Chapter 12
A Blueprint for Engineering Service Definition

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Abstract Increasing numbers of businesses are moving from the supply of physical products to the delivery of product-service systems. The resulting need to support information related to both physical artefacts and associated services has a number of implications for the design of information systems used to support product-service systems through their lives. The focus of this chapter lies on service in the context of product service systems. Designers of service solutions need to be able to answer the question, "What information is needed in service design to enable the delivery of service excellence?" A key prerequisite to answering this question lies in understanding service elements that need to be supported, performance requirements of the service and how the service elements are related to the required performance. This chapter introduces a service information blueprint that has been designed to support service designers in gaining this understanding. The service information blueprint is a general purpose model for service definition that has been used both to define "as-is" and "to-be" services, service breakdown structures and service performance indicators, and to specify relationships between service processes and service requirements.

12.1 Introduction

Increasing numbers of businesses are moving from the supply of physical products to the delivery of product-service systems. The resulting need to support both physical artefacts and associated services has a number of implications for the

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I. Ng et al. (eds.), *Complex Engineering Service Systems*, Decision Engineering,
DOI: 10.1007/978-0-85729-189-9_12,

design of information systems used to support product-service systems through their lives. The focus of this chapter lies on service in the context of product service systems. Designers of service solutions need to be able to answer the question, "What information is needed in service design to enable the delivery of service excellence?" A key prerequisite to answering this question lies in understanding service elements that need to be supported, performance requirements of the service and how the service elements are related to the required performance.

A service information blueprint is introduced in this chapter. A review of literature that informed the theoretical framework on which service information blueprint is built is provided in Sect. 12.2. Three key questions are introduced at the end of Sect. 12.2 and answered through the remainder of the chapter. A case study that is used to illustrate both key features of the service information blueprint and answers to the questions posed at the end of Sect. 12.2 is introduced in Sect. 12.3. This leads into a discussion of the requirements for the service information blueprint (in Sect. 12.4) and a description of how the service information blueprint addresses these requirements (in Sect. 12.5). Finally, in Sect. 12.6, future trends in service development are anticipated and areas for further research outlined.

With respect to the CIF (Chap. 4) the service information blueprint focuses on information transformation.

12.2 Key Characteristics of Service

Means of understanding product information needs are well established and embedded within the development methods of product information exchange standards such as STEP (ISO10303-1 1994). Typically they begin by building an understanding of the activities and information flows to be supported and are followed by a detailed analysis of the information flows that are deemed to be in scope. This yields product information requirements. In product development projects the activities to be supported typically align with the product development processes for the products and organisations concerned (Ulrich and Eppinger 2004). Stage gated product development processes are important because they allow practitioners to focus on key decisions, and the information needed to support them. Product information system designers couple knowledge of key characteristics of physical products with product information requirements to develop information solutions.

Requirements for the service information blueprint were derived from two sources: the activities that service developers carry out and key characteristics of services. During service development activities, key issues that service designers need to be able to address lie in the trade-offs to be made between service affordability and performance. This leads to the requirement to be able to link service process definitions with the key performance indicators from service contracts. This is achieved in the service information blueprint by supporting both:

a. the capture of service processes (including process flows, steps and decompositions) and performance requirements related to both the contract and the business requirements of the service provider, and
b. the definition of relationships between process definitions and performance requirements.

In addition, for companies designing multiple service offerings, there is a desire to gain benefits of scale by enabling the reuse of service definition elements which requires capabilities to create catalogues of service parts and configure services using these "standard" service parts.

Given these high level requirements there is also a need to understand key characteristics of services and how they relate to characteristics of physical products. Johne and Storey (1998) provide a review of literature related to new service development. New service development includes the definition and delivery of services; the literature relates largely to traditional service products such as financial and hospitality services. Five key characteristics that distinguish service products from physical products are identified: intangibility, perishability, non-ownership, inseparability of production and consumption, and variability. As a result of these characteristics, the information structures applied to the definition of physical products cannot be applied directly to services. A key difference between the information content of a physical product definition and that of a service definition lies in the core structure around which it is built. Both have a product structure but physical products are defined around their physical parts (typically through a bill of materials (BoM)) whereas service products are defined around the processes that are used to deliver them (for example, through process flow charts and scripts). A key difference between these information cores is that the relationships in a BoM are part-whole relationships between part definitions whereas the relationships in a service are flows between process step definitions. Engineering information systems to support the lifecycles of product-service systems need to accommodate these distinctions without compromising the need to preserve commonalities between physical and service products.

