From Internet to Service Science

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The 80s - the Networking Middle Ages

WAN:

- PTT Monopolies all over Europe
- Very low Bandwidth at high prices
- Analog technology predominant
- Mainly Host to Terminal Connections
- Dominated by Proprietary Protocols (eg SNA, DECnet, Appletalk)
- Point to point connections
- Applications firmly tied to Communications Stack
- Interoperability was a big Issue

LAN:

- 4/10 Mbit/s Ethernet/Token Ring
- Inefficient integration with WAN

SNA – IBM's flagship

- IBM's Proprietary Networking Architecture (1974)
- De Facto Standard for Enterprise Networking in the 80s
- Highly Efficient and Secure
- Optimized for slow and error prone Networks
- Connection Oriented
- LAN – WAN Connectivity challenging
- Interoperability with non-SNA networks initially difficult.
- Applications, databases and communications all mingled into same protocol
- Advanced Peer to Peer Networking addressing need for end-to-end networking
- IBM opened specifications in the late 80s

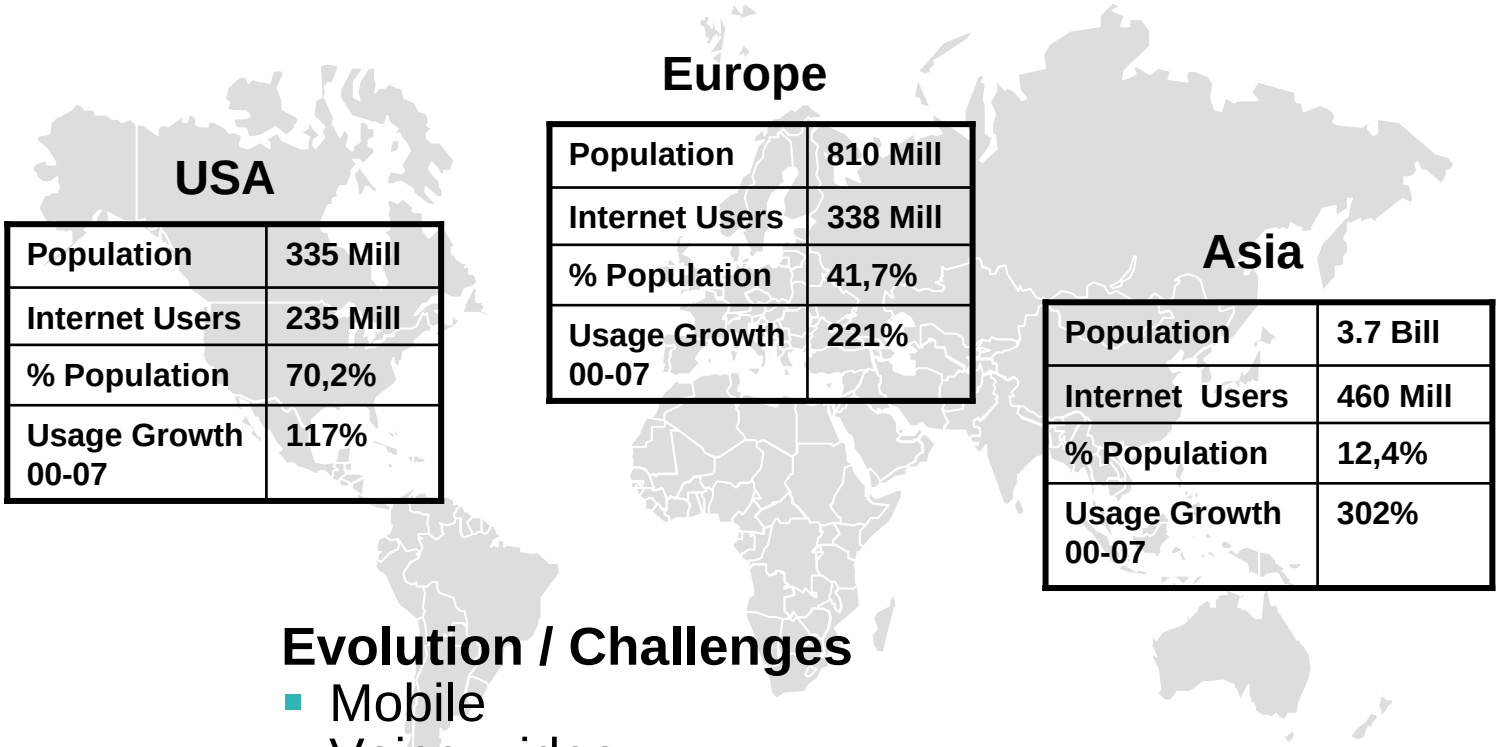
OSI – Created to be the Future 'Internet' Standard

