SEVEN CONTEXTS
for designing service systems

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Agenda

- The Definition of "Service"
- The Definition of "Service System"
- Seven Contexts with Characteristic Design Issues and Methods
- Contexts as Building Blocks of Service Systems
- Service System Scope, Intersection and the Future of Service System Design

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What is a Service?

- A computational / technological unit of functionality with hidden implementation
- Requests and responds through well-defined interfaces defined using XML
- Conforms to standards and design principles (WS*, REST, …)
- Composed / choreographed / orchestrated / mashed-up to yield more complex functionality
- Designed with concern for reliability, scaleability, robustness, interoperability…

Examples of Services

- Amazon and Google APIs
- ebXML and UBL business process interfaces in B2B
- Information from devices or sensors

What is a Service?

- Accommodations and food services
- Arts, entertainment, recreation
- Personal services characterized by high empathic or physical interactions
- Professional and information-intensive services characterized by high degree of information processing and exchange

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Examples of Services

- The process of using one's resources or competencies for the benefit of another person
- Interpersonal interactions to co-operatively create value
- Vary from "high-contact" to "low-contact" depending on need for empathic or personalized interactions

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Examples of Services

Personal Service   **Self-Service**   **Web Service**

If these are all "services," are there any design concepts and methods apply to all of them?

Motivating a new concept of Service

- What services are involved when you check into a hotel?
- What determines the quality of your hotel check-in experience?

Hotel Check-In

Making the Reservation

Hotel Check-In
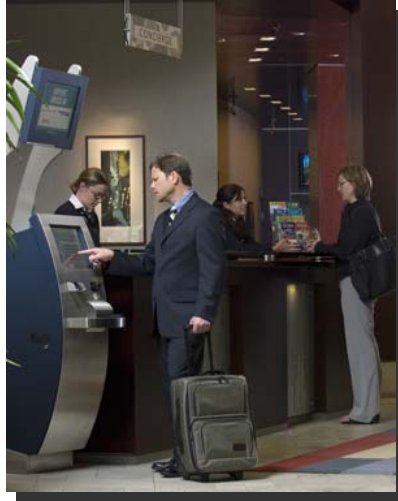
Back-end B2B

Hotel Reservation System

Hotel Check-In

Hotel
Employee to
Customer

Hotel Check-In

Looking up the
Reservation

Hotel Check-In

Self-Service
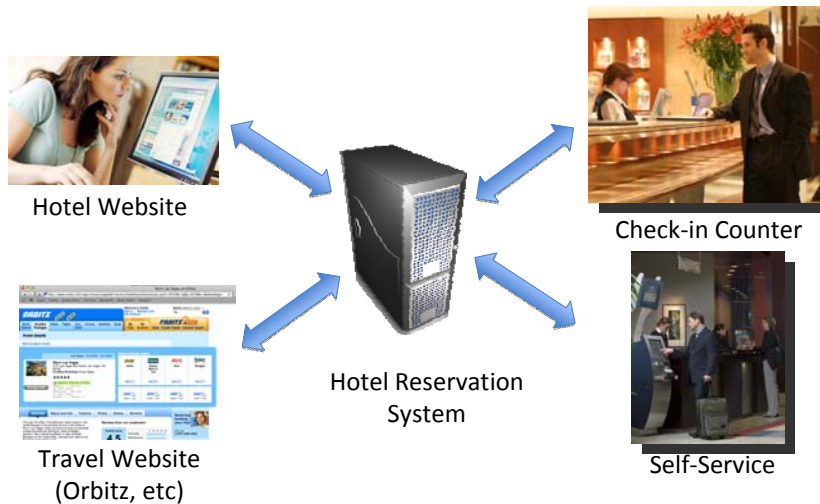
The Million {$, €, rupee} Question

- Do we focus on how these services and service encounters differ?
- Or do we emphasize what they have in common?

What is Service?

