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Technologies that Enterprises Should Budget For in 2018

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Digital Transformation

Technology development is moving more quickly than ever before and businesses might find the pace of change daunting. How can they keep up?

A company's technology strategy depends on its size, as there are key differences facing small business, mid-market companies, and large enterprises. A primary differentiator is their available spending power: While large companies can afford to make strategic technology investments that don't deliver an immediate payoff, smaller companies are often cash-constrained and must make every dollar accountable. For them, fast ROI is key.

Small businesses also often lack the expertise for sophisticated technology implementations. While mid-market and large companies can hire the appropriate skills in-house or source expensive consultants, small businesses may struggle with ambitious projects.

While these differences affect how companies make technology decisions, they are becoming less critical as business technology evolves. Developments that may have been prohibitively expensive and complex for small businesses just five or 10 years ago are now coming within reach.

This eBook explores some of the most promising technologies for 2018. Employed individually, they offer strategic benefits, as outlined in the sections below. But when used in various combinations, they promise companies small and large alike the ability to automate meaningful business processes—or perhaps transform them entirely.

"Digital transformation" has become a corporate buzzword recently, and with good reason. By harnessing the automation capabilities of these technologies, companies can drive new efficiencies into some of the foundational processes that they rely on. Businesses with the vision to explore them can make everything from customer support to accounts payable and payment automation fast and frictionless.

Artificial Intelligence

Artificial intelligence (AI) has been a holy grail since the early 1950s when scientists first started to explore its possibilities. Back then, hopes were high for strong AI that would replicate the human brain, learning any task faster than people could. But as scientists realized that the technology wouldn't deliver on these expectations, the industry endured an "AI winter," when research thinned out and funding dried up.

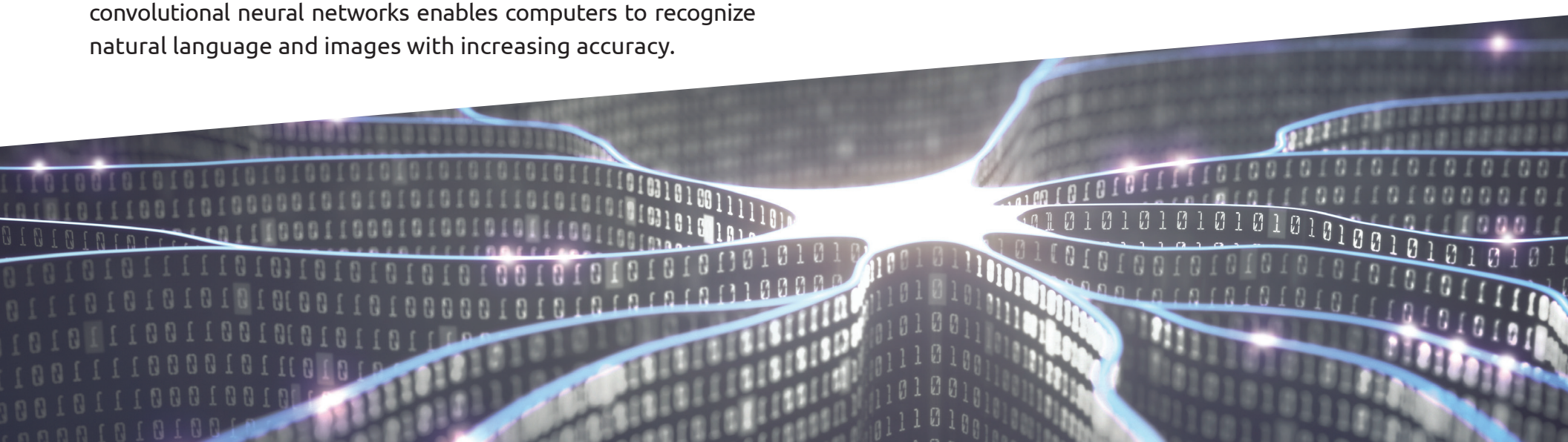
In the last few years, however, things changed. The development of fast GPU-based computing allowed for weak AI that cannot replicate human brains entirely, but which can still undertake repetitive tasks.

