XMPRO
Agile Industrial IoT

INDUSTRY 4.0 BUSINESS MODEL DILEMMA FOR OEMS

Why many manufacturers will be "netflixed" and how to avoid it

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Disruption Is Built Into Industry 4.0

Blockbuster saw Netflix coming but chose to ignore it. Actually, they thought it was a niche business when Netflix CEO Reed Hastings approached them in 2000 with a partnership proposal. They looked at how they always did business, their technology and innovation, outlet growth (which was significant at the time) and didn't see how the Netflix business model would fit with them. They grew to over 5,000 retail stores and 60,000 employees. In 2002, their market cap rose to $5billion.

Blockbuster lost their competitive advantage (and their business in 2010 when they filed for bankruptcy) not through lack of technology innovation, but through business model innovation. Developing new capabilities were centered around their existing, or known business model.

They didn't look to change the value proposition to the customer to address unconsidered needs that those customers like Reed Hastings had.

Netflix used the same technology as Blockbuster (they sent DVDs by post), but chose a different, subscription-based, business model that resonated with customers who didn't like the penalties imposed for late returns by Blockbuster.

It was only later that Netflix leveraged the Internet as a delivery mechanism with video streaming rather than physical DVDs. It was again in response to how their customers consumed the services they provided. Customers started consuming video and movies on computers and mobile devices.

This is not the only example of business model disruption and some of the other well-known examples are (adapted from *Business Model Innovation Factory: how to stay relevant when the world is changing*[1] by Saul Kaplan):

- Apple netflixed Tower Records
- Amazon netflixed Borders
- Email netflixed USPS (United States Postal Services)
- Google netflixed encyclopedias and libraries
- Craigslist netflixed local newspapers
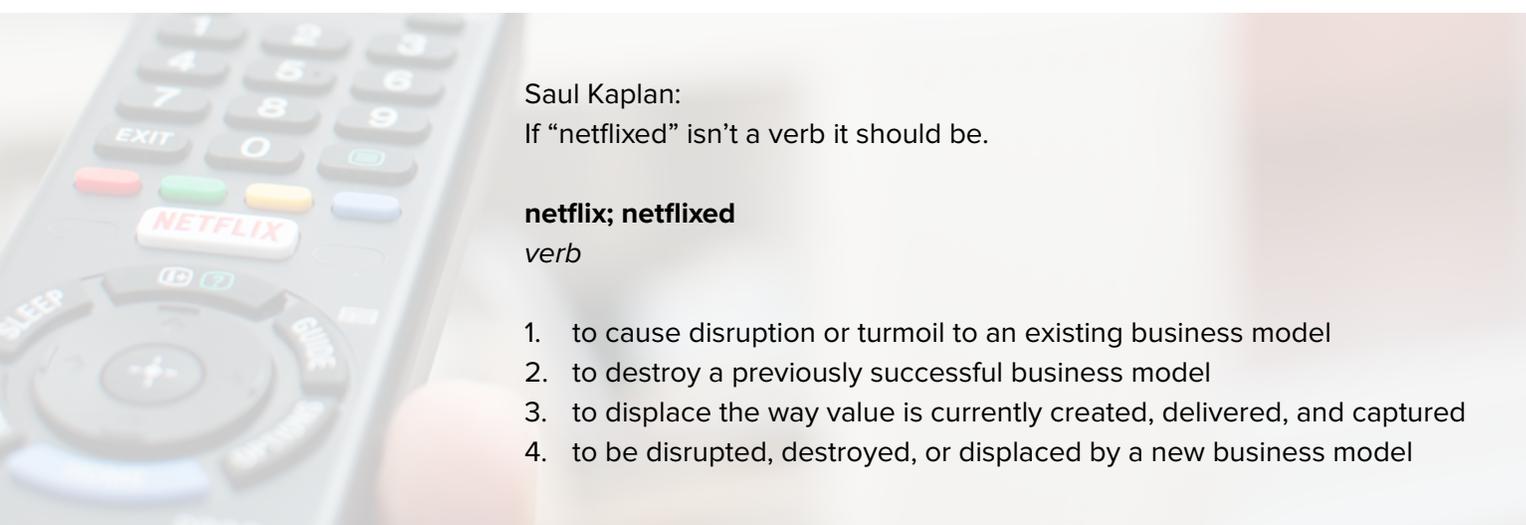
Saul Kaplan:
If "netflixed" isn't a verb it should be.

netflix; netflixed
verb

1. to cause disruption or turmoil to an existing business model
2. to destroy a previously successful business model
3. to displace the way value is currently created, delivered, and captured
4. to be disrupted, destroyed, or displaced by a new business model

