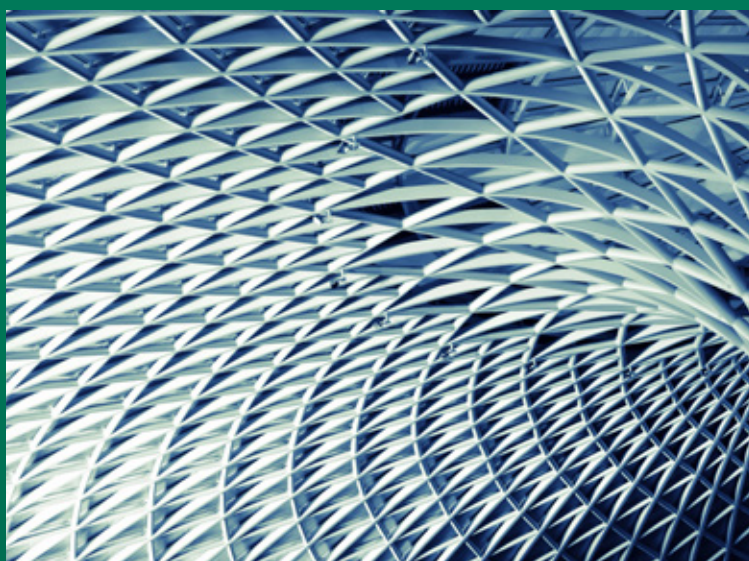


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TEBIT 2017 EXECUTIVE REPORT

# TIME TO DOUBLE DOWN ON AI AND ROBOTICS

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TEBIT 2017 EXECUTIVE REPORT

# TIME TO DOUBLE DOWN ON AI AND ROBOTICS

FRANK FELDEN

THOMAS KRÜGER

WIM DE MEYER

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# PREFACE

**W**HEN IT COMES TO industrial revolutions, not every industry is equal. For example, more than a century ago, the assembly line transformed the way the auto industry built cars. But its impact has been far less direct and substantial in other industries, such as telecommunications. More recently, automakers—along with industrial goods companies and other businesses—have experienced yet another revolution in the way they work. Thanks to artificial intelligence (AI) and robotics, these industries seem to be scoring another win. But this time, could telcos benefit, too?

That's a question many telcos are asking themselves as they start to invest in AI and robotics. And it's one that TeBIT, a benchmarking study jointly developed by ETIS—The Community for Telecom Professionals and The Boston Consulting Group, asks as well. Each year, TeBIT examines the spending, performance, and processes of telcos' IT units. But it also takes an in-depth look at one emerging topic, something that could potentially help telcos in an increasingly competitive marketplace. AI and robotics, given their great success in cutting costs and improving quality for automakers and others, seemed to be a natural focal point for this year's deep dive.

So are telcos really on the brink of a revolution? Responses from TeBIT participants suggest that the use cases now being pursued—as well as those that telcos envision—may indeed result in important, perhaps even transformative, returns. And telcos are already beginning to see some of the payoffs. But TeBIT also reveals that, despite their interest, telcos are not yet treating AI and robotics as game-changers. Telcos' investment levels are low, and their projects are limited in number and scope. Many initiatives are still in the proof-of-concept stage, and most telcos have yet to develop a strategic plan for AI and robotics.

Challenges abound, such as integrating AI and robotics with legacy platforms, knowing where to invest and what to develop, and tracking benefits—which sometimes are less tangible than cost savings. But perhaps the biggest challenge is, simply, that AI and robotics are new technologies for telcos. Asking companies to integrate them is like putting a computer in the hands of someone who has long used paper and pencil. At first glance, that person has no idea what to do with it.

Telcos are finally beginning to get an idea. But to find out if the technology can be transformative for telcos, as it has been for automakers, more investment—and perhaps some risky bets—will be needed. More focus will be needed, too, in order to tackle the challenges. But

here’s an idea. TeBIT is possible only because of participants’ tradition of sharing information. Participating telcos allow themselves to be compared with other operators and, in return, can access a full set of benchmark results, along with further trend analysis. AI and robotics can be ripe for collaboration, as well. By exchanging insights, telcos might be better able to identify optimal practices and strategies. They can find out—as an industry—whether AI and robotics will be good for them, too.



**Wim De Meyer**  
*ETIS Managing Director*



**Frank Felden**  
*BCG Senior Partner and  
Managing Director*

# EXECUTIVE SUMMARY

**A**RTIFICIAL INTELLIGENCE (AI) AND robotics have brought dramatic improvements in both efficiency and overall quality to a variety of industries. Can these technologies change the game for telecom companies, too? This year's telco IT benchmarking study (TeBIT)—a survey of European operators' IT spending and performance that was completed in August 2017—suggests that the answer could be yes. Projects now in place seem poised to lower costs and improve the customer experience—a win-win scenario for telcos. Yet TeBIT also finds that, so far, operators have not prioritized AI and robotics. Investments are low; strategies are few. The technologies might indeed be able to transform the industry—but telcos will have to spark that revolution.

**AI and robotics applications are already returning important benefits, and some patterns are emerging in where—and how—the technologies are being deployed.**

- Current AI and robotics use cases include predictive maintenance, next best offers (the next product that is most likely to resonate with a particular customer), and chatbots that respond to customer queries and requests. In different ways, these applications reduce costs while also improving service quality.
- TeBIT participants that have invested in AI and robotics are seeing ROIs of 160% to 300%. And those figures are probably conservative because they largely track cost reduction, not less tangible benefits, such as higher customer satisfaction.
- About 70% of TeBIT participants are funding AI and robotics initiatives in marketing and sales. We saw a similar figure for customer service. But fewer telcos—roughly half—are deploying AI and robotics in such areas as product management, field force management, order management, and shops.
- Machine learning, which helps to identify patterns in customer

behavior and equipment performance, was the most used technology in marketing and sales as well as in technology management. Responding technologies, which include speech synthesis and chatbots, took the top spot in customer service.

**Despite these benefits, telcos are taking a tentative approach to AI and robotics—unlike companies in other industries, such as automotive, which have spent heavily on the technologies. AI and robotics did not rank among the top-three investment areas for any TeBIT participant.**

- Overall, AI and robotics expenditures amounted to just 0.12% of revenues in 2016. While a top-three investment area typically accounted for 5% to 20% of a telco's total IT capital expenditure, AI and robotics accounted for, at most, 2.5% of the average annual IT spending of TeBIT participants.
- Telcos plan to increase investment in AI and robotics by 40%, on average, in the short term. Yet even with this boost, annual spending will still amount to less than €7 million, which will likely be insufficient to fully explore the wide array of applications that are either currently available or will be available soon.

**What's holding back telcos from fully embracing AI and robotics? The TeBIT survey and interviews with participants reveal a number of challenges.**

- AI and robotics constitute new ground for telcos, and operators often lack the required skills and experience to work with the technologies.
- Telcos' traditional vendors have been slow to incorporate AI and robotics (for instance, as plug-in modules) into their platforms. As a result, integrating those tools with legacy systems can be difficult.
- While cost reduction is an important benefit of AI and robotics, other advantages—such as a better customer experience—can be difficult to measure, making it hard to gauge any given initiative's success.

