Fuel your Enterprise with HCL’s Robotic Process Automation

HCL’s NeXt Gen Business Services
In this day and age where business process outsourcing is looking beyond labor arbitrage and process re-engineering paradigms, Robotic Process Automation (RPA) provides a comprehensively better alternative, which is not only more cost competitive, but scores way higher in terms of process execution accuracy, handling time, and scalability with little or no security and compliance concerns.

RPA involves the use of flexible, reusable and non-intrusive software components, aka robots, which interact with and orchestrate systems and applications (such as CRM, ERP, origination systems, legacy systems, and green screens). It operates in a business process in exactly the same way a business user does.

Processes once automated can reside in a virtualized data center environment and can be quickly scaled up to meet business requirements.

Recent developments in RPA technology (semantic graphs and artificial intelligence) allow software robots to actually learn and improve - through a natural consequence of processing information in collaboration with business users - even when dealing with unstructured content.

**Benefits of RPA**

**Lowered Cost of Operations**

- Typical labor cost savings envisaged from an RPA program range between 30 to 70%.
- By virtue of its speed of operation, a single robot can replace anywhere between 2 to 5 FTEs.
- Automated processes can virtually run 24 / 7 / 365 without the need for breaks or leave.
**An Example:**

Let’s consider an ideal world scenario of a logistics company’s back-office process which requires 24/7 monitoring of various carrier websites, to track shipments and send out hourly updates. Based on the workload computation, the company currently deploys exactly 2 FTEs in each hour of the day.

To achieve the required coverage of 2 FTEs in each shift, the company has to maintain a minimum of 10 agents on the headcount (considering a 45 hours’ work week, 15% shrinkage).

This entire process can be completely automated within weeks by a single RPA robot managed by a single controller.

**Improved Accuracy**

- Automated processes deliver speed with near-zero error rates.
- Robots once programmed will perform the same task over and over, tirelessly, with 100% adherence to the defined process no matter how monotonous things become.
- Automation removes human intervention, and thus “human error”

**Scalability**

- A robotic workforce can be scaled up/down in hours, to meet business requirements. Every new robot (“newbie”) on the job can be expected to deliver the same level of accuracy and efficiency as the previous one (“tenured”) without any learning curve.
- Robots can be 100% cross trained from the word go. Each robot of the automated workforce can be time shared across multiple processes while expecting 100% accuracy, adherence and speed for each of the processes.

**Enhanced Compliance / Risk Management**

- All the process steps and decision points completed by a robot are logged, and detailed audit trails are produced (at keystroke level) as needed for regulatory compliance.
- Robots can be trained to report regulatory compliance or variances across various systems by accessing them and monitoring the actual outcomes against required outcomes.
- Since Robots always perform pre-defined process steps, there is no scope for expedient worksteps – as is often resorted to by tenured FTEs.

**Analytics**

- Detailed audit trails and logs created by robots can be turned into understandable patterns that could provide greater insights into process bottlenecks, which can be used as a feedback loop to further improve the automated process.

**Faster ROI**

- Typical RPA automations can be delivered in a span of days to weeks utilizing agile methodologies as compared to traditional IT implementations, which can take months to years before any real ROI can be realized.

**No Risk to Existing Applications**

- RPA components interact with the various applications and systems in exactly the same way as a human user does. It only manipulates data to and from these systems and does not, in any way, tamper with the application logic, hence the systems remain uninvaséd.

**Can be managed under existing IT governance**

- Governance and control functions such as security, audit, and hosting are totally commanded by IT.
Why RPA with HCL?
Cutting across traditional boundaries HCL evolved from being a provider of traditional BPO services to a provider of holistic next generation business services to Fortune 500/Fortune Global 500 customers. HCL’s expertise stems in providing customers with highly mature and best-in-class business processes based on the following Next Generation tenets:

- Domain orientation
- Innovation and improvement focus
- Output/ outcome/ flexible constructs
- Integrated Global Delivery Model (IGDM)
- Risk and compliance

Building on these tenets, HCL’s Next Generation RPA suite helps organizations

- To discretely build up and underwrite the business benefits of RPA when applied to their processes
- To effective amalgamate technology with a client’s business processes assuring proper configuration, maintenance and compliance.

