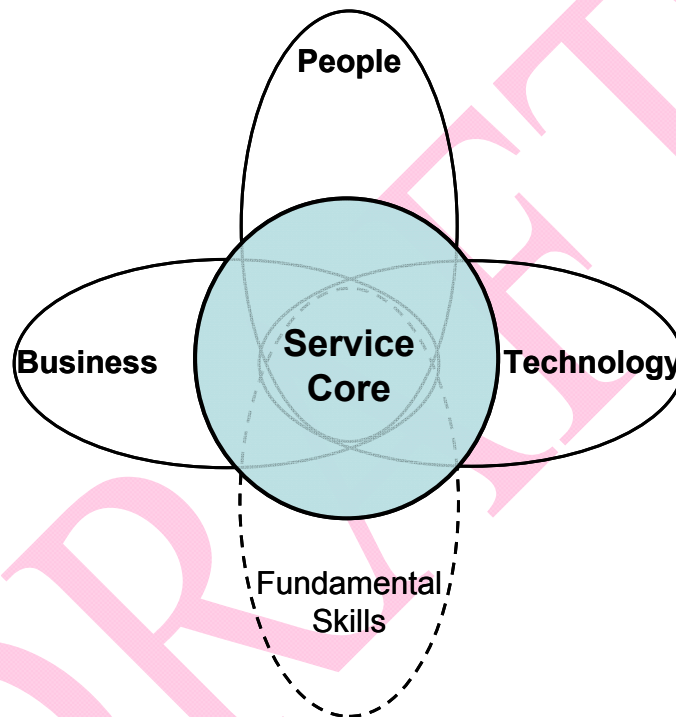


# A Framework for Service Science Curricula

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*Working Draft*

**SSMENet UK Curriculum Conference  
Manchester, UK 17-18 September 2008**

**A Business Community View  
BT, HP & IBM UK**

## 1 Introduction

This document will address the topical subject of the growth and importance of the Service economy around the world, with a specific focus on the skills required by the business community over the next 10 years.

The document will describe the background and context in which the skills are required, it will layout a generic model describing the type and breadth of skills, and will also list the specific skills in five groups.

The intended audience of the document is UK academia and the objective is to increase the number of courses providing graduates with skills matching both the spirit and the specifics of Service Science.

The skills required fall into two categories: a “core” where the expectation is for all graduates of this discipline to have been educated to an appropriate level and a series of industry specifics. This document will only address the “core” skills.

This document represents the views of its creators – Michael Lyons of BT, Richard Taylor & Chris Tofts of HP, and Chris Cromack & Steve Street of IBM. It is intended to be a basis for discussion

## 2 Background and Context

The economies of developed nations are already dominated by the service sector; in addition the emerging knowledge economy will be dominated by services in which the chief source of value is information or knowledge, rather than a physical or material interaction.

These services will rely on creating a cross functional, cross business and most likely cross country series of processes that provide the customer with the desired result. These already constitute >50% of US secondary and tertiary sectors and are still growing. In this context, information services do not only include many ICT services, but also a wide-range of professional and business services etc.

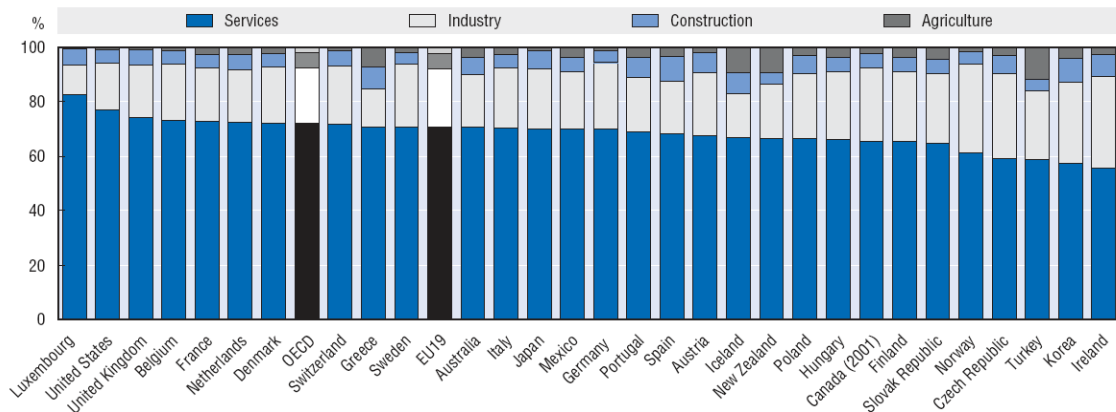


Figure 1 - Share of total gross value added by sector, 2002

The future competitiveness of both businesses and countries will be critically dependent on developing the skills needed to deliver high quality, high value information or knowledge-based services. Recognition of these trends underlies two inter-related requirements from the business community.

