# Service Systems and Systems Sciences in the 21st Century



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# Senior members of the International Society for the Systems Sciences

| Jennifer M Wilby | Kyoichi Kijima | David Ing | Gary S. Metcalf |
|---|---|---|---|
| University of Hull | Tokyo Institute of Technology | IBM | InterConnections LLC |
| Introduction: Service Systems and the Systems Sciences | A Co-creation Model of the Process of Service Innovation | Service Systems, Systems Language, and Modeling Tools | Models and Messes in the Sensemaking on Service Systems |

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Jennifer M Wilby

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Introduction: Service Systems and the Systems Sciences

# Can we develop a science of *service systems*?

A **service system** can be defined as
a dynamic configuration of **resources**
(people, technology, organisations and shared information)
that **creates and delivers value**
between the provider and the customer through service.

In many cases, a service system is a **complex system**
in that configurations of resources interact in a **non-linear** way.
Primary **interactions** take place at the interface
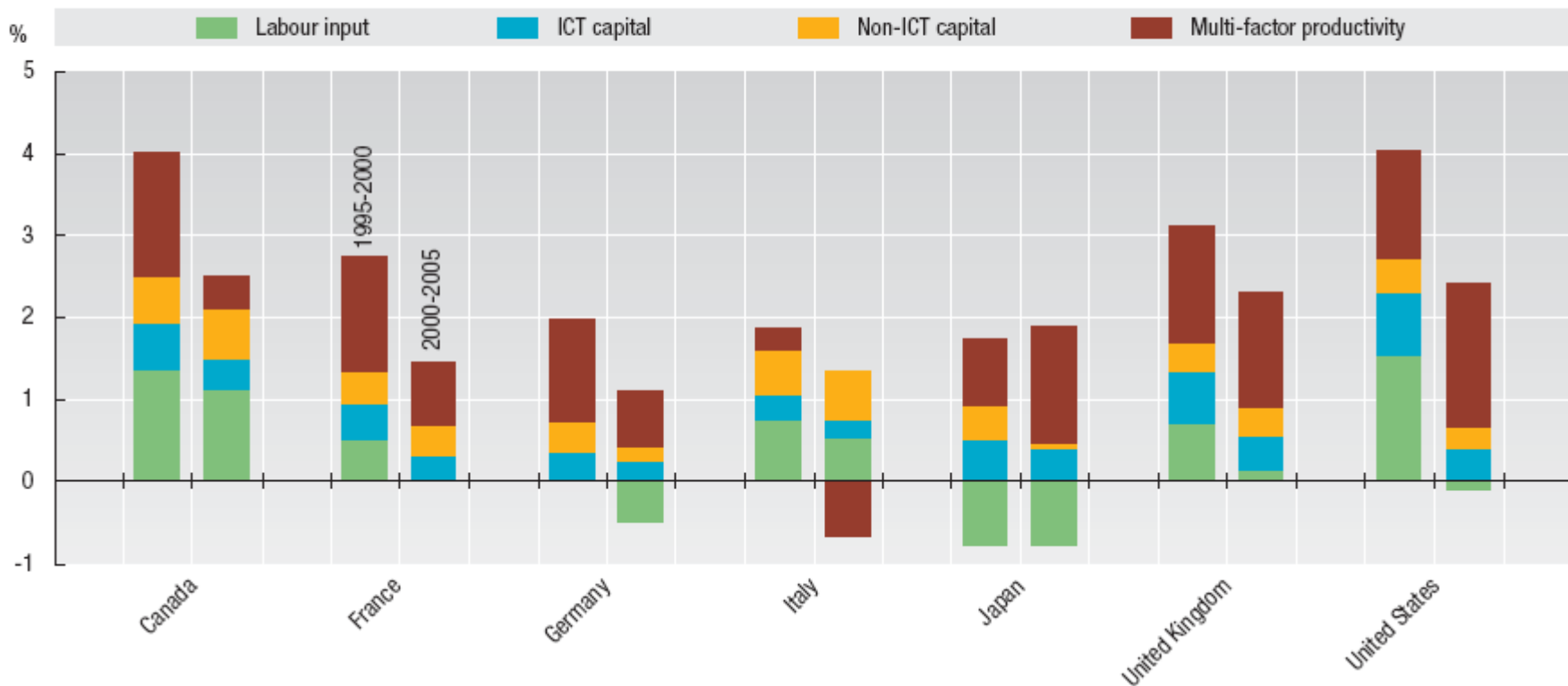**between the provider and the customer**.
However, with the advent of ICT,
**customer-to-customer** and **supplier-to-supplier** interactions
have also become prevalent.
These complex interactions create a system whose behaviour is difficult
to explain and predict.

Contributions to GDP growth, G7 countries, 1995-2000 and 2000-05[1]
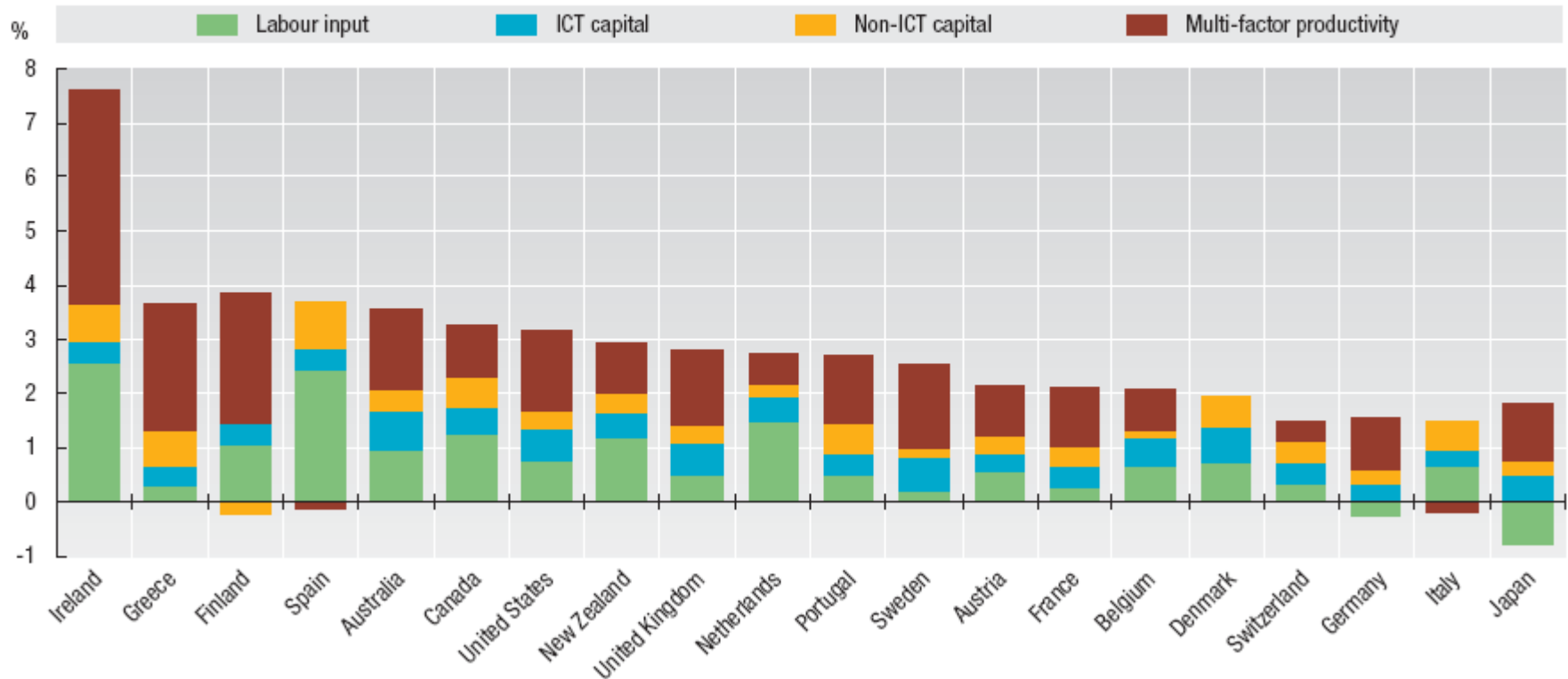
Percentage points

OECD Science, Technology and Industry Scoreboard 2007: Innovation and Performance in the Global Economy, p. 206, available from oecd.org.