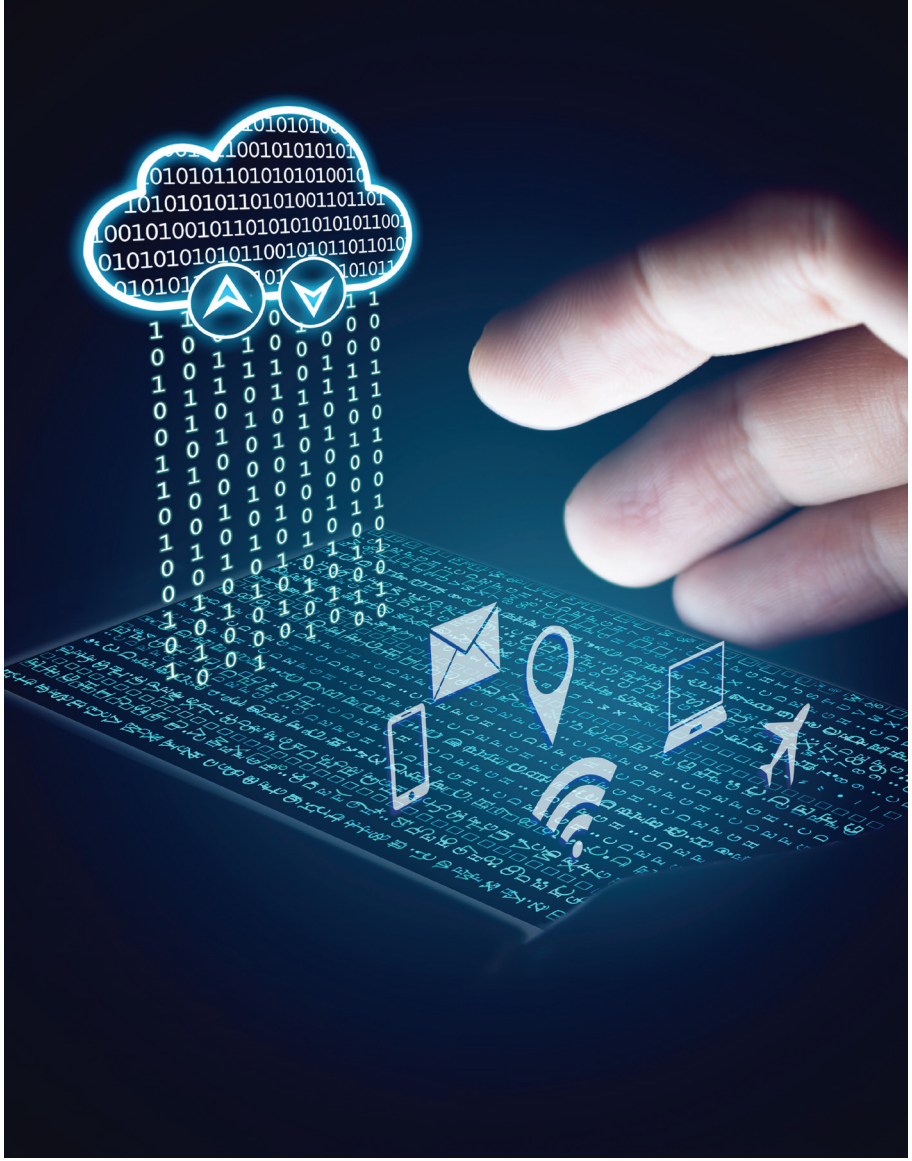
These new processors made machine learning practical. This is a subset of AI that takes a statistical approach to finding patterns in large amounts of data. A connected concept using convolutional neural networks enables computers to recognize natural language and images with increasing accuracy.

These AI concepts make it practical to produce self-driving cars, robots that do backflips, and drones that can locate survivors in natural disasters. But these are headline-grabbing developments: The real grunt work in AI is happening in enterprises that use the technology in mundane but highly profitable ways.

In these scenarios, AI automates basic tasks. This is something computers have been doing for years, but before AI, they could only automate highly-structured tasks without any nuances or subtleties: You could get a robot to rivet thousands of car doors on a production line because each rivet was exactly like the last.

AI lets computers automate repetitive tasks that need a little human thinking. Examples include JP Morgan, which





used AI to interpret thousands of commercial loan agreements in seconds, saving the bank thousands of hours of employee time. In Japan, farmers are using AI to visually sort cucumbers on a production line based on factors including color, shape, quality, and freshness, and they're doing it using a $35 microcomputer and open-source software.

Replacing humans with computers for these tasks carries two key benefits:

Cost savings: Every time a computer performs a function that a human used to do, it saves money.

Consistency: Correctly configured AI algorithms can produce more accurate, consistent results. Machines don't get tired and make mistakes.