The first is the need for a **new discipline** – Services Science – to provide a framework for understanding and improving service delivery. This emerging subject will draw on insights from the physical, social and management sciences.

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The second need is for **high calibre personnel** who not only have in-depth expertise in a key area of service delivery, but also a broad general knowledge of the range of skills needed to design and deliver new, innovative services (so-called **T-shaped people**). Most current graduate and post-graduate education is focussed on producing highly trained experts in a relatively narrow field of knowledge (I-shaped people). A key issue for companies is how to train or recruit people with the wide general skills needed to deliver high-quality services – the horizontal of the T.



Figure 2 - the 'T shaped Person' or 'Versatelist'

### **3 Key attributes of people working in the Service Science arena**

This section will give a broad outline of a “service scientist”; the expectation is not that the university course will allow individuals to build all of these skills and experiences, however it should provide the foundation and this section should also give an indication to academia of the “style” of the courses that are envisaged.

They will be an adaptive innovator, a versatilist in managing across a broad set of business and technical disciplines. They will ensure that new service implementations or adaptation of existing environments should not only consider the overarching business objectives and the IT solutions and alternatives, but also how factors such as cultural and human system dynamics influence the technology selection and implementation the total and end to end service.

They will have the ability to analyse large and/or complex processes across all private or public sectors of the service economy. They demonstrate customer interaction skills equivalent to a business consultant seeking to improve productivity, quality, regulatory compliance, or innovation of a service system. Sustainability of effectiveness in this role will require an on-going discovery, analysis, and implementations of emerging services innovation frameworks and tools.

In addition they should be able to demonstrate the ability to articulate and understand concepts, ideas, recommendations and knowledge among individuals from varying backgrounds such as: engineering, project management, business management, marketing, finance, design, computer science, systems engineering, information management, and the social or behavioural sciences. They will be able to determine appropriate trade offs required across multiple areas to obtain maximum customer satisfaction.

Finally they should have a thorough working knowledge of service concepts such as the front-stage, back-stage analogies, the service “mind-set”, service innovation, and service dominant logic, the co-creation of value, service productivity, service science, and service systems.

## 4 Type of course envisaged

Recruits to these courses will come from a wide variety of backgrounds and expertise. We believe that a syllabus based on Services Science would deliver people with the range of service-related skills and knowledge needed in the emerging information economy.

The objective is not only to develop people with a wide skills-base, but also give specialist experts the ability and knowledge that will enable them to work effectively in the cross-disciplinary teams needed to develop new services.

**Masters or Second-Degree** - In order to progress this change quickly, it is expected that these new skills will be best addressed as part of a second degree; the assumption being that the first degree will provide a deep skill in one key subject. Ultimately we would see these skills be gradually included throughout undergraduate or first degrees.

It will often be useful for Service Science students to have had a number of years of Industrial experience, so as a result a second target area for Service Science education is ..

**Retraining of Existing Staff** - In addition to the provision of second degree courses, the business community would also like to re-train a number of it's experienced staff and therefore the courses or modules should also be considered for delivery directly into the various businesses.

Finally, there is an opportunity to promote '**Service Awareness**' within First Degrees or potentially as part of other 'Further / Tertiary Education'. Such 'Awareness' Education could follow the framework and principles outlined here in a more condensed form

