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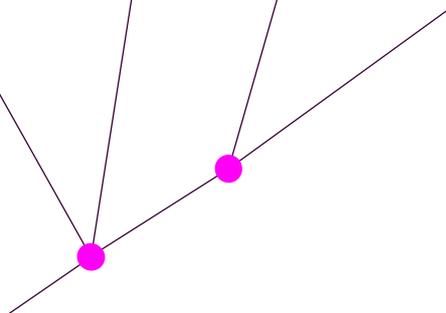
A Complete Guide
to Data Integrations

Introduction

Data is now the most critical asset for every organisation

Use data effectively, and it can transform everything you do.

> **According to McKinsey research, companies that are truly data driven make better decisions, and as a result:**
>
> - **Generate 93% more profit**
> - **Have 82% higher sales**
> - **Grow sales 112% faster**

The gap between those organisations making best use of their data and those that don't will only grow.

In this guide, we explain key data integration topics and look at what it takes to build data integration into business strategy and culture, so you can plan your next steps.

Whether you're ready to step up data integration efforts in your organisation or simply curious about what you could achieve, read on.

The data challenge

For data to make a difference, organisations must work out how to best collect, organise, analyse and use that data. As you've probably found, that's a challenge. And there's plenty of evidence to show there are widespread problems around putting data to work.

Typically, only 45% of structured data is actively used for business intelligence, with less than 1% of unstructured data used at all. 55% of organisational data isn't accessible for making decisions. The efforts that do take place are often astonishingly inefficient. 80% of data analysts' time is spent cleaning, collecting and organising data, for example. Only 9% of their time is spent on mining the data for patterns.

To change this means addressing both technical capabilities and business processes. Simply increasing IT staff and investing in ever-newer software isn't the answer (even with an infinitely expandable budget).

What could your data be doing for you?

Used to its full potential, your data could be helping you boost revenue, cut costs, reduce risk and create business opportunities. Some examples:

Boost revenue

- Improve customer experiences
- Increase cross- and up-selling
- Manage pricing and promotions
- Increase customer retention

Cut costs

- Improve processes and productivity
- Implement predictive maintenance
- Optimise supply chains
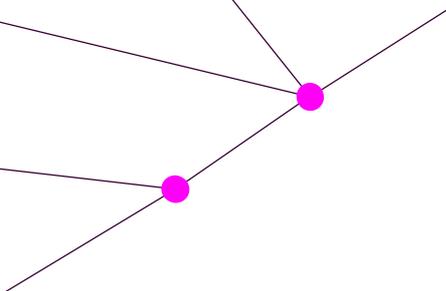- Get better procurement deals

Create new business opportunities

- Expand capabilities
- Develop new products and services
- Launch new businesses
- Find new markets

Reduce risk

- Improve regulatory compliance
- Reduce operational risks
- Reduce financial risks
- Prevent fraud

That's the promise.
How do you turn it into reality?

Data integration as a business strategy

To be successful at scale means adopting the concept of data integration as a business strategy, putting data and its value at the heart of the way the organisation works.
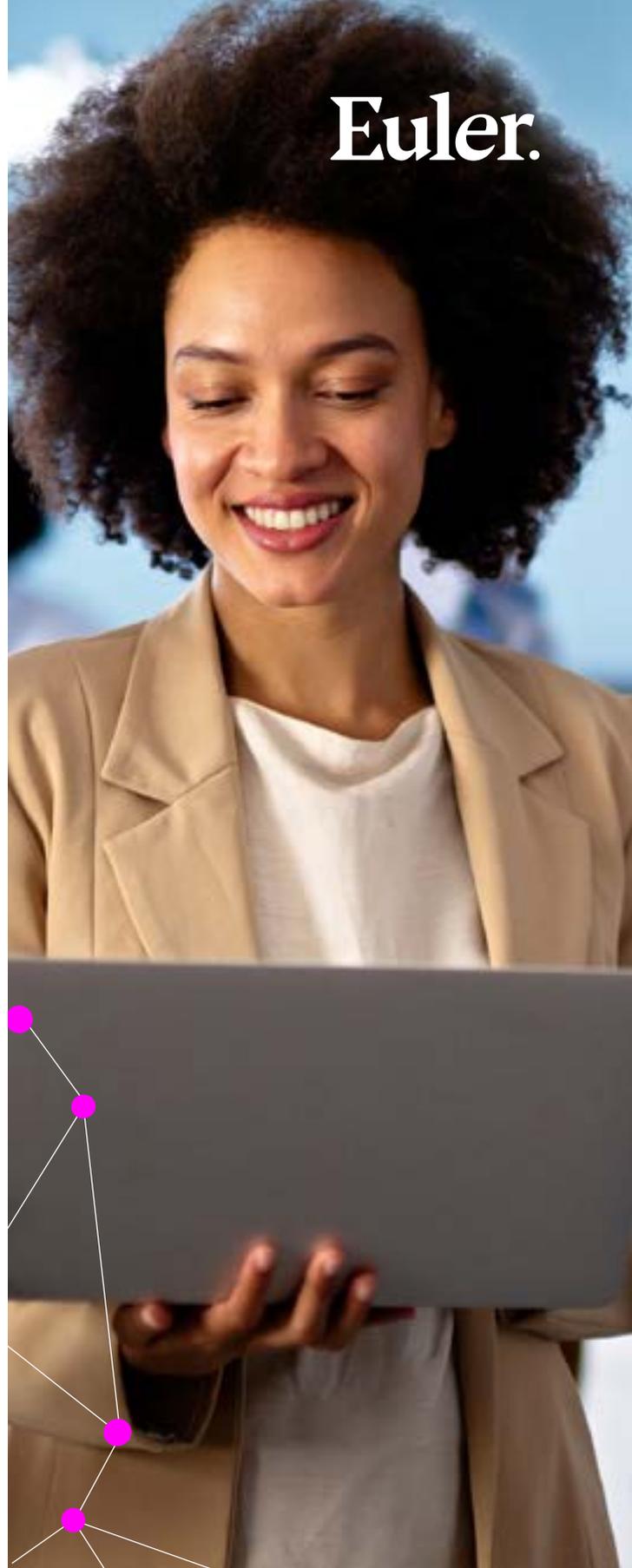
That's because effective data integration is much more than a technical process; a route to get data where it needs to go and accessible to those who need it.