- Famous 7 Layers: OSI Reference Model (1978)
- Layers reduce Complexity and enable isolated Changes and Extensions
- Clear separation between Service and Protocol
- 'Design by Committee' Approach
- Too many Compromises: Competing Technologies adopted in parallel, numerous optional features
- Need for OSI Profiles Increase Complexity and Reduce Interoperability
- Considered too Complicated, Inefficient and partially unimplenentable
- Forklift Approach:eliminate all existing protocols and replace

TCP/IP – The Clear Winner

- Created by DARPA (ARPANET 1970)
- Pragmatic Approach, Simplified Protocols
- Best option for interconnecting LANs and WANs
- Strongly tied to UNIX
- First Open Sourced Intellectual Capital Initiative
- Clear Separation of Applications from Data Transport
- End-to-end Principle: connectionless within the network, reassembly/intelligence at the edges
- Attitude: ‘we reject kings, presidents and voting. We believe in rough consensus and running code’ (Clark)

More than 1 Billion Internet Users Today



USA

Population	335 Mill
Internet Users	235 Mill
% Population	70,2%
Usage Growth 00-07	117%

Europe

Population	810 Mill
Internet Users	338 Mill
% Population	41,7%
Usage Growth 00-07	221%

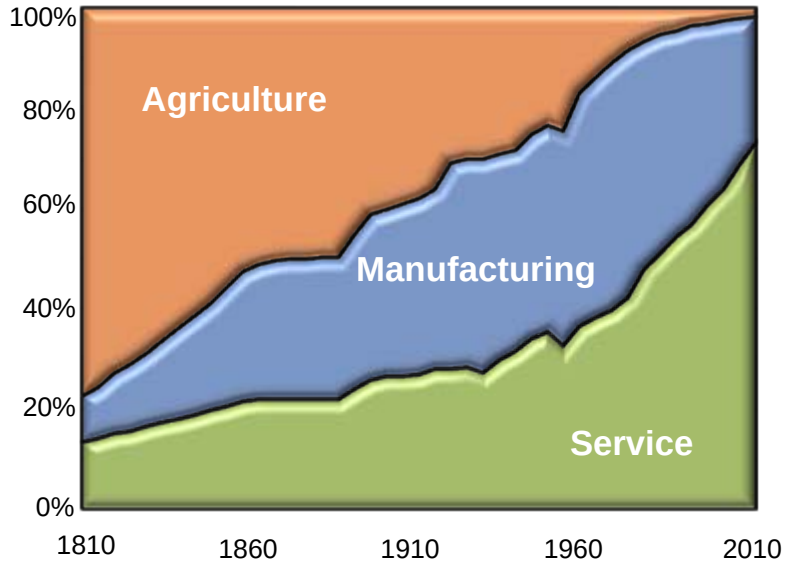
Asia

Population	3.7 Bill
Internet Users	460 Mill
% Population	12,4%
Usage Growth 00-07	302%

Evolution / Challenges

- Mobile
- Voice, video
- Security
- Social Networking
- Address shortage -> IPv6
- Pervasive Computing

