March 2016

Bridging IT and OT for the Connected Asset Lifecycle Management Era

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Executive summary

More assets, more sensors, more data and more analysis are bringing asset-intensive industries into a new era of asset management, one of unprecedented connection and information.

But how do utility companies take advantage of these new opportunities? How can they best integrate their asset management efforts while building stronger visibility across the enterprise?

Now more than ever, utilities must be able to bring together disparate technologies and systems to better understand their increasingly complex asset base. They must also share insights from their assets across the organization.
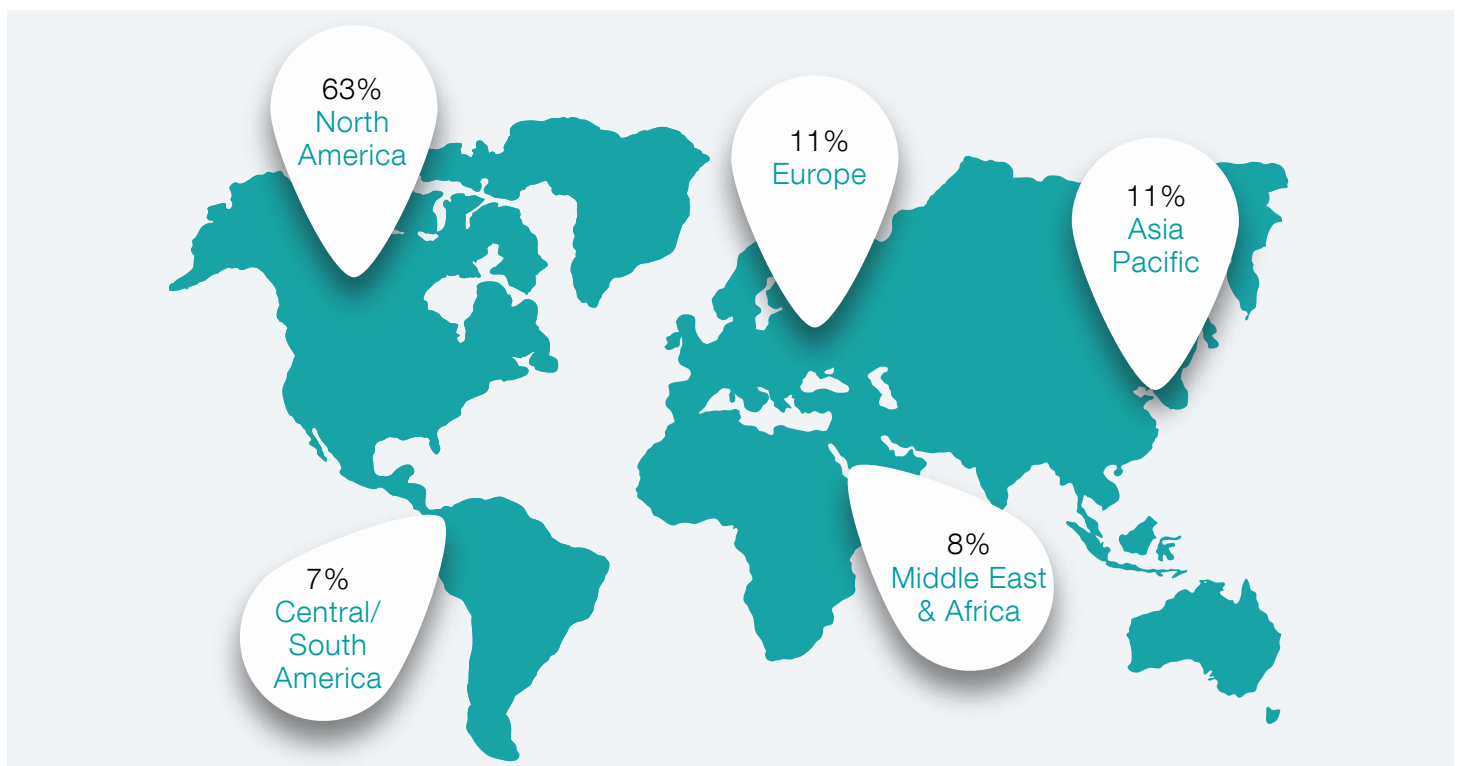
A key component of addressing these needs is to build stronger connections between information technology (IT) and operational technology (OT) – at both the technology and organizational levels.