It's a combination of technical and business processes and business culture, which together make it possible to manage the 4Vs of big data – and so turn data points into actionable insights:
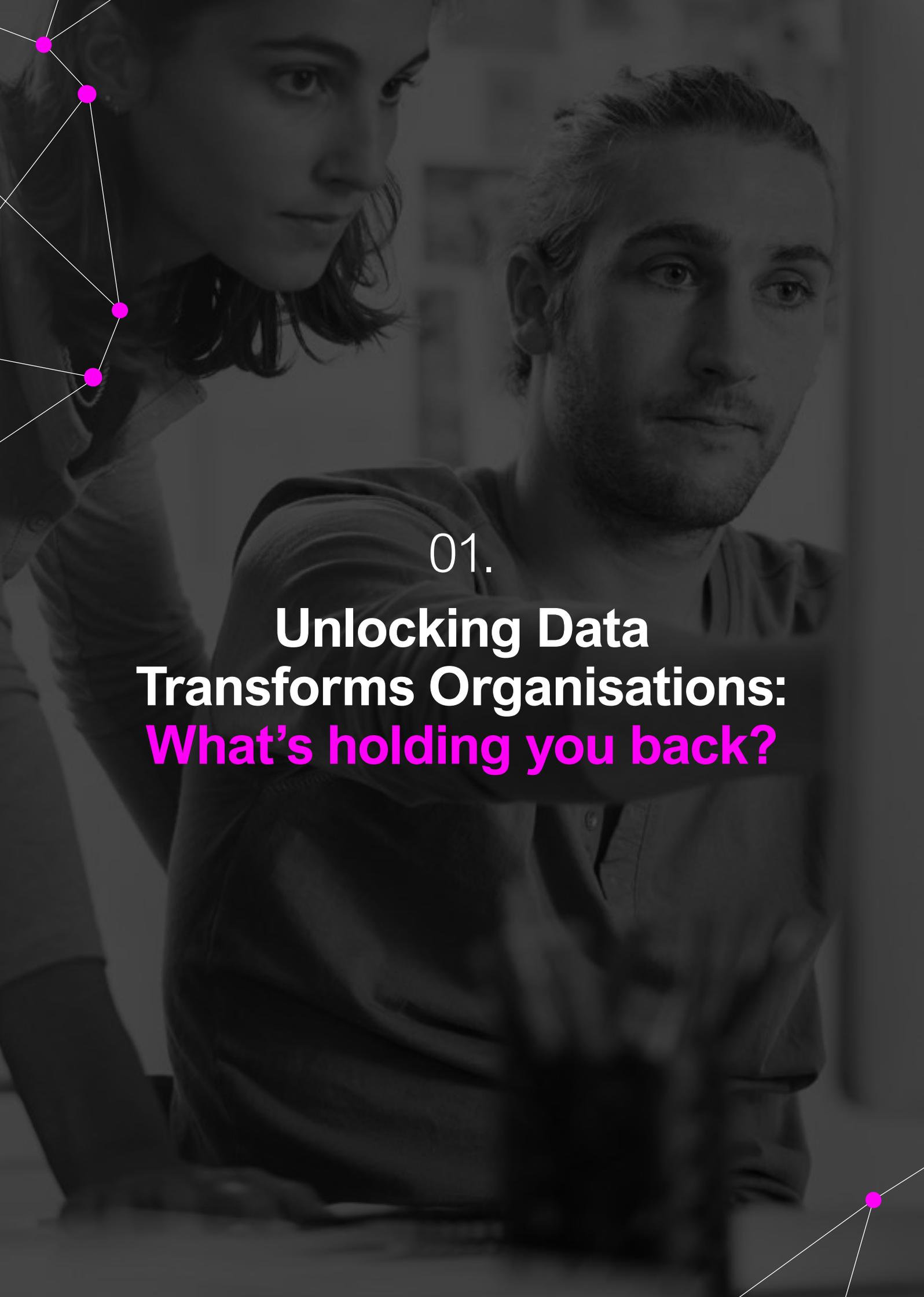
1. Volume
2. Velocity
3. Veracity
4. Variety

To be successful at scale means adopting the concept of data integration as a business strategy

Contents

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01.

Unlocking Data Transforms Organisations:
What's holding you back?

Organisations are collecting more data than ever before. And you know your organisation's data could be transformational.

You just need to unlock it and put it to use. So what's holding you back?

Common obstacles to unlocking data value

In our experience, there are nine key obstacles to unlocking value from data:

Flat budgets, legacy traps

The shopping list is going up but IT budgets aren't. So you're stuck in the legacy trap. You spend most of what you do have keeping current systems going, spending any surplus on upgrades or new proprietary replacements for specific applications – and creating new legacy traps. Is there an alternative approach that gives flexibility for the future and will not demand huge capital investment?

Data overload

New data is landing into your systems at an ever-increasing rate and from an ever-widening range of sources, including perhaps more recent additions such as social media and the Internet of Things (IoT). It's no longer possible for humans to deal with either the volume or the complexity of data. Somehow, you need to bring in automation.

Disjointed data silos

Teams want to keep using their preferred systems for operations, so how do you allow people without the particular system to see, manipulate and query system data? When each application and data source has its own way to format and represent data, how do you connect pieces of data together in new and meaningful ways?

Too much choice

With so many products and tools available, which do you choose? Do you want specialist tools, or a more multi-function approach? What impact will emerging technologies and the ever-evolving supplier landscape have on your decisions?

The scale of the task

When you look at the situation organisation-wide, it's scary. It's just not possible to do everything at once. You're wondering where to start, how you can implement changes incrementally and scale up in a way that makes both financial and business sense.

Skill shortages

New ways of working with data require new knowledge, skills and understanding. That could involve designing new job roles to cover activities you don't yet fully understand, recruiting new team members and training existing ones, and bringing in specialist support for scoping and/or design and implementation.

Others don't see the value

Colleagues can't see a direct connection between sorting out data and business success. Because they don't see the value, there's no strategic imperative for change. And you can't get the resources you need.

Privacy and security concerns

As soon as you start to play with data, new privacy and security concerns arise. Is it possible to make relevant data available on demand to those who need it without introducing time-consuming ad hoc authorisation processes?

So where do you go from here?

These are all very real and valid concerns. But with a strategic and rounded approach to data integration, you can overcome them and free your data to realise its potential.

02.

Data integration:
What is it, and why does it matter?

The basic concept of data integration is straightforward: it's simply the process of pulling data together from multiple sources, restructuring the data into compatible formats, and presenting it as a unified view.

The transformed data is then available to both business systems and business users across the organisation.

The data explosion

Data integration has become an increasingly pressing issue for organisations because of the explosion of data over recent years. Thanks to cheap computing and data storage combined with a continuing rise in the number of data sources, it's no longer just the largest enterprises that find themselves looking at big data challenges and opportunities.

How data integration helps

Data integration allows you to put your data to work for the organisation and use it to generate a continuing competitive advantage.

With data integration, you can:

Turn big data into smart data

Data integration is what makes it possible to turn big data into smart data. Where you have large volumes of data sprawling across multiple systems in multiple formats, neither human brains or artificial intelligence tools can make the connections needed for effective analysis and insight.

With data integration, you can (for example) merge internal and external data, combine spatial, tabular, graphic, and web data, and apply spatial information to non-spatial data. Once your data is integrated, you can then manipulate it for multiple purposes and apply analytical approaches successfully.

Importantly, today's integration tools handle both structured data (where data fits neatly into database fields) and unstructured data, such as social media posts, customer feedback, photos, call centre recordings, and email text. By integrating structured and unstructured data, you can derive meaning and value from data that was previously impenetrable.

Become more agile

Organisations that can't react quickly to changing conditions get left behind. Data integration gives you the tools to make rapid decisions based on real-time data, so you can adapt both operational tactics and strategic approaches and stay ahead of the game.

Improve collaboration

By integrating data, you can make data from across the organisation available for both shared and individual projects. Teams can still use their preferred systems, but others can then use that data from the central location without needing to access or know how to use the origin system.

Streamline processes and workflows

By automatically reformatting and synchronising data in real time, integrations open up new ways of working. Multiple systems can share data and talk to each other, allowing you to automate and streamline processes and workflows across the business.

Apply real-time data to operations and services

Not only can you run reports using up-to-the minute information whenever needed, you can also use incoming data streams to deliver live data and services back to customers, teams, machinery and suppliers in real time.

Save research time, improve results

To get complete data manually takes time, and is only possible when the person searching is aware of all the potential sources of information. At the same time, manual copying and reformatting inevitably introduces human error. Automate data integration, and you cut out the manual collection time and human error and avoid the risk of drawing false conclusions based on incomplete information. You als o then free up time for exploring the information more fully and generating insights.

Increase data quality

Data integration platforms typically include elements to review and resolve quality issues. In addition, as data is integrated into a centralised system, it's easier to identify and resolve quality issues.

As a result, data becomes more accurate and so more valuable.

Machine learning built into data integration processes speeds up these improvements.

Data integration automation

Data integration can be done manually, but automation is becoming an essential tool. As data volume increases and data sources and streams become more complex, integration tools automate processes, workflows, and pipelines, generating code and streamlining data journeys.