- There are service providers and service consumers… but these are roles, not intrinsic properties
- A service provider (role) has an interface through which the service consumer (role) interacts to request or obtain the service
- Value or quality is created/co-created by the interactions and information interchanges between the provider and consumer
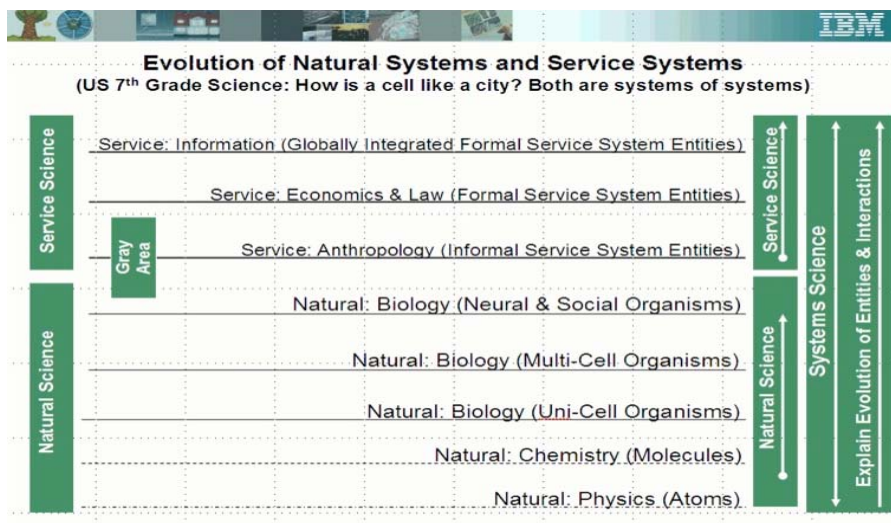
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The Hotel Check-in "Service System"

Hotel Website

Travel Website
(Orbitz, etc)

Hotel Reservation System

Check-in Counter

Self-Service

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From "Service" to "Service Systems"

- **A Unifying Concept**
  Treating services more abstractly lets us see the SERVICE SYSTEM as the appropriate framework for understanding how services work

- **An Expansive and Recursive Definition**
  "Value co-creation configurations of people, technology, and value propositions that interconnect service systems, and shared information" (Maglio et al 2006)

- **Comprehensive**
  Can include everything from person-to-person encounters to the global economy

Evolution of Natural Systems and Service Systems
(US 7th Grade Science: How is a cell like a city? Both are systems of systems)

Evolution of Natural Systems and Service Systems
(US 7th Grade Science: How is a cell like a city? Both are systems of systems)

Service Science	Service: Information (Globally Integrated Formal Service System Entities)
	Service: Economics & Law (Formal Service System Entities)
Gray Area	Service: Anthropology (Informal Service System Entities)
Natural Science	Natural: Biology (Neural & Social Organisms)
	Natural: Biology (Multi-Cell Organisms)
	Natural: Biology (Uni-Cell Organisms)
	Natural: Chemistry (Molecules)
	Natural: Physics (Atoms)

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Designing Information-Intensive Service Systems

- But the concept of "Service System" is so abstract and recursive it describes almost everything!

- We need to narrow the scope and simplify the description of service systems to be able to provide prescriptive design guidance

- Narrowing the scope to "information-intensive" service systems and constraining the descriptive vocabulary as "building blocks" gives us exactly that

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Service Design Contexts

Person-to-person

Technology-enhanced P2P

Multiple Devices

Self-Service

Computational or Backstage-Intensive

Location-based and Context-aware

Multi-Channel

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Service Design Contexts

- A framework for designing service systems from "building blocks"
- Each context has characteristic design concerns and methods
- Derivational and compositional relationships among the contexts define design patterns
- These patterns enable the incremental design of service systems

Contexts as Building Blocks

- Describing and designing service systems in terms of the seven contexts makes it much easier to consider alternative service system designs:

  – replacing or augmenting a person-to-person service with self-service

  – substituting one service provider for another in the same role (e.g, through outsourcing)

  – eliminating a person-to-person interaction with automation or stored information

Deconstructing Service Encounters
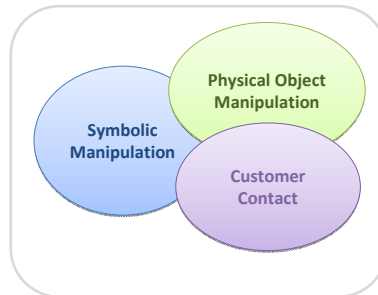
Service encounters can include:

- Interpersonal Interaction
- Physical Interactions
- Information Processing & Exchange

Physical Object Manipulation

Symbolic Manipulation

Customer Contact

Apte, U. and Mason, R.   Global Disaggregation of Information-Intensive Services. *Management Science* **(1995)..**

Deconstructing Service Encounters
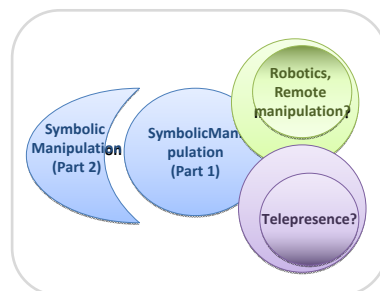
Technology changes these proportions…

- Information can augment interpersonal and physical interactions
- And can also replace them

…and enables scaleable and reliable service personalization

Robotics, Remote manipulation?

