

Digital Workers and the Hybrid Enterprise Workforce



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IBM is creating a
new workforce of
Digital Workers

01

Capable of independently operating much of a process to **get work done**

Introduction

Much has been written over the last few years about the impact of AI and automation on jobs and employment, covering both ends of the impact spectrum from unbridled optimism to the voice of doom.

In fact, several leading analyst firms covering this area have widely differing and changing views. One firm in particular has gone from predicting in 2014 that a third of all jobs will be replaced by software robots, and smart machines by 2025¹, to saying in late 2017 that AI would create 2.3M jobs by 2020, while eliminating only 1.8M, thus a net producer of jobs.² More recently we are seeing a more nuanced interpretation, with one analyst declaring that automation “Can lift employees to new levels of commitment, energy, and productivity – put a human face to a brand; and provide customers with new experiences.”³

So, while there may not be clarity on the exact effects that AI and automation will have on jobs in the enterprise in the long term, it is clear today that AI and automation are becoming more pervasive within our lives, both personal and professional, and within the companies that employ us.

Several of these automated solutions are already well known and have become common place. For example, the cognitive assistant that guides you through a ticket booking process or helps you to purchase renter’s insurance in mere minutes, or that triggers a password reset. These are helpful tools to augment human workers, or to improve a customer experience, but these are automation solutions which can for the most part perform only simple or narrow tasks. But this is changing. And there are four main factors that together are enabling much more connected, agile, and intelligent automation solutions which are capable of executing end-to-end business and IT processes.

Future of Work

The business environment that comes to life when business processes are run by technology and supported by people.

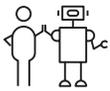
The four components of the Future of Work

Process – the traditional view is that processes are executed by people and supported by technology, but this is turning on its head. We are now seeing the emergence of processes that are run by technology and supported by people.

Technology – the rapid pace of innovation has brought to market a myriad of new technologies which, when combined, open up a whole new world of possibilities. Automation is now clearly about more than just Robotic Process Automation (RPA). By integrating RPA with workflow engines, document ingestion, complex business rule engines, natural language processing, IoT, and Blockchain, truly intelligent automation is possible both within and between enterprises.

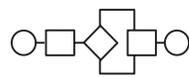
Talent – companies that have achieved even modest success with automation have begun to realize that to achieve scale and meaningful value, they must look at how to reskill and reorganize their human workforce. They must also understand how humans and software-based robots can and need to work together to achieve an outcome.

Data – 80 percent of which is hidden within enterprises. Companies are starting to tap into data to derive insights and change the way that they interact with both customers and employees. Data is the fuel that powers the cognitive enterprise.



Talent

Optimizing talent with human+machine collaboration



Process

Improving workflows to boost efficiency and speed



Technology

Harnessing the power of exponential technologies such as AI and IoT



Data

Using data to generate better business outcomes

As these four forces reshape how work is done, it is clear that the workforce of the future will consist of both humans and robots. Both will co-exist and cooperate to execute processes more intelligently and more efficiently, faster and more reliably, and be more agile to allow businesses to reinvent workflows on the fly.

Hybrid Enterprise Workforce

The partnership between human and digital resources.

In this new Hybrid Enterprise Workforce, we will see the birth of true Digital Workers capable of independently and autonomously operating significant parts of an end-to-end business or IT process and working seamlessly with their human counterparts to get work done – delivering exceptional experiences to both customers and employees.

So, What is a Digital Worker

There is currently no single, industry-wide definition of what is meant by a Digital Workforce, or what a Digital Worker is. There is some consensus among the major RPA vendors that a digital workforce is software-based labor that can perform specific tasks. Automation Anywhere has referred to digital labor as “...configurable software set up to perform the tasks you assign and control...”. UiPath calls it the ability to “execute the automation workflow” [and] “perform your important repetitive tasks”. Perhaps Blue Prism comes closest by defining its digital workforce as “... autonomous multi-skilled software robots tirelessly perform[ing] error-free rules-based admin transactions...”, with the reference to multiple skills being the key point.

Clearly, if the intent of a Digital Worker is to execute complex and to end processes and workflows, this requires multiple skills, and those skills are beyond what simple RPA tools have been capable of.

