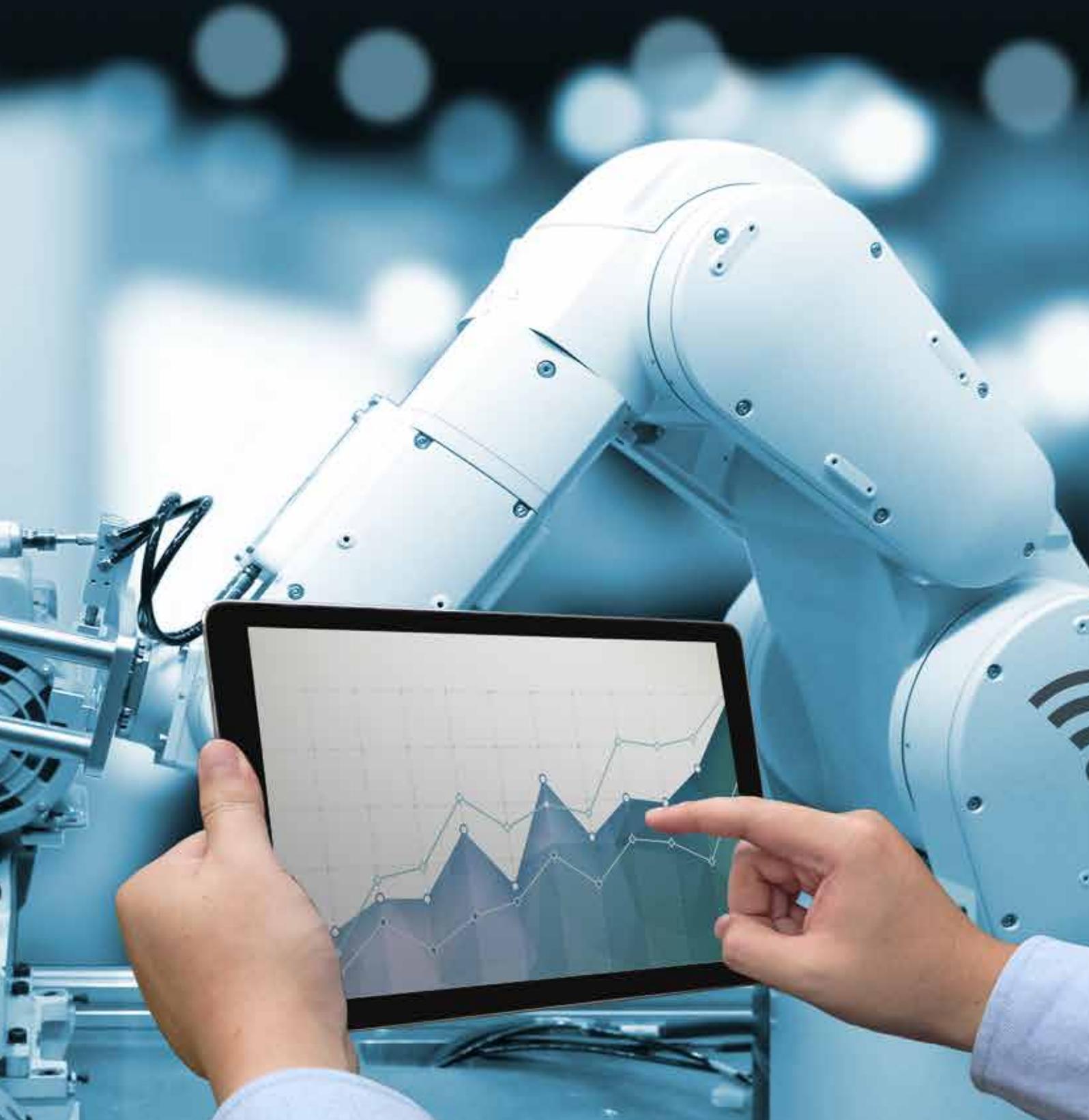


# How Software is **POWERING** the Hardware Renaissance



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## Welcome



Marc Andreessen wrote his famous article – Why Software is Eating the World – in the Wall Street Journal six years ago, and since then the notion that every organization needs to become a software company has become reality.

Today, software is increasingly crucial for business performance and revenue opportunities. And as end-users begin to demand more options and control of their devices and data, entire industries are being forced to change their business models and strategies to cater to their customers.

Whether you know it by the coined term “software-powered hardware renaissance”, the Internet of Things (IoT), or intelligent devices, the software-hardware combination has been around since the 1970s. In the 1980s the software boom helped make it more accessible, with industries like manufacturing using it to improve business and production known as ‘smart manufacturing’.

While the hardware-to-software business movement has been around for a while, many hardware technology companies are seeing both the challenges and new opportunities from transitioning to software and services business models. Whether it’s pay-as-you-grow, outcome contracts, everything-as-a-service, software licencing, subscription modelling or simply software monetization, many industries are redefining the way they sell.

With the hardware industry at a pivotal point, and organizations continuing to shift away from hardware as the main revenue driver, we wanted to take a closer look at how companies are or have integrated a software monetization strategy into their business processes.

