Service blueprinting and process-chain-network: an ontological comparison

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Abstract: Recently, Sampson (2012b) has introduced a new way to visualise service delivery processes which he calls process-chain-network (PCN) analysis. Since the 1980s, service marketers and managers have been using service blueprinting to visualise a service delivery process. We ask ‘How well does PCN represent the concepts present in service blueprinting?’ To answer this question, we examine the similarities and differences between service blueprinting and PCN using a recognised method of ontological comparison. We have found PCN supports some but not all of the concepts in service blueprinting. The outcome is important because knowing the shortcomings of PCN compared with service blueprinting will allow modellers to exercise care when using PCN diagrams to represent service processes.

Keywords: service blueprinting; process-chain-network; PCN; ontology.


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1 Introduction

Visualising a service delivery process is an important aspect of service management. Service blueprinting was developed over 30 years ago by Shostack (1981b) as a method to visualise a service process from the point of view of the service customer. Another visualisation method possible is BPMN which is a process mapping technique taking the viewpoint of the service provider instead of the service customer. These two techniques have been compared by Milton and Johnson (2012). More recently, Sampson (2012b) has developed a new service visualisation technique that he calls process-chain-network (PCN) analysis, which is claimed to be superior to service blueprinting. Further, Sampson (2012b) highlights three improvements on service blueprinting:

1. to consider the nature of interaction rather than process visibility
2. to depict all entities having distinct regions of interaction and processing
3. to accommodate a network of processes and is therefore more faithful to process realities.

Our purpose in the current paper is to compare and contrast service blueprinting and PCN ontologically and to comment on where there seem to be gaps.

With this in mind, the structure of this paper is as follows. In the following two sections, we introduce service blueprinting and PCN analysis before describing the method we used to compare the two. Following this, we present and analyse the results. We then conclude.
Service blueprinting and process-chain-network

2 Service blueprinting

Service blueprinting is the most well-known and popular business process modelling method which was developed especially for service design and service innovation in the 1980s by Shostack (1981b, 1981a, 1984, 1987). Kingman-Brundage (1989, 1991, 1993) further developed service blueprinting and called it service mapping. Service blueprinting can be used for mapping and revising an existing service or for designing new services.

A service blueprint is based on the customer view, not the organisational view. It means customer interactions with individuals or technologies (e.g., websites) are the major features of service blueprint. According to Bitner et al. (2008), in an ideal blueprinting process, cross-functional teams and possibly customers will be involved to visualise an entire service. This includes all the customer contact points, underlying support processes, physical evidence and other process functions involving customer experience. Indeed, a service blueprint is an holistic snapshot of all relevant resources, actors and activities that represent the steps and tasks in the process of service delivery (Ojasalo, 2012).

Service processes do not include just technologies and objects alone, they are customer induced. Therefore, service blueprinting is a powerful method in the service context (Zeithaml et al., 2009). Employing service blueprinting is beneficial especially in the phase of concept development when designing a new service. Specifically, it can be used to understand what the service involves and the roles of front-line employees, customer and support personnel in the process of service production and delivery (Bitner et al., 2008). Service blueprinting provides an organised development process for customer experience management which results in achieving customer outcomes and organisational goals (Bitner et al., 2008).

According to Fließ and Kleinaltenkamp (2004, p.396), a service blueprint has two dimensions: “the horizontal axis represents the chronology of actions conducted by the service customer and service provider. The vertical axis distinguishes between different areas of actions. These areas of actions are separated by different ‘lines.’”. The actors are customers, onstage employees, backstage employees, and support staff. The steps of building a blueprint are (Zeithaml et al., 2009):

1. identifying target service process for blueprinting
2. identifying the customer segment
3. mapping or designing the customer interactions with service provider
4. mapping or designing contact employee actions or technology actions related to the customer
5. linking support and management actions to contact employees actions
6. adding physical evidence for customer actions.

A service blueprint can be at various levels of detail depending on which department of the organisation and for what purpose they depict. Figure 1 presents a basic blueprint for a hotel stay. The following section is dedicated to an introduction of the PCN analysis method.
PCN was introduced by Sampson (2012b) upon which we base the discussion in this section. He claims “PCN diagrams build on the strengths of other flowcharting techniques, while emphasizing the unique conditions and design opportunities for interactive service processes” [Sampson, (2012a), p.17]. The aim of the PCN framework is to illustrate a balanced perspective of the provider-customer relationship and describe the interaction between provider and customer, considering service as a type of resource/process configuration. The involvement of the customer in service production processes increases the complexity of service operation in comparison with non-service operations (Frei, 2006). The PCN framework enables service designers and service analysts to analyse service operations in a systematic way.