**TeBIT participants increased their IT spending in 2016. But perhaps even more significant was how they spent that money. IT capex increased, yet IT operating expenses declined. That's a winning formula, and AI and robotics can help maintain the trend.**

- On average, IT spending increased by 4.6%, despite essentially flat revenues in both mature and emerging markets.
- IT capex rose by 18.7% on average, though there were significant differences between mature and emerging markets (up by 15.5% and 26.7%, respectively).
- IT opex declined by 4.8% for telcos in mature markets and by 4.4% for those in emerging markets.



- By helping to lower costs and generate revenue, whether directly or indirectly, AI and robotics initiatives can lower IT opex while freeing up or creating more funding for IT capex.

**Commercial-off-the-shelf (COTS) software continues to garner high satisfaction ratings, but packages could do a better job of supporting AI and robotics. And while outsourcing might have been used more heavily in 2016, telcos still seem to be employing it selectively.**

- In almost every process area, just a few vendors accounted for the bulk of COTS software usage. Increasing market consolidation might help explain the correlation that we saw: higher use of COTS software is associated with higher IT costs. (On the flip side, COTS software generates business benefits that may be indirect and are often hard to measure.)
- Complexity in the operating model appears to be increasing, likely owing to new business areas, such as digital and big data. But the decline in IT opex suggests that telcos are on top of the situation.
- TeBIT participants devoted 18.7% of their IT budgets to outsourcing—up from 12% last year. Yet they still seem to be deploying it in a carefully considered way, using outsourcing more in areas where in-house expertise is lacking rather than in areas of strength.

**Telcos plan to try more AI and robotics initiatives—and home in on those that deliver the greatest value. This calls for not only investment but also time, analysis, and insight. Certain steps can smooth the process.**

- The industries that have already embraced AI and robotics can provide valuable lessons on how best to apply the technologies. While these businesses may be very different from telcos, many of their use cases will be similar.
- Collaboration—internally between the business side and IT, as well as externally with vendors and even other telcos—can be an effective way to tackle the challenges that may be holding back the adoption, and the payoffs, of AI and robotics.

# WILL AI AND ROBOTICS CHANGE THE GAME FOR TELCOS?

**B**USINESSES HAVE LONG BEEN told to think outside the box—but what about thinking outside the industry? Artificial intelligence (AI) and robotics have changed the game for a number of industries, particularly automotive. For example, automation has enabled car makers to decrease both costs and the time needed for production. Could similar technologies do the same for telcos?

The idea that what's good for General Motors is good for telcos might seem a bit unorthodox. They are, after all, very different businesses. Yet this year's IT benchmarking study (TeBIT) suggests that some telcos, at least, are beginning to see how AI and robotics could benefit them. They're starting to put money into the technologies, resulting in some early boosts to efficiency and the customer experience.

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Some telcos are beginning to see how AI and robotics could benefit them.

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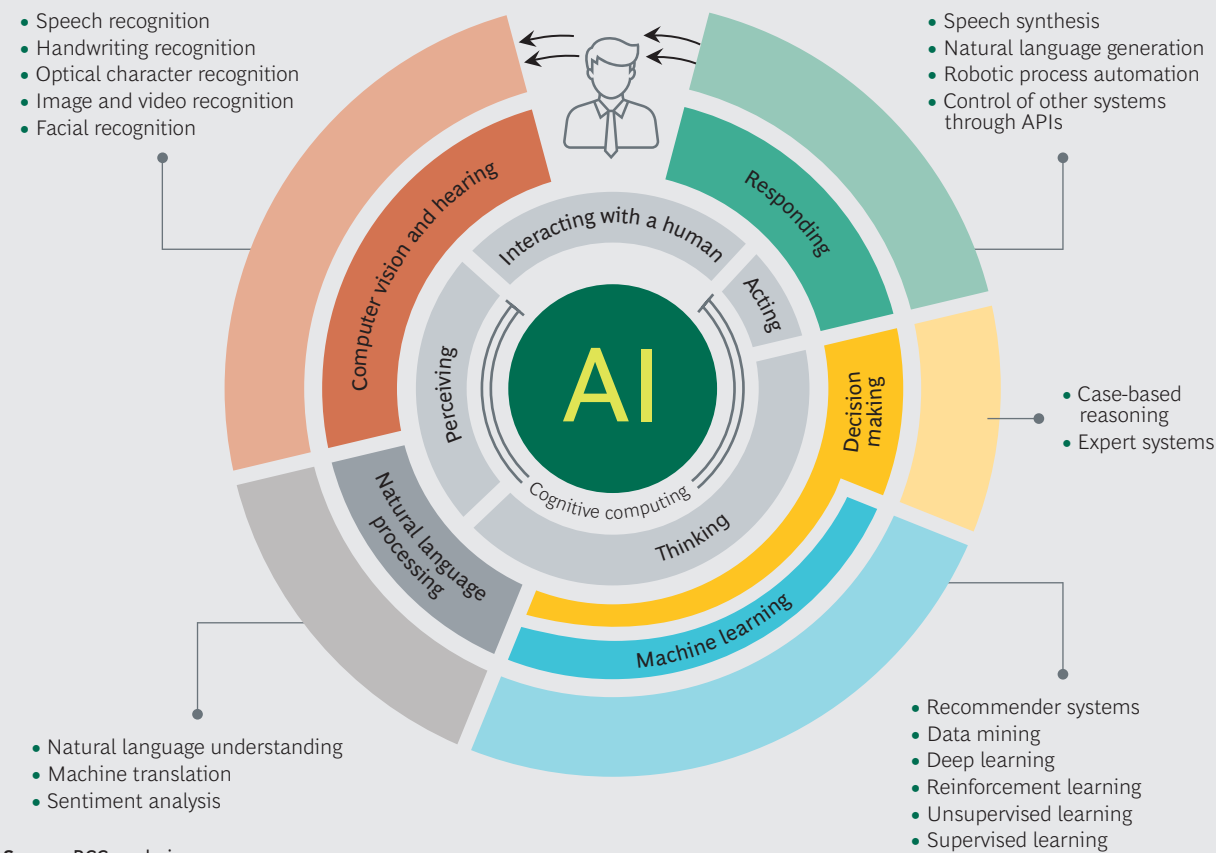
Are these telcos on to something? Will they get the jump on an emerging trend and surge ahead of the competition? Right now, that's hard to answer because no one—not even the telcos most enthusiastic about AI and robotics—is betting particularly big.

Automakers have prioritized such technologies, deploying them throughout their value chain and even their workforce. Indeed, Japan's auto industry counts one industrial robot for every 7.8 full-time human employees. Other businesses have also spent heavily on AI, often using it to better understand customer behavior and preferences. By contrast, TeBIT participants generally spend a little on AI and robotics and get moderate benefits. They are making relatively minor investments and focusing on specific projects instead of end-to-end implementation.

