



endava 

# How to Improve IT Modernisation Decisions in Aviation

Reduce risk, reveal the whole truth about your systems and make data-driven decisions with a modern approach to software assessment.

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Airlines are working to overcome geopolitical challenges and meet rising consumer expectations with legacy infrastructure.

This whitepaper explores how a new approach to software assessment can deliver fast insights based on accurate data to provide actionable recommendations for software modernisations.

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# Air travel – an industry in transformation

The immediate future of the airline industry is looking more positive, but legacy infrastructure is a barrier to progress and competitiveness in the face of rapidly unfolding global challenges and fast-emerging consumer trends.

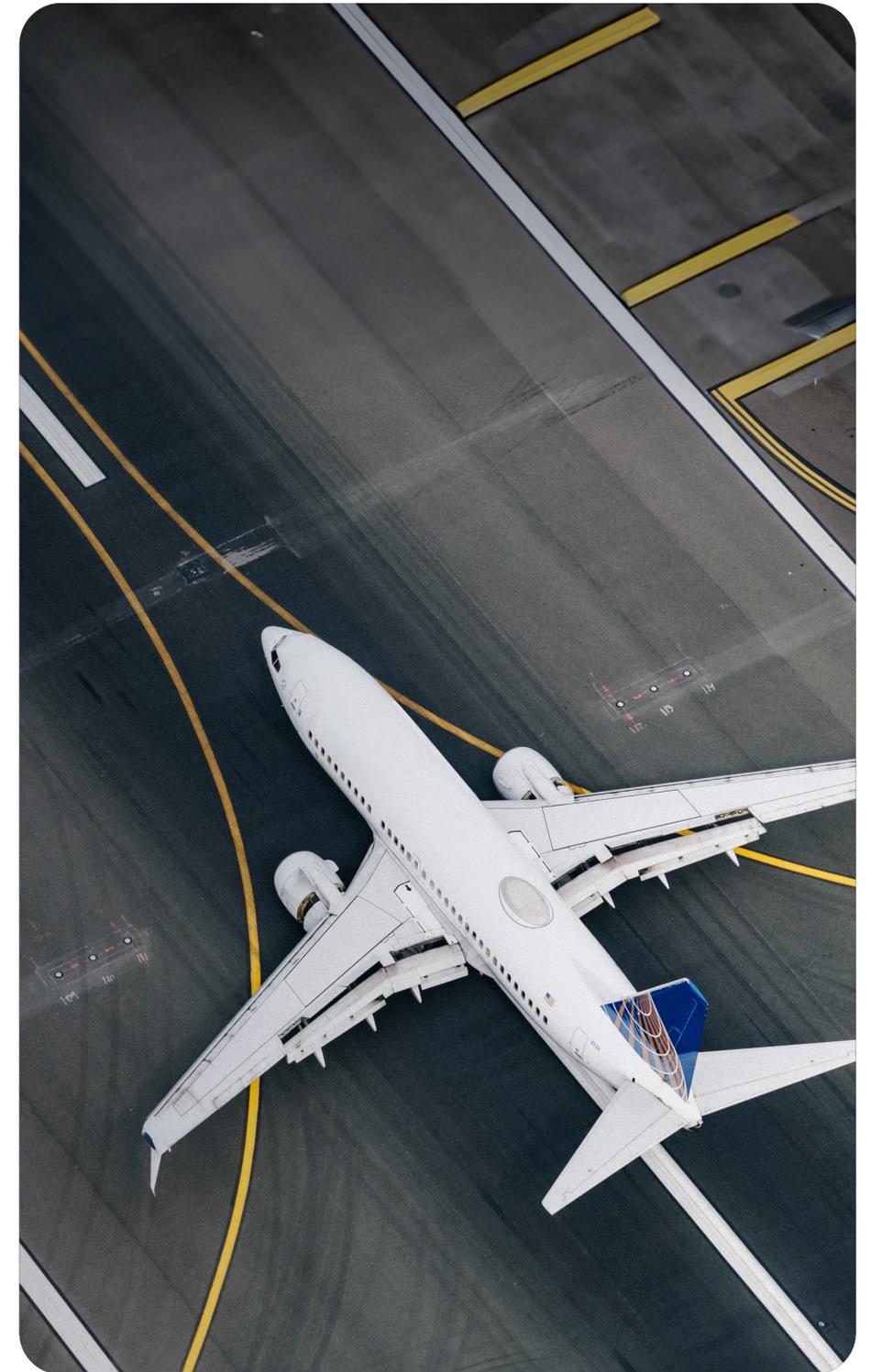
## → The four mega trends in the airline industry – and how airlines are reacting

Airlines have much to look forward to in 2023, according to the International Air Transport Association (IATA), which predicted **a return to profit** for the industry this year – the first time since 2019.

But this minuscule net profit margin (0.6%) shows there is much work to be done. And while passenger demand is expected to almost return to 2019 levels, many economic and geopolitical environment risks remain – from the threat of recessions in some countries to the possibility of increased infrastructure charges in support of sustainability efforts.

According to IATA's Director General, Willie Walsh, many airlines are still "struggling for a variety of reasons," including heavy regulation, high costs, inconsistent government policies and inefficient infrastructure.

Alongside these challenges are four major trends caused by rising customer expectations and new technologies.