# Contributions to GDP growth, OECD countries, 1995-2005[2]

## Percentage points



Legend: Labour input · ICT capital · Non-ICT capital · Multi-factor productivity

Countries (left to right): Ireland, Greece, Finland, Spain, Australia, Canada, United States, New Zealand, United Kingdom, Netherlands, Portugal, Sweden, Austria, France, Belgium, Denmark, Switzerland, Germany, Italy, Japan

OECD Science, Technology and Industry Scoreboard 2007: Innovation and Performance in the Global Economy, p. 206, available from oecd.org.

# Senior members of the International Society for the Systems Sciences

Kyoichi Kijima

Tokyo Institute of Technology

A Co-creation Model of the Process of Service Innovation

# A Co-creation Model of Service Innovation: Service Systems Science Perspective

Panel Discussion:

Service Systems and Systems Sciences in the 21st Century

July 14, 2010

Kyoichi Jim Kijima

Tokyo Institute of Technology

東京工業大学
Tokyo Institute of Technology

# Service Systems Science

- Dual meaning
  - Science of Service Systems
    - Co-creation Model of service innovation
  - Systems Science of Service

# 1. SCIENCE OF SERVICE SYSTEMS

# Science of service systems

- Study of service value co-creation phenomena among service system entities.

- Tries to shed some lights on
  - What is a scientific approach to understanding social value?
  - What propositions can be formulated and what theories empirically tested?

# Conventional Gaps Model of Service Marketing

- A well-known conceptual framework of **service marketing** to understand service quality in an organization.

- Five Gaps that service quality has to close:
  - Customer Gap: Difference between customer expectations and perceptions.
  - Four Provider Gaps: Gaps responsible for provider

- Closing the gaps = Problem Solving

# Gaps Model of Service Quality
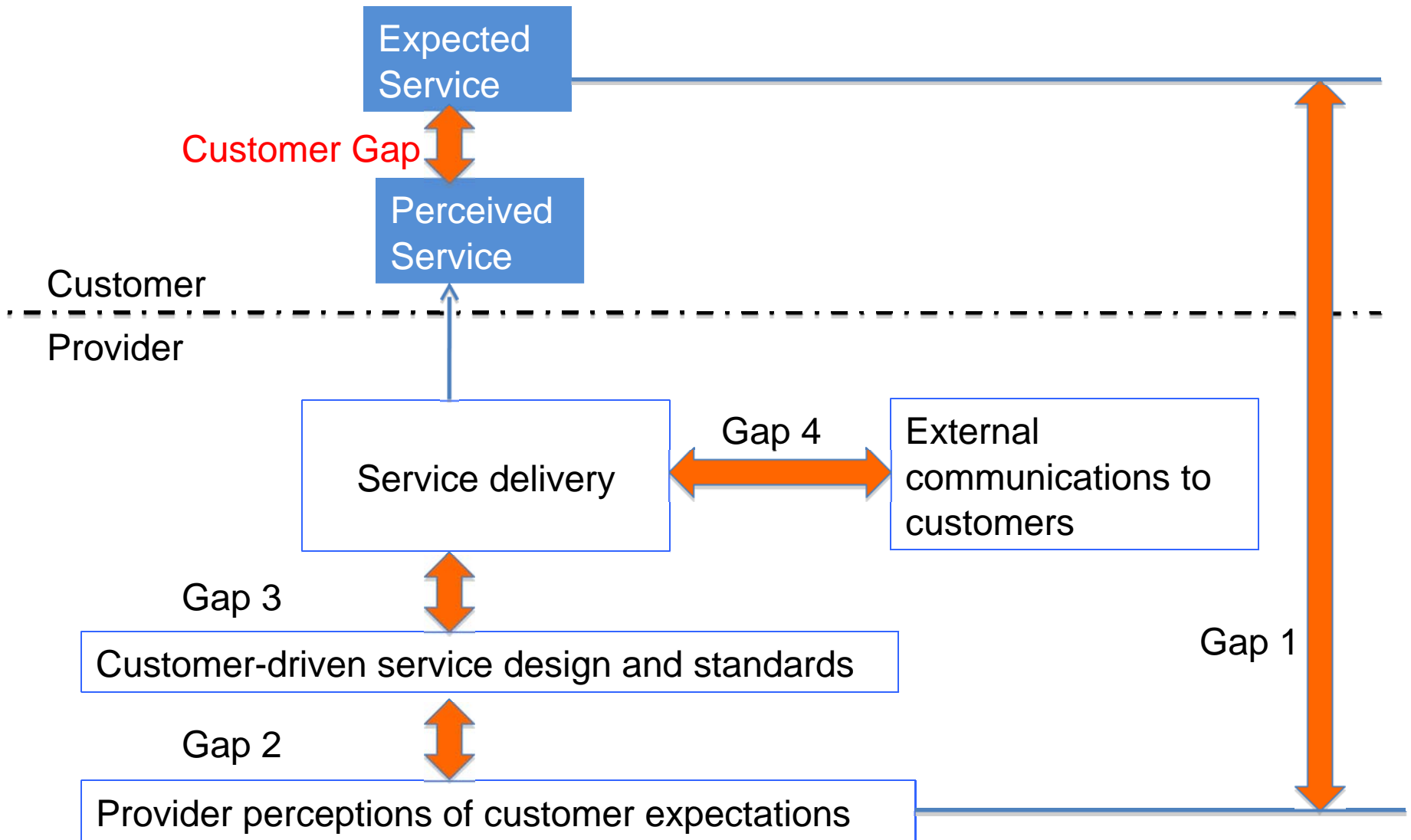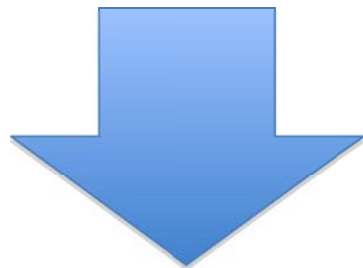
# Customer Gap

- Difference between <span style="color:red">customer expectations and perceptions</span>.

- Closing the gap is critical to deliver quality service; it forms the basis for the gaps model.

Example) When you visit an expensive restaurant, you expect a higher level of service than you would expect in a fast-food restaurant.