Such projects have given telcos a taste of what AI and robotics can provide. For example, predictive maintenance can identify potential failures, enabling fixes before systems—and the services that customers depend upon—fail. Machine learning allows telcos to identify patterns in a user's browsing and purchasing histories and then suggest what's known as the next best offer—the next product that is most likely to resonate with that customer. The list goes on, and more applications will become available in the coming decade. (See Exhibit 1.)

But telcos' current, fairly low level of investment may not allow the companies to discover how far AI and robotics can take them. Companies in the industries that have been transformed by these technologies have spent vast sums on them—and that's no coinci-

**EXHIBIT 1 | AI and Robotics Technologies Come in Many Forms, Giving Rise to a Broad Variety of Applications**



Source: BCG analysis.  
Note: APIs = application programming interfaces.

dence. To shape a trend, a company must be bold and invest a significant portion of its revenues. Will AI and robotics revolutionize the way of working for telcos as they have done for car makers—fully automating operations and radically transforming the workforce? Or will these technologies result in just another round of efficiency gains?

To find out, telcos will need to do more than dip their toes in the water. A full-on embrace of AI and robotics will require significant

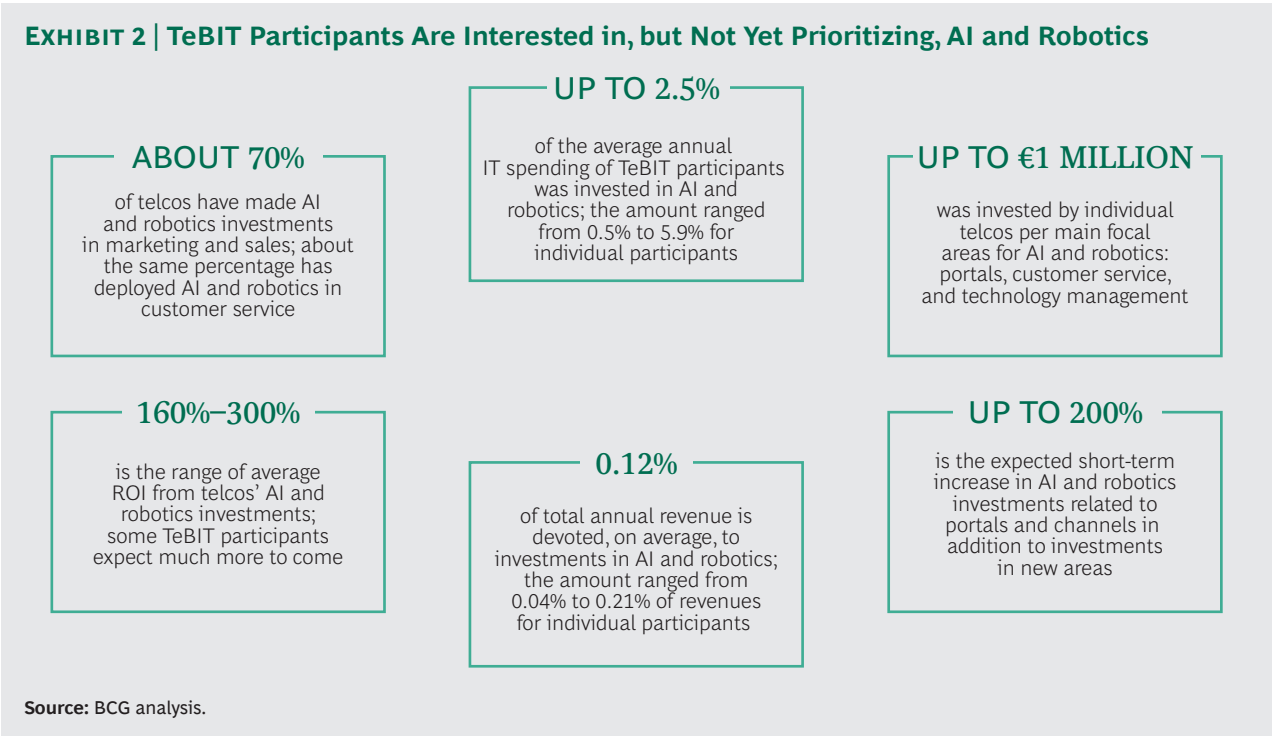
funds, resources, and effort. It will also call for change management because roles within the organization will inevitably evolve along with the technologies and applications. But judging from the initial use cases, the early adopters may indeed be on to something. In fact, now may be the time to redouble both efforts and investment.

# PAYOFFS AND TRENDS

**W**HILE COMPANIES IN OTHER industries have put considerable effort and funding into AI and robotics, telcos are still taking small steps and seem unsure about their path. On one hand, telcos are gaining important benefits from their attempts. On the other hand, there haven't been a lot of attempts. TeBIT participants reported relatively few initiatives in AI and robotics, and survey responses suggest that, overall, telcos are uncertain about how to adopt AI

and robotics—and how much to bet on them.

So far, the two prevailing investment strategies for AI and robotics are either to spend just a little—or to spend even less. AI and robotics did not rank among the top-three IT investment areas for any TeBIT participant; overall, expenditures on the technologies amounted to just 0.12% of total revenues. (See Exhibit 2.) This kind of dabbling is not



the approach that companies generally take toward game-changing technologies.

Telcos might want to step up their efforts: the industries that have benefited the most from AI and robotics have not succeeded by taking half measures. The automotive industry alone, for example, accounts for nearly 40% of all industrial robots now in the field. But there is, perhaps, an even more compelling reason to think bigger on AI and robotics: not only does adoption pay off, but it does so in exactly the right ways.

According to our 2017 TeBIT study, the benefits that operators are seeing from their early, if limited, forays into AI and robotics are just the kinds of benefits they need. (See Exhibit 3.) Predictive maintenance, next best offers, and chatbots that respond to user requests and questions all can improve the customer experience—while reducing costs. (See the sidebar “The Proof Is in the Payoff.”) TeBIT participants with projects underway are achieving average annual ROIs of 160% to 300%—and those numbers mainly reflect reductions in cost because other benefits can be more difficult to measure. Indeed, at least one participating telco thinks that operators are just scratching the surface in terms of returns. (See the sidebar “Placing the Early Bets.”)

The survey responses also help explain why participants have not yet taken the plunge into AI and robotics and are opting for pilots and specific projects instead of end-to-end integration. Among the reasons: a lack of strategy for adopting the technologies and a preference to wait and see what other telcos do and what best practices and missteps may emerge. Neither of these explanations is surprising: AI and robotics are new tools for telcos, requiring new skills, platforms, and even new ways of thinking to implement broadly and well.

In addition, we saw some patterns with regard to where telcos are applying AI and robotics. Marketing and sales, along with customer service, are focal points for investment: around 70% of TeBIT participants are funding initiatives in these areas. Product management, field force management, order management, and shops get less attention: about half of the participants are investing in AI and robotics in each category.