Whether for operational efficiencies, development of value-added services, entering new markets like the IoT or improved customer satisfaction, understanding how their company mindset changed with the advancements in software, data and analytics could be critical for those about to make the change.

We wanted to find out how this shift was impacting them to understand what benefits they’ve seen and the challenges they experienced.

Ariella Shoham,  
**SR DIRECTOR MARKETING, SOFTWARE MONETIZATION**

# Executive Summary

Gemalto's 'How Software is Powering the Hardware Renaissance' research was developed to understand how crucial software is becoming to device manufacturers, specifically in improving business performance and growing revenue. It found that, as end-users begin to demand more options and control of their devices and data, entire industries are being forced to change their business models and strategies to cater to their customers. The report provides industry data and insight into why companies are shifting to a software - driven mindset including the operational drivers and benefits, and new opportunities like data monetization and the Internet of Things (IoT).

While still in the early stages, four in ten (37%) organizations have already shifted their business model to be software rather than hardware centric. The trend is set to continue, with the majority (84%) of other organizations in the process of changing and 14% plan to start in the future.

Despite being few in number, those hardware technology companies that have shifted to a software-centric approach to business have seen significant benefits, with an average increase in revenue of +11%. This same group also reports a slight increase in costs of +2% on average – leaving a 9% net increase. Of those surveyed, the top benefits seen were driving diversity in hardware with software features (86%), remote feature upgrades (84%), improved customer experience (84%) and the flexibility to adapt to market change (79%). The software also enabled a better control of copy protection for 76% of respondents.

The transition from hardware to software-based business has given organizations the opportunity to take advantage of, and monetize, the data they hold. However, around half (49%) of organizations either do not generate data or do not access it when generated, while a further 16% do not use data even if they have access to it. Despite this, over eight in 10 (85%) decision makers agree that the future of their organization's business resides in data.

The research also revealed that manufacturers see IoT as a key aspect that will fuel their futures. In fact, almost nine in 10 (88%) IT decision makers believe IoT is driving growth in the manufacturing industry, with a similar number (85%) believing that IoT is an opportunity to change their organization's business model. This is partly down to the benefits that many are anticipating it brings their hardware products. Enabling automated upgrades (61%), remote support (57%), collecting usage analytics (54%) and gathering better/more customer insights (53%) are all benefits that respondents believe IoT could/does bring to their organizations' hardware products.

## The Journey to a Software Company Mindset

Whether you're a start-up or an enterprise business, the benefits and opportunities of software are apparent. And while it might take time for larger, traditionally hardware-orientated, companies to build a software monetization approach into their business models, our research indicates that many hardware companies have come a long way since Andreessen's article.

The manufacturing industry is embracing software over hardware as its primary business model. The report shows that the 84% of organizations in the sector are changing how they operate. In fact, 37% have already made a full shift to a software-centric business model, one that places software at the core of how a company runs and generates revenue.

Globally, businesses in France are mostly likely (96%) to have changed, while those in Germany (90%), UK (88%) and the US (87%) are all likely to have updated already. Businesses in Japan are least likely to have changed their business models (58%).

# What's driving change

To understand more about why these changes are taking place and where software monetization can support, we took a closer look at the drivers for modifying business models.

Over half of those that have changed or are changing their business model to software-based selling have done so or are doing so due to the desire to increase revenues (54%) and to reduce costs (52%) line.

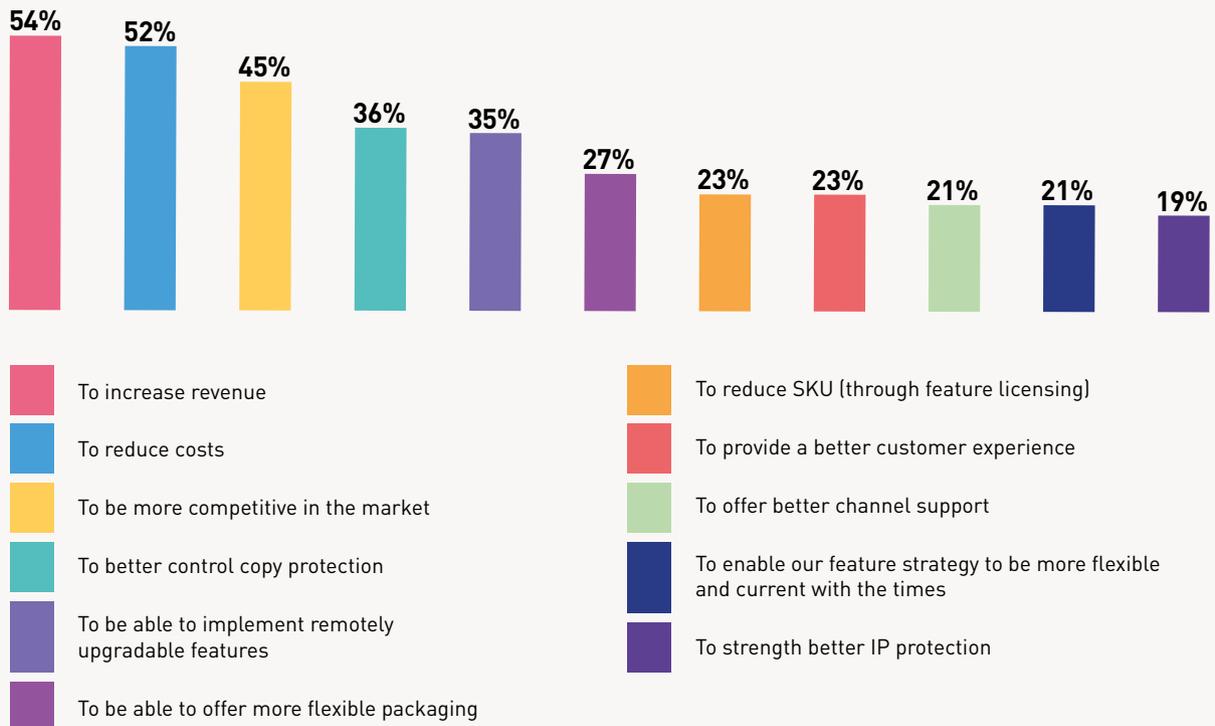
Disruption in their sector and increased competition are also seen as reasons to make changes. A similar proportion (45%) are being driven by wanting to be more competitive in the market and around a quarter (23%) to provide a better customer experience.