As automation platforms have evolved, the support they offer has widened. The best of today's tools allow you to automate the complete data life cycle: collect, govern, transform and share.
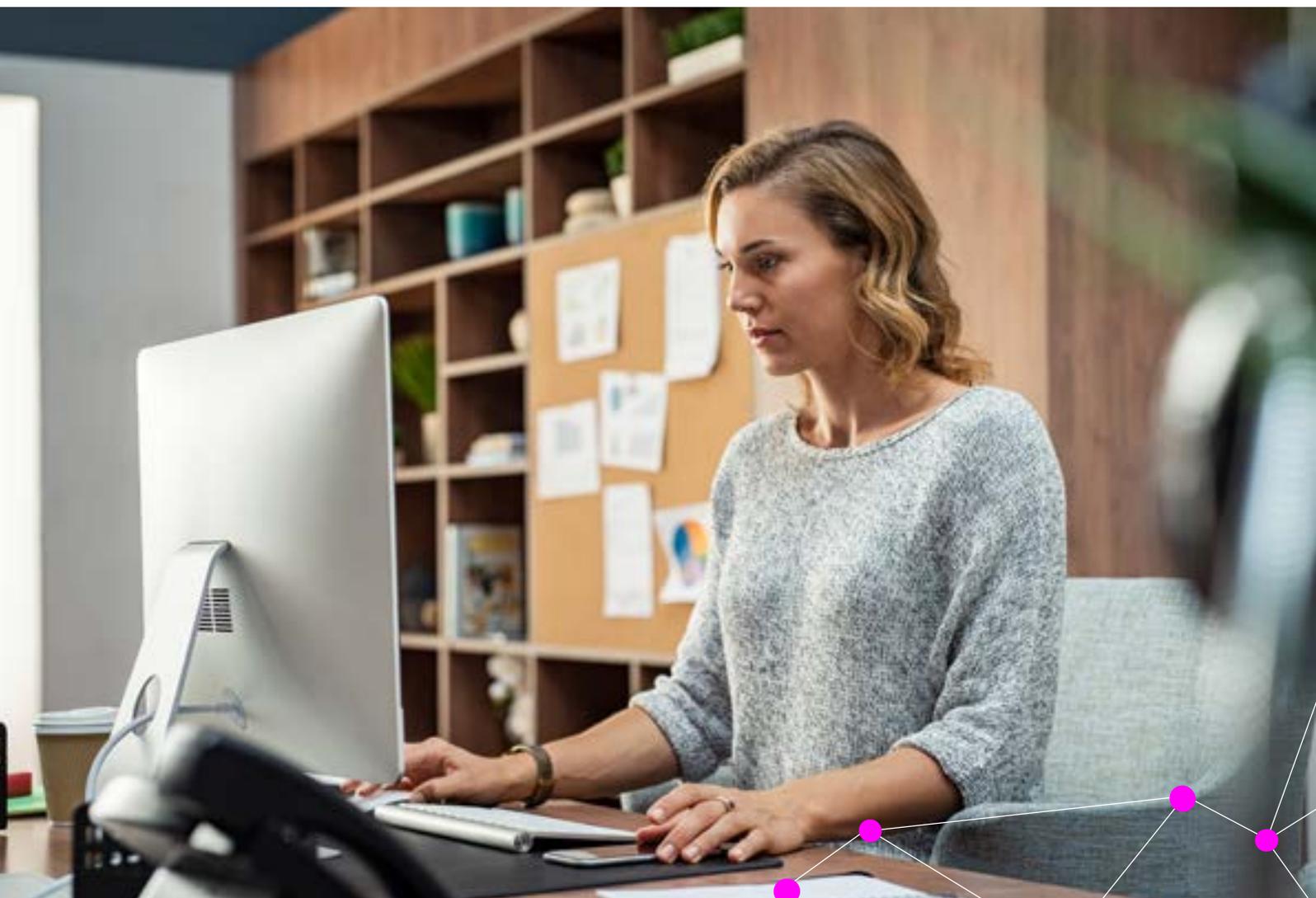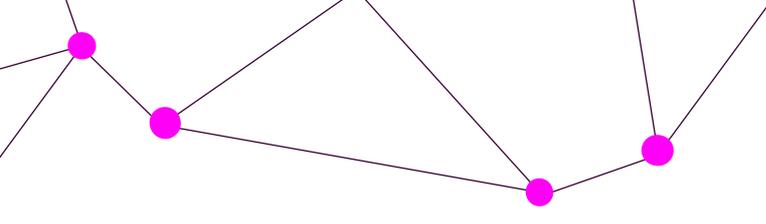
Data integration terms and techniques

There's a wide range of data integration techniques. Data can be consolidated physically, or processed virtually. What's best depends on the size of the business, the need, and resources available.

Key terms and techniques include:

Data transformation

When used in talking about data integration, the word 'transformation' can refer to any changes made to the data between the source and the target – for example, cleaning, merging, or standardising.

Manual (bespoke) data integration

The term manual data integration refers to non-automated methods of data integration – usually using hand-coding to write code to collect, connect and clean data. It's sometimes called bespoke or custom integration, because it is used for specific integration projects. Manual data integration typically involves identifying specific data points that need to be connected for a particular purpose (point-to-point integration). It's most appropriate when you want to merge data for basic analysis between a small number of data sources. You can read more about manual versus automated integration in chapter 3.

Middleware data integration

Middleware data integration uses separate software as a mediator to standardise data and bring it into a master data pool for applications to draw from. It's ideal for integrating legacy systems with newer ones, when the two systems can't talk directly to each other. Middleware can only work with certain systems, and is mainly a communications tool - it has limited capabilities for incorporating analytics.

Application based integration

Application based integration refers to the process of integrating live operational data in real time between applications. Each application takes data from the previous one in the workflow, does what it needs to do with it, and passes it on to the next. A common example is the data flow in an online purchase, which typically involves multiple applications to take the order from 'buy now' through to dispatch and delivery.

It's no longer just the largest enterprises that find themselves looking at big data challenges and opportunities.

By integrating structured and unstructured data, you can derive meaning and value from data that was previously impenetrable.

Uniform data access (virtual integration/data virtualisation)

With uniform data access you don't physically move data. Instead, you create a virtual unified front end. This means data in different formats looks uniform to the viewer, and but stays in the original source systems. The approach can give nearly zero latency: records are up to date in real time, and there's no need for a consolidated data store. But it's only possible with similar types of source system, can put extra load on the source systems, and gives limited historical information.

Common storage integration

Common data storage involves uploading and storing a copy of selected data, and processing this independently of the source system to display a uniform view to users. This gives good version management, allows you to combine data from multiple types of sources, and enables you to run sophisticated queries. Common storage integration is also known as 'data warehousing'.

Data warehouses and data lakes

The terms 'data lake' and 'data warehouse' describe two different approaches to creating an enterprise data store.

Data warehouses

Data warehouses store structured, filtered data that has already been processed and for which there is an identified need. This well-organised data is ideal for business users wanting to run queries and reports. It is of less interest to data scientists because decisions have already been made about the data before you can access it. This means you can't see the whole picture.

Data lakes

Data lakes store raw data that has not been processed and for which there may be no identified need. By their nature, data lakes can become data swamps without good governance measures. They can also be hard for non-specialists to access. But the raw data can contain huge value and is pure gold for data scientists, offering opportunities such as the ability to fix data at a series of time points to identify trends over time. Data lake data is also readily exploited by machine learning tools.

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The team at Euler has the knowledge and experience to transform any company across any sector by engaging with your business. They dedicate their time to help you reach your goals.

Euler always delivers the highest quality service in all aspects of work. From the service desk to the advice on data and business objectives, the entire team at Euler has helped the club progress significantly.

MICHAEL GITTINS, EVERTON FC

ETL and ELT (and ETLT)

ETL and ELT are the two contrasting approaches to integration used by integration tools. An ELTL approach lets you combine the best of both.

ETL – Extract, Transform, Load

ETL is the older process, but is still the best option in some scenarios. With ETL, data moves via a transformation server that handles the cleaning and restructuring of the data before loading it into the target database (often a data warehouse). Transformation servers are typically 'black box' proprietary systems.

ETL is typically used for batch processing of small to moderate amounts of structured data where the source and target database use different data types.

ELT – Extract, Load, Transform

If you need real time transformation, ELT is the only option. ELT removes the need for a transformation server by pushing transformation work into the target database; it can handle large volumes of data quickly, and can manage unstructured as well as structured data.

With no proprietary system, you have full visibility and can modify processes to suit. ELT is a sound option when the source and target database are the same type and when the database engine can cope with high volume transformation demands.