## 5 A Framework for Service Science Curricula

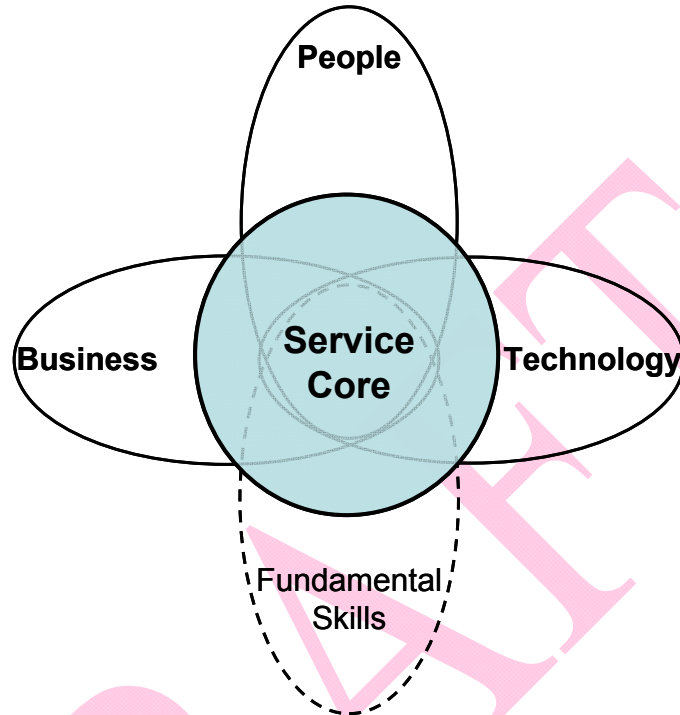


Figure 3 - Framework for Service Science Curricula

The concept is that 'Service Science' curricula should be based on a '5 element' Model / Framework

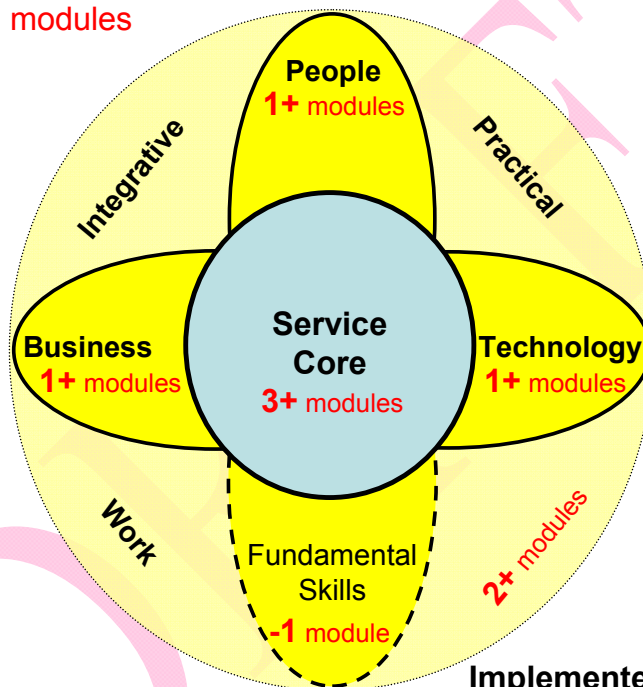
1. **Service Core** – this is the most significant single element of the anticipated curricula. It encompasses 'Key Service Concepts' (Service Systems, Customer Value & Co-creation ..) & Methods (Service Design, Delivery & Measurement ..). It acts also as the 'Integrative element' bringing together the other elements of the 'Service Science' education framework
2. **Business** – the intention of this element is to ensure at least an awareness & high understanding of key 'Business' related concepts as they relate to Services. It is *not* intended in general to teach 'Business' skills or understanding in depth
3. **People** – similarly the intention of this element is to ensure at least an awareness & high understanding of key concepts relating to the understanding of the interaction of People – as individuals, as members of a society - as they relate to Services
4. **Technology** – again, similarly the objective to ensure at least an awareness & high understanding of key concepts about how key technologies can be applied to Services

5. **Fundamental Skills** – finally, the intention of this element is to cover ‘other methods’ / ‘other ways of thinking’ which may not have been taught elsewhere but which are of value when thinking about Services

## 5.1 Teaching the Framework

The concept is that Institutions (primarily Universities) should use the Framework as a guide to developing ‘Service Science’ curricula that are likely to be effective - & to be recognised by Industry as being effective – in the development of ‘Service Innovators’ / ‘T-shaped’ people as required by Industry

### ‘Teaching the Model’ – based on 12 modules



**Implemented locally based on..**  
..Institution & Student ..  
..Background & Preference

Figure 4 - Implementing the 'Service Science' Curriculum Framework

While there is a suggested weighting & outline content indicated for each element of the Framework, there is no intention to be excessively ‘rigid’ in restricting the content of ‘Service Science’ education – there are many ways of implementing the model.