Symbolic Manipulation (Part 2)

SymbolicManipulation (Part 1)

Telepresence?

Telepresence&Telerobotics

The Continuum
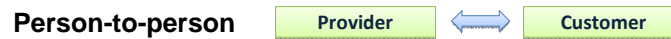
Person-to-person

Technology-enhanced Person-to-Person

Self-Service

Customer-to-Customer "Crowdsourcing"
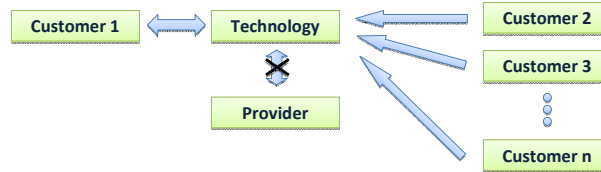
- An emerging extension to the self-service context is "crowdsourcing" or "community content"

- Service customers provide preferences or other content implicitly through use or explicitly by rating or "tagging" service offerings or information

- This information exchange between customers enhances future service to themselves or others

The Multi-Channel Context
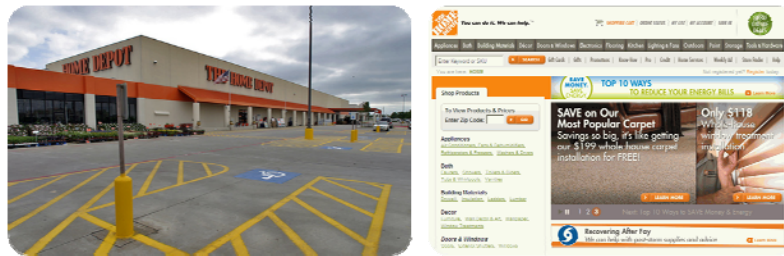
- Combines P2P and Self-Service Contexts
- **Key Design Questions:**
  Content, direction, and reciprocity of information exchange between channels

The Multi-Channel Context

| Provider | Customer |
| Technology | Customer |
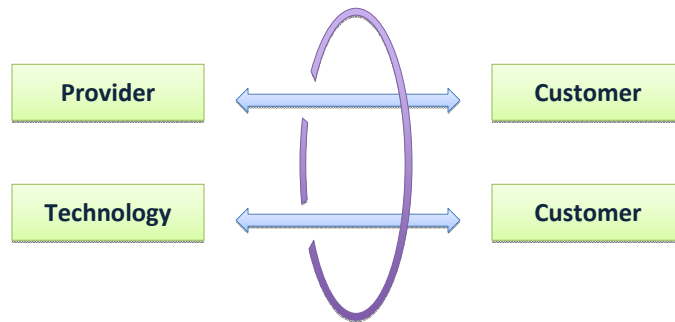
The Multi-Device Context

- Extends the self-service context (the same service) to multiple devices or platforms
- **Key Design Questions:**
  Consistency and predictability of functionality, content, and user interface between channels

The Multi-Device Context
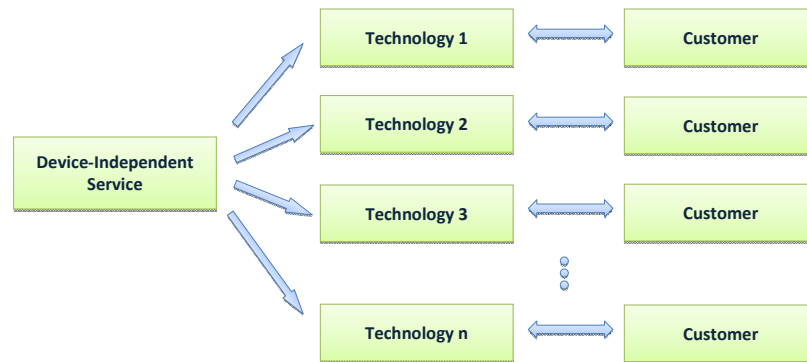
Service Design Patterns
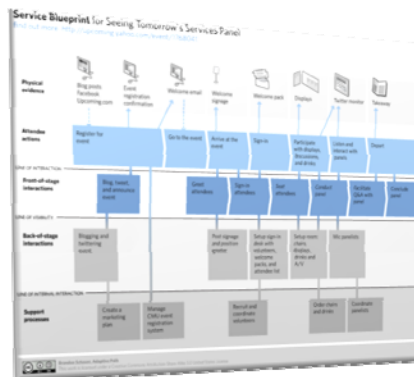
- Adjusting the absolute and relative amount of interpersonal, physical and informational interaction
- Adjusting the line of visibility between the front and back stages
- The number of "touch points" or "stored information equivalents"
- Choosing a point of view
- Transparent substitutability
- Scoping the service system and the size of the "touchpoint window"