This is not just an Internet phenomenon.
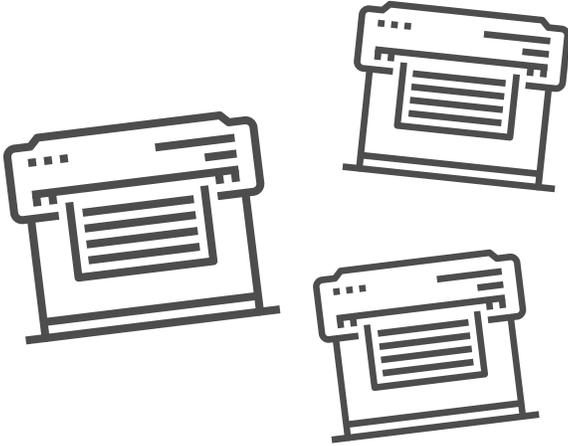
Think of Xerox in 1959 when they introduced the new model 914 photocopy machine. It is an example where a change in technology also necessitated a change in business model.

When Xerox (then called Haloid) developed Xerography technology that used electricity to produce images they were turned down by the likes of GE, IBM, and Kodak, primarily because it was more expensive than the current wet chemical processes.

Haloid decided to lease the equipment, instead of selling it, for a low monthly fee and then charge a per copy fee for copies in excess of 2000 copies per day. They provided all the required supplies, services and support and furthermore the customer could cancel the lease with 15 days' notice.

The Xerox case study is often featured by business schools as a prime example of business model innovation and disrupting the incumbent models of the time.

The Model 914 became a huge success and the company sustained a compound annual growth rate of 41% over a 12-year period.

The problem that many original equipment manufacturers (OEMs) face is that Industry 4.0

provides the perfect storm for business model disruption, in the same way that Blockbuster got "netflixed" and Xerox changed the office equipment market.

What Is Industry 4.0?

Industry 4.0 is often associated with the *Smart Factory* and from a technical perspective, it focuses on the end-to-end digitization of all physical assets in a manufacturing value chain and integrating it into digital ecosystems with value chain partners.

It leverages the Internet of Things, sensors, and data from the sensors in an interconnected way. Industrial production machinery not only produces "widgets", but these "widgets" communicate with the machinery and its supply chain, to tell it exactly what to do.

Wikipedia[2] describes this as follows:

Industry 4.0, Industrie 4.0 or the fourth industrial revolution, is the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of Things and cloud computing.

Industry 4.0 creates what has been called a "smart factory". Within the modular structured smart factories, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralized decisions.

Over the Internet of Things, cyber-physical systems communicate and cooperate with each other and with humans in real-time, and via the Internet of Services, both internal and cross-organizational services are offered and used by participants of the value chain.

From a business perspective, Industry 4.0 represents a network of open and interconnected suppliers, machines, customers and service partners that allows for new data-driven ways to increase operating efficiencies and create new revenue opportunities.

Where Industry 3.0 focused on automation, primarily through robotics in manufacturing, the next Industrial Revolution creates a network effect by allowing these manufacturing entities to monitor themselves and their processes and communicate that to the overall manufacturing value chain.

This data is not only useful to understand when machines are likely to fail and improve operational efficiencies, but it allows for new ways to provide services from these machines and create new revenue models.

The Perfect Storm For Industry 4.0

There are three primary drivers for the fast-paced adoption of Industry 4.0 practices and it creates the perfect storm for manufacturers to leapfrog competitors. This storm is also likely to wipe out those who don't see it coming and those who choose to ignore the warning signs.

1. There is an increased interest in "local" manufacturing with countries like the USA and Germany looking to increase their future competitiveness in global markets. Industry 4.0 is a well-funded initiative by the German government and it's gained international momentum as countries begin to regard this as a national priority to remain competitive.

2. Proprietary Operational Technology (OT) systems are forced to open up to the Internet of Things protocols and there is a fast convergence of OT and IT technologies. This not only connects previously incompatible systems, but it generates new machine-born data that fuels machine learning, artificial intelligence, and other analytical opportunities to drastically improve operational efficiencies and invent new business models.

3. The cost of sensors has come down dramatically and it is not reserved for the top end large-scale manufacturers anymore. Retrofitting existing equipment with IoT capabilities has come down in cost and complexity.

These three drivers accelerate the rate at which vertical and horizontal value chains can be digitized and integrated, how product and service offerings can be digitized, and how new business models can be created and digitized.

Business Model Innovation

Saul Kaplan describes business models as the way organizations create, deliver, and capture value.

