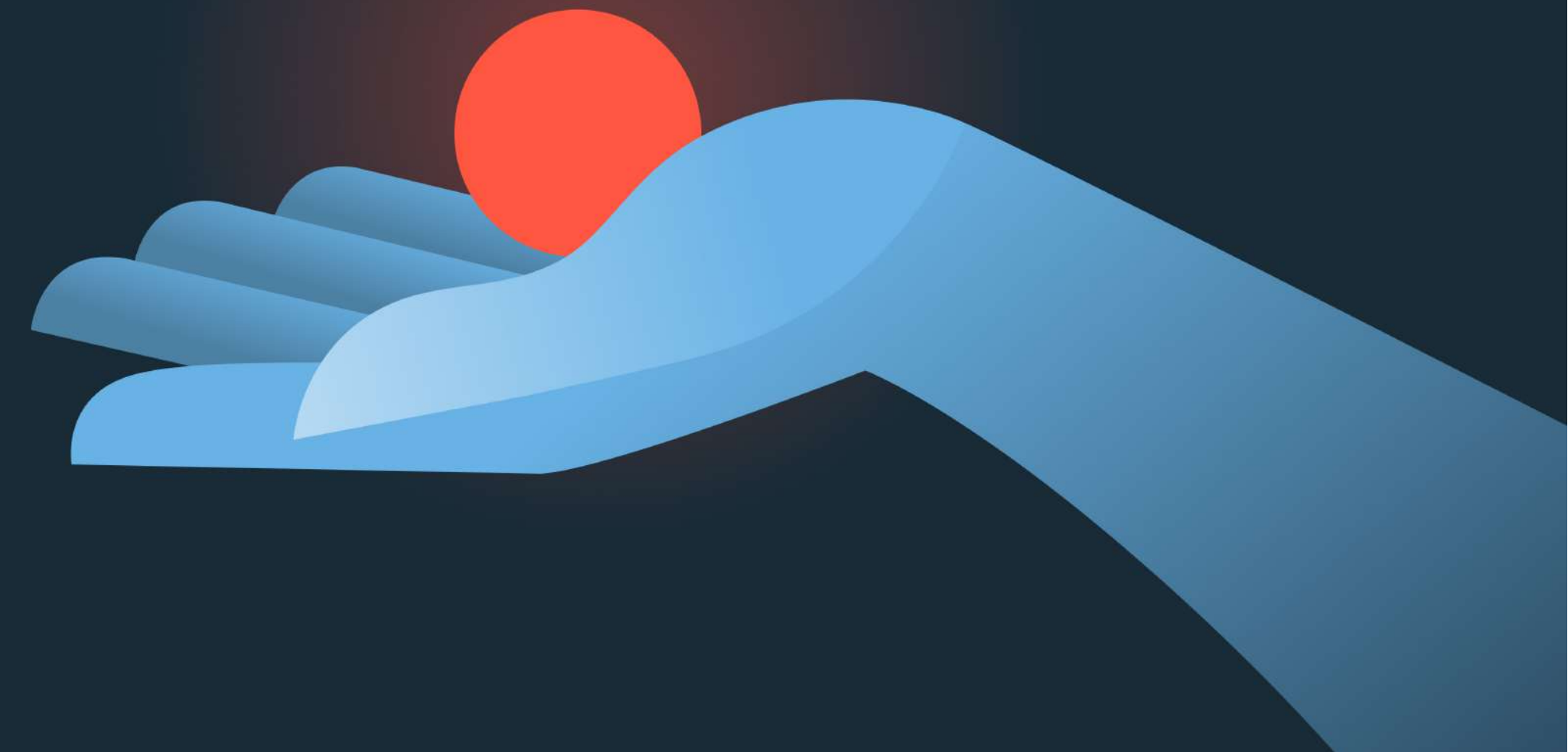


How to Make Better Software Modernisation Decisions



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Introduction

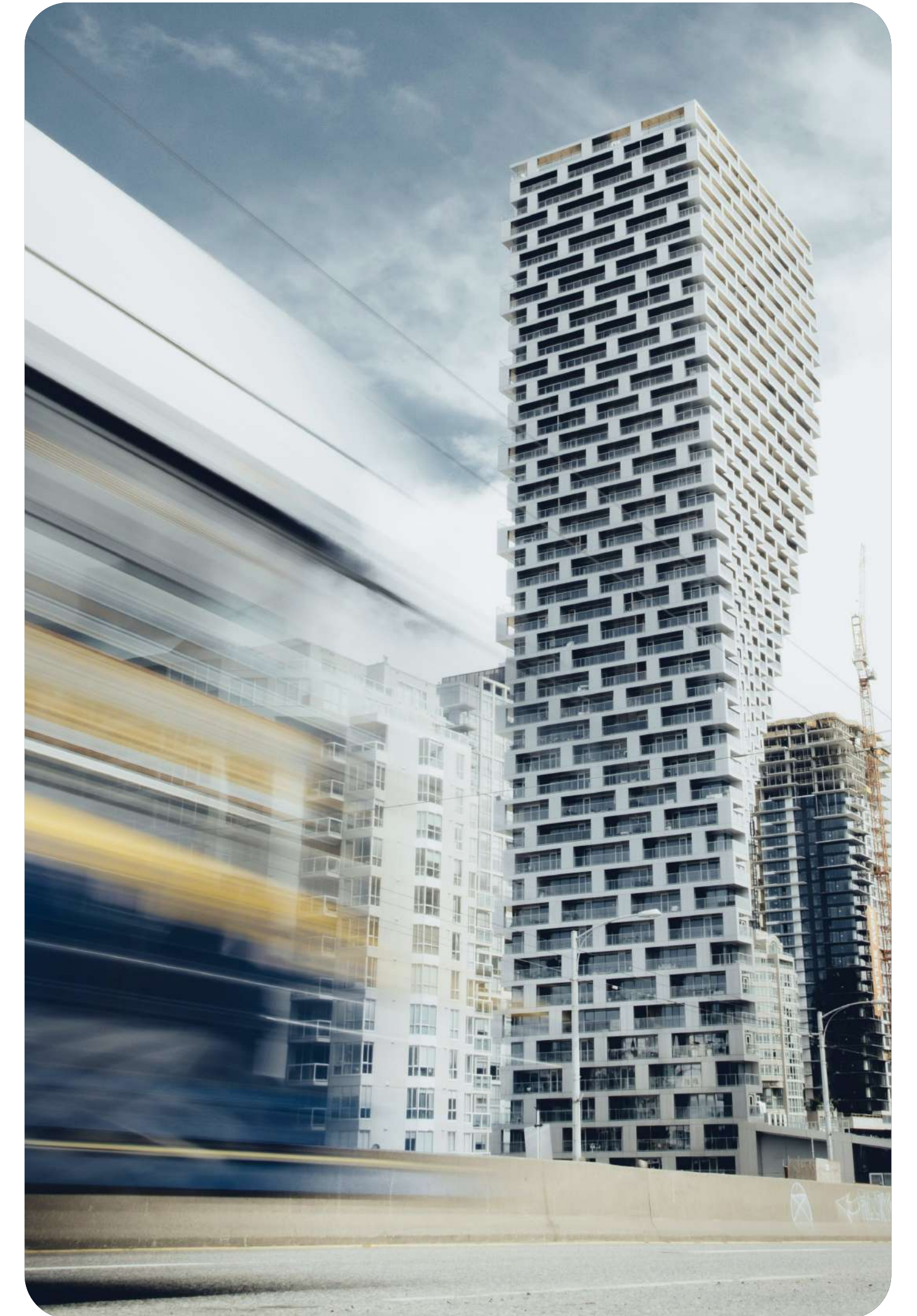
Almost every business, whatever its sector, has an ever-growing set of routes to achieve its core goals. The exponential growth underway in the software and computing spaces might seem abstract to companies beyond their immediate orbits. But as the applications of transformative technologies (and barriers to entry shrink) like cloud computing, AI, 5G and advanced data analytics grow, their productivity gains become ever more widely distributed.

