more and more interest in the Grand Duchy of Luxembourg. Then the combined use of both standards became a research objective. The AIDA research project aimed at developing a common approach for IT process assessment and improvement [8][9][10]. From now on the AIDA research framework has been renamed as TIPA: Tudor's IT service management Process Assessment. We will now describe our service innovation design process before to illustrate it by this specific innovation.

2 A Service Innovation Management Model

Based on its practices (mainly action researches, further developed in [11]) the Centre for IT Innovation (CITI) department of CRPHT has developed and is now using a global sustainable service innovation process to support the management of innovation processes: the “Sustainable Service Innovation Process” (S2IP). It is based on a participatory and collaborative innovation approach in order to sustain deep involvement of the network’s actors in the development of innovation services. Those services are dedicated to businesses (i.e. process-oriented such as e.g. security management services), to IT-oriented services (such as e.g. tourist information geo-localized mobile access services) and to Human Resources IT-related skills (such as e.g. consultancy services in SME). The overall structure of S2IP is depicted on the figure 1.

Although the figure may suggest that the S2IP is lifecycle oriented, the reality is that each box corresponds to a process by itself that has to be performed and may be pursued in parallel with other processes in a non strict sequence. In accordance with Van de Ven & al (1999) [12], we apprehend innovation in a process perspective as a non-linear dynamic system, which implies several sense-making activities. Our research on the definition of actors, activities, skills and competences mobilized in the S2IP is directly contributing to the body of knowledge developed in the new research domain of Service Science [13].

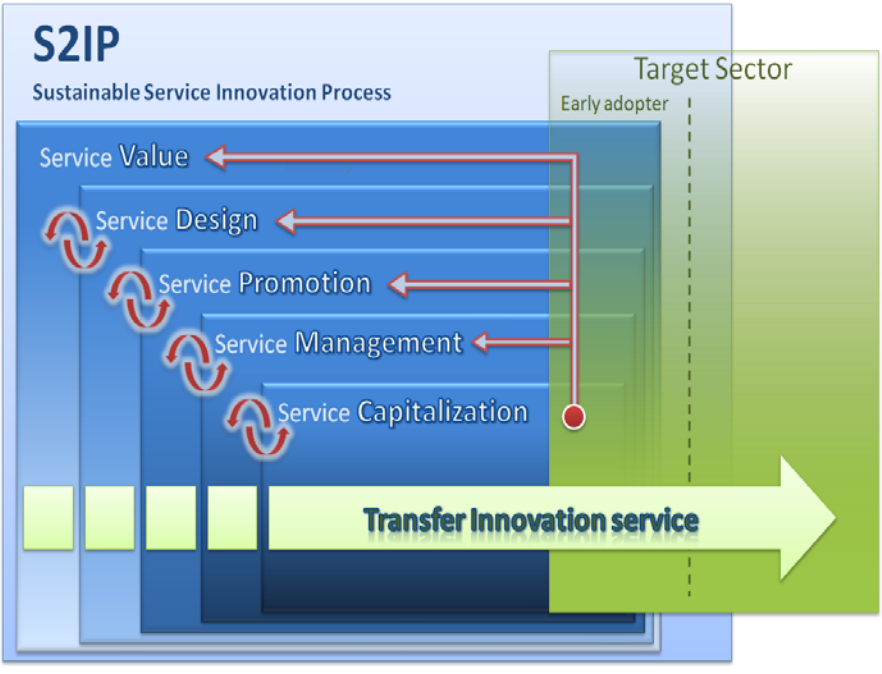

Fig. 1. Sustainable Service Innovation Process

Service value:

- This process covers the activities associated with the identification of an opportunity for a new service innovation. They cover a study of the technological feasibility of the service (which can require the building of a prototype) as well as a preliminary identification of the business model associated with the value (both expressed in terms of tangible financial elements and of intangible assets).

Service design:

- This process is associated with the definition of the service not only in terms of its business functional objectives but also in terms of all its required qualities. These activities required to elicit the strategies of the different early-adopters stakeholders involved in the final acceptance of the service as well as to understand the constraints associated with the environment (like specific regulations associated with the domain). From this initial elicitation, requirements have to be formally expressed in terms of properties of the services that can be organized in terms of a service contract (or a service level agreement).