The specific implementation in a particular place of a Service Science course will depend on -

- **The Background & Preferences of the Institution concerned** – what skills and expertise are available to be taught by the University involved ? While it is highly desirable that the basic ‘framework’ is respected, the specific local implementation should build on the strengths of the specific Institution concerned



- **The Background & Preferences of the Candidate Students** – in particular it is likely that the preceding education of potential students will have focussed primarily on one of the 3 ‘dimensional elements’ of the model - People, Business & Technology. This will naturally influence the shape of the further ‘Service Science’ education that is appropriate

## 5.2 ‘Focussing on Services’

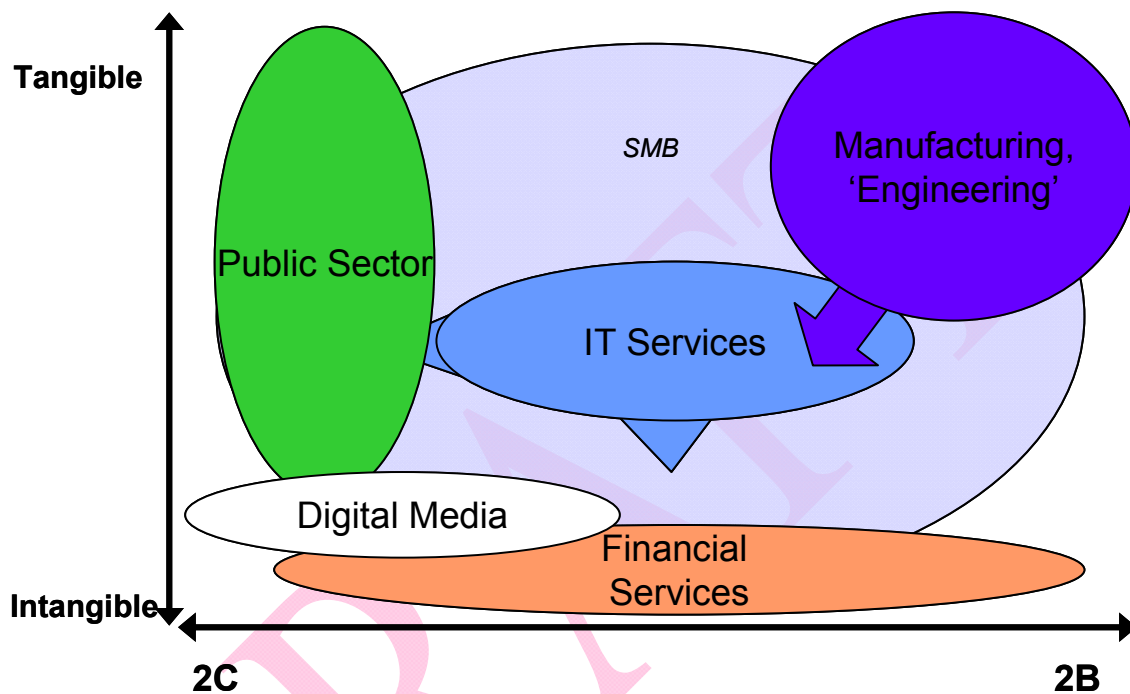


Figure 5 - Types of 'Services' (2C = 'to Customer', 2B = 'to Business')

In creating a ‘Service Science’ course, a key area of consideration will be what ‘type’ of ‘Services’ on which to focus.

The expectation is that there will be a specific main Content & Type of ‘Services’ – IT Services, High Value Engineering, Financial Services - which is the main area of study for each course.

This focus should not be ‘exclusive’ and in particular an exclusive focus on any one type of service would be a bad thing. It is important that Examples of ‘Services’ should be sought from ‘across the spectrum’. The assumption being that there will be additional modules provided to cover the specifics of a particular business.

On the other hand however it is not realistic to expect a course to seek to cover ‘all services, everywhere’ in depth

## 6 Skill Requirements

The following five groups represent those “core” skills that comprise the base for Service Science. As stated in the introduction, it is expected that these core skills will be supplemented by industry specific requirements e.g. Financial, IT and Engineering. These will be the subject of future documents.