We also saw some trends in how telcos are using these technologies. Machine learning, for example, was the most heavily used technology in marketing and sales as well as in technology management. (See Exhibit 4.) This makes sense, since understanding patterns in

EXHIBIT 3 | Many Current AI and Robotics Applications Can Improve Both Cost Efficiency and the Customer Experience

	APPLICATION AREAS	BENEFITS REALIZED
<div><div>PREDICTIVE ANALYSIS</div><div></div></div>	<ul style="list-style-type: none"><li>Proactive recognition of potential system failure</li><li>Predictive network maintenance</li><li>Field force optimization</li></ul>	<ul style="list-style-type: none"><li>Lower maintenance costs</li><li>A better customer experience</li></ul>
<div><div>PROACTIVE CUSTOMER INTERACTION</div><div></div></div>	<ul style="list-style-type: none"><li>Real-time adjustment of marketing campaigns</li><li>Next best offers</li></ul>	<ul style="list-style-type: none"><li>Revenue generation</li><li>Churn reduction</li><li>A better customer experience</li></ul>
<div><div>ROBOTIC PROCESS AUTOMATION</div><div></div></div>	<ul style="list-style-type: none"><li>Automation of customer service, order management, and back-office tasks that are performed manually today</li></ul>	<ul style="list-style-type: none"><li>Workforce efficiencies</li><li>Faster processing of requests</li><li>A better customer experience</li></ul>
<div><div>RESPONSIVE CUSTOMER INTERACTION</div><div></div></div>	<ul style="list-style-type: none"><li>Chatbots</li><li>Virtual assistants</li><li>Natural language generation</li></ul>	<ul style="list-style-type: none"><li>Workforce efficiencies</li><li>A better customer experience</li></ul>

Source: BCG analysis.

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## THE PROOF IS IN THE PAYOFF

AI and robotics have paid big dividends for companies outside of the telecom industry, and telcos have noticed. They are starting to fund their own AI and robotics initiatives, though the investments have been relatively small so far. Nevertheless, some current projects by TeBIT participants reveal that for telcos, too, significant benefits are possible.

### Predictive Maintenance

By analyzing performance data, AI technologies learn to identify patterns that suggest potential problems—or failures—in telco systems. This enables operators to take remedial action, replacing components or implementing repairs before systems fail.

Predictive maintenance can enhance the customer experience by improving system uptime. It can also lower operating expenses (because preventive maintenance is often far less expensive than doing repairs after a failure) and allow for more efficient use of staff through a reduction in manual work and better planning.

### Next Best Offers

By leveraging data sources such as customer browsing and purchasing histories, AI technologies learn patterns that predict customer preferences. The idea is that a customer who looks at, clicks on, or purchases a certain product might be

interested in another product because other customers who behaved similarly showed an interest in that second product. This enables telcos to identify and present an offer that the customer may find particularly compelling.

Next best offers generate higher sales by targeting offers more precisely. They also increase customer loyalty by enabling the telco to better understand and satisfy customer preferences. Finally, by using automation to home in on products that customers may like, telcos can more efficiently perform a task that has traditionally been time and resource intensive.

### Chatbots

Chatbots, instead of human representatives, handle customer queries and requests.

Chatbots increase customer satisfaction and loyalty with round-the-clock availability and fast responses. They also lower operating costs and improve efficiency by reducing the need for human support.

customer behavior and system performance is essential for identifying next best offers and potential failures. Similarly, so-called responding technologies—such as speech synthesis, chatbots, and robotic process automation—dominated in customer service. Such capabilities can speed responses to customer queries and requests while enabling more efficient staffing.

In the short term, participants plan to boost their spending on AI and robotics by more than 40%, on average, and the increases will vary by area. Portals and customer channels will see the greatest boost, with investment

amounts roughly doubling. Yet even at these higher levels, each telco's annual investment in AI and robotics will still amount to less than €7 million. That's not trivial, but it won't buy a transformation in the way telcos work and serve customers.

Though telcos seem to realize how they can benefit from AI and robotics, they aren't quite ready to put their money—or rather, their *big* money—where their hunches are. The caution may be understandable, but is it the right play? That's the big question—and one that every telco should be asking.

## PLACING THE EARLY BETS: AN INTERVIEW WITH RAMZI HAMOUDA OF SWISSCOM

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“We expect that in the midrange, three to five years, we will be seeing benefits that are 10 to 20 times our investment.”

*Telcos are increasingly interested in AI and robotics. They're sowing the seeds of investment and looking for where the payoffs might be the biggest. Along the way, they're getting a sense of the potential benefits and the challenges in realizing them. AI and robotics can be difficult to integrate within existing IT landscapes, and best practices may be hard to identify. How can telcos achieve those payoffs? For insight on these issues, BCG and ETIS spoke with Ramzi Hamouda, a technical strategist at Swisscom.*



Let's start by looking at Swisscom's investments in AI and robotics. Are there any main areas of focus?

One area where we have invested is in customer interaction and support. We have a lot of analytics and have put some machine learning and artificial intelligence in place. Another area is operations. We believe that all operational processes that do not require an assessment by a human expert can be automated.

What would be an example of an operational task that you could migrate to automation?

We are investigating the implementation of four use cases. At the moment, they are still in the proof-of-concept phase. One use case covers the area of event management. Incident tickets must be qualified, assessed, and resolved manually over several systems. In the future, we want to use automation to collect all necessary data and to trigger actions—such as the restart of a network element—based on predefined rules. Each incident ticket would then be enriched with all data and steps.

This sounds like a lot of the benefits of AI and robotics are related to cost efficiency. Is that correct? Or do you find that there are other benefits, such as revenue growth or an improved customer experience, that are just as important—perhaps even more so?

In operations, the main driver is efficiency. At the same time, we aim to boost quality, because a lot of incidents are what we'd call people-driven, and automation helps us avoid that. If you look at our projects in customer interaction, cost improvement is a driver there, too, but it must be done in a way that maintains—and, ideally, improves—the customer experience. For example, chatbots can help customers manage the increasing complexity of our networks. We not only want to reduce costs but also improve our Net Promoter Score [NPS].

Do you measure the NPS before and after these tools have been implemented in order to gauge the value they bring?

It's very difficult to link a change in NPS to any specific tool we've put in place. There really isn't a one-to-one relationship, as we are doing a number of things, with robotic machine learning being one of them.

In those two focal areas for AI and robotics—operations and customer support—who initiated the investment: the business side or IT?

## PLACING THE EARLY BETS (continued)

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In both of those areas, the projects were initiated by the business, driven by the need to improve efficiency and the customer experience. On the other hand, IT had been working to learn the technology, so it was able to support the implementations.

Okay, so the business initiates a project. Does it then own and drive it, or does it hand over the project to IT?

The business owns the project. It will decide where to invest and which use cases to pursue, but the actual delivery of the project is handled by IT.