To better understand the progress being made in the utility industry, ABB, Microsoft and Zpryme reached out to 221 utility executives to learn more about their IT-OT approaches to the next generation of asset management.
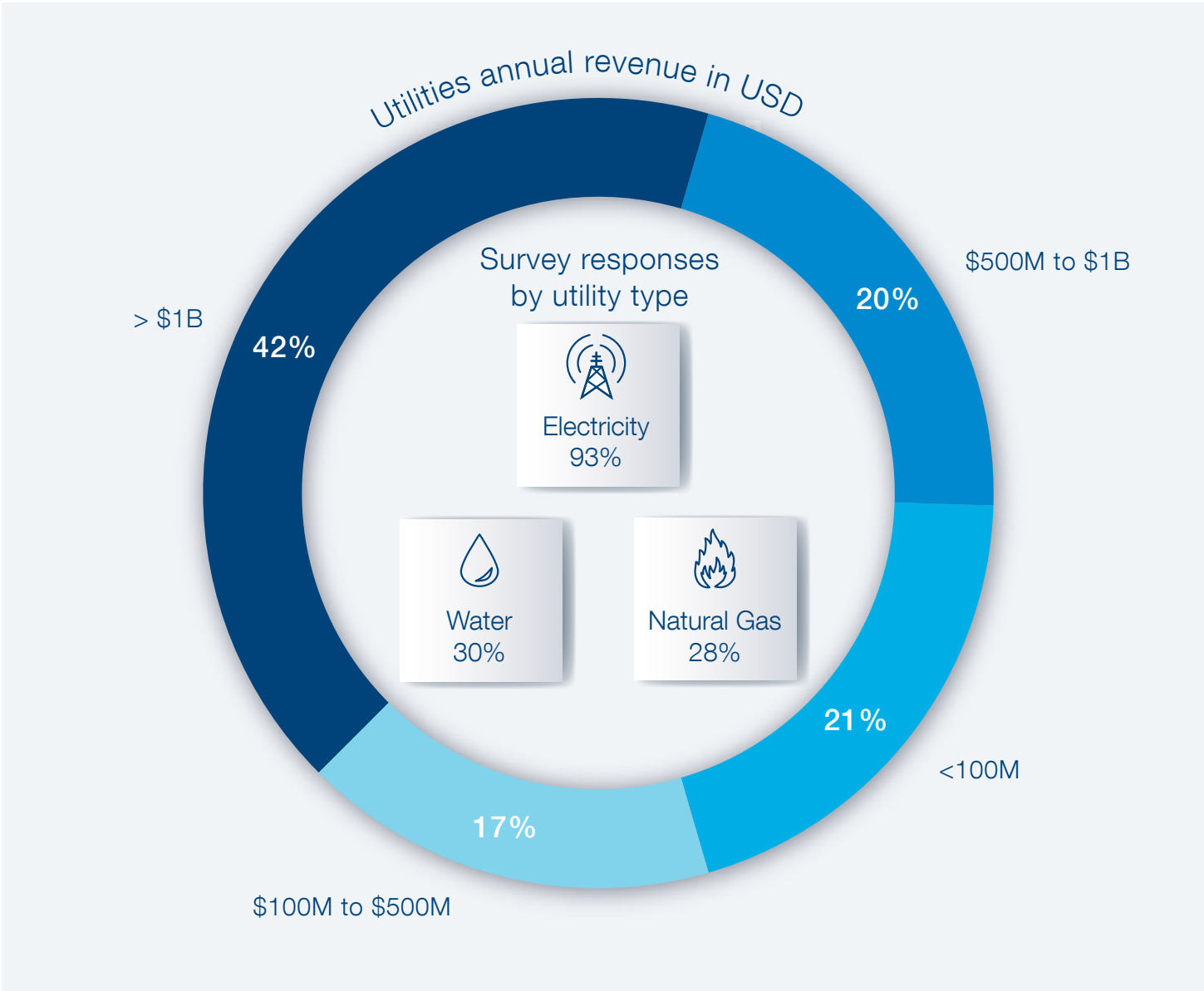
Key findings include:

– Nearly every respondent said asset management was a priority, and 55% reported that the importance of asset management had increased over the past 12 months.

– Approximately 35% of respondents said IT-OT integration for asset management is valuable, and 45% revealed it to be very to extremely valuable.

– Over a quarter of respondents indicated their IT-OT technology integration is not going well at all, and another 41% noted that it was only going fairly well.

– Most respondents felt their technology and business groups work together fairly well together (38%).

– The Internet of Things, Services and People (IoTSP) has the power to significantly influence utilities and their asset management operations. When we asked utilities how influential they thought the internet of things would be on asset management they rated it slightly above the midpoint – yet only 22% currently have a strategy in place.

**Survey stats: 221 responses from utility executives globally**

63%
North America

11%
Europe

11%
Asia Pacific

7%
Central/ South America

8%
Middle East & Africa

Respondent profile

Utilities annual revenue in USD

Survey responses by utility type

Electricity 93%

Water 30%

Natural Gas 28%

> $1B — 42%

$500M to $1B — 20%

<100M — 21%

$100M to $500M — 17%

Asset management is a priority – today

Along with expanding deployment of automation technologies, the smart grid era of utilities introduced an increasingly connected network of smart assets impacting electricity generation, transmission and distribution (T&D) – from smart meters to electric vehicles to community-scale solar and wind farms. Utilities are now recognizing the importance of asset management to support both emerging and existing assets.

Figure 1. Importance of asset management compared to other business efforts

High priority
52%

Moderate priority
40%

Low priority
7%

Not a priority
1%
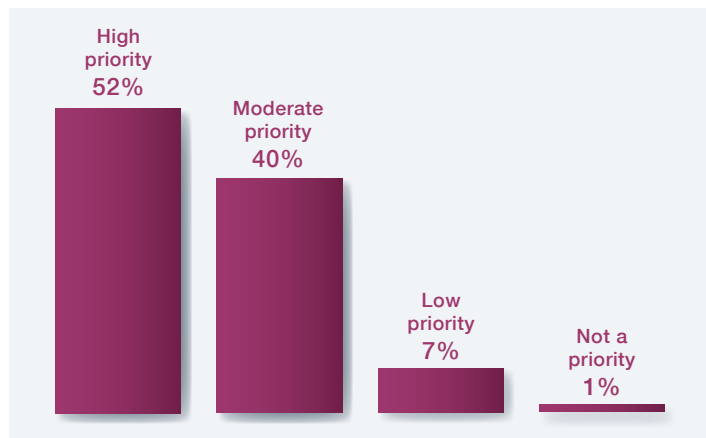
Smart grid and renewable energy initiatives unleashed not only new assets and greater connections, but also more data that utilities can use to better understand their asset management efforts. "The importance of asset management was eclipsed for a few years by the focus on smart grid investments, but now we're seeing it back on the upswing," said Rick Nicholson, Global Head of Product Management and Marketing for the Enterprise Software product group within the Grid Automation business unit at ABB.

Of the 221 respondents we surveyed, nearly every one said that asset management was a priority, and 52% listed it is as a high priority for their organizations (Figure 1). Furthermore, the importance of asset management is increasing for many utilities – 55% of respondents reported that the importance of asset management had increased over the past 12 months (Figure 2).

Figure 2. Change of asset management importance over the past 12 months

4% Less important

41% No change

55% More important
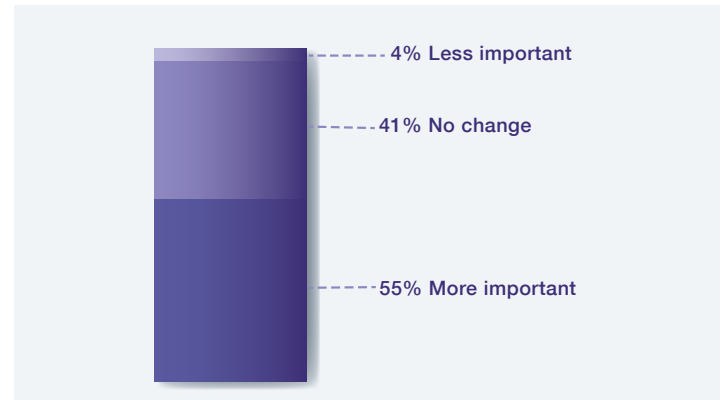
When thinking about asset management in a "connected" utility, it is often about real-time and predictive efforts – for example, identifying a potentially catastrophic transformer problem before it happens, correcting the problem, and saving the day. Although real-time asset management efforts are critical, another important perspective is the long-term view of assets for capital planning purposes. Over two-thirds of respondents listed capital planning as a high priority in their asset management efforts (Figure 3).