### 6.1 Service Core

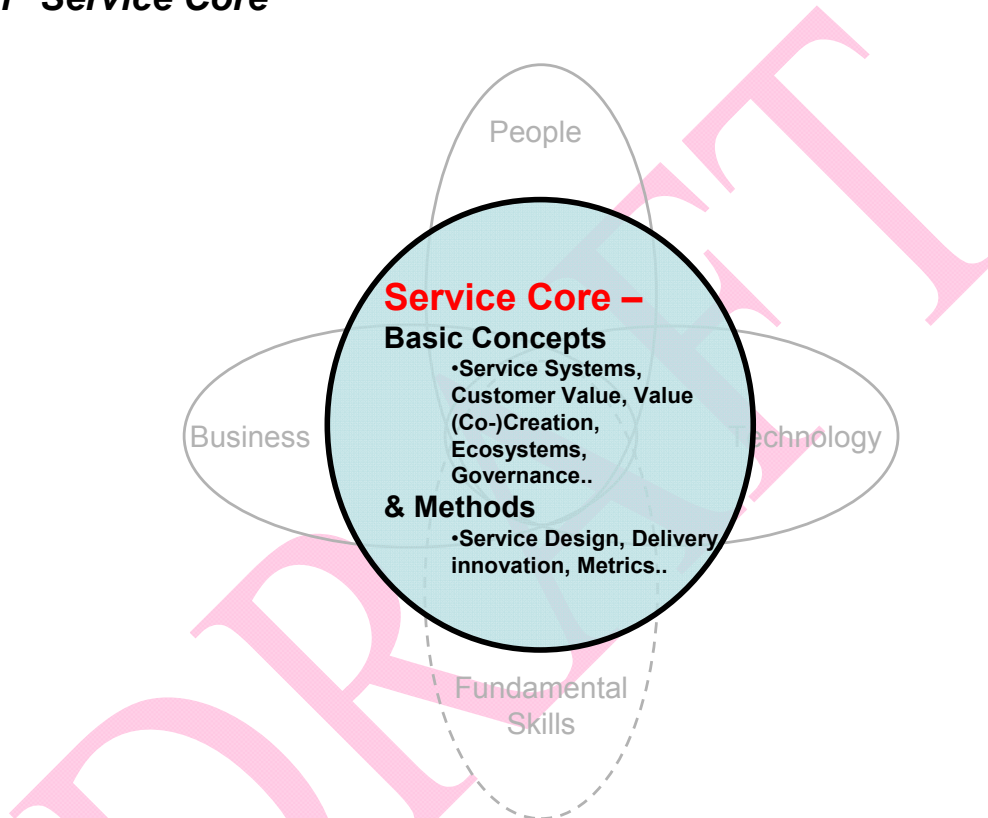


Figure 6 - Concept of the 'Service Core'

This element of the model should consist of Basic Service related concepts and key methods. This should be the largest element of any ‘Service Science’ course and it should be used as the key element – based on Case Study / other practical work – to bring together / integrate the other elements of the course

Overview – should include Concepts, Modelling, Design, Measurement, Delivery, Management, Governance and Innovation.

Service “mind-set” – customer viewpoint, outside in view

Holistic view (technology and business and people)

Logical Deduction

Business development, new service development

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Service Life Cycles

Service concepts and vocabulary (Cambridge)

Service modelling

Service design

“aesthetics and artistic design (expression and personalization), beyond just low costs and productivity (functionality and standardization).” (Cambridge)

Service Planning

Service Dominant Logic

Service ‘Front Stage’ / ‘Back Stage’

Service Design: Front-stage – service blueprints

Front-stage: Customer variability, total customer experience: Service Blueprints; Service Channels, Customer ‘moments/ experiences’. Customer satisfaction/ customer loyalty/ customer profitability. Customer journey: basic service+ support + handling changes etc. Look at specific channels: call centres, self-service etc. Note relationships to back-stage systems.

Service Metrics

Measuring services: at national level (size, productivity of service economy); at company level (measuring customer satisfaction, links to internal measures.).

Service Delivery

Back-stage: levels of thinking. Linking front-stage and back-stage.

Modularisation of service functionality (SOA etc), need to co-ordinate resources.