## 1. Response to rising retail ambitions

Airlines are starting to sell to passengers more. It's being driven by the IATA with systems like [New Distribution Capability \(NDC\)](#) and [ONE Order](#), which are finally gaining traction in the industry and **allow airlines to offer products in more flexible ways.**

## 2. Meeting escalating customer expectations

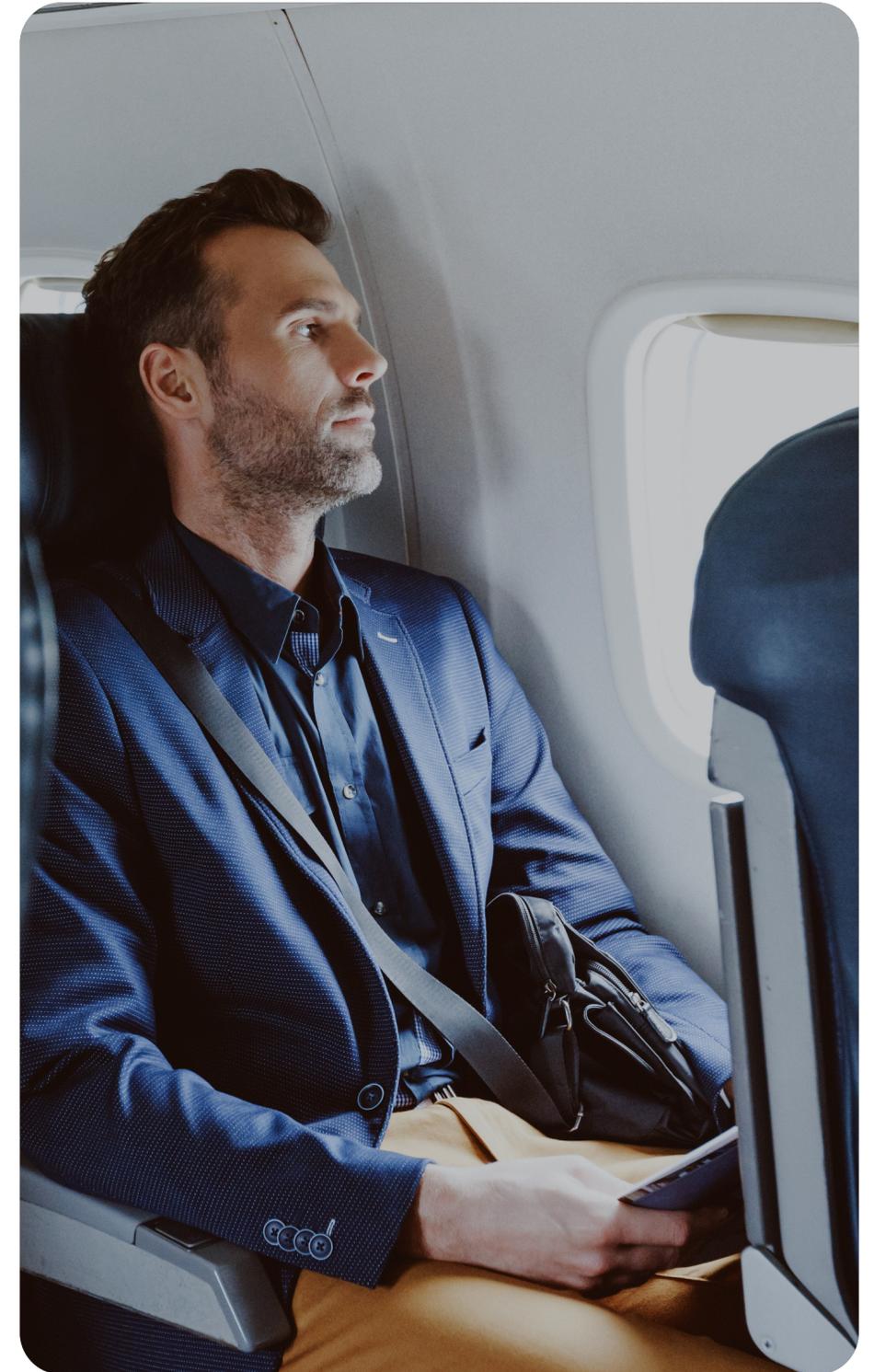
Airline companies are raising their customer experience (CX) game to match digital experiences provided by other service providers. For example, Berlin Brandenburg Airport [rebuilt its website](#) to improve the online customer journey [following a two-year consultation project](#) that resulted in enhanced user experience and user interface.

In an effort to follow suit, many airlines are looking to deliver personalisation alongside new products and services via seamless omnichannel interactions and customer-facing apps.

They're also implementing integrated, contactless digital technologies and introducing seamless check-in and boarding processes.

## 3. Harnessing AI and data management tools

Artificial intelligence (AI), machine learning (ML), and integrated data analytics present opportunities for airlines to streamline operations and processes, while improving customer service and CX.