Such rapid change in businesses' technological environment unlocks doors for those who keep up with it, while imposing a compounding opportunity cost on those who don't. Simply put, the rules of the game will be constantly rewritten. In each industry, early adopters will be able to set new bars for service and delivery, driving up standards across the market.

To stay competitive, leaders need strategies to continuously evolve their software stacks in line with emerging best practices.

The costs of creeping obsolescence aren't only theoretical. Maintaining an outdated software architecture gets pricier with every passing year. Endlessly patching up defective or unsupported components creates an unwieldy Frankenstein's Monster of a codebase. This is more vulnerable to security threats and whole-system breakdowns that could incur profound expenses, both financial and reputational.

In this whitepaper, we will explore the value of knowing and inspecting your systems. We will then lay out the practical steps to perform a successful software assessment.



Why modernisation matters

The outlook for global business at the start of 2024 is more promising than was widely forecast twelve months ago. With inflationary pressures abating and recessions skirted in many large economies, growth prospects are looking brighter.

With the skies slowly clearing, businesses need to identify their internal limiting factors that could stop them taking full advantage of improving conditions.

For many, if not most businesses of all sizes, technical debt will be an impediment.



🔗 Understanding technical debt

Technical debt is a metaphor in software development that describes the implied cost of additional rework caused by choosing (knowingly or unknowingly) a quick, yet suboptimal solution now instead of using a better approach that would take longer. It's similar to financial debt: if you borrow now, you must repay later with interest.

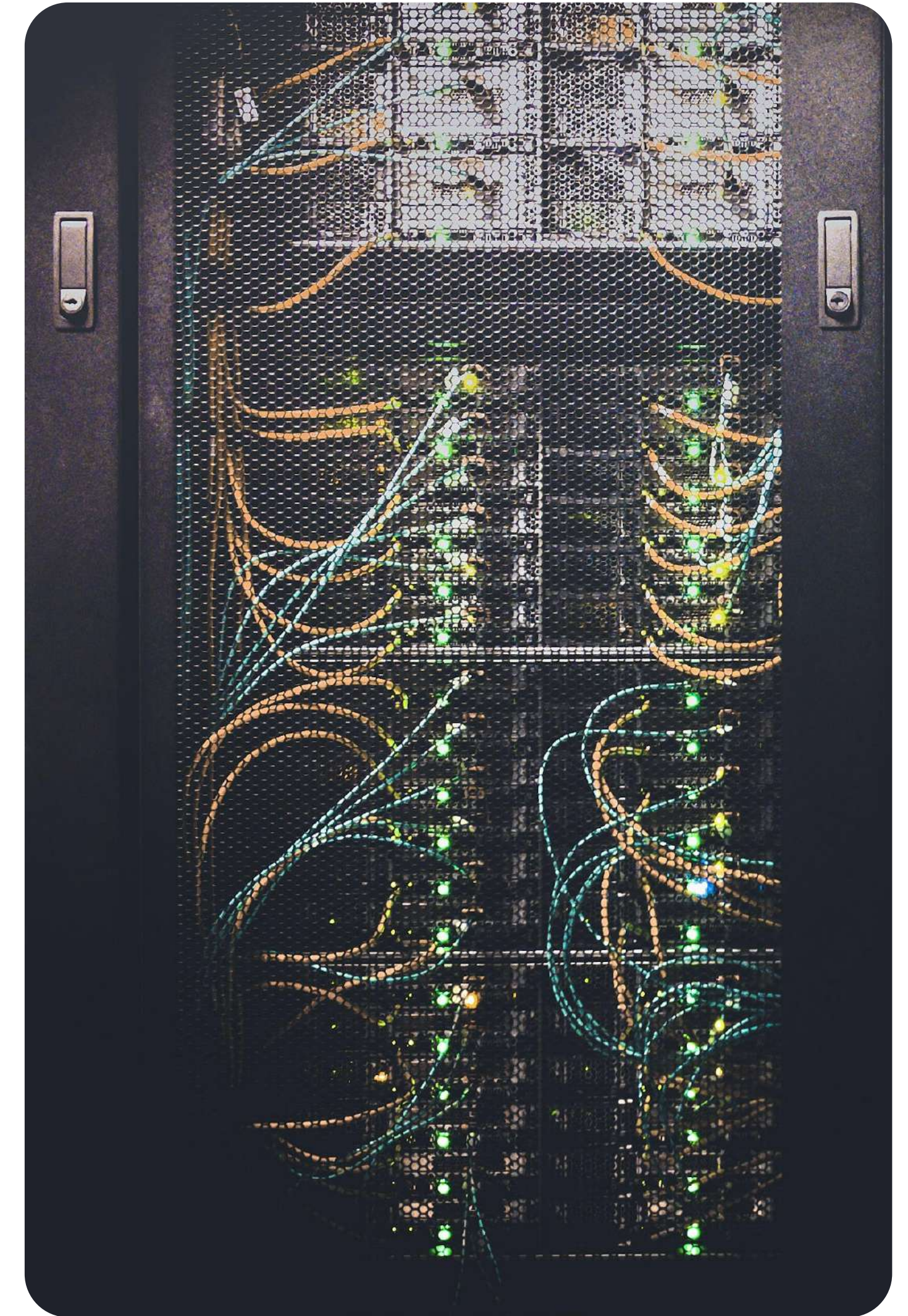
In the context of software, the "interest" comes in the form of the extra effort required in future development because of shortcuts taken earlier, which can slow down new feature delivery and lead to higher costs in the long run.

