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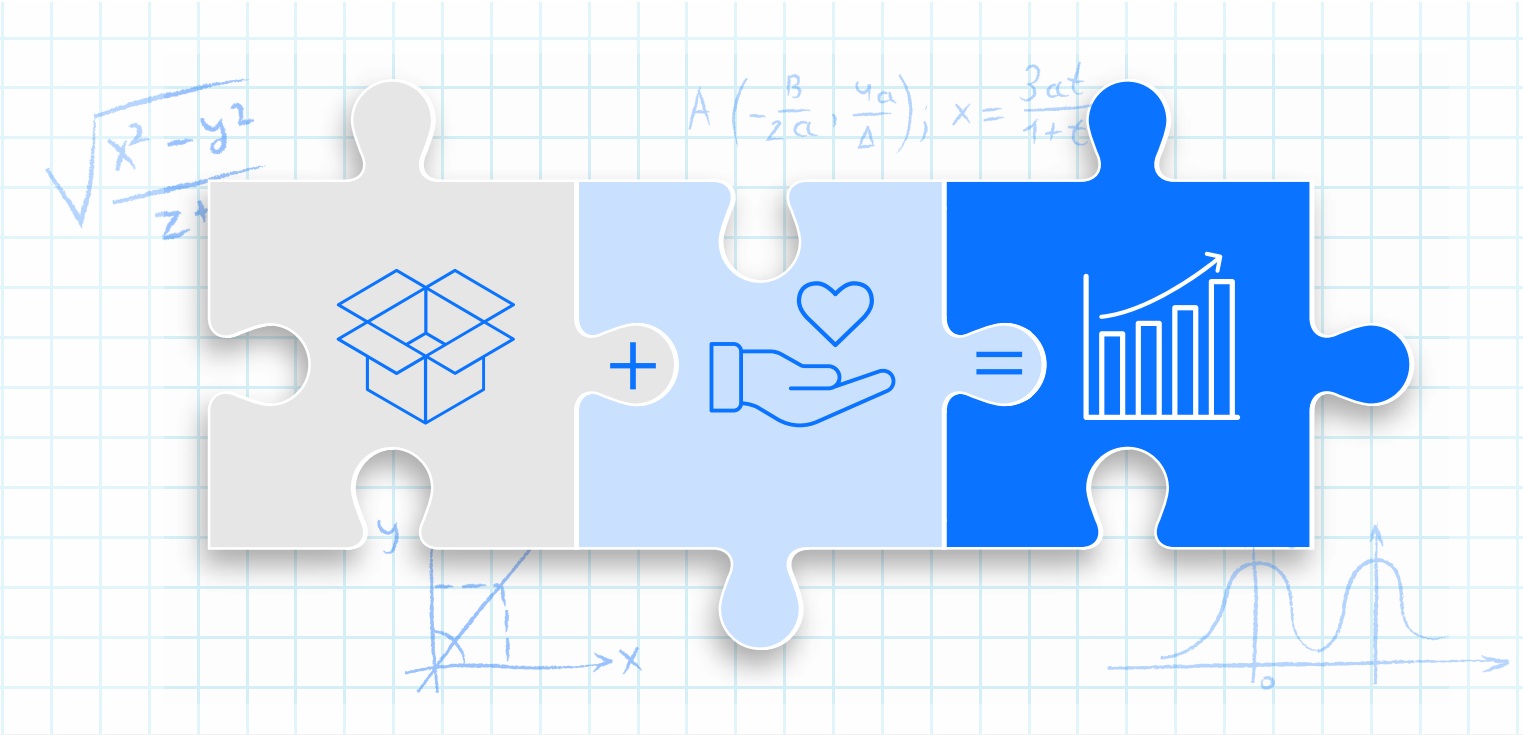
Servitisation in the digital age: moving from outputs to outcomes

By Alun James and Ross Jones



While servitisation is not a new concept, it's taking on renewed significance as the Industrial Internet of Things gains momentum. In this paper, our Chief Technology Officer, Alun James, and Principal Consultant, Ross Jones, consider what servitisation means in the digital age, and how to make it work for your organisation.

With its outcome-focused principles, servitisation is a tried and tested approach which is being reimagined by many industries in the digital age.

For many people, Gillette's 'razor and blade' business model is a classic example of servitisation. It drives profitability, market share and long-term revenue.