ETLT

Sometimes, you might want the best of both ELT and ETL approaches – and with modern tools, you can have just that. It is now possible, for example, to do simple transformations (such as adding timestamps) while the data is streaming, and to task the target database with handling more complex calculations once the data arrives.

Automate data integration, and you cut out the manual collection time and human error and avoid the risk of drawing false conclusions based on incomplete information. You also then free up time for exploring the information more fully and generating insights.
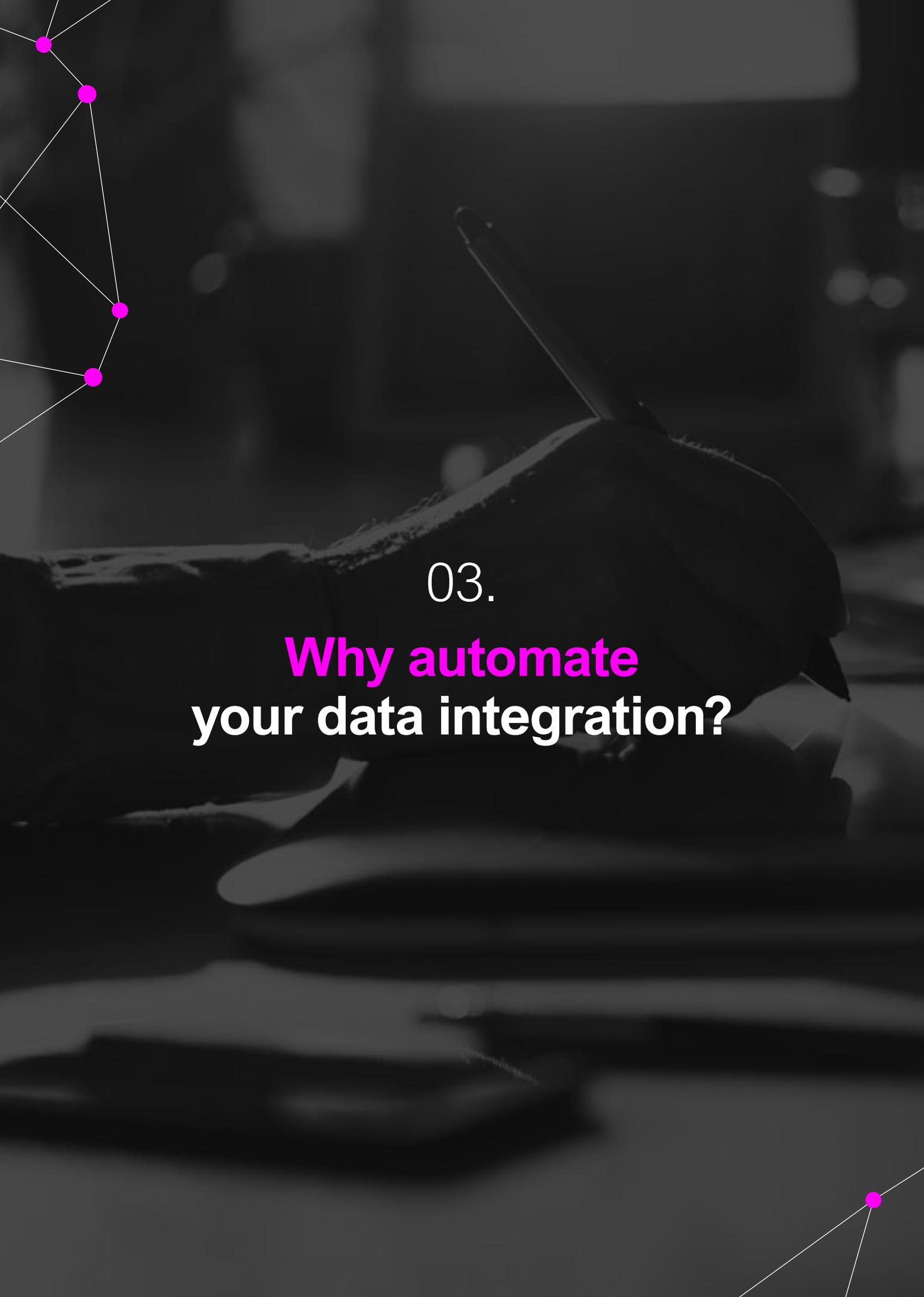
As data volume increases and data sources and streams become more complex, integration tools automate processes, workflows, and pipelines, generating code and streamlining data journeys.

03.

Why automate
your data integration?

Why invest in data integration tools, if you can do the work manually? In fact, it's common for organisations to use both automation and hand-coding for integration projects. What's most appropriate depends on the context of each particular project.

Issues to consider include:

The state of data

The value of any data integration initiative relies on the quality of the data you start with. So is your data a problem? Almost certainly. According to [Harvard Business Review research](#), when 75 managers were asked to review their departmental data, most were shocked by what they found: only 3% found the data met levels of quality they considered to be acceptable.

Quality problems include inaccuracy, incompleteness, inconsistency (e.g. date formats), duplication, poor validity (not conforming to standards set), and data being out-of-date.

Poor data can cause operational problems and inefficiencies. It can lead to poor decisions and flawed strategies. And in sectors where safety is a key consideration, the consequences of poor data can, of course, be extremely serious for customers, staff or even the wider public.

For all these reasons, it's therefore critical to be able to check and measure how clean data is before it gets to core systems, and to then follow agreed rules to deal with each type of issue. If you're handling data at scale, the only way to do this is through automated data integration processes.

IT team resources

Do you have developers with the relevant expertise to hand code whenever you need a new integration? If they need to learn new technologies, how long will it take them to get up to speed? Is building integrations the best use of valuable coder time, when people without coding expertise can use tools to do the job and get it done faster?

Wider staff resources and expertise

When developers hand code, what other resources are needed? Who will be manually cleaning and reformatting data? Can you rely on these people to deliver the complete and accurate data sets that a tool would provide? Who will be using the results of the integration? Think about the benefits of a consistent visual interface for business users, as offered by automated tools.

Reusability and scalability

If the project is a specific one-off job, manual coding gives you the flexibility to customise in detail. But if the integration is likely to be a recurring requirement, or you plan to expand the scope of the project, then it will be time-consuming to modify the code and maintain the relevant processes unless you use automation. If you want to redeploy code on a different technology platform, you'll need to redevelop manual code, whereas tools allow you to switch easily from one platform to another. Options to reuse development elements in automated tools avoid duplicated effort and lead to more efficient data flows.

Collaboration

Where multiple developers are working on a project, how easy is it for them to collaborate? A tool makes it easy to share code and design environments and documentation, as well as providing wizards and guidance.

Cost

The up-front costs of hand coding can sometimes be cheaper - but how long will the code be in use? Will you need to allow for ongoing costs to cover support and updates to accommodate new business needs or changes in data sources or targets?

And don't forget the cost of the people manually cleaning and reformatting the data. A tool-based approach simplifies maintenance and is likely to result in lower costs over the lifetime of the code.

Code knowledge

If the original developer leaves, who will know how any manual code works and how to update it to accommodate new business needs or changes in data sources or targets? Who will know how to fix the code when it breaks (it will)?

How consistent is the approach between one developer and another – will you need to allow for learning time when other developers get involved?

Governance and project management

Automated tools make it easier to manage data integration initiatives - you see exactly where data is coming from and what's happening to it. And built-in governance measures can help you put sound governance processes in place.

Using hand coding for complex integrations, on the other hand, can be clunky and lead to mistakes. On top of this, it's not unusual to find that what starts out as a simple SQL script evolves over time into pages and pages of undocumented, non-compliant scripts you struggle to repeat, audit, verify or validate.

3%
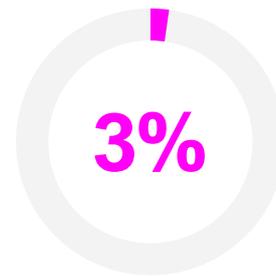
3% met acceptable level of data quality

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According to Harvard Business Review research, when 75 managers were asked to review their departmental data, most were shocked by what they found: only 3% found the data met levels of quality they considered to be acceptable.