The Rise of the Service Economy



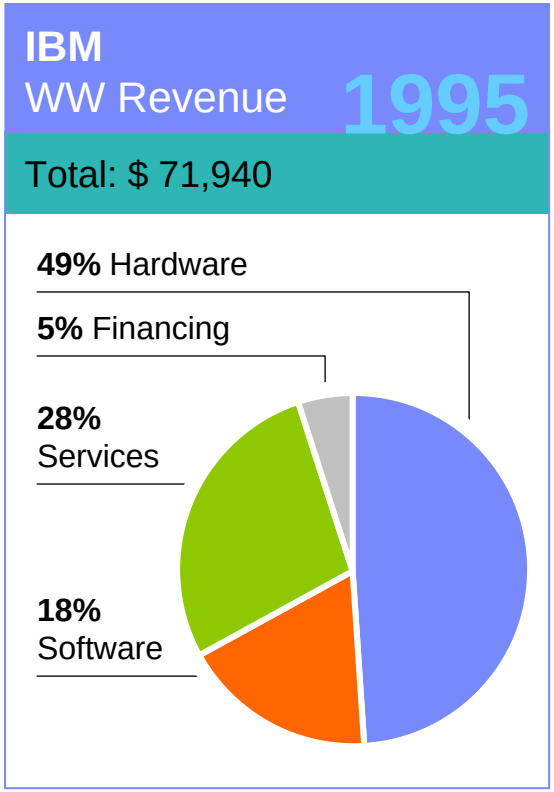
Internet Evolution

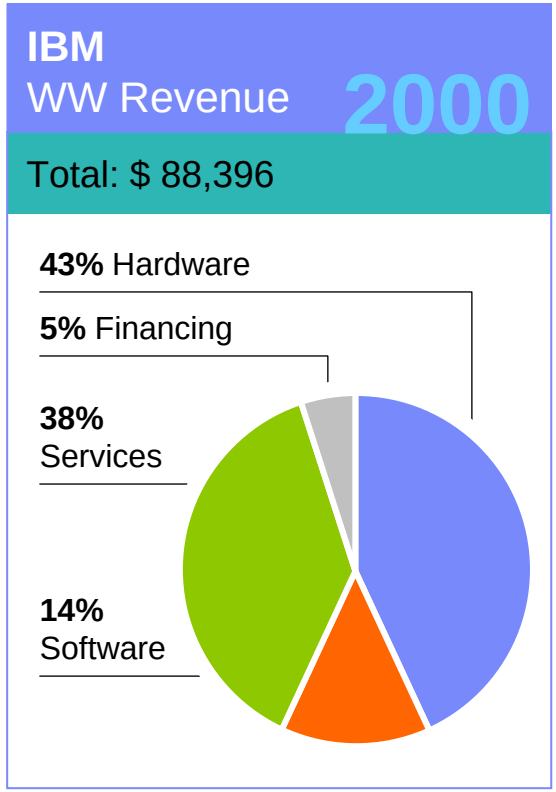
- Intermediation of value networks
- Location Independence

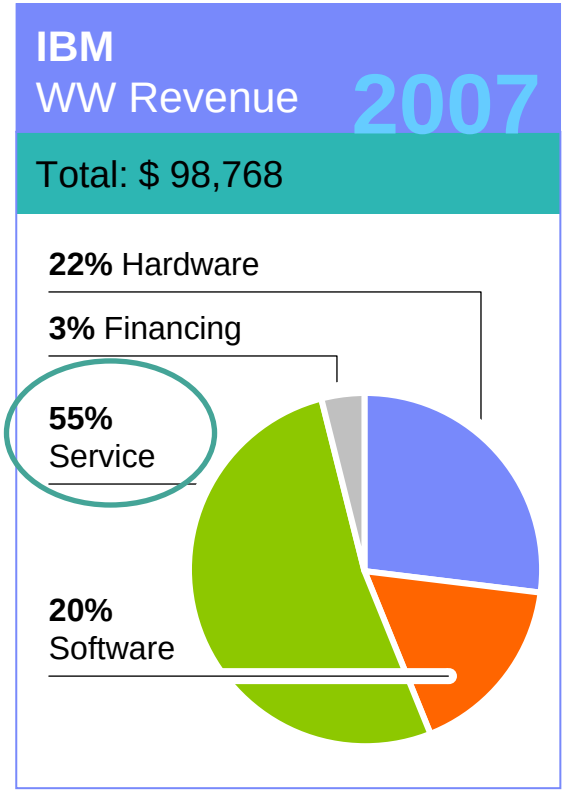
GDP Contribution of Industrial Sectors in Germany