But AI also has its challenges. In 2017, machine learning and deep learning were at the top of the Gartner hype cycle's "peak of inflated expectations." People view AI as a magic cure-all, due to over-enthusiastic media coverage and a tendency for vendors to over employ and promote the technology.

The other roadblock is skill. While AI cloud vendors do provide some online services for basic tasks, like speech and image recognition, it still takes skill to use them. As soon as AI applications become more bespoke, people who can properly train and refine the underlying statistical models become difficult to find.

When it comes to your enterprise technology, enter the world of AI innovation with open eyes and realistic expectations.

Blockchain

At the end of 2017, interest in bitcoin was at an all-time high. Its price had broken $19,000, and people were taking out mortgages to buy the cryptocurrency. Underneath the speculative frenzy, however, lies the real value in bitcoin: the blockchain. It's a technology that enterprises are using to their advantage without a bitcoin in sight.

The blockchain is what made bitcoin so appealing: It was a disintermediation technology used to remove the middleman from transactions. People rely on banks to keep a central ledger of transactions that no one can challenge. If one person sends money to another, the recipient cannot later claim that the money didn't arrive. Bitcoin's blockchain made it possible to do that without the banks by distributing a copy of the ledger to all participants in a giant network. Everyone can see all transactions, meaning that if someone tries to alter the ledger fraudulently, everyone will know and ignore it.

While scams, speculation, and security risks have called into question bitcoin's promise, the underlying blockchain concept has uncoupled from the cryptocurrency and evolved on its own.

Instead of merely storing value, alternative blockchains such as Ethereum and the Linux Foundation's Hyperledger promise the use of smart contracts. These are entire programs that run inside the blockchain. Instead of operating on a central computer, a program can run on lots of connected computers, all of them comparing their results to ensure that no one can tamper with them.

This carries several benefits:

Efficiency: Instead of relying on a single inefficient entity that might take too much time to process transactions, participants in a blockchain can deal directly with each other.

Resilience: A single program processing everyone's transactions represents a single point of failure. If it goes down, business stops. By running the program everywhere, it is always available, even if some computers fail.

Security: Data breaches litter headlines, and the story is always roughly the same: a single organization holding millions of records in a central location didn't secure them properly. By encrypting the records and putting them in the control of their owner on the blockchain, the records are more secure.

Trust: A single organization processing all transactions has the power to alter its policies against the best interests of the user. It might also be corrupt and change data records to fit its agenda. This is a substantial risk in complex, distributed

networks, such as supply chains with multiple participants who must trust each other. Blockchain technology helps to keep everyone honest.

Several industries are already piloting blockchain technology to harvest these benefits and disrupt entrenched business models:

In **finance**, banks hope to use blockchains to instantly process back-office settlements that traditionally took days.

In **healthcare**, companies are experimenting with blockchain-based systems that give patients secure control over their medical records.

In **supply chains**, companies hope to use blockchains to track goods' provenance, ranging from gold bars to diamonds and even wheat.

But blockchain technology has its challenges. One of them is interoperability: The industry for this technology is still nascent, and getting blockchains to talk to each other will be difficult, as will getting all players on board. If an industry launches a blockchain network for inter-company collaboration, then the politics and economics of participation will be complex to establish.

Secondly, developing governance models for blockchain-based systems is also a work in progress. There are many design and deployment variables for these networks, and the various players must agree on models of confidentiality and integrity. Regardless, blockchain technology is proving to be a lasting fixture within the cryptocurrency space.

Embedded Collaboration

Digital collaboration has long been a holy grail for enterprises. Years ago, enterprise collaboration tools revolved around groupware and intranets—these were portals that you visited to send messages, upload files, and see what the team was talking about. They worked well enough, but they didn't handle any complex tasks.

The newer wave of collaboration tools is different. It provides what old-school groupware tools always promised: a way to bring people together. But it does so in a frictionless way, while directly incorporating business processes.

These tools are native to the cloud, and they thrive on one of its fundamental commodities: application programming interfaces (APIs). These expose one program's functions as online services for others to access, and they enable companies to embed collaboration into the heart of their workflow.

These embedded collaborative tools are as powerful as the cloud-based services they access. Companies are already creating their own "virtual employees," using AI chatbots that collaborate with real users to offer them online services. These can cover many different tasks, including internal expense management and payment processing.

> “Expect to see more advanced companies embedding cloud-based digital assistants into their mobile workflows.”

A finance system might automatically message people through the collaboration system at the end of the week asking if they have any expenses. Employees can send their receipts back, and the collaboration tool can automatically message the appropriate manager with a yes/no button to approve the receipt. Then, the collaboration tool can send the job back to the finance program, which can automatically action it and pay the employee. This transforms a task that could have taken weeks into an automatic collaborative process that takes minutes.