Automated tools make it easier to manage data integration initiatives - you see exactly where data is coming from and what's happening to it.

In summary...

Custom coding can be a sensible option for simple tightly-targeted one-off projects that won't need much maintenance and in situations where there are no suitable tools.

But when you're looking for multiple repeatable processes you can rely on at scale, automation is likely to be the more sustainable choice.

Get in touch

Curious about our services? We'd love to talk.

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Website: **www.euler.net**

04.

Cloud data integration:
Open up new avenues to productivity and innovation

Cloud data integration options are allowing businesses of every size to discover, store, process and explore more data cheaply and efficiently. Though modern data integration platforms can run either on premises or in the cloud, more and more organisations are choosing cloud integration for their data.

What's so good about data integration in the cloud?

The benefits of cloud integration include:

Lower total cost of ownership

Cloud-based data transformation is pay as you use. There's no big up-front investment as there would be with an on-premise solution. Though costs are higher when large jobs are running, they drop right down when there's little being processed. Averaged over time, this results in far lower total cost of ownership than on-premise options.

Speed

Cloud-based data integration is fast. It delivers real time data and data-driven products such as reports and analyses rapidly and allows you to stream data-driven services with minimal lag.

Agility

When agility is key, cloud integration tends to win out. Typically, it speeds up development cycles by making it possible to incorporate new data sources and users quickly.

IT team time-savings

With the cloud provider handling capacity planning, optimisation, maintenance and upgrades, IT teams have more time for work that adds value.

Elastic capacity

With cloud integration, it's easy to handle peaks of demand that would otherwise take up considerable server capacity and potentially slow down business systems. Capacity scales up and down as needed, without IT staff having to spend time managing server resources.

Connecting everything and everyone, everywhere

It's common for businesses to use multiple cloud environments to store data and run services, and to run both on-premises software and software as a service (SaaS) application. By optimising cloud-to-cloud, on-premises and hybrid scenarios, data integration in the cloud provides a robust and reliable infrastructure for connecting data, applications and people regardless of type or location.

Shared resources and capabilities

By centralising integration resources and capabilities in the cloud, you make data management across the organisation more consistent and governable. At the same time, you increase developer collaboration and productivity.

Easy access to external cloud data sources

Using cloud integration makes it easy to bring in data from wider public and private cloud data sources. As you expand your use of data, the more data sources you can explore and the more opportunities you can find.

A platform for innovation

Cloud platforms are widely acknowledged as the ideal environment for bringing together innovative technologies. Data integration clouds are no different, offering the flexibility and capacity to deliver new ways of working.

Support for wider cloud migration

Data integration in the cloud helps organisations migrate other applications, data sets and user groups to cloud computing, supporting organisation-wide efficiencies and productivity gains.

Unified solutions that can run natively

Cloud integration solutions work alongside on-premise native ones, allowing developers to design unified solutions to run natively where this would give local performance or functionality advantages.

05.

How to build a data integration strategy that works for your business

Data integration strategies succeed best when they set out how to use data to serve customers and the organisation in a way that meets business goals. To do this means combining both business processes and technology, as well as introducing significant culture change.

When you create a business integration strategy, it's essential to:

Understand long term business goals

All too often, the people making the decisions about integration approaches don't have a good grasp of long-term business goals. If you're a decision-maker, make sure you understand where your organisation is heading and what the implications are for technology decisions. If you're not, then do whatever you can to make sure that the people who are making the decisions are up to speed.

Consider the full data life cycle

Data integration is only one element in the data life cycle. The closer you can bring all the elements together, the more streamlined your operations will be.

Think inside and outside the organisation

The world is awash with data – and it's yours for the taking. Explore what information could be useful to support business goals, wherever it might come from. Then build a strategy that joins the dots between external and internal data so you can spot the widest possible range of risks and opportunities.

External data can come from social media sources, mobile device use, business databases, publicly available web data streams and more. It can shine a light on everything from shifting demographics and competitor initiatives to the effects of weather and geopolitical changes on consumer behaviour.

Reviewing how companies are using external data, Deloitte cite a study that found faster growing companies were more likely to be planning to expand their ability to source external data than companies with lower growth rates.

Set priorities

You can't do everything at once – and not all integration activities will add value. With both time and money in limited supply, you'll need to set priorities, to map out exactly where you expect to see quantifiable business value from integrations.

With infinite possibilities, it can be tempting to start with the data and ask questions just because you can. But you'll see the fastest results if you instead start by identifying business problems, and then use the data to solve them.

We've found that domain-based approaches can be the most effective. (A domain is a set of functions, product or service lines, or workflows that share a common element, such as a deployment mechanism, data sources, or group of business users).

Plan for change

Consider what changes will be needed beyond technical implementation. How will you manage the cultural and organisational changes required to ensure successful widespread adoption?

IT and business units will need to work together to understand how roles and processes will change and plan for how to manage the change (more about this in section 7).

Understand regulatory requirements

With uniform data access you don't physically move data. It's important to outline regulatory requirements (including data protection) clearly, and check that preferred integration solutions can accommodate these. Plan too for how to keep track of changes to requirements and make sure processes stay compliant

Review skills

Chances are you don't currently have all the skills and expertise you'll need. There are decisions to make about how to grow the skill base – do you hire staff, upskill existing ones, or bring in external support (either fully outsourced or as part of a blended team?).

When you're considering skill gaps, tread carefully. McKinsey report that companies often assume ramping up analytics is simply a matter of hiring enough data scientists (there was a 256% increase in job postings for data scientists between 2013 and 2019)

But they go on to point out that no matter how many data scientists you hire, you'll be lost without translators to bridge the gap between these data scientists and the frontline managers with problems to solve.

Customised training for in-house staff who already understand the business is the ideal approach here.

You'll also want to think about wider technical skill sets such as data engineering, user experience design, information architecture and data visualisation. How much expertise you need will depend on what your chosen solutions deliver out of the box.

Assess budgets

You want a solution that combines speed and integrity at a scale big enough for you to meet business demands – but you still need to balance what's possible with the budget available. It's fine to start with baby steps. Once you can show successes and prove value, you'll earn more investment so you can scale up efforts

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PETER FOSTER, NISBETS

Create policies and guidelines

You'll need to create master data management policies and guidelines. These are the foundations on which you build your processes. They are what will give a single version of the truth, sound data governance, and solid data security.

Look to the future

How will your plans evolve to give you capacity to innovate and grow as a business? It's risky and inefficient to look at a single end point state for your data architecture. Data integration is a process, not an end itself.

So your organisation will be best served by an incremental approach that incorporates open architectures, cloud based capabilities, and open source tooling and enabling technologies you can use to scale analytics and that avoid vendor lock in.

Build a strategy that joins the dots between external and internal data so you can spot the widest possible range of risks and opportunities.

You'll see the fastest results if you instead start by identifying business problems, and then use the data to solve them.

06.

Choosing a data integration solution with unified data management capabilities.

When you review data integration options, look for platforms that give the widest business benefits. The best of today's integration solutions cover the full data lifecycle and provide unified data management capabilities, including:

- Profiling (reviewing data quality and structure and highlighting issues)
- Cleansing (resolving quality issues)
- Transformation (restructuring into compatible formats and other changes)
- Functions to support data discovery (the process of finding patterns and outliers in data)
- Security and privacy
- Monitoring and governance processes

By eliminating hand coding and human intervention as far as possible, you can operate faster and get more data out of silos into the hands of people who can use it.

As you read about unified data platforms, you'll almost certainly come across the term 'data fabric'. If this is new to you, here's a quick summary: In simple terms, a data fabric is a single environment with a unified architecture on which all services and technologies run. The goal is to deliver maximum value from data and speed up digital transformation. Gartner identified data fabric as one of their top 10 data and analytics technology trends for 2019 – so that's a strong sign this is the way things are heading.

Key capabilities

You'll need to create master data management policies and guidelines. These are the foundations on which you build your processes. They are what will give a single version of the truth, sound data governance, and solid data security.