Service as a service systems, organisations as systems of systems.

Service Innovation

Innovation vs. Invention. Innovation processes and tool.

Innovation = ‘the successful exploitation of new ideas’ (DTI)

Innovation as a core business process

Outsourcing

Outsourcing is an issue/ driver for both service ecosystems and large-scale ICT systems

Service Ecosystems

Emerging business models e.g. JV, inter-organisational networks, ecosystems:

Economic and governance issues.

## 6.2 Business

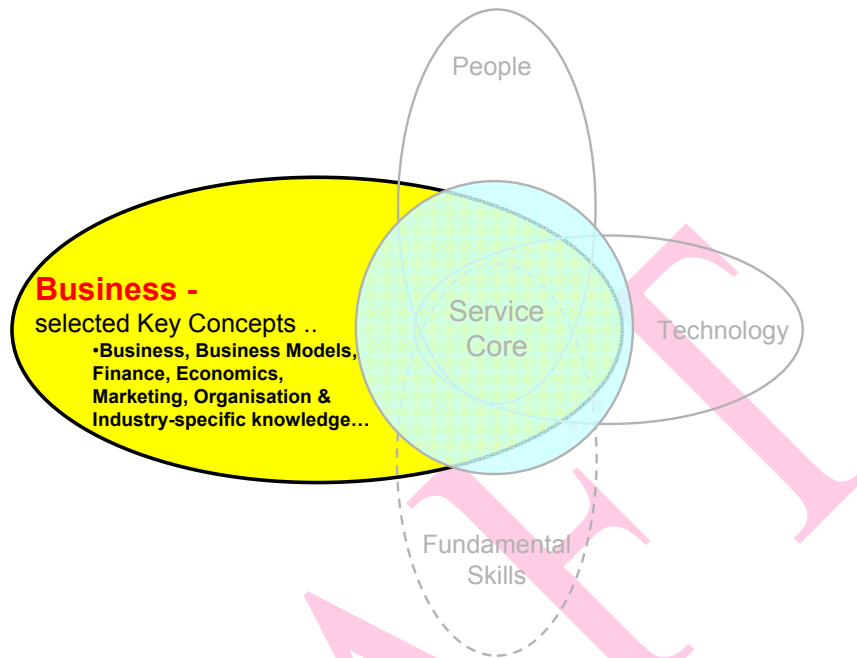


Figure 7 - Key Business Skills

Business acumen

Financial acumen

Basic finance

Business case development and analysis

Project justification

IRR/ROI

Economics

Cycles, exchange rates

Inflation

Supply and demand management

Transaction Economics

Globally integrated enterprise

Marketing

Market analysis (Internal & External Analysis)  
(Macro & Micro)

