Discipline in Service Science and Service Science Teaching

Six Universities Joint Workshop

Tsukuba University

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Professor Robert J. Glushko

University of California, Berkeley

glushko@ischool.berkeley.edu

Plan for Today's Lecture

Overview and History of SSME at UC Berkeley

Designing a Discipline with Discipline

SSME Course Experiences

The "Big Ideas" in our SSME Courses

What's Next

Who Am I?

I've been a "service scientist" for my entire professional career without knowing it

For nearly 30 years I've designed and deployed information-intensive applications, systems, and services

I started out emphasizing the "people parts" or "front stages"

Over time my focus shifted toward the "back stage"

My current goal is to develop methods for designing "service systems" that treat the entire network of service components that comprise the back and front stages as complementary and integrated parts

SSME at UC Berkeley

A very slow, bottom-up process:

2004 - contemplate a coordinated SSME effort

2005 - seminar to develop concepts and principles for SSME at Berkeley

2006 - campus-wide coordination slows down; new courses developed in School of Information and business school

2007 - School of Information narrows focus from SSME to "Information and Service Design"

2007 - Information Systems Clinic founded at School of Information

2008 - Several new ISD courses launched

Designing a Discipline with Discipline

Robert J. Glushko, "Designing a Service Science Discipline with Discipline." IBM Systems Journal, 47(1): 15-27, 2008

A Discipline is not the same thing as a Curriculum

Generative model of what the SSME discipline might be

Challenges and constraints face us as we develop a curriculum with that model in mind

A Discipline != Curriculum

A DISCIPLINE is a principled model of a coherent body of research and practice

A CURRICULUM is a program of study leading to a degree or certificate

No single curriculum CAN cover the entire SSME discipline

No single curriculum SHOULD cover the entire SSME discipline

Curricula Will and Must Differ

Different universities and their schools have distinct emphases and character

Different univerisities who are nominally engaged in the same discipline often have different curricula

These differences are INEVITABLE and DESIRABLE because presumably they exploit the comparative advantages of each institution

Designing A Discipline

But the design of a discipline shouldn't have any institutional bias

Requirement to be able to evaluate and compare curricula against some model of the discipline

Can't start from any existing curriculum or courses

Instead, ask "What are the key concepts, themes, and challenges that a SSME discipline should encompass"

Treat every participant's discipline as an equal partner until you have a principled reason not to

Examples of Cross-Disciplinary Questions [1]

Candidate disciplines: economics, engineering, law, organizational sociology, business strategy, business operations, information technology, user-centered design, ...

Does the discipline have a theory about how firms change over time?

What mechanisms does each discipline propose that firms use to seek and maintain advantages?

How does each discipline evaluate the success of innovations or adaptations?

Examples of Cross-Disciplinary Questions [2]

How does each discipline propose that firms encode what they learn in new mechanisms, organizational forms, or information technology?

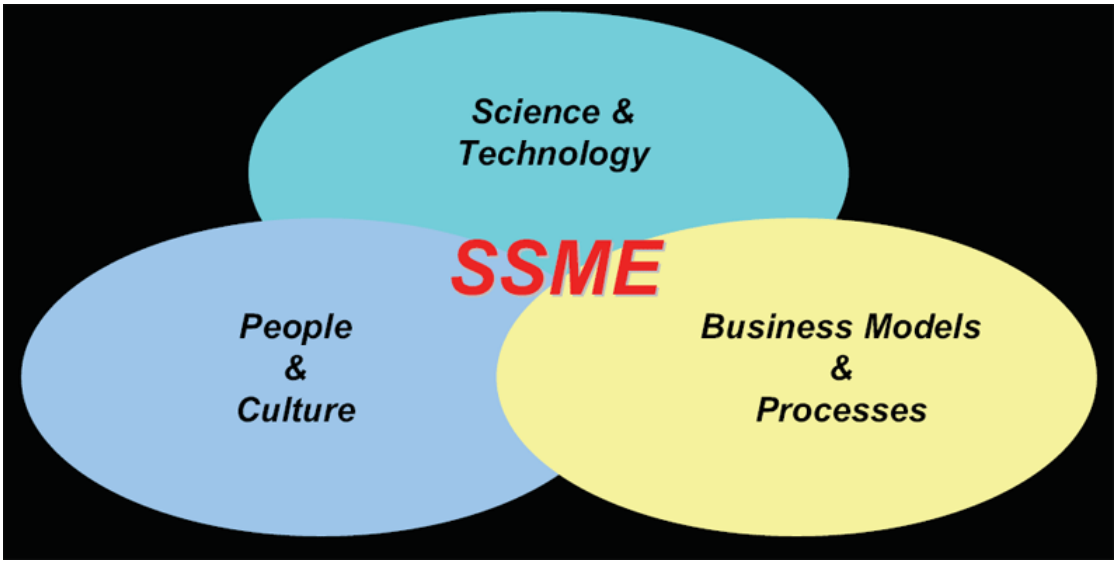
How does each discipline explain why and how services combine, standardize, and evolve?

How does each discipline propose to evaluate and optimize a service?

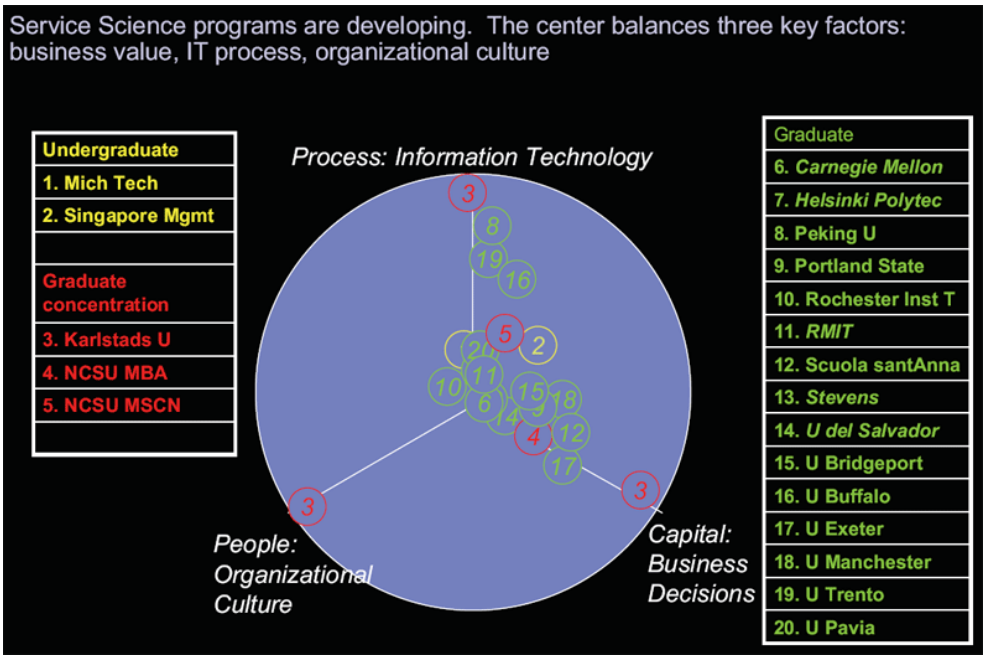
The Life Cycle vs Discipline Matrix

		D1	D2	D3	...
Strategy	Planning				
Design	Innovation				
	Specification				
	Composition				
	Realization				
Operation	Deployment				
	Management				
	Evaluation				
	Optimization				
	Evolution				

