Legacy

Mechanical Orchard
Research Report

What IT leaders *really*
think about modernization

Issues

MECHANICAL ORCHARD

Contents

"The can has been kicked down the road for years now. We've simply run out of road."

Edward Hieatt, Chief Customer Officer, Mechanical Orchard

In the early days of computing technologies, organizations focused on the gains from operating more efficiently and optimizing resource allocation. These gains powered some of the most revered brands in the world to enviable market success; their computer systems helped manifest their competitive advantage.

With the explosion of data in the last two decades, computing technologies — now commonly known as "the IT department"— gained another superpower: the ability to respond quickly to market changes. Competitive advantage expanded from operational excellence to include *optionality*, the ability to pivot quickly in the search for profitable opportunities. Technology became a strategic competency, essential to continued success in the future.

Yet, many of the world's largest companies and public-sector organizations are still relying on business-critical IT systems installed before humans landed on the moon. Despite robust growth in the cloud computing market[1], most F500 companies continue to run one or more core functions on legacy systems: finance, human resources, inventory, sales and logistics, transactions, and more.

These older IT systems by and large still work. But they're beginning to constrain optionality —

and starting to exhibit risks and vulnerabilities that expose companies to near-catastrophic failures and substantial fines[2]. Many of these systems are approaching or have passed end-of-life and are no longer supported by their original vendors (if indeed, the original vendors still exist!). Other systems were born from the obscure corners of shadow IT and now run essential programs that should be subject to compliance requirements.

Older systems are surprisingly prevalent:
- Almost 60% of global enterprise organizations rely on mainframes for about one in five of their servers, according to research by Forrester Research published in 2023.[3]
- ZDNet estimates[4] that organizations are using old Windows operating systems, such as Windows 7, 8.1 and 10 on hundreds of millions of computers, despite Microsoft either having withdrawn security and technical support[5] for the systems or is on the verge of doing so.
- Appeon, the company supporting PowerBuilder, cites more than 18,000 companies and "most" of the F500 as customers.

Moreover, as the institutional knowledge for many of the systems fades as IT professionals retire, new generations of IT talent are reluctant to work with older systems. As one individual wrote in a PowerBuilder discussion board,

> **"It seems funny but young employees that are used to iPhones and web application [sic] get REALLY SCARED once they take a look at our PB application forms."[6]**

And then there is the accumulation of "technical debt"[7] (TD). This is the price companies pay when they choose short-term technological fixes over a more exhaustive, long-term solution. Aging and inflexible IT systems are the primary contributor to technical debt. As Professor Herb Krasner, publisher of the biannual Cost Of Poor Software Quality In The U.S. report, notes, "The growing impact of Technical Debt has become the biggest obstacle to making any changes to existing code bases."[8] McKinsey elaborates on the negative impact: "87 percent of leaders cited the 'complexity of existing infrastructure' as a key impediment to implementing next-generation services."[9]

To be sure, modernizing has been happening, just not particularly successfully: studies note failure rates of 70% or more.[10]

Complexity is high, projects take years, and many sensitivities need to be managed. All of this leaves large organizations with the only expectation of their IT systems being to "keep working" – or "not dying," which is a very low bar for measuring success, as one fintech columnist noted.[11]

Enter the dramatic growth of AI over the past two years: because legacy systems make deploying AI solutions difficult, if not impossible, CEO and boards are turning their attention towards these old systems and starting to ask some very difficult questions of their IT leaders.

The practical challenges of legacy IT modernization are well documented. However, through our research with IT leaders, Mechanical Orchard (MO) has seen a more subtle pattern of complications emerge.

We hear frequently that psychological and organizational politics, including risk aversion and generational divides, are delaying or hampering legacy modernization as much as poor project-management techniques and

impenetrable code. We began to see that the difference between success and failure in legacy modernization could simply boil down to IT leaders' fear of failure.

So, to investigate, we surveyed IT leaders, from C-Suite to director level, at 150 large private sector companies and public sector organizations in Western Europe and the United States, in industries including technology, financial services, manufacturing, and healthcare. This report summarizes the research findings.

Now is the time to start a new debate about legacy modernization, question conventional wisdom, and find new approaches to tackle one of the most difficult but necessary IT challenges faced by large organizations around the world.