Expect to see more advanced companies embedding cloud-based digital assistants into their mobile workflows. These will be able to mine and surface appropriate information from company data to suit the task at hand.

There are several benefits to this technology:

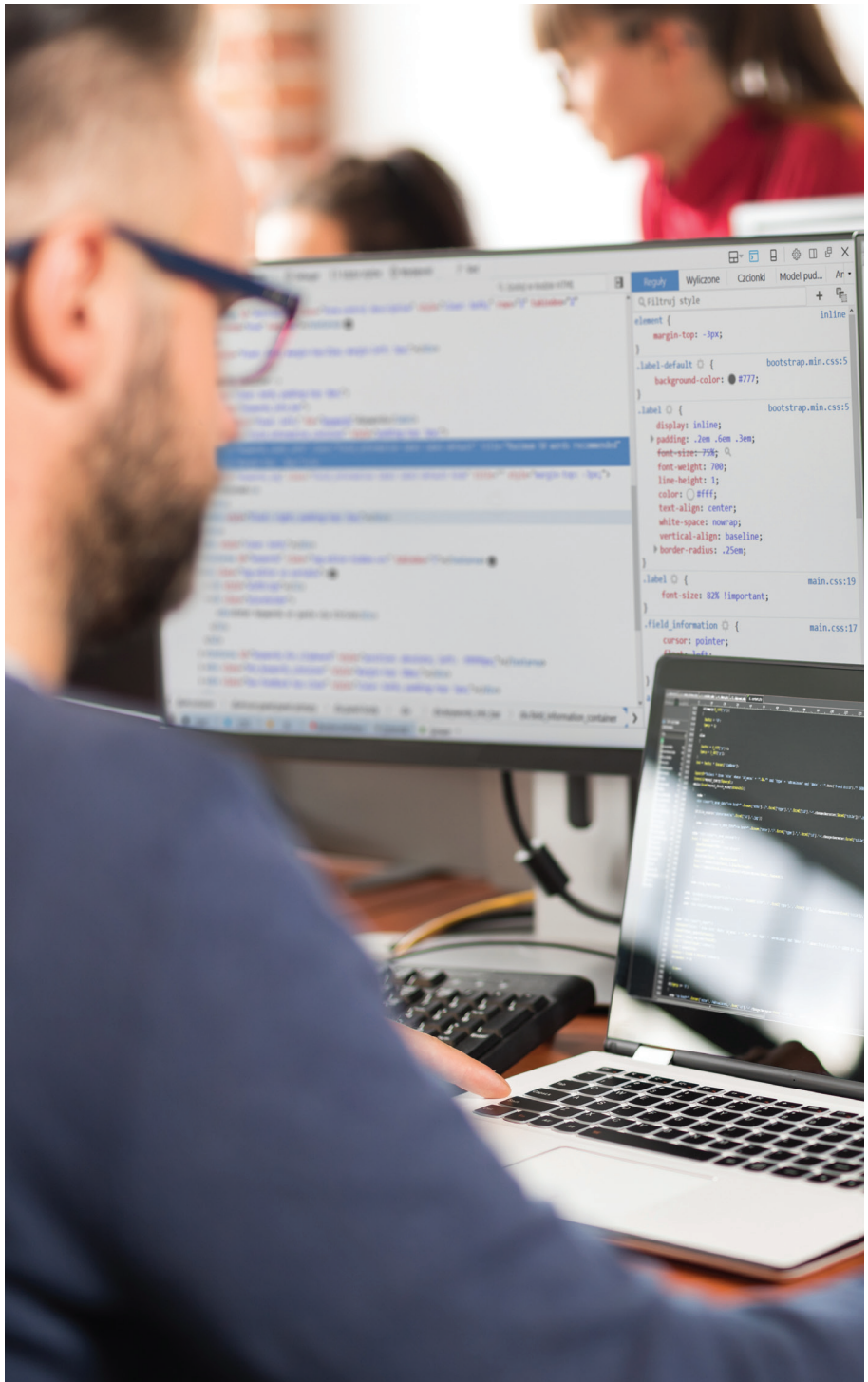
Fast knowledge exchange: Knowledge is the new currency. Making its transfer easy and frictionless is part of the digital transformation process.

Frictionless business processes: Speeding up existing business processes and reinventing new ones is part of the digital transformation concept. Effective, embedded digital collaboration is a platform to help enable it.