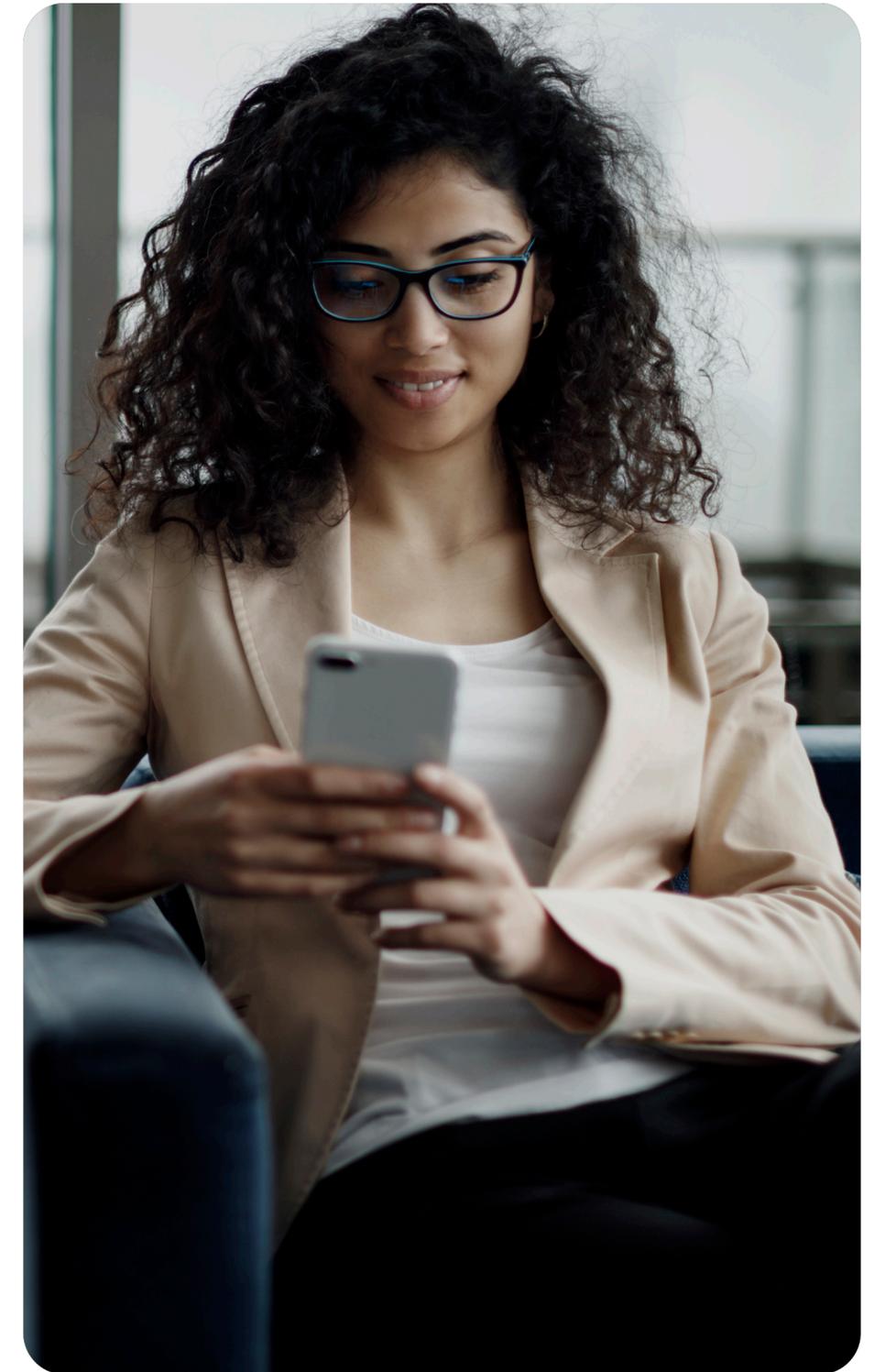


Once organisations have the capability to integrate data into experiences, they can continually uncover new insights to inform what matters most for each customer and build increasingly compelling interactions.

**Zivan Gvozdenovic**, SVP of Travel, Endava

#### 4. Overcoming the payment system barrier

Payment ecosystems are extremely costly to manage and many airline companies don't understand how individual solutions work, **so they are very often paying more than they should**. To meet consumer expectations, airlines need to offer more services to customers via a single transaction and provide relevant payment options in every country. **Achieving this means considering different payment models and simplifying their payment ecosystems.**



## ~5% of airlines' revenue was spent on IT before the pandemic (relatively low compared to other sectors).<sup>1</sup>

According to McKinsey, airlines could consider:

- Stepping up IT and automation investment
- Re-exploring relationships with IT and distribution providers
- Investing in CX, support services and analytics

## \$4.7 billion (0.6%) – the expected net profit margin for airlines in 2023; the first profit since 2019<sup>2</sup>

“We are in a new era of aviation – one that is about more than selling seats. In 2023, it’s all about finding new paths to becoming profitable and uniting the entire travel experience.”<sup>3</sup>

Zivan Gvozdenovic, SVP of Travel, Endava

<sup>1</sup> [Back to the future? Airline sector poised for change post COVID-19](#), McKinsey, 2021

<sup>2</sup> [Airlines Cut Losses in 2022; Return to Profit in 2023](#), International Air Transport Association (IATA), 2022

<sup>3</sup> [Experts predict the airline trends we’ll see in 2023](#), Airport Technology

<sup>4</sup> [Airline retailing: How payment innovation can improve the bottom line](#), McKinsey & Company, 2022.

**\$14 Billion**  
The potential value for airlines that strategically address payments:<sup>4</sup>

**\$8 Billion**  
Value from increasing sales of ancillary services, enhancing loyalty programs and giving customers more flexible exchange and refund processes.

**\$2 Billion**  
Potential from reducing payment costs, particularly for B2B or corporate sales.

**\$4 Billion**  
Through putting payment enablers in place to increase direct channel usage and improve payment conversion.

# Legacy technology is a barrier to transition

**If airlines can ride the momentum from these four trends, they can grow and build competitive advantage.** But inefficient and inflexible legacy systems are slowing their progress – and this type of infrastructure is prevalent across the industry.

