

Flex into the future with mainframe modernization

It's time mission-critical
got a modern makeover



It's time to lose the legacy lag

In an era of unprecedented change, the need to keep pace continues to grow. Organizations in every sector are facing new opportunities and new challenges, can access more customer insight, and are competing with cloud-first disruptors that live to challenge the status quo.

Those who have built their success on layers of legacy in the mainframe want to embrace change too. But business-as-usual operations are tightly bound to the detailed software that drives them. Changes run the risk of upsetting this intricate set up and replacement is a fraught enterprise as well. Many are stuck between needing to move but unable to afford the risk of doing so.

Partners since 2013, Atos and Amazon Web Services (AWS) bring together market-leading technology that can fully mitigate that operational risk at an affordable cost. Together they provide a deep understanding of legacy infrastructure and proven migration processes that take their clients forward into a flexible and agile future. One with innovation, growth and security at its core.

In this insight guide, we talk to four of our mainframe experts about why standing still is no longer an option and how to move forward safely. With the right expertise, complex legacy infrastructure is not the barrier to progress it once was, and the benefits of business transformation can now be realised with minimal impact.

"You've got to look at the promise of the future and mitigate the risk in getting there. That is a very fine line"

Don Estes

Contributors



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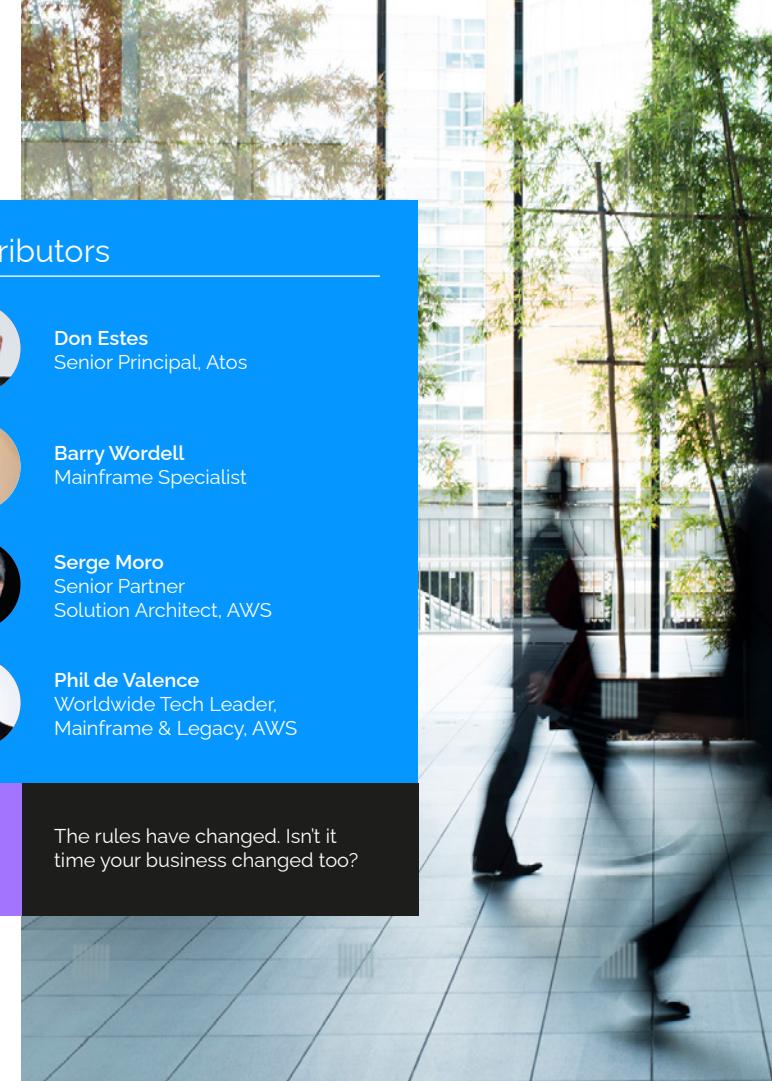
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The rules have changed. Isn't it time your business changed too?