Source: HCL

Types of processes amenable to RPA

- Digital, standardized and structured input
- Highly manual, rule-based processes, with minimal to zero subjective decision
- High percentage of happy path flows (i.e. lesser proportion of exceptions)
- Operations environment consisting of a large number of disparate and complicated systems, the integration of which is costly or un-feasible
- In-depth, accurate and readily available knowledge documents

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ToscanaBot – HCL’s Robotic Automation Framework

Increasing cut throat competition in the industry and a rapidly changing economy is driving business process management service providers to cut costs while ensuring consistently higher productivity.

While BPOs realize the limitations of labor arbitrage in delivering any further cost benefits, HCL has gained competitive advantage by completing core operations quickly, accurately, and cost-effectively, through its ToscanaBot Robotic Process Automation (RPA) Framework.

ToscanaBot is supported by industry leading RPA technology partnerships. HCL has established the ToscanaBot Center of Excellence which comprises experts who support ongoing automations while working closely with business teams to identify future automation opportunities and deliver business benefits on the same.

ToscanaBot – Business Benefits

HCL’s ToscanaBot RPA Framework addresses the challenge of lowering costs while enhancing productivity rates and consistently higher levels of quality by providing a third alternative, which allows business teams to rapidly automate processes using non-invasive and un-obtrusive techniques to realize benefits across the long tail.

Enterprises that implement HCL’s ToscanaBot RPA Framework realize considerable improvement in productivity levels, since software robots (unlike humans who require breaks and leave) can work round the clock, efficiently analyzing and extrapolating data, making rules-based decisions and orchestrating multiple systems. In addition, software robots are unsusceptible to human error – thereby boosting the accuracy of operations. As a result, our customers can experience financial gains by quickly identifying the right opportunities to reduce debt and avoid unnecessary costs.

ToscanaBot – Features & Capabilities

- Changes to underlying systems not required
- Emulates human interface with existing applications
- Continuous operations without break
- 100% compliance to the regulatory requirements
- 70–80% reduction in turnaround times
- Underlying BPM is not a necessity
- 100% accuracy
- 30–50% reduction in operation costs
- Continuous operations without break

Source: HCL
Retail Banking – Automated Customer Onboarding Processes

**Process Pain Points**
- Heavy FTE dependence - due to disintegrated legacy systems
- Error prone - requiring 100% maker-checker arrangements
- Long training durations - as different systems present different screens depending on the type of customer
- Higher attrition rates - due to the monotonous nature of business

**Solution Benefits**
- 60% reduction in FTE dependence. Almost 80% reduction in the process AHT
- Improved accuracy due to robot-driven straight through processing - reduced requirement for checkers
- Reduction in attrition rates as human FTEs are now involved in qualitative work
**Telecom – Customer Lifecycle Management**

**Process Pain Points**

- Agents spend significant time working through a maze of applications and systems
- Sometimes rules-based, lengthy workarounds are required if an application does not return the appropriate results
- Agents often put the wrong query to a customer; pre-paid customers may get asked post-paid based questions
- Post the call, agents need to add notes separately into all applications
- All this sums up to higher AHT, inefficient process execution, and ultimately, a lower CSAT

**Solution Benefits**

- 23% increase in First Call Resolution
- 18% reduction in the process AHT
- 60% reduction in FTE training cost
- Enhanced customer experience

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**FIGURE 2**

**Agent desktop for as-is scenario**

**Agent desktop with 360 degree view of applications**

Source: HCL
FIGURE 3
Other Process Areas and Benefits Potential

Source: HCL
Smart-machine technologies are enabling new business and IT services by accelerating the shift from labor-based to intellectual-property-driven offerings. Sourcing executives must understand and evaluate the efficacy of smart-machine-enabled services to expedite results.

