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How the Internet of Things is Shifting Value from Products to Systems (and What to do About It)

By Juan Garin

As the digitisation trend sweeps through the realms of manufacturing and infrastructure, it raises fundamental questions for companies in these sectors regarding the very notion of value and how it is created. For managers and strategists in engineering, manufacturing and utility companies, the advent of the IoT, cloud technologies and data analytics have implications that go far beyond the scope of technological choices and investments. These technological trends are shifting value away from products to information and services, and ultimately, the system of outcomes they enable. Companies will need to ask themselves hard questions about the nature of their business, rethink their relationships with customers and other stakeholders, and access or acquire a new suite of capabilities.

Three technological trends: IoT, cloud technology and data analytics

Three related technological trends are transforming how manufacturing and industrial companies create value and are changing the nature of their relationship with customers. Physical products are increasingly becoming producers of data as a result of the proliferation of cheaper, smaller and smarter sensors that capture everything from products' operating performance and maintenance needs to their operating environment and location. As products become connected to communication networks, this information can be collected, transmitted and shared, thereby creating the Internet of Things (IoT).

Because the amount of data being generated by the Internet of Things will exceed that of the communications Internet, a large amount of new infrastructure is required in order to capture and store these vast quantities of data. The spread of cloud technology is making this storage infrastructure widely accessible.

Finally, for data to support decision-making and value creation, it needs to be processed and analysed in order to extract insights. Data analytics and machine learning, supported by the expansion of computing power, are opening up vast new opportunities for companies to exploit data in order to create value and build new offerings.

The convergence of these technologies is driving a fundamental shift in the very notion of products. The value of products is migrating away from their physical attributes to the information they generate and the services that this information enables. Products will no longer be sold as stand-alone physical objects delivering a set of features but as one element in a broader service offering comprising data and knowledge (embodied in people, processes or algorithms). Seen in this light, Google's acquisition of Nest, a manufacturer of smart sensors, is entirely about gaining an entry point into the home that can provide a basis for a wide number of future services.

Migration in value from products to systems & relations

This migration in value from products to information-based systems has momentous implications for manufacturing and industrial companies whose capabilities have been developed and honed over many decades to engineer bundles of features and manufacture them at the lowest possible cost. As connected products increasingly become sources of data they are leading to the emergence of new business models based less on ownership of physical objects and focused more on providing access or delivering certain outcomes. Ultimately, an individual or a business doesn't derive value from ownership of an object whose value depreciates rapidly, but through the achievement of certain beneficial outcomes that a particular product supports.

Thus, in the case of motor vehicles the desired outcome is mobility. However, vehicle ownership is by no means essential to achieving a mobility outcome, as transport alternatives exist particularly in urban environments (public transport, cycling, or walking).

Moreover, ownership is increasingly seen as an inefficient means of achieving a mobility outcome since private vehicles are used only for a small proportion of the time and involve high fixed costs (e.g. parking, insurance). Public, private and peer-to-peer car sharing schemes are emerging in order to address these inefficiencies, thus providing mobility at a much lower total cost to both vehicle owners and non-owners.

Similarly, in the B2B space, transport and logistics companies, manufacturers, distributers and retailers are seeking to achieve access to raw materials or the movement of goods at the lowest possible cost. Valued outcomes include maximising vehicle operating time, optimising routes to reduce distances and transport times, maximising fill-rates, and minimising costs per ton-kilometre. Through analysing operating data generated by a fleet of trucks, fleet managers can now optimise maintenance to reduce the total cost of maintenance and repair, minimise vehicle off-road time, and extend the lifetime of vehicles.

Connected sensors are also being embedded in infrastructure whether it be power stations, pipelines, or bridges. By collecting and analysing data from thousands of points, utility operators or infrastructure managers can improve the operating efficiency of a power plant, identify equipment faults before they occur, plan interventions in order to minimise disruption, and extend the lifetime of the infrastructure assets.

The IoT, cloud technology and data analytics triad is going to generate an explosion of new services, many of which have yet to be imagined. Multiple players from traditionally different sectors are converging on the IoT space setting the stage for a fierce battle (see Box 1). Manufacturing firms, through their control of the product and their large existing installed base, have a strong hand to play in the evolving game to reap the rewards from the IoT. On the other hand, they are by no means guaranteed of retaining a central role in the delivery of value and face the risk of being relegated to the role of sub-supplier and even losing their relationship with the end-customer.

Becoming an outcomes business

In order to adapt and flourish, manufacturing firms will need to embark on a transition which moves them from their current role of suppliers of equipment to outcome-enablers. Based on research at NormannPartners, companies that are successfully undertaking this transition are adopting some of the following practices.

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From products to solutions

Engineering and manufacturing firms will have to reconcile themselves with the fact that products alone don't deliver outcomes. Outcomes are produced by systems consisting of a combination of technology, data, processes and people, and usually involving a multiplicity of actors. As customers increasingly value outcomes over equipment ownership, manufacturing firms will need to consider how their products form part of such broader systems, and convene the necessary capabilities and actors to create solutions that deliver desirable outcomes for customers. Companies will need to adopt a systems view of their strategic context that extends beyond the all too limiting industry perspective of suppliers, customers and competitors.