Figure 2 shows the PCN representation of the hotel blueprint introduced in the previous section. The diagram shows a sequence of process steps with an identifiable goal that is called a process chain. The purpose of the process steps in this diagram is the serving of a hotel customer. The process steps are connected with arrows to indicate process dependency. Sampson (2012a) refers to the defined value concept discussed by Grönroos (2008) to explain, in general, the goal of a process chain in improving the wellbeing of process entities.
A process entity is a participant entity in a process. Examples of process entities are organisations, departments of organisations, customers, agents of customers, and so forth. A key feature of PCN diagrams is that they can show one entity or span multiple entities. An entity that acts on some other resources and controls certain process steps are called operant resources (Constantin and Lusch, 1994). In comparison, the process entities that they are acted upon by another entity, function as operand resources (Sampson, 2012b). It is possible an entity at some parts of a process chain functions as an operant resource and at some other parts of process chain functions as operand resource.

All entities participate in a process chain to receive a value (Sampson, 2001). Participant entities are grouped into two categories based on their received value type: specific beneficiaries (called also customers or consumers) and generic beneficiaries. Specific beneficiary entities participate in a process chain to benefit from the specific purpose of the process chain. Generic beneficiaries mainly participate in a process chain to receive the generic resources (such as money) to use in other process chain activities that satisfy their specific needs. It is common for an entity to receive both generic benefits and specific benefits. These entities are called hybrid entities. For example, a bank that offers financial services to businesses can request feedback from them to use in its future strategy design processes.

Every process entity has a process domain which includes all the process steps for which that entity is an operant resource. It means an entity controls the process steps in its process domain to some degree. An entity can be an operant resource for certain steps outside of its process domain, but it cannot control or lead those process steps directly.
Sampson (2012b) refers to Wemmerlöv (1990) to explain there are three types of contacts between a service system and a client/customer: **direct contact**, **indirect contact**, and **no contact**. Based on this, Sampson divides a process domain to three process regions: **direct interaction**, **surrogate interaction**, and **independent processing**. Considering the hotel stay example, Figure 2 illustrates that the hotel has direct contact with its customers at the check-in desk, has only indirect contact with them when the hotel staff take bags to the room, and has no direct contact with customers when the hotel purchases supplies.

4 Method

The aim of this section is to explain the method of conceptual evaluation which was first introduced by Wand and Weber (1993, 2002) and elaborated further by Milton and Kazmierczak (2004). This method enables us to compare the core concepts of two modelling languages to find what are their similarities and differences. The current study employs the method of conceptual evaluation to understand how well PCN supports service blueprinting. During the evaluation process, each core concept in service blueprinting was compared with each core concept in PCN.

It is a recognised approach in information systems research to compare modelling formalisms based on their embodied ontology (Wand and Weber, 1993). We used the method of conceptual evaluation to compare the ontology embodied in PCN with the ontology embodied in service blueprinting as shown in Figure 3. The purpose is to find qualitative answers to: How well does PCN capture reality compared to service blueprinting?

**Figure 3** The method of conceptual evaluation

PCN and service blueprinting represent a part of reality using their respective modelling commitments. Modelling commitments equate to ontology and contain a series of constructs. Every construct holds a concept that explains how and what part of reality the construct is representing.

Consequently, the evaluation tries to examine how close the concepts in PCN support the concepts in blueprinting. In other words, we are evaluating PCN using service blueprinting.

The method of conceptual evaluation has four basic steps:

**Step 1** Determine the set of concepts from service blueprinting to be used in forward evaluation. This set of concepts we call reference concepts.
Step 2 Determine the set of concepts from the ontology embodied in PCN to be used in backward evaluation.

Step 3 Perform a forward and backward evaluation of two concepts and tabulate the results.

Step 4 Analyse and discuss the results.

We explain the steps below.

The first step is to determine the basic set of concepts on which the comparison will be based. The concepts come from the literature concerning service blueprinting. Table 1 presents these concepts. The second step resembles the first and involves determining the set of concepts from PCN. These concepts are summarised in Table 2.

Table 1 Core concepts in service blueprinting

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Actions that customers, onstage personnel, backstage personnel and support staff perform</td>
</tr>
<tr>
<td>Action flow</td>
<td>Sequence of actions by an actor</td>
</tr>
<tr>
<td>Communication flow</td>
<td>Flow of communication between any participants in the service</td>
</tr>
<tr>
<td>Line of interaction</td>
<td>Interface between customers and onstage employees</td>
</tr>
<tr>
<td>Line of visibility</td>
<td>Interface between onstage and backstage employees</td>
</tr>
<tr>
<td>Line of internal interaction</td>
<td>Interface between backstage and support employees</td>
</tr>
<tr>
<td>Actor categories (four types)</td>
<td>Customers, onstage personnel, backstage personnel, and support staffs</td>
</tr>
<tr>
<td>Physical evidence</td>
<td>Anything seen by the customers in the process of the service delivery</td>
</tr>
</tbody>
</table>