History's reliable workhorse

In 1991, former InfoWorld editor-in-chief Stewart Alsop stuck his neck out. "I predict that the last mainframe will be unplugged on March 15, 1996," he said.¹ Thirty years later, that prediction hasn't come true. But organizations built around mainframe technology are becoming limited by their legacy estate, particularly when compared to their cloud-native competitors.

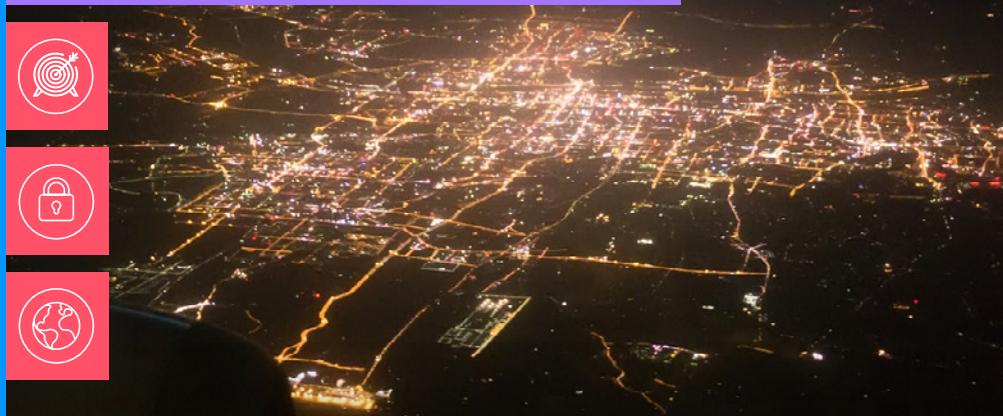
Mainframes have been at the center of mission-critical workloads for decades. In 1954, when the first electronic business computer was installed at General Electric Co's new factory in Louisville, it marked the beginning of a data processing era never seen before.² Organizations that computerized in the years that followed wrote applications using mainframe systems that were large and expensive, but increasingly powerful. "It wasn't until the 1990s that we had alternatives that could scale when the PC gained enough power to compete," Don Estes says. "Those organizations that computerized in the 1960s-1980s will typically have a legacy problem."

Mainframes are known for their reliability. They're secure. They have unwavering and relentless processing power – the IBM z15 mainframe, for example, can process 220,000 encrypted transactions per second (19 billion per day).³ That's been an attractive proposition for organizations in financial services, transportation, retail, manufacturing, telco and the public sector. So attractive in fact, that the majority still rely on mainframes today for their core processing. According to IBM, 92 of the top 100 global banks use mainframes, as do the world's top 10 insurers and two thirds of the top 25 retailers.⁴

"The one thing about mainframes is they don't break," Don Estes says. "If you look at the Fortune 500, you're going to find some mainframe technology in probably 90% of them. While some of the less critical application workloads have been migrated, what is left is both the most critical to the business and the most difficult to move or replace."

"Some of the most successful organizations on the planet – Google, Amazon, Netflix – have been built without a mainframe"

Barry Wordell



1. <https://www.computerworld.com/article/2697650/how-the-mainframe-last-50-years--adaptation.html>

2. <https://www.computerworld.com/article/2697650/how-the-mainframe-last-50-years--adaptation.html>

3. <https://www.infosecurity-magazine.com/opinions/modernizing-replatforming-impact/>

4. <https://www.businesswire.com/news/home/20200506005128/en/COVID-19-Pandemic-Exposes-Modernization-Needs-for-Critical-Mainframe-Systems>

Prime for disruption

Mainframes per se are not the problem, but their 20 to 40-year-old applications are. Seventy years after the first business mainframe application was run, it's clear they aren't compatible with modern business needs. "This legacy largely preserves the past," Barry Wordell says. "Some of the most successful organizations on the planet – Google, Facebook, Netflix – have been built without a mainframe. You can push around a lot of data in the cloud and you can do it with pretty awesome agility." Business leaders now realize their vision for the future may not be achievable while their organization is still anchored to a mainframe.