Research on philosophy and engineering casts insights on relationships between technical artefacts and the processes and actions that surround them. A key tenet of the arguments put forward by Vermaas and Houkes (2006), (Houkes and Vermaas 2009) on the dual nature of technical artefacts is that technical artefacts have both designed physical structures and intended functional structures. On intended functional structures, Vermaas and Houkes, in their ICE (Intentionalist, Causal-role, Evolutionist) theory (2006), assert that when engineers ascribe functions to artefacts they have to consider explicitly the goals for which agents use artefacts and the actions that constitute their use; the agents' actions are captured in a "use plan". Mumford (2006) discussess distinctions between function, behaviour and capacity of physical artefacts and provides the following definitions for function and capacity:

- capacity is a property of an artefact that is understood according to what it can do or what function it can play in relation to other properties;
- function is a capacity plus the use plan that exploits it for an intended purpose.

Design rationale, as captured using tools such as the D-Red software tool (Bracewell et al. 2004), is a means by which designed physical structures might be related to intended functional structures. Design intent, for example as captured using advanced requirements management techniques (Agouridas et al. 2001), enables intended functional structures to be related to stakeholder intent and so aspects of what Vermaas and Houkes refer to as use plans. Illies and Meijers (2009) explore further relationships between artefacts and action schemes. The notion of an action scheme can be used in the context of product-service systems to include maintenance and support activities. As such, it can be argued that the service part of a product-service system is a kind of action scheme.

On designed physical structures, Simons (2003) uses mereology[1] to provide a theoretical basis for the definition of physical product structures, of which BoMs are a common manifestation. If services are regarded as products, or parts of product-service systems, then the following questions arise given the discussion in this section.

1. What are the intended functional structures of service products and how might they be represented?
2. What are the designed structures of service products and how might they be represented?
3. What kinds of service definition relationships are required to support the information needs of service development processes?

In the rest of this chapter we provide answers to these questions.

12.3 Case Study

A service deliverer's requirements arise from two sources: the requirements specified in the contract with the customer and internal requirements needed, for example, to ensure that delivery of the service offering is affordable and the business sustainable in the longer term. For example, efficiencies might be gained by sharing common service elements, akin to sharing standard parts in physical products, without detrimental effects on the quality of the delivered service. As product service system offerings develop, a number of different kinds of contract are being identified. The defence sector is one of the most advanced in identifying different kinds of service contract. The Logistics Coherence Information Architecture (LCIA)[2] is a joint Government (UK MoD) / industry framework developed to improve the way in which these different kinds of support service contract are

[1] "Mereology (from the Greek μερος, 'part') is the theory of parthood relations: …" [http://plato.stanford.edu/entries/mereology/].

[2] The Logistics Coherence Information Architecture defines a structure for use in identifying information requirements for logistics support solutions [http://www.modinfomodel.co.uk/].

Table 12.1 Example service level agreements (SLAs) and key performance indicators (KPIs)

	Availability type contract	Spare only type contract
KPI 1	Call-to-Repair response time- 24 h (max)	Call-to-Repair response time- 48 h (max)
SLA 1	Provider to supply, install, maintain, repair and support spare parts and the whole machine	Provider to supply and install spare parts for the Coffee Maker
SLA 2	Service package includes planned preventive and predictive maintenance, and unplanned breakdown maintenance	Provider to repair back to safe working and/or operating conditions for the Coffee Maker
SLA 3	Provider is responsible for customer training and to demonstrate the use of the Coffee Maker	Provider responsible for customer training and to demonstrate the use and/or operation of the Coffee Maker
SLA 4	Provider to supply user manuals/training materials to the customer	Provider to supply user manuals/training materials to the customer
SLA 5	Customer to pay annual fixed price to the provider for availability of the product (Coffee Maker) and services	Customer to pay separate price for each of the new or replaced spare parts supplied by the provider
SLA 6	The price includes both spares and services (i.e., complete availability and ready for use)	Customer to pay annual fixed price to the provider for repair services that cover for a whole calendar year
SLA 7	24 months minimum contract period	12 months minimum contract period
SLA 8	Services are provided on both as-planned and on-demand basis for the duration of the contract	Services are provided on-demand basis for the duration of the contract

achieved; LCIA identifies a range of contracts from the provision of spares through the delivery of equipment availability to the delivery of capability. The case study used in this chapter is a fictitious maintenance and repair service for a coffee making machine. Two kinds of contracts are considered: availability and spares only type contracts. In the availability type contract the manufacturer supplies coffee making machines to its customers and takes responsibility for ensuring that the machine is available for use for an agreed proportion of the time. For example, an availability of 95% would mean that the machine must be available to use for 95% of the time. On the other hand, for the spares only type contract, the manufacturer supplies spare parts for the coffee making machine and carries out all repair activities; however, the customer pays separately for the spare parts. Typical service level agreements (SLAs) and key performance indicators (KPIs) for these two kinds of contract are shown in Table 12.1. Commonalities and similarities in the processes needed to deliver services under the two contract types are summarised in Table 12.2.