Flexibility: These tools enable workers to collaborate at the place and time where it makes sense to them, surfacing messages and options in the programs that they're using, on the mobile devices that they're accessing.

Employee appeal: The flexibility of these apps makes them appealing for millennial workers and the even younger Generation Z digital natives. These employees grew up with mobile technology and expect these kinds of consumer-style digital services to help them get their jobs done.

The cloud-native nature of this technology integration might raise compliance challenges for companies wanting to integrate with external cloud collaboration services. IT departments will also need to prepare their infrastructures to support these tools, and promoting their use involves training and cultural change for many organizations. But those that make the investment stand to reap significant rewards.



DevOps and Continuous Deployment

Software development is changing, and employees want their enterprise applications to work seamlessly, like the ones they use at home for social networking, music, and movies. The problem is that traditional software development processes can't support this. DevOps and continuous deployment offer companies new ways to deliver software that reflects modern employees' needs.

Traditionally, software development teams used rigid, waterfall-style processes: They would gather requirements from users at the start of a project, and work for months in isolation before delivering the software. By that point, the business had often moved on, and working patterns had changed, making the software less relevant.

Agile development altered this. Developers would meet with users more regularly, developing small chunks of software functionality and checking that they were happy with it before repeating the cycle.

However, there were still bottlenecks in the process. Manually testing the software took time, and there was a disconnect between developers and the operations staff that deployed the software. Provisioning computing and storage resources for new applications and features could take weeks, and if a glitch stopped software from working, developers and IT operations would blame each other.

DevOps brings software development teams and operations staff closer together, using cloud computing's flexibility to remove friction. Cloud computing abstracts computing, storage, and network hardware into programmable resources, enabling a developer to provision his or her virtual machine instantly.

By automating the development, testing, deployment, and maintenance of software, DevOps supports agile development and collapses the extended software development and deployment cycle.

Executed properly, this brings dramatic benefits to IT departments:

Responsiveness: Developers can deploy changes to applications in hours, not weeks. If a computer glitch occurs, the developer can use programming interfaces to fix the problem.

User-centric computing: Users get the software features they need to do their jobs, and development teams can quickly obtain and execute their feedback. If an employee reports a bug, developers can swiftly program a fix, test it, and roll out the update in a process of continuous deployment. It also lets them deliver a more responsive, pleasurable experience for the users—which can include customers alongside employees.

Reduced time to market: By deploying applications and services more quickly, companies can act on new market opportunities.

Companies pursuing a digital-first strategy, in which they use software to continually embody and refine their business processes, will be the primary adopters of DevOps and continuous deployment technology.

The challenges here are both technical and cultural: Companies need public or private cloud-based infrastructures and automation expertise to execute DevOps. They must also persuade their employees to think in different ways: Developers must become operations people; operations people must think like developers. They must all navigate shifting ownership of tasks and applications.

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Edge Computing

For years, companies have built up computing, storage and networking power inside data centers. These large computing facilities are typically located in a dedicated building—in a server room somewhere at headquarters or in a rented space at a co-location facility.

This works well for most traditional computing applications, where employees or customers access an application using a desktop computer or mobile device. Everything from e-commerce sites to customer relationship management software works this way.

Increasingly, though, a new generation of computing devices and services is emerging that challenges this centralized model. There are two predominant ones: The internet of things (IoT) and artificial intelligence. These technology revolutions have something in common: They both often require computing services close to the point of delivery.

In industrial computing, for example, we mentioned a manufacturing device that visually sorts cucumbers. It could send image information back to a central data center for processing and then wait for a result to come back across the network. This would introduce latency, slowing down the processing rate and delaying the conveyor belt. But by embedding the statistical model and processing capability directly in the machine, it could run the algorithms to sort the cucumbers locally without using the data center at all.

This concept of decentralizing processing power and putting it closer to where it's needed is known as edge computing. It offers several benefits depending on the specific application:

Resilience: In our example, processing cucumbers locally could reduce the equipment's reliance on the network, potentially enabling it to operate during a connectivity outage.

Speed: Processing data at the point of delivery reduces network latency and speeds up local operations. By processing images locally, our cucumber sorting machine could increase its sorting rate, leading directly to greater output.

Security: If dealing with sensitive data, such as facial recognition or personal details, keeping it within a device rather than sending it across a wide area network could make it more difficult for intruders to access. Although, this depends on if the edge device itself is secure.

Edge-based computing already happened to a certain extent when companies offloaded applications to branch offices. Now, enhanced computing power and miniaturization are driving computing power even further to the edge of the network.