SERVICE SCIENCES AND ENGINEERING

Explosion of Services in IT: Example IBM



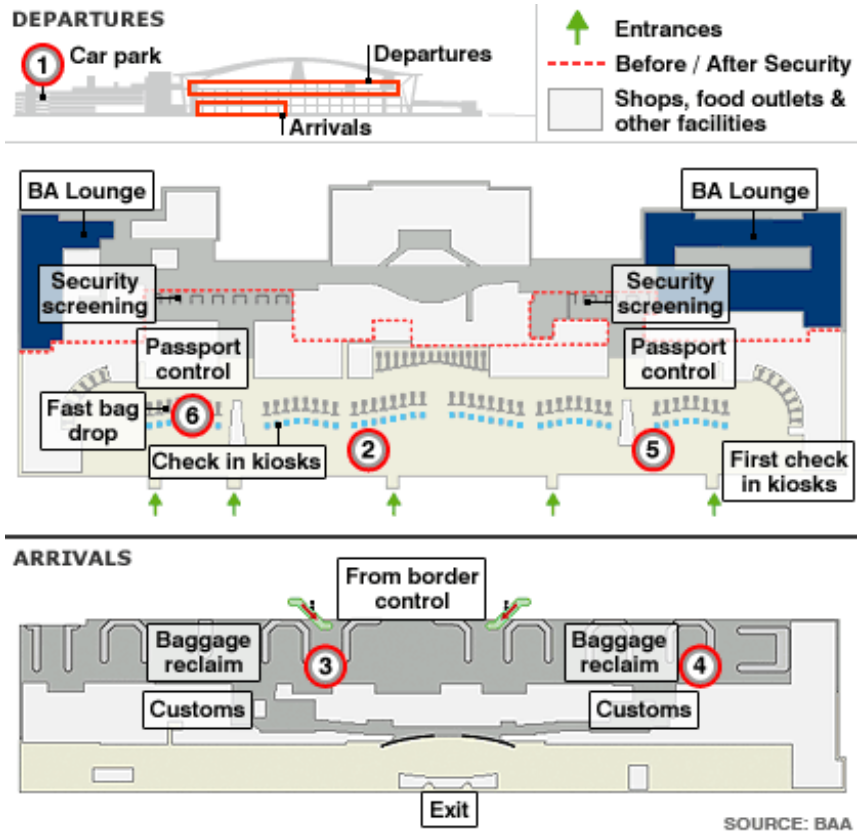




Source: IBM Annual Reports

Why do we need Service Science?

Heathrow T5: An Example for Murphy's Law in Services



1. 0400 - Passengers and staff have trouble locating car parks
2. 0400 - Delayed opening of check-in results in long queues
3. 0442- First passengers arrive early but wait an hour for luggage
4. All morning - Clogged conveyor leads to long wait for luggage
5. 1630 - Baggage system failure; all check-in at T5 suspended
6. 1700 - BA suspends check-in of all luggage into hold