Impacts
- The arrival of smart-machine-enabled services – a new breed of commercially available offering – requires sourcing executives to explore ways of harnessing them at the right time, at the right speed, and for the right process.
- Companies are already piloting smart-machine-enabled services, which offer potential cost savings of over 50% and the chance to accelerate business outcomes, so sourcing executives cannot afford to ignore these offerings.
- To prevent their enterprise being disrupted (losing competitive advantage) and potentially rendered irrelevant by companies that harness smart-machine-enabled services, and instead to make it one of their industry’s successful disrupters, sourcing executives need to match these services to its critical initiatives.

Recommendations
Sourcing executives should:
- Formulate a catalog or “radar list” of smart-machine-enabled services to track potential market offerings and to help them engage in recurring dialogue with business unit teams, enterprise architects and IT leaders.
- Connect with the leaders of, or change agents responsible for, business-focused innovation and digital initiatives within their organization to ensure that smart-machine-enabled services are understood and considered by business unit teams, enterprise architects and IT leaders.
- Empower a multidisciplinary, cross-functional team that will work with sourcing managers to execute proofs of concept for smart-machine-enabled services, and recognize the best way to contract for and implement them.

Strategic Planning Assumptions
By 2017, managed service offerings leveraging autonomies and cognitive platforms will permanently remove head count, resulting in a 60% reduction in the cost of services.

By 2018, the total cost of ownership for business operations will be reduced by 30% through smart machines and industrialized services.

By 2018, digital business will require 50% fewer business process workers and 500% more key digital business jobs, compared with traditional models.

Analysis
In this report, we explore the impact on business and IT services of smart-machine technologies (defined in Note 1). We examine how their adoption can deliver not only significant savings but also expedite business results for improved customer experience, turnaround times, differentiation, innovation, and ability to rapidly digitalize business and IT processes. More specifically, we discuss how smart-machine technologies are accelerating the significant shift from a traditional labor-based services market to an intellectual property (IP)-based services market, which is resulting in accelerated business outcomes to deliver rapid business differentiation and innovation.

CIOs and sourcing executives must understand the various technologies and services available within the smart-machine spectrum in order to assess the level of “smartness” needed to achieve their desired business outcomes. This will be the factor that leads enterprises to become either disrupters or the disrupted.

By “business outcome” we mean a specific and measurable result that includes significant savings but also expedite business results for improved customer experience, turnaround times, differentiation, innovation, and ability to rapidly digitalize business and IT processes. More specifically, we discuss how smart-machine technologies are accelerating the significant shift from a traditional labor-based services market to an intellectual property (IP)-based services market, which is resulting in accelerated business outcomes to deliver rapid business differentiation and innovation.

Gartner’s latest CIO study found that 51% of CIOs consider themselves ill equipped to meet these challenges. In the past, most CIOs and sourcing managers were challenged to do “more with less” – to deliver more business and IT services with lower-cost sources of supply (fewer people or less cost per person). The grim reality now is that it is impossible to continue down that path. Labor rates, for example, have already been recalibrated to new “offshore,” lower-cost rate structures.

An even bigger challenge is posed by new pressures, namely the “need for speed” and the demand for improved customer experiences via digital technologies. The rapid evolution of digital technology has changed the focus of sourcing managers from lowering cost to accelerating velocity. This has led to significant investments in the commercial availability of smart machines across an extensive spectrum (see Figure 1), for application to business and IT processes and problems.

Gartner developed this smart-machine-enabled services spectrum in order to track the evolution of the different types of new service offerings that use smart machines as their core source of value. The spectrum has two axes: smartness scale and dependency on technology enablement.

The smartness scale is a composite of the seven smart-machine characteristics – autonomy, understanding, complexity, active learning, passive learning, probabilistic predictions and well-scoped purpose – embedded in the service offering. Therefore, the smartness scale is a critical indicator of an offering’s sophistication and ability to drive business outcomes.
The technology enablement axis measures the level of technology dependency — based on size, complexity and ease of applying the technology footprint — embedded in the service offering. A larger, deeper footprint results in an ecosystem that requires much more setup and configuration work and that is more technology-dependent (for examples, see “Hype Cycle for Smart Machines, 2014”). Therefore, higher-dependency offerings require more time, money and resources to implement and operate. However, we have found that there are valuable business benefits to be had across the entire spectrum.