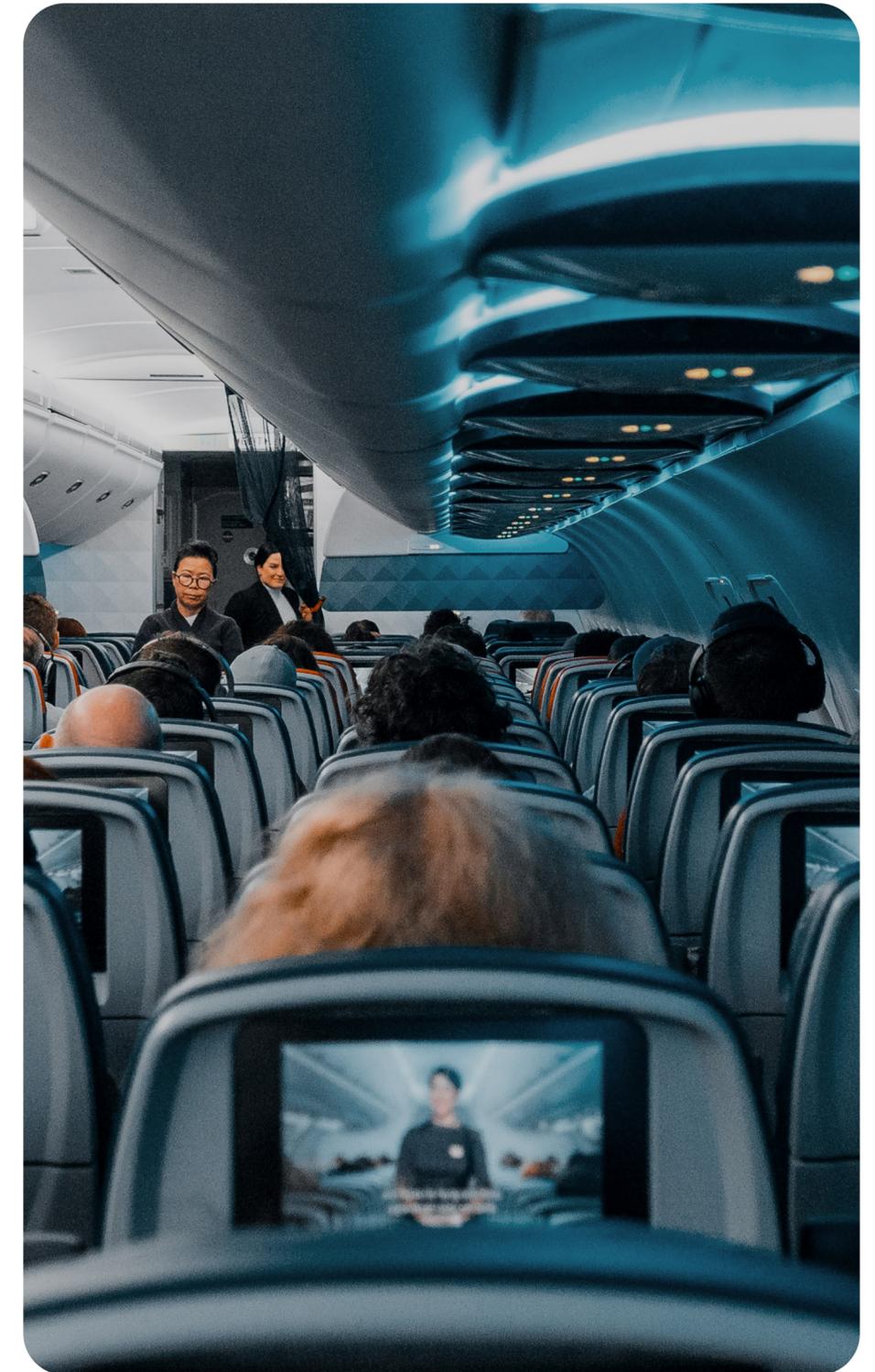
As more applications are bolted on to each system, so the complexity exponentially grows. With these homegrown, mission-critical systems built over decades, there is an obvious reluctance to change – the systems are complex, so making any change would be complicated, time-consuming and expensive.

As a result, many airlines are undergoing drawn-out, tactical digital transformations instead of replacing the entire system.

However, at some point, technology executives may want to step back and assess to unpick the complexity of the system. And when they do, they will need to conduct a full health check to build a committed modernisation strategy.

**The problem is most modernisation projects are based on best guesses,** regardless of if you're planning an upgrade or a replacement. If every airline's board knew how to conduct a complete review of the organisation's software – before executives made their next move – it could make a significant difference to their fortunes.

↓ **Let's explore how software assessment can help.**



# What is software assessment and how can it help?

Many airlines use a software assessment approach before investing in technologies to help them discover the truth about their system and inform their decisions around software upgrades, purchases and modernisation programmes.

## → When is software assessment needed?

There are several scenarios when an airline company will need objective insights about its systems.

### Switching vendors or restructuring applications

Airlines will want to conduct an audit when seeking to switch vendors as this will uncover the truth about the systems, which will help both companies. During an application portfolio restructure, perhaps when looking to reduce or merge related systems, airline companies will also need a detailed assessment of every solution in its landscape.

### Modernising homegrown legacy systems to adapt to change

Many airlines still run on inefficient infrastructure. The need to transform their systems is urgent – so they can streamline operations and processes, adopt emerging technologies to meet rising CX expectations, and enhance their agility and resilience in response to rapid change in the market.

Software assessment is fundamental to the success of every major transformation. When an airline is looking to future-proof its existing legacy systems it will need to evaluate the feasibility, cost, and amount of effort required.

Once the modernisation has started, the organisation will also need to carry out periodic health checks, particularly in relation to large codebases with several quality issues. The findings from the assessments will help business leaders and development teams monitor the project's progress to ensure it is moving in the right direction and at the right pace. This will not only help accelerate delivery but also reduce defect rates.

### Buying or selling companies

Finally, if an airline is looking to acquire another company or sell an existing entity – and software systems are part of the deal – the data from a comprehensive assessment will be essential to the sale



**In all these scenarios, airline companies need relevant, accurate, and far-reaching insights from the software assessment – and they need them fast.**

# The limitations of traditional software assessments

For decades, most airline companies have been using a traditional approach to software assessment, but the flaws in this method can have many negative and costly impacts.