However, for us, the concept goes beyond taking more control of the value chain. Take Rolls-Royce's leasing approach to aircraft engines for example, where they sell 'thrust' rather than physical product. Its customers don't have to worry about engine maintenance, and the cost is spread out as an OpEx rather than a large upfront CapEx.

So, at its best, servitisation also delivers value from the customer's standpoint, making their life easier in some way.

The servitisation spectrum

In our view, servitisation is a spectrum. For some organisations it's an evolutionary process, but for others (especially start-ups) it can be revolutionary and disruptive. At one end of the spectrum it involves services being bolted-on to an existing product. At the other, it centres on an abstract or conceptual service which leverages a separate physical product or asset. Uber, Deliveroo and Airbnb are prime examples, where they don't even own that physical asset.

Wherever you sit on the spectrum, servitisation provides a holistic solution to the customer. It improves customer focus, because rather than simply engaging in a single transaction, the business engages with the complete value chain. This brings greater responsibility for the overall value-creating process compared to product-centric, transaction-based business models.

Servitisation unlocks new ways to deliver real value-added propositions to customers. It can be used to win new or additional work, develop long-term customer relationships, diversify income streams, and offer more consistent revenues which are also less sensitive to price competition.

However, we've found that this change requires a significant shift in mindset. It involves a move from product lifecycle management to service lifecycle management. So, you need to get feedback and intelligence from customers about what is happening to the product: where it is, how it's being used, the spare parts and maintenance instructions needed to keep it going. This can translate into condition-based monitoring, predictive maintenance and prognostics and thereby whole-life, asset management services.

There are many potential avenues for a successful servitisation strategy. They range from design, installation and maintenance to training and consultancy services as well as usage-based sales models. Whatever approach you take, effective use of new technology is a critical success factor.

Servitisation can be mutually beneficial for the customer and the supplier. However, it is not always straightforward and the advantages are not universal. Success is dependent on a robust strategy and other influential factors.

Examples of servitisation in construction

Added services – where a manufacturing firm remains primarily a product provider but with some service proposals integrated into its offerings.

Activities reconfiguration – where the manufacturing firm defines itself as both a product and service provider and actively creates value by developing new activities with its customers.

Business model reconfiguration – where the provider no longer transfers the ownership rights of its products to customers. Instead, its offerings are sold on a 'by use' or 'by results' basis.

Leverage of another's asset - not creating the product and thereby not retaining ownership of it, just selling the service and leveraging an asset that is owned elsewhere.

(Sourced from Designing Buildings magazine)
https://www.designingbuildings.co.uk/wiki/Servitisation_in_construction

One of the most significant examples of servitisation is IBM's transformation from a product-centric to a service-centric organisation in the 1990s.

IBM first released its personal computer to the market in 1975, but sales were disappointing as there was simply very little demand. In 1980 IBM tried to crack the personal computer market again, but by then many other companies were already making machines and IBM couldn't gain market control.

In 1994, new management led IBM to exit the network products business, with its focus on application software, storage and personal computers. Instead, it became a freestanding service business focused on software. Now IBM is a US$115bn company and the market leader in many areas including enterprise security and artificial intelligence.

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Rolls-Royce offers a strong example of servitisation, with its service package where customers pay according to the amount of time an engine is in flight. Its power-by-the-hour service was introduced almost 60 years ago, offering operators of the De Havilland DH125 business jet an hours-based service contract on Viper engines.

With the TotalCare® service package that Rolls-Royce now offers to airlines, engines are rented to customers. Rolls-Royce monitors data from the engines to predict potential maintenance needs, meaning that work is only carried out when necessary. This saves costs on needless work as well as reducing unplanned maintenance and engine downtime.

Caterpillar offers a portfolio of services beyond production.

One such is the Cat® Product Link. This remote tracking and monitoring service provides clients with updates on the location of equipment as well as preventative maintenance monitoring of components. This extends component life and reduces the need for downtime. Caterpillar monitors the equipment remotely, using data sent from its vehicles to help make decisions that optimise performance.

Originally known for photocopiers, Xerox now positions itself as an enterprise for business processes and management. Today, more than half of Xerox's business comes from services.

Photocopying companies in the 1950s adopted servitisation successfully, keeping machine costs low and making money on the specialised papers required by the wet copying process.

Xerox has since diversified to offer document publishing and production services, document management and business process outsourcing. It describes the process it has gone through as "the essence of servitisation; utilising technology to offer services tightly coupled with existing products."