The service provider delivers services to a number of customers, some on a spares only basis and others as availability contracts, for the coffee making machine in this case study. To improve efficiency, the company maximises the sharing of common processes across different services, products and customers. As such, when designing services a goal is to minimise service elements that are specific to the product being serviced for the customer.

Table 12.2 Process commonalities and differences across the two contract types

<table>
<tr><th>Availability type contract</th><th>Spare only type contract</th></tr>
<tr><td>Service provider carries out planned preventive and predictive maintenance to an agreed schedule</td><td>Customer takes responsibility for the maintenance and repair of the machine</td></tr>
<tr><td colspan="2">If there is a breakdown the customer contacts (by telephone) the service provider, reports the problem and schedules a service engineer's visit</td></tr>
<tr><td>The engineer is expected to visit the customer within 24 h of the problem having been reported.</td><td>The engineer is expected to visit the customer within 48 h of the problem having been reported</td></tr>
<tr><td colspan="2">The service engineer diagnoses the cause of the breakdown and tries to resolve the problem on-site. If the problem cannot be resolved on-site the machine is taken from the customer's premises for repair. During the repair, if necessary, the service provider either purchases replacement parts from its suppliers or uses parts that have been manufactured in-house</td></tr>
<tr><td>An alternative machine is provided to the customer for temporary use</td><td>–</td></tr>
<tr><td>The service provider pays for any new or replacement parts.</td><td>The customer pays for any new or replacement parts.</td></tr>
<tr><td colspan="2">The faulty machine is then repaired by the service provider's maintenance and repair team</td></tr>
<tr><td>Other planned, preventive and predictive maintenance might be carried out</td><td>–</td></tr>
<tr><td colspan="2">The service provider's call centre staff contact the customer to arrange the return of the repaired coffee making machine</td></tr>
<tr><td>The standby coffee making machine is returned to the service provider</td><td>An invoice for the cost of the repair is sent to the customer</td></tr>
</table>

With respect to the questions posed at the end of Sect. 12.2, the following answers can be provided.

1. *What are the intended functional structures of service products?*

The intended functional structures of services come from the service contract and business strategies of the organisations involved in the delivery of the service (both customers and suppliers). In the case study these are the KPIs and SLAs from the service contract, and the company goal to maximise sharing of service elements across products, services and customers.

2. *What are the designed structures of service products?*

The designed structures of services are the means by which the intended functional structures are realised. For this case study they are the processes used to deliver the service, such as those that can be derived from the descriptions given in Table 12.2. In addition, the designed structure is likely to include references to standardised process elements.