Table 2 Core concepts in PCN

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process chain</td>
<td>A sequence of steps with an identifiable purpose</td>
</tr>
<tr>
<td>Process entity</td>
<td>An entity that participates in and makes decisions about steps of a process chain</td>
</tr>
<tr>
<td>Value</td>
<td>The satisfaction of process entity needs</td>
</tr>
<tr>
<td>Specific beneficiary</td>
<td>An entity that participates in a process chain to have needs met by the specific competencies in the process chain</td>
</tr>
<tr>
<td>Generic beneficiary</td>
<td>An entity that participates in a process chain to acquire generic resources (money) to meet needs from other process chains</td>
</tr>
<tr>
<td>Process domain</td>
<td>Portion of process chain that falls under an entity’s control and responsibility</td>
</tr>
<tr>
<td>Process regions</td>
<td>Areas of a process domain for steps of a particular type</td>
</tr>
<tr>
<td>Direct interaction</td>
<td>Steps involving person to person interaction between entities</td>
</tr>
<tr>
<td>Surrogate interaction</td>
<td>Steps involving interaction with non-human resources of another entity (e.g., technology or information)</td>
</tr>
<tr>
<td>Independent processing</td>
<td>Steps that are performed independent from other entities in the process-chain-networks</td>
</tr>
</tbody>
</table>
The third step involves the comparison of concepts from the ontologies embodied in service blueprinting and in PCN. The concepts embodying service blueprinting drives the comparison and the presentation of results uses the reference of service blueprinting. Further, the comparison is at the level of concepts, thus moving beyond the specific names or terms used to signify the concepts. Additionally, this step is subjective; there is no other way to undertake a conceptual evaluation of this nature.

The presentation of the results of this evaluation utilises semiotic theory for two reasons. First, terms and concepts are clearly semiotically related. Second, comparison of concepts is semantic with semiotic theory providing an ideal basis for explaining service blueprinting or PCN. Specifically, concepts span parts of a semantic field (Eco, 1976), or conceptual plane (Cruse, 2000, Culler, 1976). Alternatively, each term possesses an essential depth (Liska, 1996) which similarly evokes the conceptual span of a term. The term *semantic field* labels these ideas and expresses the similarities and differences between concepts in service blueprinting, the list of concepts in Table 1, and those embodying PCN, the list of concepts in Table 2. Specifically, we use a graded indicator to express the similarities and differences.

When comparing concept c (from service blueprinting) with PCN, there are three broad categories of results. First, PCN may have total overlap with respect to c; total overlap may be provided by one concept (e.g., d) or perhaps by several concepts (e.g., two concepts d and e). That is, there may be one concept or several concepts that together provide total overlap, in terms of semantic field, with the concepts from service blueprinting. The second possibility is where the overlap is partial. Finally, it may be that there is no overlap at all between PCN and c from service blueprinting.

Figure 4 shows the three categories of results pictorially. While the coverage of a specific concept is depicted in this figure as a sharp rectangle, the nature of semantic fields dictates that the boundaries between semantic fields are quite imprecise. This emphasises the fact that comparison is conceptual and that concepts may be partially covered and that a simple presence/absence is not ideal for evaluation of this nature.

**Figure 4**  Degree of overlap in coverage of semantic field

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<tr>
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<tbody>
<tr>
<td>c</td>
<td>d</td>
<td>c</td>
<td>d</td>
<td>c</td>
<td>d</td>
<td>e</td>
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<td>e</td>
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</tbody>
</table>

\( \sqrt{\text{c}} \) \( \sqrt{\text{d}} \) \( \checkmark \) 

Each of these categories of results can be indicated using symbols so that an idea of the results of the comparison can be conveyed easily in tabular form. This is called the indicative results. The three symbols for full coverage, partial coverage, and no coverage are (\( \sqrt{\text{c}} \)) (\( \sqrt{\text{d}} \)), and (\( \checkmark \)), respectively.

The final step requires the expansion of the indicative results from Step 3. Specifically, it requires that issues beyond the direct comparison of concepts are discussed such as the nature of the gaps in coverage and the implications of these on supporting service processes in PCN.
5 Results

Using the described method, Table 3 shows the results of conceptual evaluation. The table indicates action, action flow and communication flow are covered completely by PCN. Actor categories are covered partially. However, PCN does not fully cover the defined lines in service blueprints. Specifically, PCN covers line of interaction partially, but does not provide any tools to support the line of visibility, or the line of internal interaction. PCN diagrams also lack any direct reference to physical evidence.