Service promotion:

- Once early adopters have validated the service contract, we have seen that it is important to promote the service to other potentially interested parties. This can be done within an organization through some marketing regarding the socio-economical sustainability of the service. In a network of organizations or for a sector, this promotion can also include initiatives regarding the branding of the new

service through some label definition and associated certification scheme. Ultimately standardization activities run for example at the national or international levels (like e.g. ISO) definitively help in a successful promotion of the service.

Service management:

- This is out of the scope of CRPHT's mission to deploy by itself the service with an organization or within a sector. This is where the market should play its role. However we define and provide tools that can be used by those that will deploy the service for checking and measuring the correctness of its implementation. In particular for each new service we propose metrics associated with the measurement of the quality of the implementation of the services contract.

Service capitalization:

- This is where we collect the feedbacks associated with the measures as well as from evaluation performed with the services end-users. The analysis of this feedback will indicate the possible evolution of the service in terms of new requirements, new business model, etc. Thus this will be the beginning of new iterations associated with the different processes described above.

With regard to the overview of innovation models, the "Sustainable Service Innovation Process "model can be qualified as a 5th generation model following the historical perspective of innovation models proposed by Rothwell [14] (see Bernacconi & al. 2008 [15]). Indeed, it stresses the continuous, iterative and process aspects, which are typical of this generation.

In addition, it highlights the influence of the intensive networking, including the cross-functional collaboration within the organization and further emphasizes the downstream alliances with key beneficiaries and end-users of the generated innovations. In turn, these strong ties with users foster the sustainability of the innovation and through the capitalization phase, it is the innovation process itself that may be considered as sustainable, provided that all the capitalization mechanisms are actually put in place. Finally, this model captures the knowledge-intensiveness characteristic, which is also a common point with the 5th generation models.

We will now describe a S2IP instance regarding the definition of a service innovation related to an Assessment and Improvement integrated Approach. This illustration will highlight the strengths and weaknesses of the followed approach and can thus be helpful to any service innovation definition process.

The applied methodology is based on participant observation in the context of an action research project, coupled with an "external" view to increase the objectivity of the interpretation.

3 TIPA's S2IP Instance

After having introduced the S2IP framework this section is presenting its in the TIPA's context. We can consider here a first iteration where the S2IP framework has been deployed.

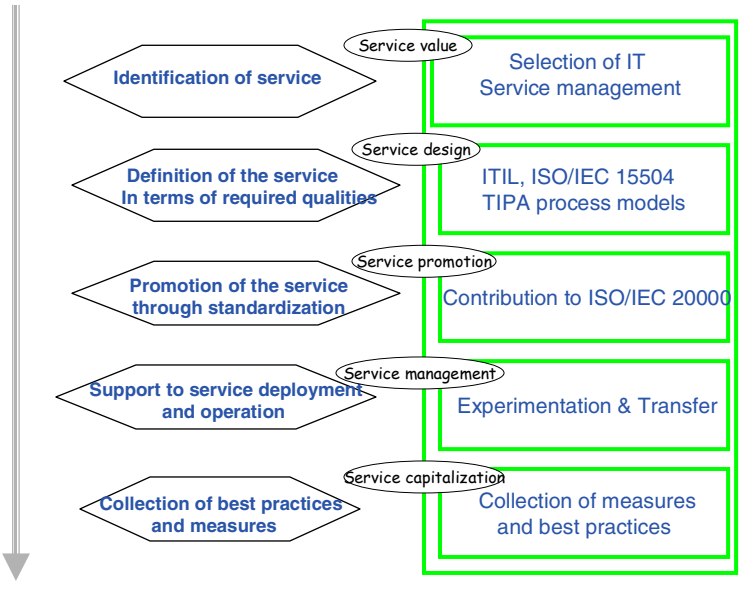

Fig. 2. TIPA's S2IP instance

3.1 Service Value of the TIPAs Framework

In the S2IP framework, the identification of the service value for the potential stakeholders consists in activities such as the development of a business model related to the service innovation. The added value service built around our assessment methodology under the name TIPA (standing for Tudor's IT Service Management Process Assessment), was designed as a solution to reduce the cost for assessing ITSM processes and for companies aiming at improving them. This solution was mainly based on a methodological framework (process models; assessment methodology and associated tools such as questionnaires, templates and case study examples; training courses for assessors) enabling the assessment of ITSM processes. The ITIL de facto standard was selected as the input for deriving process models [16] [17], according to the ISO/IEC 15504 process assessment requirements [6].