Front Stage and Back Stage

- **FRONT STAGE**: Where interactions with the service customer/ consumer happen

- **BACK STAGE**: Produces information and "stuff" needed by the front stage

- Placement of **LINE OF VISIBILITY** is a design parameter

The McDonald's Experience
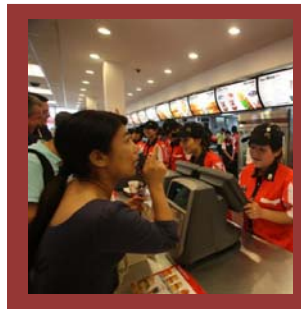
Front Stage | Back Stage

Line of Visibility

The Gourmet Restaurant Experience

Front Stage

Back Stage

The Benihana Experience

Front Stage

Back Stage

"Touch Points"

- Many of the important design concepts for service systems come from the P2P and Technology-enhanced P2P contexts:

  - "Touch Points" – the points where service providers and service consumers interact

  - "Moments of Truth" – the most critical touch points, where the quality of the experience is most apparent to the service consumer

- In our more abstract conception of services we can treat "touch points" as equivalent to "service interfaces" and "information exchanges"

"Touch Points" and Service Intensity / Quality

- Services differ intrinsically in the number of touch points they require to create value; this is often called the "service intensity"

- Traditional P2P service system design assumes that intensity is positively correlated with service quality

- This view lets us treat intensity as a design parameter to differentiate service offerings of the same type or industry domain

- The "generic" service offering is a design pattern that can be increased or reduced in intensity by changing the number of touch points

Generic Hotel
"Value Creation Cycle"
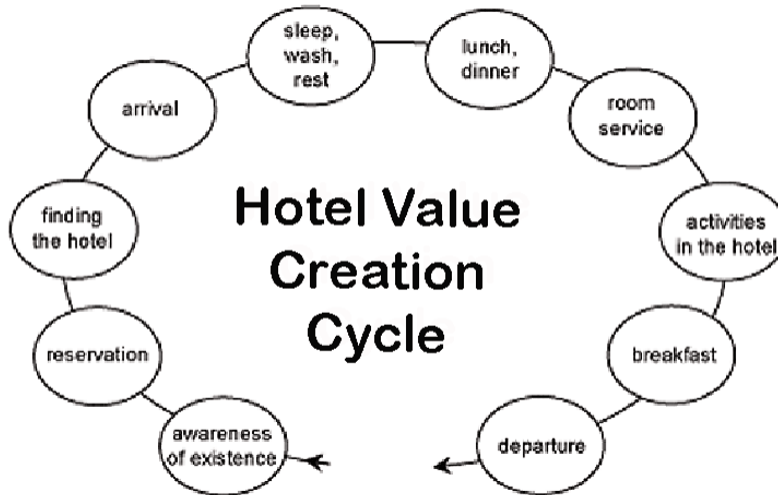
Budget Hotel
"Value Creation Cycle"
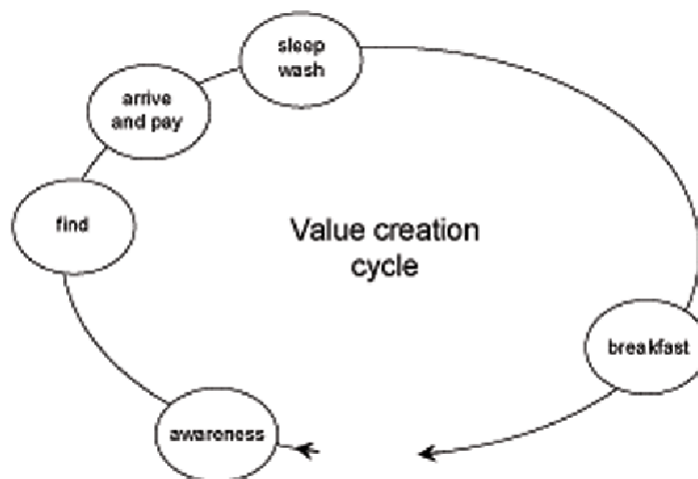
Luxury Hotel
"Value Creation Cycle"
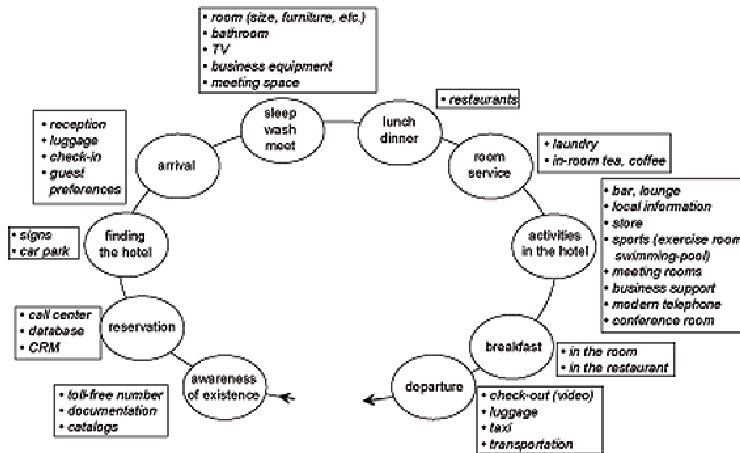
Information and Interaction Substitutability