A Coarser Model of the SSME Discipline



Don't Accept the Assumption Here!



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Phase 1: A SSME Foundation Course

Designed against the "matrix" - cover as much as possible

Key themes:

- Historical, economic, and theoretical foundations of the rise of the information and service economy
- Analysis and design of services and service systems
- Service oriented computing and self-service
- Service innovation
- Service quality

Most recent syllabus and lecture notes: http://rosetta.sims.berkeley.edu:8085/sylvia/f07/view/print/210.complete

Lessons Learned: Teaching Perspective

A "survey" course in a new field with unclear boundaries is simply too broad and ambitious

It can be strong on foundational concepts, but at the cost of being weak on skills and practical methods

Treating SSME as a new discipline inevitably disconnects it from what students already know

Very challenging to develop a multi- and cross-disciplinary syllabus when separate disciplines and "core" readings aren't equally accessible

Lessons Learned: Curricular Perspective

Person-to-person and computer-based / computer-to-computer service design need more unification

A "service systems" framework would better unify concepts and methods across these contexts

"Design patterns" from different disciplines can provide more scaffolding for teaching practical methods

Motivating "Service Systems"

Traditional concepts of service management and design emphasize person to person interactions

This approach focuses on the "touch points" or "encounters" or "moments of truth"

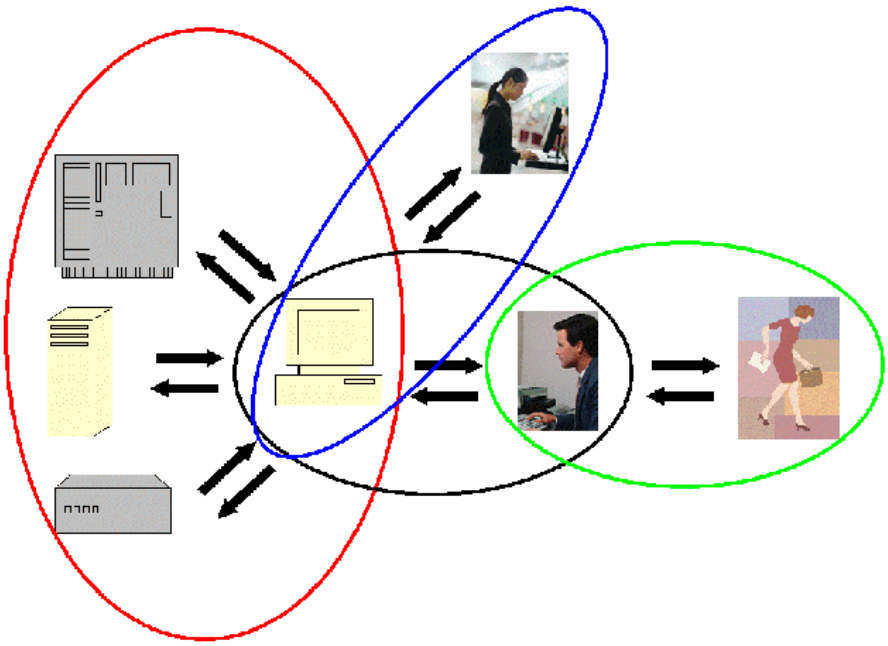
This reinforces a sharp distinction between the "front stage" and "back stage" of the service value chain, which the service consumer can't see

This perspective is inadequate for understanding today's more complex mix of services that include self-service, multichannel services, and intra- and inter-enterprise automated services