Figure 3. Importance of capital planning in asset management

High priority
65%

Moderate priority
31%

Low priority
3%

Not a priority
1%
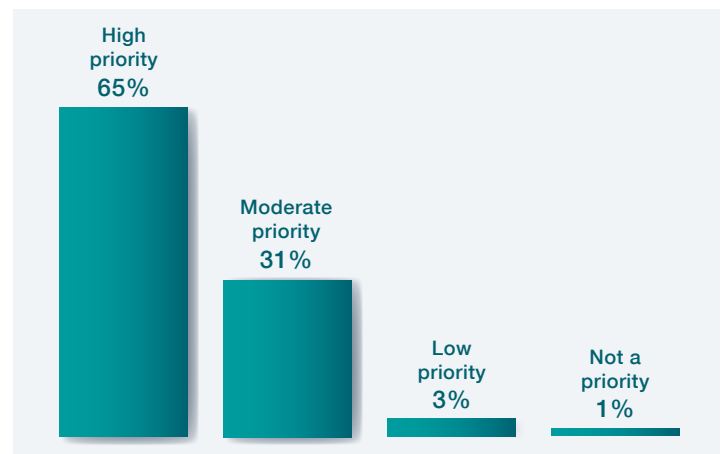
"Utilities already have an established practice of long-range forecasting for demand, and long-range forecasting for new projects and capital investments. We're going to see long-range forecasting applied to maintenance,"

– *Aaron Merkin, Chief Technology Officer*
Enterprise Software product group, ABB

> "Make sure you are coordinating across organizational boundaries so you're looking at a broader roadmap and not just an asset management roadmap."

Gary Cassilagio

Director – Business Applications, Distribution Operations, Pacific Gas and Electric (PG&E)

Utility spotlight

What are the biggest changes you see coming for asset management in the next few years?

One change is the ability to stay on top of very detailed design documentation and database management of the grid. There are so many different types of equipment and contributions to the grid right now that the ability to: (a) create and maintain a database which reflects that, and (b) correlate the impacts of those auxiliary grid-of-things type systems on the capacity component, will be critical.

Also, how do I correlate my capacity planning in a proactive manner so that I am looking out at least 2 to 3 years into a forecast model which tells me how much distributed energy resources (DER) I am going to see increase in the future and where it will be connected? And, how will it impact my planning focus over the distribution grid in the future?

And lastly is around technology and how we continue to deploy technology which keeps up with the visibility of both real-time and historical information on what is really happening on the grid, which will help downstream with our decisions.

How do you think utilities can best prepare for the changes that are coming in this industry?

The industry is a big industry but it's also a very tight industry. We really need mechanisms and forums to cross-communicate challenges that we each have and our lessons learned from them. We can learn from each other and not operate as silos. That's number one.

Number two is we certainly have to focus from a financial planning standpoint on the need to continue to deploy improvements around asset management databases, asset management systems and technology, as well as operational systems and technology. We really have to commit to the funding as well as the right expertise and teams to make progress and deploy these advanced operating and asset management systems so that we're never at a point that we don't have good visibility into what's happening on the grid.

The last piece is, this world is changing so rapidly for our stakeholders and our users that you have to focus on training and change management, and that means not only by the purest context of change management but also on training the right skill sets coming into these positions.

What are your recommendations for utilities that are just beginning to strengthen their asset management efforts?

I would certainly say to make sure that your strategy is broad, not siloed, and ensure that you are tied to the hip with operations. If you develop your asset management strategy without consideration of where your critical support needs are for this vastly and rapidly evolving space on the operation side, there is going to be a deficiency, and there's going to be a gap. Make sure you are coordinating across organizational boundaries so you're looking at a broader roadmap and not just an asset management roadmap.

IT-OT integration is critical for Connected Asset Lifecycle Management

We've seen that asset management is recognized as essential to the long-term success of an organization, and as utilities approach the next generation of Connected Asset Lifecycle Management™, these efforts will no longer be isolated within one group of a utility.

Integration will become increasingly important, particularly between IT and OT. Approximately 35% of respondents said IT-OT integration for asset management is valuable, and 45% agreed that it is very to extremely valuable (Figure 4).

Why does it matter? Why are utilities looking to better integrate their IT-OT efforts? Building upon what we discussed earlier, better long-term planning is a top priority (Figure 5). Another

priority is better visibility across their organization. Different systems and knowledge that can impact asset management efforts often sit in multiple areas of the utility. For example, there could be benefits from linking supervisory control and data acquisition (SCADA) to asset performance management (APM) systems for real-time asset analysis, or connecting enterprise asset management (EAM) systems to financial systems for better capital planning.

But it isn't just about integrating technologies and systems; it is also about integrating different departments and people to build stronger asset management efforts. In the next couple of pages we'll explore the importance of IT-OT integration for technologies, as well as for people.

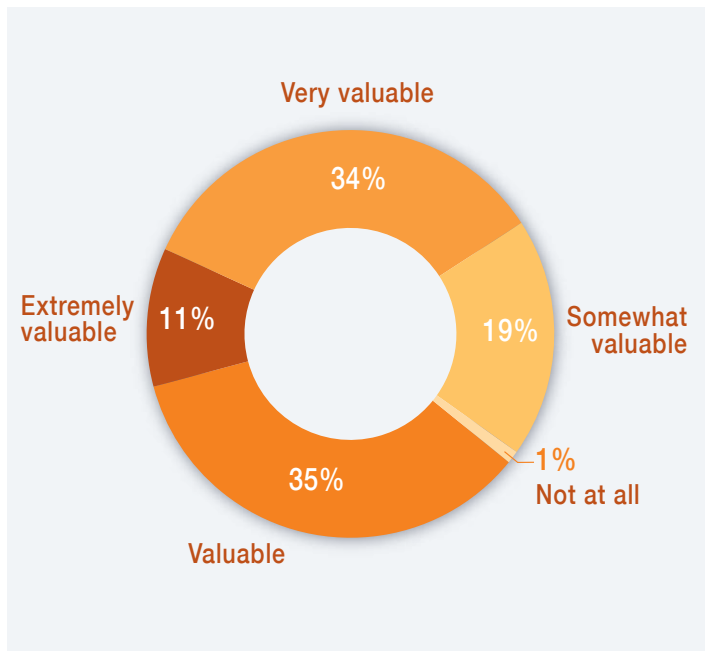**Figure 4. Value of IT-OT integration for asset management**