# Problems with Gaps Model

The Gaps Model is based on Goods dominant logic

- Customer expectation exists there.
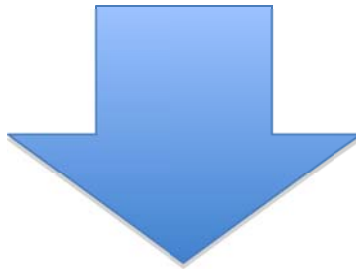- Provider has to possess abilities to produce goods.

Main concern

How to find out customer's expectation?

# Service dominant logic

- There are no producers and consumers.
  - All parties are resource integrators.
- Markets do not exit, but they are rather imaged and created by linking the integrators

(Vargo, 2009)

Main concern

What value to create by collaboration?

# Service is defined as value co-creation interactions

- Service is defined as value co-creation interactions among entities that results in value being created (or destroyed, with or without compensation) for one, both , and sometimes all entities.
  - Service system entities can be people, businesses, non-profits, government agencies, cities and so on.

# Service System

- Service system: Definition
  - A dynamic interaction of providers, customers, ICT (information and communication technology) and shared information that creates value between the provider and the customer (Cambridge White Paper, 2007).

# Service System
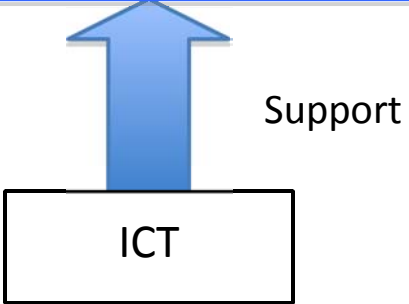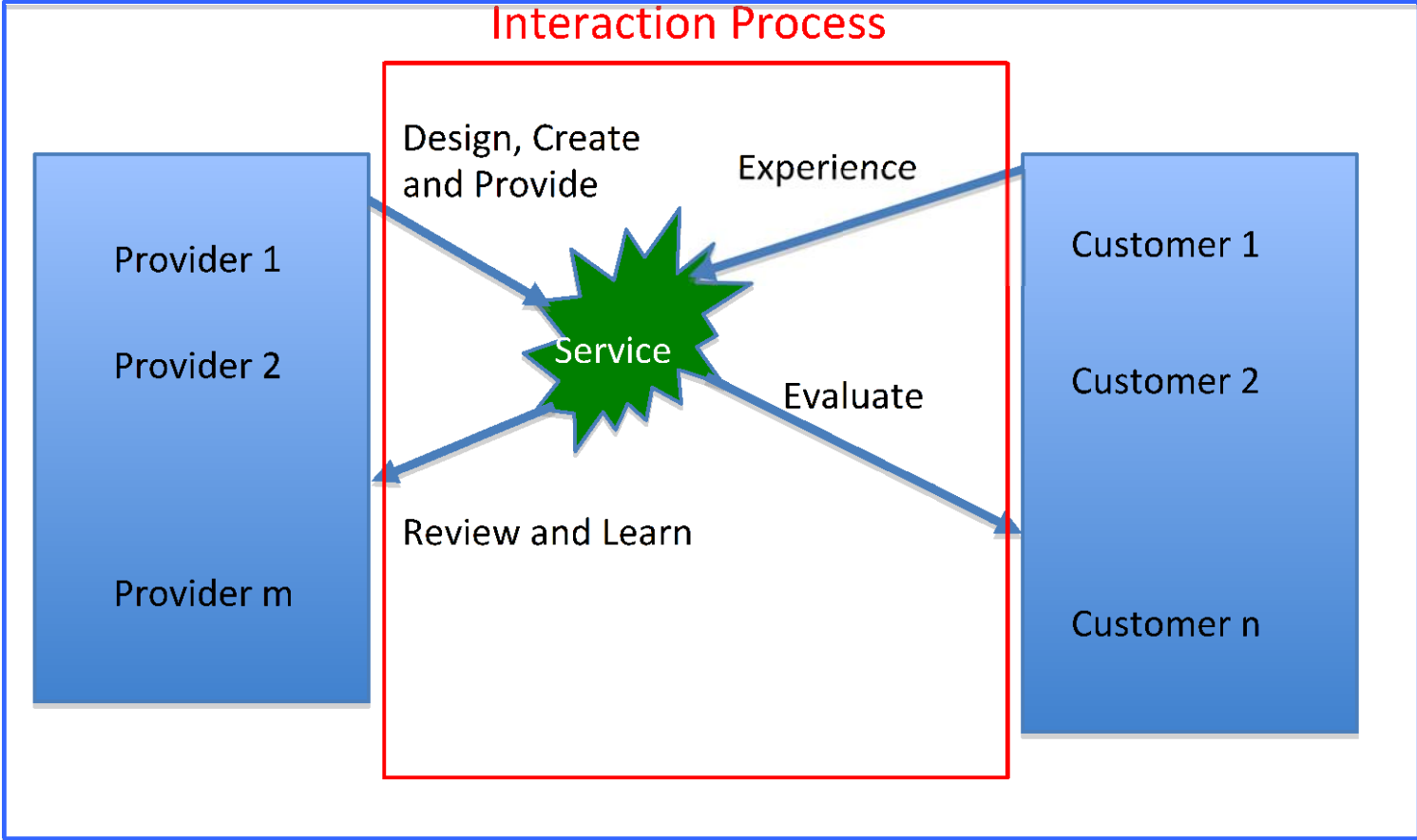


Service System as interactions among providers and customers, or service system entities