## → 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 many drawbacks.

### 1. Architectural documents can be out of date and incomplete

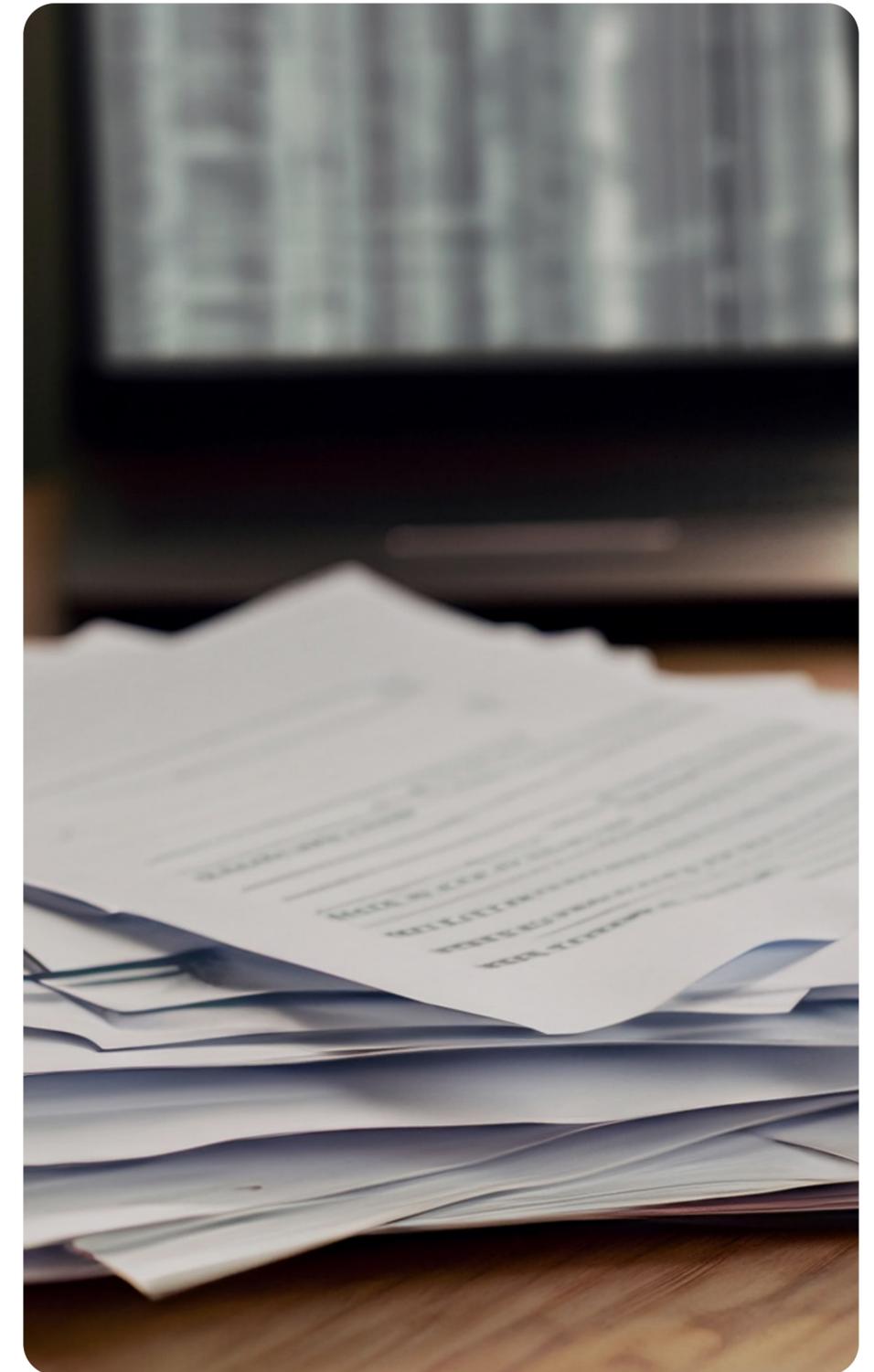
As well as being partially completed or just too old to be useful, sometimes documents don't exist at all. They may also be unrelated to the reality of a sprawling architecture that's grown over decades.

### 2. Interviewing developers can be subjective and misleading

It's rare that a single person knows everything about a homegrown landscape. (And if all this knowledge does reside with one person, it highlights a vulnerability within the wider team.)

The most common situation is that the original system designer has long since left the company, and information has been passed from person to person over the years, leading to fragmented knowledge across multiple people.

To further complicate matters, interviewing people is always subjective so it can be misleading.