Just as a using a tarpaulin to cover over a hole in a roof would set up a property owner for a deluge of flood repair pay outs when a winter storm next hits, a lackadaisical approach to digital update and maintenance can turn out to be rather expensive.

Even for CEOs familiar with the concept, technical debt is rarely top of mind. Its costs can simply seem too hypothetical and implied over a long-time horizon. But that doesn't make them any less real.

A recent McKinsey report found that companies with the most technical debt divert up to 20% of the budgets earmarked for new product investment into fixing issues related to that debt. That's money that should go towards enabling innovation and growth, poured into simply keeping the lights on.

To quantify this more appreciably, the same report found that one large bank's complex software estate generated over \$2 billion in technical debt costs. Companies with the most technical debt are also more likely to have a string of cancelled modernisation programmes. In this sense, waste begets waste.



What technical debt stops you doing

A degree of technical debt is simply unavoidable. But when it accumulates to excessive levels, it will severely constrain any business's ability to take advantage of new capabilities. At a time like ours, when the whole economy is blossoming with new potentials and concurrently emerging technologies, that could represent a major, long-term revenue drain.

For instance, a business hemmed in by the consequences of previous botched jobs will lack the bandwidth to modernise. This will prevent them from responding to opportunities and trends including:

Customer experience (CX) design

The quality of a business's product or service is no longer its primary differentiator. The battleground increasingly lies in crafting textured interactions that consistently please customers across every touchpoint.

Businesses who prioritise customer experience design retain **42% more customers**. Those customers are also willing to spend at least 5% more if they can expect a better experience from it.

But creating a mobile-first, seamlessly personalised experience requires, at the very least, some digital design and data analytics capabilities. Such technologies can be implemented in good time, but only if there is capacity to invest in them.



Artificial intelligence and advanced analytics

Business leaders are now turning their interest in AI into real investment. In the UK, **68% of large companies**, 33% of medium-sized companies, and 15% of small companies have incorporated at least one AI technology.

There is still much more to come.

AI's enterprise applications are broad and variegated. Generative AI is already enabling huge steps forward in customer-facing functions. Its cousin, machine learning, is revolutionising businesses' decision-making processes by turning masses of data into actionable forecasts.

Putting business-grade AI to use will involve much more than punching questions into a freemium interface like ChatGPT. These tools demand intensive computing power and may require a complex web of integrations with other apps to fulfil their purpose. This is not a technology open to those still preoccupied with patching up the cutting-edge tools of the early 2010s.