Let's return to the benefits for a moment. According to the data we collected, TeBIT participants expect roughly a 200% to 300% return on their investments in AI and robotics. What's your reaction to that figure?

It's in line with the numbers we are using. But it's important to note that people are being conservative. We don't know how fast, exactly, we can get the benefits from AI and robotics. In the short term, one to three years, the payoff may not be that much. But we expect that in the midrange, three to five years, we will be seeing benefits that are 10 to 20 times our investment.

That's huge—and it leads nicely to the next question. Do you think these technologies can change the game for the industry?

Yes, I think so. These technologies will have a big impact on cost efficiency. They will allow us to be much more competitive and also to redefine our processes. On the customer side, they can help us create innovative services, a better experience, and improved marketing. We have a lot of expectations for this technology in the CRM area.

We talked about tracking investments when it comes to customer experience and how that can be difficult. But what about efficiency? Do you track the cost benefits that come from AI and robotics measures?

We track savings. We have some KPIs defined, and we'll have objectives each year. These are tracked on a regular basis.

Can you create a direct link between specific measures and savings? Or do you have challenges that are similar to those of NPS?

A direct link is difficult here, too, as we have a lot of measures in place. For example, we'll make process improvements, we'll implement automation and machine learning, we'll use robotics. So while we track savings from AI and robotics, it's very hard to say which specific measure impacted cost the most.

You mentioned marketing earlier. Do you feel that AI and robotics can lead to a revenue increase?

That's our expectation—or, at least, our hope. At the moment, I see the link between our AI and robotics initiatives and revenue increase as an indirect one. If you better understand the customer, you can react better. You can know how best to improve services. You can identify additional products and features that a customer might find attractive. But right now, I don't see a more di-



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rect link, such as offering a robotics-based service. We had some discussion about offering a kind of butler that helps people manage their TV programs or options. But that's very difficult to do. Language processing—especially in a country like Switzerland, where we have a lot of dialects—is a major barrier to creating something like that.

The TeBIT data reveals that the main areas in which participants have invested are predictive maintenance, chatbots for virtual assistance, and machine learning. What has been Swisscom's experience in these areas?

We're pursuing all of these areas. We've been working with predictive maintenance for the past year or year and a half. And machine learning is something we've been using on both the operations side and the customer side—in the latter case, to improve the service experience. As for chatbots, we started a project using the chatbot as an interface for customer support. The pilot should be going live by the end of the year.

Is the chatbot something you're developing with a vendor?

No, it's a solution we are building ourselves.

That raises another question. Do you think that as the major vendors—telcos' traditional providers—offer these technologies as part of their standard solutions, AI and robotics will lose value as a differentiator?

I think it depends. Consider, for example, two solutions we have in place today. The first is an Ericsson solution to optimize our network. Here, AI and robotics will improve processes but won't really be a differentiator. Everyone will get similar results. The second solution is a Nokia product for analyzing the home networks of our customers. It delivers information but our value add is in how we use that information. How effectively can we identify and propose services that customers could add to improve network quality? The solution may get everyone the same kind of information, but by building on that—defining processes and how we interact with the customer—we can create a real differentiator.

Do you expect your investment in AI and robotics to increase, to stay stable, or even to decrease?

I believe that it will increase as we identify more projects to pursue. We are trying to invest in many areas; invest, test, get some proofs of concept. At the moment, we might have a dozen projects, but we always have new ideas and there are always new tools. So in the short term, we might have 20 to 30 different tools. Maybe in two to three years we would have a consolidation initiative to reduce that amount, but in the beginning, at least, I think the investment would increase.

So far we see most telco operators investing on their own. Do you think we will see more of a team effort in the future—telcos cooperating and investing jointly in AI and robotics technologies?

I think that will happen because, in the end, a lot of this is about making processes better, whether in operations or customer interaction or whatever. So it will help a lot if we can exchange experiences and take advantage of synergies.

# PLACING THE EARLY BETS (continued)

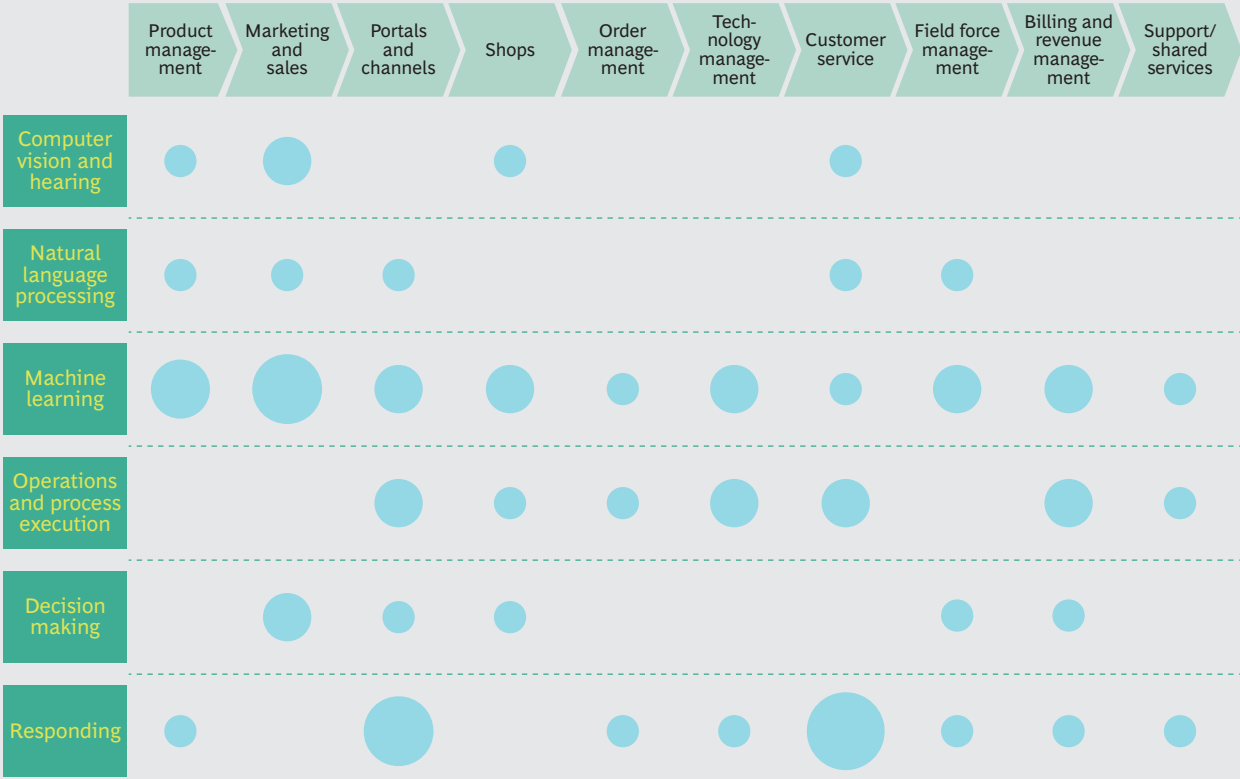
Those synergies would seem especially valuable when you consider technologies like natural language processing, which costs a ton of money. Sharing and reusing might be a big lever.