The spectrum includes three categories to help organizations understand the various smart-machine technologies that often form the underlying platform of fully bundled smart-machine-enabled service offerings:

- **Adaptable automation**: On the left is adaptable automation, which typically includes technologies more sophisticated than the automation technologies typically seen in the past. The key characteristic of offerings in this category is that they can efficiently mimic a process using highly “adaptable” scripting technology that is unintrusive (meaning it does not change or impact legacy systems) and that leaves a documented audit trail that can be tracked, reviewed and confirmed. We refer to this category as “highly adaptable” as it is several notches above traditional automation – the technology allows for much more robust automated capture and replication of a business or IT process configuration than prior methods involving extensive manual configuration of business rules and algorithms. However, this technology does not have cognitive-learning, semantic-understanding or problem-solving capabilities.

  Since many adaptable technologies can emulate the work of human agents by mimicking keyboard presses, moving or populating data between systems, performing actions and triggering downstream process activities, several vendors have marketed such offerings using the term “robotic process automation.” However, Gartner’s polling of an extensive group of existing and prospective users reveals an overwhelming dislike for this term as it conjures up images of physical robots, which are in no way part of these offerings. It is also confusing to teams developing radar lists of smart-machine-enabled services as some other offerings do use robotics. Given this, and the likelihood that much of this technology will continue to evolve dynamically, Gartner analysts will not embrace this term.

- **Orchestration**: The middle of the spectrum is referred to as “orchestration” because the designers and curators of these offerings can orchestrate and bundle several elements (human and nonhuman) to develop a business or IT service that delivers an ecosystem that makes decisions on its own, using high-level policies. This ecosystem constantly monitors and optimizes the status of certain conditions, and then automatically adapts to changing conditions. The underlying platform is often based on intelligent-process, autonomic-service technologies. These are above automation in that they involve “autonomic computing,” which refers to the self-managing characteristics of distributed computing resources and adaptation to changes, while hiding intrinsic complexity from users.

- **Cognitive-enabled services**: On the right of the spectrum are offerings that can autonomously understand, learn and solve problems. Cognitive-enabled services differ from previous ones in that they go beyond tabulating and calculating based on preconfigured business rules or defined set of circumstances, rather, they can be invoked, or can take action, based on dynamic sets of business or IT factors. These offerings are on the right of the smartness scale as they address complex situations characterized by ambiguity and uncertainty — in other words, human kinds of problems. In dynamic, information-rich and shifting situations, data tends to change frequently and is often conflicting. The goal is to continue to evolve, learn dynamically and solve problems with the level of fluidity inherent in business and IT processes. To respond to the fluid nature of business and IT processes, cognitive-enabled services offer a synthesis of not just information sources but also of influences, contexts, and insights from human and nonhuman sources.
Impacts and Recommendations

The arrival of smart-machine-enabled services requires you to explore ways of harnessing them at the right time, at the right speed, and for the right process. CIOs and sourcing managers working with business unit leaders can no longer deliver the required services at the necessary speed using human-labor-based operating models and offerings. It is impossible to process a huge number of transactions across a myriad channels (physical, mobile, Internet, sensor-based and so on), or to meet the desired subsecond customer service response times, using human power alone – automation, autonamics and machines must be involved at some level. Additionally, though, it is no longer enough to "simplify and automate" with some type of software or to string together technologies, as there is always some labor-based activation or confirmation that cannot be fully automated.

This is why smart-machine-enabled services are gaining so much attention. A recent poll of 44 service providers found that the percentage of inquiries from their existing clients and prospective buyers regarding smart-machine-enabled offerings had increased from 10% in January 2014 to 70% in November 2014. This dramatic rise has led to a significant focus on research and development (R&D), funding and marketing activities by over 25 of these providers.