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Why is the move to servitisation hard?

Moving towards higher levels of servitisation can reap great rewards but it also carries risks. Getting it right isn't always easy and we've found that success relies on a combination of different factors.

Traditionally, servitisation relied only – and completely – on ownership of the entire value chain. Without this centralised control, there would be a disconnect between the service end (where value lies in data and analytics) and the product development end (where producing the 'thing' is the focus). For many organisations, the cost of acquiring, developing and achieving this end-to-end value chain was prohibitive and it would take years to deliver return on investment.

The digital age turns this on its head. Uber and countless others clearly demonstrate the ease with which a competitor can enter and disrupt a market today. Therefore, finding ways to tie customers to your service is key. Retaining an infrastructure / product perspective is more expensive but when it's done right, it should secure longer-term success.

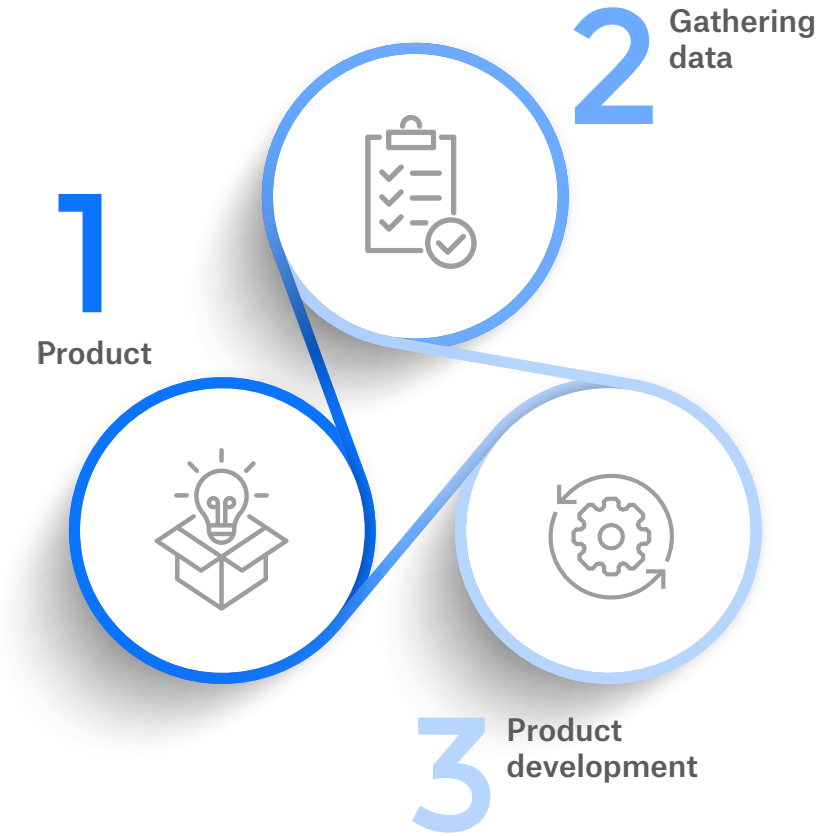
However, the complexity of process co-ordination can be a significant barrier. Many firms struggle to harmonise multiple services and product offerings. Finding and allocating the right resource to deliver the service can also be a challenge. These are all risks that need to be accounted for and balanced against potential outcomes.

Managing risk

Servitisation can require a fundamental shift in the business model, restructuring the commercial deal to gain advantage. But this involves re-distributing commercial risk to somewhere else in the value chain. The balance of investment against risk requires strategic thought and consideration – and often hundreds of thousands in R&D investment. However, it is possible for elements of risk to be deliberately moved outside the value chain. Take Airbnb, a holiday rental platform which doesn't own a single property.

But success or failure does not lie solely with investment: management sponsorship and employee involvement are also factors. The necessary cultural changes include a mindset shift from selling a product to thinking about customer needs. Decisions must be based on data and facts, and it's important to move from performance-driven to relationship-driven approaches, increasing accountability and transparency.

We've also come across the argument that moving to a servitisation model will lead to a reduced focus on product improvement and innovation. Personally, we don't hold with this. Harnessing and looping back data is a fundamental quality of servitisation. If it's used to inform the service model, it's no great leap to channel it into product iteration and improvement as well.