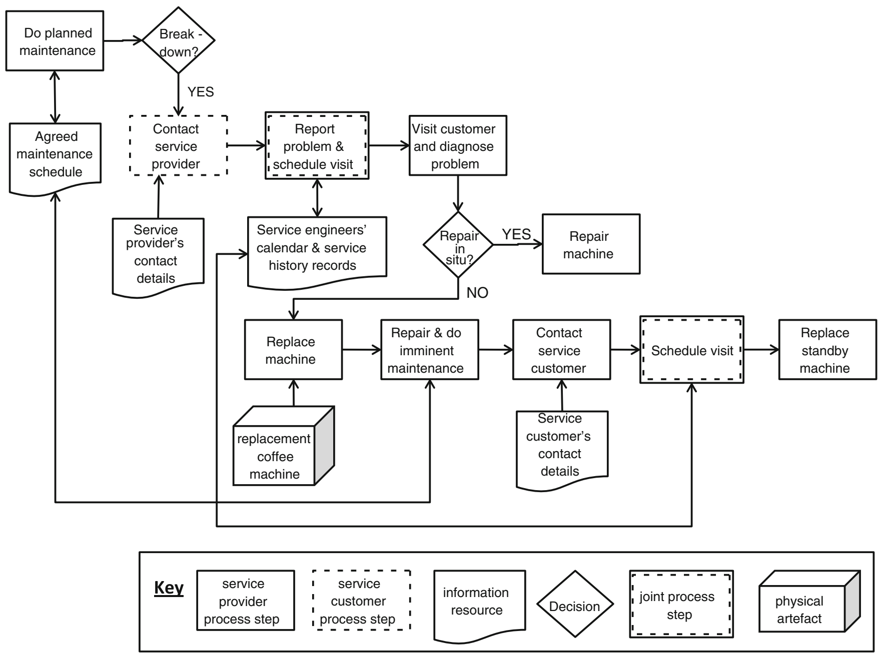

Fig. 12.1 Flow chart of the Availability Contract service case study

12.4 Requirements for a Service Information Blueprint

Requirements for the service information blueprint came from two sources: the information needed to support downstream applications such as service simulations and the needs of the service development process itself. These can be boiled down into two questions.

- What do service developers need to be able to say? and
- What do service developers need to be able to do?

12.4.1 What do service developers needs to be able to say?

The flow chart given in Fig. 12.1 is the result of an analysis of the availability contract example given in Table 12.2; an edited version showing the differences in process flows and information uses for the spares only option is given in the Appendix. The key in Fig. 12.1 is instructive in answering our question. It can be seen that there was a need to capture three kinds of service process: those carried out by the customer, those carried out by the service provider and those carried out by both parties collaboratively. The spares only contract flow chart in the

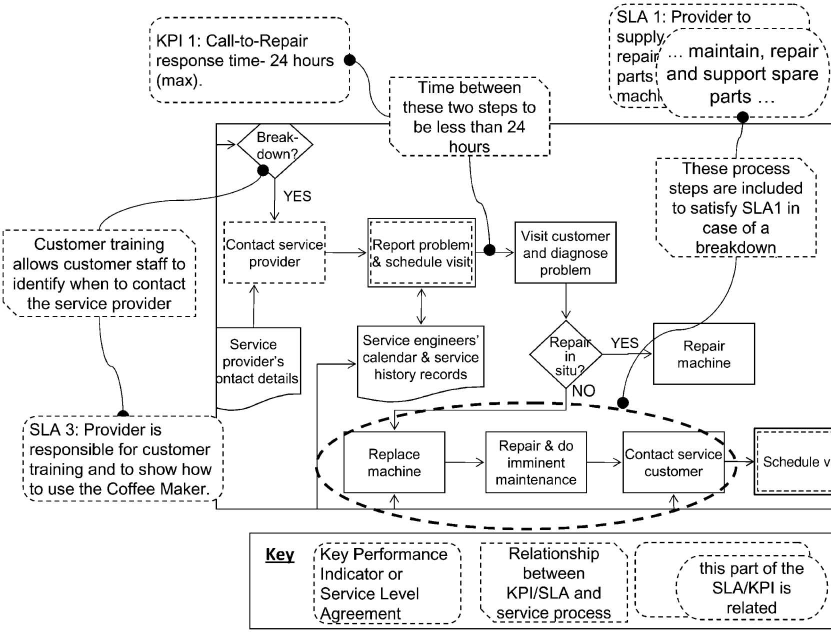

Fig. 12.2 Relationships between process steps and SLAs and KPIs

Appendix shows how these process steps change across different kinds of service contract. Real-world situations are often more complicated than this because services are frequently delivered and consumed by networks of stakeholders. Common examples are package delivery services where the customer experience (and so service quality) is influenced by the goods provider, the goods deliverer and the customer; and industrial services such as those delivered to the armed forces where the service is co-delivered and consumed by a number of agencies who are related to each other in different ways. These kinds of service are beyond the scope of the service information blueprint presented in this chapter.

There was also a need to capture information used in the service process; typically these would be held in business information systems (for example, contract and customer contact details) and engineering information systems (for example, service histories and information about replacement products and parts). The example used in this chapter oversimplifies these information systems; a key role for the service information blueprint lies in supporting service developers in identifying the detailed information requirements of their service; this is covered in more detail later.

Finally, although not shown in the key to Fig. 12.1, it is important to capture relationships between process steps and the service requirements to which they contribute. For this reason, a third kind of relationship to capture is between the process steps shown in Table 12.2 and the service level agreements (SLAs) and key performance indicators (KPIs) given in Table 12.1. Examples of these kinds of relationship, for the availability contract are shown in Fig. 12.2.

Again, the key in Fig. 12.2 is instructive in identifying the kinds of relationships that need to be supported. It highlights the need to be able to relate aspects of the service process to parts of and whole KPIs and SLAs. This requirement is mirrored in references to the service process where there is a need to refer to:

- individual process steps, such as in the case of SLA3,
- relationships between process steps, such as in the case of KPI1, and
- collections of process steps that are not necessarily defined as a self-contained group within the service definition, such as in the case of SLA1.