# 2. CO-CREATION MODEL OF SERVICE INNOVATION

# Co-creation Model of Service Innovation
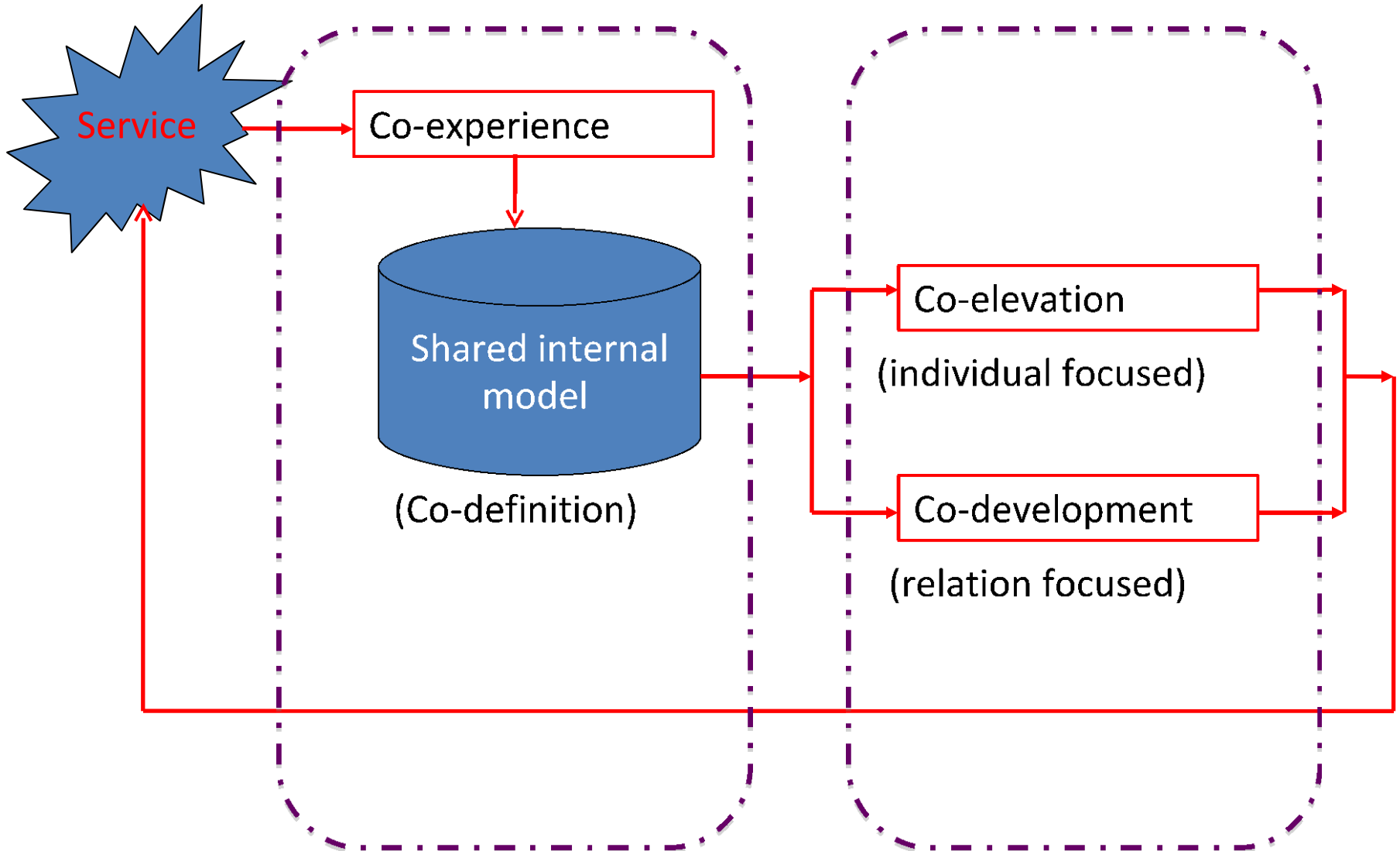


1) Co-experience and co-definition   2) Co-elevation and co-development

# 1) Co-experience and co-definition

- Often customer may not know exactly what he/she wants.

- Rather than reducing the gap between the needs and seeds, by co-experience the provider and customer <span style="color:red">share internal model</span> to co-define a common understanding about the service.
  - Customer's needs and preference
  - Provider's direction of service

# 1) Co-experience and co-definition

Satisfaction is generated
by co-experiencing and
co-defining a
shared internal model
by provider and customer.

At Sushi Bar

Through conversation

Chef recognizes customer's preferences, mental and physical condition, today's appetite and so on.

Customer understands today's specialties,  seasonal fish.

# 2) Co-elevation and co-development

- Social value can be innovated both in terms of the <span style="color:red">entities</span> and the <span style="color:red">interaction</span> between them.

  - Co-elevation is <span style="color:red">spiral up elevation</span> of the expectations or abilities of each entity.
    - Empathic learning
    - Resonant interaction
    - Co-evolution

  - Co-development is <span style="color:red">co-development</span> in joint collaboration.

# 2-1) Co-elevation

Spiral up mechanism generated by higher quality service and higher expectation



Capability                    Expectation

New idea
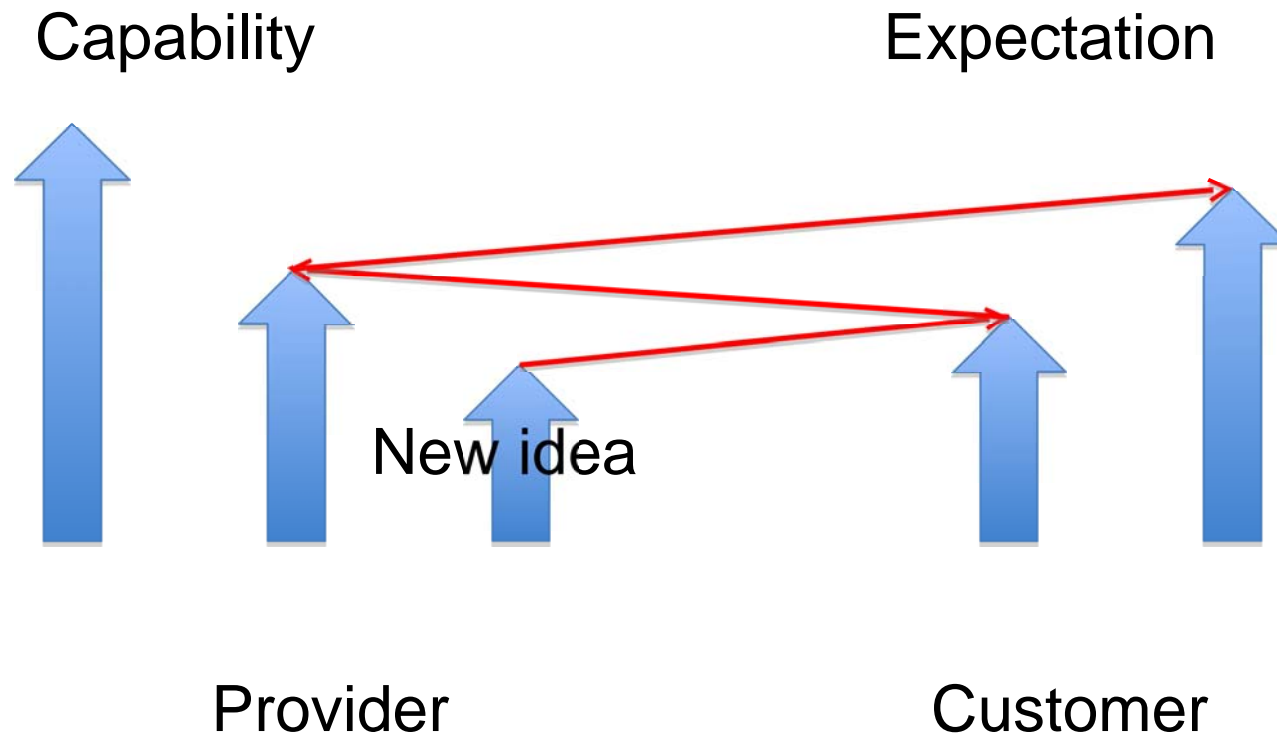
Provider                    Customer

# 2-2) Co-development

- Co-development on better outcomes and experiences in ways that <span style="color:blue">the customer evaluates and assesses the value, while the provider learns from the responses from the customer</span>.

  – Example: Development of Linux
  – Example: Development of iPhone applications

# 2-2) Co-development

Example:

– Rotating top of a
round table at
Chinese restaurant
was invented by a
Japanese in 1930s
to take care of long
sleeves of kimono of
female customers.

# 3. SYSTEMS SCIENCE OF SERVICE

# Systems Science of Service

- Service Science is a specialization of systems sciences (Jim Spohrer)

- Systems Sciences provide common language to crossover relevant disciplines
  - Co-evolution, Emergence, Internal model

# Service Value as Social value

- Not "service" in the narrow sense of business only

**But also**

- Service is social value provided by government agencies, not-for- profit organizations, businesses and individuals.