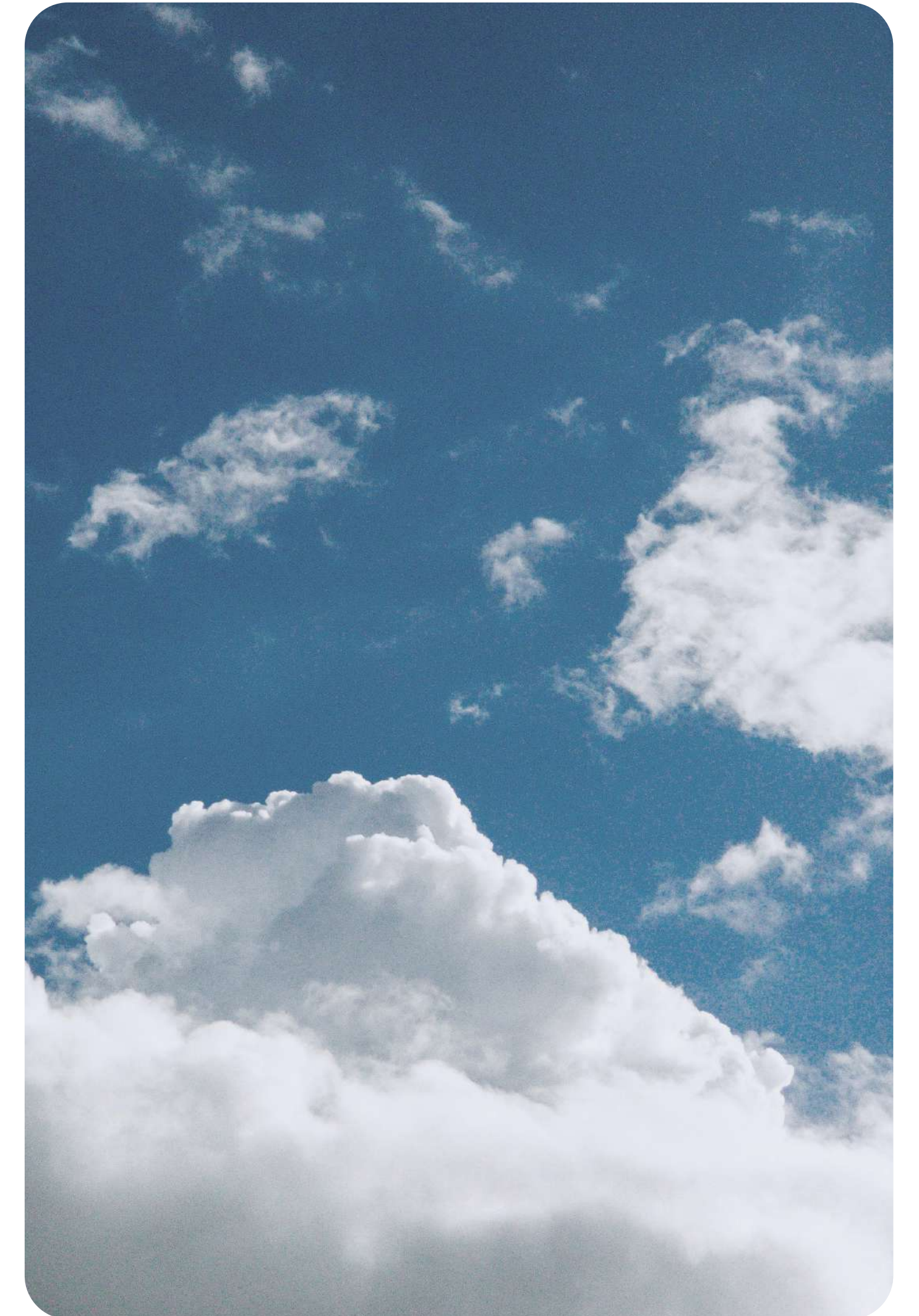
Sustainability

Governments across the world have signed agreements to get their national economies to net zero carbon emissions. The business world will have to fly with them on this mission.

This isn't just a task that weighs on capital-intensive companies like airlines, auto manufacturers or miners. Shareholders in many businesses now expect executives to implement meaningful sustainability drives.

Cleaning up a company's operations is a forensic art. Leaders must identify carbon-heavy spots in their supply chains, internal processes and operations and nominate ways to replace them without compromising their own efficiency.

This is a much easier task for businesses who can leverage data analytics technologies to monitor each aspect of their operations. It's very hard to efficiently optimise resources if you're not able to turn raw information into instructive insights and forecasts.



🔗 Why legacy systems make everything worse

Businesses suffering from high levels of technical debt are almost invariably over-reliant on legacy technology – systems that have become outdated or obsolete.

It could help here to define precisely what we're talking about when we talk about legacy systems. Technology moves at ever-increasing pace, and few businesses could justify the frequency of upgrades needed to stay up to date with every single innovation. Many older elements of software stacks are still more than adequate for their users' needs.

A legacy system, on the other hand, is one that is still in use despite no longer being in line with current standards and best practices. This might be regarding security concerns, incompatibility with newer applications, code quality, ease of maintenance or basic efficiency.

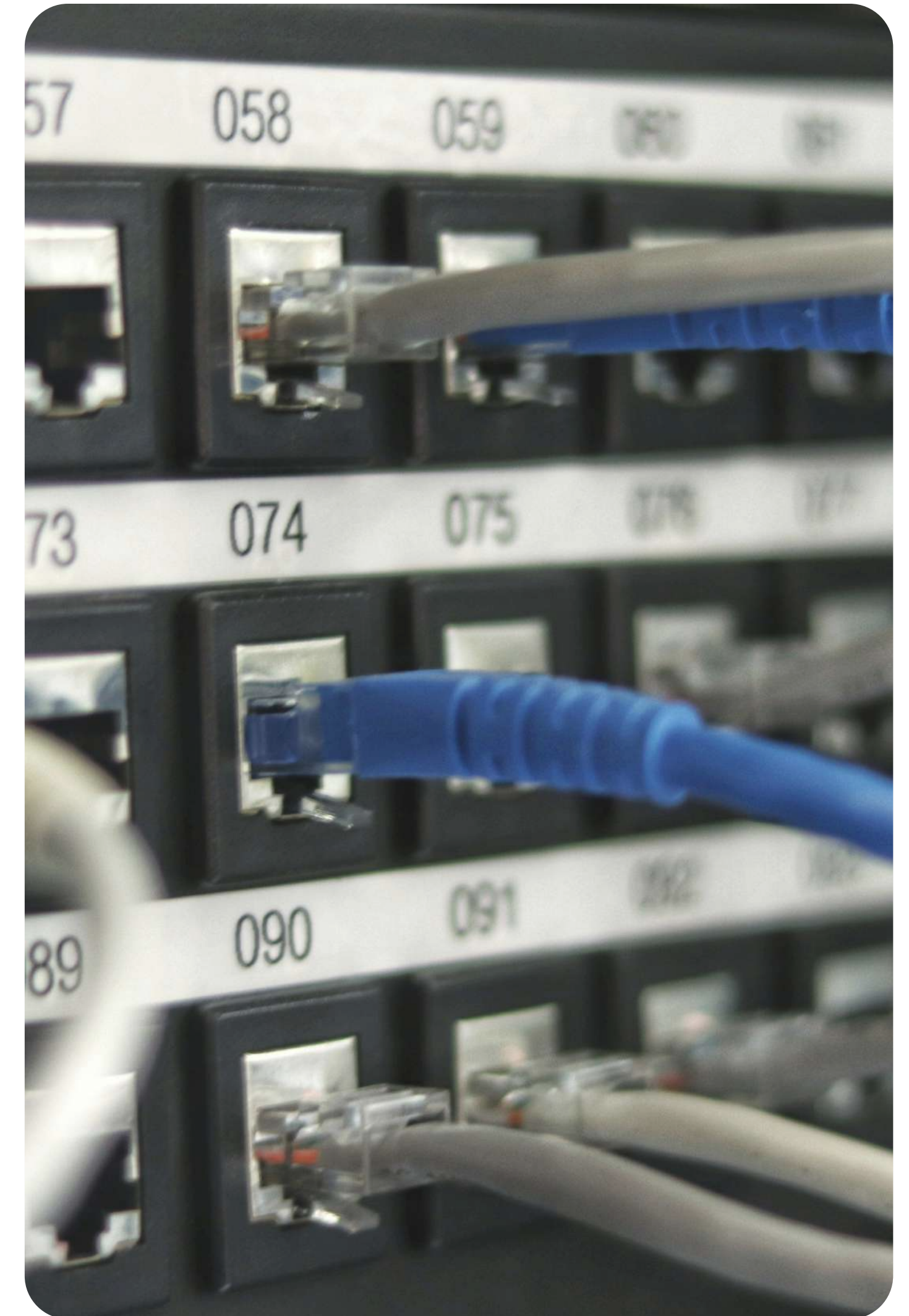
The most emblematic and visible example might be the preponderance of organisations still running Windows 8 (or even Windows 7). But the issue runs deeper, impacting systems at every layer of operations.