Very valuable

34%

Extremely valuable 11%

Somewhat valuable 19%

35%

Valuable

1% Not at all

Figure 5. Benefits of IT-OT integration for asset management (Average ranking on a scale of 1 to 5)

Better long-term planning	4.67
Improved visibility across organization	4.60
Cyber security	4.43
Forecasting & planning	3.98
Outage management	3.68

1 = LESS   BENEFIT   5 = MORE

"We don't look at asset management from a technical point of view – it's a financial perspective, and therefore, extremely important."

Bengt Johansson

Head of Asset Management and Design,
Ellevio AB (Sweden)

Utility spotlight

What does your IT-OT integration for asset management look like today, and how do you see it evolving as more assets become connected?

We believe we will connect more, of course. We are in a situation where we have recently been divested from the Fortum Group, meaning that we have an asset platform based on an international group perspective. That means that we will upgrade our asset platform including the asset management system, and that work is ongoing. We will also add stronger asset systems to monitor the performance of physical assets in the long run.

Who makes regulations for your company?

The government sets up the legislation and then you have a ministry that sets up the framework, and then there's the Energy Inspectorate, which is the authority that sets up the fine detail as to how to calculate different things from a functionality perspective. And then you also have the Electrical Safety Board which steers everything about electrical safety. The industry has its own set of recommendations about the safe way of working with electricity commissioning, fault repair, and so forth.

In the context of your utility's bigger picture, where does asset management fit in and how important is it as a strategic initiative?

It is the most important thing. We don't look at asset management from a technical point of view. It's a financial perspective, and therefore, it's extremely important. We need to invest in assets in order to keep up our income. We are emphasizing investments because that is the most financially valuable activity we can make so long as we reinvest in old assets and improve the quality of supply.

How do asset lifecycle management and long-term capital investment planning fit into your asset management programs?

It's an integral part. We modeled the whole business into a time perspective, and, after something is getting to be 50 years of age and no matter how well they work, they still don't give any income amounts and therefore, they are changed. It's very clear by the regulations. But, otherwise of course, we have to do things like other countries to monitor the functions, to understand the risk for outages and so forth. The company has a model as to what assets should be changed, down to equipment type level and the expected cost structure if, for example, we change technology from uninsulated over-headlines to all cable. We model all those things, and we drive the company based on that.

"We need more and more integration with SCADA and secondary information that is not needed for direct operations to the maintenance systems in order to understand what is being experienced in the field as well as to forecast potential risks."

What are the biggest changes you see coming for asset management in the next few years?

For our part, it's very much to be able to fulfill our investment plans because we're ramping up so heavily. In the long run, it's more to get a deeper understanding about how we can optimize maintenance over the lifecycle of assets and the functionality, of course. For that purpose, we believe we need to have more online information on the bigger sites and the high voltage network. While we're on the local grid, we need to get more information about the voltage quality as well as the outage information. We have automatic meter reading for all of our customers, which means we know, in practice, if the meters and the network are up and running. We need more and more integration with SCADA and secondary information that is not needed for direct operations to the maintenance systems in order to understand what is being experienced in the field as well as to forecast potential risks.

What advice or recommendations would you suggest for utilities that are just beginning to strengthen their asset management efforts?

Optimize your understanding of the lifetime of the asset – when to replace it and when to maintain it. You also need to have a good understanding of the regulatory framework as a basis, and from that bringing up a strategy within that framework. What type of surveillance should I have online? What should be done by physical inspections? And then, of course, you need to have a strategy as to how you develop your assets. But it depends on what type of company you are. We are financially driven, but many companies are more driven from a technology point of view.
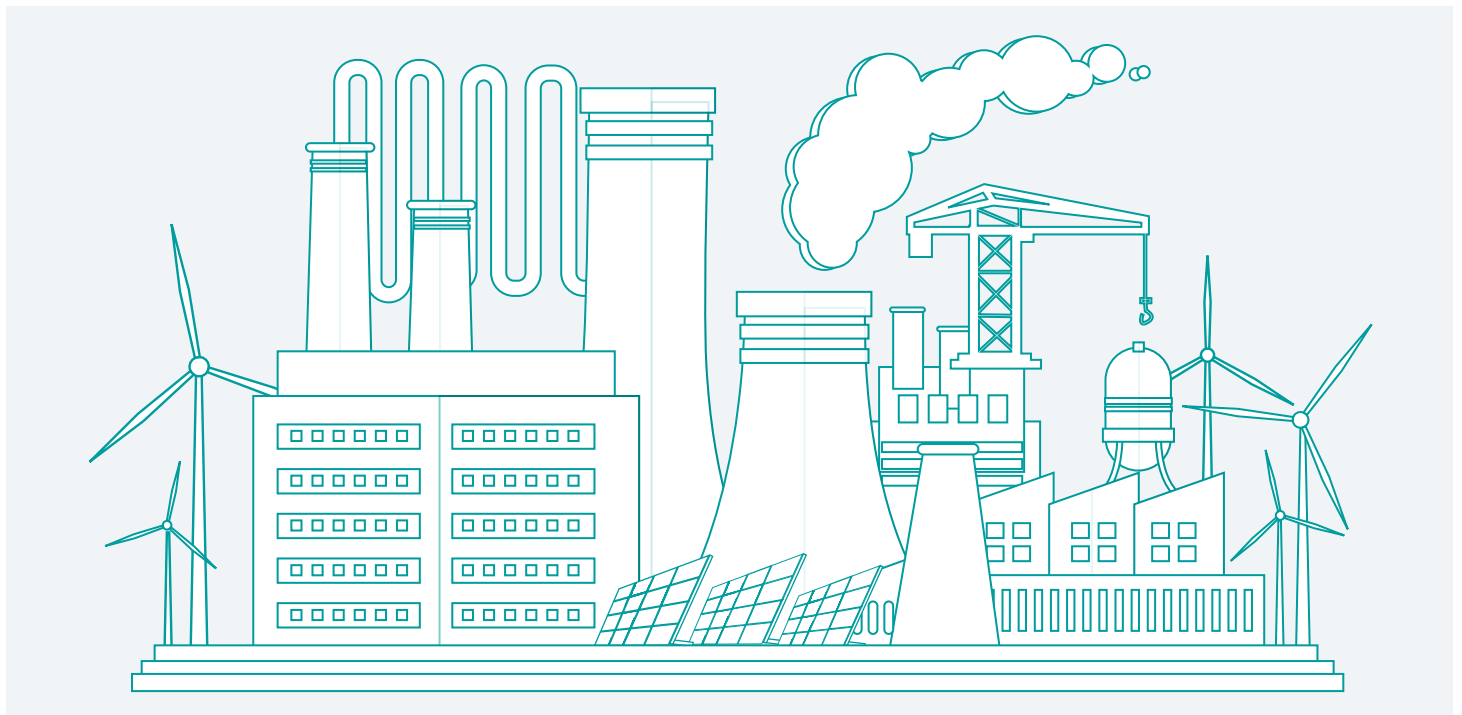
IT-OT integration: technology