Industry 3.0 Business Models For Manufacturers

The traditional business model for manufacturers has remained largely unchanged since the invention of the machine or Industry 1.0. Manufacturers produced product and sold it to its customer base with no further interaction with the product. Manufacturers retained a relationship with the users and consumers in order to sell more goods in future.

In the example of a machine manufacturer or builder, a machine would be sold and delivered to either a producer or a contract manufacturer. The machine builder would occasionally be involved in supplying replacement and maintenance parts. And most often the maintenance repair services were undertaken by the customer or 3rd party provider.

Little or no data existed around the operation of the equipment and typically none of that was available to the original equipment manufacturer. Some customers may have collected information for condition monitoring and maintenance purposes, but none of this was shared and most often it wasn't digitized.

The way value was created, delivered and captured was through traditional financial transaction-based interactions.

The price of an Industry 3.0 machine was determined by its manufacturing cost and not through the value that it provides in making "widgets". It is based on inputs rather than outputs and the only way for a machine producer to remain competitive in commodity markets, is to try and improve manufacturing efficiency.
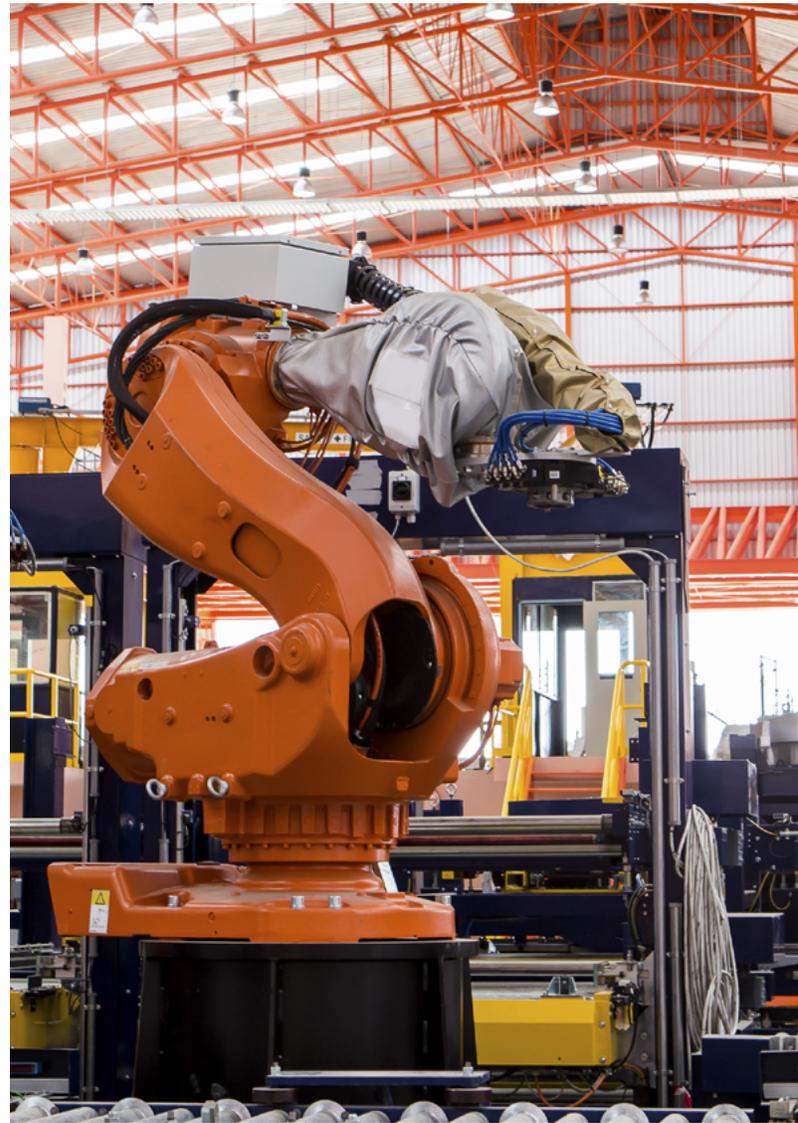

With mass automation and robotics at the heart of Industry 3.0, this approach has reached saturation. Efficiency gains are marginal in countries like the US and Germany and the drivers of Industry 4.0 are changing the traditional business models.

Industry 4.0 is Happening Right Now

According to the PwC 2016 Global Industry 4.0 Survey (Industry 4.0: Building the digital enterprise)[3] that surveyed more than 2000 companies in 26 countries, first movers are almost 3 times more successful in combining high revenue increases with significant gains in cost-reduction.

What is even more significant is that most of the respondents expect to double the level of digitization by 2020.