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

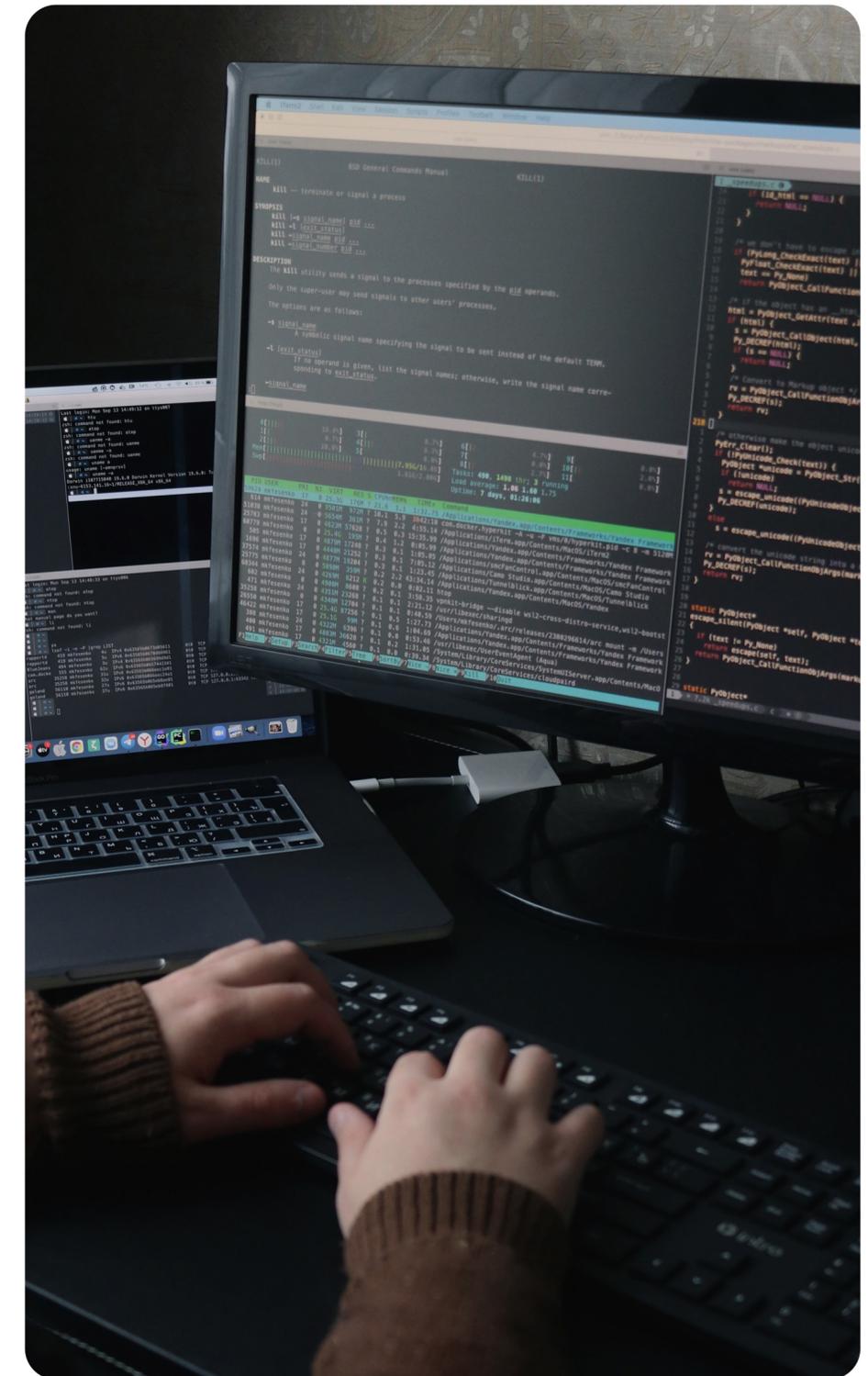
Manually reading code is time-consuming, making it unrealistic to read an entire codebase without extensive time and resources. So, it only enables samples to be taken, which don't tell the whole story.

To overcome this, developers 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, it still takes an excessive amount of time and effort to scan hundreds of thousands – or millions – of lines of code.

Also, tools are pre-set. This not only overwhelms users with myriads of data warnings, but it forces the modernisation team to adapt their questions to what the tool was designed to retrieve, making it harder to discover what they actually need to know.

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



## → The costly impact of the traditional approach:

The flaws of this approach to software assessment mean the insights do not reflect the complete reality of the system – which can be costly.

### The code doesn't reveal all the risks

Most risks are not visible directly in the code because source code is unaware of changes to the system over time. This includes the impact of adding new features (or adjusting existing ones) and changes in the development team.

### CTOs can't see the business impact

Most traditional software assessment approaches produce super-technical and fine-grained reports, which don't translate the insight into clearly defined business impacts, leaving decision-makers in the dark.

### This approach can be costly

As a result, executives are likely to make less informed decisions which can cost the organisation dearly. For example, leadership teams may invest in the wrong system, or implement the right application but realise they lack skills to properly deploy and maintain it.

**What can airlines do to mitigate the risks inherent in this traditional approach?**



# A comprehensive consultancy for airline transformation

Endava's approach to software assessment is 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 that's based on decades of experience, expertise, and domain knowledge with legacy aviation solutions.**

It's a comprehensive, customisable service that can help your airline uncover the risks and positive traits in your large software systems.

The best analogy for Chronos 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 any documentation, interview developers and monitor code, 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 functional or regional 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 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.