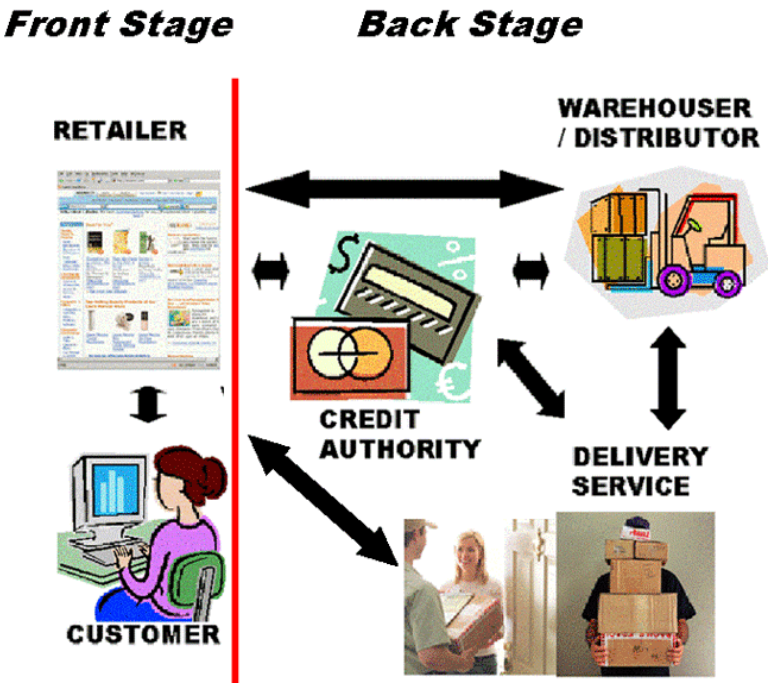
The Hotel Service Encounter

Self-Service Hotel Check-In

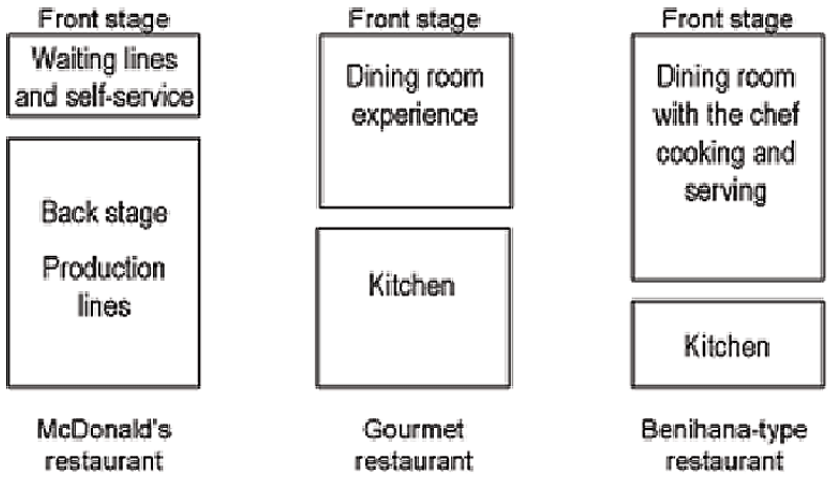
Four Types of "Encounters" in Hotel Check-In



The Invisible Back Stage



Different "Lines of Visibility" -- Front / Back Stage Boundaries in Restaurants



Bridging the Front Stage and Back Stage in Service Design

Robert Glushko & Lindsay Tabas, Proceedings of the 41st Hawaii International Conference on System Sciences, January 2008

Front stage / back stage is not an architectural distinction

It is just a point of view and bounded scope in a service system

It embodies some design biases that cause problems in service system design

But if we design the service system as a whole rather than as front stage + back stage, we can overcome these problems

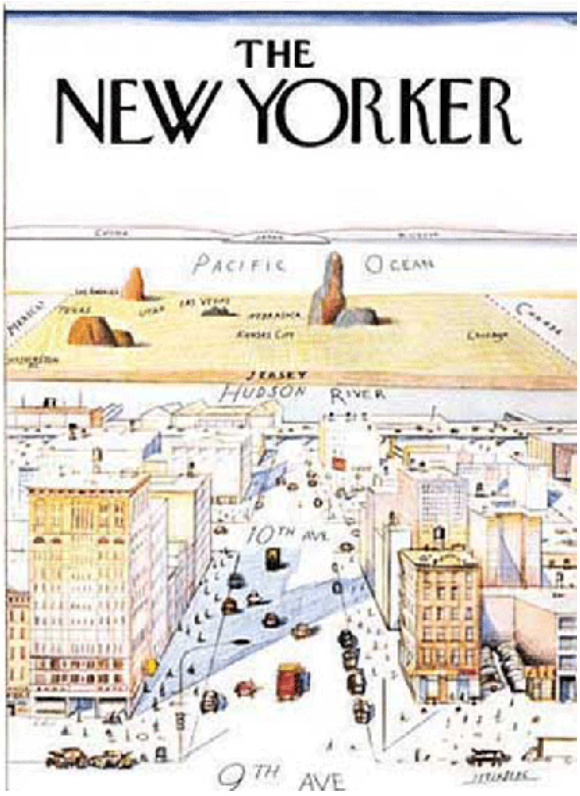
"Point of View" in a Service System

In any service system design, we designate some component as the ultimate consumer or customer

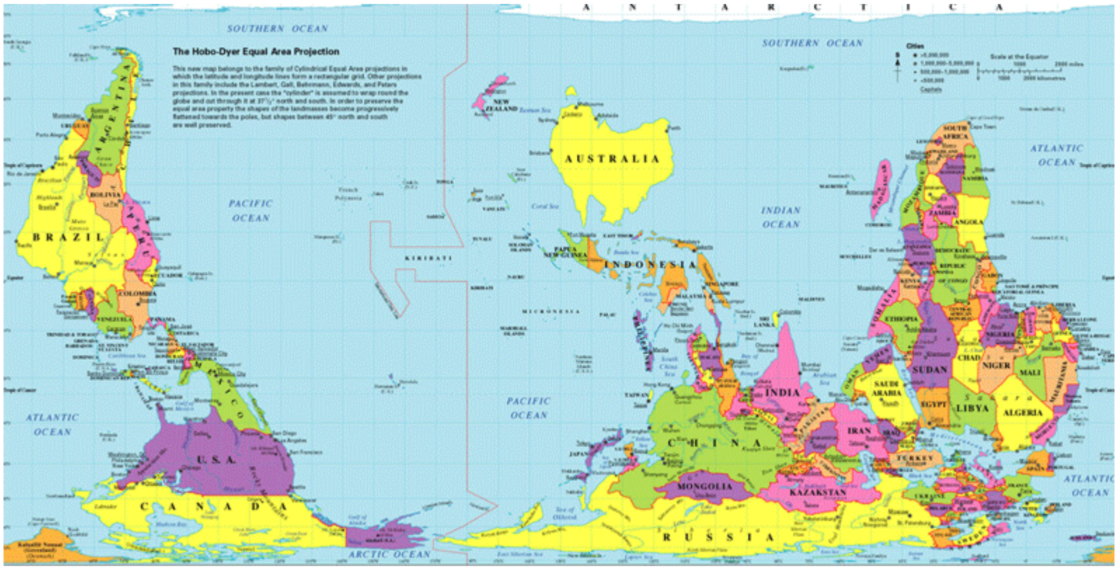
This often appears to be the end of a value chain or information flow, or where some typical class of "users" is found

But this point of view or perspective is often arbitrary, and there may be alternate POVs in the same service system

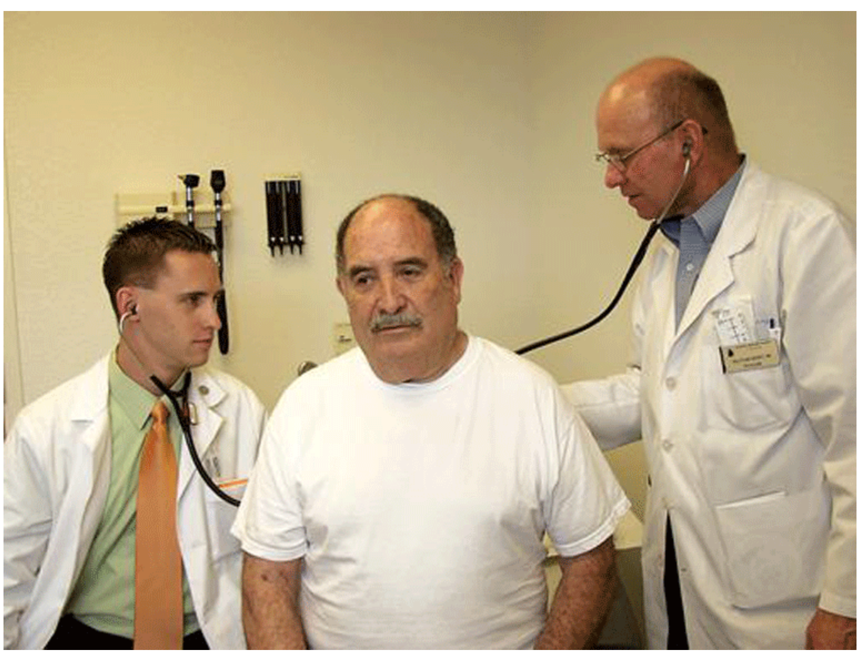
A New Yorker's Map



An Australian's Map



Who's the Service "Consumer" in a Teaching Hospital?