Across the globe, most countries agreed that financial factors were driving changes, with the most likely drivers for changing business model ranked as:

- > **UK:** to increase revenue (61%)
- > **France:** to reduce costs (52%)
- > **Germany:** to reduce costs (62%)
- > **US:** to increase revenues (57%)
- > **Japan:** to be more competitive in the market (48%)

Although organizations' drive towards a software-based selling model is likely to be led by potential financial gains, this change impacts a range of important areas. The drivers for organizations that have changed or are changing their business model are; being competitive in the market (44%) and providing a better customer experience (33%).

## Drivers for changing the business model



**Fig.1** Why has your organisation changed/changing the business model from hardware-based selling to software-based selling?

# Benefits of a software-centric business model

The research further reinforces that those organizations that have changed their business models from hardware to software centric are seeing substantial benefits.

Over eight in 10 have driven diversity in hardware with software features (86%), implemented remote feature upgrades (84%), improved customer experience (84%). Other common benefits include increased flexibility to adapt to market change (79%), better protection (76%) and being more competitive in the market (73%).

Combining the benefits seen with the drivers of change shows that a move to a software-centric business model can have many of the benefits organizations are looking for. In addition, it highlights that those yet to start the process of changing their model will be missing out on substantial opportunities and benefits.

## Benefits due to moving towards software-based selling



**Fig.2**

Analysis of respondents' organisations that have already experienced the following improvements

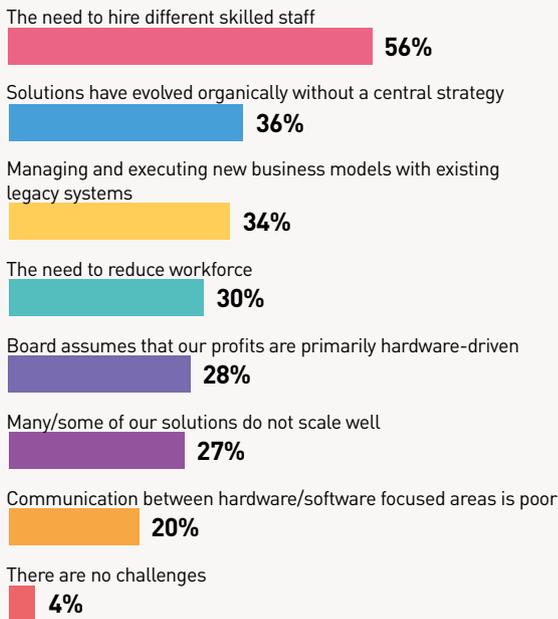
# Challenges experienced in changing models

When it comes to practicalities around implementing new business models, almost all (96%) organizations that have changed or are changing have experienced some challenges in making it work.

Despite the benefits seen, hardware companies report some challenges in moving from a hardware to software centric business. However, most are related to how they adjust working processes and strategies.

One in two (56%) respondents reported that they needed to hire staff with different skills. Around one in three said solutions evolved organically without a central strategy (36%) and managing or upgrading legacy accounts with outdated legacy accounts (34%), caused challenges in the transition.

## Challenges experienced



**Fig.3**

What challenges has your organisation faced in making the business model from hardware-based selling to software-based selling work in practice?

## Why is this important?

Whether it is business efficiency, pricing flexibility or extended market reach the benefits of switching from a hardware-centric business model to one led by software are clear. While hardware becoming a commodity, software can bring the flexibility needed to add extra value to both end users and the business offering the solution.

However, it requires a change in business processes and mentalities within an organization. Selling a piece of equipment, device or hardware is different to selling a service or using software to reduce long-term costs and improve efficiencies.

As organizations look to strengthen their offering with more customizable options for customers, there is a need for a dynamic, yet structured, approach to become a software-centric business – ensuring control of software licencing, protecting IP and, ultimately, monetizing the software.