# Social Service Value

| Social Service Value | | | |
|---|---|---|---|
| **Research Level** | **Research Aspects** | **Related disciplines** | |
| | | Disciplines | Systems Sciences |
| Basic Value of Social Infrastructure | Pandemic Disease, Terrorism and risk Management, Health-care | Social Systems Theory, Social Simulation, Intelligent Systems | <span style="color:red">Communication Language</span>: Trans-disciplinary, Analogy, Commensurability |
| Innovative Service Value of Business | Innovative Business Models, Service at NPO | SSME, Leadership Management | <span style="color:red">Holistic View</span>: Meta-discipline, Systems thinking, Map of intellectual knowledge |
| Sustainable Development of Global Community | Consensus Building, Confrontation Management, Global environment | Soft Systems Thinking, International Environment Politics | <span style="color:red">Common Principles</span>: Co-evolution, Emergence, Internal model |

# Role of Systems Thinking

Co-creation of value by mutual understanding, collaboration and learning
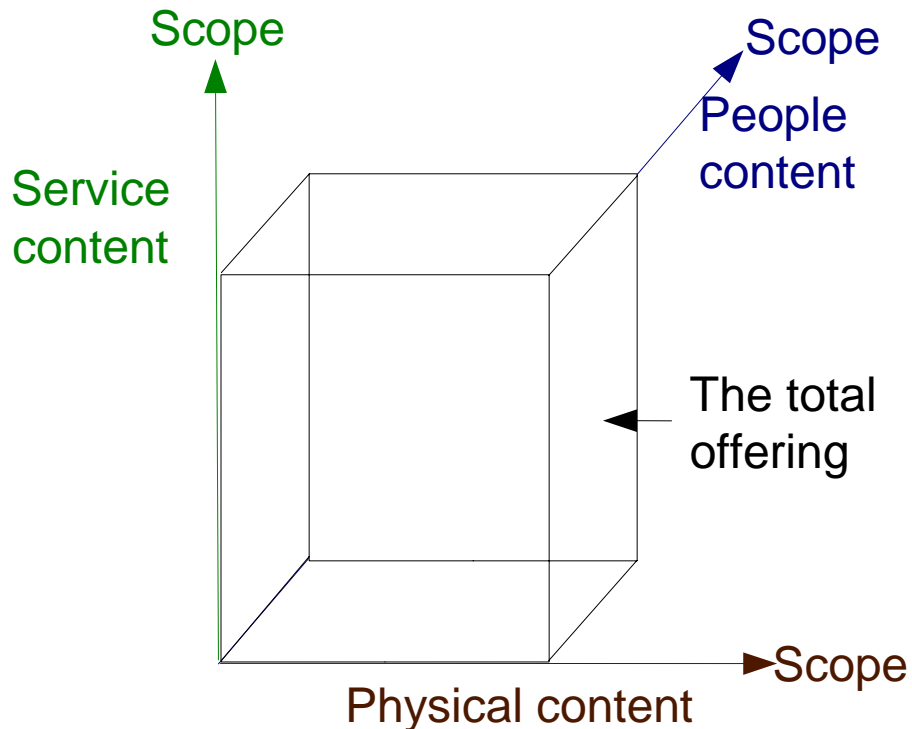
Applied Systems Thinking

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IBM

Service Systems, Systems Language, and Modeling Tools

# Offerings are interactions that provide benefits in the form of physical products, service and infrastructure, and interpersonal relationship

... it is useful to examine the offering in terms of a three-dimensional activity package ....

- The physical content of the offering consists of elements such as the core product, the packaging, the quality and dependability of the good and its material components, the product range, etc.

- The service content includes distribution, technical support, product modifications, customer training, on-line advice, troubleshooting, warranties and other trust-supporting insurance aspects, information brochures, brand reputation, complaint handling, invoicing, integrated information systems, etc.

- The people content covers issues like long-term partnerships, interpersonal trust, reputation, human resource co-development, etc.

... different customers will emphasize different axes of the offering.

**Scope**

**Service content**

**Scope**

**People content**

**The total offering**

**Scope**

**Physical content**

Rafael Ramirez and Johan Wallin. *Prime Movers: Define Your Business or Have Someone Define It Against You*, 2000, pp. 58-59.

# Packages of offerings can be shaped in different ways



GM
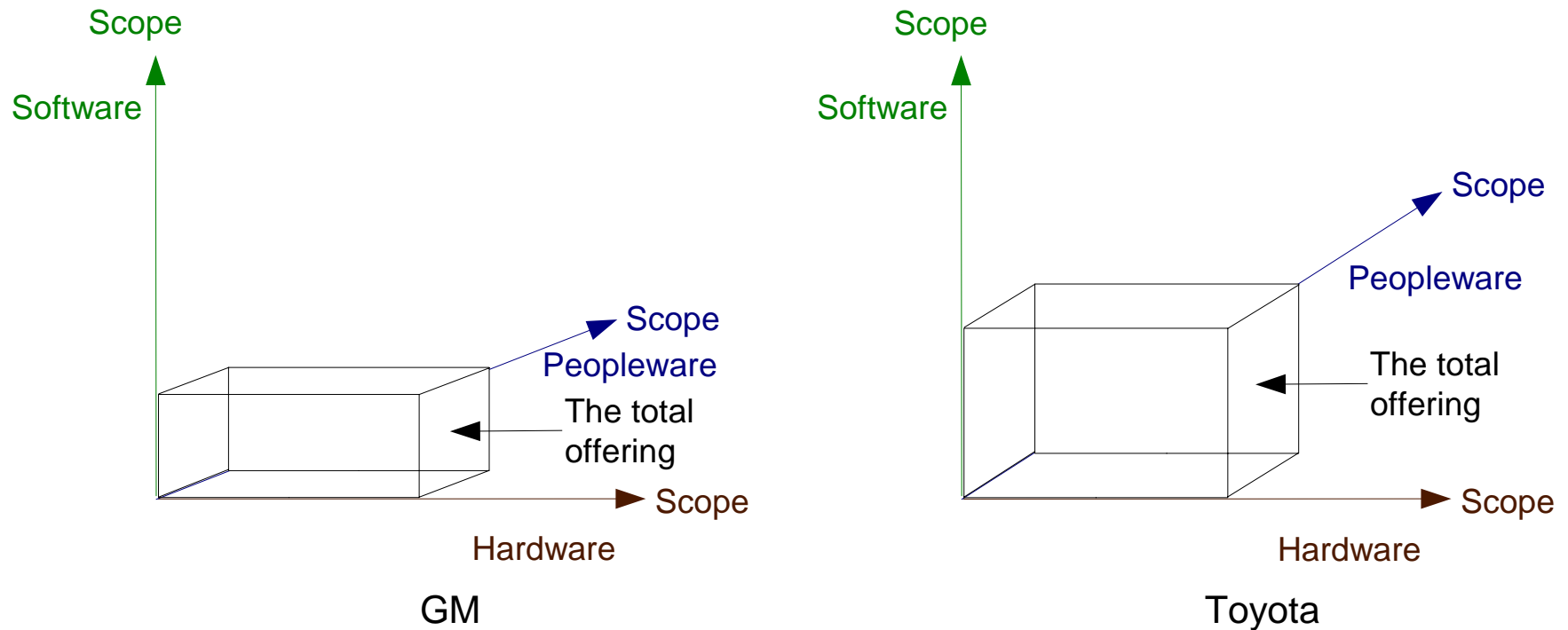
Toyota

Toyota tries to develop long-term partnerships with its suppliers. General Motors has historically been more transaction focused, and long-lasting relationships have not been seen as a worthwhile goal. As customers (of a supplier's offering), GM and Toyota would have radically different measurements on the 'people content' axis,

Rafael Ramirez and Johan Wallin. *Prime Movers: Define Your Business or Have Someone Define It Against You*, 2000, p. 59.