When we think of IT-OT integration, technology is often what comes to mind. As shown in Figure 6, many technologies from across the utility contribute to asset management, including customer information systems (CIS) and outage management. In fact, with an average rating of above three, all of the technologies we listed for survey respondents were of above-average importance.

Many applications are important for asset management, and the integration among them can help release the best visibility into asset health and planning. Figure 7 shows some of the key areas for integration, including APM to real-time systems, and EAM to APM.

"Integration is really about the sharing of data," said Gary Rackliffe, Vice President of Smart Grids North America for ABB. "For example, integration between SCADA and asset management systems is about getting real-time data for critical assets. You want to make use of all the data across the organization and you want people to use all of the data. The sharing of information is important."

How well are integration efforts going? Over a quarter of respondents said the integration is not going well at all, and another 41% noted that it was going fairly well (Figure 8). There is still some room for improvement.

"Some systems are sparse in data, and common identifiers; it can be difficult to relate them together while keeping the data in sync," said CJ Parisi, Chief Data Scientist, Enterprise Software product group, ABB. "Utilities can't always correlate data in real time making it a challenge to be completely accurate."

Figure 6. Importance of applications for asset management (1 = no role, 5 = significant role)

Application	Rating
SCADA, DCS, real-time control	3.92
APM	3.87
Outage management	3.72
EAM	3.71
GIS	3.56
MDM	3.52
ERP	3.46
MWFM	3.33
CIS	3.32
Supply chain management	3.19

1 = NONE   ROLE   5 = SIGNIFICANT

Figure 7. Value of integrations (1 = no value, 5 = extremely valuable)

Integration	Value
APM to real-time systems	3.86
EAM to APM	3.78
EAM to real-time systems	3.75
MWFM to real-time systems	3.44
APM to MWFM	3.32
EAM to MWFM	3.32