Industry specific knowledge

### 6.3 People

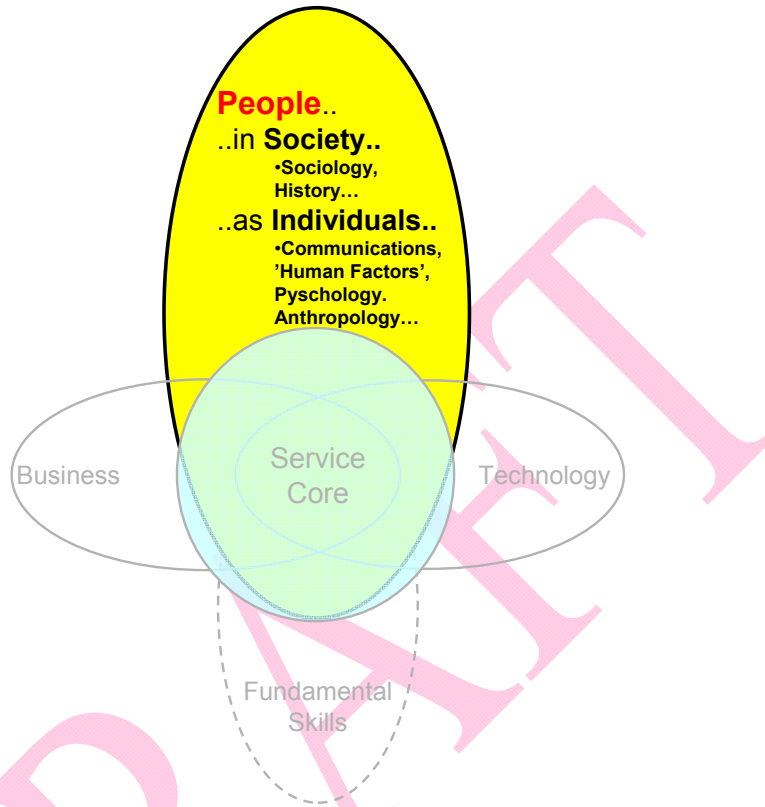


Figure 8 - People in Society & as Individuals

This is a key element, perhaps *the* second key element (behind 'Service Core') of any Service Science course – as it is the area that most 'Technology' based students will be weakest in

There are 2 key elements to this area, if possible elements of both should be addressed in the course -

1. **People in Society** – the way that individuals work within groups, be they 'organisations', companies or 'society as a whole'. It is not realistic to expect this element of the course to teach *all of Sociology* or *all of History* ! However it is key that the student builds some awareness of at least some of the significant elements of how people 'work in society'. Specific approaches could include teaching –
  - a. History of Technology / History of Innovation
  - b. Organisational Theory / Organisation Design
  - c. Key Concepts of Sociology

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2. **People as Individuals** – supplementing the teaching of ‘People in Society’ it is useful to teach some element of ‘how people work as individuals’. At one extreme this could touch on simply ‘personal skills’ training. Of more value is probably the teaching of such things as ‘Leadership Styles’, ‘Team Dynamics or major elements of (a selected) Psychological theory / theories.

Overview - Human Factors, Social Theory..etc

Client, Supplier or Partner relationships – building and maintaining

Communications using multiple channels

Communication across disciplines: scientists, engineers, managers, designers, and many others

Multi-cultural understanding

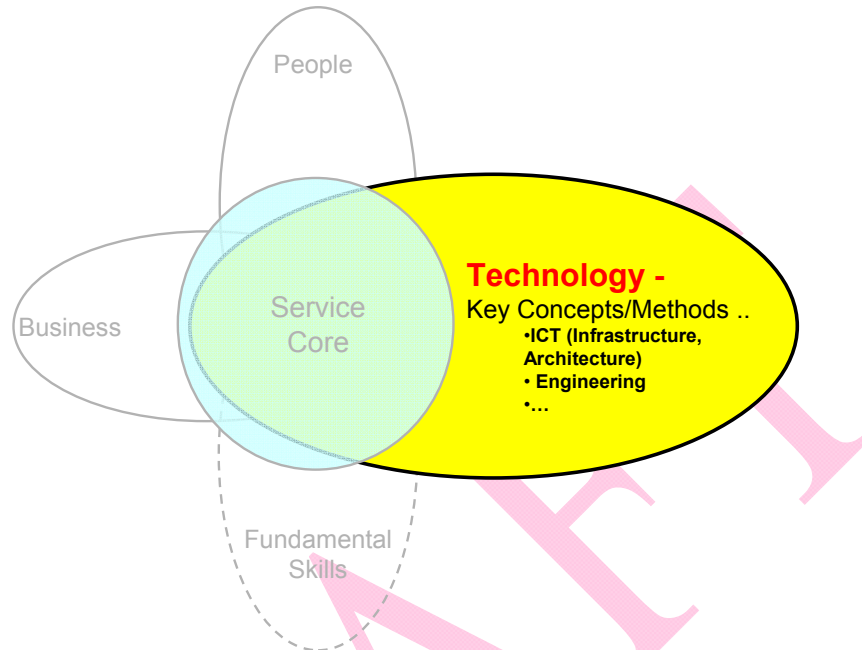
Negotiation

Networking

Human Resources in the Global Economy - provide students with a developed knowledge and critical understanding of international dimensions of HRM within the debates on globalisation. Examine empirical developments and trends within this international context and relate these to theoretical debates and issues. The interrelationship between local, national, international and global organisation and management will be explored with particular reference to the implications for HRM.

Organisation Behaviour – understand the perspective of micro-organisational behaviour theory and research; focus on the concepts of organisational culture, the psychological contract, and trust, especially as they apply to service organisations.

## 6.4 Technology



**Figure 9 - Services Technology**

It is recognised that most people will come with some of the noted skills or the equivalent practical experience. The intention of this section is for the student to select those new skills not already gained.