Businesses need a software monetization strategy that connects the different pieces of the go to market – whether it's managing entitlements, or linking with the organization's financial systems and customer support services. This end-to-end integration is essential to ensure the internal benefits to a company are optimized, while providing a positive customer engagement experience from the initial onboarding process through to the complete product lifecycle.

## Investment in software development

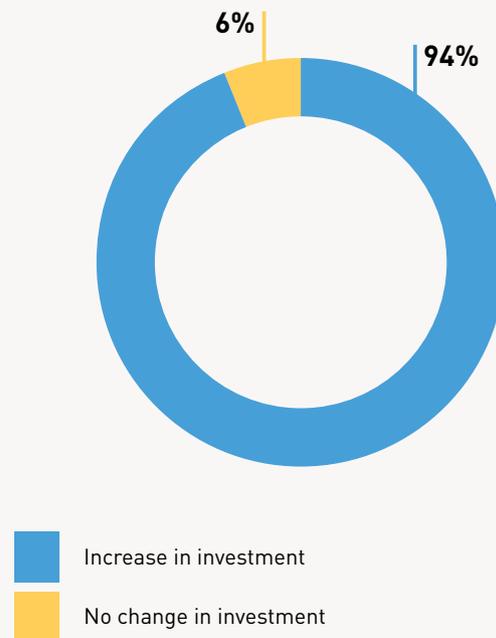
Now that the benefits of moving to a software-based business model are more clear, it can be expected that organizations will increase their investment in software development.

In fact, almost all (94%) have already done so over the past five years, with no manufacturing businesses reporting a decrease in their investment in this area. According to PWCs 2016 Global Innovation 1000 Study, companies will recruit less mechanical engineers and more software engineers. Additionally, the number of firms where electrical engineers are projected to be the top technical speciality will fall by more than one-third to 13% by 2020, while companies where data engineers predominate will double to 16% in the same time frame, posing challenges both for higher education and the job market.

With many organizations now moving towards -as-a-service offerings, and revenue from software expected to increase in the next five years, most organizations are allocating capital to drive these changes forward and ensure they are able to differentiate themselves from the competition.

This investment is most prevalent in Germany, where 100% of organizations are reported to have increased their investment in software over the past five years.

### How has investment in software development changed?



**Fig.4**

Compared to five years ago, how has investment in software development in your organisation changed?

# The impact of investing in software development

As a result of these increases, manufacturing businesses need to make changes to their strategy and investments in other areas. Around two fifths of organizations that have increased investment in software development have already reconfigured sales strategies (41%), are now working with new partners or third parties (41%) and have reorganised the structure of the organization (38%).

There's a positive impact on employees, with organizations willing to invest in people as their business models change. Most (64%) have already retrained employees and recruited new ones (58%), while 61% have or will reshuffle employees into different roles. Encouragingly, organizations are less likely to have released employees (25%).

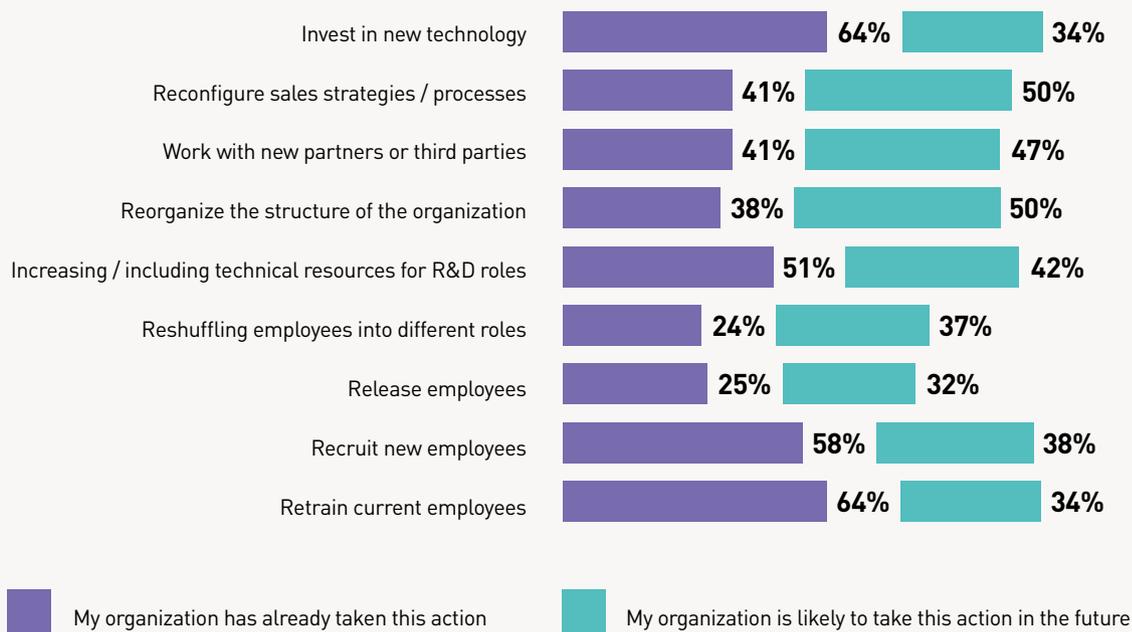
Those surveyed from Germany are most likely to say their organization has or will reshuffle employees (70%), and the least likely to say they have or will release them (50%), potentially due to local employment laws. Those from the UK or France are most likely to believe staff will be released at some point (63% and 72% respectively).