# A service system includes a supplier with a customer (and possibly subcontractors) as *coproducers* of outcomes

2.31. *Coproducers*: two or more objects, properties and/or environments that are producers of the same product.

Since no producer is ever sufficient for its product, every producer has at least one coproducer. The set of all coproducers of a product *y* is the cause of *y*, since the set is sufficient as well as necessary for *y*. [p. 23]

2.40. *Outcome*: the product of an individual's or system's action.

In other words, the outcome of an individual's or system's action is a change in that individual or system, or its environment, which is produced by that action. [p. 26]

Russell L. Ackoff, and Fred E. Emery, 1972. *On purposeful systems*. Aldine-Atherton.

... the view of the universe revealed by viewing it in terms of producer-product is quite different from that yielded by viewing it in terms of cause-effect. Because a producer is only necessary and not sufficient for its product, it cannot provide a complete explanation of it. There are always other necessary conditions, coproducers of its product. For example, moisture is a coproducer of an oak along with an acorn. These other necessary conditions taken collectively constitute the acorn's environment. [....]

... the use of the producer-product relationship requires the environment to explain everything whereas use of cause-effect requires the environment to explain nothing. [p. 21]

Russell L. Ackoff 1981. *Creating the corporate future : Plan or be planned for*. New York: Wiley.

# An offering can either be an *output of coproduction*, or an *input to coproduction*
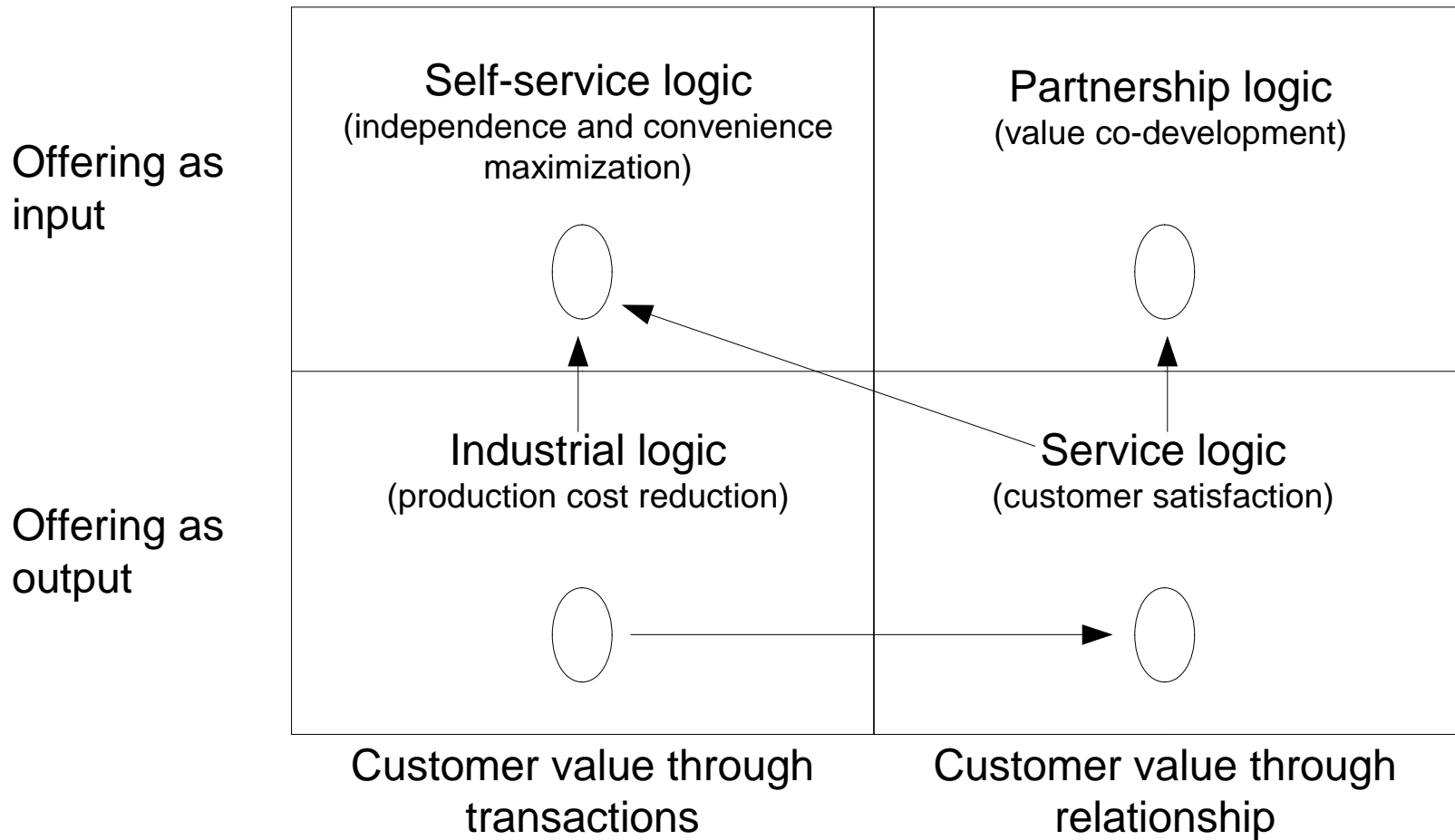
| | Customer value through transactions | Customer value through relationship |
|---|---|---|
| **Offering as input** | Self-service logic (independence and convenience maximization) | Partnership logic (value co-development) |
| **Offering as output** | Industrial logic (production cost reduction) | Service logic (customer satisfaction) |

Rafael Ramirez and Johan Wallin. *Prime Movers: Define Your Business or Have Someone Define It Against You*, 2000, p. 141.