<table>
<thead>
<tr>
<th>Service blueprinting concept</th>
<th>PCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>✓</td>
</tr>
<tr>
<td>Action flow</td>
<td>✓</td>
</tr>
<tr>
<td>Communication flow</td>
<td>✓</td>
</tr>
<tr>
<td>Line of interaction</td>
<td>✓&lt;sub&gt;p&lt;/sub&gt;</td>
</tr>
<tr>
<td>Line of visibility</td>
<td>✗</td>
</tr>
<tr>
<td>Line of internal interaction</td>
<td>✗</td>
</tr>
<tr>
<td>Actor categories (four types)</td>
<td>✓&lt;sub&gt;p&lt;/sub&gt;</td>
</tr>
<tr>
<td>Props and physical evidence</td>
<td>✓&lt;sub&gt;p&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

Action flows are demonstrated in service blueprints and each actor category shows a sequence of actions which are performed by that type of actor. Communication flows are also shown in service blueprints when an arrow connects two actions from two different actors. In comparison, Sampson (2012b) highlights that an arrow in a PCN diagram shows state dependency between actions. This means that actions are based on resources that can be generated by previous actions. He explains arrows can illustrate a movement of goods and/or information like arrows in a supply chain diagram. Therefore, arrows in PCN represent both action flows and communication flows.

One of the most critical parts of a service blueprint is the line of interaction. The line of interaction defines the interface between the customer and onstage employees. Considering that a service blueprint is based on the customer view, the visible interaction between customer and onstage employee plays an important role in this model. Bitner et al. (2008, p.72) state “every time the line of interaction is crossed via a link from the customer to a contact employee (or company self-service technology), a moment of truth has occurred.” Moments of truth affect customer perceptions of the delivered service. In other words, the visible part of a company has a major impact on customer satisfaction. PCN defines direct interaction regions which involve person to person interactions between entities. In contrast to the line of interaction in service blueprints, the direct interaction regions do not consider visibility of the interaction; the interaction can be visible or not visible (e.g., telephone call).

The next represented lines in service blueprints are the line of visibility and line of internal interaction. PCN does not cover these lines. Line of visibility divides onstage and backstage activities. In PCN, the interface between onstage and backstage personnel is not defined. While onstage activities are always in the direct interaction region, backstage activities can fall in the direct interaction or surrogate interaction regions. For example, a backstage activity such as make reservation for guest falls in the direct interaction region.
On the other hand, a backstage activity such as take bags to room falls in the surrogate interaction region.

The line of internal interaction divides the activities of backstage personnel from support processes. In PCN, there is no mechanism to show whether an activity is performed by front-line employees or support personnel. The reason is both front-line employees (specifically backstage personnel) and support employees can perform a surrogate interaction and PCN does not clarify whether the action is done by support or front-line employees in the surrogate region.

Service blueprinting identifies four categories of actors: customers, onstage employees, backstage employees, and support personnel. PCN diagrams involve a customer entity and all activities fall in the customer process domain, regardless of whether they are direct, surrogate interaction or independent. The three other actor categories are not defined in PCN diagrams (onstage employees, backstage employees, and support personnel). The main reason is because PCN separates process steps or activities based on whether they involve another entity or not rather than the performer of actions.

Physical evidence is a major part of service blueprints. They are tangible items that have a significant effect on customer perception about service quality. They identify how physical evidence should be designed to increase service quality. PCN lacks this important aspect of service design and does not define the physical surroundings of the direct and surrogate interaction regions of customer. However, PCN does provide support for environmental conditions that can be used to show important aspects of the service-scape. This idea is less specific than physical evidence.

6 Conclusions and future work

The aim of this paper was to compare PCN with service blueprinting. We have found that PCN fully supports action, action flow, and communication flow from service blueprinting. Partial support was found for line of interaction, actor categories, and physical evidence. We found no support for line of visibility and line of internal interaction. Since these aspects of service blueprinting have been found to be particularly useful in managing service processes (Bitner et al., 2008) our suggestion would be to enhance PCN analysis in some way to incorporate these two service blueprinting concepts. Therefore full support for service blueprints awaits the enhancement of PCN along these lines.

PCN offers a very promising way forward in representing service processes where there is collaboration between business units and other organisations in delivering services. Milton and Johnson (2012) have previously raised this aspect. Specifically, PCN incorporates important network aspects of processes and therefore is a viable way of supporting these processes. This aspect should be explored through case studies of PCN with these types of processes.

Additionally, PCN, with its emphasis on process regions (direct interaction, surrogate interaction, and independent) has potential to highlight aspects of services involving surrogate interactions that, in turn, impact on service experience. For example, waiting at the front desk, as a surrogate interaction, negatively influences the experience of the customer if the wait is long or unpleasant.
PCN offers a promising way forward to represent the complexities of contemporary service processes. Strengthening PCN with relevant aspects of service blueprinting will help the promise to be realised.

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