In addition, although not shown in Fig. 12.2, there is a need to be able to refer to parts of process steps, such as the *Repair* part of the *Repair & do imminent maintenance* process step.

12.4.2 What do the service developers needs to be able to do?

Discussions with service design and development personnel led to the identification of basic requirements for service developers. In essence they need to be able to indentify implications of decisions made during contracting, especially on affordability and performance. A key issue lies in enabling both the supplier and customer to understand the affordability of requirements defined in the contract, that is, what will it cost the supplier to deliver the requirement and is the added benefit worth enough to the customer for them to pay for it?

Hence the basic needs of service developers were defined as being:

- to capture service definition processes in ways that can support evaluation through, for example, simulation, risk assessment and life cycle cost models;
- to understand how the process elements relate to the contract; and
- to understand information and other resource requirements both at contract definition and during service development.

With respect to the questions posed in Sect. 12.2, the following answers can be provided.

1. *How might the intended functional structures of service products be represented?*

Service level agreements and key performance indicators in the service contract need to be captured in such a way that relationships between them and process elements of the service can be represented and visualised.

2. *How might the designed structures of service products be represented?*

From the case study, the designed structure of a service is its process structure. Both flows and part-whole relationships between process steps are required.

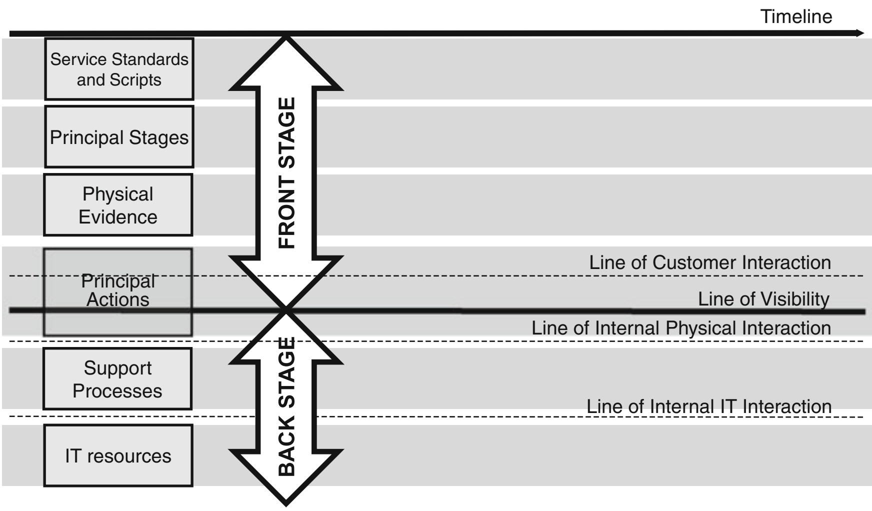

Fig. 12.3 The overall architecture of the service information blueprint

3. *What kinds of service definition relationships are required to support service development processes?*

An analysis of the example given in Table 12.2 highlights the following relationships that need to be supported:

- flow relationships between service process steps;
- references to standardised service elements;
- information on who carries out which process steps;
- relationships between elements of the functional structure and elements of the designed structure;
- relationships to product design and configuration data; and
- relationships to information generated through the service delivery process.

12.5 The Service Information Blueprint

Approaches to the definition and visualisation of service systems have emerged from a number of disciplines in recent years, including social and behavioural sciences, business, design and information technology. They are often tailored to different aspects of service definition processes; summaries of a range of these tools and techniques are available (Tassi 2008, 2009; Engine Group 2009). Service blueprinting approaches have traditionally been used to capture services, such as those in the hospitality and financial sectors, that are not associated with complex products. The service information blueprint introduced in this chapter is an