# Interactions through language and action are linked through *directives* and *commissives*
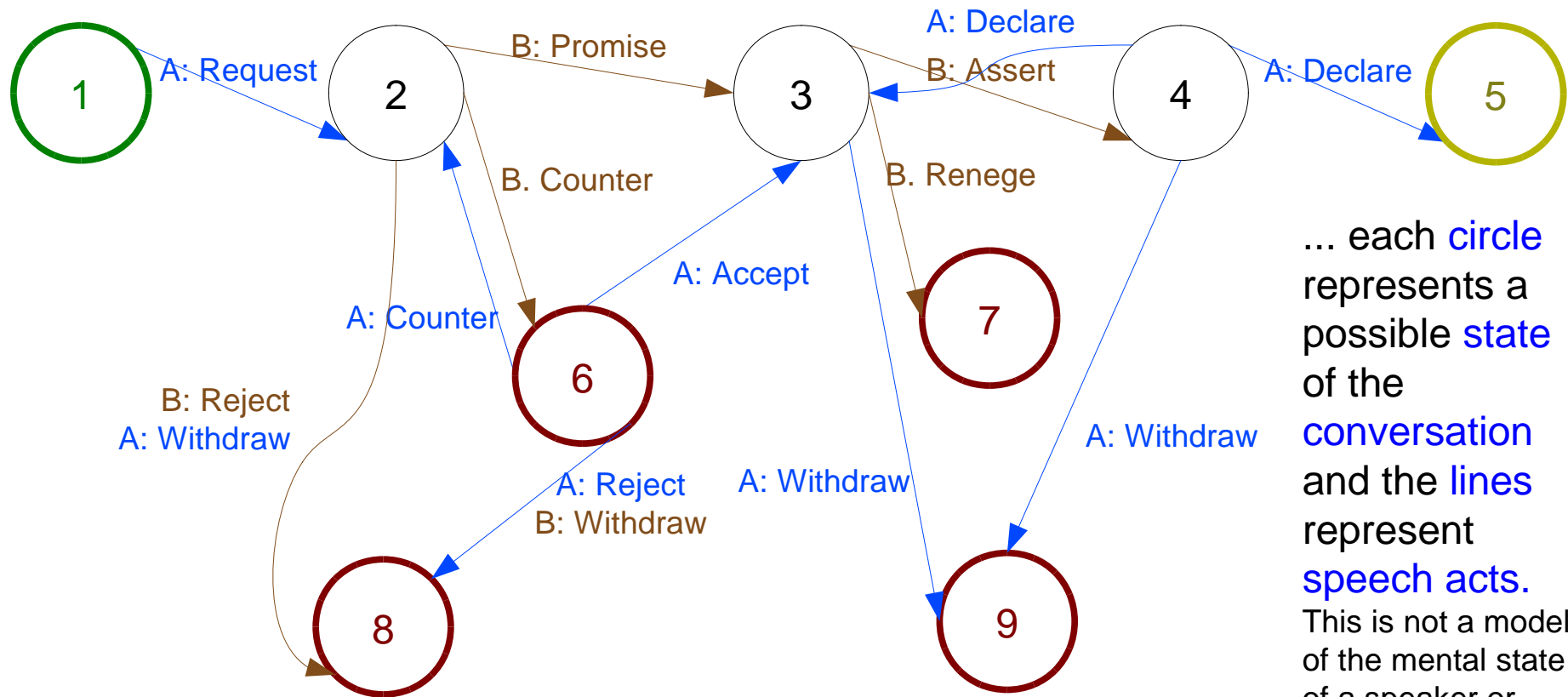
If we examine the basic issues underlying the questions, "What do people do in an office?" and "What is communication in an office?" we find that the questions are not truly different. Our theory of commitments and conversations allows us to give an answer to these questions that provides guidelines for examining the work in an office or organization.

Let us use the insights gained into the relationship between commitments and action to analyze organizations. For this purpose we make the following assertions:

- Organizations exist as networks of directives and commissives.

- Break-downs will inevitably occur and organizations need to be prepared for them. In the process of coping with break-downs, whole new networks of directives and commissives are triggered.

- The process of division of labor may be considered a cultural heritage of ways to cope successfully with anticipated break-downs. This has been a constant concern for managers.

Fernando Flores and Juan J. Ludlow. 1980. Doing and speaking in the office. Decision Support Systems: Issues and Challenges, *Proceedings of an International Task Force Meeting, IIASA,* June 23-25, 1980, pp. 102-103.

# Conversations for action are interplays of requests and commissives towards explicit cooperative action



... each circle represents a possible state of the conversation and the lines represent speech acts.

This is not a model of the mental state of a speaker or hearer, but shows the conversation as a 'dance.'

Terry Winograd, and Fernando Flores, 1986. *Understanding computers and cognition: A new foundation for design*. Ablex Pub. Corp, p. 64.

# As an alternative to command-and-control, parties can structure action as *who owes what to whom*

**Customer role** — Define → Assess

**Type of communication** — Request | Agree | Report | Accept

**Supplier role** — Negotiate → Perform

TIME →
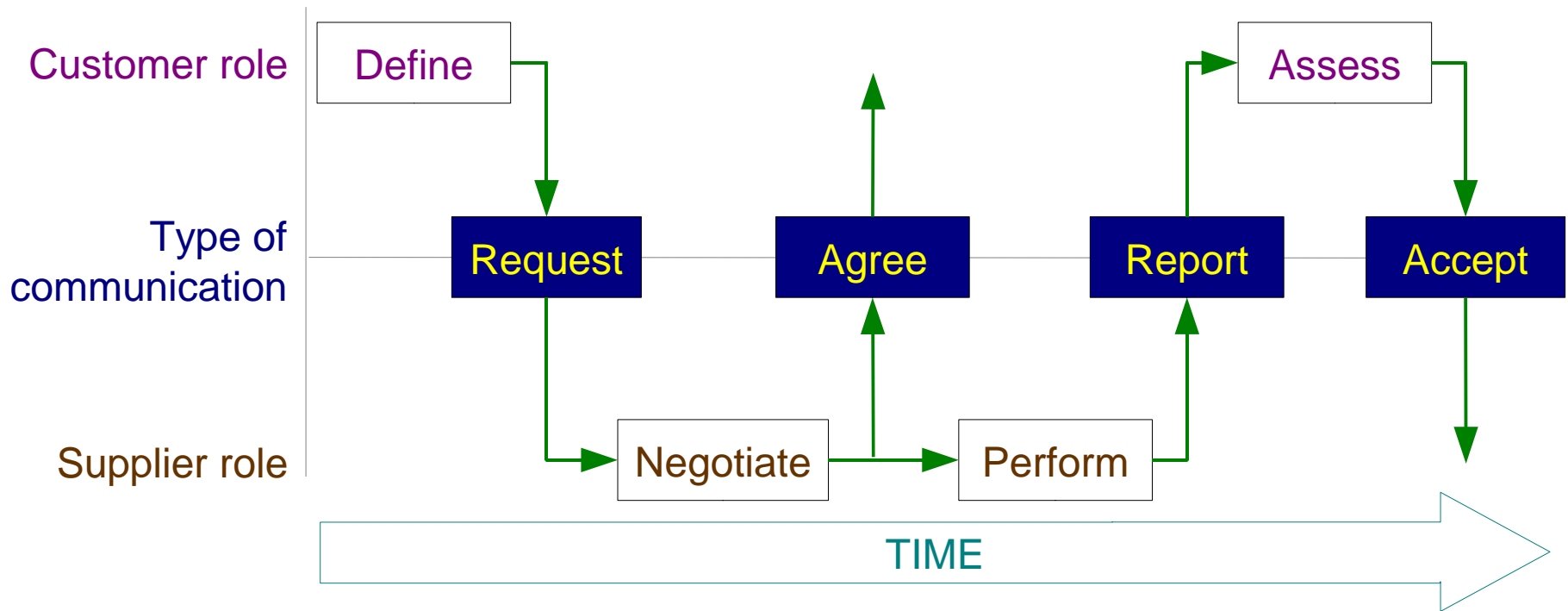
By coordinating the dynamics of who owes what to whom and detecting breakdowns early on, leadership can manage the interactions without interfering with the actions of empowered and accountable people.

Stephan H. Haeckel, 1999. *Adaptive enterprise : Creating and leading sense-and-respond organizations*. Harvard Business School Press, p. 142.