With manufacturing businesses keen to invest in retraining their staff, a change in skillset could be one of the biggest impacts of the software era.

As the skills gap – that is, the difference between the skills the workforce has and the skills hardware technology companies need to be successful – grows in many countries, not investing in retraining could mean employees will need to develop their skills themselves to maintain employability.

Hardware technology companies reshuffling employees into new roles are moving workers to a variety of different teams. While many are leaving hardware or production roles, the new roles they are moving into range from software and security to research and development.

## Actions taken as a result of investing in software development



**Fig.5**

What actions has, or will, your organisation take as a result of investing more in software development?

# Impact on revenue and costs

Thanks to business model changes, organizations are seeing an increase in revenue – but there are costs attached to this. Among respondents whose organization has changed its business model to software-based models, their organization has experienced an 11% increase in revenue, on average, as a result. Overall, 94% of this same group have seen their revenue increase.

However, half (50%) of respondents have also seen their costs rise because of amending their model, with an average increase of +2%. While the average revenue uplift clearly outweighs the costs, hardware technology companies need to be prepared to make investments before they can realise some of the financial benefits associated with a shift away from a hardware-based selling model.

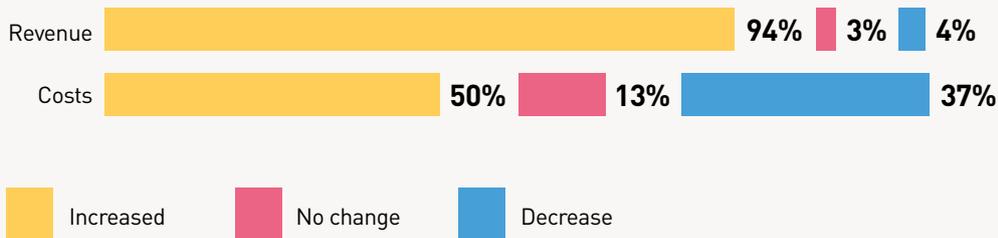
Looking more closely, the uplift in revenue changes depending on the improvements seen. When respondents' organizations experience improvements with 'more flexible packaging' and 'strengthen IP protection', they are more likely to report a slightly better average difference in revenue (+12%). However, when respondents' organizations experience the following challenges: 'The need to hire different skilled staff'; 'board assumes that our profits are primarily hardware-driven'; and 'staff resistance', decision makers are most likely to say costs have increased due to changing the business model, and that the average difference in cost is likely to be higher.

## Why is this important?

For software vendors that are looking to become more software-centric and differentiate themselves from the competition in their chosen market, it's important that their software monetization is built on a proven methodology that leverages best practices and optimizes the software investment.

While investment in software is a business priority, the knock-on effects mean the entire strategies of organizations must change. From how the product is developed, to how it is delivered and sold, software-centric approaches are shifting how businesses run. It can't be a one-off event. Successful software-centric business model implementation is a continuing process. And, for those willing to shift their business model, the financial benefits are clear, both in the short and long term.

## Impact on revenue and costs



**Fig.6**

Analysis of the increase/decrease in revenue and costs that have already been experienced due to changing the business model

# The new data economy

Despite software-based models offering the opportunity to generate and analyze considerable amounts of data, hardware technology companies do not appear to be capitalising on this yet. Around half (49%) of organizations do not generate data or do not access it when generated. A further 16% do not use data even if they have access to it.

Encouragingly, hardware technology companies seem to realize the potential that data holds, and are working on ways to take advantage. In five years' time, almost all hardware technology companies (93%) will generate and be able to access data.

Across the different markets included in the research, around a third (32%) of respondents in France have access to data but do not use it. Those in the US appear to be the most data-ready, with around a quarter (26%) already using data they generate to sell customers additional features and analytics. In five years' time, 48% from this market expect to be using data to upsell to customers.

This theme continues when looking at how hardware technology companies see the data they hold shaping their organizations in the future. Data is a 'currency' for organizations, which they are hoping to use wisely. In fact, over eight in ten (85%) decision makers agree that the future of their organization's business resides in data. A similar proportion believe that data will allow their business to develop better products by helping them build an understanding of what the market needs – which is an important success factor for many organizations.

With 72% of respondents agreeing that hardware-centric business models will be leaving money on the table as others monetize software-enabled hardware, the ability to extract insights will be important.

However, the skills problem continues in this respect. Nearly half (47%) admit that their organization does not have required skills in-house, indicating that this is another area hardware technology companies must consider when thinking how to reskill their employees, or lean on third-party support.