Front Stage and Back Stage Inversion: Cooking School, or Restaurant?

KITCHEN

Front Stage for the Cooks
Back Stage for the Customers

DINING ROOM

Front Stage for the Customers
Back Stage for the Cooks

A New Way of Thinking About Service System Components

If a service system can be designed from alternate POVs, we must reconsider how we classify types of services and service encounters

A service provider or service consumer can be a person

Or a computational or automated process

The service provider and consumer can have pre-existing relationships, or ad hoc ones

The service can be highly predictable, or highly variable

Service variability can be desirable or undesirable

Commonalities Among the "Encounter Types"

There are service producers and service consumers

Each service provider has an interface through which the service consumer interacts to request or obtain the service

Value or quality is created/co-created by the interactions and interchanges between the provider and consumer

Why Emphasize the Commonalities?

It makes it much easier to consider alternative service system designs like:

-- Replacing or augmenting a person-to-person service with self-service

-- Substituting one service provider for another in the same role

-- Eliminating a person-to-person interaction with automation

-- Delivering similar or complementary services through multiple channels

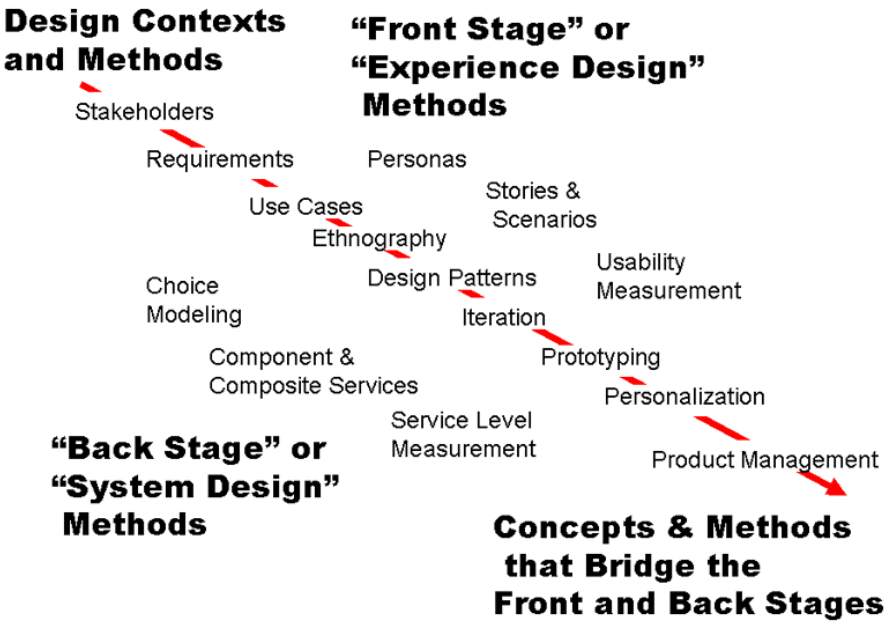
Phase 2: Information System and Service Design

The lessons learned from our first course can best be followed by designing a new course

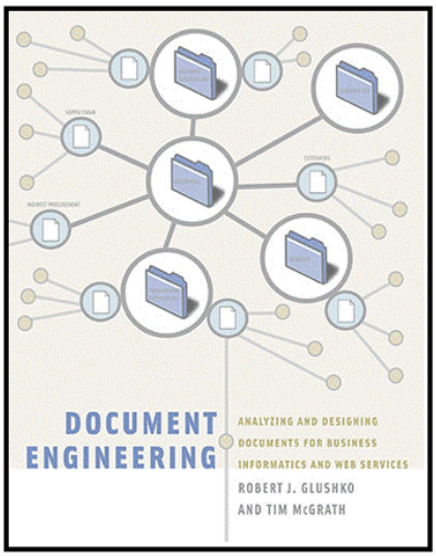
This course takes a Service System design perspective that explicitly bridges front and back stage concerns

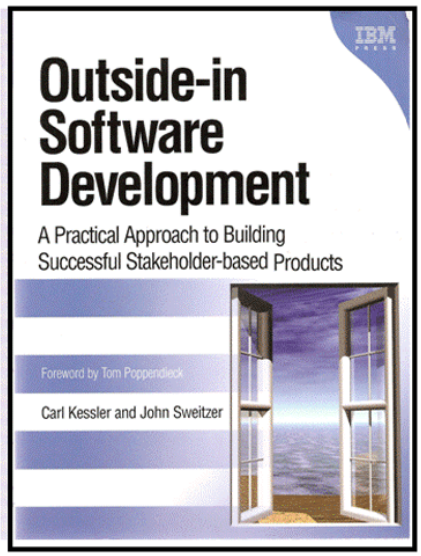
Most recent syllabus and lecture notes:
http://courses.ischool.berkeley.edu/i290-1/f08/ISD-Fall2008-Syllabus.html

Course Architecture



The "Chicken and Egg" Textbook Dilemma





Design Methodologies

When we design something we follow – implicitly or explicitly – some steps or techniques for scoping, analysis, idea generation, and implementation

This DESIGN METHODOLOGY makes assumptions about which design questions can be separately answered, the priorities and dependencies, and who can best answer them

Methodologies can be formal, prescriptive, step-by-step, documented and auditable; they can be the opposite: informal, ad hoc, "seat of the pants" with no trace other than the design artifact itself; or they can be anywhere in between

Methodology choices reflects management or business philosophy and often a personal or ideological one

Not Quite Agile Methodology

Most Methodologies Are Hybrids [1]

