2. Design Contexts and Challenges

31 August 2009

Bob Glushko

Plan for ISSD Lecture #2

Motivating "Seven Contexts"

Design Patterns for Information-Intensive Contexts
  - Apte & Mason article
  - Betancourt & Gautschi article
  - "Information Supply Chains" from Document Engineering

A Brief Tour of the Contexts
Service Systems

"Value co-creating configurations of people, technology, value propositions that interconnect service systems, and shared information" (Maglio et al 2006)

This is an expansive and recursive definition

It is comprehensive - a "service system" can be scoped to describe person-to-person encounters, the service offerings of an enterprise, to the services in a city, to the global economy

Motivating "Seven Contexts"

But the definition of "Service System" is too general and descriptive; it doesn't provide any prescriptive design guidance

Even if they weren't designed that way, service systems can be analyzed as configurations of design contexts, each with characteristic design issues and methods

This "building block" view of service systems and the concepts that span and contrast the design contexts simplifies the design of service systems

Derivational and compositional relationships among the contexts define design patterns for incremental evolution of service systems
The Seven Contexts

P2P, Technology-enhanced P2P, and Self-Service Contexts define a Continuum
"Flavors" of Technology Enhancement

"Assisted" encounters - technology used by the "frontline" provider to enhance capabilities

"Facilitated" encounters - technology used jointly by provider and customer

"Customer-improvised" - technology introduced by customer and not expected by provider

Design Patterns for "Information-Intensive" Services & Business Models

There have been many efforts to devise abstract frameworks or patterns that describe business models, or "families" of related business models.

Many of these are centered around the increasing role of information and communication technologies in enabling new patterns of business architecture.
Apte & Mason: "Disaggregation" of "Information-Intensive Services"

Disaggregation is the "reformulation" and "geographical dispersion" of value chains.

There are plenty of good reasons for doing this...

How can we analyze the "disaggregation potential" of a service or business model?

Apte & Mason's Three Dimensions

Business models / occupations can be characterized by their intensity on three dimensions:

- Information actions that involve symbolic manipulation
- Interpersonal actions that involve dealing with customers and other people
- Physical actions that involve manipulation of physical objects

In addition, many interpersonal actions are predominately information exchanges

(A fourth dimension is the extent of "non-value adding" activities)
Examples on the Three Dimensions

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Information Intensity</th>
<th>Customer Contact Need</th>
<th>Physical Presence Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuary</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Marketing Manager</td>
<td>H</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>H</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>Comm. Eqpt. Operator</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Cleaning</td>
<td>L</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>Food Service Manager</td>
<td>L</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Secretary</td>
<td>M</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

Apte & Mason: To Disaggregate, or Not To...
Apte & Mason - Before Disaggregation

A. Original Activity

- Symbolic Manipulation
- Physical Object Manipulation
- Customer Contact

Non-Value-Added Actions

Apte & Mason -- After Disaggregation

B. Reengineered Activity

- Symbolic Manipulation (Part 2)
- Symbolic Manipulation (Part 1)
- Physical Object Manipulation
- Customer Contact

Non-Value-Added Actions
Underestimating the Impact of Technology?

B. Reengineered Activity

Reduced by logging & tracking?

Symbolic Manipulation (Part 2)
Symbolic Manipulation (Part 1)
Telepresence?

Robotic manipulation?

Non-Value-Added Actions

Telerobotics
Telepresence

Betancourt and Gautschi - Patterns of Economic Activity

Production, Distribution, and Consumption are the three economic activities. What are their spatial relationships? What are their temporal relationships? 25 possibilities

<table>
<thead>
<tr>
<th>Time</th>
<th>{P, D, C}</th>
<th>D</th>
<th>{P, C}</th>
<th>C</th>
<th>{P, D}</th>
<th>P</th>
<th>{C, D}</th>
<th>P</th>
<th>D</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>{P, D, C}</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>{P, C}</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>{P, D}</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>{C, D}</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>D</td>
<td>{C}</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Multichannel Context

A "channel" is "the means by which suppliers of goods or services provide them to customers"

Multichannel Contexts integrate person-to-person and self-service / virtual encounters

Home Depot - Physical Store
Design Issues for Multichannel Services [1]

What are the (actual or potential) benefits of multichannel services for providers?