This is a large and insidious problem across sectors.

A whole third of UK financial institutions admit that most of their technology is out of date. The challenge is no less acute across the Atlantic, and it is certainly not limited to the world of business. **A recent audit** found that eight US Federal Government agencies are reliant on legacy technology, with the IRS' primary system for accessing tax data now over 60-years old.

Technical debt and legacy systems are intertwined and mutually multiplying. An ageing technology becomes more prone to outages, failures or security breaches. This leads to short-term attempts to mend the issue as quickly as possible and get back up and running. As more quick fixes are bolted on, the outdated system becomes bloated and unwieldy. This exacerbates its original deficiencies and stores up more trouble for the future.

If you can recognise these problems in your own organisation, it may be time to fire the starting gun on a programme of modernisation.



Software assessment: the first step to modernisation

Any IT modernisation project is an investment programme requiring an evidence-based strategy. This must start with a rigorous fact-finding process that removes any doubt about the dimensions of a software estate and the specific deficiencies within it.

This is known as a **software assessment**.

1. Identify the current state

Leaders need a comprehensive view of the architecture, components and integrations of its existing system.

2. Identify technical debt:

The process must define the locations, sources and consequences of technical debt.

3. Determine modernisation needs:

The process should provide leaders with a set of priorities for feasible upgrades, such as cloud migration or opportunities to replace parts – or the entirety of – the application portfolio, with an indication of costs and resource intensity

4. Establish a roadmap for improvement:

The software assessment process should facilitate a strategic roadmap for how to realise these upgrade priorities.



🚩 The limitations of traditional software assessments

For decades, companies have used a set of approaches to carry out their software assessments. However, many of these methodologies are becoming just as obsolete as the tech stacks they evaluate, leading to similar costs. Here are some of the most common tactics employed and their drawbacks, particularly when done alone.

The use of documents, interviews and tools

Companies usually conduct software assessments by reviewing architectural documents, interviewing developers and using tools to review code quality. However, this approach has its disadvantages.

1. Architectural documents can be out of date and incomplete

As well as being partially completed or just too old to be useful, sometimes documents don't exist at all. They may also be unrelated to the reality of a sprawling architecture that's grown over decades.

2. Interviewing developers can be subjective and misleading

It's rare that a single person knows everything about a homegrown landscape. If all this knowledge did reside with one person, it would highlight a critical vulnerability within the wider team.

Most of the time, the original system designer has long since left the company. Information then further fragments with natural churn, as it is passed from person to person over a matter of years. This leaves an incomplete pool of knowledge dispersed across multiple people.

To further complicate matters, people's subjective testimonies can routinely turn out to be misleading.

3. Using tools to review code quality is fraught with scalability and context challenges

Manually reading an entire codebase is unrealistically time-consuming, while taking samples will never tell the whole story.

To get around this, developers will use code quality tools to identify duplicated code, old code that's no longer used, or open-source code that's not being maintained. They can also pick up code style issues, potential defects and vulnerabilities, complexity metrics and structural relations.

However, while the use of code quality tools is scalable, the time and effort required to scan hundreds of thousands – or millions – of lines of code remains excessive.

Also, tools are pre-set. This not only overwhelms users with floods of data warnings. It also forces the modernisation team to adapt their queries to what the tool was designed to retrieve. This might not always align with what they actually need to know.

Code quality tools also offer limited context on change over the course of a system's life and the impact on applications and code today. This lands the modernisation team with the almost impossible job of transforming data points into meaningful insights.

The costs of a traditional approach

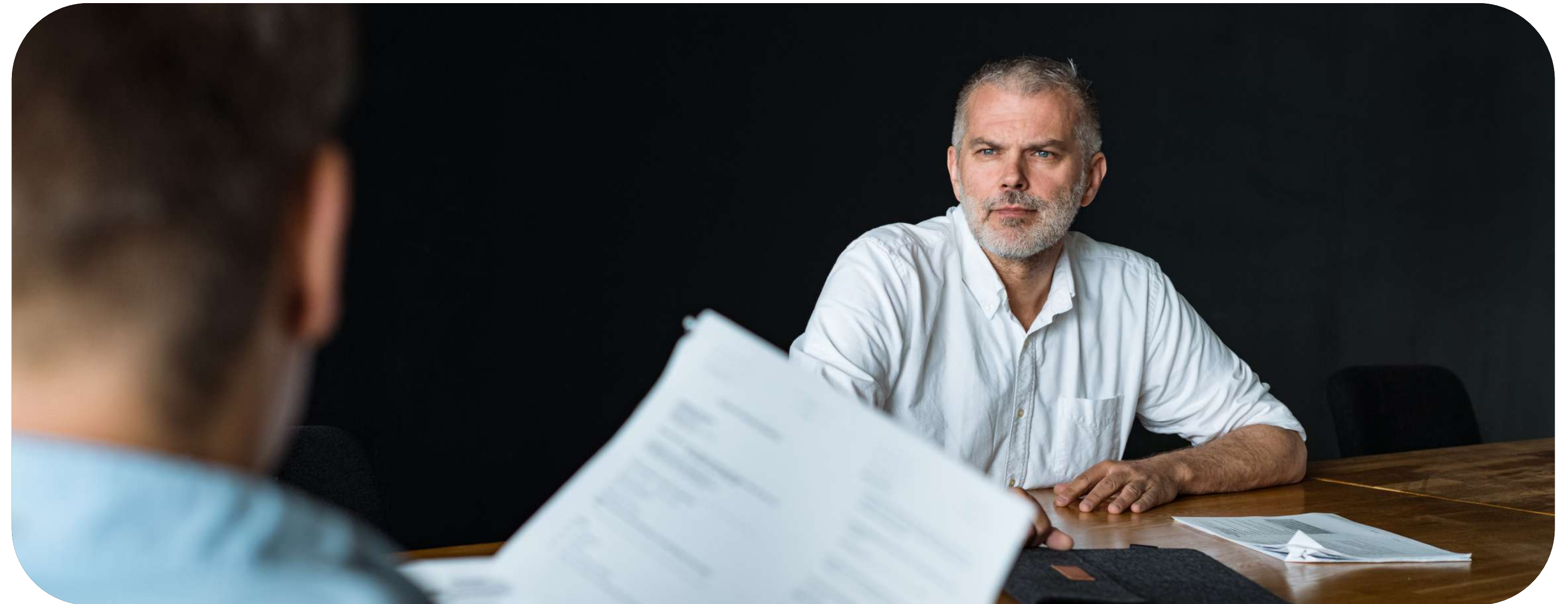
Thanks to these flaws, a software assessment performed in this way will not produce insights that reflect the full reality of the system. This incompleteness has costly consequences.