Sequential methodologies are often presented as a "straw man" to be rejected

But their appropriateness depends on granularity -- every methodology has sequential characteristics

Similarly, iterative methods are often presented as a radical departure from sequential methodologies

But every iterative methodology has some sequential characteristics when viewed from a "coarsed-grained" perspective

Most Methodologies Are Hybrids [2]

Top-down methods work down from high level business goals and progressively refine them to more concrete or physical instantiations

These are most appropriate in "information-intensive" domains governed by abstract models and constraints

Bottom-up design methods generalize from observations at the concrete or physical level to create a story that ties them together

These are most appropriate in "experience-intensive" domains governed by concrete objects and constraints

But most so-called bottom-up approaches have some top-down aspects, and vice versa

The Methodology "Portfolio"

Unless the design projects taken on by an organization or team are always for the same context, with similar scope and requirements, they will not follow the same design methodology on every project

There will be always be a need to adapt the methodology in some way, emphasizing some activities more or less than usual because of schedule, resource, or stakeholder considerations

So in practice, the "methodology" employed in any given project is likely to be a set of design techniques selected and adapted for it

Designing "Experiences" and "Systems"

The "point of view" for "experiences" is a human actor; for "systems" it need not be

"Experiences" have more emotional content; "systems" have more information content

"Experiences" are a form of drama in which the actors (the service providers) and audience (customers) carry out interconnected and reciprocal roles and actions

"Experiences" are often discretionary; users and other actors with "systems" are often engaged in nondiscretionary activities

"Informants" vs. "Information" on the "Ethnography Continuum"

Design contexts range from "experience-intensive" to "information-intensive"

On one end of this continuum "documents" and other other information sources are incidental or occasional; on the other they are ubiquitous and intrinsic to goals and activities

On the "experience-intensive" end the most important things to study are people, and on the "information-intensive" end the most important things to study are documents

When we design experiences we need to learn mostly from "informants" but when we design systems we can learn mostly from "information"

Document Anthropology and Archeology

Locating and understanding documents always requires a mixture of "anthropology" ("observing their use") and "archeology" ("digging into their history")

Document designs are often enduring aspects of business processes, lasting far longer than the tenures of the specific people who produce and use documents

Document implementation or management technology often changes, but the logical model of a document is often preserved

Iteration in Document Inventory

Identifying all the potentially relevant documents or information sources is inherently an iterative task

Documents may refer or link to other documents

Documents may refer to people, who can refer to other documents or people

Developing a causal model of the domain can help identify the intrinsic documents

- What high level business goals need documents as part of the activities to satisfy them?
- Where are the "headwaters" for the information -- what events or processes cause it to be created?

"Staple Yourself to an Order"

Customer Participation	Steps in the Order Management Cycle
plans to buy	1. Order planning
gets sales pitch	2. Order generation
negotiates	3. Cost estimation and pricing
orders	4. Order receipt and entry
waits	5. Order selection and prioritization
waits	6. Scheduling
accepts delivery	7. Fulfillment
pays	8. Billing
negotiates	9. Returns and claims
complains	10. Postsales service

10 steps in the Order Management Cycle define a company's way of doing business

Because the OMC is an end-to-end system, every employee who affects an Order is the equivalent of a frontline worker

But most companies don't view the OMC as a system, and most executives have a simplistic or incorrect model

"Staple Yourself to an Order" -- Organizational Responsibilities

● leading role ⊙ supporting role — no role

Customer Participation	Steps in the Order Management Cycle	Sales	Marketing	Customer Service	Engineering	Purchasing	Finance	Operations	Logistics	Top Management Participation
plans to buy	1. Order planning	⊙	●	⊙	⊙	⊙	⊙	●	⊙	coordinates
gets sales pitch	2. Order generation	●	⊙	⊙	—	—	—	—	—	some
negotiates	3. Cost estimation and pricing	⊙	●	⊙	⊙	⊙	⊙	⊙	⊙	some
orders	4. Order receipt and entry	⊙	⊙	●	⊙	—	—	⊙	⊙	none
waits	5. Order selection and prioritization	⊙	●	⊙	⊙	—	⊙	⊙	⊙	some
waits	6. Scheduling	⊙	⊙	⊙	⊙	⊙	—	●	⊙	none
accepts delivery	7. Fulfillment	⊙	⊙	⊙	⊙	⊙	—	●	⊙	none
pays	8. Billing	⊙	⊙	⊙	—	—	●	—	⊙	none
negotiates	9. Returns and claims	●	—	⊙	⊙	—	⊙	⊙	⊙	some
complains	10. Postsales service	⊙	—	●	⊙	—	—	⊙	⊙	none

Process Analysis for "Experiences" and "Systems"

The goals and activities of process analysis are the same for experiences and systems

- We perform an "as-is" analysis of how some activity is conducted today
- We identify requirements that may result in new or revised activities / processes / transactions – the "to-be" model
- We look for existing patterns or opportunities to use patterns in the models
- We may "re-engineer" the "as-is" model to optimize the processes; this is process design

Process Modeling using "Document Engineering"

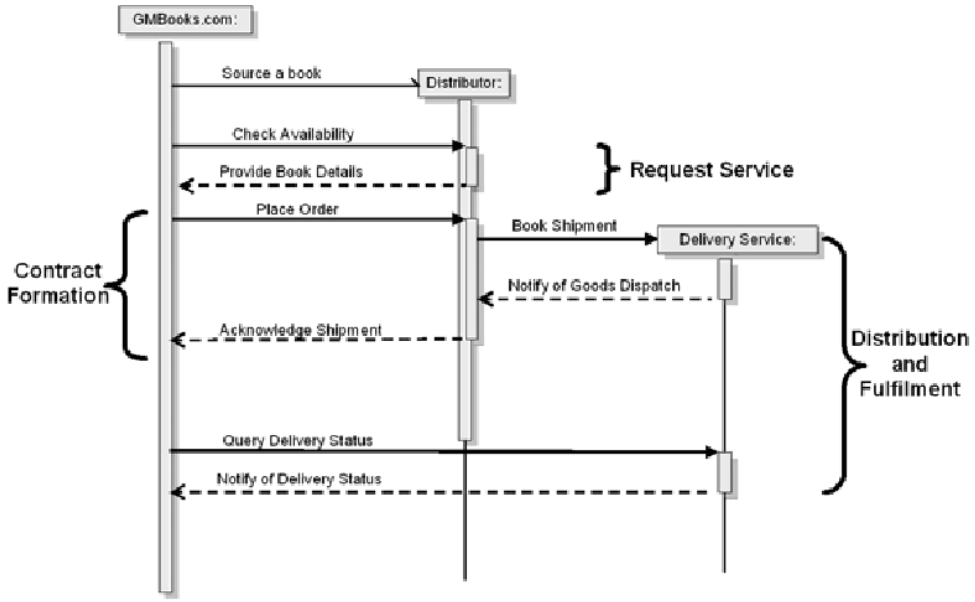
For systems and services composed from components or information sources, it is useful to conceptualize the design in terms of patterns of information exchanges