▪ In the "Technology-enhanced P2P context capturing, managing, integrating and retrieving information allows service providers to substitute information for interaction

▪ You don't need high intensity or many touch points if stored information makes interaction unnecessary

▪ A hotel clerk with a database doesn't need to ask for your room preferences; Amazon doesn't need to ask you about what type of books you like

▪ Design implication: hidden computational services are interchangeable with customer-facing "touch points"

Point of View

- Designate some actor or service as the focal / primary consumer or customers

- Typically the end of the value chain or information flow, or where "users" are

- Often arbitrary, and other actors or services could be alternative POVs

Point of View

Who is the Service Customer?

In a teaching hospital

Who is the Service Customer?

In a cooking school

Backstage-Intensive / Computational

Front Stage — Back Stage

Retailer

Customer

Credit Authority

Warehouse / Distribution

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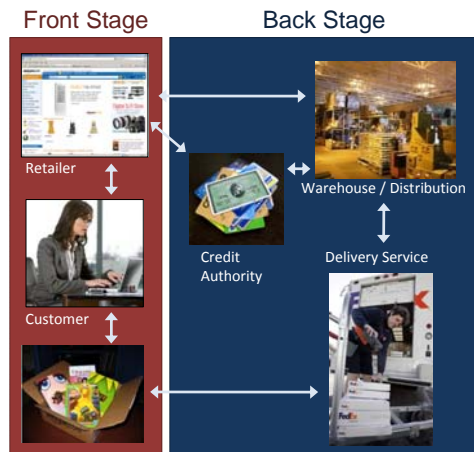
- Many enterprise applications, transactional systems, or devices generate information that is not usually exposed in customer-facing interfaces

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

The Drop Shipment Pattern

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Transparent Substitutability

- Providers and consumers interact by exchanging information through "service interfaces" that specify the inputs and outputs of each service

- These interfaces are implicit in P2P encounters, but always explicit for non-human actors

- In the purest vision of "service oriented architecture," the interfaces are abstract, enabling transparent substitution of one provider for another to optimize service quality for each consumer

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Transparent Substitutability

| Drop Shipment Retailer | `<ShippingRequest>` `<PackageInfo>…` `<DestinationInfo>…` `<DeliveryPromise>…` `</ShippingRequest>` | **Delivery Services** FedEx DHL UPS UNITED STATES POSTAL SERVICE |

- The same abstract Shipping Request is sent to many delivery services and one is selected to provide the service

- It probably doesn't matter to the customer which delivery service handles his package

Customer

- It might not even matter to the retailer

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Location-based / Context-Aware Systems

Location-based Service

loopt

Context-Aware Service

- No need for service consumer to provide location and context information that the service provider has already obtained from sensors
- No need for service provider to give information to consumer that isn't relevant to his location and context