In this survey, PwC found that while Industry 4.0 was on the radar for many companies in 2014, it is no longer a "future trend" and is now at the heart of their strategic and research agendas.

33%

+39%

72%

High level of digitisation today

High level of digitisation in 5 years

	Today	In five years
Vertical value-chain integration	41%	72%
Horizontal value-chain integration	34%	65%
Digital business models, product and service portfolio	29%	64%
Product development & engineering	42%	71%
Customer access sales channels & marketing	35%	68%

Today   **In five years**
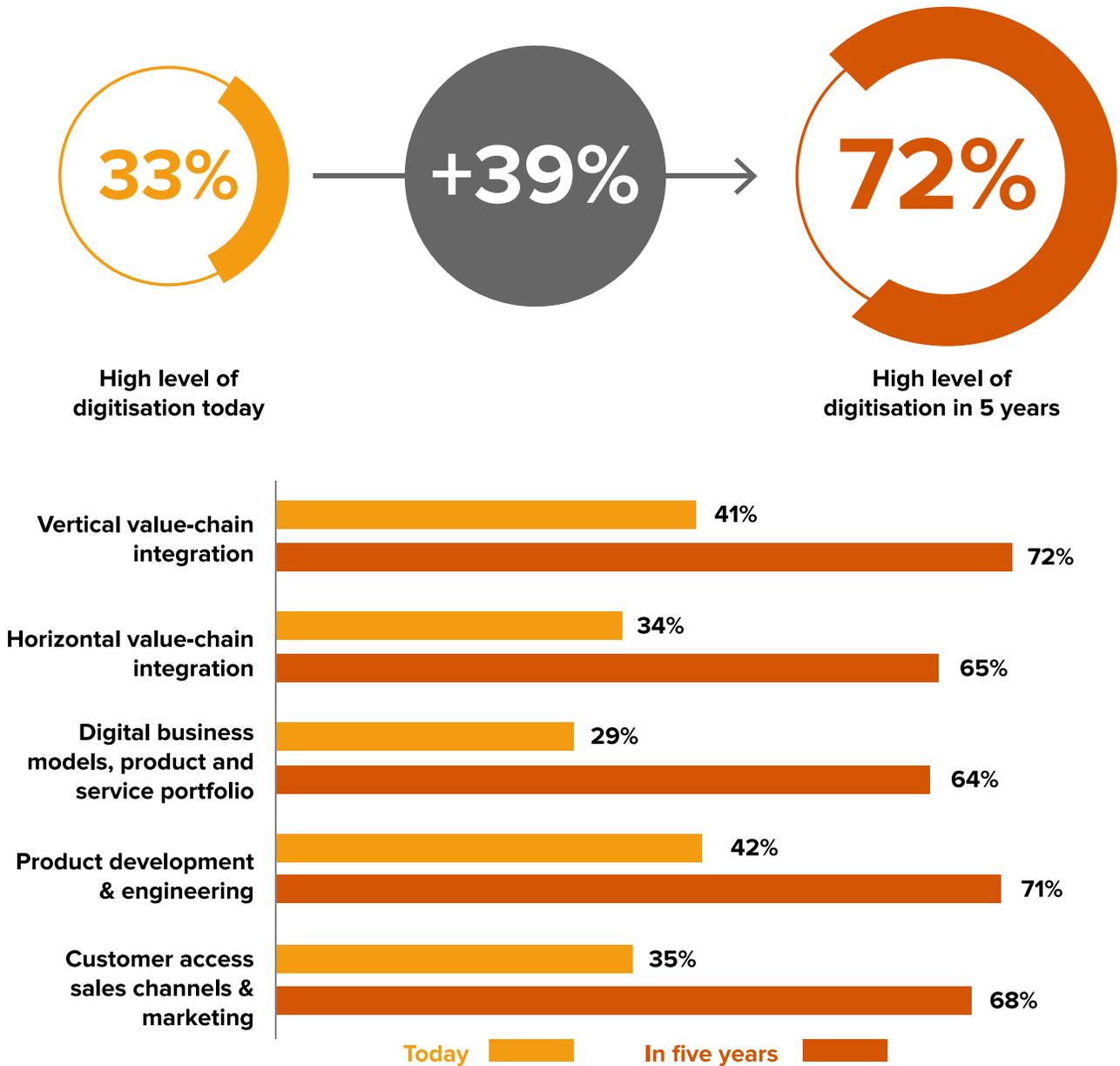
Shown: Percentage of companies surveyed reporting high degrees of digitisation and integration

Figure 1

Adapted from Industry 4.0: Building the digital enterprise

This means that most organizations plan to do as much in the next 3 to 4 years as they have done in the decades leading up to Industry 4.0.

