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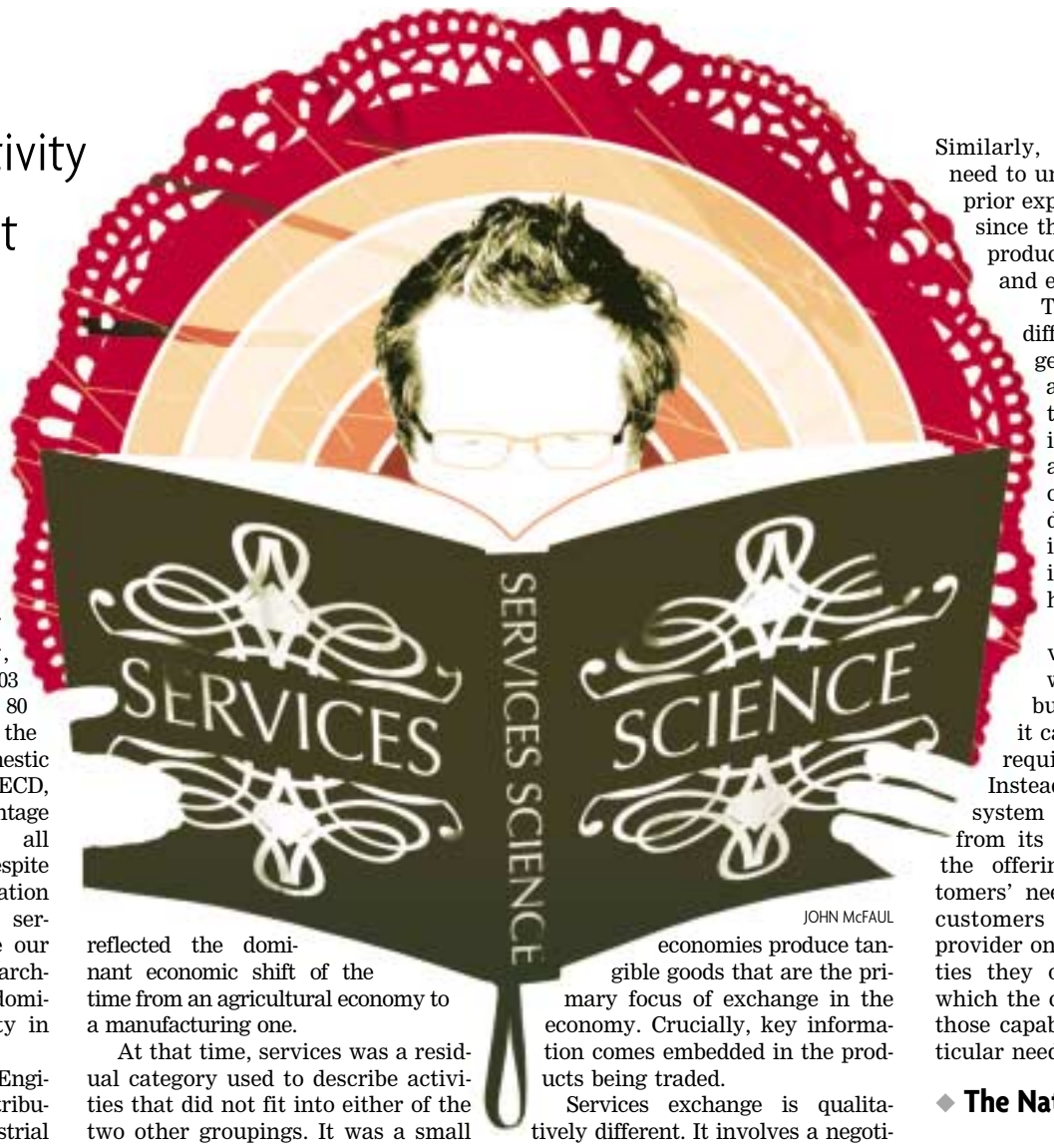
# A failing grade for the innovation academy

Services dominate economic activity in developed economies, and yet understanding of innovation in this sector remains very limited

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According to a study by the National Academy of Engineering, services in 2003 represented 80 per cent of the US's gross domestic product. And according to the OECD, they account for a similar percentage of economic activity across all advanced industrial economies. Despite this, most analyses of innovation tend to focus on products, not services. It is now time to update our curriculum for teaching and researching innovation to address the dominant sector of economic activity in most advanced economies.

The National Academy of Engineering study surveyed the contribution of academic research to industrial performance in seven industries. In the five product-based sectors – network systems, communications, medical devices, equipment and aerospace – academic research was found to have had a very significant effect. However, in the two service industries – transportation and financial services – it had only a limited impact. Further, the study concluded that "the academic research enterprise has not focused on or been organised to meet the needs of service businesses."

The term "services" itself is confusing. There is a tendency for people to use it as a prefix or suffix to some other knowledge domain, such as "financial services" or "services marketing". As a result, academics have no shared sense of "services".

The accidental history of the term helps to explain this uncertainty. It emerged in the early 20th century, when a taxonomy of the economy defined the major economic sectors as agriculture, manufacturing and services. This reflected the dominant economic shift of the time from an agricultural economy to a manufacturing one.