1. Read and write data from the widest range of relevant sources, internal and external, on-premise and in the cloud.
2. Offer or integrate with the widest range of related tools, such as business intelligence, artificial intelligence, machine learning, and visualisation applications.
3. Deliver strong performance characteristics.
4. Provide a wide range of prebuilt functions and connectors.
5. Work effectively in any environment – on premise, in the cloud, or within a hybrid infrastructure.
6. Scale up, allowing you to move from simple processes to complex integrations.
7. Keep you free from long-term vendor lock-in.
8. Take you into the future by adapting to new and emerging technologies and innovations

This means choosing a flexible platform based around open-source architecture and data sharing via APIs.

Open source architecture

Open source platforms make the best use of data integration investment. With an open source base, you have no proprietary software to install or manage and you can:

- Build integration flows once and run them anywhere
- Generate optimised native code for every deployment
- See code and debug easily

On top of this, open source architecture gives you access to innovations faster.

APIs

An API is a set of functions and procedures that makes it possible to create an application to access the features or data of an operating system, application or service. Supported by an integration platform, APIs mean you can access and share data across an organisation and with third parties, including web-based services.

APIs versus point-to-point integration

Increasingly, APIs are replacing 'point-to-point' (one-to-one) integration approaches (though a point-to-point integration can still be necessary for legacy systems). Point-to-point integrations are problematic for many reasons. They may be manageable for an organisation running just a few applications, but become increasingly tangled as the number of applications grows. The resulting maze hinders business growth and gives IT teams constant headaches: if one connection goes down, it can destroy the whole landscape and put operations at risk. Within applications, point-to-point integration risks affecting dependencies and breaking processes.

APIs are a big step forward because:

- They are independent of the applications being connected, so there's no risk of interfering with operations.
- They work with all common programming languages and are designed to be simple for developers to use, even if they have no experience in API technology.
- You can change providers easily, swapping a few components while keeping business and transformation logics the same.
- They deliver better quality data and better governance, by providing a series of linked processes through which you can track data movement.
- Each API can be isolated from the applications it serves, to allow for dynamic updates.
- Developers don't need to reinvent the wheel each time they perform simple services such as accessing database information, provisioning a server or sending a message – define the service once, and the API will repeat it for ever after.

It's important to create a map to define your API strategy, and to establish a consistent approach to using APIs and making data ready.

Helpfully, you can use an API management platform/gateway to control and manage APIs.

API security
API technology offers three main approaches to security.

API keys
One of most common ways to secure API access is through a key, essentially a password given to developers when they register. The key must then be built into the code and included in each call to the API. API providers grant and revoke keys as necessary.

Basic authorisation (basic auth)
The basic authorisation access approach involves a username and password log-in. It's the easiest way for users to authenticate with a web API. But where the log-in is giving access to secure information, basic authorisation should only be used on https sites. This is because when it is used on an http site, the name and password is sent in plain text and can be intercepted.

Open authorisation (OAuth)
Open authorisation gives users access to a service using credentials from another unrelated service, without sharing the log in credentials from the unrelated service. An example is when you're asked to sign on to a new website with your Google or Facebook password. You can also use open authorisation to send cloud-stored files to another user without them needing a second log-in to reach file storage system. This saves people having to log in twice for what looks to them to be a single transaction, and allows you to give limited access to specific resources.

Supported by an integration platform, APIs mean you can access and share data across an organisation and with third parties, including web-based services.

Emerging and future technologies

We can't predict what technologies you'll need tomorrow. But what we can say for sure is that upcoming innovations will give a competitive advantage to those businesses able to harness them quickly.

So it's vital to choose a data integration approach able to adapt to whatever comes next, both in terms of data integration and your wider IT platform.

Emerging technologies to consider include:

Cloud computing
Cloud computing is now well established, but many organisations are still to discover its full potential to increase productivity and deliver efficiencies and cost savings. As more services and applications move to the cloud, adopting a cloud-first approach for your data integration puts you in a strong position to take maximum advantage.

Containers
Now becoming mainstream, a container is a standardised unit of software containing all the code and dependencies needed to run an application. With containers, there's no need to install or pay for a complete operating system, and you can pack a large number of containers on a single computer. In many scenarios, containerisation can prove to be a far cheaper and less resource-heavy alternative to virtual machine set-ups.

Serverless computing
The concept of serverless platforms as a service is growing, though it's yet to take off in a big way. Serverless platforms sell backend services without you needing to manage a server or buy software or specific capacity: you simply pay for what you use, whilst the vendor scales capacity up and down on demand. Applications come as a collection of functions so you can upload only what you need; get systems up and running fast, and add and modify code as you go along. For applications that see peaks and troughs of traffic, serverless computing can save significant time and resource.

Artificial intelligence and machine learning
Artificial intelligence (AI) and machine learning are fast becoming data analytics must-haves. Together, machine learning and AI can deal with data at scales humans can't.

AI
With AI, you can rapidly transform enormous volumes of data into reliable, useable business information. A McKinsey study found most companies deploying AI report measurable benefits, but that many struggle to scale up. Organisations reporting widespread use of AI were 4.2 times more likely than others to have standard tool sets, showing the importance of incorporating AI into integration automations.

Machine learning
Machine learning improves data quality by teaching your systems to respond to data anomalies and trigger alerts and follow up actions. It also contributes to automated help functions for users, speeding up time to insight when combining multiple data sources and formats. Machine learning can help with everything from finding and cleaning data and identifying relationships to compliance with data protection.

Graph engines
A relatively recent technology, graph engines are opening up exciting new possibilities for data analysis. Where traditional databases put data into a structure with fixed connections, graph engines see each individual piece of data (for example, first name and last name) as an independent entity but linked to every other piece of data. They then take out any connections that definitely don't exist. This enables you to model and discover relationships in new ways – especially when you team up with AI. Currently, graph engines are as much art as science, but they are nevertheless well worth considering as a destination for your data.

Data visualisation techniques
A request to 'draw me a picture' can often give a short cut to understanding. The same applies to the way you present data analytics. The faster and easier it is for people to see what data is telling them, the more likely they are to come up with insights and take action. Look for solutions that include easy to understand dashboards, charts, graphs, and more.

Internet of Things
For many businesses, the real value of Internet of Things (IoT) devices is in the data they deliver rather than in the sales of the devices. And with sensors now both cheap and sophisticated, you can add real time information about physical context to the data you get about human interaction with the device. There's an almost endless variety of use cases, from analysing how people use products for actionable marketing insights to providing new data-led services for device owners.

07.

Collaborative Data Management:
Data as a team sport.

Setting a data integration strategy and choosing shiny new tools is only the start. For the investment to realise its potential, you'll need to create a culture where people are keen to use the data and to build organisational structures focused on extracting full value from the data.

That means developing collaborative data management practices across the organisation.

Data quality is everyone's business

Once, information was designed and published by a small number of data professionals to a small number of consumers. When you scale up data integration efforts, data quality must become everyone's business (regardless of who 'owns' the data). As we've discussed, poor data has consequences.

The more you use data for decision making, the more important it is for everyone to play their part in making sure poor data doesn't influence critical decisions. It's an entire discovery process that requires people to ask the right questions, be alert, recognise patterns, and make informed assumptions about expected behaviour.

Breaking down IT/business barriers

Collaborative data management breaks down the technology and psychological barriers between data keepers and information consumers. Often, data roles will emerge within business units rather than as part of IT, whilst business product owners will take on the task of organising their own data sets in an easy-to-consume way.

Developers, data scientists, data stewards, analysts and business unit teams start to work together to agree governed workflows, build architecture, and put in place standard, repeatable processes to develop curated data sets ready for modelling. When it comes to developing and acting on insights, a similar cross-functional approach pays dividends.

Putting data at the heart of job roles

Human expertise is as important to making data useful as analytics and algorithms: maths doesn't tell you what to do. Training is essential, to help people understand how to identify good questions to ask, and how to bring insights into day-to-day work.

You'll want to upskill both senior leaders and front line staff, so they understand the opportunities and challenges and know how to implement changes. And everyone involved needs to learn how they can best contribute as an individual, so data quality, processes and insights are as good as they can be.