For example, GE Healthcare realised that what health care providers and payers ultimately valued were improvements in quality of care and lower costs of care. As manufacturers of high-end medical diagnostic equipment such as MRI and CT scanners, they found themselves in an awkward position of being pinpointed as one of the contributors to rising health care costs, while finding it difficult to prove that medical scanners directly improve health care outcomes.

Box 1: Competitive environment for IoT platforms

Manufacturing and industrial companies can exploit their large installed base of equipment to develop IoT-based solutions. GE is possibly the leading example of an industrial business undergoing such a digital transformation. GE has developed a cloud-based analytics platform for gathering and processing machine data called Predix. Because it is based on open standards and protocols, it can accommodate data generated not only by its own equipment but that of other manufacturers. It has also opened up its platform to customers and third-party developers with a view to generating scale and network effects.

While GE has a strong advantage in its large existing customer base it is by no means alone in seeking to create the dominant platform for the industrial Internet space.

The IT behemoths such as IBM are active in this area as are enterprise application providers such as SAP. Finally, a clutch of start-ups have also developed analytics platforms for industrial applications.

It is too early to judge whether there will be one or two dominant platforms for industrial Internet applications — as in the case of the iOS and Android duopoly in the realm of smartphones — or whether a wide diversity of solutions will co-exist. Industrial companies will face a critical choice of whether to develop their own analytics platform and infrastructure, as in the case of GE, to partner with other organisations, or to use solutions developed by other third-party providers.

As a response, GE Healthcare decided to focus their innovation on generating outcomes in terms of improving quality of care, reducing health care costs, and improving access to care. They also concluded that to affect outcomes they needed to approach health care at a more systemic level – a view which resulted in the development of a more solutions-oriented business, and often involved collaborating closely with customers or third-parties. A key success factor in GE Healthcare's shift to an outcomes-focused solutions business was the use of software and digital technologies to codify knowledge, and create replicable and scalable solutions.

Acquiring new capabilities

The transition from a product orientation to an outcome and solutions orientation in an IoT environment requires the development or acquisition of a number of new capabilities across a range of activities, from product development to sales. For example, the process of selling solutions involves a very different skill-set from that of selling products, requiring a much deeper understanding of the customer as well as strong business analysis skills and sector-specific knowledge. Similarly, a company seeking to exploit opportunities in IoT will require strong capabilities in data management and data analysis.

Companies that are successfully managing the transition have made a concerted effort to identify future capability requirements, sometimes over as long as a 10-year timeframe, and develop strategies for acquiring those capabilities. A key question will be whether to develop those capabilities internally through recruitment, or through acquisitions or partnering. GE concluded that data and analytics were so critical to the future of its business that it a made a strategic commitment to internalise these capabilities. However, not all companies may have the resources to do so – particularly given the imbalance between supply of and demand for certain professions such as data scientists – in which case they might need to consider working with partners or outsourcing.

Co-creating with customers

A focus on outcomes requires a deep understanding of customer values, and the ability to design solutions that enable those outcomes. Solution development requires a much closer collaboration with customers than a traditional product development. Manufacturers should be particularly attentive to their best performing and most innovative customers, as they can be a source of innovation or inspiration. Moreover, when solutions involve the analysis and interpretation of what is often proprietary customer data, they require a particularly close and cooperative relationship between provider and customer.

An outcomes focus also involves a different allocation of risks, with a greater degree of risk being accepted by the solutions-provider to the benefit of the customer. Responsibility to deliver a particular outcome – such as a level of

uptime for a fleet of vehicles – depends on a much wider range of factors than delivering equipment meeting specifications or performance standards achieved in lab conditions. While preventative maintenance will be a key factor, other important variables such as road conditions and driver behaviour are out of the control of the vehicle supplier. It will therefore require a greater degree of interaction and collaboration with customers and other stakeholders such as the drivers themselves. By collecting and analysing data on these variables, a solutions-provider will be able to take them into consideration, and even influence them (e.g. through offering driver training and coaching alongside maintenance services).

Organisational changes

In some cases, the scale of the change of moving from a product orientation to an outcome orientation is so dramatic that it cannot be undertaken within the existing organisational structure. When GE Healthcare shifted its focus to improving healthcare outcomes, it created a new entity separate from the existing business lines called Healthymagination that was tasked with driving those outcomes.

Organisational changes may also be required when the solution does not involve the bundling of equipment— the manufacturer's core business — or if it involves a very different route to market than for products. Under such circumstances, it may be necessary to establish a subsidiary to provide the new business with freedom from the constraints of the traditional business. For example, when Scania, the trucking company, decided to enter the transport and logistics systems business, it created an independent wholly-owned subsidiary to market advisory services. Finally, when certain critical capabilities are not available within the organisation it may require entering into joint ventures with other suppliers.

Ultimately, digital innovation is not simply about technological adoption. Technology is an important enabler that can spark transformations in the value creation process, the nature of offerings and the relationship with customers. However, if new IoT, cloud and analytics technologies are to generate sustainable and virtuous business transformation, they need to be framed within a more systemic view of the strategic environment and a fresh understanding of value creation.

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