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Context-Aware Context

```
        ┌──────────────┐              ┌──────────────┐
        │  Technology  │ ◄────────►   │   Customer   │
        └──────────────┘              └──────────────┘
                │
        ┌─────────────────────┐
        │ Computational Service│
        │       (Base)         │
        └─────────────────────┘
         ↙          ↕          ↘
┌──────────────┐ ┌──────────────┐  ┌──────────────┐
│ Computational│ │ Computational│  │ Computational│
│  Service 1   │ │  Service 2   │  │  Service n   │
└──────────────┘ └──────────────┘  └──────────────┘
```
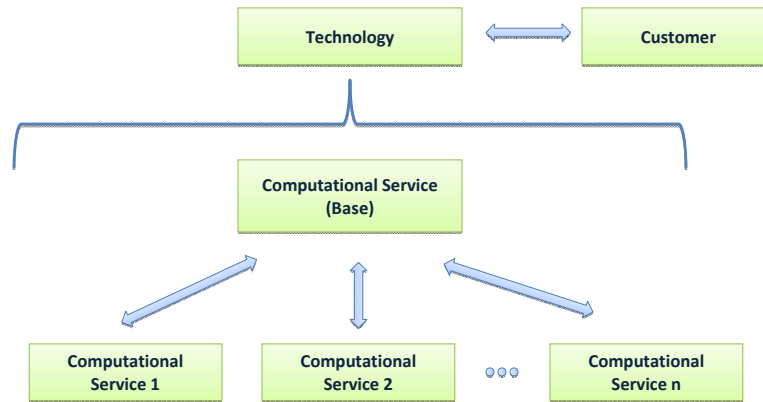
Contexts as Building Blocks

Banking

(1) Pure P2P
Private banking / VIP financial advisory service

(2) Tech-enhanced P2P
Tellers at bank windows

(3) Self-service
ATM

(4) Multi-channel
Online banking

(6) Back stage / computational
Wire transfer

(7) LBS / Context-aware service
Fraud detection / alert
(If card usage is abnormal such as overseas,
alert is sent to customer and bank.)

(5) Multi-device
Mobile banking
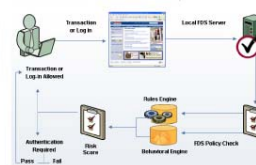
Contexts as Building Blocks

Smart home experience

(1) Pure P2P
Extreme end of services trigerred only by human interactions
(e.g. A: "It's so hot inside!" / B: "Shall I open the window?")

(3) Self-service
Customers can monitor status by themselves.

(6) Back stage / Comp.
Backbone grid is the back stage in the customer's point of view.
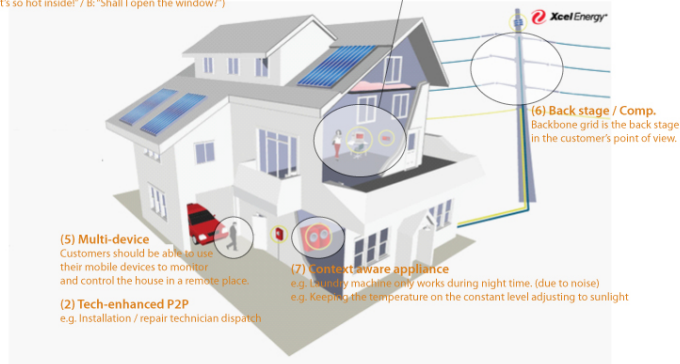
(5) Multi-device
Customers should be able to use their mobile devices to monitor and control the house in a remote place.

(7) Context aware appliance
e.g. Laundry machine only works during night time. (due to noise)
e.g. Keeping the temperature on the constant level adjusting to sunlight

(2) Tech-enhanced P2P
e.g. Installation / repair technician dispatch

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The "Smart Bookstore" [1]

Customer browses "Bookland" bookstore site, looks at several books but doesn't purchase them

While walking in town a few days later, text message alert on mobile phone tells him he is near a Bookland store, offering him a discount on the books he browsed online that are in stock at that store

Customer identifies himself with RFID-enabled loyalty card at self-service kiosk, gets printed store map with book locations highlighted

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The "Smart Bookstore" [2]
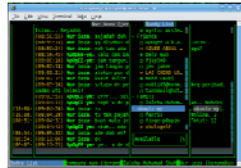
His purchases update his customer profile and store inventory, triggering new recommendations and reordering

Books that are removed from shelves but left in coffee shop, rest room, etc. are "zombies" that are detected by RFID tracking, with alerts sent to employee dashboard