Customer expectations and technical issues

While customers are likely to value servitisation, an inherent 'service-for-free' mindset can make it more difficult to develop a sustainable, commercially viable business plan. Many organisations come unstuck thinking an additional cost can be attached to a given service when that may not always be the case.

For instance, if your initial model is based on hardware with infinite software upgrades, bolting-on a revenue model that recovers the ongoing software development cost can cause disconnect and tension between company and customer. On the flip side, customer behaviours can aid and influence the service model. It's about handling the process in an innovative way that adds further value to the customer.

On a more practical level, servitisation infrastructures can be difficult. The situation is improving with the development and sophistication of cloud services. But the number of sensors required in-the-field coupled with the level and complexity of data analytics can cause problems.

The communication channel also raises questions and challenges. Will 4G/5G etc. be reliable enough or are satellites required? What's the data rate and quality? Are there different considerations for mobile versus static devices? What about power consumption, battery life and latency of data transfer? There are many factors at stake, and the value of the data being transmitted is likely to influence decisions here. The greater the physical cost of the product along with the opportunity cost of failure, the greater the need for sophisticated data collection and transmission. It's also important to consider whether the monitoring can be scaled, should the need arise.

Despite the inherent risks and challenges, the benefits of servitisation can be huge to an organisation and its bottom line. Core drivers for servitisation range from improved customer service and retention to increased market share and profitability.

But it can also reduce operational risk through a more diversified product and service offering as well as repeatable annual income streams (for example through maintenance agreements). It all adds up to improved commercial resilience and stronger cash flow.

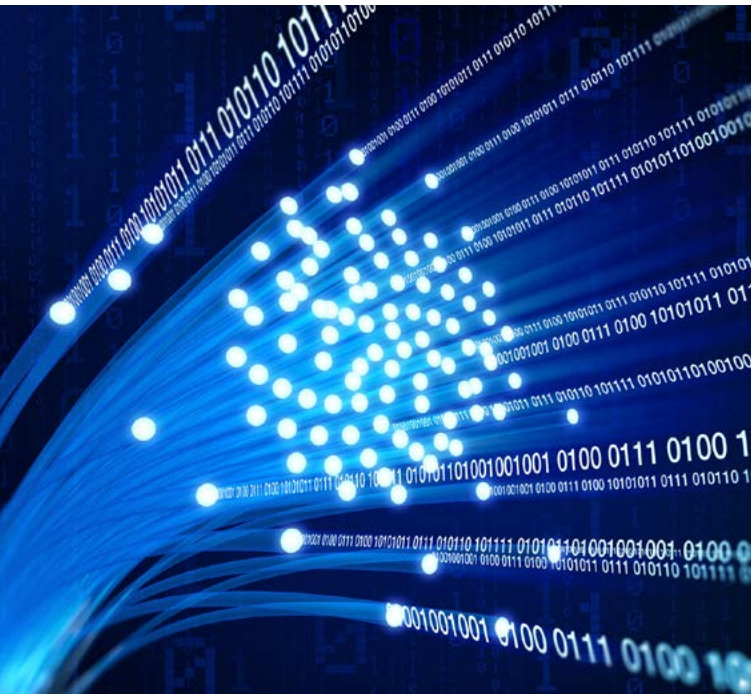
Why AI is not a silver bullet

If servitisation is about customer-centric value creation, then Artificial Intelligence (AI) is often seen as its enabler in the digital age. However, despite what's portrayed in the media, we contend that AI not a panacea for every problem. In fact, in most cases, it is not the best answer.

Like any tool, AI is very useful when applied correctly. But if we can use a simpler tool to achieve an equivalent (and often better) solution, then we ought to do that. Don't fall into the 'If I have a hammer, all I see is nails' trap.

In the modern world, most servitisation programmes involve IoT. This typically encompasses the system architecture, from sensors generating data (perhaps with some local signal processing) through to the Cloud where more advanced processing capabilities convert raw data into something actionable. On the route from sensor to Cloud there is a communications infrastructure, often with different layers, ranging from classic wired options (ethernet, RS485 and analogue signals) through to wireless options (2/3/4/5G cellular, Bluetooth, LoRa, WiFi).

It's when we're faced with deciding the right tool to convert that raw data into something actionable that AI is too often the default answer. We will always need sensors to generate data, but sometimes a simple algorithm can do the smart conversion of that data. It doesn't have to be AI.