Exactly. The use cases, in the end, are more or less the same, so collaboration could make a lot of sense. Exchanging experiences can be helpful in other ways, too. For example, how do we integrate these solutions into our business support systems and operations support systems? That’s a huge question and one we might answer faster—and better—by sharing ideas and practices.

Finally, what do you see as the main challenges of AI and robotics going forward?

Integration is certainly one—how to integrate all of these solutions into our landscape. Robotics has specific challenges. What roles should a robot assume, say, in operations? And what about accountability? If people make errors, we know who is responsible; but what happens if robots make errors? Who is responsible for that? Another challenge is finding a framework in order to manage all of these technologies. Security will be a huge issue, too. But make no mistake: this is a very, very interesting area—and not long down the road, we will be seeing major benefits.

**EXHIBIT 4 | Machine Learning and Responding Technologies Are the AI and Robotics Tools Most Used by Telcos**



**Source:** BCG analysis.  
**Note:** Bubble size represents the number of telcos that confirmed AI and robotics in the respective areas.

# IT INVESTMENT IS FOCUSED, BUT THE BULL'S-EYE IS MOVING

**T**EBIT PARTICIPANTS INCREASED THEIR IT spending in 2016 by 4.6%, on average. They achieved this despite essentially flat revenues in both mature and emerging

markets. (See the sidebar “The Business Environment.”) But even more noteworthy was the sharp rise in IT investments. Overall, IT capital expenditures rose 18.7% for

## THE BUSINESS ENVIRONMENT

While new technologies and business models may be changing the telecom industry, market conditions have not taken any sudden turns. Telcos continue to face a challenging business environment in which price pressure and heavy competition are not so much trends as traits. In the markets where TeBIT participants operate, revenues for telcos declined in 2016, dropping 3.3% in mature markets and a full 10% in emerging markets.

TeBIT participants fared somewhat better than their peers: overall, their revenues were stable. Yet while that stability was seen in both mature and emerging markets, there were significant differences in how revenue developed.

In mature markets, TeBIT participants saw a 4.0% drop in average revenue per user (ARPU). Traditionally, ARPU loss has tended to drive revenue loss, but this time, a rise in the number of both fixed and mobile subscribers (up 3.6% and 4.3%,

respectively) seems to have compensated participants for the ARPU decline. User increases, however, are unlikely to foster success. In mature markets, populations are stable, so one telco's user increase is typically another telco's user decline—a dynamic that risks triggering a price war.

In emerging markets, TeBIT participants saw their average ARPU increase by 3.8%. But that rise, it turned out, was effectively canceled out by an overall drop in users (fixed subscribers declined by 3.4%; mobile users remained steady).

In both types of markets, growing ARPU is crucial. To increase revenue from existing customers, telcos need to provide innovative offerings and a top-flight customer experience. The good news is that operators now have some powerful tools at their disposal: digital content and services, big data and analytics, AI and robotics. By using them wisely, telcos can boost their relationship with users—and their bottom line.

participating telcos (with a 15.5% increase in mature markets and an even more robust 26.7% rise in emerging markets).

We’ve seen this dynamic—sluggish markets, increasing investments—before. The idea is that when revenues go flat, companies need to boost growth and efficiency. And that requires capex.

Yet while IT capex rose, IT operating expenses declined. (See Exhibit 5.) Telcos in mature markets saw, on average, a 4.8% drop. Participants in emerging markets saw a 4.4% decline. The decrease could well be the result, at least in part, of earlier cost-cutting projects: in last year’s TeBIT survey, a number of initiatives—such as data center consolidation—were clearly intended to reduce costs. And telcos have pursued such investments in years past, as well.

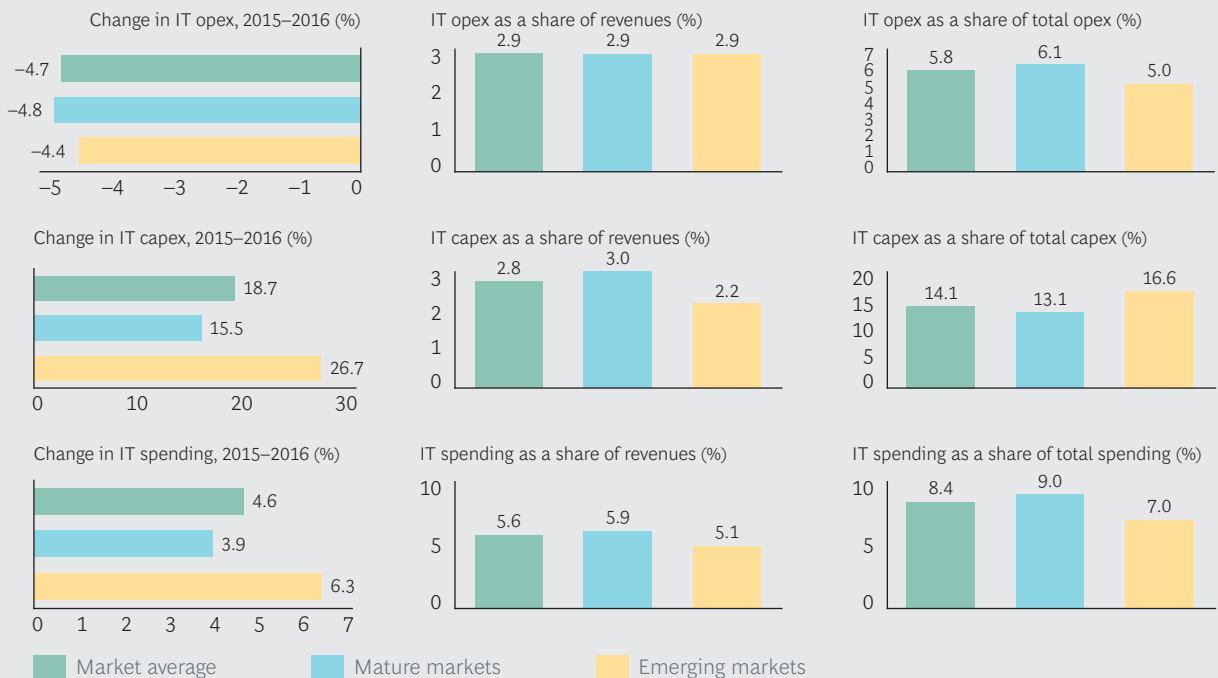
Boosting IT capex while decreasing IT opex is just the right approach for telcos. They need to pursue opportunities to generate revenue—particularly in emerging areas, such as digital and big data—while continuing to improve efficiency. To hit these twin goals, telcos will need to strike the right balance be-

tween investments that create revenue and those that reduce cost. (See *TeBIT 2014 Executive Report: Paving the Paths to New Revenue*, BCG report, October 2014.)