1. The code doesn't reveal all the risks

The source code does not act as a ledger of changes to the system over time. These might include the impacts of new features that have been added, of adjustments to existing ones, or of changes in the development team.

2. CTOs can't see the business impact

Most traditional software assessment approaches produce super-technical and fine-grained reports. These will be hard to understand for anyone looking to glean defined business impacts. This leaves decision-makers in the dark.



3. Inadequate information leads to poor decisions

Without the right information, executives are more likely to make decisions which might cost the organisation dearly. For example, leadership teams may invest in the wrong system, or implement the right application but realise they lack the skills to properly deploy and maintain it.



What can companies do to mitigate these risks?

A comprehensive consultancy for digital transformation

At Endava, we have devised our own, in-house approach to software assessment called Chronos: a fast, flexible and holistic service that goes beyond the traditional approach to uncover the complete truth about your IT landscape.

Radiography for your IT systems

Chronos is an adaptable, people-centred consultancy based on decades of experience, expertise, and domain knowledge. This comprehensive, customisable service can help any company uncover the risks, weaknesses and strengths present in large software systems.

The best analogy for how Chronos works is radiography – an imaging technique that uses X-rays or gamma rays to provide a holistic internal view of an object – because it reveals the entire truth about your system.

Fast insights based on accurate data for actionable recommendations

Chronos adopts multiple perspectives. While we review all the available data in code monitoring and interview developers, that's only the beginning.

Our experts review the detailed history of your teams over the long term, sometimes integrating additional data into the model, such as the grouping of developers per teams.

We use off-the-shelf tools for monitoring code quality and adapt them to your landscape, where necessary, or develop entirely new ones specifically for your challenge.

Additionally, we analyse data from three sources: the code, source control systems and issue tracking systems like JIRA. This analysis is based on the code and meta-data like code history and requirements.

As a result, the service delivers fast insights based on accurate data to provide actionable recommendations.



Comprehensive, adaptable, fast and accurate

- **Comprehensive**

By assessing code, processes and people, Chronos discovers risks related to the quality of the design and implementation of your systems as well as those associated with the way your organisation works. These operational risks can include unusual commit patterns, high team churn, insufficient knowledge distribution and long ramp-up of new developers.

- **Adaptable to your project**

While offering a set of standard analyses, Chronos easily accommodates project-specific adaptations. We don't try to shape your problem to our approach we adapt our tools and methodologies to address your specific challenges.

- **Fast and efficient insights – one day versus several weeks**

We can usually provide a first impression about a system much quicker than traditional approaches by working incrementally. Quite often, we can verbally discuss some initial observations very soon after we get the data. (We don't provide a report for this.)

This can even happen on the first day, particularly if there's time pressure. Such insights might take several weeks in a more traditional mode of software assessment.

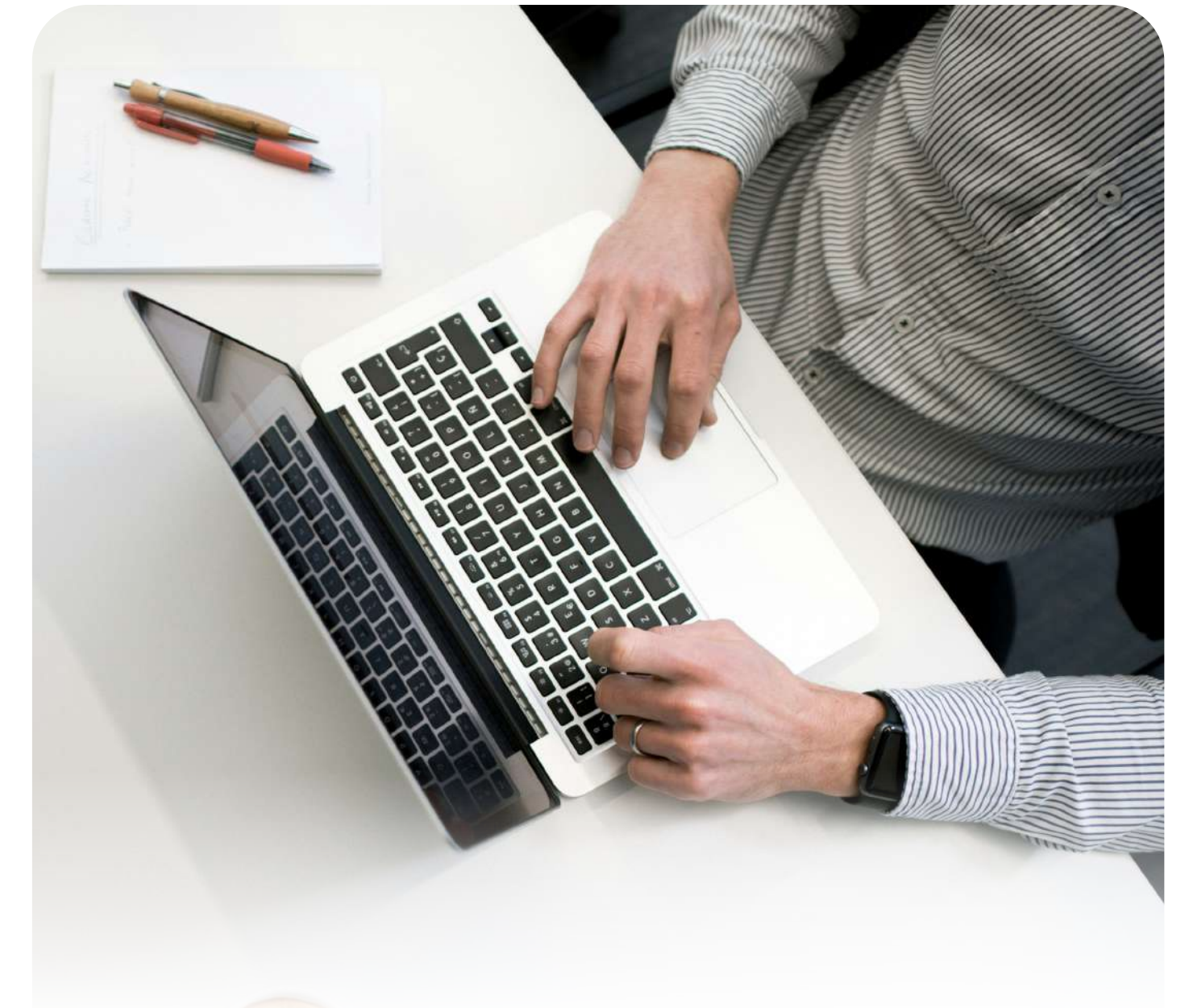
At the beginning of a due diligence process or architectural review, this degree of speed can shape the questions we need to ask developers, making the interview process more effective and efficient.