1 Gartner; Gartner says cloud will become a business necessity by 2028, https://www.gartner.com/en/newsroom/press-releases/2023-11-29-gartner-says-cloud-will-become-a-business-necessity-by-2028)
2 Guardian; December 2023; Southwest Airlines agrees to $140m penalty over 2022 holiday meltdown, https://www.theguardian.com/business/2023/dec/18/southwest-airlines-penalty-holiday-meltdown
3 Forrester; Tackle the overwhelming challenge of mainframe modernization, https://www.forrester.com/report/tackle-the-overwhelming-challenge-of-mainframe-modernization/RES146395
4 The Verge; Windows 7 is still running on at least 100 million PCs, https://www.theverge.com/2021/1/6/22217052/microsoft-windows-7-109-million-pcs-usage-stats-analytics
5 Microsoft, End of Support for Windows, https://www.microsoft.com/en-gb/windows/end-of-support
6 Appeon; The Future of Power Builder, https://community.appeon.com/index.php/qna/q-a/the-future-of-powerbuilder-and-what-could-be-done-about-it
7 Sloan Review; Technical Debt Might be Hindering Your Digital Transformation, https://sloanreview.mit.edu/article/technical-debt-might-be-hindering-your-digital-transformation/
8 Professor Herb Krasner; The Cost of Poor Quality Software; 2022, https://www.it-cisq.org/the-cost-of-poor-quality-software-in-the-us-a-2022-report
9 McKinsey; CIOs are redefining what a successful relationship with their IT providers look like, https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/cios-are-redefining-what-a-successful-relationship-with-their-it-providers-looks-like
10 VFunction; Why App Modernization Projects Fail; 2022, https://info.vfunction.com/hubfs/Download%20Assets/Wakefield-Report-2022-Why-App-Modernization-Projects-Fail.pdf?
11 Fintech Futures; The Art of Not Dying; 2024. https://www.fintechfutures.com/2024/03/the-art-of-not-dying/

It's widely acknowledged that modernization is stressful

Senior IT leaders are delaying IT modernization due to fear of failure and worry that it may harm their career

About the Research

- Research conducted by TechTarget's Enterprise Strategy Group
- Survey of 150 Senior IT decision makers (C-suite to directors) across large enterprise (2,000+ employees) organizations with >$1 billion total annual revenue
- North America (US, Canada, 67%), Western Europe (UK, 33%)
- Multiple industry verticals across the public and private sector
- Field dates: 4/2/2024 – 4/24/2024
- 82% of respondents had undergone a legacy modernization project in the last 12 to 24 months

This risk averse attitude contrasts with a "just do it" approach among their teams (not C-suite) who believe that creaking legacy systems are holding companies back and making it hard to reap the full rewards of new technologies such as artificial intelligence

Internal politics and lack of a cohesive vision are causing delays or failure

81%

Eight in ten (81%) IT leaders anticipate migrating business-critical apps to the cloud

The top drivers for planned business-critical application migrations to the cloud are:

55%
Improved scalability and flexibility

42%
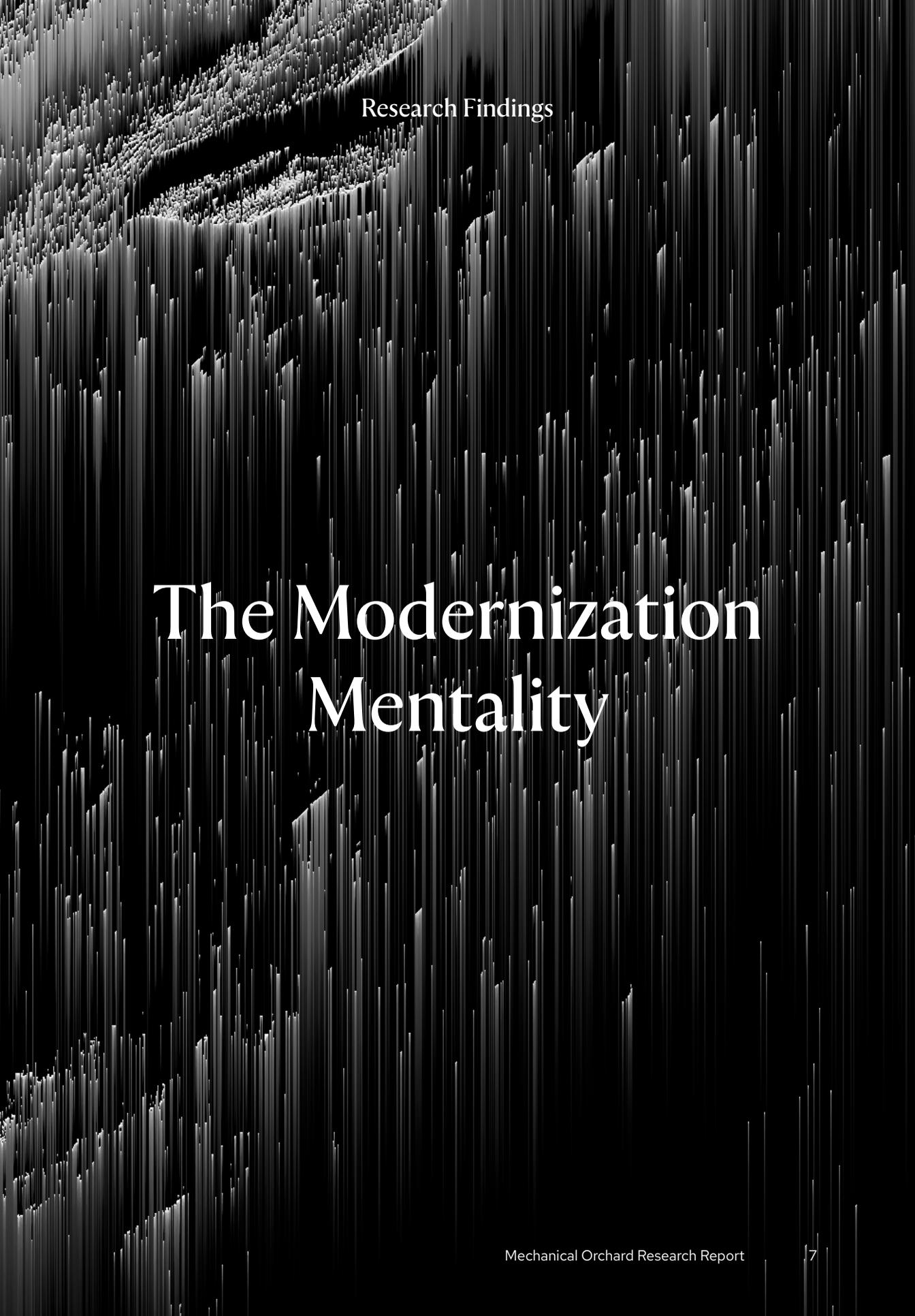Improved computing capabilities and workload performance

40%
Increased business continuity and resilience

39%
Cloud capabilities continue to better support customer and/or user experiences

34%
Maximizing applications' business outcomes by leveraging cloud technology benefit

The Modernization Mentality

IT leaders are conflicted about the skills they need to get the job done

Our research highlighted that Enterprise IT leaders tend to favor traditional leadership traits, while entrepreneurial attributes are assigned the least value to success in their roles. For example, technical expertise was rated very highly (61%), while curiosity scored low at 19%.
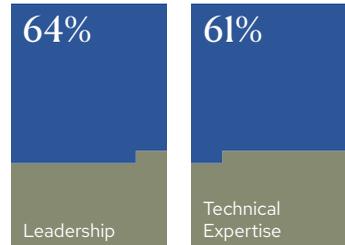
When it came to assessing their personal strengths and weaknesses, on average, eight in ten (83%) of respondents rated themselves as strong or very strong in traits such as adaptability, leadership, technical expertise, and decisiveness.

A 'Visionary Mindset' came top at 55% when thinking about the attributes needed for successful modernization. However, less than a third (31%) said willingness to experiment/take risks was an area of strength.
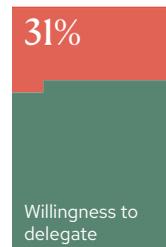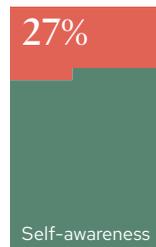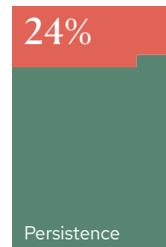
However, there appears to be a willingness to be bolder. When respondents were asked whether, in a hypothetical scenario of a legacy modernization, they would pick the higher risk/higher reward option, compared to a risk-free (or at least, low risk) option, 85% of IT decision-makers picked the first, riskier option.

A quarter of IT leaders (26%) apply the old adage "If it's not broke, don't fix it" to decision-making.