## Use of data now and in five years' time

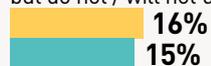
Our hardware products do not / will not create data



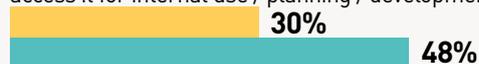
Our hardware products create data but we cannot / will not access it



Our hardware products create data and we can access it, but do not / will not use it



Our hardware products create data and we do / will access it for internal use / planning / development



Our hardware products create data and we can / will access it in order to sell the customer additional features and analytics

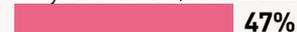


**Fig. 7**

Analysis of whether respondents' organisations can generate, access and use data now and whether that will change in five years' time.

## The important role of data

My organization does not have the skills in-house to be able to analyze data when / if we collect any



Those with hardware-centric business models in my industry will be leaving money on the table as others monetize from software-enabled hardware



The future of my organization's business resides in data



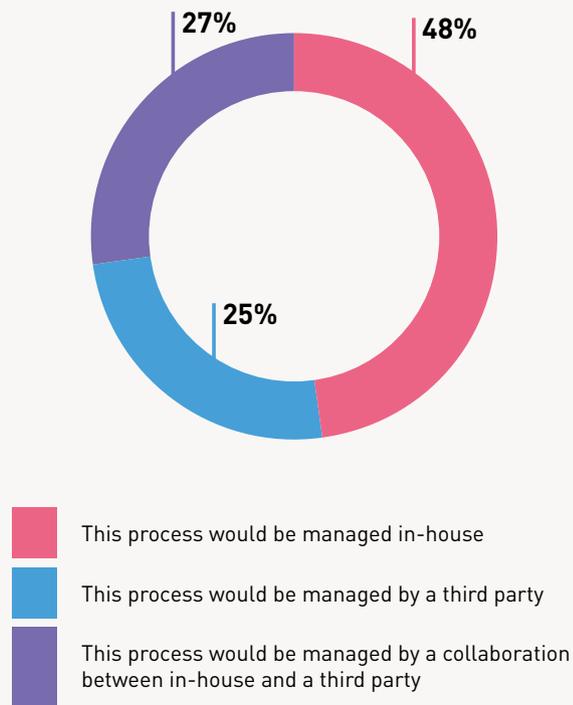
Data will allow us to develop better products by understanding what the market needs



**Fig. 8**

Those that selected agree for "What extent do you agree or disagree with the following statements?"

## The important role of data



**Fig.9**

Those that selected agree for "What extent do you agree or disagree with the following statements?"

## Why is this important?

Today data is much more than just information. It's the new oil. It's high in demand and crucial to driving not only organizations forward, but the world too. Sensor and machine data is transforming industries, so understanding data and drawing on its insights is crucial to the success of any organization.

Many business intelligence companies already provide the necessary tools to sift through and analyze endless data effectively. But the ability to take the data to the next level and monetize on it, will be the real breakthrough. However, Gartner even estimates that through 2018, 80% of companies will fail to monetize sensor and device data.

To overcome those barriers, it's expected that raw sensor and device data will be outsourced or sold to so-called emerging data marketplaces. These types of platforms will act as a broker mediating between those generating data and those wanting to consume it.

No matter whether you are a hardware technology company or a data marketplace provider, you must choose the right technology and partner to help you achieve your data monetization goals. The flood of data coming from sensors and machines will be useless, if it's not packaged and priced in a valuable way. To successfully embrace data monetization, hardware technology companies and data marketplace providers need to rely on software licensing solutions which are the backbone of implementing various data packaging and pricing models, and is tailored specifically to monetize your data.

# Software monetization powering the Internet of Things

With much discussion about its potential, hardware technology companies see the move to software as something that could help increase the benefits they see from this new wave of technology (IoT).

According to around six in 10 respondents, IoT would benefit their organizations by enabling automated upgrades (61%) and remote support (57%). In addition, over half say IoT can help with collecting usage analytics (54%) and gathering better/more customer insights (53%) – areas that organizations could improve on.

Since the previous Software Monetization study (2014/2015), there has been a significant increase in the benefits seen in the IoT. 61% of respondents from the industrial automation sector felt that IoT could provide their organization with new monetization opportunities. This is compared to 98% that see benefits with IoT during this year's study.

## Benefits IoT could provide to hardware products



**Fig.10**

What benefits does, or would, IoT provide to the hardware products that your organisation manufactures?