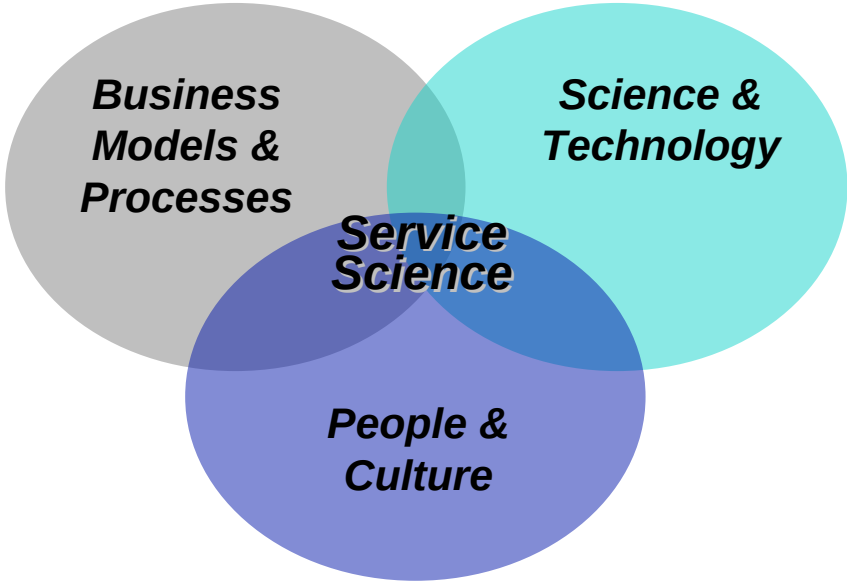
Why Should We Care?

- **Academics need to make service innovation a priority**
  - Job placement for existing students
  - University competitiveness for prospective students
  - Continued attractiveness to business for shared research
- **Governments need to make service innovation a priority**
  - GDP growth of nations increasingly depends on it
- **Businesses need to make service innovation a priority**
  - Revenue and profit growth increasingly depend on it

What is Service Science?

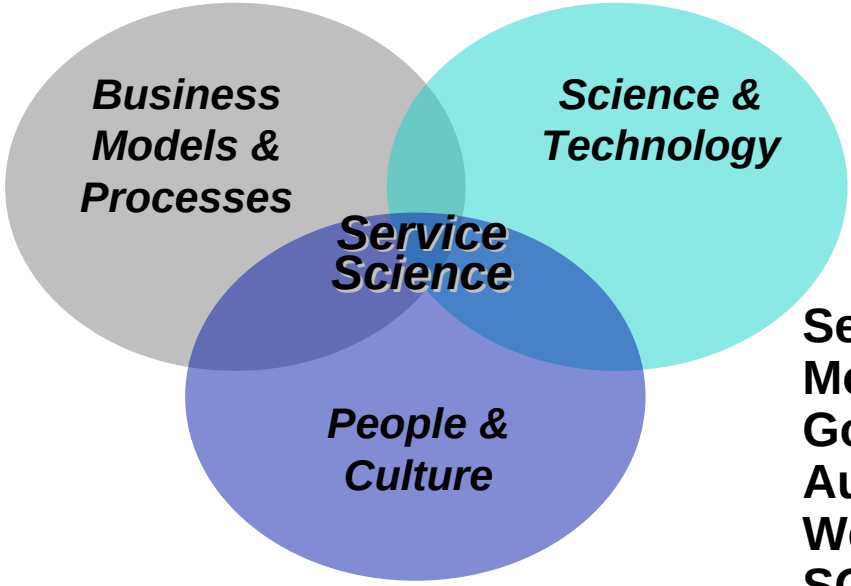
Design, Evolution, Processes and Data of Service Systems

To Create Value, Increase Productivity, Improve Quality, Control Risk, Innovate for Growth and Operate in Dynamic Environments



Interdisciplinary Application of
Science, Management, and Engineering Disciplines to Services

Services Science Challenges



Service Innovation
Globalization
Service Life Cycle
Legal Requirements
IP Rules
Service Quality

Service Culture
Demographic Change
Knowledge Harvesting
Recruiting
Skill Development