Digital transformation has been a priority for businesses for many years and most will have started to embrace cloud technology across certain business functions. But few have applied digital transformation to their core business applications, which are usually on mainframes and are the most difficult to understand. That's left them at a disadvantage, compared to their cloud-native competitors, particularly in traditional sectors such as banking, which have seen an influx of nimble disruptors in recent years. They're able to embrace breakthrough technology with ease, collect and analyze vast swathes of customer data, and accelerate digital engagement across devices. Innovation is second nature to them, as they pivot new services and products according to their customer insights.

Serge Moro believes that's putting extra pressure on businesses to modernize. "If we look at large banks and governments – those that have been using computer systems the longest – to them, the risk associated with the impact to the customer has outweighed the necessity to modernize. Now, the challenger risk has become so great that those organizations recognize they have to shift regardless of the anticipated risk."

Alterations to applications on mainframe are often a massive undertaking, with the risk of unforeseen chain reactions with every revision. Barry Wordell has worked with one global distribution company, for example, that can only make changes twice a year. "They understand they've got to break that down, have much shorter release cycles with a lower overall impact," he says. "There's big competitive pressure there. Some progressive companies are using code that was developed 40 years ago on much more limited machines. There's a business flexibility penalty that you pay because of that."

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Serge Moro



New generation eyes innovation

The new generation of computer science engineers are hungry, innovative and bursting with bright ideas. That's great news for businesses but does mean the knowledge needed to maintain legacy mainframe applications is starting to dwindle as Common Business-Oriented Language (COBOL) experts retire.

In 2020 there were an estimated 84,000 unfilled COBOL programmer positions.⁵ It's a language that hasn't been widely taught in universities for decades, largely because students aren't interested in the old technology, Serge Moro says. "Young developers are not interested in working on these platforms, primarily because they're not at the cutting edge of what customers are looking for. They see no innovation in writing mainframe applications, especially with an outdated language like COBOL."

Organizations are also increasingly addressing their global emissions, challenging established behavior and shifting to low carbon sources of energy. Everybody has to play their

part if the world is to reach the net zero emissions target by 2050, as laid out in the Paris Agreement. Moving to cloud technology is a key part of tackling energy consumption and emissions levels when pursuing a decarbonization strategy. Serge Moro adds. "Mainframes aren't cheap things to have warming your data centers. They're also resource hungry because the functions run all the time, rather than on demand. From a sustainability perspective, it's not the ideal platform to have running your business long term."

Business leaders are having to ask themselves whether they're channeling resources to the right platforms; whether they'll be able to provide customers with the seamless, responsive, digital experiences they expect; and whether those processes can be kept reliable, secure and in line with regulation. "Ten years ago, you could say, I don't know if I want to move off the mainframe – it's so stable and I'm not sure you can match the speed or stability of the mainframe in the cloud," Barry Wordell says. "But I don't think you could say that anymore."

"It's an on demand, always available economy that we live in. Mainframes weren't designed for that purpose"

Serge Moro

Why AWS?

When embarking upon mainframe modernization, business leaders want the assurance the cloud platform will have high security, high availability, high scalability and strong system management, Phil de Valence says.

AWS was one of the first public cloud providers to operate at its current global scale and combines that scope with a strong emphasis on operational excellence and sustainability. It has the largest set of security services that support enterprise workloads, compared to other providers; more managed services, which reduces the burden of administrative tasks and reduces costs; and the widest choice of services and features that facilitate innovation.

"For any ideas that a customer may have, those services are readily available at their fingertips and they have a low cost of entry," Phil de Valence adds. "Businesses can start experimenting and adopting new elements to be incorporated into their architecture very quickly."

5. <https://techchannel.com/Enterprise/10/2019/closing-cobol-programming-skills-gap>

A monumental shift

The potential of what technology enables businesses to do is expanding every day, with new opportunities to connect with customers like never before. That's never been truer than in the past year, when teams all over the world began to work and interact remotely, digital capabilities expanded and were reimagined, and leaders were challenged to think on their feet, optimizing operations and inspiring others without a rule book to rely on.