According to Gartner’s analysis of the impact of smart-machine technology on business and IT services, the most profound change will be in the valuation of new cognitive-enabled services – those on the right side of the smart-machine-enabled services spectrum. Smart-machine service valuation will be based on the solution’s IP, not the quantity or capability of the human labor replacement that is part of the service. In the current valuation process, enterprises ask about labor rates and billing rates. In the future, prices will be determined by the valuation and monetization of the IP in cognitive-enabled services. Considerations will include, for example, what you will be prepared to pay to have your insurance claim processed 15 days earlier, or your mortgage application processed in hours rather than days. A more personal consideration might be whether you be willing to be treated for cancer by an oncologist who is unaided by smart-machine technology. Consider the following. A doctor can read and absorb several hundred research studies a year, but there are over 23 million published each year. There is smart-machine technology commercially available that can process this volume in hours and provide probabilistic results to help doctors decide the right treatment.

Interviews with nine Gartner clients who used cognitive-enabled services for more than six months revealed that they found the most enticing business benefits to be (1) speed-to-result, (2) cash flow shift, (3) consistency and predictability.

Figures 3 and 4 illustrate the shift from labor-based models to IP-driven models for services. A comparison of 12-month cycles reveals that they found the most enticing business benefits to be (1) speed-to-result, (2) cash flow shift, (3) consistency and predictability.

In Figure 3 we see the current pattern whereby a buyer purchases hardware, software and IT services to implement a future solution. Once those elements have been procured (often after a substantial period of evaluation and selection), the transition and knowledge transfer phase commences. Depending on the scope and scale of the effort, this phase may take weeks or months. (The graphic is illustrative, rather than precise, so it shows a range of months.) At the end of a successful transition, the enterprise starts the process of realizing the savings, as depicted by the positive, green dollar sign beneath the last three months of the timeline. The negative, red dollar signs for the previous months depict the cash outlay for many earlier months. The main result is that savings often take a year or more to commence, and require business cases to model the time-based valuation of benefits.

This approach is driven primarily by human labor, as this accounts for the largest part of the service solution.
In Figure 4 we see the result of a client using cognitive-enabled services. The enterprise does not make several distinct purchases of hardware, software and services. Rather, all services are bundled together. Nor are they always based on human labor. They are primarily cognitive-computing technologies. The commercial terms are for outcome-based, managed-service structures, for which there is no initial cash outlay. These terms are directly tethered to distinctive business outcomes, with payment triggered upon delivery of the service, rather than by the number of hours of human labor. The graphic shows how, in this approach, the timeline shrinks from one year to three months. The main reason for this shortening is that cognitive-enabled services have the ability to learn, thereby significantly shrinking the transition time. Cognitive technology can digest and process large quantities of knowledge in hours and days, rather than the months required for human-based efforts.

Ultimately, this means that time-based valuation of services and monetization of the IP included in cognitive-enabled service offerings will lead to a profound and lasting shift to outcome-based commercial structures for business and IT services.

The basis of the new, shorter timeline, and of the increased speed with which savings can be achieved, is the IP in the platform underlying the smart-machine services. This IP will be the primary source for the valuation and commercial terms of the services. More specifically, the time valuation will be heavily influenced by a time-based model for achieving savings. Therefore, the monetization of the IP included in cognitive-enabled service offerings will determine the new pricing structures for outcome-based services. This will demand that sourcing executives develop new competencies for analyzing, contracting and managing these offerings, and create deeper and broader links to the desired outcomes. This will require investment in IP, at the center of which will be the smart-machine technology embedded in the platform behind the new service offerings.5,9

Recommendations:

Sourcing executives should:

- Formulate a radar list or catalog of smart-machine-enabled services and vendors to track potential market offerings and to help them engage in recurring dialogue with business unit teams, enterprise architects and IT leaders (see Note 2).

- Start working with business and IT teams to define value drivers and specific business or IT processes that might be candidates for the application of smart-machine-enabled services. This work will form a basis for negotiating commercial terms and defining metrics for business outcomes.