That has never been simple to do, but it might be a bit easier with AI and robotics, which often help to lower costs *and* facilitate revenue generation. (See the sidebar “Nothing Artificial About the Results.”) Machine learning, for example, can reduce the effort and expense required to identify next best offers. And it could potentially do a better job of matching customers with the offers that resonate with them, thus boosting sales. Similarly, chatbots can lower costs by reducing staffing needs. By providing quick responses 24-7, they can also improve the user experience, possibly reducing churn and increasing a telco’s attractiveness to prospective customers.

Although the levels of investment in AI and robotics are low, IT investment overall was much more focused in 2016 than in previous years: TeBIT participants spent, on average, some 40% of their IT capex budgets on their top-three investment areas (last year, when spending was more spread out, the figure was just under 18%). The areas of focus—digital

### EXHIBIT 5 | Telcos Increased IT Capex and Decreased IT Opex—a Winning Combination



Source: BCG analysis.

## NOTHING ARTIFICIAL ABOUT THE RESULTS: AN INTERVIEW WITH PAUL SLOT OF KPN AND ETIS

“AI and robotics will need C-level attention to become fully embedded in the organization.”

*Will AI and robotics bring about a revolution in the way telcos operate, or will the gains be decidedly more modest? That may be the big question, but it's not the only one. Can other industries offer important lessons? Should telcos work together on solutions? Where will the benefits be greatest? Can the benefits even be measured? As telcos start to pursue AI and robotics, they're gaining some insights on these issues. Paul Slot, the executive vice president for access, core, and networks at KPN and the chairman of ETIS, discusses his company's perspective.*



What do you expect to be the key benefits of AI and robotics? Cost efficiency? Revenue growth? A better customer experience? Or maybe something else entirely?

It's not just one thing. Of course, efficiency is part of it, but so, too, is the effectiveness of planning models—whether for capacity or investment. Revenue growth and the customer experience are other important aspects. That said, if predictive analysis gets you more-effective planning models, that probably also translates into cost efficiency. So the parts aren't necessarily equal, with cost efficiency being, perhaps, the biggest one.

This year's survey suggests that, so far, the general trend on AI and robotics is to spend a little and get moderate benefits. That raises an interesting question: Do you think that AI and robotics can really change the game, or will they yield relatively modest improvements?

One thing to keep in mind is that the benefits of AI and robotics are often difficult to quantify. Where we have applied the technology we have definitely seen a benefit, but it's not always one that translates directly into money. Of course, there are examples—for instance, if you deploy AI and robotics in your call center—where quantification is easy. If you need fewer agents, that is measurable savings. But in a lot of areas, the benefits are more qualitative, or less tangible, or help position you for a longer-term payoff. This can make it difficult to evaluate investments—and to be sure, benefit tracking is something we should be doing better. But I do think that AI and robotics can change the game because if you are better in your predictive models, you can be more effective in a lot of things that you do.

Looking at the call center, where the benefits of AI and robotics would be tangible, what kind of savings do you think are possible as a result of chatbots and other technologies? Are we talking double-digit percentages?

I think if you compare today's costs with costs several years out, say a five-year horizon, then you will see a high double-digit percentage in savings.

In the TeBIT assessment, we see three main areas of investment in AI and robotics: predictive maintenance, chatbots and virtual assistants, and machine learning in marketing and sales. What do you believe will be the next big application area or areas?

One area that is very important to us is using AI to create more effective planning models. Where do we have to place our antennas for the radio network? Do we roll out fiber or copper in certain

## NOTHING ARTIFICIAL ABOUT THE RESULTS (continued)

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areas? Complex models underlie a lot of the things that telcos do. AI can help us do our planning more effectively, so that is a key application. Meanwhile, we expect that in the long run, much—if not all—of our operations will be automated, so our outsourcing and offshoring will be reduced significantly. This is something that is already starting to happen on the IT side, and on the network side it will happen in the next five years.

Do you think investments in AI and robotics will consist of a few big bets in specific areas, or will they be spread more broadly across the value chain?

Maybe on the call center side it will be big bets, but otherwise it will be spread across multiple areas.

From the benchmark data, we saw that AI and robotics investments—and planned investments—in marketing and sales and physical shops are quite low. Do you think the real momentum is coming—or will come—from other areas, such as automating customer service, network quality, planning, and optimizing back-office functions?

I think there are definitely things to explore on the marketing and sales side. By using more AI, you can do a lot more in terms of approaching your customers. So, yes, there is more to be done in marketing and sales, though you also have to comply with privacy rules and laws.

Who drives AI initiatives at KPN? Are the ideas for where and how to use AI coming from IT or from the business?

It's a combination, as we do not have a clear distinction between IT and the business. For example, data and analytics is a group in itself at KPN and within it you'll find both business and IT skills.

At a recent ETIS gathering, we had an interesting discussion about billing. The gist of it was, telcos have the same need yet make all these individual investments in different solutions and vendors. Do you think the field of AI and robotics is an area where telcos will wind up—or would do better by—collaborating?

I could imagine that there will be cooperation between certain telcos, especially as automation may be a game-changer, but it won't be a differentiator. Everyone will need to do it to keep up with the competition. Perhaps the big global telcos won't need cooperation, but if you look at the smaller ones, they are already learning from each other and sharing information. So I can certainly see that happening with AI and robotics. ETIS could be a great platform for this.

Which industries do you think are the front-runners in this space? Are there certain sectors you look to for insight on where and how to invest?

If you take automation, there really isn't much difference between automating IT at a telco and at a different kind of business. So as a telco, you'd look at organizations that are front-runners in what they are doing with IT. It's not really industry specific. One time we'll look at a bank, another time it's a utility company or an insurance company.

One final question. Many new technologies linked to IT, such as analytics and cybersecurity, have

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become C-level topics, discussed and driven by the C-suite and the board. How long do you think it will take for this to happen with AI and robotics?

That's a good question. I do think AI and robotics will see attention at the C-level, but I also think this attention will be temporary. That's because, ultimately, AI and robotics—like analytics and many other technology topics—will become part of our normal work. They will need the C-level to get to maturity, to become fully embedded in the organization. But once that happens, the C-level will be less hands-on and AI and robotics will just be part of our normal practices.

transformation, converged fixed-and-mobile offerings, and content-related services—are all drivers of growth for telcos. But the investment breakdown also reveals just how much less telcos spent on AI and robotics. Typically, a telco spends 5% to 20% of its total IT capex on a top-three investment area, but investment in AI and robotics was, at most, 2.5% of the average annual IT spending of TeBIT participants. Telcos fall well short of other industries, as well. Industrial robots accounted for more than 12% of total spending on new and upgraded production facilities in the automotive industry in 2015. TeBIT participants, by contrast, devoted less than 2% of their investment in production facilities (represented by network and IT capex) to AI and robotics.

Moving AI and robotics higher on the priority list could not only generate revenue and boost efficiency but also reduce costs while improving speed, overall quality, customer satisfaction, and—whether directly or indirectly—the bottom line. To put it another way: telcos can get everything they need.