Poor data has consequences

Robust and repeatable methodologies

With cross-functional teams, you can develop sound methodologies that will help you use the technology to the fullest advantage. Think, for example, about how you will scope each new project. Standard questions to ask at the start of a business intelligence project, for example, will include what the end goal is, what types of data you need, where the data will come from, what systems will use it, what types of analysis will be conducted, and how often data and reports will need updating.

The rise of citizen integrators

Today's integration tools mean you don't need to be a programmer to put new integrations into practice. That's led to the emergence of new 'citizen integrators' - business users keen to apply integration technologies to day-to-day business problems. It's part of the wider citizen developer trend, where business users are increasingly building their own business applications using automated tools.

A typical citizen integrator is someone who is tech-savvy and understands the wider business as well as the specific process and data requirements of a particular project. Encourage citizen integrators and you get sound, business-focused solutions. At the same time you save expensive developer resources and free up IT teams for more complex problems.

Aligning goals

Communication about goals – as in every area of business – is critical. When people have a clear view of shared goals and understand why those goals matter, they pull together – as the response to Covid 19 proved. Data solutions that would typically take months or even years to build were launched in a matter of weeks. Cross-functional teams came together, companies increased the use of agile delivery methods, and there was a shift from top-down to front-line decision making.
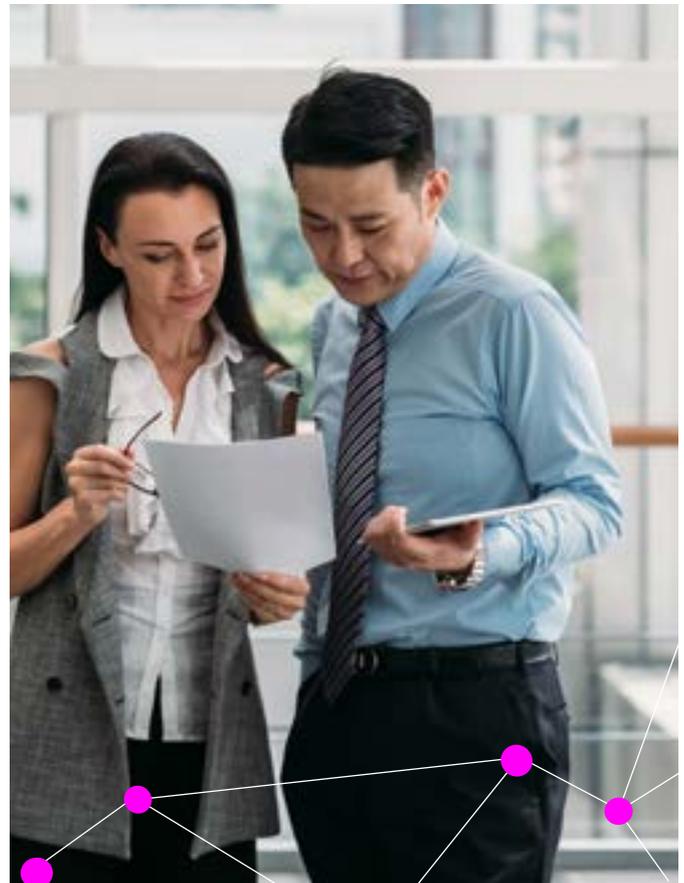
When people have a clear view of shared goals and understand why those goals matter, they pull together – as the response to Covid 19 proved.

Managing the demand for data through self service

With the explosion of data comes a parallel surge in demand. Once one business area starts to uncover what data can do for them, others want the same. IT teams must manage this demand, creating self-service applications tailored to each role. If they don't, employees will find workarounds that can put data at risk.

Through self-service, business users can also then become more involved with the collection, cleansing and qualification of data, strengthening quality and usefulness throughout.

Data protection rules still apply

In the face of widespread demand for data, the easy option is to make as much data as possible available to as many people as possible. But data protection rules still apply, with a key principle being that people should only have access to information when they need it for an agreed purpose.

So IT teams must set up properly structured access arrangements, and make sure systems are in place to track who accesses what information when.
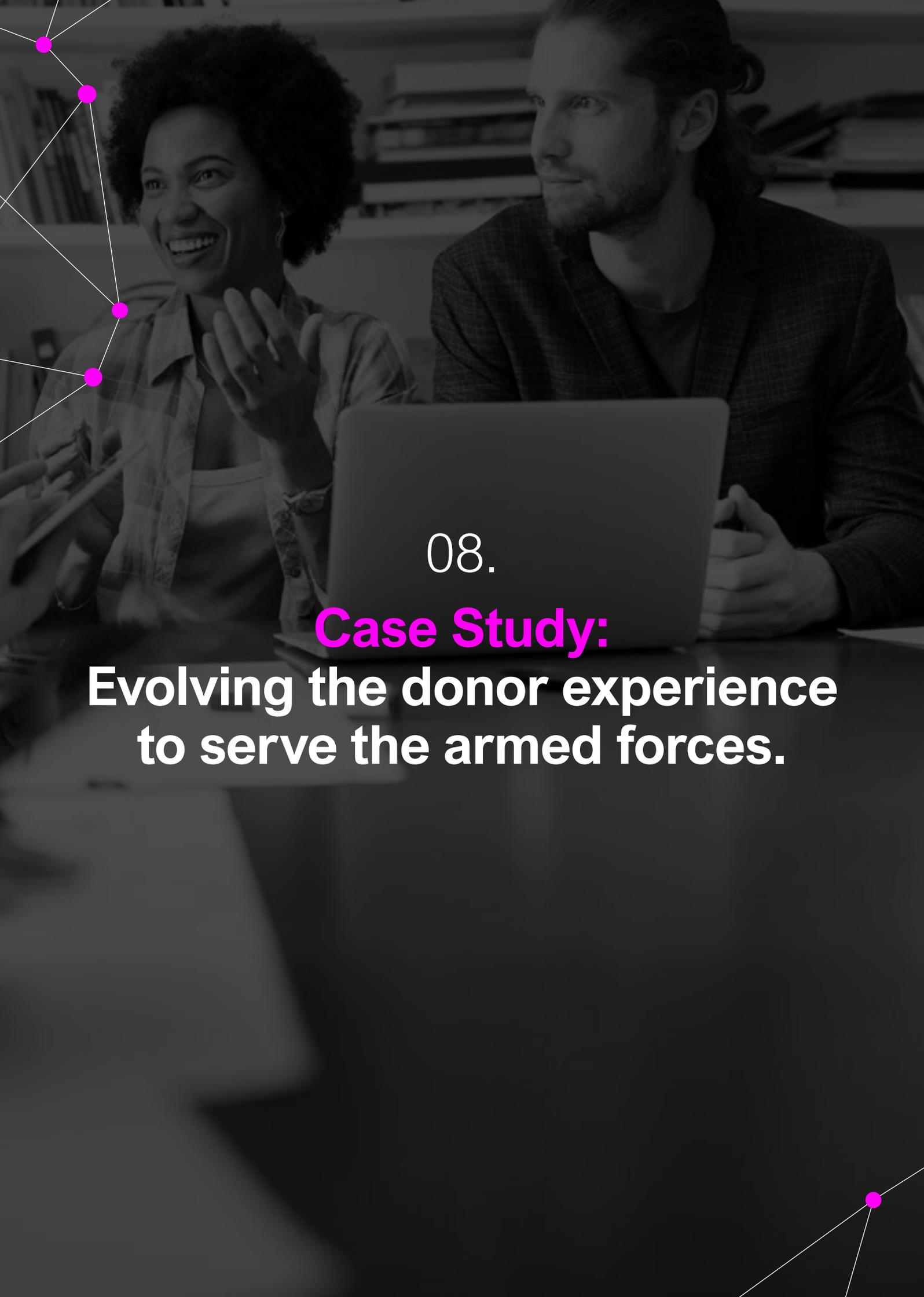
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Curious about our services? We'd love to talk.

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Website: **www.euler.net**

08.

Case Study:
Evolving the donor experience to serve the armed forces.