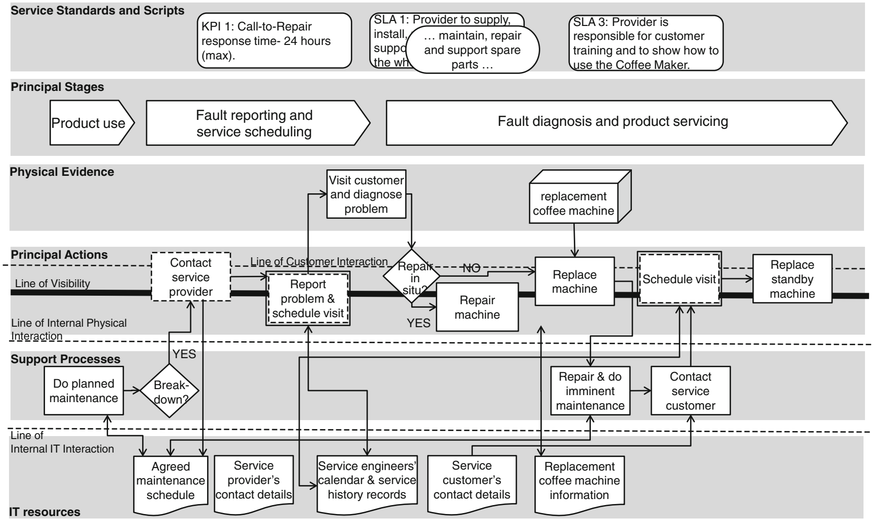

Fig. 12.4 Application of the service information blueprint to the coffee making machine availability contract

adaptation of the traditional service blueprinting technique that suits the needs of complex service systems intended to meet requirements set out in a contractual agreement with a customer and, potentially, other stakeholders. The overall architecture of the service information blueprint is shown in Fig. 12.3 and an application to the coffee making machine availability contract is shown in Fig. 12.4.

It can be seen that the service information blueprint is constructed around a collection of "swim lanes"; these are shown by the horizontal grey bars in Fig. 12.3. The idea of swim lanes is adopted from the Business Process Modelling Notation OMG (1997–2010). However, the content of the swim lanes is based on the core elements of a service blueprint.

It can be seen from Fig. 12.3 that the swim lanes are labelled as either Front Stage or Back Stage. Front stage lanes can be seen, or experienced, by the service customer whereas back stage lanes are not seen or directly experienced by the service customer. In addition there are a number of lines superimposed on the swim lanes in Fig. 12.3. The timeline represents the chronology of actions conducted by the service customer and provider. A line of visibility defines the service processes that are visible to the customer during service delivery. If the enactment of a service blueprint is seen as a simultaneous production and consumption of the service then this line governs which parts of the delivery of the service are visible to the customer. Finally there are three lines of interaction: contact person (visible actions), internal physical interacti

- Service Standards and Scripts specify target performance levels for the service. Examples from the coffee maker example would be the KPIs and SLAs in Table 12.1, as shown in Fig. 12.4.
- Principal Stages are the key process steps as seen by the customer. Examples from the case study include *Product use*, *Fault reporting and service scheduling* and *Fault diagnosis and product servicing*.
- Physical evidence addresses the intangibility of the service itself. Service activities are essentially intangible but they often leave tangible or physical evidence that they have been carried out; this evidence often informs customers' perceptions of the quality of the service. In the coffee maker example the replacement machine, the tone of voice of staff who arrange the engineer's visit and the visit by the service engineer are examples of physical evidence.
- Two kinds of process are captured.

  – Principal Actions can be of three types.

    - onstage principal actions by the customer, for example, *Contact service provider* in the coffee maker example;
    - onstage principal actions by the service provider, for example, *Replace machine* in the coffee maker example; and
    - backstage principal actions by the service provider, for example, *Schedule visit* in the coffee maker example.

- Support Processes are backstage processes that are carried out by the service provider. *Repair & do imminent maintenance* is an example from the coffee maker example.

- IT resources are the information systems, both engineering and management information systems, used to support the service delivery. In the coffee maker example the service history of the machine and contact details for the customer are examples.on and internal IT interaction. The swim lanes contain the service definition itself.

Product service systems are often designed and developed to improve performance such as reducing time and cost, improving quality and responsiveness, and maintaining a sustainable business. Effective delivery of services with improved performance demands access to high quality service information (i.e., complete, correct, minimal and available to the right people at the right time). This is pertinent throughout the lifecycle (which typically includes definition, development, delivery and evaluation) of the product-service system. To address this there is a need to capture service information requirements while defining services. The service information blueprint has information requirements associated with each service activity (i.e., the principal actions and support processes). These are intended to allow service designers to answer the following questions in the service definition:

- What information is needed by this activity?
- Does the information exist?

- If the information exists, where is it?
- If the information does not exist, where might it come from?

For each of the service activities, three types of service information are considered: input information, process information and output information. This builds on the service information classification scheme proposed by Berkeley and Gupta (1995). For the service information blueprint, input information refers to the information that is needed before the service activity can be performed; process information is the information required by the actor while performing the activity; and output information refers to information that is available as a result of the performance of the service activity.