But, the major challenge for organizations that do not keep up is not the fact that they won't have the infrastructure and technology to support Industry 4.0 to improve operating efficiencies and create new revenue streams.

Their major challenge is that they will not be "networked" into the new interconnected value chains of the smart manufacturing ecosystems.

Their lack of horizontal integration will mean that they cannot collaborate with their machines at their customers and provide meaningful insights to their suppliers in real-time, like their competitors will.

Most of the leading equipment manufacturers are now shipping their machines with extensive monitoring capability as they understand that future business models will rely heavily on capturing value on the output side of the equipment.

The diagram below shows how the evolution from Industry 3.0 to Industry 4.0 is also changing the value chain by introducing servitization opportunities.

In the traditional Industry 3.0 model, value for the machine builder is derived from a markup on the input cost and effort.
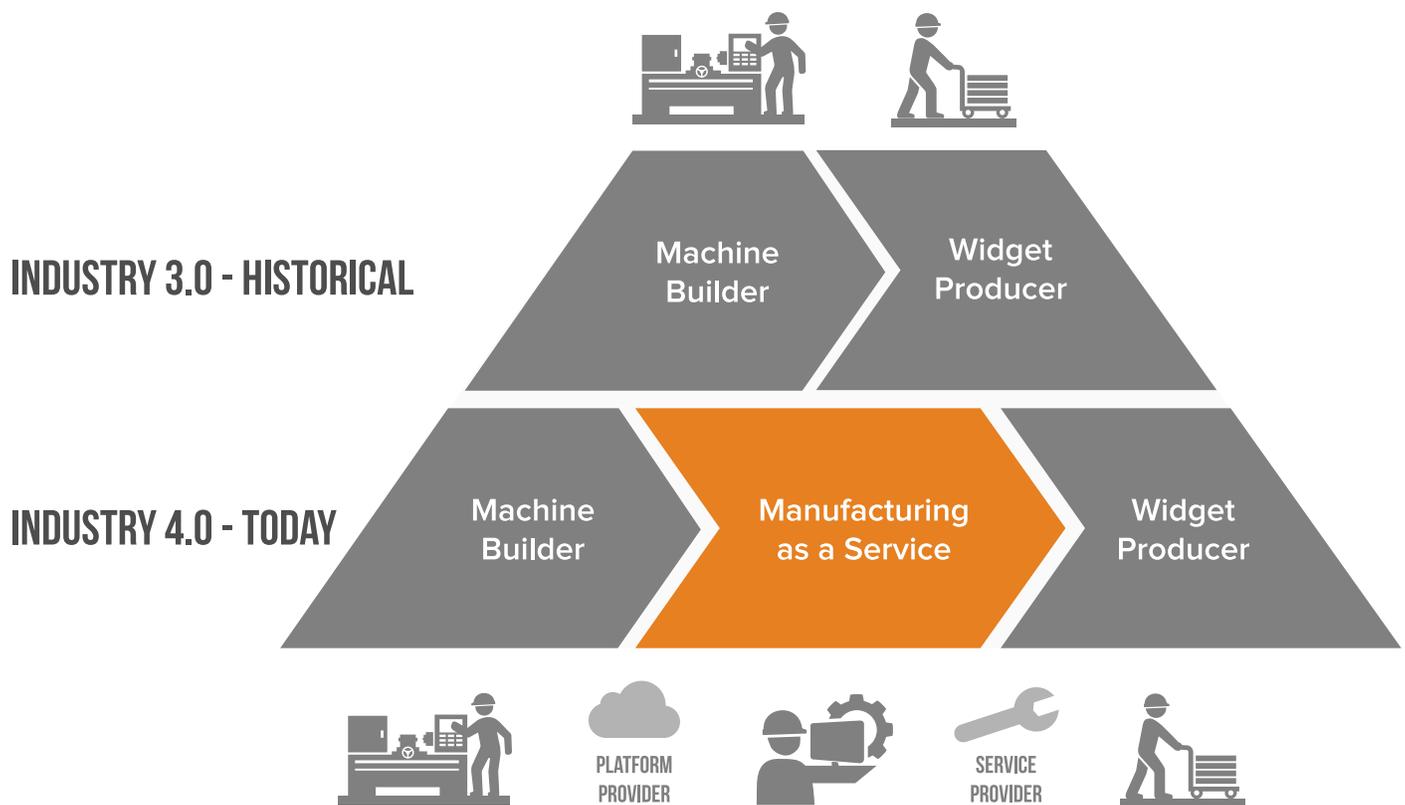

Figure 2

Current business models that are emerging with Industry 4.0 add a new component to the value chain and the opportunity exists for the machine builder or service provider to disrupt the traditional way that value is captured. "Manufacturing as a Service" as shown in figure 2 is a new data-driven service where the "Widget" producer doesn't own or operate the machines, but pays for widgets produced. It is the Xerox model all over again, and OEM manufacturers are in the unique position to capitalize on this.