This is why we are seeing all the RPA vendors add what they call skills to their core RPA products, either through technology alliances or by building additional capabilities into their software. These new features include vision, natural language understanding, and machine learning to name a few. However, these are really just base capabilities and not really skills. A skill is the application of one or more of these base capabilities to execute to a specific task, to achieve a defined outcome.

For example, as humans we have eyesight and analytical minds. But most humans wouldn't know how to interpret an MRI image. A skilled radiologist or physician uses these two capabilities (and years of experience) to be able to do that; this is a skill that is both learned and taught.

80%

of data is hidden

The creation and use of skills are the design principles for IBM Digital Workers.

Capabilities (examples)

- Sight
- Voice recognition
- Natural Language Understanding
- Pattern Recognition

Skills (examples)

- Ingest, allocate, and reconcile an incoming payment
- Receive and deliver against a request for a travel booking, presenting options to resolve any issues

Effective Digital
Workers at scale
are **configurable**
and adaptable

02

Just the same way as our human workforce has been for **decades**

Productivity through adaptability

One of the keys to human-workforce productivity is the ability to adapt. Even the most well-defined business processes will encounter execution problems, bottlenecks, and other bumps in the road; it's humans' ability to cope with these exceptions that keeps many businesses running smoothly. Digital Workers, if they are to operate at scale, will need the same kind of abilities to deal with process exceptions, but in a controlled way. We will need a way to configure how Digital Workers operate, the tasks they

perform, and what they do when they encounter a process exception. It will be critical that we have a way to specify the details of a particular skill that a Digital Worker has and how these skills interact with each other and with their human co-workers. Therefore, we need an appropriate taxonomy to describe these skills, as well as the behaviors and desires we expect when process exceptions are encountered.

The IBM Digital Worker

For our purposes, we will define a Digital Worker as software-based labor with skills. The necessary software goes beyond RPA – we include all of the different technologies that are now being wrapped around RPA and which are opening up a whole new world of possibilities for what automation can do.

Skills must be designed to execute tasks, and a Digital Worker must have multiple skills if it is going to be able to execute complex workflows and interact with humans.

The other important design principle for IBM Digital Workers, is their ability to execute across a reasonably useful scope of work. That means not a single task, but rather, a sequence of tasks and activities that form a workflow. Just as you would not hire an administrator who could book meetings but was unable to respond to emails, we do not want to create, say, an SAP Administration Digital Worker who can monitor SAP but is unable to create a ticket in Service Now, or unable to fix an issue that it finds.

Anatomy of a Digital Worker

You can't yet hire a Digital Worker from an employment agency in the same way as you can a human. You can, however, go to a bot store and download what some RPA vendors call a digital worker – but these are still very simple, single task bots that can open a spreadsheet, download some data, and post it into an ERP system. IBM is combining capabilities from across the automation spectrum to create Digital Workers with the skills needed to execute end-to-end processes, such as Order to Cash or Talent Acquisition.

We begin with the workflow outcome in mind. One of our first Digital Workers is a Cash Application specialist within the Order to Cash process.