In addition, the service information blueprint captures information associated with relationships:

- between two elements within a swim lane of a service blueprint, such as the flows between process steps are represented by arrows in Fig. 12.4; [3] and
- across the swim lanes of a service blueprint, for example, the relationships shown in Fig. 12.2.

To date the service information blueprint has been used to aid the understanding of as-is and to-be services. The blueprint can be used to provide a structure for service definition workshops and a software prototype that can be used to create digital service definitions is available.

With respect to the questions posed in Sect. 12.2, the following answers can be provided:

1. *How might the intended functional structures of service products be represented?*

In the service information blueprint SLAs and KPIs are currently represented as text that can be structured to enable parts of requirements to be identified. For example, this allows "…maintain, repair and support spare parts …" in Fig. 12.2, which is a part of SLA1, to be identified and then referenced by the relationship to the relevant service process steps.

2. *How might the designed structures of service products be represented?*

In the case study used in this chapter, the service information blueprint represents service processes as process steps related by flow relationships. Although not included in this chapter, the service information blueprint also supports the definition of part-whole relationships between process steps; this is a key area of functionality needed to support the definition of service breakdown structures.

3. *What kinds of service definition relationships are required to support the information need of service development processes?*

In the case study introduced in this chapter, the service information blueprint is used to capture the following relationship types identified at the end of Sect. 12.4:

[3] Relationships within a given swim lane can be one of two types: connection and composition,

- flow relationships between service process steps;
- information on who carries out which process steps; and
- relationships between elements of the functional structure and elements of the designed structure.

Although not included in this chapter, the service information blueprint also supports the definition of references to standardised service elements (using hypertext links) and, through its underlying information framework [defined in McKay and de Pennington (2001)], it offers the potential to define relationships to product design and configuration data.

12.6 Discussion

The research that resulted in the service information blueprint concluded with a road mapping activity where future trends in service information strategies were anticipated. It was recognised that current practice in service design and development tends to focus on bespoke services created to meet the needs of individual contracts. A key area for improvement, for example in reducing costs and improving the quality and reliability of service offerings, lies in standardisation across services. A key priority in this respect lies in the use of common information system solutions which, in turn, leads to a need to use standardised service processes. In the medium term it was anticipated that service design and development activities will become more like product development activities where new offerings are built using standard parts. This would change the nature of service offering from being bespoke-to-the-customer to including standard-to-the-supplier elements and, in the longer term, variants of services that are standard to the supplier. As commonality across service elements increases opportunities for significant savings in service delivery and the use of common IT/IS services for common service functionality becomes a real possibility. Ultimately these could be used to enable service providers to manage fleets of services in a similar way to which fleets of products are managed today.

A number of drivers for product service systems development were identified and could be used to inform future generations of service information blueprint.

- *Need for more defined/accurate information at start of process to define service* Although desirable, and what a lot of designers and stakeholders might like to have, this may not be feasible given the constantly changing landscapes for and within which services are designed and delivered. In addition, the process of designing and delivering a service might change such information. Thus, an alternative need could be to build better capability of working with processes in addition to physical products within organisations that are moving to the delivery of services. A number of discussions during the research centred on advanced business process modelling approaches and techniques such as ARIS (Scheer 2000). The service information blueprint complements these systems by enabling the association of process steps with information requirements and elements of the contract.

- *Service cataloguing and reconfigurability*
  An analysis of current practice with colleagues in BAE Systems led to the conclusion that typical service development processes involve the design of bespoke services that respond to the needs of individual customers. Key issues lie in the lack of consistency across resulting service offerings. For example, opportunities for substantial savings from using the same process for a given task could be identified in terms, for example, of avoiding the need for bespoke information solutions and overly specialised training of personnel, and of increasing transferability of people and information across different service solutions. This led to the identification of a need to support the creation of service elements through the configuration of "standard" service elements, akin to the use of standard parts in physical products: service cataloguing and reconfigurability. Ideas on service configuration can be drawn from a large body of work in product configuration. Product configuration involves linking physical elements together to form new products; part-whole relationships are used to define product breakdown structures and connection relationships are used to define how parts within a product breakdown structure relate to each other to deliver intended functionality. Different kinds of connection relationship occur in product breakdown structures: for example, mating conditions in assemblies and functional interactions in functional definitions. These ideas can be transferred to service products in the service information blueprint because it is based on an underlying meta-model that treats physical and service products in a consistent way. However, whilst it is possible to use the service information blueprint to define service breakdown structures, their use requires understanding of issues that were beyond the scope of this research.
- *Reusability of service elements*
  This can occur within and across service information blueprint swim-lanes. However, more understanding is needed of how to (a) select service parts and (b) connect them to each other to create new services that will behave in intended ways. Given a service catalogue, from which service elements can be selected, how will service parts be found and then re-used? What are the equivalents of, for physical parts, bearing calculations for use in the selection and "assembly" of service elements?
- *Platform-independent services*
  Two kinds of platform agnostic service were identified: services that can be plugged into multiple platforms and assume that certain data from the platform is available and services that use minimal data from the platform and so can be applied in multiple contexts. The service information blueprint could inform research and development in this area, for example, by supporting the identification of relationships between the service definition and physical product.