At that time, services was a residual category used to describe activities that did not fit into either of the two other groupings. It was a small sector of the economy, so shoving "other" stuff into the category was reasonable. As demonstrated above, today that residual is the bulk of economic activity and by far the fastest-growing part of economic activity in the advanced economies.

The leading role of services in the economy comes as no surprise to many companies who were leaders in the manufacturing sector. Today, businesses such as GE and Xerox find that services are the fastest-growing parts of their businesses. Indeed, IBM earns the majority of its revenues from its IBM Global Services business, a unit that did not exist prior to the 1990s.

## Innovation in services

What is different about innovation in services as opposed to products? One clear distinction is the intangible nature of the services activity. Both agricultural and manufacturing economies produce tangible goods that are the primary focus of exchange in the economy. Crucially, key information comes embedded in the products being traded.

Services exchange is qualitatively different. It involves a negotiated exchange between a provider and an adopter (supplier and customer) for the provision of (predominately) intangible assets.

The absence of a central product raises an important corollary: each party in the exchange needs the other's knowledge in negotiating it. On the one hand, the provider lacks the contextual knowledge of the customer's business and how the customer is going to leverage the offering to compete more effectively in the market. At the same time, the customer does not know the full capabilities of the provider's technologies or its experience from other transactions in assessing what will work best.

When products were the main focus, the information they contained helped each side communicate effectively with the other. As products and their functions became better understood, suppliers did not need to understand the customer's business to be an exchange partner. Similarly, customers did not need to understand their suppliers' prior experiences and capabilities, since these were reflected in the products they could see, touch and experience directly.

The services transaction is different. The exchange is generated by both parties, and the process of adoption or consumption is an integral part of the transaction. So, the adopter or customer is also a co-producer, intimately involved in defining, shaping and integrating the service into his or her organisation.

The supplier of the service can extend an offer of what is to be provided but, as we shall see below, it cannot entirely specify the requirements of the service. Instead, the supplier designs its system to elicit this information from its customers, and modifies the offering in response to customers' needs before sale. In turn, customers select their service provider on the basis of the capabilities they offer, and the extent to which the customer is able to shape those capabilities to serve their particular needs.

## The Nature of Knowledge

This leads to a consideration of the nature of the two types of knowledge that need to be considered in a services exchange. Codified knowledge is information that is well understood by providers and adopters owing, for example, to common language, customs, media and culture. This type of knowledge is also developed within more technical areas, when technical standards represent the codification of information across multiple entities, such as the html and http protocols on the internet or the digital video disk (DVD) format for movies. These standards enable information to transfer between physical devices in ways that are predictable in advance. When knowledge is standardised in this way, parties can exchange services with each other even though they may be otherwise not known to each other.

Tacit knowledge is experiential knowledge that has not been reduced to a codified form. A classic example

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is learning to ride a bicycle – knowledge that is difficult to transfer when parties do not know each other. This difficulty of transmission greatly complicates the services exchange. It limits the ability of each party to fully comprehend the needs and abilities of the other.

These constraints have been well understood in international business for decades, where the very cultural and linguistic identities that facilitate communication within a culture become part of the challenge of managing a transnational organisation.

Even in technical domains, however, tacit knowledge is vital. Professional associations, school ties, convention gatherings and the like provide face-to-face experiences that help to transfer tacit knowledge.

Consider the challenge of transferring a technology from one company to another. Some aspects of it may be well understood, due to patent publications, technical blueprints, bills of material and product manuals.

But putting the technology into practice invariably requires more knowledge than has been written down. The patent may describe how a product or process works, but anyone who has licensed a patent will testify that the know-how required to make use of the technology is not included. Many licensing transactions, therefore, explicitly include consulting services to supply this know-how.

**In essence, innovation in services boils down to improving workforce productivity. It promises greater job creation and higher living standards**

These knowledge transfer challenges are heightened by increasing complexity in the systems in which the knowledge is exchanged. In complex systems, which are defined as being composed of two or more technologies, processes must be combined in order to deliver value. The possible ways in which these technologies might work together grows exponentially as the number of additional technologies within the overall system increases. Companies struggle early on in the technology life cycle to identify a feasible system out of this complexity that does something valuable.

While the problem of complexity is not unique to services, the lack of products heightens the challenge of the exchange. Today, services exchanges involve many complex combinations of both codified and tacit knowledge. Thus, identifying feasible solutions ("systems integration") that actually work before others have done so is an increasingly important source of economic value.

To see this, think of Apple's iPod. None of its component parts are particularly new but the speed and ease of use has been enormously valuable, not least to Apple's shareholders.

## The role of service innovators

To build new and useful systems, services innovators need to do two things. First, they must learn how to deconstruct complex knowledge and how to integrate, recombine and reuse it from one instance to another. Innovators are now building information technology tools to help with this process.

One such tool is called "business process modelling", and is used by service providers such as IBM Global Services, Accenture and Infosys. This tool analyses a business process by breaking it down into individual activities, and noting the links that connect the activities together to deliver a particular function. Such mapping is an attempt to codify the knowledge in this process – how the different activities in a business process connect to one another.