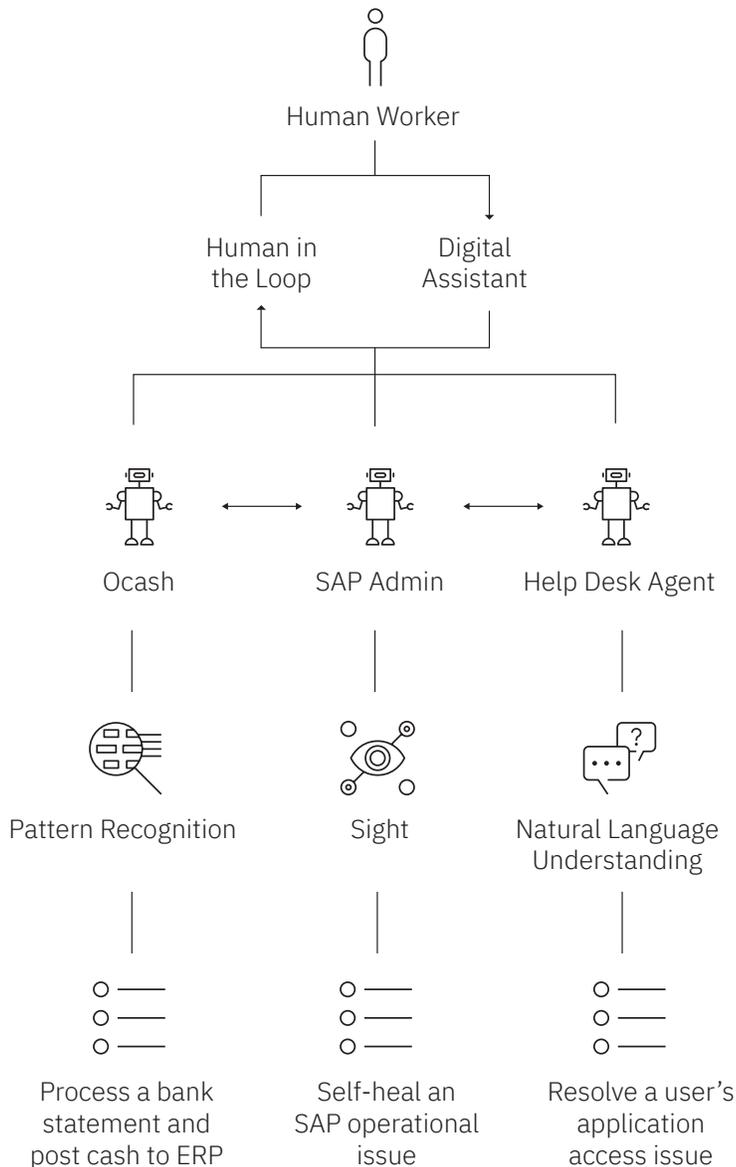
To create it, we broke down Order to Cash into component parts, and then focused on one of the areas which today is most manual to execute. Within Cash Application, we identified the tasks that can be automated, those that can be augmented, and those that will still require a human to execute.

By thinking “technology first,” we have eliminated unnecessary human intervention and designed the process such that the Digital Worker can execute the majority of tasks and then call upon its human colleague(s) when needed.

It is extremely helpful to think of Digital Workers as fully-fledged personas participating in the execution of the process; then, we can use Enterprise Design Thinking to inform us more clearly as to how the Digital Worker and humans can best interact.

This approach also clarifies which skills humans will need, therefore enabling the planning and execution of upskilling and reskilling the human workforce to be able to operate in this environment.

In Figure 2, below, we show some of the skills that the Cash Application Digital Worker possesses and, ultimately, this may amount to more than 100 individual skills as the Digital Worker is taught, and learns, more.



Enterprise Design Thinking

IBM's approach to applying human-centered design practices to achieve outcomes at the speed & scale a modern enterprise demands.

Figure 2. Digital Worker Skills – Cash Application

Modes of interaction

Humans and digital workers can engage in bi-directional communication, working together seamlessly to get the task done

Digital Workers

Pre-trained and configurable, with the ability to learn, or be taught, new skills

Capabilities

Categories of abilities, and specific technologies, that can be combined to enable the skills needed to execute enterprise processes

Skills

The means to execute specific tasks within an intelligent workflow to accomplish desired outcomes

Meet Ocash

We find it helpful to consider these Digital Workers in terms of the roles they fill in the enterprise's operations. So, meet the Finance and Accounting function's latest recruit:



Ocash

Order to Cash bot

“I feel excited to be part of the IBM team supporting our clients' Finance & Accounting department. I really like when my human teammates teach me more stuff and help me to manage exceptions.”