12.7 Concluding Remarks

In this chapter we have introduced a service information blueprint that allows service definitions to be created and used to identify both information requirements for service delivery and relationships between service activities and service requirements. A number of companies are using process mapping techniques. The service information blueprint complements these techniques by supporting the definition of relationships between service processes and service requirements in addition to service processes. The way in which the service processes are represented make the service definitions well-suited to support some of the longer term aspirations outlined in Sect. 12.6. For example, they include information needed to support service simulations and the kinds of relationship supported could be used to support the configuration of new services from standard service elements. Further research is needed to demonstrate this potential and build understanding of the additional functionality that would be needed.

We began this chapter with a question faced by designers of service solutions, namely, "What information is needed in service design to enable the delivery of service excellence?" The research upon which the chapter is based focused on the first half of this question and information implications of alternative service options in the context of product service systems. In delivering service excellence, the service design needs to be operationalised. This is typically done through networks of organisations (so-called "enterprise networks") and, within each organisation, the people who deliver and receive the service. Further research is needed to understand both social and technical aspects of service excellence and the information needed to, for example, capture customers' experiences of a service both quantitatively and qualitatively.

12.8 Chapter Summary Questions

This chapter introduced a service information blueprint that embodies answers to the following questions.

1. What are the intended functional structures of service products and how might they be represented?
2. What are the designed structures of service products and how might they be represented?
3. What kinds of service definition relationships are required to support the information needs of service development processes?

Acknowledgements The authors thank the industrial and academic members of Work Package 2 in the S4T project (BAE SYSTEMS, MBDA, Institute for Manufacturing at University of Cambridge, and Decision Engineering Centre at Cranfield University) for their input to project workshops and Peter Dawson from the Keyworth Institute at the University of Leeds who

supported the work through the establishment of software prototypes. Both informed the development of the service information blueprint reported in this chapter.

Appendix

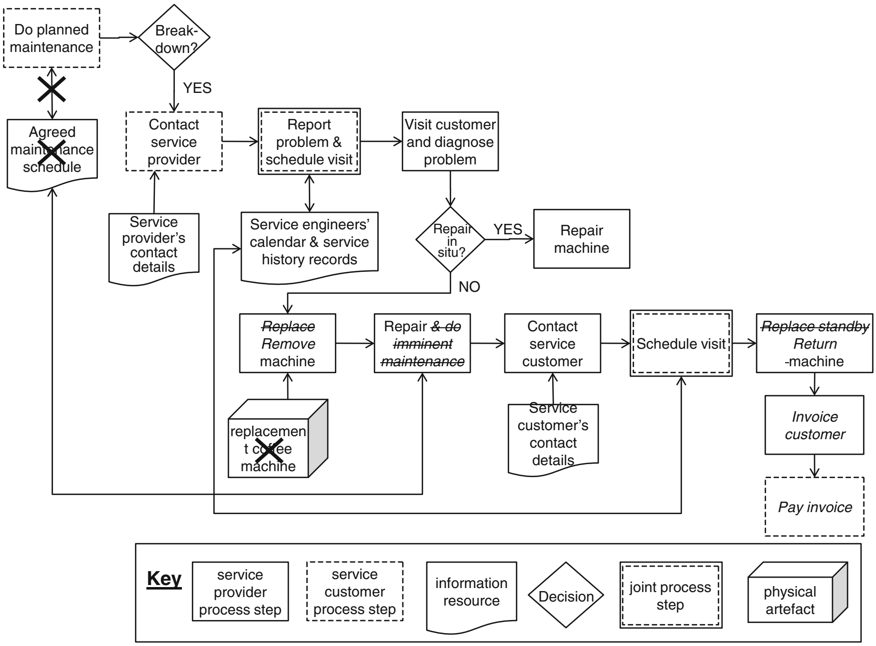

Fig. 12.5 Flow chart showing changes to the Availability contract for the spares only contract service case study

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