How much technical integration is possible/desirable?

How much business integration is possible/desirable?
Design Issues for Multichannel Services [2]

What are the (actual or potential) benefits of multichannel services for customers?

What do customers expect or understand about the "user experience" in multichannel environments?

What are the implications for technical and business integration?

(a)Symmetric Personalization in Multichannel Services?

What information about a customer's activities in an online channel can be recorded?

How can this information be used to provide better functionality or service in the online channel? in the physical channel?

What information about a customer's activities in a physical bricks and mortar can be recorded?

How can this information be used to provide better functionality or service in the physical channel? in the online channel?
Within and Cross-Channel Information Flow in "Bookland"

Multiple Devices / Platforms Proliferation
Multi-platform Services

Why do some applications or services need to run on multiple platforms?

How can user interfaces be developed for multiple platforms? What are the costs and benefits of separate designs for each one vs a "design once and adapt" approach?
Can We Achieve Consistency or Continuity of User Experience?

"Users expect to be able to reuse their knowledge of a given version of the system when using the same service on another platform"

Alternatively, if "capabilities vary so greatly...it makes sense for users to expect varying functionality on the different devices"

Context-Based Services
Context Attributes

Location is the most obvious context attribute, but if context is "any information that characterizes a situation related to the interactions between users, applications, and the surrounding environment" context is very open-ended.

Many technologies for sensing context information can make devices and services "smart".

New "Smart Service" Concepts with "Connected Devices"

"Virtually any product that uses electricity -- toys, coffeemakers, cars, medical diagnostic machines -- possesses inherent data processing capabilities. Each has a wealth of information about its current status, usage history, and performance."

- Remote monitoring (of environments or products)
- Vendor-managed inventory ("remote monitoring" of retail shelf space)
- Monitoring + capability upgrading
- Location information as a service
- Remote monitoring + Location Information
- Remote monitoring + Interactive control
"Back-stage Intensive" or "Computational" Context

Many enterprise applications, transactional systems, or devices generate information that is not usually exposed in customer-facing interfaces.

Many of these back-stage services involve information exchanges or computations with no human involvement.

Providers and consumers interact by exchanging information through “service interfaces” that specify the inputs and outputs of each service.
"Transparent Substitution" in B2B Services

The Supply Chain Pattern

A supply chain is an aggregated and end-to-end view of the buy-side and sell-side relationships of an enterprise.

A supply chain is the network of facilities and distribution capabilities an enterprise uses to:

- "Source" (or "procure") raw materials (chemicals, ores, grains, ...) or components
- Transform the materials or assemble the components into products
- Deliver the products to customers (indirectly through distributors or stores or directly to the purchaser)
Supply Chain - Conceptual Model

The Information Supply Chain

The flow of materials and goods in a supply chain is accompanied by information about it.

But information about supply chain activities and processes is increasingly separated from the physical flow of materials and goods, and for information-based services there is no physical stuff.

Information also flows in the opposite direction from the customer, retailers, and distributors back into the supply chain – this is also called the DEMAND CHAIN.

The information supply chain has become especially important because increased global competition and better informed customers are forcing forms to shift from forecast to demand (i.e. customer) driven business models.
Design Issues for the Information Supply Chain

What information is exchanged?
Which entities in the supply chain are able to exchange information?
What is the frequency of this information exchange?

Readings for 2 September

Kessler & Sweitzer, Chapter 3, O-ISD
Lentz & Bleizeffer, "IT Ecosystems: Evolved Complexity and Unintelligent Design"
Norman, "Designing the Infrastructure"