The best tool for the job

Selecting the right analysis engine for the problem-at-hand is vital. If we choose too complicated a tool (and AI is a very complex tool, despite its idealisation as a black box hidden by a nice interface) then we don't really understand how the tool makes decisions. This increases the risk of catastrophic failure when the system encounters unexpected conditions.

An AI system is typically trained on data that has been previously classified by a human. So, the AI learns some characteristics of the data, and then applies that learning to a much larger set of data, at a rate far beyond human capabilities. However, if the training data is accidentally incomplete (as is often the case) then we naively still expect the AI to give an answer, and as it works most of the time, we come to rely on the answers. But the AI might miss some other critical characteristic of the data, and so come to the wrong conclusion.

We'll offer a couple of examples from Amazon's history to underline this point.

Firstly, an HR tool for filtering resumes to identify the top 5% of applicants failed as it was trained on current engineers' profiles (which sounds like a sensible approach, doesn't it?). As a result, the AI would reliably identify white, male engineers as the best candidates (since current engineers were largely white males).

A second example is Amazon's Rekognition system, which matches images of a human face to a database of known faces, to quickly identify who that person is. This tool was intended for use by law enforcement agencies to correctly and efficiently spot wanted criminals. In fact, it was found that the AI incorrectly matched the faces of people of colour at an alarmingly higher rate than the faces of white people.

To be fair to Amazon, it recognised these inherent biases, and has taken steps to resolve the issues. But we can never be sure that unintended consequences and unconscious bias won't proliferate with overuse of AI systems.

Understand your data needs

Here at Sagentia, when we're selecting the best tool for the job, we consider the type of data that will be served to the analysis engine, classifying it as hard, firm or soft.

The way that we like to consider how to choose the right tool, is to look at the type of data that the analysis engine has an input, and we classify that data into three general categories:

1. **Hard data:** gathered from a system that is amenable to mathematical modelling, using sensors with a specific goal in mind. For example, a heating system, in which the sensors measure water / gas flow, pressure, temperature, valve position, test voltages & currents, and where it would be possible to build a digital twin of that system. The data is well structured and there's a close correspondence between what is measured and what needs to be known.
2. **Firm data:** this is where the sensors allow an indirect inference of system status. To continue with the heating system example above, there might be an acoustic sensor, which isn't directly measuring water flow, but allows an approximate inference of the state of the system to be made. The data can be used to answer questions like 'can I hear flow, can I hear boiling, can I hear valves switch?'
3. **Soft data:** this is generally unstructured in nature and further removed from the system. So, in that heating system example, it might relate to the local weather now and over the next few days. It could also extend to the number of people in the building and whether they are Googling "what's the minimum allowable temperature for a workplace".