1 = NONE   VALUE   5 = EXTREME
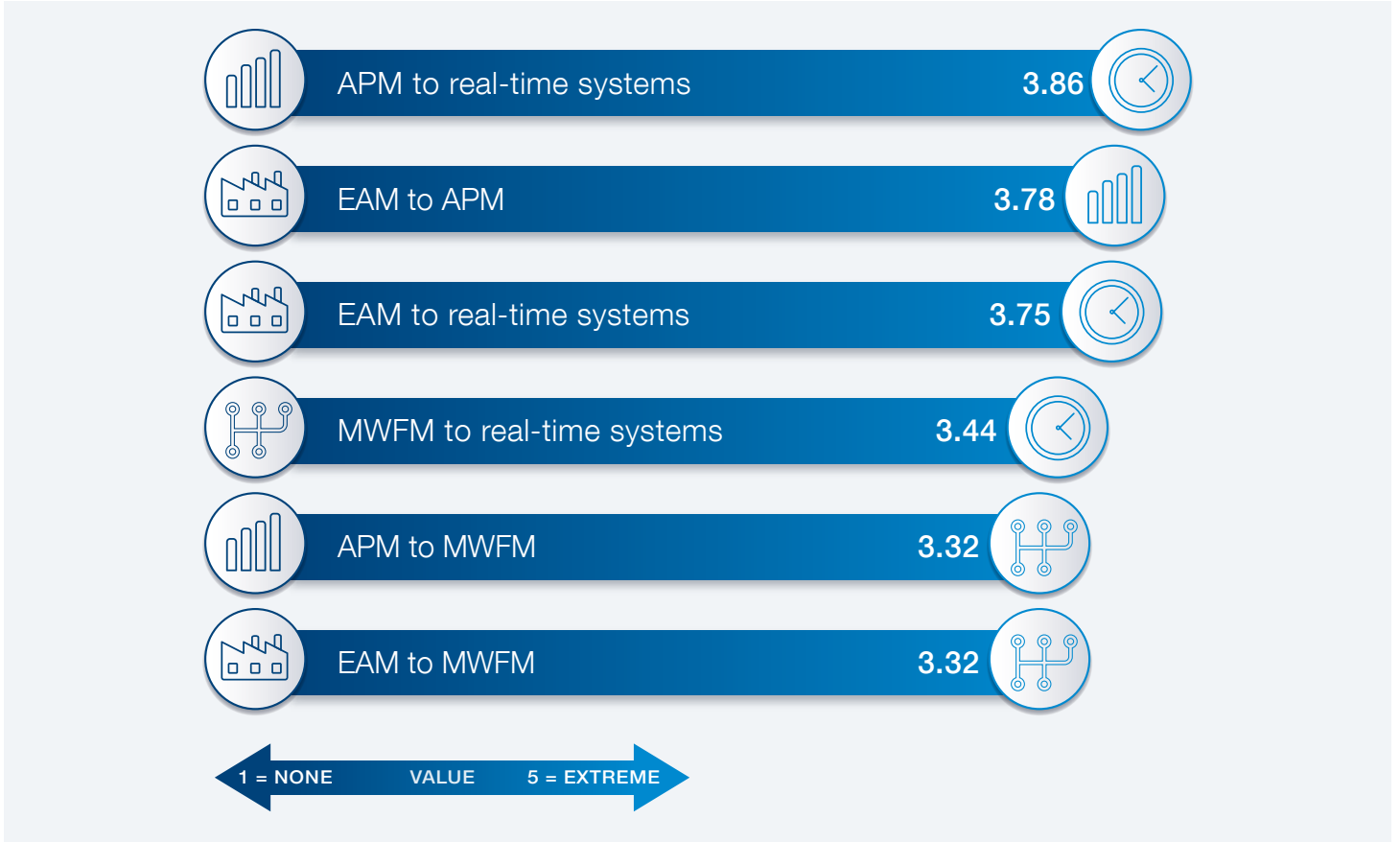
Figure 8. How well applications are integrated today
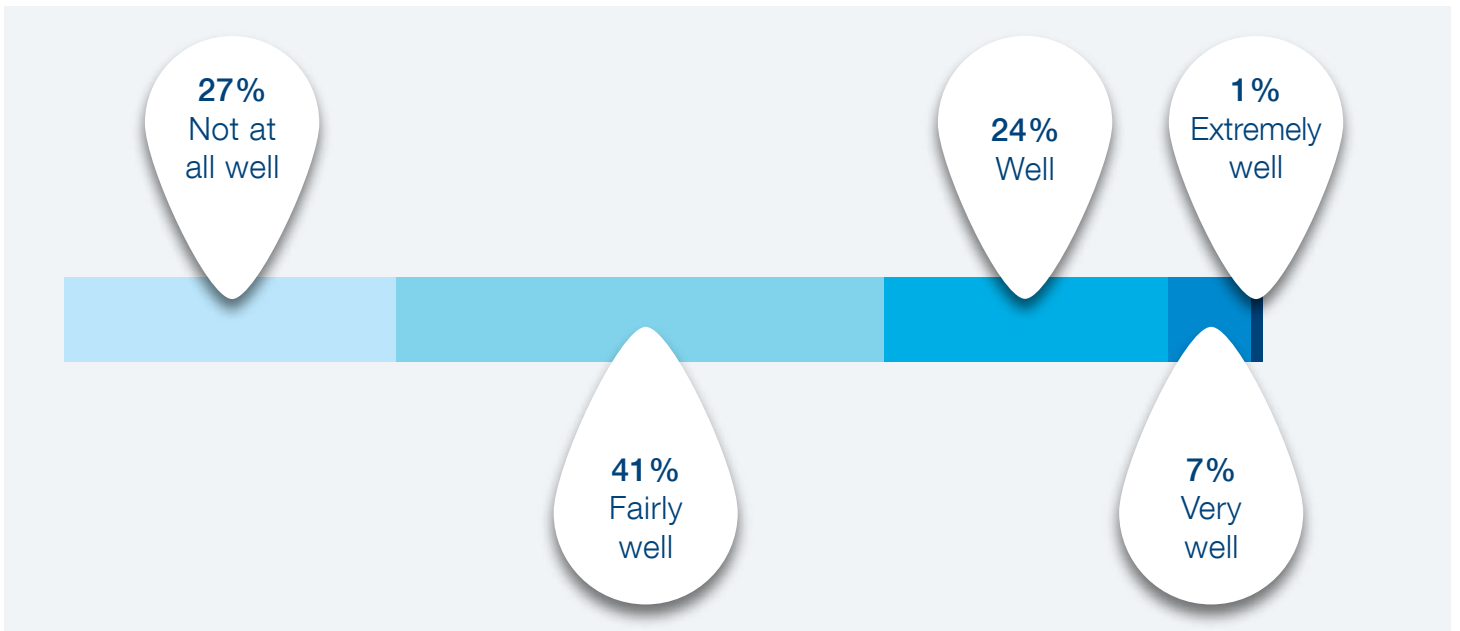
- 27% Not at all well
- 41% Fairly well
- 24% Well
- 7% Very well
- 1% Extremely well

"We have gone through a use-case exercise of different things we want to tackle in analytics, and our biggest hitter – the one that drives the most value – is asset management."

Raiford Smith

Vice President – Corporate Development and Planning, CPS Energy

Utility spotlight

What does your IT-OT integration for asset management look like today, and how do you see it evolving as more assets become connected?

Right now IT-OT integration is a cross-functional team of experts and project managers that live in separate areas of our company. That can lead to some interesting results, not necessarily good, because everything exists in silos. What's coming is a revolution from utilizing internet of things technologies, like an open-field message bus, that develop the people responsible for IT-OT solutions into hybrid experts in both IT and OT spaces.

What does your asset management leadership team look like today and how do you see it evolving in the future?

Today the asset management team is primarily an accounting and financial function. While those are certainly important, the organization definitely needs to evolve to become more analytically and technically-oriented.

In the context of your company's bigger picture, where does asset management fit in and how important is it as a strategic initiative?

Spending on capital assets is a large, ongoing expense for the company. For us, being able to effectively run, operate, manage and maintain those assets is extremely important. We have gone through a use-case exercise of different things we want to tackle in analytics, and our biggest hitter— the one that drives the most value—is asset management.

How do asset lifecycle management and long-term capital investment planning fit into that program?

That's part of the analytics – to predict future maintenance opportunities, reliability impacts, cash flow, and cost/benefits for our assets. There's a lot of work to be done to pull that one off.

What are the biggest changes you see coming for asset management in the next few years?