At that time, there was no business plan developed for the future use of the TIPA's framework in a commercial perspective, even if Intellectual Property Rights were studied for CRPHT, and tackled for ITIL trademark and ISO standards use. Globally speaking, the identification of the services to be provided by the TIPA's framework was weak.

3.2 Service Design of the TIPAs Framework

Before the AIDA R&D Project, there were already existing process assessment models such as ISO/IEC 15504-5 and CMM, and more recently CMMI [18]. But there were not many initiatives linking assessment purposes and ITSM. So an ITSM

Process Reference Model (PRM) and its associated Process Assessment Model (PAM) [8][9][10] were developed.

ITSM focuses on delivering and supporting IT services that are appropriate to the organisation's business requirements, whatever its type or size. ITIL® provides a comprehensive, consistent and coherent set of best practices for ITSM processes, promoting a quality approach to achieving business effectiveness and efficiency in the use of information systems. Developed in the late 1980s, ITIL® has become the worldwide de facto standard in Service Management.

OGC, the British Office of Government Commerce, defined ten processes for ITSM in the two well-known ITIL® books "Best Practices for Service Support" and "Best Practices for Service Delivery" [16][17].

The TIPA® model was inspired by ITIL® best practices, with the goal to enable objective ITSM capability assessments. The references used to create the PRM and PAM were the Service Support and Service Delivery books published by OGC. These inputs are considered as implementation best practices, and can be seen as a Process Implementation Model (PIM) to start with. The purpose of the PRM was to define, at a high level of abstraction (i.e. in term of Process purpose and Process outcomes), a set of processes that can be used as the process dimension for a PAM in the IT Service Management area. According to the maturity of the definition of these processes, the process list of the PRM was directly derived from the Service Support and Service Delivery ones. The ten processes from Service Support and Service Delivery were then selected without adding or removing any of them.

Using ITIL® best practices, CRPHT developed a Process Reference Model and a Process Assessment Model, by using Goal-oriented Requirement Engineering techniques [19]. Several steps were followed to derive the models.

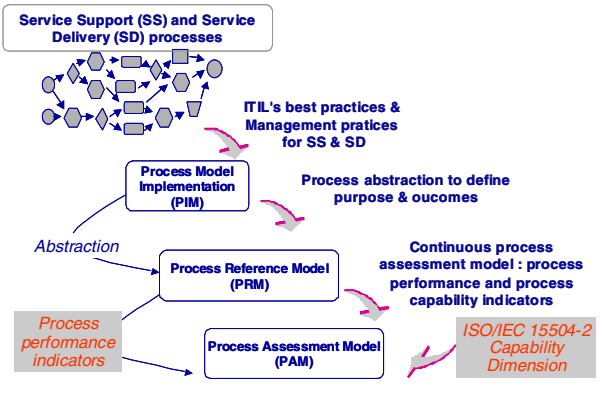

Fig. 3. Deriving the IT Service Management Process models

If we consider the TIPAs framework from the S2IP's perspective, the "Service Design" Process has been tackled in this section on its particular functional features, with a special attention paid on inputs standards. Non-functional ones were neglected. The definition of the TIPA's services in terms of required qualities were just tackling the

methodological aspects, without using ITIL® principles themselves for featuring the TIPAS's services, in terms of Service Level Agreements for instance. Nevertheless, there were early adopters of the models through experimentations that contributed to validate the models.

3.3 Service Promotion of the TIPAs Framework

The main component of the TIPA's framework is the set composed of the TIPA's Process Reference Model and Process Assessment Model. These models were build in meeting ISO/IEC 15504 requirements, and were similar as exemplar ones in ISO standards (i.e. the ISO/IEC 12207 PRM [20] and ISO/IEC 15504-5 [21] which is the PAM based on the ISO/IEC 12207 PRM).