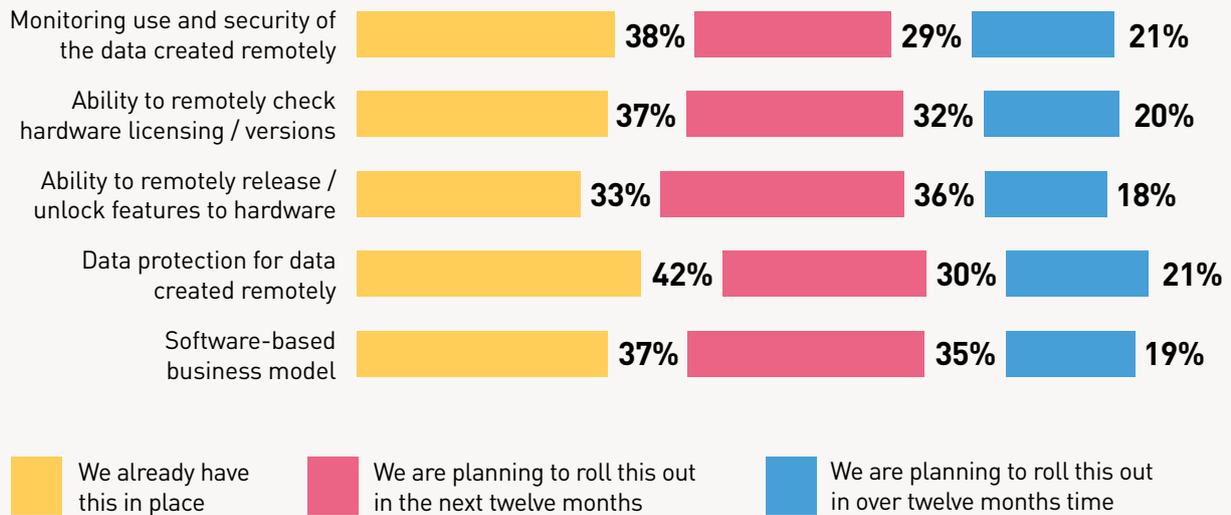
## IoT features implemented

The research clearly shows that IoT platforms and software development can work together to drive business model changes, which can increase revenue, make organizations more competitive and improve customer experiences.

Around seven in ten (69%) are, or plan to be able to remotely check hardware licensing/versions when rolling out an IoT solution. When/if this is achieved, this is likely to help organizations increase their revenue from hardware licensing (Fig 11). Security will also be improved. Two fifths (38%) can already monitor use and security of data generated remotely, with an additional 29% planning to implement this in the near future.

There has been a substantial shift in this area. In the 2014/2015 Software Monetization study, only 15% of the industrial automation sector was exploring how to monetize from IoT.

### IoT features implemented



**Fig.11**

When it comes to rolling out an IoT platform in your organisation, which of the following features does your organisation already have in place, and which would your organisation like to have in place?

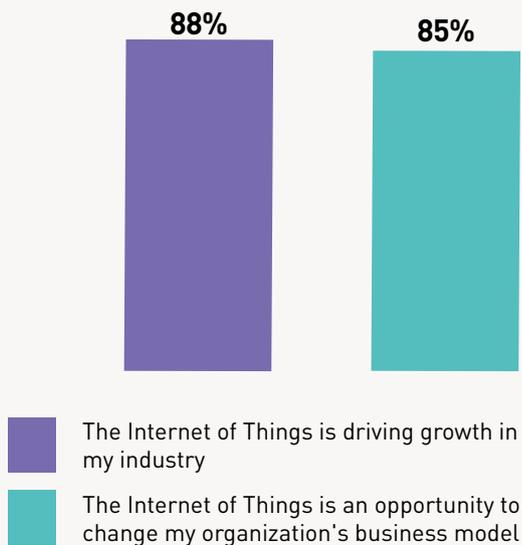
# The future of IoT

IoT is disrupting not just individual organizations but the industry as a whole. The vast majority of those surveyed believe that IoT is driving growth in the manufacturing industry (88%), and that IoT is an opportunity to change their organization's business model (85%).

Japan and the US see the biggest potential, with over nine in ten (94% and 91% respectively) agreeing that IoT is driving growth in their industry.

With this disruption, it's worth considering whether organizations will be able to design the required software for IoT adoption themselves. Only 35% of respondents' organizations do or would prefer to design the necessary software for their IoT integration and adoption in-house. Most (65%) have chosen/would chose to work with a third party. This is likely to be because software design/development skills are not in an abundance at most organizations, without retraining or hiring new staff.

## Benefits IoT could provide to hardware products



**Fig.12**

Those that selected agree for "What extent do you agree or disagree with the following statements?"

## Why is this important?

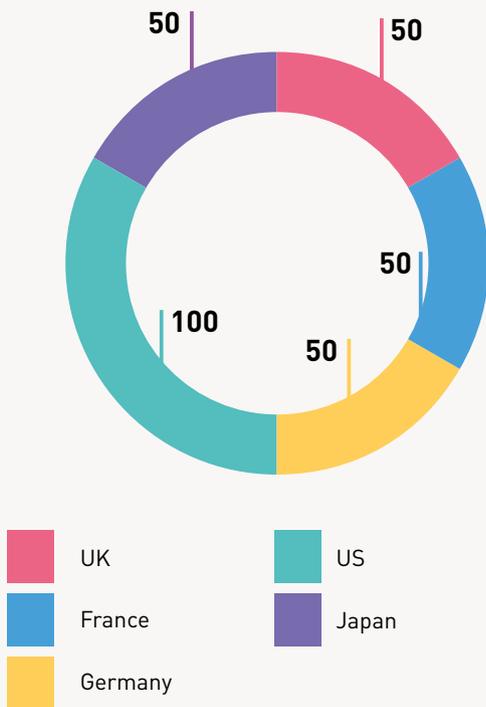
The IoT is helping hardware technology companies realize the potential that monetizing software can have on the bottom line. The connectivity of IoT devices creates a path to delivering new experiences and opportunities via its embedded software.