Current manufacturing examples of this include:

Robots as a Service where the service provider owns, operates and maintains the robots in customer production facilities. This service provider gets paid for "widgets" made, rather than just servicing and maintaining the producer's equipment. In this example the robot manufacturer did not seize the opportunity to provide the service and a third party provider stepped in to netflix them.
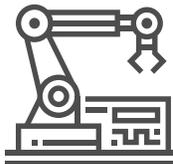
Additive manufacturing services (3D printing services) has moved beyond prototyping experiments and a number of well-known "widget "producers have their products printed as a service. The benefits are numerous from an efficiency perspective, but the real benefit for them is their ability to now offer new business models for monetizing their products. They can now offer "lot sizes of one" with very short lead times.

The Future For OEMs in Industry 4.0

10% of all companies surveyed and 27% who are first movers anticipate more than 30% increase in revenue while reducing more than 30% of their costs, by implementing Industry 4.0 capabilities through to 2020.

10% All Companies

27% First Movers

% of companies achieving >30% increased revenue and >30% reduced costs simultaneously by 2020

196

Revenue Growth — >30% / <30%

Cost reduction — <30% / >30%
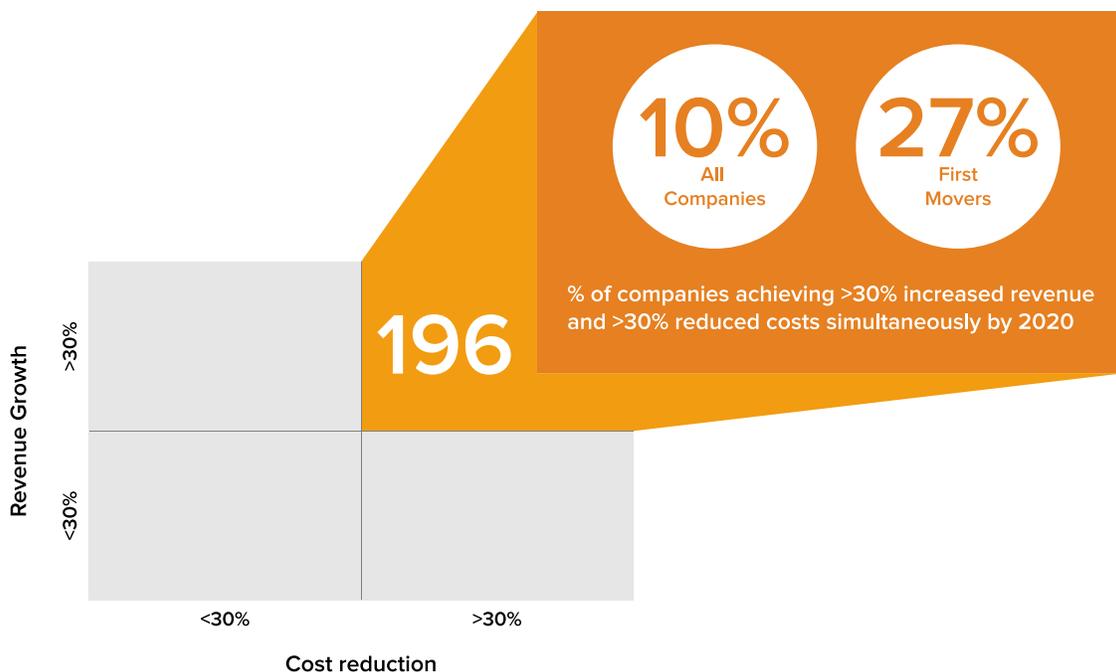
Adapted from Industry 4.0: Building the digital enterprise

Figure 3

Industry 4.0 Business Model Dilemma for OEMs

The OEM manufacturers that will netflix the market are those in the top right quadrant of the diagram. Their business models will support new revenue generation while being supported by operating efficiencies to sustain their competitive advantage. These manufacturers are looking at the new "Manufacturing as a Service" component of the value chain and finding ways to build that into their future digital products and services.

Intelligent Business Operating System For Industry 4.0

The systems needed to support the new business models described in this whitepaper are evolving in the same way that the IoT technology for Industry 4.0 evolved from the automation systems and manufacturing systems in Industry 3.0.