# Obligations can be formalized as commitments to deliverables, process and/or relationships (at least)

Commitment to a deliverable
•produce

Commitment to a process
•follow

Commitment to a capability
•provide

Commitment to a relationship
•contribute
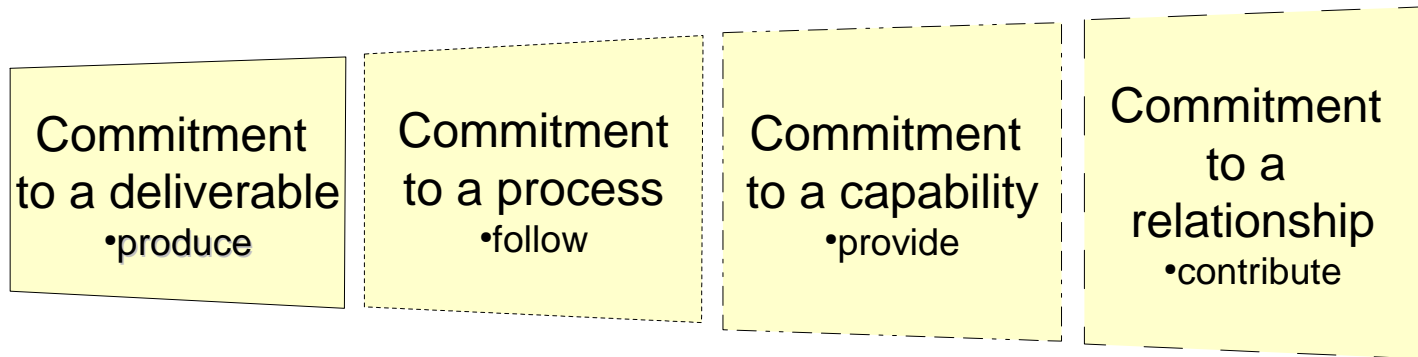
# Commitments can be explicitly linked upstream or downstream, and can be impacted by the unanticipated

Commitment
to a
relationship
contribute

Commitment
to a capability
provide

Commitment
to a process
follow

Commitment
to a deliverable
produce

Commitment
to a deliverable
produce

Commitment
to a deliverable
produce

Commitment
to a process
follow
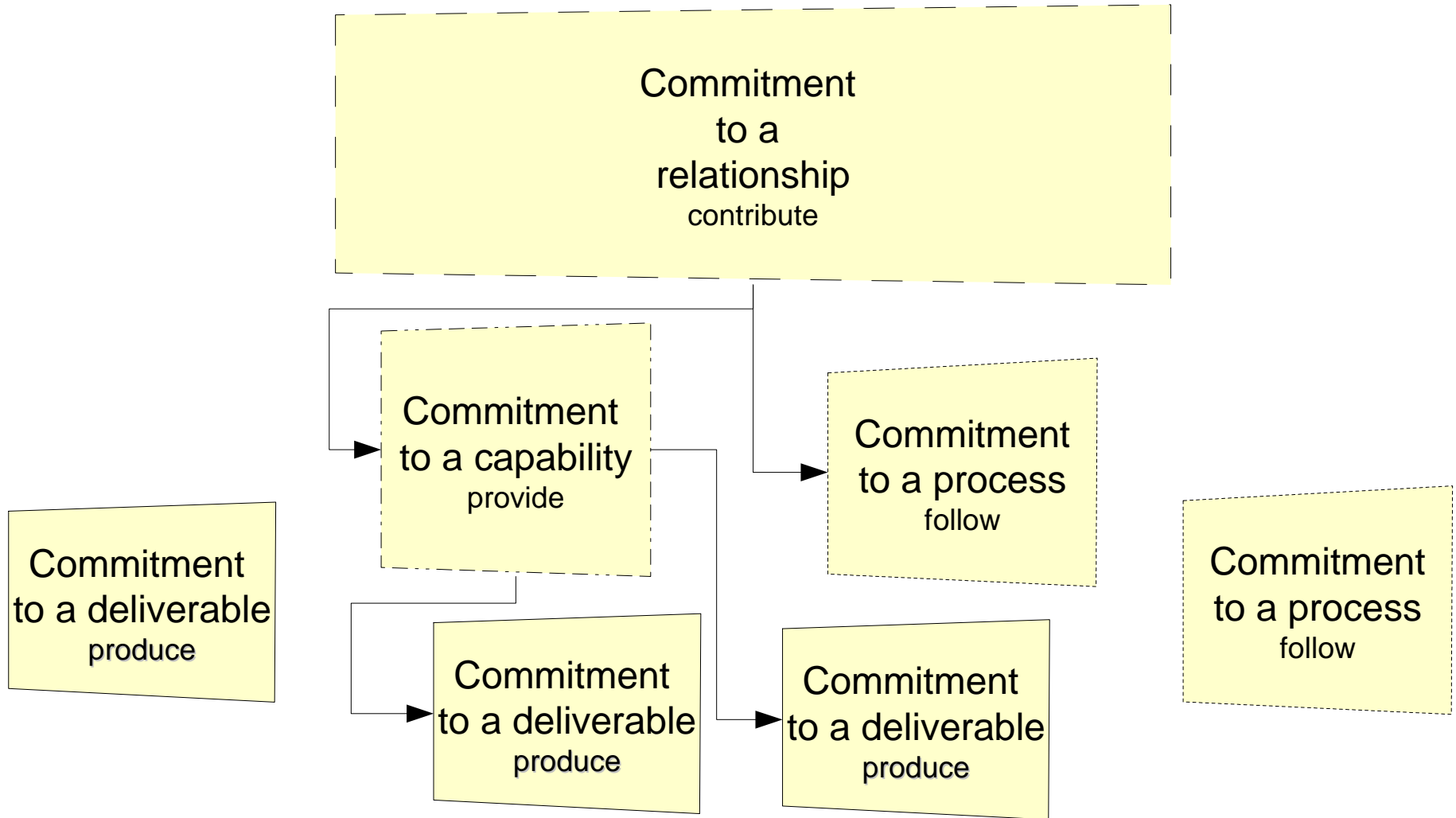
# Commitments occur in contexts of language decoupled from action, and action decoupled from language

Less intimacy: inclusivity          More intimacy: exclusivity

| | | | |
|---|---|---|---|
| **Language as rhetoric** | Accounts of past events | | Guidance on future action | |
| **Language-Action as commitment** | Commitment to a deliverable *produce* | Commitment to a process *follow* | Commitment to a capability *provide* | Commitment to a relationship *contribute* |
| **Action as behaviour** | Uniform / undifferentiated behaviour | | Particular / negotiated behaviour | |

More disclosure: publicity          Less disclosure: privacy

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|  |  | Gary S. Metcalf |
|  |  | InterConnections LLC |
|  |  | Models and Messes in the Sensemaking on Service Systems |

# Spectrum of Models

*Heuristics*

*Algorithms*

"Wicked Problems"
(Conklin; Rittel &
Webber);
"Messes"
(Ackoff)

Business Strategy
Frameworks

Closed
Systems

Unstructured
Models

*Research Funding*

Structured
Models

Qualitative
& Visual
Reasoning

Quantitative
or Semantic
Computation
& Analysis

Quantitative
or Logical
Predictiveness

Figure I: Degree of structure in a model determines its capabilities.

From: SERVICES SCIENCE: A NEW ACADEMIC DISCIPLINE? – IBM Research