"The shift was monumental and the necessity was immediate," Serge Moro says. "The last year has created a huge pause for thought across all of the industries. The interaction with the customer has changed and the systems that they operate haven't necessarily been able to adapt well to that changing landscape. The mainframe doesn't adapt well when change is needed at speed."

Addressing technical debt and process debt will create a more productive, agile, resilient and innovative organization that can take advantage of the opportunities and advancements in technology. Leadership in today's modern environment is no easy task. The only way to compete is to outpace the competition, build client-centric products and optimize IT infrastructure at every stage.

The flexibility your business needs for the future

Letting go of legacy is not easy and it's often seen as easier – although not wiser – to struggle on with what's already in place. Leaders may feel overwhelmed by technical debt and layers of complicated systems that need to be unraveled. They may face opposition from others who are more risk averse, or have misconceptions about what modernization involves. But that doesn't mean this is a project that can be ignored.

"The software has tentacles everywhere," Don Estes says. "But when you need to respond to a change in the marketplace, it's not unusual for relatively changes to take three to six months, whereas you need it by tomorrow. You've got to rethink your whole business process. Start to finish."

Making the business case for mainframe modernization is key. It's a process that is likely to touch every department and process and bring efficiencies to areas that have merely been 'patched' rather than reorganized and optimized.

A business-wide project can justify the cost beyond IT's budgets and will bring a faster return on

investment as technical and process debt is dealt with, piece by piece.

"The people with the best motivation are attempting to solve business problems, rather than technical problems," Don Estes says. "Forget IT. What does your business need for the future? What are the business processes, how can they be optimized? How can we improve productivity across the organization? How can we bring in new revenue? If you want to have the flexibility to respond to both threats and opportunities in the market, you've got to take a hard look at both organizational and technical rigidity."

"There's scaling capacity with the public cloud," Phil de Valence says. "If you have workloads that are very spiky, we can address that need with our elastic infrastructure and only allocate resources that are necessary. On-premises customers, for example, have to think about their entire year and how much hardware resource is going to be necessary.

They have to purchase all of that hardware, if it's not utilized for most of the year. With cloud, scaling comes at a much lower cost, and there is a low cost of entry to experiment with



Mitigating risk

A staggered approach to mainframe modernization can reduce the risk of failure and helps get skeptics on side by proving value early. "No one organization will typically come to the conclusion that they're going to go and modernize their entire mainframe in one shot," Serge Moro says. "Instead we look at the easiest things to move first, to break apart the more monolithic aspects of the mainframe and modernize those in parallel to continue to run the system. That's not necessarily shortening the time it takes to achieve the task, but the benefits start to be derived long before the completion of the end-to-end process."

On a technical level, those applications that have inherent risk can be managed effectively if they are carefully handled. Tools for emulation replatforming or automated refactoring can expedite workload migration, minimizing risks. Business rule management systems and low-code or no-code programming can break the application down to a granular level to enable pinpoint refactoring so that business operations are less disrupted.

Breaking a mainframe project down into smaller chunks focused on individual workloads and functions can also hone the minds of senior leaders on how the needs of their customers can best be met in the future. Look at the relevance of those business functions in the market and identify where the opportunities are in terms of plugging new innovative features into that modernized architecture.

Projects can become more affordable through Atos' MIII funding model, which uses savings found at each stage to fund the next.

"A lot of people want a magic bullet," Barry Wordell says about modernization misconceptions, adding that the time they spend with a client can be anything from six months to a number of years, depending on the complexity of the mainframe system. "This is a journey. It's going to take a little time and you want to have a plausible, managed approach to make sure you realize the benefits you're looking for. There are challenges. But that doesn't mean it can't be done. It can absolutely be done."



Mainframe modernization can take on many forms – from hub hosting and performance optimization, to a full transition, transformation and migration to the cloud.

Our approach centers around a well-oiled manage, migrate, modernize technique. "What we really advocate for is tool-accelerated modernization of the code," Barry Wordell says. "Taking a little bit of time to break that code down and improve the structure of it to enable more agility on the other side. There's so much value in doing it that way – you get rid of the legacy debt, you enable more agility, and create digital opportunities for the future. There are definitely advantages to cleaning out the attic."