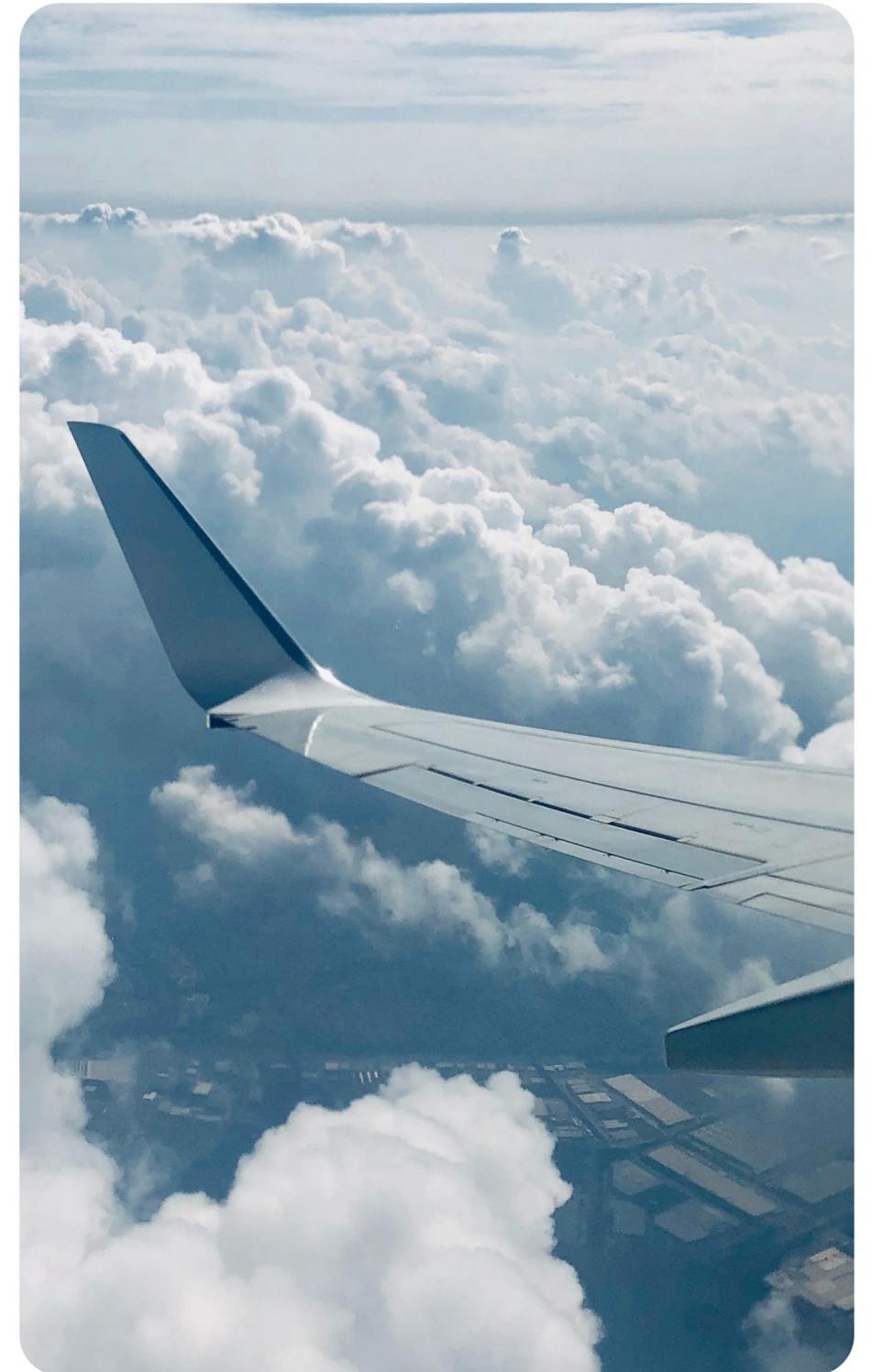
### Adaptable to your project

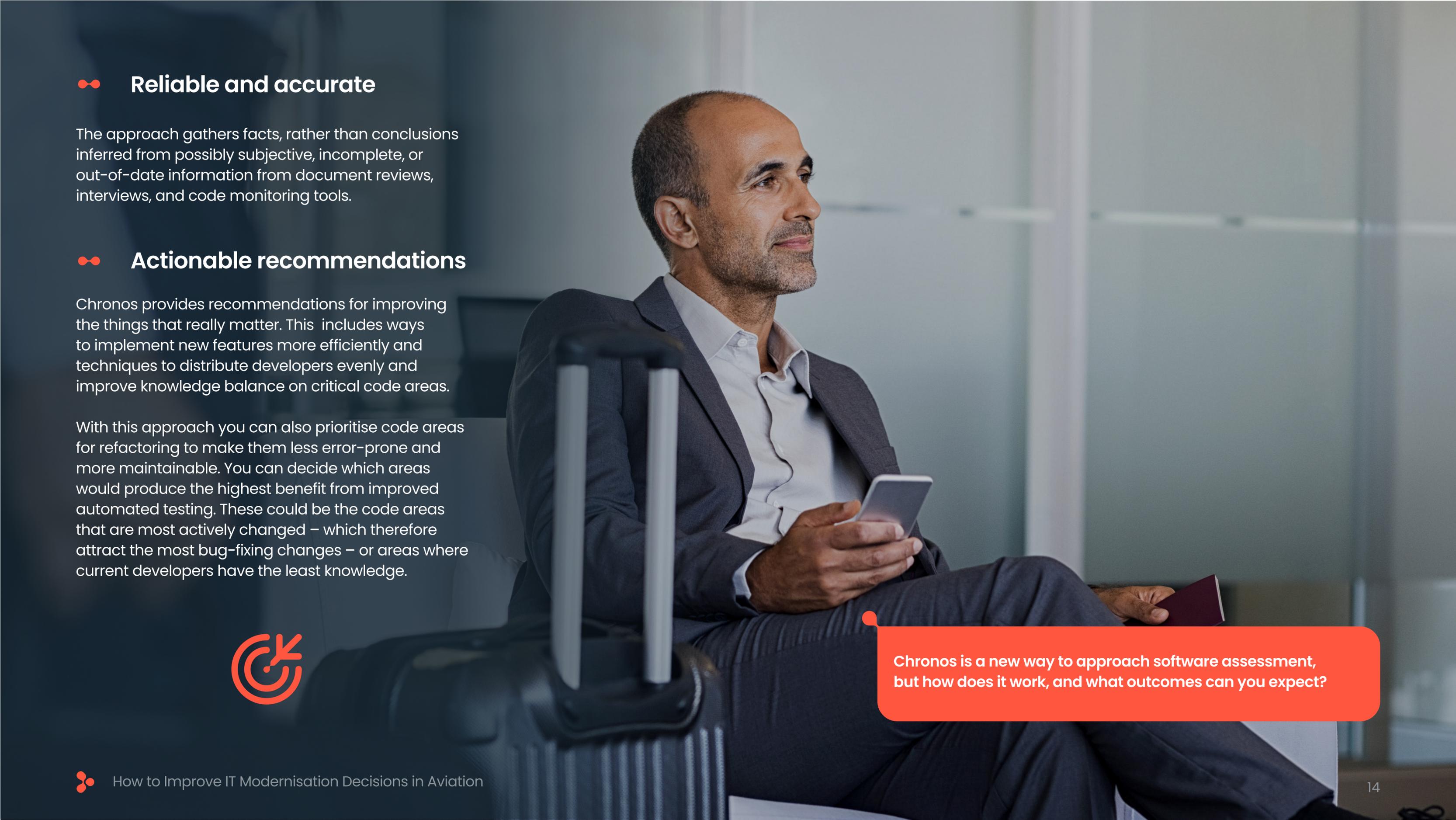
While offering a set of standard analyses, Chronos easily accommodates project-specific adaptations. We don't try to shape your problem to our approach, we adapt our tools and methodologies to address your specific challenges.