Most important attributes

64% Leadership

61% Technical Expertise

61% Adaptability

57% Long-term focus/vision

45% Ability to influence

Least important attributes

19% Curiosity

24% Persistence

27% Self-awareness

28% Willingness to experiment/take risks

31% Willingness to delegate
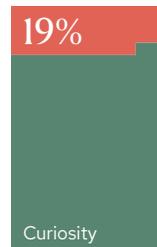
There is a disconnect between vision and reality. Over half of IT leaders (55%) said having a visionary mindset was an important attribute for successful modernization. However, less than a third (28%) attributed willingness to experiment/take risks as important to success in their role.

55%

Agree a visionary mindset is needed

28%

Report willingness to experiment/take risks as important in their role
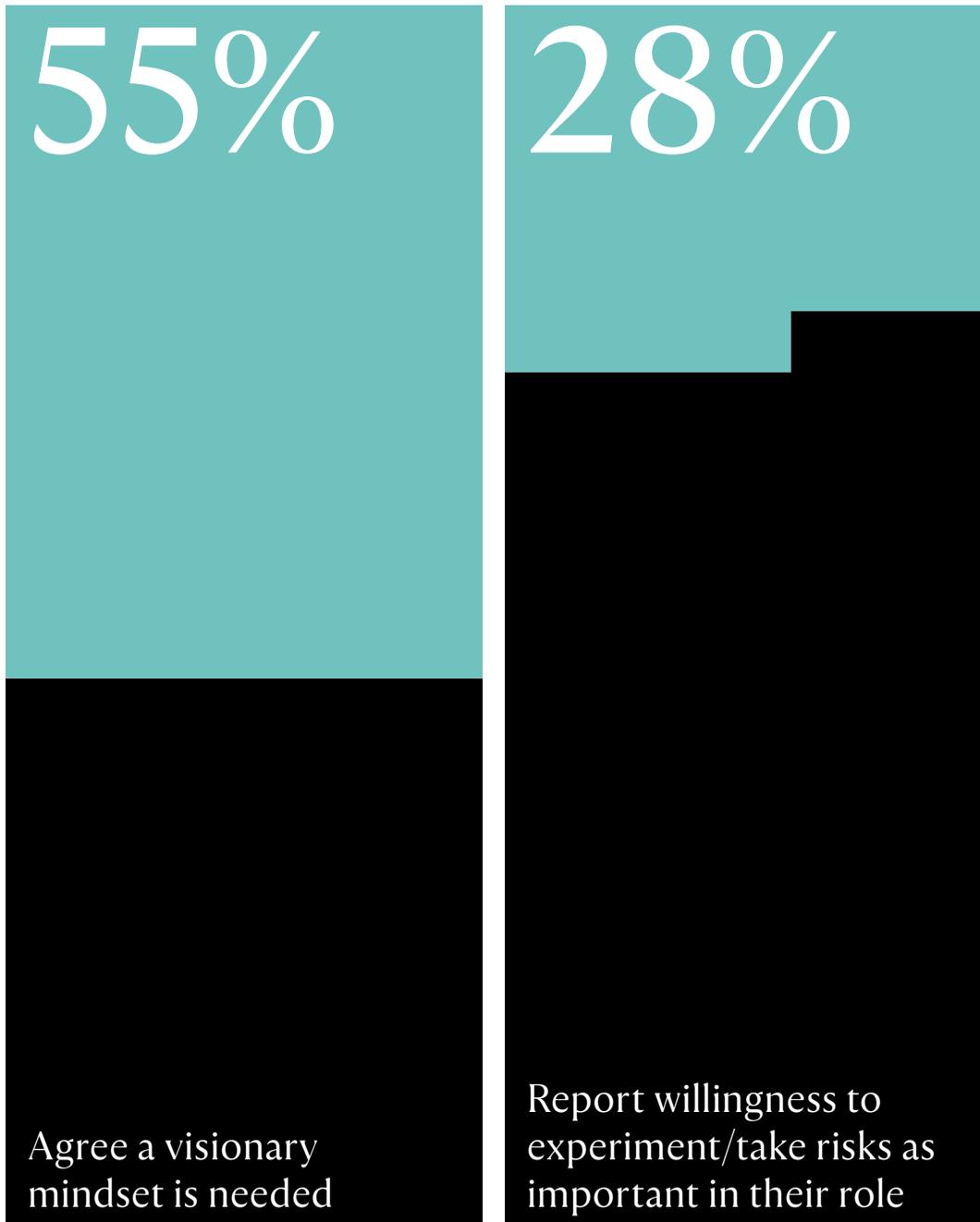
Modernization is complicated beyond logistics

57%

Have delayed

Have not delayed

43%

In the past 12–24 months have you considered advocating for a major investment in legacy modernization but ultimately decided to delay the project?