The British Standardization Institute drove in the International standardization Organization (ISO) the publication of the ISO/IEC 20000 IT Service Management standard [22][23]. It is aiming at certifying a service provider with a management system for IT Service Management Processes. The ISO/IEC 20000-1 [22] standard, titled "Specification" promotes the adoption of an integrated process approach to effectively deliver managed services to meet the business and customer requirements. On the other hand, ISO/IEC 20000-2 [23], named "Code of practice" provides guidance and recommendations.

From 2005 up to now, Luxembourg played a critical part in ISO international meetings by letting people know how advanced Luxembourg's works were. The International standardization community recognized the benefits of using complementary approaches between audits and Process Assessment [24][25]. TIPAS's works were presented in international meetings, but because ITIL trademark use was not resolved between in 2006, TIPA's PRM and PAM were not ceased to ISO working groups, but it was definitely a fundamental promotion of the TIPA's services.

3.4 Service Management of the TIPAs Framework

As mentioned in the generic description of the S2IP framework, it is out of the scope of the CRPHT's mission to deploy a service. But CRPHT has the duty to transfer R&D results to the market, and then services developed in research projects. So CRPHT can assist companies to deploy services to be transferred of newly transferred services.

In the case of TIPA, there were early adopters that experimented the process models and methods for assessing IT Service Management processes. The way the TIPA services were transferred can be featured in two processes of the S2IP framework: service design (first use of TIPA's framework in a company [26][27]) and service management (TIPA's deployed service in a company, after its transfer). Actually CPRHT engineers were leading first experimentations with a trained TIPA's assessor, without experience. For a second experimentation, these TIPA's assessor was coached by CRPHT experienced assessors but was gaining autonomy. Gradually, TIPA's team also developed some methodological support tools for easing the assessment running, such as questionnaires and templates for reporting assessment results. This contributes to the professionalization of TIPA's services, for a better adoption by the market.

3.5 Service Capitalization of the TIPAs Framework

Some feedbacks were collected from the early adopters of the TIPA's framework, from people but also from our team in order to improve the service design on the functional aspects.

In order to structure the methodology leading to the construction of a PRM-PAM and to organize components, a process model has been drafted, aiming at engineering process models [19]. The purpose of this model is to design and manage an ISO/IEC 15504 compliant process model (validation and traceability) fulfilling the stakeholders' requirements and needs, and to provide a knowledge base supporting uses of the model. This draft Model provides the framework for the overall methodology. By using a rigorous and systematic approach for developing PRMs and PAMs, it provides a very structured and trusted basis for process improvement. Then it can be valuable inputs for combining process modeling and assessment with the help of a support tool, within an improvement approach contextualized to an organization.

In the context of TIPA, the use of this systematic approach for developing process models based on ITIL V2 in a first time, and later on ISO/IEC 20000-1 was very useful and helped to gain structured feedback on the quality of the models. This theoretical feedback is completed by companies using the TIPA's framework, and by CRP Henri Tudor engineers participating in ISO standardization works.

4 Luxembourg Standardization Part

The Luxembourg Institute for Standardization, Accreditation, Security and quality of products and services [28] (ILNAS - Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services) is under the administrative supervision of the Minister of economy. The law from May 20th, 2008 was the basis for the creation of ILNAS and its activities started in June 2008.

For complementarity reasons, efficiency, and transparency and in the context of administrative simplification, ILNAS gathers several administrative and technical missions. ILNAS is a network of competences serving competitiveness and consumer protection.

Before it was encompassed within ILNAS, the Luxembourg National Body did not play a very active part in Luxembourg's standardization efforts. It is now evolving with the government strong will to develop digital trust, and determine clear Luxembourg economic advantages in following up some IT standards. Then, in February 2009, Luxembourg became a Permanent member of the Joint Technical Committee 1 covering IT standards.