"There are challenges. But that doesn't mean it can't be done. It can absolutely be done"

Barry Wordell

Choose an experienced guide

The right partners can make or break a mainframe modernization project. It takes experience, patience and obsessive attention to detail to mitigate the risk of what can seem like an overwhelming task. But the impact of successful modernization can be huge.

One Fortune 100 company, for example, was able to work with Atos and AWS to digitize its supply chain management and modernize key operational applications to the cloud. That resulted in a 50% reduction in maintenance costs and an improved experience for customers and staff. Another major credit card company wanted to transform its mainframe credit approval system. The resulting cloud-native microservices had 100% accuracy, accelerating the implementation of new business processes and eliminating technical debt.

"When you start looking at something as big and complex as a mainframe, you really need to know what you're doing," Barry Wordell says. "This is running the core of the business. There need to be assurances it's being undertaken using the best possible care to ensure disruptions to the customer are minimized or nonexistent. You've got to bring in partners who have the experience, the capability and the technology to be able to deliver that. And to convey that vision to all of the people invested in the business."

"The tools that you have available on the mainframe are very limited compared to what you can do on AWS," Phil de Valence adds. "The data analytics and tool chains, for example, are readily available. You can start moving data to form a data lake or create data pipelines, you can do reporting for business intelligence, and you can start building artificial intelligence (AI) or machine learning models and start differentiating yourself with new capabilities."

Leaders may understand the potential benefits but there will always be underlying concerns about security and compliance; and about the need to modernize but stay functional at the same time. Stability and continuity are paramount, as key applications and services move from the mainframe to the cloud. But the right partner can decrease the pressure on existing resources and staff, create agile, AI-driven environments, drive efficiencies and transform your organization for the future.

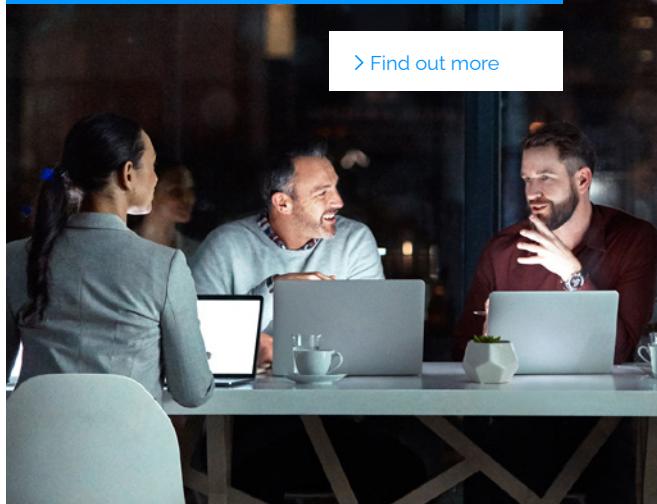
"In addition to the agility benefits and cost savings, I would say risk mitigation is a third strong advantage of AWS cloud compared to mainframes," Phil de Valence says. "Risk mitigation for skills, because it's getting harder to find those people on the mainframe side, but there is a large talent pool for AWS; reduced risks on AWS with a modern stack that reduces vendor lock-in and prevents abusive license costs; and easier integration of new innovations because of the lower technical debt and silos that are removed as part of the modernization process."



One of the common obstacles to the mainframe modernization journey is funding the migration effort. Atos' M3 (Manage Migrate Modernize) solution is a self-funded offering that allows organizations to spread the cost by bringing efficiencies to their IT operations. Those savings are then reinvested into digital transformation and cloud initiatives for mainframe workloads.

Atos' 40 years of mainframe expertise can help reduce the business running costs by as much as 50% when moving the mainframe to AWS. That's on top of other benefits such as speed of innovation, improved reliability and performance, and access to powerful tooling and automation capabilities.

[Find out more](#)





The fine line

In working together, Atos and AWS combine decades of experience to execute a modernization journey that is bespoke to each customer's needs. "We start with an assessment of the code base to determine how we're going to tackle the project," Barry Wordell says about the process. "We start with smaller pieces, move them across to minimize risk and show early value. There are solutions both from an infrastructure and code point of view to manage risk and ensure there's zero disruption and zero security flaws."