71% of respondents reported legacy modernization as being stressful. Different approaches within teams are also common. Fear, internal politics and bureaucracy play major roles in deciding the outcome of modernization efforts.

Key research findings show:

JOMO *and* **FOMO play a major role**

This complexity and pressure has led to C-level respondents being 82% more likely than senior management to believe that the "Joy of Missing Out" (JOMO) or – "I might get fired if I do something that winds up being unsuccessful" – as a reason for modernization failures.

In contrast, almost a fifth of the respondents (15%) attributed "Fear of Missing Out" (FOMO) or – "I might get fired if I don't do something" – to successful legacy modernization strategies.

C-level respondents we surveyed were 82% more likely than senior IT management to believe that an excessive aversion to risk – for example, a fear of getting fired if a large IT project fails – is the main reason for failed attempts to modernize.

Fears of career failure weigh heavily

When it comes to reasons why organizations delay modernization, over a quarter (27%) of respondents worry that if the technology they endorse or invest in fails to meet expectations, their employment may be terminated.

Similarly, 24% have concerns that if the technology they back falls short, their career or leadership trajectory would be harmed. Three in ten (29%) also raised concerns about lacking peer support in gathering support for technology or an approach.

Internal politics is a constant headache

Even if IT leaders and C-Suite managers want to modernize legacy systems, they often hesitate. Common worries, according to our research, include conflicting internal organizational views and agendas on the matter (37%), and insufficient support from their organization's leadership (37%).

There is more to do to convince the boardroom it's worth it

Other common reasons include an organizational culture that isn't open to change (40%) and skepticism as to whether the legacy modernization will produce a return on investment (39%).

However, with almost a third (29%) of respondents stating low tech curiosity as a reason for failure, questions could be raised as to the breadth of modernization options put on the table.

Lack of conviction means legacy modernization budgets are tight

All these concerns are taking a toll on budgets. 47% of all respondents cited budgetary constraints as the main cause of failed modernization strategies.

With IT leaders also fearing IT budgets will be lost if their modernization project fails (33% agree), a vicious cycle emerges.

Similarly, only 19% said their Executives are evangelists and promote peer buy-in of legacy modernization efforts.

Senior management is frustrated with the state of play

It could be argued that senior management is more willing to take risks than their C-suite counterparts to get the job done. In contrast to C-suite (36%), 41% of senior managers cited risk aversion as a common reason for failure.

Cheap and quick are two words not typically associated with legacy modernization. Yet our research found that senior management is more than two times as likely (2.1x) than the C-suite to attribute the pressure to purchase low-quality, quick-fix solutions aimed at immediate gains, on modernization failures (38% agreed).

This is hand in hand with senior management stating that modernization is hindered because of skepticism of new technology (40%). Only 27% of C-suite agreed with this.

Over a quarter (27%) of IT leaders say fear of moving away from the security and stability of legacy infrastructure is stifling modernization efforts.

Trial and Error: lessons learned from legacy migrations

Seven in ten (71%) of IT decision-makers said they had to repatriate previously modernized legacy workloads. Reasons for the reversal vary but include a view that critical IT systems are more secure and more likely to comply with data privacy and other compliance regulations if they are moved back to an on-premise IT system. There are also general concerns about the quality of the IT modernization.

What lessons did organizations learn from legacy modernizations that involved moving IT systems to the cloud?

Identifying ways to enhance application and workload performance during the project was the biggest lesson (41%), followed by IT leaders recognising that understanding of the current mainframe environment needed to improve (38%). Insights into backup and disaster recovery plans were also helpful (37%).

The winning formula for a successful migration

When asked about the mindset of the organization's leadership which contributed to a successful migration, over half (53%) of IT leaders said effective communication resulted in improved collaboration, problem-solving, and efficiency.

Unlocking budgets was also a key factor, with 48% saying their leadership team was okay to spend more if the results were greater network security and operational efficiency. Realistic expectations were also important (42%) plus a clear strategic vision and direction (33%).

Fifty percent of IT leaders said successful migrations occurred when the leadership team was open to change.