The technology in the smart "things" and sensors, the big data that they generate, and the cloud platforms it runs on, are all part of the evolution of OT and its convergence with IT.

Industry 3.0 saw the rise of Enterprise Resource Planning (ERP) and Manufacturing Execution Systems (MES) to support the scale and speed of robotic manufacturing automation. These systems are still necessary for Industry 4.0 but they need to be combined with real-time monitoring and processing capability to provide the situational awareness that systems need to support this new interconnected and real-time mode of manufacturing. These real-time systems need to communicate and orchestrate both horizontally and vertically across the manufacturing value chain, inside and outside the organization. Augmenting this with artificial intelligence and machine learning algorithms provide a new "Intelligent Business Operating System" or iBOS for Industry 4.0.

INDUSTRY 4.0 - FUTURE

Machine Builder

Manufacturing as a Service

Widget Producer

PLATFORM PROVIDER

SERVICE PROVIDER

ERP

Real-Time Orchestration & Enablement Platform

ERP

ERP

INTELLIGENT BUSINESS OPERATING SYSTEM
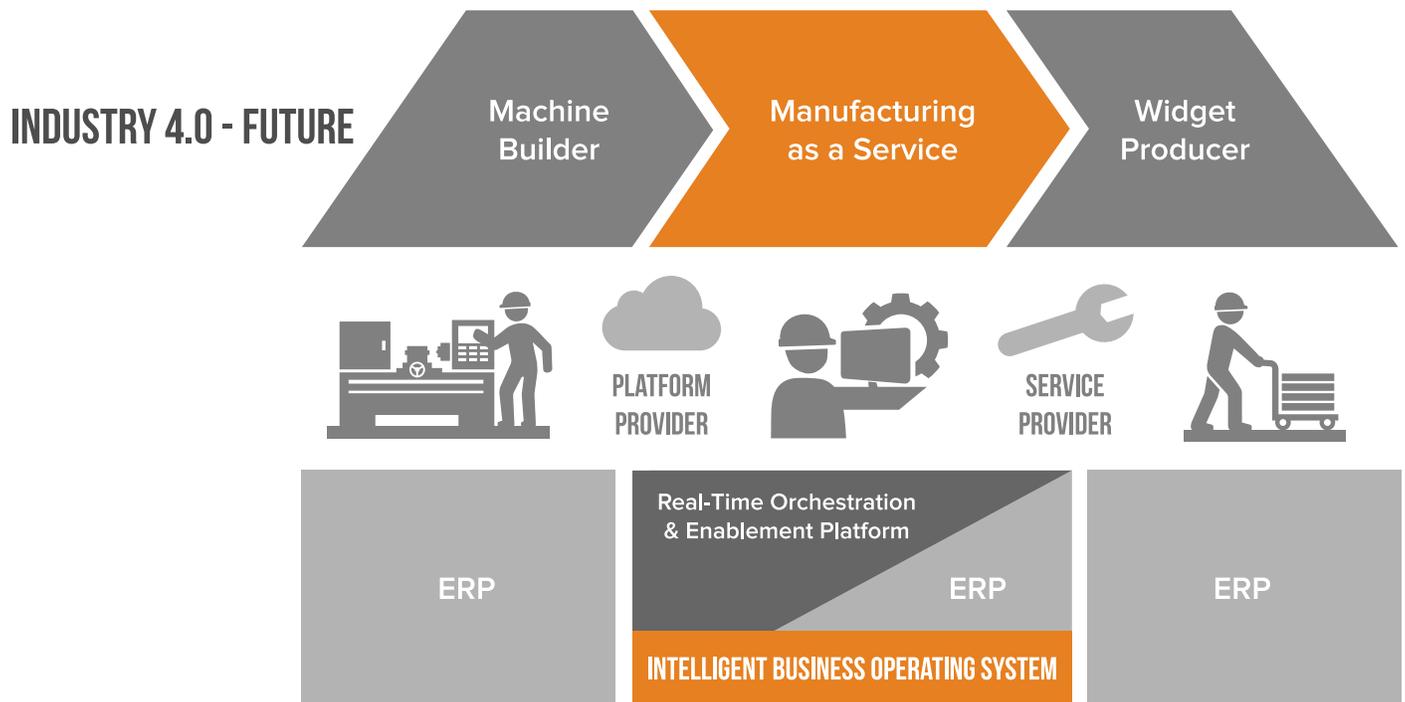
Figure 4

Such an intelligent business operating system provides the platform for monitoring real-time operations and ensuring the efficiency gains and cost reductions needed to stay competitive in the Industry 4.0 landscape. To netflix competitors requires the intelligent business operating system to support the creation, delivery and capturing of value delivered through disruptive, digitally supported products and services. Some of these capabilities include:

- digital billing through traditional or micropayments and also support cryptocurrencies

- continuous asset performance monitoring with predictive and/or cognitive learning

- event response coordination through real-time situational awareness

- service level monitoring with real-time event response capabilities

- product lifecycle management for connected goods

How To Avoid Being "netflixed" as an OEM

Industry 4.0 is more about the change in business model and the required business model innovation than it is about IoT and technology. It requires strategic thinking supported by digitalization through technology that wasn't available only a few years ago. To be successful and remain competitive as an original equipment manufacturer will require strategic leadership that focuses on business model innovation more than technical innovation.