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Information Flow in "Bookland"
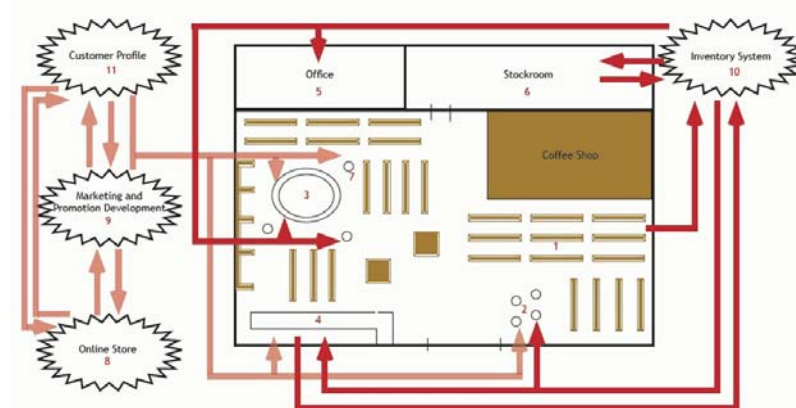
Customer Self-Service Interface

Employee Dashboard

Design Methodology with Service Contexts

- Iterative scoping (and defining the POV in) the service system determines relative importance of each context

- Choose a portfolio of appropriate design methods for the combination of contexts

Portfolio of Methods
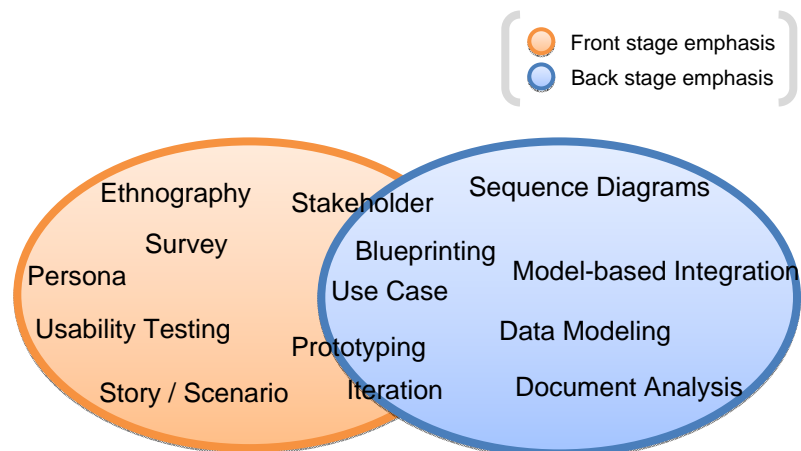
Service System Scope

- Design techniques for person-to-person services typically describe the service from the perspective of the customer and emphasize the "touch points"

- But the scope extends before and after these touch points to an extent that is itself an important design decision

- The scope is more complex with multiple channels, multiple devices, or location-based services

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Service System Scope

Time is a primary dimension of scope but not the only one

- Time   Front Stage | Back Stage   + Time

Touch Point
"Window"
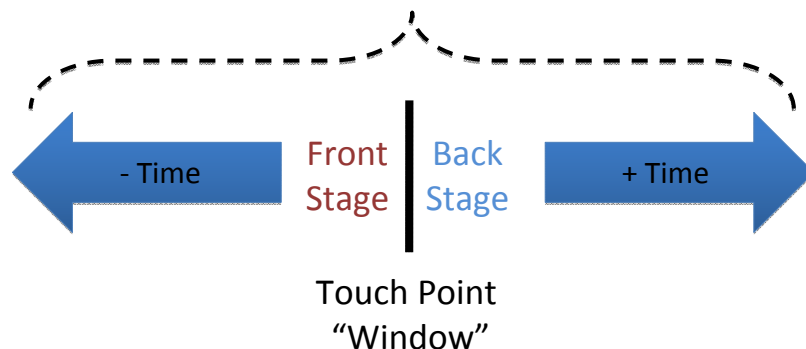
The Gourmet Restaurant Experience

Front Stage

Back Stage

A "customer-oriented" perspective on a gourmet restaurant suggests a narrow service system scope

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The "Locavore Restaurant" Service System

Service System Scope

Touchpoints

Primary Producer   Supply Chain   Delivery   The Stage

But it might be essential to extend the design scope to ensure the desired experience in the "touchpoint window"

