SSMED and SOA: Service Science, Management, Engineering and Design and Service Oriented Architecture

David Ing
IBM Canada Ltd. and the Helsinki University of Technology
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This document was created in Lotus Symphony Presentations, and is clearer when viewed as a Screen Show
Agenda

A. Why is SSMED important?

B. SSMED and SOA

C. Progress to date

D. Challenges and gaps

E. Where to start?
Consider three businesses impacted by ICT capital

**Financial services**
Banking and insurance “products” in physical branches or local offices
Customer and agents networked on electronic communications (Internet, mobile phone)

**Media and entertainment**
Tv, radio, newspaper ➔ audio cassette, videotape, CDs, DVDs
Digital content over broadband: Flash video, MP3 audio, blogging

**Information technology solutions**
Customer and agents networked on electronic communications (Internet, mobile phone)
Distributed personal computers ➔ global service providers / outsourcing ➔ free/libre and open source software

WILLIAM ASPRAY
BERNARD O. WILLIAMS

This article discusses the role of the US National Science Foundation in the provision of scientific computing facilities for colleges and universities in the period 1950 to 1973. In this period, the NSF played a major role in establishing computing facilities on American campuses for the purposes of scientific research and science education. By the end of this period, most of these programs at NSF had been disbanded, and the foundation was concentrating its support for computing not on the service of other scientific disciplines, but instead on the establishment of a theoretically oriented discipline of computer science. The primary focus here is on NSF institutional history, with only a few examples of the impact of NSF programs. But it is an important part of a larger story of the role of the federal government in establishing American hegemony in computing in this era.

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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.

Service-Oriented Architecture (SOA) is an IT architectural style that supports the transformation of your business into a set of linked services, or repeatable business tasks, that can be accessed when needed over a network.


Source: https://www.ibm.com/developerworks/webservices/newto/
Basic questions in SSMED

**Science** of Service Systems
... to improve understanding, map natural history, validate mechanisms, make predictions.
- Service system entities?
  - Their evolution?
  - Their interactions? Influencing their shape?

**Management** of Service Systems
... to improve capabilities, define progress measures, optimize investment strategy.
- Invest to create, improve, scale?
- Measures of quality, productivity, compliance, sustainability

**Engineering** of Service Systems
... to improve control, optimize resources
- New technologies, environmental infrastructures or reconfiguration of existing?
- Tools?

**Design** of Service Systems
... to improve experience, explore possibilities
- How to improve the experience of people?
- Possible value propositions? Governance mechanisms?

Develop T-shaped professionals along 4 resource types

(1) Whole businesses and organisations
(2) Technology
(3) People
(4) Shared information

Studied primarily by schools of management (marketing, operations management, operations research and management sciences, supply chain management, innovation management)

Studied primarily by schools of science and engineering (industrial engineering, computer science, statistical control theory)

Studied primarily by schools of information (communications, management information systems, document engineering, process modelling, simulation)

Studied primarily by schools of social sciences and humanities (economics, cognitive science, political science, design, humanities and arts)

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### Knowledge of service systems benefits from disciplines

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<th>Academic disciplines</th>
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<th>(2) Technology</th>
<th>(3) People</th>
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### Knowledge of service systems benefits from disciplines (page 2 of 3)

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Recommendations for education

1. Enable graduates from various disciplines to become **T-shaped professionals**, who are adaptive innovators with a service mindset and can make early contributions to the service-driven economy.

2. Promote **SSME education programmes and qualifications** as a way of developing a service mindset, in conjunction with industry recognition and recruitment of SSME qualified graduates.

3. Develop a **modular template-based SSME curriculum** in higher education, add new materials and refinements as research develops over time, and then extend to all levels of education.

4. Explore **new teaching methods** for SSME related education.

Recommendations for research

1. Develop an **inclusive interdisciplinary and intercultural approach** to service research.

2. **Build bridges** between disciplines through **grand research challenges**.

3. Establish **service system and value proposition** as foundational concepts.

4. Work with practitioners to **create data sets** to better understand the nature and behaviour of service systems.

5. Create **modelling and simulations tools** for service systems.

Recommendations for business

1. Establish **employment policies and career paths** for T-shaped professionals.
2. Review existing approaches to service innovation and provide **grand challenges** for service systems research.
3. Provide **funding** for service systems research.
4. Develop appropriate organisational arrangements to enhance **industry-academic collaboration**.
5. Work with stakeholders to include **sustainability measures** and create **actionable service innovation roadmaps**.

Recommendations for government

1. Promote service innovation for all parts of the economy and provide funding for SSME education and research.

2. Demonstrate the value of Service Science to government agencies, and thereby create methods, data sets, and tools to inform and challenge current education and research support.

3. Develop relevant measurements and reliable data on knowledge-intensive service activities across sectors to underpin leading practice for service innovation.

4. Make government service systems more comprehensive and citizen-responsive.

5. Encourage public hearings, workshops, briefings with other stakeholders to develop service innovation roadmaps.

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Entry points

8 scenarios lead to 5 entry points – 3 business-focused and 2 IT-focused

People Entry Point

Interaction & Collaboration Services Scenario

Process Entry Point

Business Process Management Scenario

Reuse Entry Point

Service Creation & Reuse Scenario

Information Entry Point

Information as a Service Scenario

Connectivity Entry Point

Service Connectivity Scenario

Foundation Scenarios

SOA Design Scenario

SOA Governance Scenario

SOA Security & Management Scenario

A challenge

a system ... to ... a service system

... as ...

[?] architecture ... to ... service-oriented architecture
A challenge: *transition* (or *transformation*)

The transition from ...

- a [industrial?] [production?] system
- [integrated?] [procedural?] [object-oriented?] architecture

... is as significant as ...

... to ...

- a service system
- service-oriented architecture
On more than one occasion, I’ve heard IBM executives assert:

> The nature of innovation has changed. In the 21st century, innovation is open, collaborative, multidisciplinary, and global.

The ideas of open, collaborative, multidisciplinary, and global appeared in the Global Innovation Outlook 2.0 report that was published in mid-2006. These words appeared on IBM-internal slides presented by Nick Donofrio at an Consulting Leadership Exchange in September 2005, and at the external-facing conference on Education for the 21st Century in October 2006 ... with lots of other occasions in between. But what do these four words mean?

To make some sense for myself, I’ve extended these words into phrases and contrasted their contexts in a table.

<table>
<thead>
<tr>
<th>Industrial age nature of innovation</th>
<th>21st century nature of innovation</th>
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- **Innovation as open, collaborative, multidisciplinary, global**
- **World diet is concentrated on a few cereal grains**
- **Conversations for action, commitment management protocol**
- **Coproduction, interactive value, offering, value constellation**
- **Talent in the (new) service economy: creative class occupations?**

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