Edge computing will be useful for any company needing low-latency computing and data that remains on its premises. Examples range from healthcare to manufacturing and retail.

As with many other new technology trends, this concept is not without its challenges. Companies must invest in devices with more local computing power, which may entail in-the-field equipment upgrades. They may also find management of this edge-based equipment more involved, meaning an investment in systems management software that can manage the many complex devices at the network's edge.

Finally, companies should invest in standard edge deployment models to ensure consistency in their deployment and management of edge-based computing equipment. This takes planning and cohesive ownership of edge-based programs at the business level.

Reap the Rewards of Technology

Readers will notice that many of these foundational technologies complement one another. For example, AI meshes with collaboration and edge computing; DevOps and continuous integration make the fast-paced delivery of embedded collaboration services more manageable, and enable companies to continually refine their AI training models; blockchain's decentralization technology has the power to supercharge IoT-based edge computing models, where the power lies in thousands of decentralized devices rather than at the edge.

Companies can reap rewards by exploring these technologies individually. Sensible project teams will pick the low-hanging fruit first, engaging in small projects that demonstrate potential gains before expanding their scope. The smartest companies will do this all with an eye on digital transformation, however, developing a cohesive view of the broader business changes that they hope to achieve.

This structured approach will help to deliver immediate ROI, while also making room for longer-term strategic goals that will put companies ahead of the competition. 2018 will be an exciting, milestone year in technology's journey from cost center to innovative profit center.

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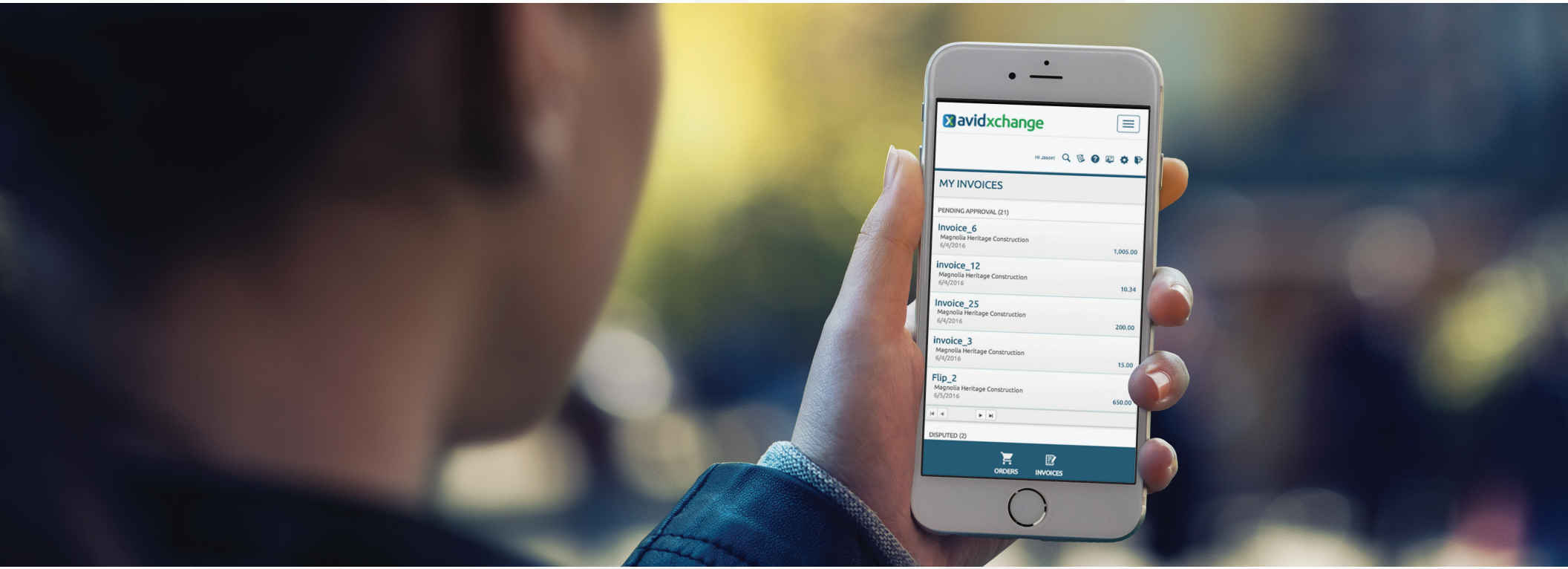
Say Goodbye to Paper Checks and Invoices



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