I think it will be similar to our advanced metering infrastructure (AMI) rollout. Utilities will start with a single use case in mind but evolve to recognize they need a more sensor-heavy, digital, and connected environment for everything from the power plant to the assets on the grid. Rather than having to send a technician to manually gather data or inspect assets, they're going to want data in more real-time, and they're going to want to have analytics that continually monitor, alert and react to issues that arise.
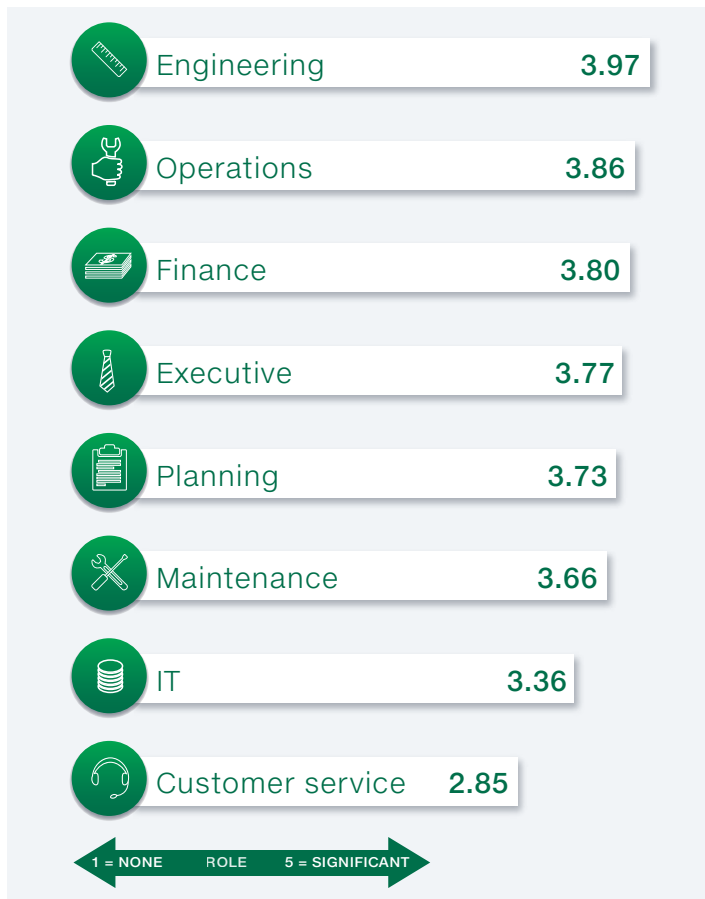
IT-OT integration: people

Technology is critical, but people are just as important for building a more connected approach to asset management. IT-OT integration among different groups within a utility is necessary to better understand the short- and long-term needs of assets. Better integration among operations and IT groups can help enable:

- Improved strategic decisions regarding asset management that account for varying needs across the organization

- Drive the business process changes necessary to adopt innovative approaches to asset management

- Build transparency among data sources and generate new insights

Although the leaders of asset management efforts tend to be on the engineering and operations side of the business, many groups are playing a role in asset management – from engineering and operations to IT and customer service – according to survey respondents (Figures 9 and 10).

Figure 9. Role of groups in asset management
(1 = no role, 5 = significant role)

Group	Score
Engineering	3.97
Operations	3.86
Finance	3.80
Executive	3.77
Planning	3.73
Maintenance	3.66
IT	3.36
Customer service	2.85

1 = NONE   ROLE   5 = SIGNIFICANT

Most respondents felt their groups work at least fairly well together (Figure 11), but there are issues, particularly when it comes to data. "Data is in no man's land," said Rackliffe. "IT wants the data, but then so do the functional areas that want to work with the data more closely."

Beyond data, there are questions about: Who owns what in the world of asset management? Who is responsible for the business strategy? The technologies? The overlap between ownership of IT and OT systems creates unique challenges that companies must be prepared to address.
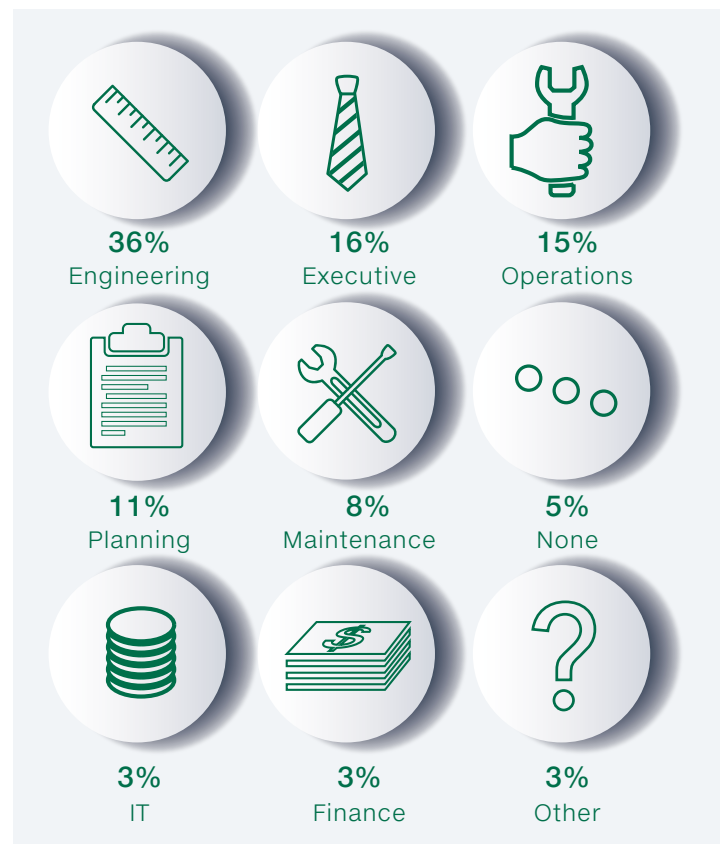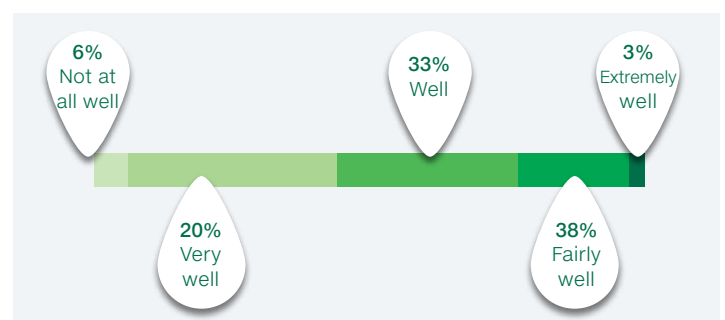
Figure 10. Group leading asset management strategy

36% Engineering	**16%** Executive	**15%** Operations
11% Planning	**8%** Maintenance	**5%** None
3% IT	**3%** Finance	**3%** Other

Figure 11. How well groups work together

6% Not at all well
20% Very well
33% Well
38% Fairly well
3% Extremely well

The IoTSP in IT-OT

In addition to more traditional IT and OT systems, utilities are also considering the role of IoTSP within their organizations. With sensors from smart meters to in-home devices, IoTSP is further blurring the lines between operational and information technology systems.

The IoTSP has the power to significantly influence utilities and their asset management operations. When we asked utilities how influential they thought the internet of things would be on asset management [On a scale of 1 to 5, with 1 = not influential, 5 = extremely influential], they scored it at 3.4.