- Engage in and prioritize fact-finding and reference-checking efforts for a select number of smart-machine-enabled services that align with their most prominent enterprisewide digital initiatives. This should include working with service providers to understand their capabilities.
Companies are already piloting smart-machine-enabled services, which offer potential cost savings of over 50% and the chance to accelerate business outcomes, so sourcing executives cannot afford to ignore these offerings.

Business processes and the entire value chain of business operations will shift from a labor-driven and technology-enabled paradigm to a digital-driven, human-enabled model. Smart machines will not replace humans, because people will still need to “steer the ship” – by, for example, designing and curating smart-machine-enabled services – and interpret digital outcomes. Rather, smart machines will reduce complacency and inefficiency and add tremendous velocity to business operations, thereby accelerating business outcomes. They will also perform lower-level tasks that do not require intuitive approaches, thereby freeing humans to do more challenging and interesting work.

With this in mind, Gartner analysts gathered examples of smart-machine-enabled services with a view to evaluating the size and source of the savings they can deliver. We interviewed 19 enterprise buyers and 39 service providers over the past 14 months to understand their most significant business drivers and the shifts that will impact business and IT services. Figure 5 depicts an aggregation of the savings achieved across the smart-machine-enabled services spectrum. Not all the enterprises used the same technology platform.

One example was a top-five media company in the U.S., which implemented smart-machine technology for a customer service function. The shift in business operations in the initial three-month period included reducing the average time to resolve a customer issue from 18.2 minutes to 4.5 minutes. The average time to address an issue started at 55 seconds (with a head count of 76) and shrank to two seconds (with smart-machine technology in place and 32 people). Gartner has conducted similar case studies for a variety of business processes, including wealth management in the financial services sector, and supply chain logistics in the oil and gas industry.

![FIGURE 5](source: Gartner (January 2015))

A key point to remember is that we are still in the early days of smart-machine-enabled services. Therefore, the savings levels shown in Figure 5 should be taken as directional indicators. They signal the clear new direction of many service providers that are looking to shift from labor-intensive operating models to IP-driven business structures for profitability.

**Recommendations:**

Sourcing executives should:

- Understand the size and source of the IP underlying the smart-machine-enabled services that will deliver savings, to ensure clarity about the valuation of the deal and the business case.

- Implement an iterative process for matching potential business and IT initiatives to a radar list of smart-machine-enabled services. It is crucial to continually evaluate and connect potential offerings in order to harness specific types of smart-machine-enabled service at the right time, at the right speed, and for the right process.

- Connect with the leaders of, or change agents responsible for, business-focused innovation and digital initiatives within their organization to ensure that smart-machine-enabled services are understood and considered by business unit teams, enterprise architects and IT leaders.

- Avoid shying away from technologies on the edge of “smartness” and waiting for full technology maturity. Waiting would have been a $100 million mistake in terms of annual operating expense for Rio Tinto. The key question is “How much can I tolerate losing while I wait for others to build winning use cases?”

To prevent their enterprise being disrupted (losing competitive advantage) and potentially rendered irrelevant by companies that harness smart-machine-enabled services, and instead to make it one of their industry’s successful disrupters, sourcing executives need to match these services to its critical initiatives.

Sourcing organizations can no longer simply be order takers or sit passively waiting for business unit leaders to start the demand cycle. Success – indeed, survival – for entire entities, and the ability to achieve differentiation and innovation at “digital
Empower a multidisciplinary, cross-functional team that will work with sourcing managers to execute proofs of concept for smart-machine-enabled services, and recognize the best way to contract for and implement them.

Engage with business process leaders to devise a checklist and evaluation criteria with which to determine which external service providers or crowdsourcing options should be considered “fit for purpose” for various use cases.

Develop business cases with targeted business outcomes in order to gain the buy-in of other executives and establish the measures of success to include in sourcing contracts. They should work closely with business teams to monitor the results and develop next steps for mainstream adoption of implementations that meet or exceed the business case requirements.