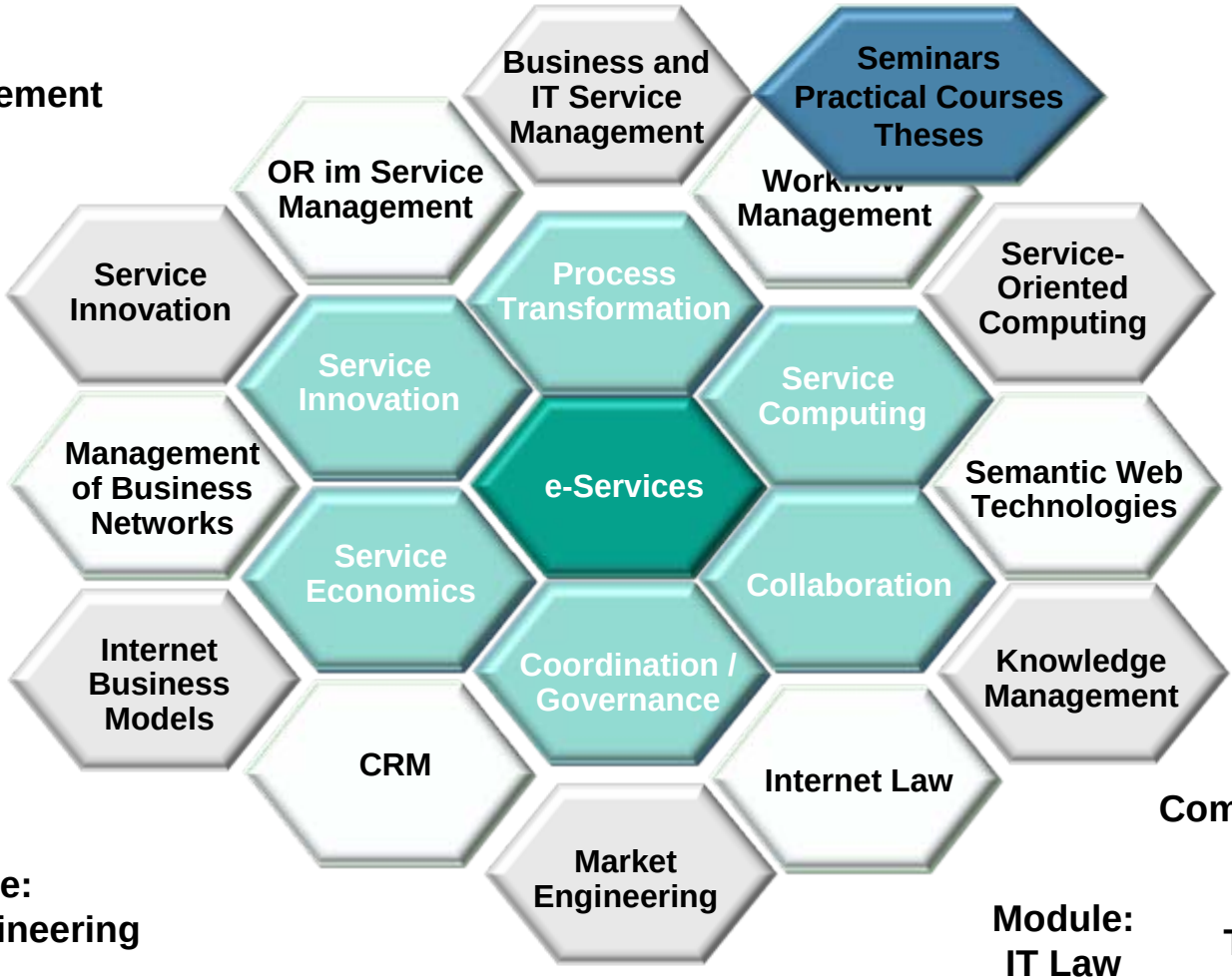
Service Industrialization
Modelling/Simulation
Governance
Automation
Web based Services
SOA
Service Frameworks
Self-service Approaches
eSourcing

Growing Investments in Service Science worldwide

Over 130 universities worldwide are piloting Service Science curricula and programs

Example: Service Science Curriculum at KSRI (Karlsruhe Service Research Institute)

Module:
Service Management



Module:
Service Engineering

Module:
IT Law

Computer Science
Module:
Service Technology

Skills for the 21st Century

T-shaped people – They speak the language of many disciplines, and are deep in at least one area