With flexible software-based licensing solutions, IoT hardware technology companies can ship the same product with different functionality to different customers at varying price points, and then upgrade those products remotely. Customers can use only the features they want, request additional features on-the-fly and pay only for what they use.

More IoT hardware technology companies choose to move away from perpetual to subscription based models, but still lack the technology to react effectively and to prevent themselves from potential threats and risks. In building new IoT offerings, it will be essential to consider working with expert partners to ensure your IoT infrastructure can scale to support automatic provisioning, updating, metering, and flexible business models.

## Demographics

This research was conducted with 300 business decision makers who have input into and/or responsibility for product development and how their organization's products utilize software. Respondents were from organizations that manufacture software-enabled hardware, across the US (100 respondents), UK (50), France (50), Germany (50) and Japan (50).



Manufacturer of healthcare / medical devices

**36**

Manufacturer of network and telecom equipment

**70**

Manufacturer of industrial automation instruments

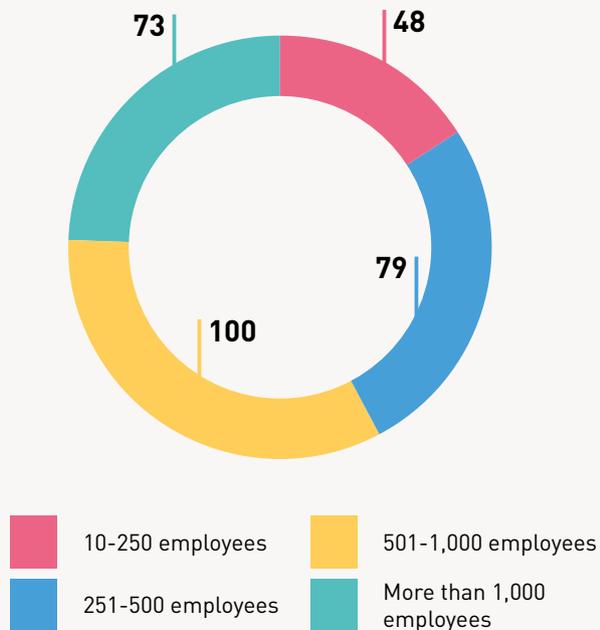
**124**

Manufacturer of industrial machines (for packaging, textile, automotive, etc.)

**69**

Other manufacturer

**1**



# Summary

At first glance it's easy to understand what Marc Andreessen was getting at when he wrote about software eating the world, but in truth it hasn't eaten the world, it's enhanced it. It's taking hardware technology companies to the next level, becoming integral to how businesses run and enabling them to take advantage of the data they are producing.

## Software strategy taking companies to the next level

In order to achieve the full benefits software has to offer, businesses need a software monetization strategy that connects every part of their go-to-market – whether it's managing entitlements, or linking with the organization's financial systems and customer support services.

What's driving this change is the need for operational efficiencies. By having more data available to them, better business decisions are being made, in turn leading to a more efficient business. Pricing will fundamentally change too. Businesses will begin to truly understand how their products are being used and the features that work best, ensuring more confidence for future product releases down the line, as well as simplifying channel operations for hardware technology companies. All this will help take businesses that embrace software to the next level.

## Investing in the business

While investment in software is a business priority, it affects how the rest of the business operates - from software go-to-market processes to how sales teams work, to the partners they work with and the training that is required. It mustn't be a one-off event. Successful software-centric business focus is a continual process. And, for those willing to shift their business model, the financial benefits are clear, both in the short and long term.

It's not just the business itself that is benefiting from investment though, with it also having a positive impact on employees. Hardware technology companies are keen on investing in employees by retraining them, recruiting new staff or shuffling people into different roles. Businesses are far more likely to invest in people than let them go.

## Monetizing the data

No matter whether it is a hardware technology companies or a data marketplace provider, each business must choose the right technology and partner to help achieve its data monetization goals. The flood of data coming from sensors and machines can't be used if it's not packaged and priced in a valuable way. To successfully embrace data monetization, hardware technology companies and data marketplace providers need to heavily rely on licensing solutions that are the backbone of implementing various data packaging and pricing models.

## The power of IoT

The IoT is helping manufacturing organizations realize the potential that monetizing software can have. The connectivity of these devices creates a path to delivering new experiences and opportunities via its embedded software. As more devices are connected to the internet, the possibilities for hardware technology companies are endless. This also comes in the form of IoT hardware devices themselves. Like all industries, for manufacturers it's all about making money and software monetization is helping them to ensure they are getting a return for their money and giving the opportunity to upsell. The trend towards subscriptions is on the rise, think Netflix and Spotify, and the same will be the case for IoT. Software monetization will help make this a reality, with different subscriptions models based on usage soon to be common place in the enterprise world.



At Gemalto, we believe that successful software-centric market approach is not built on one event, but through a continuing process. Only through careful alignment of strategy, process, design, technology and people can the software-driven business objectives be achieved.

This approach enables organizations to develop a scalable software monetization process using a proven methodology to achieve positive results, including: improved and more efficient licensing operations; great customer experience; increased customer satisfaction, and tangible return on investment.

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