Ideally, elements that recur frequently in a variety of customer processes can be recombined in a range of ways to serve different potential purposes. These recurrences might be overlooked if the activities weren't codified, forfeiting a chance to reuse knowledge, instead of creating it from scratch.

Understanding the customer's business process is necessary but not sufficient to the challenge of innovating in services. As noted above, the customer must interact with the supplier at various points in the services process. Thus, a second necessity to business process mapping is the idea of experience points. These are points of contact between customers and suppliers in the exchange of services, where each entity's respective processes must interact with the other's in order to fulfil the exchange. At these experience points, customers select paths from sets of choices constructed by suppliers, and the exchanges branch into different domains depending on the choice made by the customer. Even customers within the same industry will not necessarily share the same experience points.

Because each party brings its unique knowledge and experience to the exchange, and because part of this knowledge is tacit in character, no two experience points between different suppliers and customers are exactly alike. Thus, while there are important economies to be obtained from the recombination and reuse of earlier elements, there will always be some degree of difference that must be accommodated in the context.

## Why Now?

If we have gone this long without a conception of innovation in services, why do we require one now? The critical enabling technologies in communications and information technology are a crucial part of the answer.

As these technologies have advanced according to Moore's Law, which predicts that the density of semiconductor circuits will double every 18 to 24 months, the ability to codify and transmit knowledge – and to reuse and recombine that knowledge – has grown exponentially. This has resulted in sophisticated technologies being embedded in a wide variety of devices, and a robust network of interconnections has fused them in useful ways.

For example, today a car is a highly sophisticated system that contains dozens of chips that collectively help power, steer, brake and monitor the car while giving the user control over the interior climate, audio, visual displays and often telecommunications portions of the vehicle.

More subtly, these advances have enabled information that had previously accompanied the production of agricultural or manufactured products to be separated from those artefacts. Today, this information can move at a much higher velocity from the end user all the way back up the value chain to the supplier of raw materials.

What is more, the information is not consumed in the exchange, but remains available for additional use or reuse by others. This was not true in earlier eras, when the consumption of a product meant that others could not consume it.

## An agenda for research on innovation in services

In essence, innovation in services boils down to improving workforce productivity. It promises greater job creation and higher living standards in the west, and will bolster western businesses competing with companies in China, India and other parts of the rapidly developing world.

Moreover, innovations can also help to close the wide productivity gap described in the work of Eric Brynjolffson of MIT and Robert Gordon of Northwestern respectively. In their separate studies, each has demonstrated that there is tremendous variation in productivity among different industries, much of which can be explained by the ways in which companies have (or have not) incorporated new communications and information technologies into their businesses.

At this early stage, academic research about innovation in services is not well defined. (There is even an active debate over the proper definition of the term "services".) Any useful understanding of the opportunities and risks that are unique to services innovation will invariably involve business process modelling, business models, systems integration and design. More deeply, questions of complexity in systems design, cognitive processing of information, and the role of codified and tacit knowledge will also be involved. The design of choice sets and experience points in facilitating interaction with customers will also be a rich vein of inquiry.

While our understanding is at an early stage, we can already anticipate some initial academic insights about innovation in services. Numerous studies of innovation in products show a life cycle pattern, with different challenges confronted at different stages of a technology's phase in the cycle. It is likely to be the case that this pattern exists in services, too.

For example, an unexplored area of research opportunity is the termination of services engagements. We know very little about how these projects terminate, and how post-termination issues are addressed. Yet companies should understand the endgame as they consider the choice of whether to enter into a services arrangement.

Systems integration is another area ripe with implications for services. As the number of potentially reusable bits of codified knowledge expands, the wider the scope of potential services that can be produced from those reusable bits.

However, we also know that the same increase in these knowledge elements expands exponentially the number of possible ways that these elements can be combined. This means that the gains in scope could be outweighed (at least in theory) by the even greater increase in complexity. Academic research is needed to weigh the costs, as well as the benefits, of expanding the menu of reusable knowledge.

Furthermore, there is the trade-off between standardisation and customisation: when should a module be reused, instead of employing a custom-engineered piece of knowledge, to serve a customer need? The former will cost less to develop, since it has already been created. The latter will be more tightly connected to the context of the customer's problem. How should we compare the two?

Another insight could come from understanding sources of rigidity. Academic studies into business processes have noted the benefits of complementary activities among business process steps. But these studies have also identified rigidities that emerge from these same complementarities that impair the ability to adapt that business process to new challenges. So, targeting a solution in a customised way to serve a current need might impose a hidden cost in being less flexible to adapt to a future need.

Services innovators will also require a different set of measurements to manage and advance their efforts. Time and cost have unusual characteristics in the services world, with many services having a high initial development cost and a very low replication and distribution cost. Most companies' current measures of innovation – developed for a world of products – do not take adequate account of these features in the services context.

This agenda may sound daunting but the effort is certainly worth it. We need to do a better job of understanding the process of innovation in services. Only through continued innovation in what is now the supermajority of economic activity in advanced industrial economies can we uncover ways to increase high-value, high-wage employment that will support an abundant and rising standard of living.