Client and project goal

The client was a leading armed forces community charity with an aging donor base. The leadership team had recognised that to compete successfully for funds in the crowded charity sector, it would be essential to reach and engage with a new, younger audience. This would require moving on from the organisation's traditional direct mail focus and adopting digital platforms.

The goal of the project was to put in place data integration systems to support this digital approach, and so enable the organisation to both streamline supporter management and deliver the seamless online interactions and fast responses expected by today's digital consumers.

The twin data challenges: how to integrate new data from digital sources and move to zero data defects

There were a number of issues with the charity's existing CRM system. Many of these revolved around the fact that the system had been implemented over ten years ago and was designed for direct marketing. This meant that it wasn't possible to automatically upload digital platform data directly. To integrate the growing volume of data, multiple members of staff were having to work full time loading files onto the system manually. With the demand to use a wider number of data sources growing, it was clear this wasn't a viable long-term approach.

On top of this, time was then being wasted identifying issues and re-uploading because the CRM was rejecting whole file sets even when just a single record was flawed.

Realising that the best approach would be an enterprise-wide data integration solution, the charity organised a competitive tender process. They then selected Euler as their project partner.

Integrated, accurate data…

The Euler solution covered support with scoping, product selection, implementation and ongoing management. Euler's recommended provider for the key activities of data ingestion, data quality and data stewardship was the leading integration platform Talend. Work quickly started to put new processes into place.

The first data target was general response handling. Next, the team set Talend to work ingesting, cleaning and managing data from the organisation's raffles and lotteries and online stores as well as from wider sources such as referral campaigns and online platforms.

Not only can the organisation now take in data quickly from multiple sources to any platform they choose, they can do so confident in data quality. The Euler/Talend solution means they can identify at the point of ingestion what sources are causing errors upstream, and use rules to ensure data entering the database is accurate, up to date and meets quality requirements.

…more effective donor relationships

Bringing together data from smartphones, social media networks, email and web page tracking into the central database, Euler has helped the charity better understand its supporters and potential donors. This has allowed it to communicate in more targeted ways, making each donor feel uniquely known and wanted. By using comprehensive high-quality data to drive fundraising efforts, the charity is able to determine which supporters are most likely to respond to particular appeals and design campaigns accordingly.

An ongoing partnership

The success of the project has been down to strong partnership working.

"We work as an extension of the charity's team, helping them to define and perform integrations and analysis, manage and define implementations, and determine best practices and processes,"

Explains Neil Martin, Commercial Director for Euler.

"We see the relationship as a collaborative partnership."
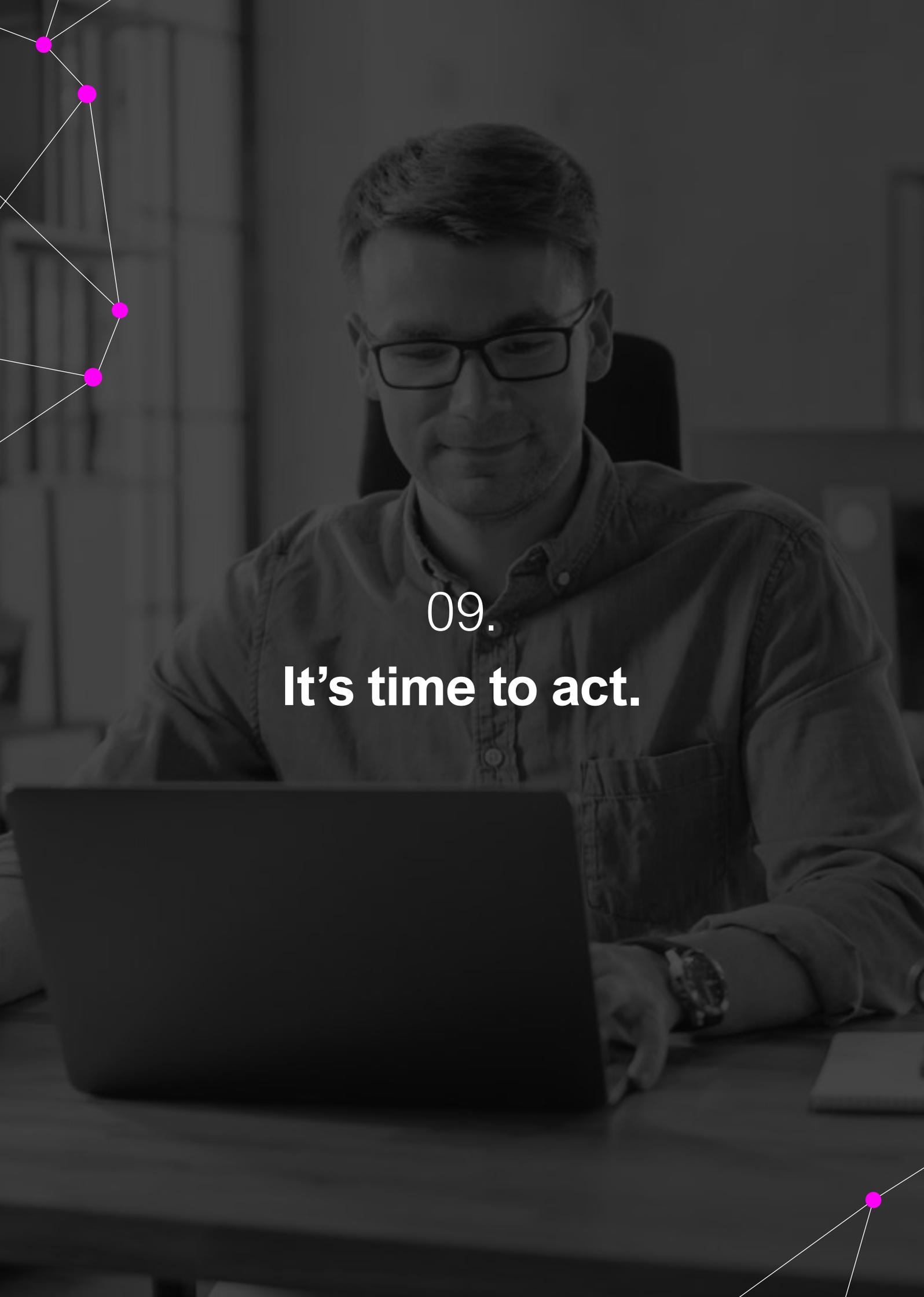
09.

It's time to act.

The volume of data and the demand for it is going to keep growing. It's time to act.

Start using data integration and analysis to unlock insights, and see your organisation become more agile, more resilient, and more competitive. Flexible tools mean you can start small, prove value, and scale up. And with few organisations really doing data well, there's everything to play for.

About Euler

In a data driven world, Euler helps organisations to realise the full value of their data assets. Its services include data management and migration, data quality and governance, business analysis and insights, and marketing automation. It helps companies to prepare and build their data infrastructure so that it can be used to provide insights and analytics to optimise automated customer journeys and orchestration.

Euler has 40 employees operating from its HQ in Warrington, Cheshire, where it serves customers such as Arriva, HSBC, Trust Ford (Retail), Great Ormond Street Hospital Charity, and Everton Football Club.
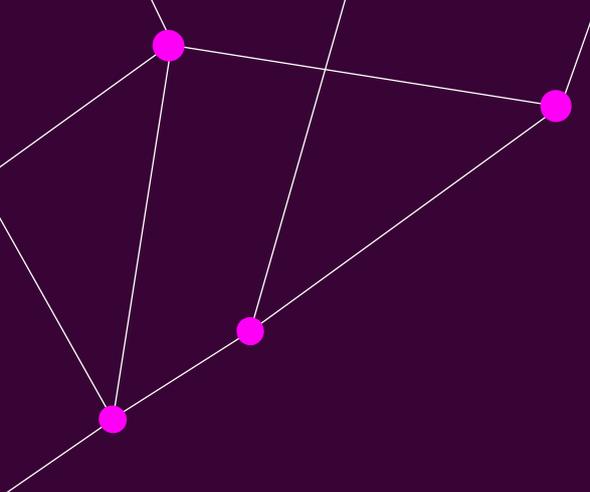
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