To take one example, drones are used primarily for military reconnaissance, but some service providers have used their business process knowledge to develop an offering that uses them in an operational business process for monitoring oil and gas pipelines over hundreds of miles. This process was previously executed by humans using helicopters, but this was less effective and efficient because they could not get as close to the pipelines as drones can. Additionally, helicopter fuel is more expensive, and it is harder to take photographs from a helicopter for an audit trail of inspections. It required some “out of the box” thinking for teams to see the applicability of drones to this operational business process.

This requirement represents the biggest hurdle to adoption of smart-machine-enabled services. It is incumbent on sourcing managers, enterprise architects and IT teams to engage with business units to explore the “art of the possible” and to work with service providers that have access to hundreds of machines in similar environments, whether in the same industry or different industries.

Recommendations:

Sourcing executives should:

- Empower a multidisciplinary, cross-functional team that will work with sourcing managers to execute proofs of concept for smart-machine-enabled services, and recognize the best way to contract for and implement them.
- Engage with business process leaders to devise a checklist and evaluation criteria with which to determine which external service providers or crowdsourcing options should be considered “fit for purpose” for various use cases.
- Develop business cases with targeted business outcomes in order to gain the buy-in of other executives and establish the measures of success to include in sourcing contracts. They should work closely with business teams to monitor the results and develop next steps for mainstream adoption of implementations that meet or exceed the business case requirements.

Evidence

1 See “CEO Resolutions for 2014 – Time to Act on Digital Business” and “Research Overview for the 2014 Gartner CEO and Senior Executive Survey – CEOs’ Interest in IT Is Highest in a Decade.” In 4Q13, over 400 executives from large enterprises in more than 20 countries responded to the 2014 Gartner CEO and Senior Executive Survey. Its findings indicated that business growth was among the top three priorities for 64% of respondents (up from 50% in the previous year). For 80% of respondents, it was in the top five.

2 Talent shortage data is composite, being derived from several different studies. In the field of data science, for example, there is a shortfall of 140,000 to 190,000 data scientists and 1.5 million managers (see “How to Manage the Skills Gap”). Additionally, educational systems globally (but especially in developed countries) have been slow to change their curriculums and effectively address the need for specialized business and IT capabilities for future digital technology markets. University graduates often continue to learn traditional information and communication technology and computing skills, which are quickly becoming obsolete. According to a study by researchers at Georgetown University, in the U.S., the higher education graduation rate is stagnant, and the economy will face a shortage of 5 million workers with the necessary education and training by 2020 (see “Report: Economy Will Face Shortage of 5 Million Workers in 2020” and “The Reality of the Digital Skills Gap”).

3 See “Taming the Digital Dragon: The 2014 CIO Agenda,” in which Gartner analysts published the results of a comprehensive 2014 CIO study (the largest such survey in the world). Gartner polled over 2,300 CIOs, who managed a cumulative IT budget of $300 billion.

4 See “Taming the Digital Dragon: The 2014 CIO Agenda.”

In November 2013, a dedicated special interest group was formed, consisting of over 50 service providers and 20 smart-machine technology vendors. It was polled in January 2014, and again in November 2014, to compile a collective number of inquiries from clients and prospective clients regarding smart-machine-enabled services. The number of clients and prospective clients polled varied by vendor, and the base of enterprises in the January 2014 analysis differed from that in the November 2014 analysis. The collective number of clients and prospective clients was over 1,500 organizations in both polling periods.

Data points provided by Memorial Sloan Kettering hospital, New York.

7 Gartner analysts’ interviews conducted with eight U.S.-based clients and one European client from October 2013 to July 2014.

8 Gartner analysts regularly field inquiries from a base of over 10,000 clients. Gartner’s smart-machine analysts estimate that they addressed over 240 inquiries from clients between November 2013 and August 2014.

9 Gartner’s services and sourcing analysts have a formal client inquiry database for logging inquiries. A query of its data from December 2013 to August 2014 identified over 120 inquiries relating to outcome-based managed services.