The primitive or atomic exchanges are transactions

Sets of related transactions that have meaningful semantic overlap can be treated as collaborations

Transactions and collaborations follow patterns, and thus can be used as building blocks in process or interaction design

Process Model for "Drop Shipment"



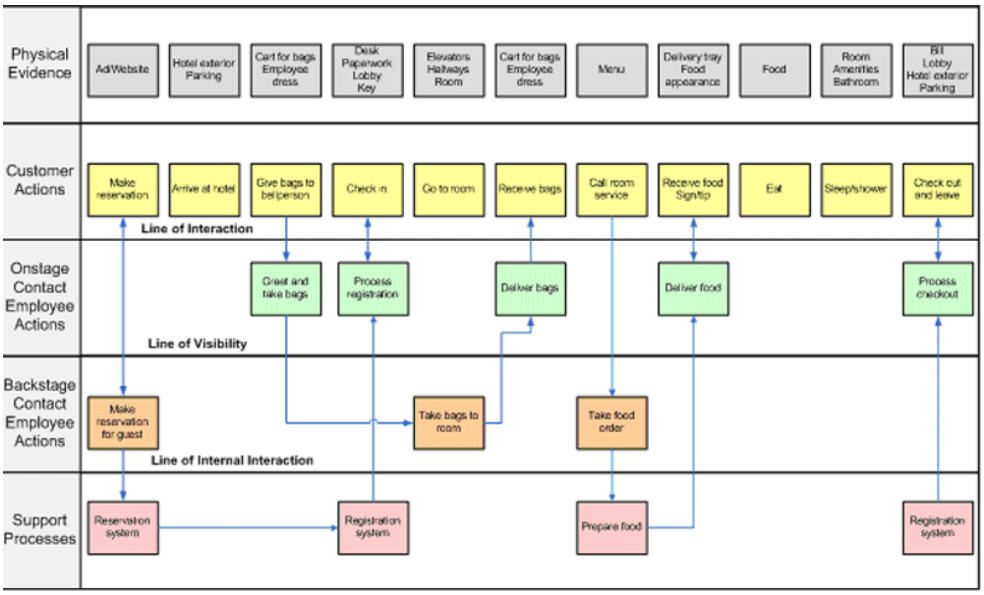
Process Modeling with Service Blueprints

Blueprinting is a design methodology for "systematically managing the customer experience" and "promotes a conscious decision on what consumers see and which employees should be in contact at each moment of truth"

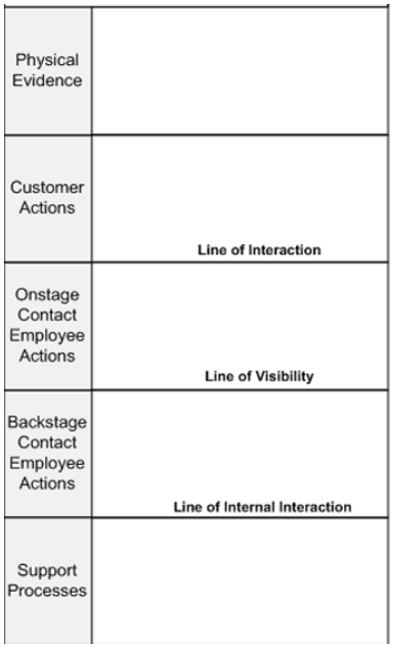
It is a design methodology for services that have an interface with an actual customer through technology or interpersonal interactions

Appropriate for services that are "dynamic, unfolding over time through a sequence or constellation of events and steps"

Service Blueprint for Overnight Hotel Stay



Blueprinting Methodology: "Metamodel"



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

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

Patterns in Service System Innovation

Because services are often less tangible or more abstract than products, service descriptions are more amenable to conceptual manipulation

As "service" moves beyond traditional person-to-person services to self-service, web services, computer-to-computer service we are induced to take a more abstract perspective to emphasize what they have in common

This suggests that design patterns or models for services could be exploited systematically to invent new or improved services

This is a framework for innovation, not for evaluation

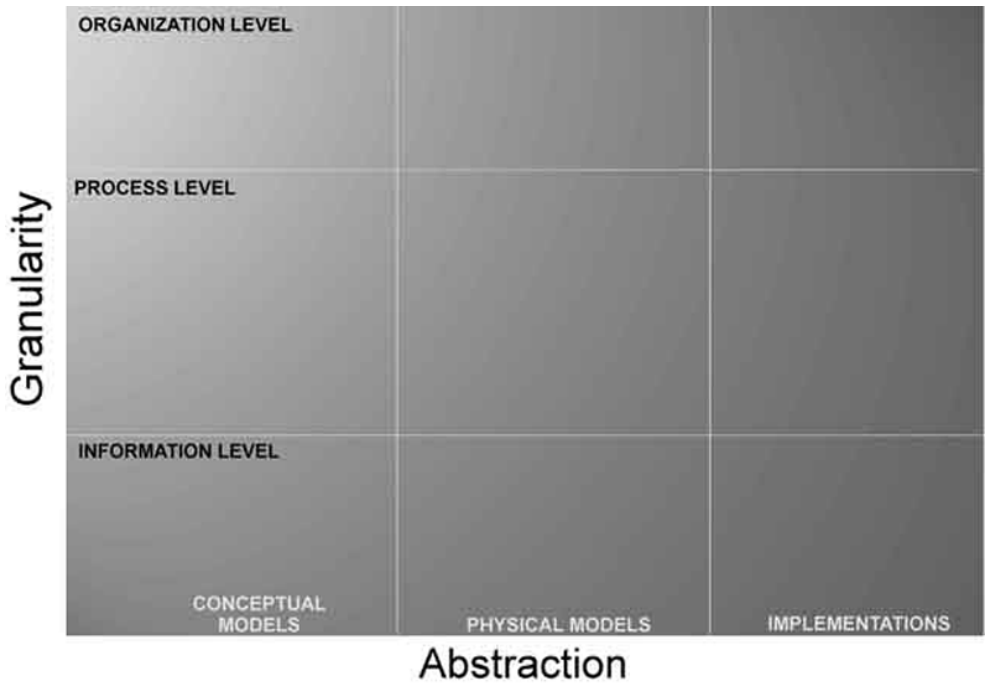
Model and Pattern Abstraction and Granularity