Background

- Ocash has been with IBM for nine months
- He likes to learn new ways to process Cash Receipts
- He started using machine learning three months ago

Roles and responsibilities

- He monitors the bank accounts of key clients – identifying all new receipts
- He likes to link receipts to the intended invoices that the client planned to pay
- Sometimes, he asks a human teammate, or a client, for guidance or approval to fix a problem – using SMS, e-mail, and he is currently testing the use of voice mail
- He works around the clock, processing receipts as efficiently as he can
- He recently learned to convert scanned copies of complex Remittances into digital format, which saves my human colleagues manually entering and matching this data

Motivations

- Find and allocate payments efficiently
- Seamlessly interact with his human teammates
- Learn more parts of OTC to help with intelligent workflows

Favorite activities

- Fixing problems all by himself
- Learning new skills
- Working with numbers

Development Areas

- His human teammates don't always respond to him as quickly as he would like
- Some humans don't trust him
- Occasionally, his clients don't give him the system access he needs to do his job
- Confused when he hears colleagues planning their vacations – as he hasn't had any time off since joining IBM

As we design and build our Digital Workers, four important design principles prevail. The same principles can, and should, be applied by organizations creating Digital Workers for themselves, using IBM's CloudPak for Digital Business Automation.

Humans are involved by exception only. Think big and take the view that the technology will run the process and humans will assist. Where humans are involved should represent the smallest proportion of work and will include dealing with exceptions and higher value work, such as dealing with the more complex customer interactions, and improving the customer experience. We can train the bots to find the exceptions, and then human intervention should be triggered by a bot calling for help in what we refer to as “human in the

loop” by flagging an exception, rather than a human monitoring the bot. Through the use of AI and machine learning, we can teach the Digital Workers to resolve more and more complex exceptions, thus reducing the number of exceptions over time, and further reducing costly human effort.

Take an end-to-end view. Something you can automate at the start of the process may radically change what happens downstream. For example, automating the verification of invoice accuracy with a customer at the start of the process can significantly eliminate the number of disputes later on. As stated before, it is important to take a granular view – Lead to Cash comprises over 800 tasks – and continuously step back and look at how those tasks were connected in terms of data flows, dependencies, and impact on straight-through processing.

Build on your RPA beginnings. While Digital Workers are about more than just RPA, it doesn’t always have to be cutting edge. The use of machine learning, for example – not just to make the robot smarter but to make the process smarter – is an important goal, but keep it simple to start. Add OCR to enable document ingestion. Include complex business rules engines to help a Digital Worker know what to do next. The inclusion of some sort of human-in-the-loop capability is also essential, such as TrustPortal which integrates seamlessly with Blue Prism. The use of machine learning requires a lot of data and at least some idea, or hypothesis, for how you want to improve the process – and neither of these may be available until you have had the Digital Worker running for a while, so you may not be able to start there. RPA and RDA are the workhorses here and in our pursuit of the worker of the future, we mustn’t be blind to the technologies that have served us well up to now.

It’s a people thing. You must consider the human element. Take a persona-based view, leveraging Enterprise Design Thinking to build a persona-centric, experience-based design, thinking about how we want humans to interact with this Digital Worker and enable the intelligent workflow.

What’s next

We are building Digital Workers for both business and IT processes, starting with areas where there are high volumes of repetitive work, and where there are routine interactions with traditional ERP applications such as SAP and Oracle. The key to Digital Workers at scale will be to make them configurable and adaptable, in just the same way as our human workforce has been for decades. As we expand into Procure to Pay, Record to Report, and other finance processes, we will be able to significantly impact back-office process cost and efficiency, as well as flexibility. This will form the agile underbelly of an organization that will enable a more connected Cognitive Enterprise, leading to better customer experience, business agility, and the ability to compete in an ever-changing world.



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About the author

Barry Mitchell is the Global Leader for IBM’s Digital Workforce, as part of the IBM Automation Innovation Unit within IBM Global Business Services. In this role, he is leading the development and deployment of a Digital Workforce that is helping IBM and its clients transform to a Cognitive Enterprise. With over 25 years of experience in enterprise IT, Mr. Mitchell focuses on leveraging automation and AI to continually reinvent and transform business and IT processes.

**For more information on this technology,
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Resources

- ¹ Gartner Symposium & ITXPO, October 2014, “Smart robots will take over a third of jobs by 2025” - <https://www.pbs.org/newshour/economy/smart-robots-will-take-third-jobs-2025-gartner-says>
- ² Gartner Symposium & ITXPO, October 2017, “Top 10 Strategic Predictions for 2018 and Beyond”, Prediction #8
- ³ Forrester, April 2019 – Future Jobs: Plan Your Workforce For Automation Dividends And Deficits