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The Massage Experience

Touchpoint

Physical Therapy
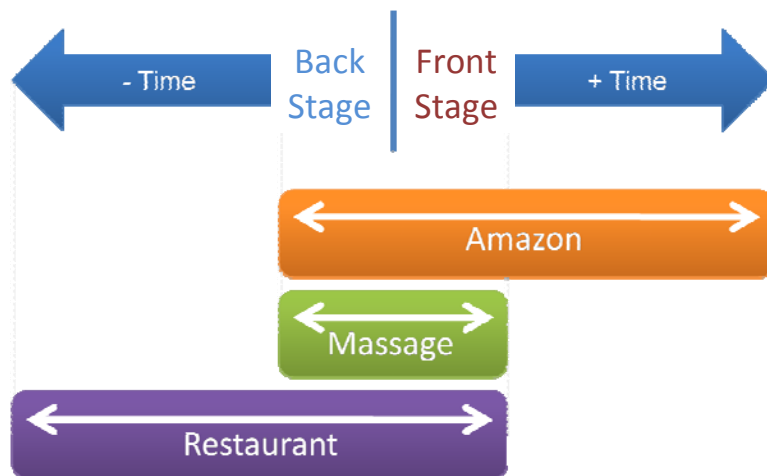
Touchpoint — Touchpoint → Touchpoint

Touchpoint → Touchpoint

The Amazon Experience

Touchpoint	Service Scope	Touchpoint

The Stage · Warehouse · Wrapping / Distribution · Stage Again

Service System Scope
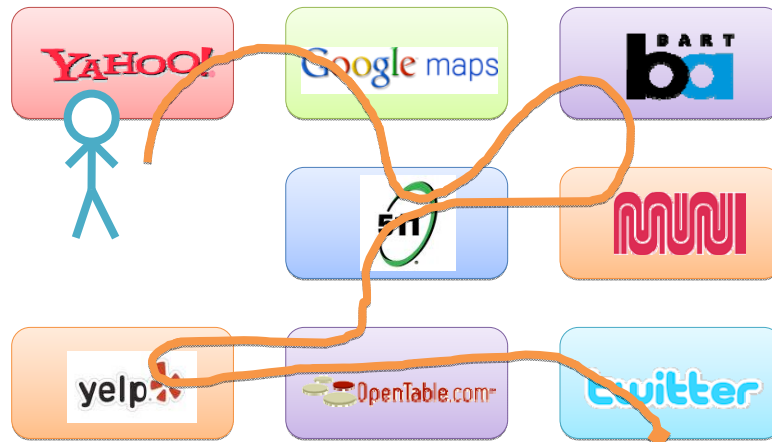
Service Systems Intersect

You're having dinner with a friend near his workplace.

Actions and Services

- Confirm the location
- Search for a restaurant
- Read reviews and ratings
- Make a reservation
- Plan how to get there
- Share the story and pictures
- Add a review and rating
- …

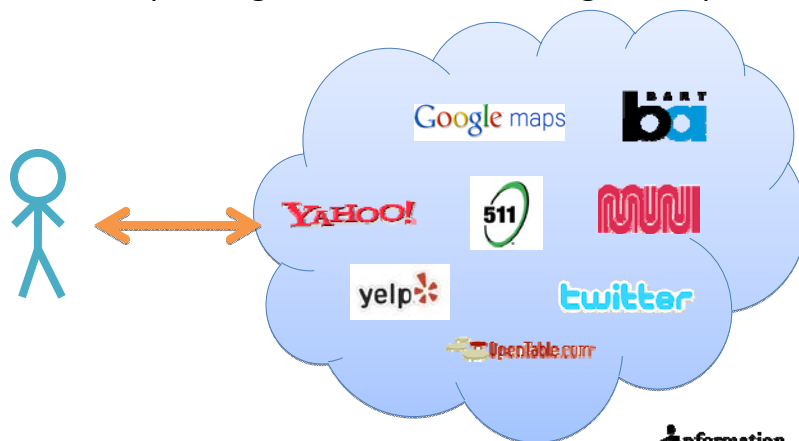
Service Systems Intersect

Today: Ad hoc composition "by eye"

From "Boundary Crossing" to "Dynamic Composition"

Future: Dynamic service negotiation and composition; automated "pruning" of non-value-adding touch points

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Summary

- The seven design contexts enable a prescriptive and generative method for designing service systems

- The more abstract conception of services and service interfaces embodied in the seven contexts unifies traditional P2P and SOA visions of service system architecture and design

For More Information

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▪Glushko, RJ. Seven Contexts for Service System Design. To be published in Maglio, P. P., Kieliszewski, C, & Spohrer, J., *Handbook of Service Science*, (2009)

▪Glushko, RJ and Tabas, L. Designing Service Systems by Bridging the "Front Stage" and "Back Stage." *Information Systems and E-Business Management*, (2009).

▪Glushko, RJ. *Information System and Service Design: Strategy, Models, and Methods.* Graduate course taught at University of California, Berkeley
(http://www.ischool.berkeley.edu/programs/courses/290-ISaSDSMaM**)**