- **Reliable and accurate**

Chronos gathers facts, rather than conclusions inferred from possibly subjective, incomplete, or out-of-date information from document reviews, interviews, and code monitoring tools.

- **Actionable recommendations**

Chronos provides recommendations for improving the things that really matter. This includes ways to implement new features more efficiently and techniques to distribute developers evenly and improve knowledge balance on critical code areas.

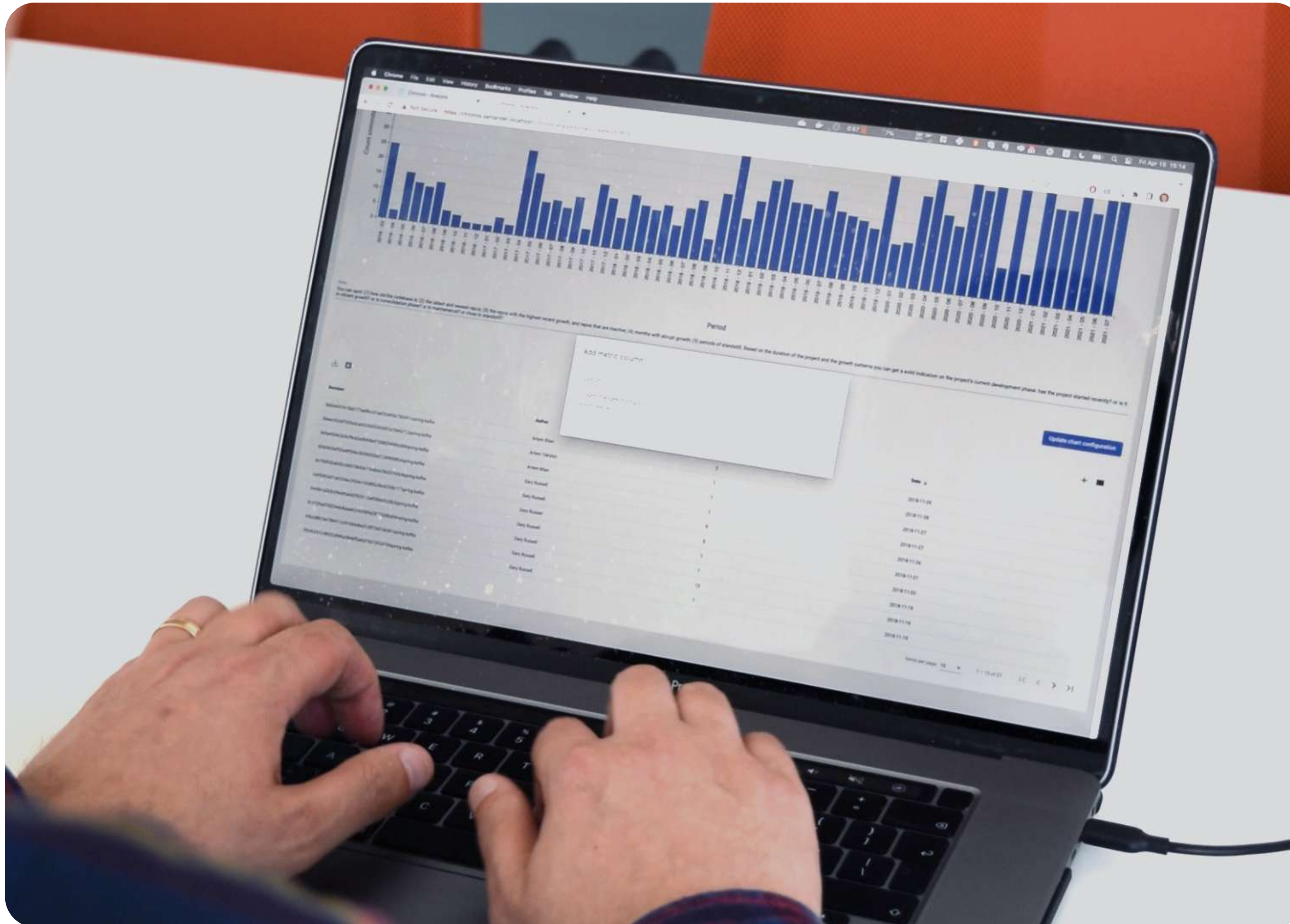


With this approach you can also prioritise code areas for refactoring to make them less error-prone and more maintainable. You can decide which areas would produce the highest benefit from improved automated testing. These could be the code areas that are most actively changed – which therefore attract the most bug-fixing changes – or areas where current developers have the least knowledge.



How Chronos empowers executives to make data-driven decisions

Chronos allows our team to uncover and prioritise the risks in your system, using complete, accurate data to advise the best course of action.



🔗 Revealing the whole truth about your IT environment

Chronos reduces the risk of software implementations and empowers executives to make data-driven decisions about the IT landscape. This saves your organisation from investing in a system you don't need – or are not ready for.