"The technical solution will depend on the customer but we're quite prescriptive in how we approach mainframe modernization based on our accumulated experience," Phil de Valence adds. "We start small, we scale fast, we try to automate as much as possible. We use a hands-on approach and favor evolutionary approaches so that customers can realize short-term business benefits without having to do the risky, big-bang, rip and replace approach."



"Look for people with a holistic business focus"

Don Estes

In choosing the right partners, Barry Wordell says, it's important to first decide what you want to achieve. "Obviously industry recognition is important. But I think you have to look at your own goals and expectations of value. If you open it up to exploratory workshops with lots of different vendors, you're going to end up going in a lot of different directions."

"Look for people with a holistic business focus who are prepared to work with your own business and enterprise architects," Don Estes adds. You've got to look at the promise of the future and mitigate the risk in getting there. That is a very fine line."

Atos is one of AWS' most trusted partners and one of the few to achieve AWS Mainframe Migration Competency certification. "We are pretty selective and are very careful about who we partner with," Phil de Valence says. "Earning trust is one of the Amazon leadership principles and is very important to us so we can move quickly with customers."





Act now

Once the stalwart feature of successful, reliable organizations, the mainframe is now holding businesses back. Faced with fast-paced disruption and evolving consumer needs, business leaders need to be ready for change. Tomorrow's powerhouses of innovation are not – nor will they be – built on mainframes. To respond to competitive pressure from cloud-native disruptors, modernization is essential.

"The costs are coming down and the risks of not modernizing are getting higher. All of those pressure points are putting people's minds towards this legacy evolution that's underway," Barry Wordell says. "Clients are looking for the agility, flexibility, cost savings and scalability of cloud computing at a high level. That's not just mainframes, that's exiting the data center altogether and getting rid of asset intensity in their businesses."

According to Gartner, the number of companies shutting down their physical data centers will rise from 10% in 2019 to 80% by 2025.⁶ It's also expected 2020 investments in cloud IT infrastructure will surpass spending on non-cloud infrastructure, reaching 54.2% of overall IT spend for the first time.⁷

"It's an on-demand, always available economy that we live in," Serge Moro says. "Mainframes weren't designed for that purpose. Anything that's new and innovative, that can be used to build new business solutions to respond to new consumer asks have been invented in the cloud. So if the functionality supporting your business isn't in the cloud, you're not going to be able to react at the same speed as those that are."

"It doesn't get any simpler than that. Mainframe modernization is a hard piece of the puzzle to achieve. But if you're worried about losing relevance with your customers, you need the technology in place to ensure that doesn't happen."

"If the functionality supporting your business isn't in the cloud, you're not going to be able to react at the same speed as those that are"

Serge Moro

6. <https://www.gartner.com/smarterwithgartner/the-data-center-is-almost-dead/>

7. <https://atos.net/wp-content/uploads/2020/11/aws-cloud-is-revolutionizing-it.pdf>



Delivering swift and sure cloud migrations for even the most complex legacy businesses, Atos and AWS will expertly guide you through change, transforming your mission-critical legacy environments into powerful platforms for enterprise-wide innovation and sustainable future growth.



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About Atos

Atos is a global leader in digital transformation with 110,000 employees and annual revenue of € 12 billion. European number one in cybersecurity, cloud and high-performance computing, the group provides tailored end-to-end solutions for all industries in 73 countries. A pioneer in decarbonization services and products, Atos is committed to a secure and decarbonized digital for its clients. Atos operates under the brands Atos and Atos|Syntel. Atos is a SE (Societas Europaea), listed on the CAC40 Paris stock index.

The purpose of Atos is to help design the future of the information space. Its expertise and services support the development of knowledge, education and research in a multicultural approach and contribute to the development of scientific and technological excellence. Across the world, the group enables its customers and employees, and members of societies at large to live, work and develop sustainably, in a safe and secure information space.

About Amazon Web Services

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from datacenters globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

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