# THE POTENTIAL OF COTS SOFTWARE AND OUTSOURCING

**O**F ALL THE TOOLS that help telcos operate, commercial-off-the-shelf (COTS) software is one of the most effective—and prized. As in past years, TeBIT participants expressed high satisfaction with COTS software packages, which play a key role in a multitude of process areas, including marketing and sales, billing, and revenue management. Nonetheless, there seems to be room for improvement, especially with regard to how COTS software can support AI and robotics.

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Telcos are staying on top of managing complexity in their IT operating models.

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Survey responses indicate that one of the key challenges in adopting AI and robotics is a lack of plug-and-play integration with the existing business support systems and operations support systems that power so many telco functions. Last year, we saw a similar situation in our deep dive on big data and analytics: promising new technologies emerged but weren't immediately embraced by the major COTS software players. By incorporating AI and robotics into existing software suites (for example, through add-on modules), vendors could differentiate their own

products as well as help telcos leverage these new tools.

Unlike last year, we did see a correlation between the degree of COTS software usage and IT costs: higher use is associated with higher costs. This wasn't entirely unexpected. We had seen the correlation—which is likely due to the customization and annual maintenance fees that telcos pay for their COTS packages—in earlier TeBIT analyses, and last year we wondered whether it might return. We saw that a few vendors dominated in most practice areas, potentially setting the stage for higher prices. This year, the consolidation trend continues: in every application category except for billing and revenue management, two to four vendors accounted for a combined penetration of more than 50%.

Another continuing—and positive—trend is that telcos are staying on top of managing complexity in their IT operating models. Survey participants scored an average of 46 (out of 100) on TeBIT's complexity index, a slight rise from last year's score of 42 and a more significant uptick from the average of 36 in 2015. It's not surprising that complexity is steadily increasing: telcos are venturing into new areas, such as big data and analytics, that require new skills, processes, and resources. New models of cooperation, with external experts and other third parties, are needed as well. Yet the declines in IT opex



that we saw for 2016 in both mature and emerging markets suggest that operators are doing a good job of managing any added complexity.

One trend did reverse, however. Over the past few years, we've seen telcos devote an increasingly smaller percentage of their IT budgets to outsourcing. The 2015 average of 12% was down from 15% in 2014 and 26% in 2013. Telcos, it seems, are using outsourcing more selectively, increasing it in areas where they tend to lack sufficient skills (such as application development) while reducing it in areas where in-house capabilities are stronger (such as IT infrastructure). On first glance, this year's TeBIT survey seems to find telcos returning to a less granular approach: outsourcing accounted for 18.7% of IT budgets. But there is another possible explanation for the rise. Outsourcing can be a relatively quick

way to access needed skills, and the technologies and business models that telcos are increasingly adopting—especially in digital and analytics—require a lot of new skills.

Indeed, outsourcing could help telcos ramp up their efforts in AI and robotics, providing much of the necessary talent and resources and reducing the time and effort needed to launch new initiatives. Outsourcing may have started as a tool to reduce costs, but used wisely, it might provide telcos with something even better: a quicker path to an industrial revolution.

# EFFICIENCY BOOST OR PARADIGM SHIFT?

**E**ARLY RETURNS DON'T ALWAYS predict the future. But there is reason to believe that the initial benefits generated by AI and robotics may portend bigger things for telcos. The projects now underway seem to be hitting all the right notes: cutting costs, improving the customer experience, and growing revenues (even if indirectly). The question is: Will AI and robotics result in an ordinary efficiency boost or a paradigm shift?

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The initial benefits generated by AI and robotics may portend bigger things for telcos.

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Other industries have experienced transformation, but, unlike telcos, they have also invested heavily in the technologies. And while TeBIT participants do plan to spend more in the area, the increases don't look as though they will be dramatic, at least in the short term.

TeBIT participants are trying a variety of initiatives and planning more—such as machine learning for cybersecurity, network troubleshooting, and customer service; AI for fault management without the need for operators; and more uses for predictive analytics. And it's understandable that telcos want to test

different ideas to see what works best. But spreading the initiatives means greater demand for slices of the AI and robotics investment budget—and that may mean increasing the size of the pie.

Sharply increasing investment in AI and robotics would be a bold move. But it might be needed if telcos are to find out whether AI and robotics could be really big for them, too. By doing so, telcos would be able to more fully explore the technologies and use cases, and zero in on those that matter most. Then they could make more focused investments, deploying AI and robotics where, and how, they deliver the greatest value.

Fortunately, there are ways to smoothen and accelerate this process. One idea is to look at other industries. The businesses may be different, but many of the tactics that leaders in AI and robotics are taking—such as using machine learning to better understand customer behavior or to spot potential problems with systems—may be relevant for telcos, as well. Some telcos already do this kind of extra-industry review with IT, looking to banks, utilities, and other types of businesses for insights on applying technology.

Telcos should also consider how best to track the performance of projects involving AI and robotics. This isn't always straightforward because the benefits may be indirect or impact-

ed by multiple factors. But developing a link between an initiative and results is crucial for understanding where and how these technologies can best be employed.

Collaboration between IT and the business side is important, too. Like other key technologies, AI and robotics can be leveraged to simplify business processes and effort. But to do that well, telcos must really understand and quantify the impact of a potential project. These are tasks that need to be driven jointly.

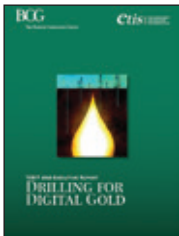
Collaboration among telcos could also prove to be a powerful way to home in on the best approaches and practices for AI and robotics. Traditionally, telcos haven't been inclined to share ideas and information with their competitors (though the TeBIT participants are a notable exception). But because the field of AI and robotics is largely uncharted ground for operators, working together might be the

most efficient way to steer development, tackle integration challenges, focus investments, and even spur vendors to create plug-and-play solutions.

Through collaboration, telcos could help build an industry baseline for AI and robotics. They could then go their own ways to build on top of that—perhaps changing the game *and* creating differentiation. And if that comes to pass, the technologies that are reshaping other industries will, indeed, transform telcos, too.

# FOR FURTHER READING

This publication is part of a series of TeBIT Executive Reports—telco IT benchmarking studies jointly developed and conducted annually by ETIS and The Boston Consulting Group.



**Drilling for Digital Gold**  
The TeBIT 2016 Executive Report, October 2016



**Telcos's New Business Cycle: Time to Invest Again**  
The TeBIT 2013 Executive Report, October 2013



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The TeBIT 2015 Executive Report, October 2015



**Telco's New IT Weapon: Business Value Creation**  
The TeBIT 2012 Executive Report, October 2012



**Paving the Paths to New Revenue**  
The TeBIT 2014 Executive Report, October 2014



**Telco IT Units Did Their Homework**  
The TeBIT 2011 Executive Report, October 2011

# NOTE TO THE READER

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