It also helps you achieve all these outcomes by revealing the truth about your unique landscape to give you a complete understanding of the reality of the code – no matter how large, how old, or how many additions have been made to it.

Here's how it works ↓

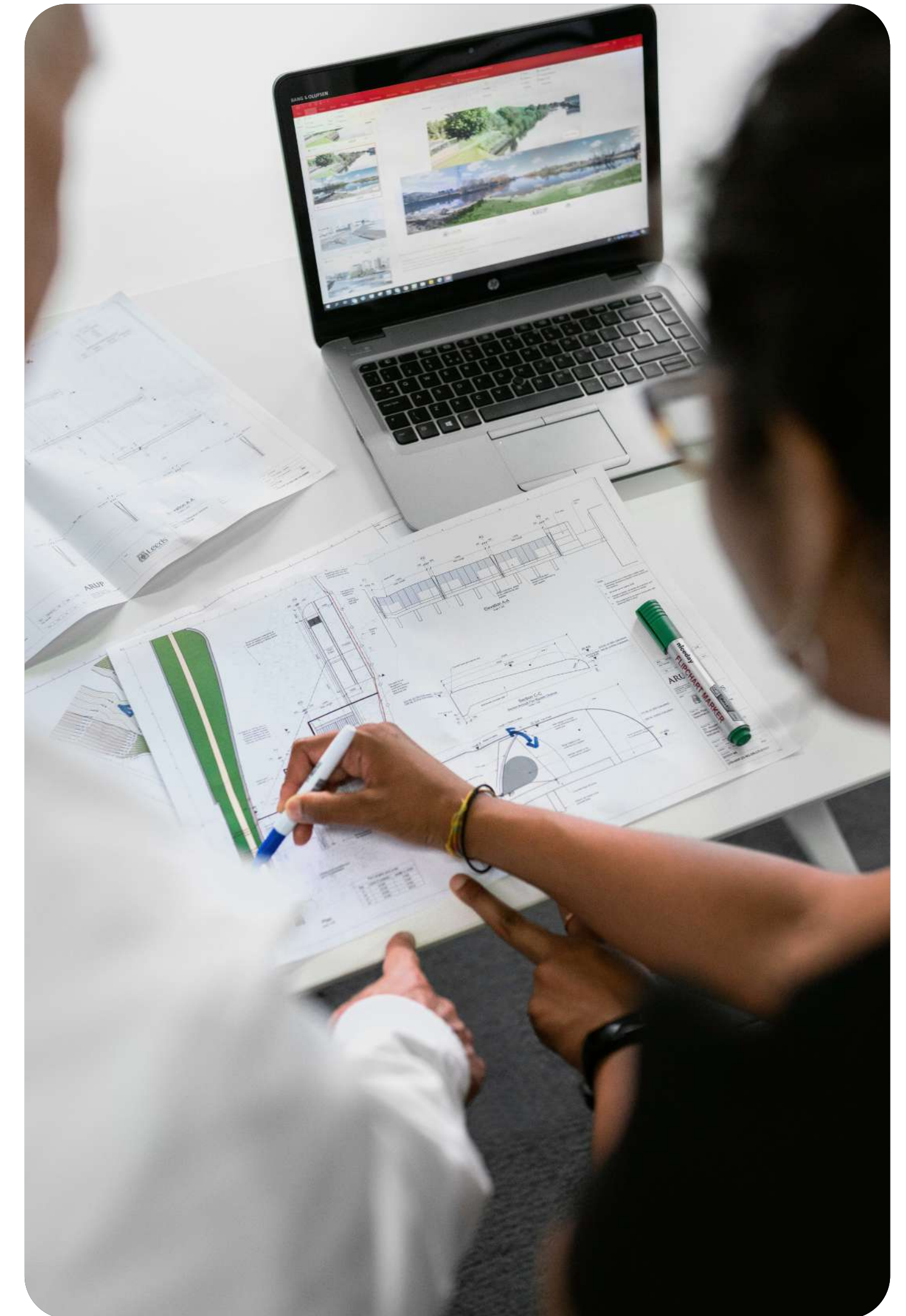
🔗 Recommendations based on the truth about your system

Our team presents a prioritised list of risks, including those not visible in the code. It also presents an assessment of what's working well. Our experts then make independent, business-focused recommendations based on holistic understanding of your unique situation in detail.

They may suggest replacing some apps you no longer need, or rewriting a few components. Our specialists might advise some testing to fix bugs and security vulnerabilities, or ask you to consider creating a schedule for maintaining dependencies from open-source code usage.

They could recommend further delaying your current modernisation project if there are other critical issues that need solving. Also, during a large modernisation programmes they can help with monitoring the progress and the quality of the work that is being delivered, to avoid replicating old mistakes or catch new ones early in the process.

Our team would only advise replacing your entire system in extreme situations. This is always the last resort due to the huge investment needed and the disruption it can cause. But if this is our recommendation, we will help you create a roadmap for transition. And this would always include suggestions for upgrading the team as well as the system to ensure knowledge share.



⌘ Chronos delivers what decision-makers need

Detailed insights

- Accurate knowledge about weak spots and their severity, plus prioritisation of what to tackle first.
- Comprehensive information about the team's knowledge
- Clarity on the causes of slow development

Business-focused reports

- A full explanation of the traits and risks in your systems at both the business and technical level.
- High-level, business-focused recommendations in a short, to-the point report, written in the language of the CTO.
- A comprehensive, in-depth technical analysis report.

Powerful business benefits

- Reduces the risk of software implementations
- Empowers executives to make data-driven decisions about your IT landscape
- Saves you from investing in a system you don't need, or are not ready for · Enables you to deploy systems that streamline operations and processes and adopt emerging technologies to meet rising CX expectations – this includes simplifying payment ecosystems
- Increases agility and resilience in response to rapid changes in the market



Endava's Chronos software assessment in numbers

106+

clients

150+

assessments
of varying type and scale

300+

systems with a wide array of technologies



Find out more

Get in touch with Endava to explore how our approach to software assessment can reduce the risk of implementations and help you make data-driven decisions about software modernisations.

[Contact us >](#)

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