Five hard lessons learned during migration

33%

Without adequate support from peers and key stakeholders, even the easiest approach to migrations becomes challenging

31%

Process and goals should have been stronger and more well-defined

31%

The complexity of the migration was underestimated

29%

The longer and/or more difficult the migration, the more the tolerance for technical debt grew

26%

Budget and scope targets were rarely achieved

The IT Leader's Perspective

"Consider IT leaders nearing retirement, who are very risk averse. Understandably they are apprehensive about leading a legacy modernization project worth tens of millions of dollars that may define their career if it goes wrong."

IT leader at large global logistics firm

One IT leader interviewed by Mechanical Orchard acknowledged the psychological factors within large organizations that can affect how they approach legacy modernization.

In the other corner are the "caretaker" IT engineers with deep knowledge of the legacy system, who may feel underappreciated after looking after the system for several decades or more. Although they are initially skeptical about legacy modernization, they are willing to support it if they believe it will work.

One veteran CIO – with about 35 years of experience at some of the world's largest retailers and financial services companies – was recently head of technology at a large retailer.

When the retailer decided to modernize its mainframe – moving from COBOL to a Java-based cloud system – it paid a large consulting firm about $20 million to lead the project. Early in the project, however, the retailer realized that the code in the Java system was as "incomprehensible as the old system," the IT leader told us.

The retailer canceled the contract early and stayed on the mainframe.

"We took an old system that we didn't understand, we moved it onto a new platform and translated it into a new programming language, and we still didn't understand the system," the IT leader recalls.

An iterative approach to legacy migration – in which the project is broken into components, tested and installed gradually rather than all at the same time – can calm nerves and build confidence in the new system.

"You need a lot more feedback along the way. If you're going to, let's say, end up doing 100 things [in a legacy modernization project] it's much better to get feedback after each one," the IT leader adds. "So, you can do slice one and then field test it, and then slice two and then field test it, rather than build all 100 and then realize you need something else."

The practicalities of modernizing old systems isn't primarily what's preventing decision-makers from moving ahead. It's far more nuanced, complex and personal than that.

Failure is a fungible term. It can mean not delivering to a timeframe and a particular budget. It can also mean not achieving the desired outcomes.

These diverse definitions are used to mask the ultimate goal of modernization – to get rid of all the accumulated debris and complexity that has built up over the years so that the systems can adapt to changes in the market.

That's why this is a psychological issue more than a technological one. No one wants to admit to failure. Instead, they continually chip away at the definition of success to merely mean being in the cloud. (Even if the cloud-based system is stuffed with incomprehensible code, translated from the legacy system, that's difficult to change.)

As one IT executive shared, most organizations have long developed a set of "coping mechanisms" for their legacy systems. Such mechanisms have become so comfortable that organizations rarely examine them to see if they are healthy and good for their business and their IT.

"Most folks, if they were more honest about the coping mechanisms they've developed, would recognize that they're carrying around [legacy IT systems] that are much riskier than the way they're currently treating it."

About Us

At Mechanical Orchard, we specialize in safely rewriting the most critical and complex business applications so they're ready to adapt quickly and easily to market challenges and opportunities. Our approach emerged from observing the decades-long patterns in modernization efforts.

Code-first approaches often become overwhelming in the face of millions of lines of code, numerous interdependencies, and incomplete or absent documentation. These types of projects often result in test phases that last far longer than the time it took to transpile the initial code, resulting in a highly uncertain waiting period prior to turning "on" the new system.

The other common approach, which reimagines business processes while modernizing a legacy system, creates an extremely complex project with many moving parts. Legacy systems are already intricate, with deeply embedded business logic that has evolved over time. Redesigning business processes simultaneously with a modernization project can overwhelm teams, making it difficult to manage scope, maintain operations, and deliver results.

Based on these observations, Mechanical Orchard follows three core principles for safely rewriting and moving applications to the cloud:

- The system in action is the specification.
- We recreate its behavior exactly in a modern language.
- We roll increments into production.

These principles inject confidence and control into the modernization process. Our insistence on putting thoroughly tested and validated increments into production lets teams demonstrate continuous, measurable progress through working software—and vastly decreases the risk of failure.

Most importantly, customers can make any future innovations easily, quickly, and inexpensively without the need for specialized knowledge in aging programming languages.

Every member of the Mechanical Orchard team is steeped in best practices for software development. The executive team includes software development laureates such as Kent Beck, who created Extreme Programming, and Rob Mee, who industrialized these practices as the founder of Pivotal Labs. We now apply our approach, discipline and expertise to the challenge of reinventing the software that runs the world.

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