Even with this importance, however, many utilities don't have a strategy for bringing the IoTSP into asset management. In fact, less than a quarter of respondents said they had a strategy in place (Figure 12).

IoTSP is an area that will become increasingly important for utilities, and it is vital to have a plan in place to make the best use of these technologies for asset management.

Figure 12. Do you have a strategy around the internet of things for asset management?


22% Yes

36% No, but Plan to

42% No Plans
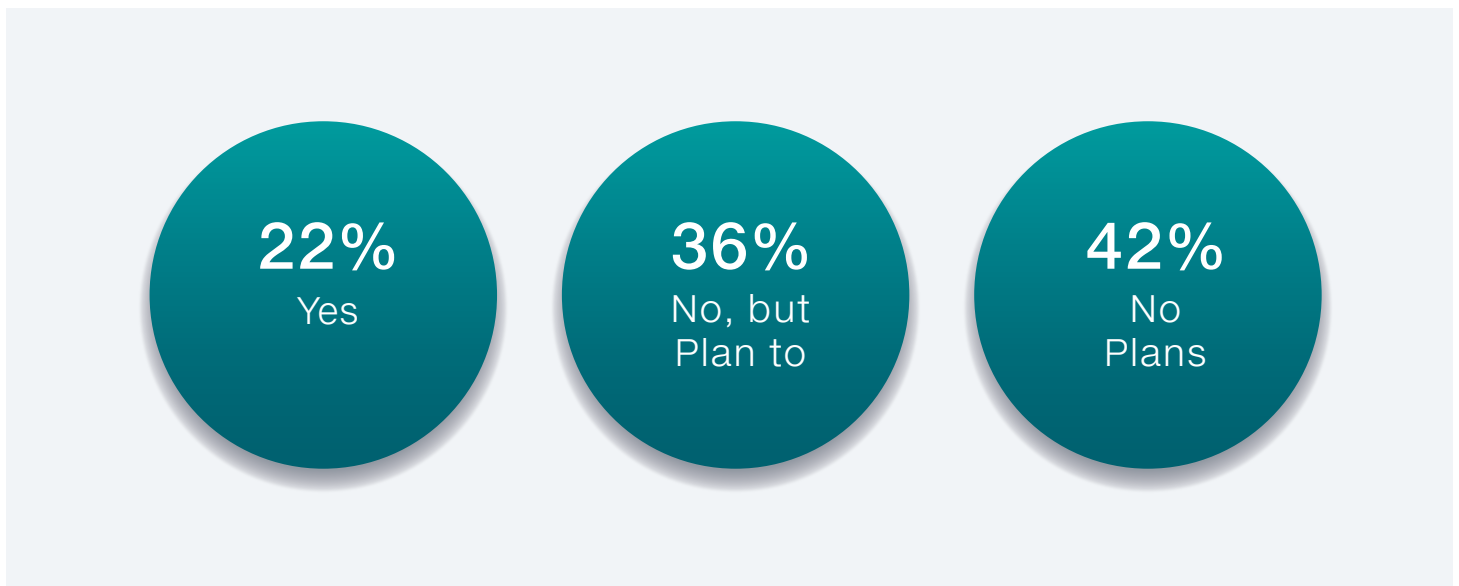
Next steps

Now more than ever, organizations must be able to bring together disparate technologies and systems to better understand their increasingly complex asset base, and IT-OT integration will be a key component of these efforts.

As shown in this research, utilities are heading down the path of better integration. Recommendations for taking your IT-OT efforts to the next level include:

1. Build the vision: Each company is different, so it is important to define what it means for your utility to achieve Connected Asset Lifecycle Management. Is it about better leveraging or deploying IoTSP technologies? Is it a better understanding of long-term capital planning efforts? The smart technologies being deployed at utilities today provide a great opportunity for companies to transform their approach to asset management.

2. Consider not just what, but who will make it happen: It is important to understand the technology changes that need to happen to realize this vision, but it is also important to understand the business change required as well as the people who make it all happen.

3. Leverage low-hanging fruit: Determine where your utility can get started with IT-OT integration efforts today. Low-hanging fruit include, for example, developing better visibility and transparency to the data that you already have today, and unlocking the value of the data that you're currently collecting. Opportunities like this will help your utility build stronger connections across the organization and provide a great starting point for larger asset management initiatives.

Internet of Things, Services and People
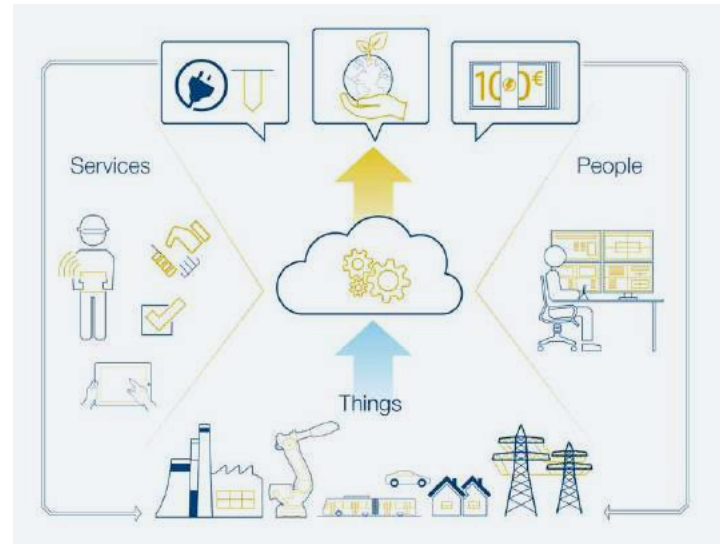
Source: ABB, 2016

Contact Us

About the Enterprise Software product group within ABB

The Enterprise Software product group is part of the Grid Automation business unit in ABB's Power Grids division. ABB is a global leader in power and automation technologies. Our solutions improve the efficiency, productivity and quality of our customers' operations while minimizing environmental impact. Innovation is at the forefront of what we do and many of the technologies that drive modern society were pioneered by ABB. The Enterprise Software product group offers an unparalleled range of solutions for asset performance management, operations and workforce management, network control and energy portfolio management.

Ready to step up your IT-OT integration efforts? Contact us to learn more about the possibilities.

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