10 In March 2014, one of the top-five media companies in the U.S. began analyzing specific business processes with a view to selective adoption of smart-machine-enabled services. In June 2014, the company implemented a cognitive agent for one of its customer service functions. In the initial three-month period, it achieved the results depicted above.
“Smart machines” is Gartner’s overarching term for a number of emerging technologies (with distinctive characteristics) that will drive a significant wave of change in the next 15 years. Some of the more notable smart-machine technologies include process automation, virtual agents, autonemics, cognitive computing, artificial intelligence and machine learning. For a full definition, see “Digital Business Innovation With Smart Machines.”

In the two years since the introduction of this term, Gartner analysts from a number of disciplines have worked to further describe smart-machine technology, its relationship to people, its impact on jobs, associated human-machine collaborations and synergies, and potential areas of friction and ethical concern. They have also analyzed the impact of smart-machine technology on business and IT services and developed a definition of smart-machine-enabled services.

### Definition of smart-machine-enabled services

These are business or IT services that use one or more smart-machine technologies (such as a cognitive-computing technology platform) as the basis of an offering’s core value proposition. The business or IT services involve the delegation of one or more tasks or processes where the commercial terms are directly tethered to distinctive outcomes and where payment is triggered by delivery of the service, rather than by ongoing effort (often referred to as “inputs”) as measured by, for example, number of work hours or full-time equivalents.

For this definition, it is crucial that the offering includes one or more smart-machine technologies in its core platform or underpinning. Such inclusion often requires extensive R&D investment to achieve an aggregated (tightly bundled) solution that ensures predictable, reliable outcomes. This often results in a relatively large portion of value being derived from IP, accelerators and verticalization, as opposed to pure labor. The increased size of this portion marks the key shift from labor-driven to IP-driven offerings and results in different commercial terms, which are outcome-based.

### Note 1

**Smart-Machine Definitions**

“Smart machines” is Gartner’s overarching term for a number of emerging technologies (with distinctive characteristics) that will drive a significant wave of change in the next 15 years. Some of the more notable smart-machine technologies include process automation, virtual agents, autonemics, cognitive computing, artificial intelligence and machine learning. For a full definition, see “Digital Business Innovation With Smart Machines.”

In the two years since the introduction of this term, Gartner analysts from a number of disciplines have worked to further describe smart-machine technology, its relationship to people, its impact on jobs, associated human-machine collaborations and synergies, and potential areas of friction and ethical concern. They have also analyzed the impact of smart-machine technology on business and IT services and developed a definition of smart-machine-enabled services.

### Definition of smart-machine-enabled services

These are business or IT services that use one or more smart-machine technologies (such as a cognitive-computing technology platform) as the basis of an offering’s core value proposition. The business or IT services involve the delegation of one or more tasks or processes where the commercial terms are directly tethered to distinctive outcomes and where payment is triggered by delivery of the service, rather than by ongoing effort (often referred to as “inputs”) as measured by, for example, number of work hours or full-time equivalents.

For this definition, it is crucial that the offering includes one or more smart-machine technologies in its core platform or underpinning. Such inclusion often requires extensive R&D investment to achieve an aggregated (tightly bundled) solution that ensures predictable, reliable outcomes. This often results in a relatively large portion of value being derived from IP, accelerators and verticalization, as opposed to pure labor. The increased size of this portion marks the key shift from labor-driven to IP-driven offerings and results in different commercial terms, which are outcome-based.

### Note 2

**Radar List of Technologies**

Technology radar lists or screens have been developed by enterprises and researchers in a variety of formats to catalog offerings, high-level costs, associated risks, maturity levels, adoption levels, potential applicability and other characteristics. One common form resembles a radar screen used to monitor aircraft, with offerings plotted to highlight one or more of these characteristics.

The goal is to establish a common repository that captures the various offerings and their specific characteristics in order to help prioritize proof-of-concept efforts, determine applicability for future use and monitor competitors’ activities.

For an example, see “The Gartner Scenario for IT Services Providers: The Future of IT Services” [Note: This document has been archived; some of its content may not reflect current conditions].

Gartner Research, G00269974, Frances Karamouzis, Ruby Jivan, 19 January 2015
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