### 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 happen on the first day, particularly if there's time pressure.

These early insights can take several weeks with traditional processes. If done at the beginning of a due diligence process or architectural review, this speed can shape the questions we need to ask developers, making the interview process more effective and efficient. the beginning of a due diligence process or architectural review, this speed can shape the questions we need to ask developers, making the interview process more effective and efficient.





## Reliable and accurate

The approach 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.



Chronos is a new way to approach software assessment, but how does it work, and what outcomes can you expect?

# Empowering executives to make data-driven decisions about software modernisation

Our team uncovers and prioritises the risks in your system and uses complete, accurate data to advise the best course of action.

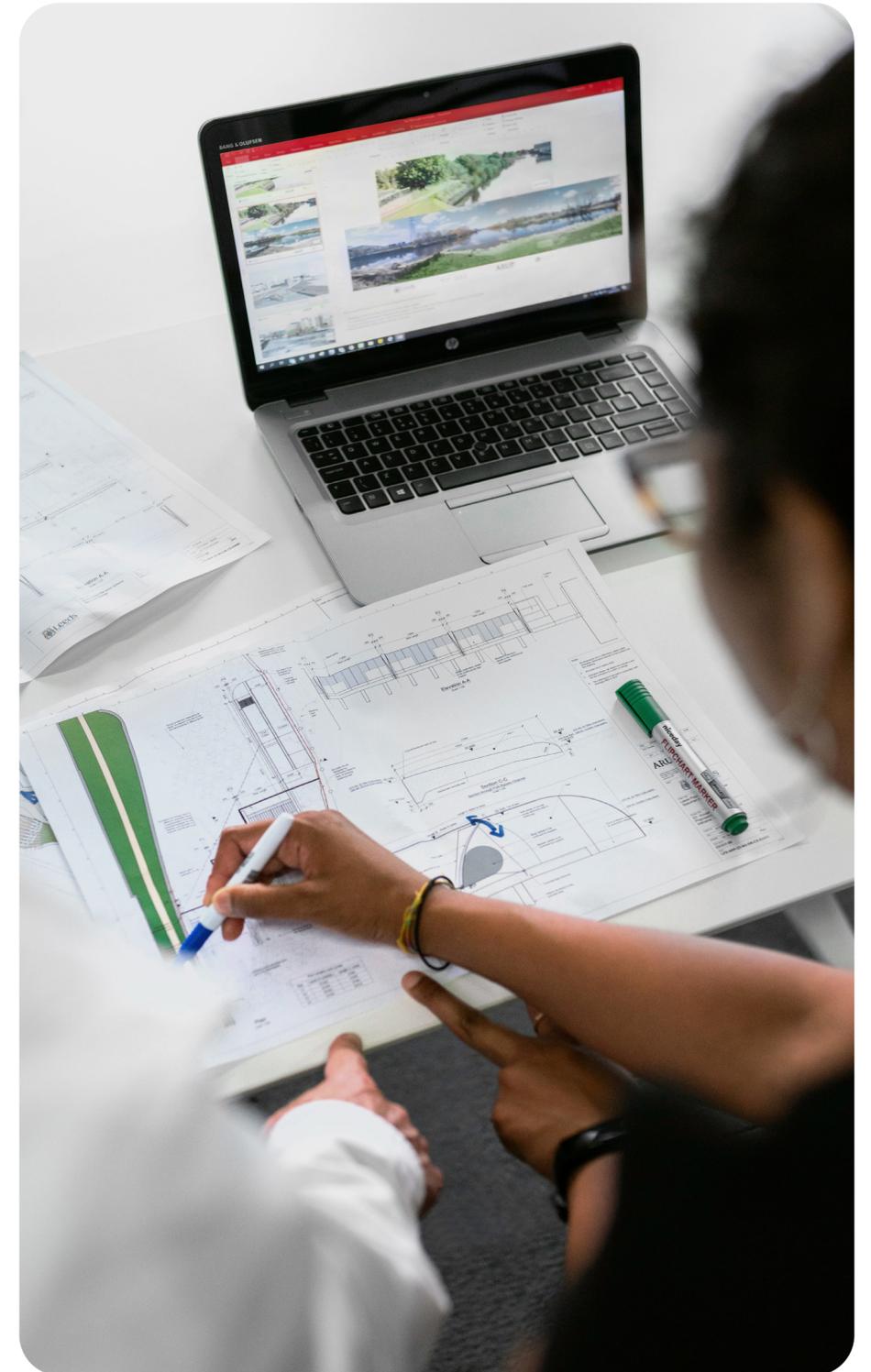
## → Revealing the whole truth about your IT environment

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 enables you to deploy systems that streamline operations and adopt emerging technologies to meet rising CX expectations, increasing your agility and resilience in the face of rapid change in the market.

**Chronos 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.

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 all airlines 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 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 the Endava Travel team to explore how our approach to software assessment can reduce the risk of implementations and help you make data-driven decisions about software modernisations.



[Get in touch with us!](#)



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