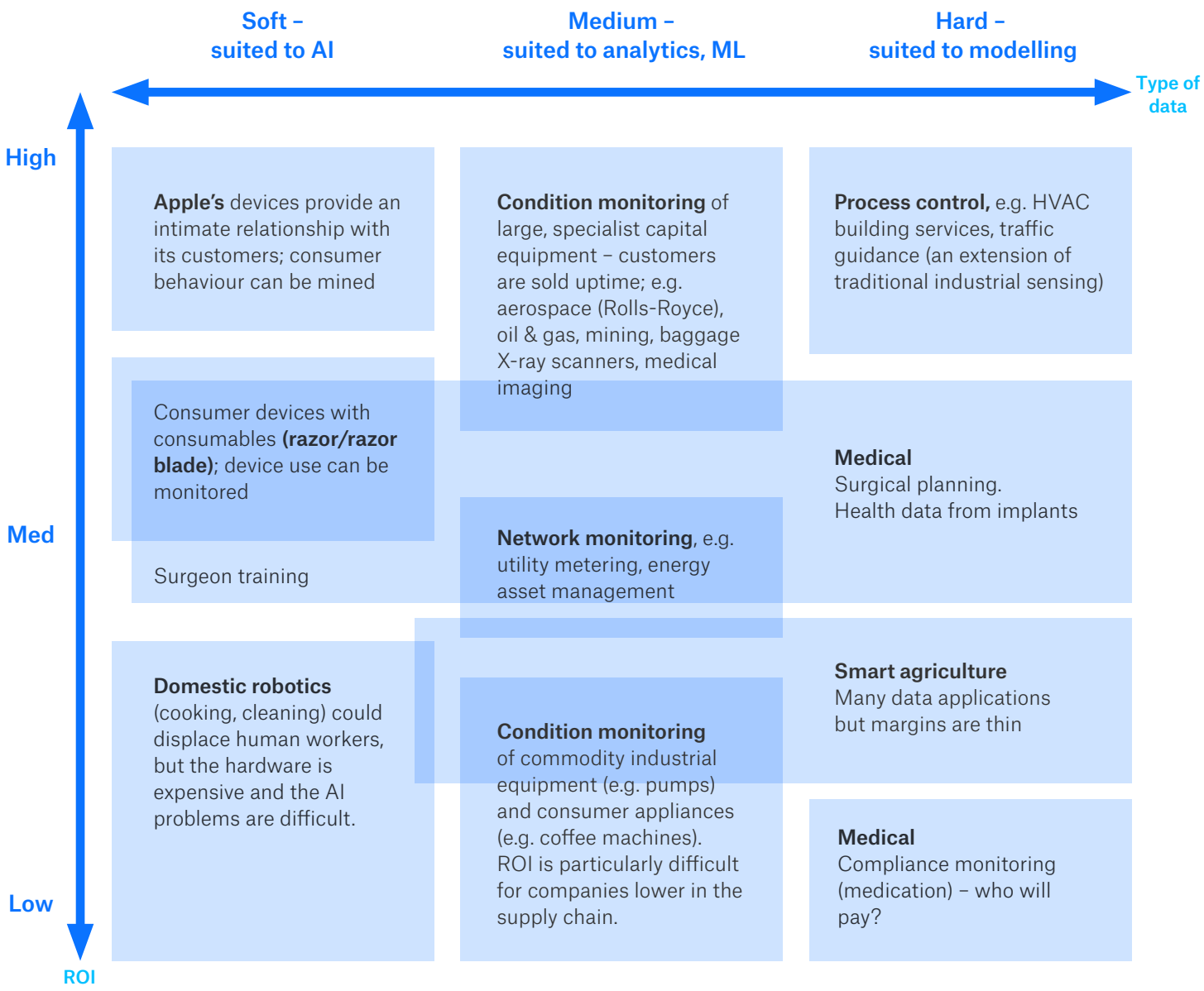
Once we know what type of data we have, we can decide on the appropriate type of analysis engine. Hard data can be examined with mathematical models or simple data analysis, whereas soft data is a likely candidate for full AI. Between these extremes, firm data needs some machine learning algorithms that are directed by prior knowledge of how the system works. It's important to note that there are no well-defined boundaries here, it's a spectrum, and good data scientists are critical to deliver real customer value.

To illustrate this, let's consider the servitisation example of condition monitoring in that heating system. There is a maturity process where, as a first step, the goal is to spot a fault that has already occurred, diagnose it, then issue alerts and instructions to maintenance staff to fix it. This would typically utilise hard data.

A next step would be to predict (prognose) when maintenance may be required or identify a part that should be replaced before it fails. This might utilise weather forecasting to identify the least disruptive opportunity for that maintenance. The prognostics step requires data collection about past faults in order to predict future problems, as it allows training systems to be written. But many months – even years – of data collection are required to get enough data to develop models and algorithms that train and predict with sufficient reliability.

Final thoughts

Whether you're a conventional business or a cloud-native start-up, servitisation offers a wealth of opportunity to achieve more in the digital economy. The trick is to balance technical considerations with commercial viability and customer needs. Don't over-complicate things, keep customer value front of mind and focus on outcomes, rather than outputs. Check out the figure below for an overview of data types and potential servitisation models.



About Sagentia

Sagentia is a global science, product and technology development company. Our mission is to help companies maximize the value of their investments in R&D. We partner with clients in the medical, consumer, industrial and food & beverage sectors to help them understand the technology and market landscape, decide their future strategy, solve the complex science and technology challenges and deliver commercially successful products.

Sagentia employs over 150 scientists, engineers and market experts and is a Science Group company. Science Group provides independent advisory and leading-edge product development services focused on science and technology initiatives. It has ten offices globally, two UK-based dedicated R&D innovation centers and more than 400 employees. Other Science Group companies include OTM Consulting, Oakland Innovation, Leatherhead Food Research, TSG Consulting and Frontier Smart Technologies.

For further information visit us at:

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Here at Sagentia we work across the whole servitisation model but are particularly well-placed in the middle space: the physics of the device, sensors, algorithms, analytics, physics, and working in challenging environments.

Get in touch to find out more.

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