Principles of IT Infrastructure and Architecture

Principles of Physical Architecture / Logistics

Principles of Engineering

Experimentation / Demonstration, Proof of Concept

Root cause analysis

Cause & effect Feedback & correction

Web 2.0 Implications

## 6.5 Fundamental Skills

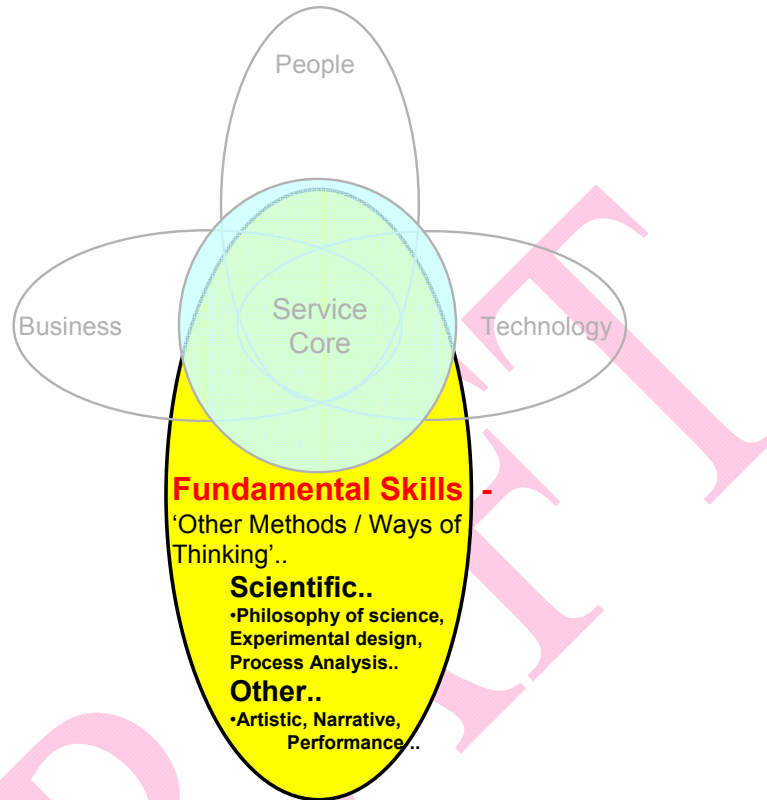


Figure 10 - Fundamental Skills

This element of the Service Science is *not* the primary element of the proposed Framework for Service Science education Curricula. As a result it is perhaps the most variable & most linked to the preferences & background of the Institution & Students involved

However, the key rationale in our view is to teach 'other skills' / 'other ways of thinking' / methods that can be applied to assist in the analysis and design of Services with the key goal of building & exploring multiple potential 'Interdisciplinary' approaches to considering Services.

As a result there are a wide range of potential 'subject areas' that may be considered as candidates for this element of a Service Science curriculum

6. **Teaching of 'Scientific Methods'** – particularly where that teaching has been absent earlier. Specific potential topics include -
  - Experimental Design
  - Process Analysis
  - Or 'Philosophy of Science' (selected elements for example Kuhn's Theory of Scientific Revolution)



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1. **Teaching of (selected) 'Artistic' / 'non-Scientific' methods** (ref the 'Big Tent' concept promoted by Ray Fisk at the 2007 Cambridge Symposium). Specific potential topics include the teaching of –
  - 'Narrative' / 'Storyboarding' skills to support Service Orchestration & Design
  - Artistic 'Performance' skills to support Service Delivery & Design

Many of these skills may have been started in the 1<sup>st</sup> degree course, however they are key to the type of role we foresee in the Service arena and they should be tested and grown during the period of the primary subjects.

Risk

Identification, Evaluation and Mitigation

Quality

Service operation analytics

Metrics, indicators, SLO, SLA

Methods - Kaizen, circles, ISOxxxx, eSCM, Six Sigma, Lean, Malcolm Baldrige,

Project Management

Work breakdown, Resource Management and Utilisation

Expert thinking – solving problems for which there are no rules based solutions

Research, fact finding and data collection

Process Analysis and synthesis

Process analysis and design

Process management and improvement

Change management

Problem management

Contract management