Recurring patterns in structures or processes are visible in abstract models but invisible in the concrete, real-world objects and functions that the model describes

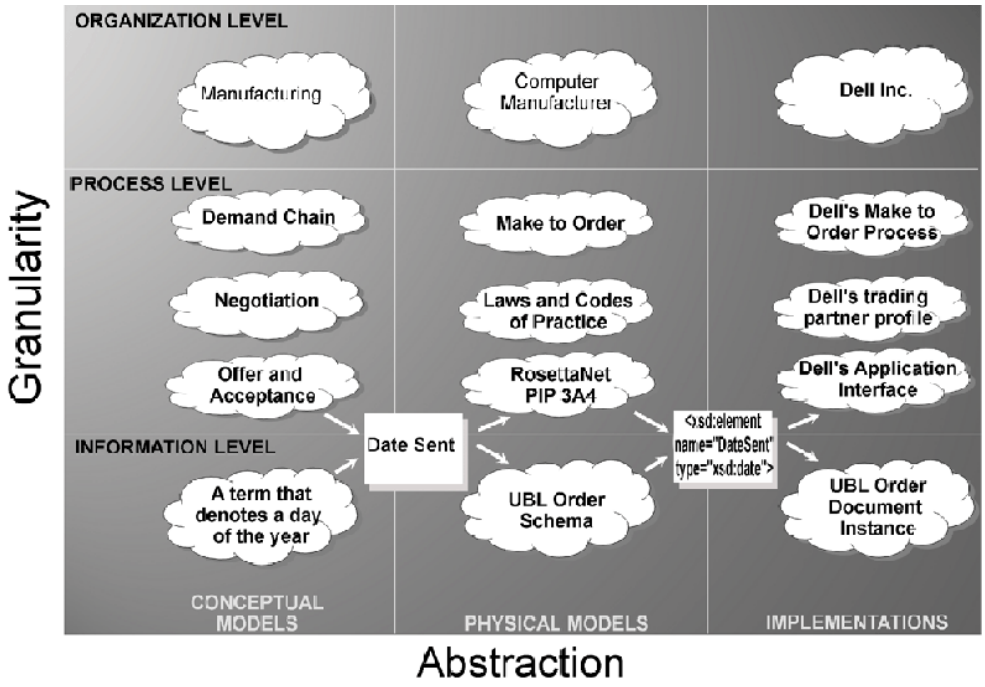
Models can also be expressed at different levels of granularity

- *Business model or organizational* patterns: marketplace, auction, supply chain, build to order, drop shipment, vendor managed inventory, etc.
- *Business process* patterns: procurement, payment, shipment, reconciliation, etc.
- *Business information* patterns: catalog, purchase order, invoice, etc. and the components they contain for party, time, location, measurement, etc.

The Model Matrix



The Model Matrix: Examples



Design Patterns for "Information-Intensive" Businesses

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

(We'll briefly discuss two of them today, and later in the semester when we talk about "component and composite services" we'll see some more)

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

Time	{P, D, C}	D | {P, C}	C | {P, D}	P | {C, D}	P | D | C
Space					
{P, D, C}	1	2	3	4	5
D | {P, C}	6	7	8	9	10
C | {P, D}	11	12	13	14	15
P | {C, D}	16	17	18	19	20
P | D | C	21	22	23	24	25

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

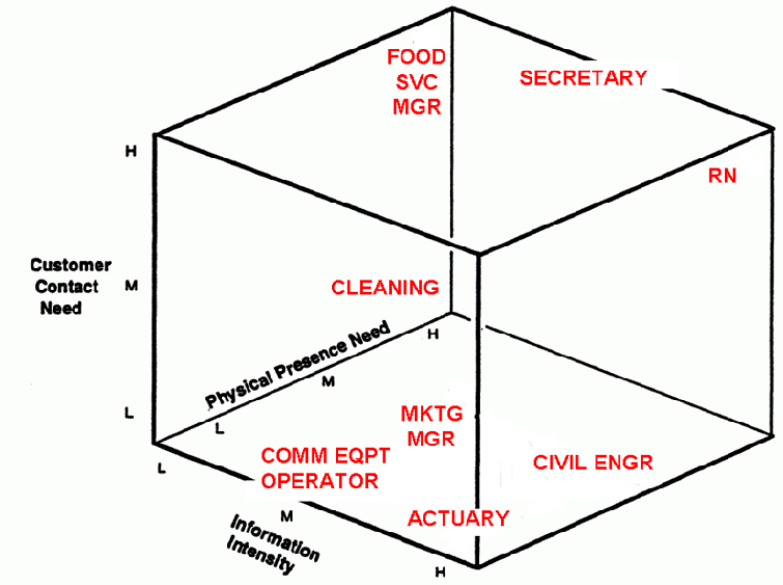
In addition, many interpersonal actions are predominately information exchanges

(A fourth dimension is the extent of "non-value adding" activities)

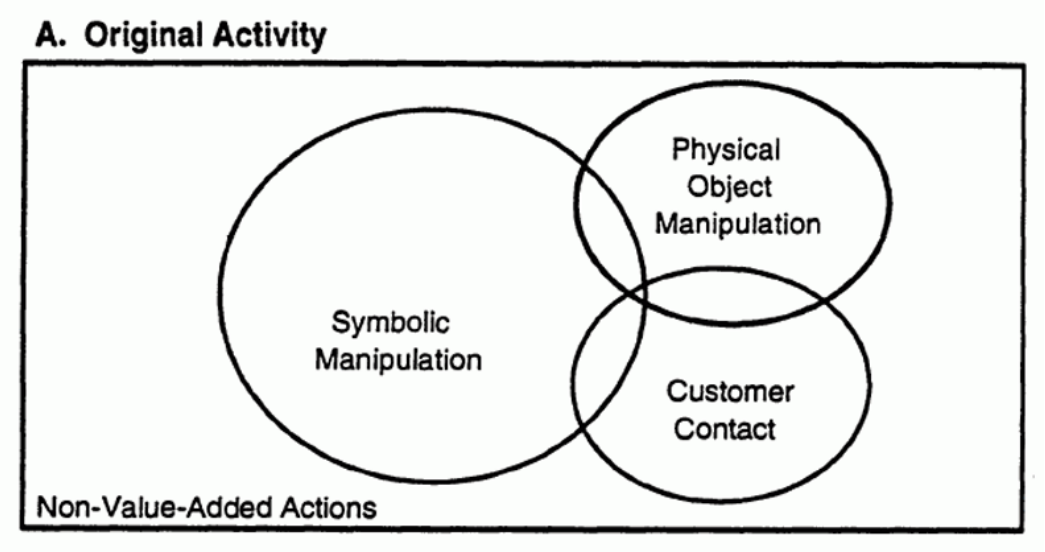
Examples on the Three Dimensions

Occupation	Information Intensity	Customer Contact Need	Physical Presence Need
Actuary	H	L	L
Marketing Manager	H	M	L
Civil Engineer	H	L	M
Comm. Eqpt. Operator	M	L	L
Cleaning	L	L	H
Food Service Manager	L	H	H
Secretary	M	H	H
Registered Nurse	H	H	H