The Netflix and Xerox stories for Industry 4.0 are yet to be discovered and written. Here are a few pointers your organization can review in the next 90 days when you consider your Netflix strategy:

- Create an open forum in your business to discuss potential new business models that include digitization and servitization of the equipment that you are manufacturing and selling.

- Actively engage in Business Model Innovation workshops. Consider using experienced practitioners to help you facilitate ideas.

- Keep a running list of business model options and consider which to experiment with.

- Look at what other industries are doing. Consumer markets often provide indicators of business model innovation that could be applied in more traditional OEM markets.

- Tool up. Put the building blocks for an intelligent business operating system in place that will allow you to experiment and test new business model innovations.

- Brainstorm on digital IP and algorithms that you can develop for your products (and potentially those of your competitors) that will provide a digital revenue opportunity.

- Ensure that you have systems in place that can do value-based billing to monetize your "Manufacturing as a Service" solution.

- Continuously remind yourself of the Blockbuster story - look for the Netflix in your industry and make sure you see them coming.

Industry 4.0 is leveling the playing field once again for manufacturers of all sizes to compete for the new value wedges in a service-based economy. New business models that support Industry 4.0 are already here. It's not a future trend and at the current rate of change it will be "game over" by 2020 for those organizations that don't only change their technology, but also their business models.

"Industry 4.0 is not a technology shift, it's a paradigm shift."

- Pieter van Schalkwyk

About The Author

As the Founder and CEO of XMPro, which is used by two Fortune 10 companies, Pieter van Schalkwyk oversees a team of experts who obsess over helping customers solve complex industrial IoT challenges. He earned his Bachelor's Degree in Mechanical Engineering and his Master's Degree in Information Technology.

He has accrued nearly twenty years of IT and software development experience and more than ten years of engineering experience, having first been employed as a plant engineer and maintenance manager by a large chemical manufacturer. Pieter brings a unique mix of engineering and IT skills to solve the unique challenges of Industrial IoT solutions in asset intensive industries.

Pieter is currently serving as a co-chair for the Industrial Internet Consortium's (IIC) Ecosystem task group and is also a co-presenter on the recent openSAP Imagine IoT course.

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1. S Kaplan, 2012. The Business Model Innovation Factory: How to Stay Relevant When The World is Changing. 1st ed. Hoboken, New Jersey: Wiley.

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3. Dr. R Geissbauer, J Vedso, S Schrauf. 2016. PwC 2016 Global Industry 4.0 Survey - Industry 4.0: Building the digital enterprise. Available at: https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf. [Accessed 19 October 2016].

To watch an 8-minute demo video go to xmp.ro/8min-iot-demo
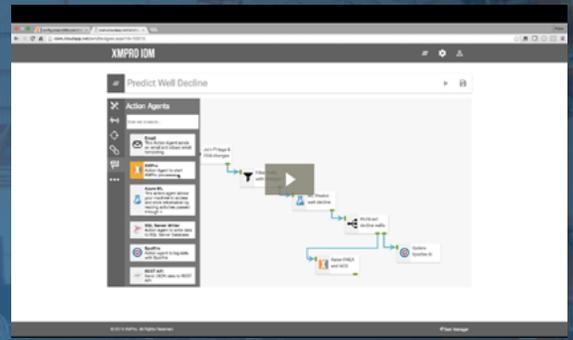
About XMPro

What it is: Industrial IoT Orchestration & Enablement Platform

What it does: Visually orchestrates IIoT inputs with business logic to compose agile IIoT applications that create calls to action

What it means:
- Subject matter experts can create, prototype and deploy real-time IIoT applications to support new business models and improve operating efficiencies for OEMs that are looking to provide digital, real-time "manufacturing services".

- Reuse existing OT, IoT and business data to drive calls to action in EAM, ERP and other business systems as a new intelligent business operating system.

- Create new digital products based on predictive analytics using machine learning algorithms and big data.

For more information visit xmpro.com or send an email to info@xmpro.com