Moreover, with the support of the Luxembourg government, ILNAS and CPRHT have joined their forces in a collaborative research project in order to connect innovation, research and standardization, with a twofold focus: IT standardization and financial sector potential national standard. So this project is aiming at:

- investigating and developing digital trust domains where standards are innovation and competitive vectors at the national level;
- developing a normative knowledge economy;
- supporting and developing (IT) standardization activities in Luxembourg;

- investigating the opportunity of creating national standards for the financial sector;
- federating all the stakeholders of the financial sector in order to develop a standardization strategy.

This project contributes in the support of standardization in Luxembourg, more particularly in IT, and the development of a two-way communication and exchanges between market and National Body (representing economic interests of Luxembourg). As previously mentioned, special attention is paid by ILNAS on national standard opportunities.

In a more global perspective, a partnership programme is planned between CRP Henri Tudor and ILNAS. It will gather several standardization-oriented collaborative projects, targeting several sectors such as construction, finance, SMEs…

5 Discussion

Considering the TIPA's approach, the S2IP framework has been derived with two iterations. The second one is currently active, and weaknesses that were issued during the first one are on the track to be corrected. As an innovation framework, the 5 identified processes (service value, service design, service promotion, service management and service capitalization) were not deployed with the same maturity, depending on several factors such as the resources and priorities in the Centre.

The Service value of the TIPA's framework had not been identified and prospected right from the beginning of the TIPA's initiative. Some work has still to be performed, in order to finalize a business plan for the exploitation of the TIPA's services, and to determine the exact scope of the proposed services. Some TIPA's focus groups were organized a few months ago, in order to collect market needs, and align TIPA's services to them. Even if this process of the S2IP framework is performed quite late in the context of the TIPA's framework, it still demonstrates the value of the TIPA services, their innovation role and benefits for the market [29]. A certification scheme is also targeted.

The *Service Design* was partially performed, because most of the considered aspects were "only" functional, with methodological and standardization aspects. The contracts aspects of the TIPA's framework have to be more investigated and developed further. TIPA's service level agreements could be derived. But according to the high interest of IT departments in companies on service providers, new methodological developments are considered (ITIL V3 based PRM and PAM development).

About the *Service Promotion*, if we consider globally the S2IP framework, standardization activities and roles played highly promoted TIPA's services at national as well as international level. Thus there is an acknowledgement of CRP Henri Tudor expertise in the standardization domain for the IT Service Management and Process Assessment fields, and also for the corresponding innovation and scientific communities. Having said this, there is a gap still to cover, in order to develop the TIPA's service promotion on the market. Then some new activities are already planned and currently implemented in order to develop a branding, a valorization strategy, some

professional partnership for certifications and selling of a TIPA's book describing the TIPA's methodology and tools.

The *Service Management* for TIPA's has to be enhanced with an important deployment in terms of number of uses of TIPA's, and a spreading worldwide. There are also some more R&D works to perform in order to develop measures of the quality of TIPA's services. As for the TIPA's assessment, a very structured approach could enable benchmarking and provide statistics on the TIPA's deployment and quality of service.

About *Service Capitalization*, some more analysis is necessary for deriving real trends from all TIPA's experimentations. An impact analysis is on its way, in order to demonstrate quantitatively as well as qualitatively the added value and return on investment of the TIPA's approach.

6 Conclusion

This paper presents the Sustainable Service Innovation Process that is used in CRP Henri Tudor as a generic framework supporting innovation, and promoting multi disciplinary activities throughout our research teams. Moreover, the S2IP's framework can be instantiated to any service line resulting from our research works. This derivation has been illustrated with the TIPA's framework aiming at proposing IT Service Management Process Assessment services. There are several instances of the S2IP for the TIPA's case. We saw that some improvements have to be made for the TIPA's framework regarding S2IP, which is then used as a tool to see gaps in the innovation process. In this context of research-action, CRP Henri Tudor gains maturity in the Service Science with a multi-disciplinary approach, and targets to use the S2IP framework as a process innovation management governance model. Other services frameworks have been studied on the same way as the TIPA's one (i.e. in the construction sector, in the financial one [30] and for SMEs). It demonstrates how the model works, with strengths and weaknesses. This gives us perspectives for improving innovation approaches, capitalizing and refining the model.

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