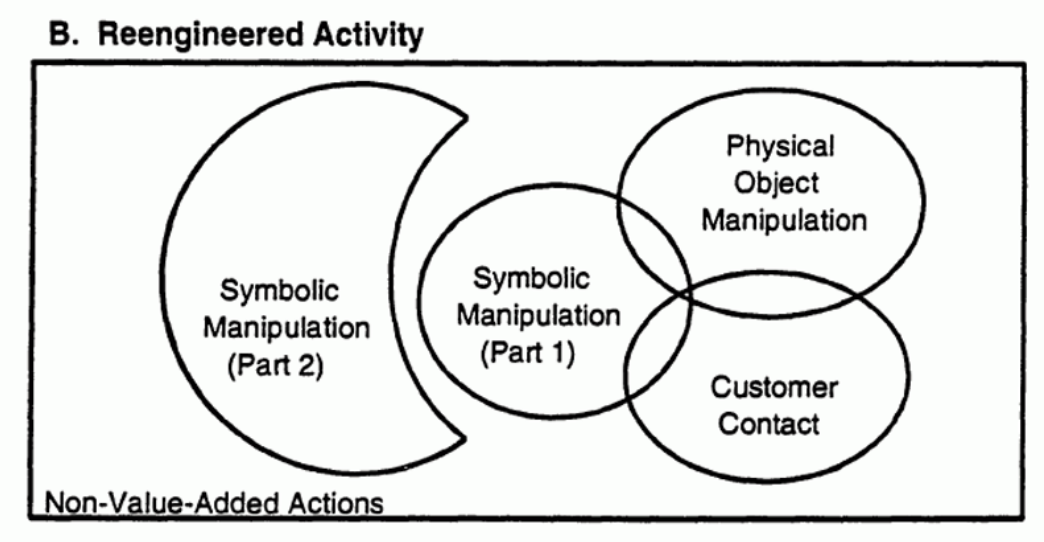
Apte & Mason: To Disaggregate, or Not To...



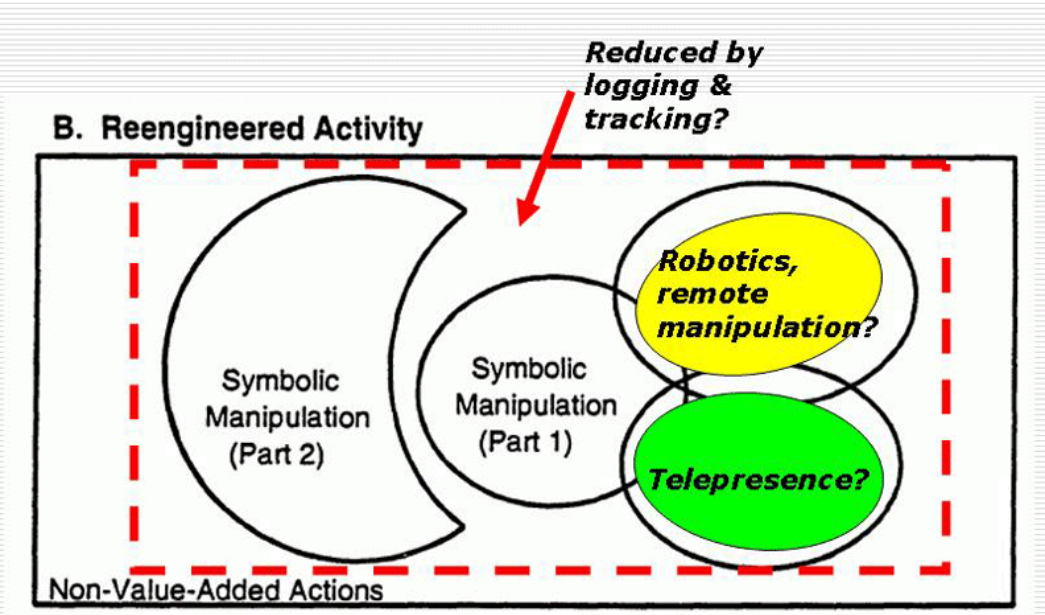
Apte & Mason -- Before Disaggregation



Apte & Mason -- After Disaggregation



Underestimating the Impact of Technology?



The Berkeley ISD Vision

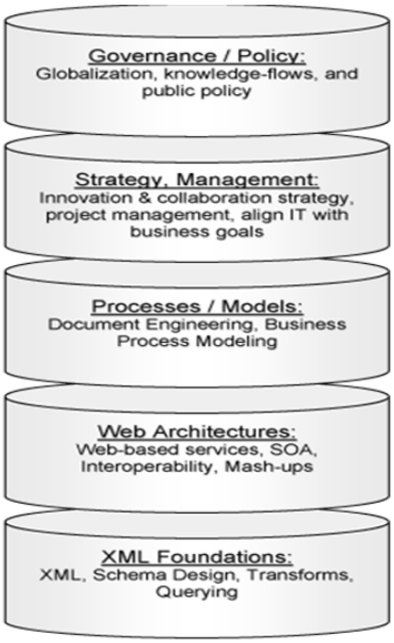
The Information and Service Economy (Glushko & Saxenian)

Management in Information-Intensive Industries (Hansen)

Information Systems & Service Design (Glushko)

Web Architecture (Wilde)

XML Foundations (Wilde)



And In Summary

Service system design requires an abstract perspective to understand how person-to-person, self-service, and computer-to-computer "encounters" can be combined

Service system design techniques must be robust and flexible to accommodate the diversity of contexts in which service systems are deployed

Designing a service system design curriculum requires an abstract, robust and flexible approach too!