TechRadar

by Devoteam

*A Spotlight on
Emerging Technologies*

2023 Edition
devoteam.com/techradar

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Cloud, Cyber, AI*
& Sustainability.

Born in tech, Devoteam has over 25 years of deep expertise in guiding your business through the complexity of tech, supporting your sustainable digital transformation.

*Artificial Intelligence

devoteam

Creative tech for Better Change

TechRadar

What's inside

Preface

The Devoteam TechRadar, a rendez-vous with technology

ast year, Devoteam published its first TechRadar, an overview of the leading technologies established by our experts. This initiative was a huge success, revealing the great thirst for information on the most important technologies in the market.

For the past three years, companies have been confronted with an accumulation of challenges of all kinds, and they know that it will be impossible to meet them without technology. However, due to a lack of resources and skills, they sometimes feel helpless in the face of abundant offerings and surging innovation. Cutting through this noise and selecting the technologies with highest potential is a difficult task. It is the job and the passion of Devoteam's employees to be on the lookout for the latest technological innovations in order to evaluate, test and assimilate the most advanced innovations in the fields of cloud, data, application development, cybersecurity, automation and environmental sustainability. Technological expertise is our DNA and providing our customers with the benefits of this expertise is our vocation.

To keep up with the rapid pace of innovation, it quickly became obvious that we need to make the TechRadar a recurring "rendez-vous." Our objective: to provide a comprehensive overview of what's happening across a technological landscape in perpetual motion, and assess the potential impact it can have on businesses and society. As in the first edition, the technologies featured here have been independently selected by our experts. Some have been around for a long time, others are only just emerging, but they all deserve special attention as they address major business and technological issues in the current economy.

As proof of the rapidity of the digital ecosystem, of the 150 technologies presented in this edition of the TechRadar, half of them are new. Among those that have disappeared, some are the result of mergers and acquisitions, others because they are no longer required to be introduced due to their popularity, and others because they have not experienced the expected boom. Above all, it is about making room for the promotion of new technologies that are as exciting as they are promising in the context of **"Cloud Native," which is undoubtedly the keyword of this 2023 vintage.**

"Technological expertise is our DNA and providing our customers with the benefits of this expertise is our vocation."

We hope that you will enjoy reading this new publication and that the monitoring, analysis and popularisation work of our experts will usefully enrich your thoughts.

Karen Auffret
Publication Director

Devoteam's Perspective

Entering the Cloud Native Era

nflation and economic slowdown, surging energy and resource prices, geopolitical tensions, supply chain disruptions, skills shortages, climate and health hazards, regulatory and societal demands: for the past several months, companies have been faced with a succession of challenges of all kinds. In spite of this, they have to find the path to a profitable and sustainable transformation amidst these roadblocks. On this path, they have only one certainty: no matter what happens, **their salvation will come through the cloud.**

Cloud is no longer, as it was in its early days, just a way to streamline IT infrastructures in the face of business fluctuations. It is even more than the limitless pool of digital resources that it later became. Today, the cloud is the essential tool for business innovation and adaptation. It's the cloud that drives productivity, accelerates time-to-market, and scales success. It is the place where business activities are reinvented and new models are created - more sober, more resilient, more aligned with the demands of society and the constraints of the world. These new disruptive models are built with the cloud, in the cloud, for the cloud. They are cloud native, and almost all of the technologies presented in this TechRadar 2023 are participating in this movement. Gartner predicts that by 2025, 95% of all new digital initiatives will be built on cloud native platforms! **Cloud native is therefore becoming a strategic topic and companies must prepare for this new era where technology and businesses are more interconnected than ever.**

Being prepared means first of all building a technological ecosystem. Given the plethora of technologies available, the first risk would be to lose focus. To rationalise investments, to ensure the interoperability and security of systems, to accelerate developments and to develop skills, it is necessary to choose a stable and coherent set of tools and vendors. Around the hyperscalers, which are essential mainstream partners, the company will rely on a certain number of preferred solutions, possibly differentiated by geography, business or criticality: regional, sovereign or industrial clouds, data, AI/ML, automation, infrastructure, security, etc. This technological set, in which open-source and cloud native technologies such as Kubernetes or severless will predominate, will form the basis of the information system.

"Gartner predicts that by 2025, 95% of all new digital initiatives will be built on cloud native platforms!"

As a result, IT will be split in two. **On one hand, there will be those who will be responsible for designing, building, operating and maintaining this foundation, and who today have much more mature tools for this (Infrastructure as code, service mesh, etc.); on the other hand are those who will develop applications using the elements made available to them.** Hence, cloud

native will give birth to composite architectures. As in a construction game, the elementary bricks will be used to build specialised functional modules, which can themselves be combined to create complex applications for end users. Based on identical technologies and principles, the modules will be compatible with each other. **Managed as products** under the authority of a global governance, they can then be used as a foundation for future developments.

By redistributing the roles within IT, but also outside, this assembly logic should enable the business to become more involved in application development. At a time when technology and business have become one, this is the wish of CEOs. **According to a Gartner survey, 67% of CEOs would like to see the business take a greater role in the implementation of technology. Cloud native will accelerate the creation of multidisciplinary development teams, known as Fusion Teams.** Composed of different specialists (business, data, UX, security, etc.), they will mostly rely on no-code tools, which are more accessible and accelerate innovation through the assembly of components.

"According to a Gartner survey, 67% of CEOs would like to see the business take a greater role in the implementation of technology."

In a context of talent shortage, this model will lead to a strong evolution of jobs, skills and profiles within the organisation. Roles requiring dual skills (business/IT, business/data, etc.) will proliferate at the intersection of the specificities of each project and the standards to be used and respected by all. **The company will need both specialised experts and agile generalists,** able to demonstrate ingenuity and creativity, to change projects frequently, and to work in ad-hoc teams. In addition to technical training, this will require new organisational and operational models built around centers of excellence, increased automation of tasks and processes, and a redefinition of traditional "make or buy" perimeters. More than a new stage in the evolution of technology, the cloud native is a new paradigm that will shake up many habits and will require a lot of support to adopt. But the effort will be worth it because the companies that know how to adapt to this new era will be the best equipped to face the immense challenges that the future will surely bring.

Philippe Bournhonesque
VP Innovative Development

TechRadar

Radar at a Glance

The Devoteam TechRadar is designed to help you stay up-to-date with what Devoteam considers to be the latest and most interesting technologies, whether they're just emerging or have already proven themselves in the market. The technologies included in the TechRadar have been carefully selected by our experts and classified within two different categories: strategic domains and rings. The strategic domains represent the topics that we believe are essential for organisations to focus on if they want to become leading digital companies.

Ring levels are a way to classify the maturity of a technology, helping you decide on which technologies you need to **hold** out on, **assess**, start a **trial** with, or **adopt** completely. The idea is that as new and emerging technologies mature, they will move up the ring levels as time goes on.

Hold	Assess	Trial	Adopt
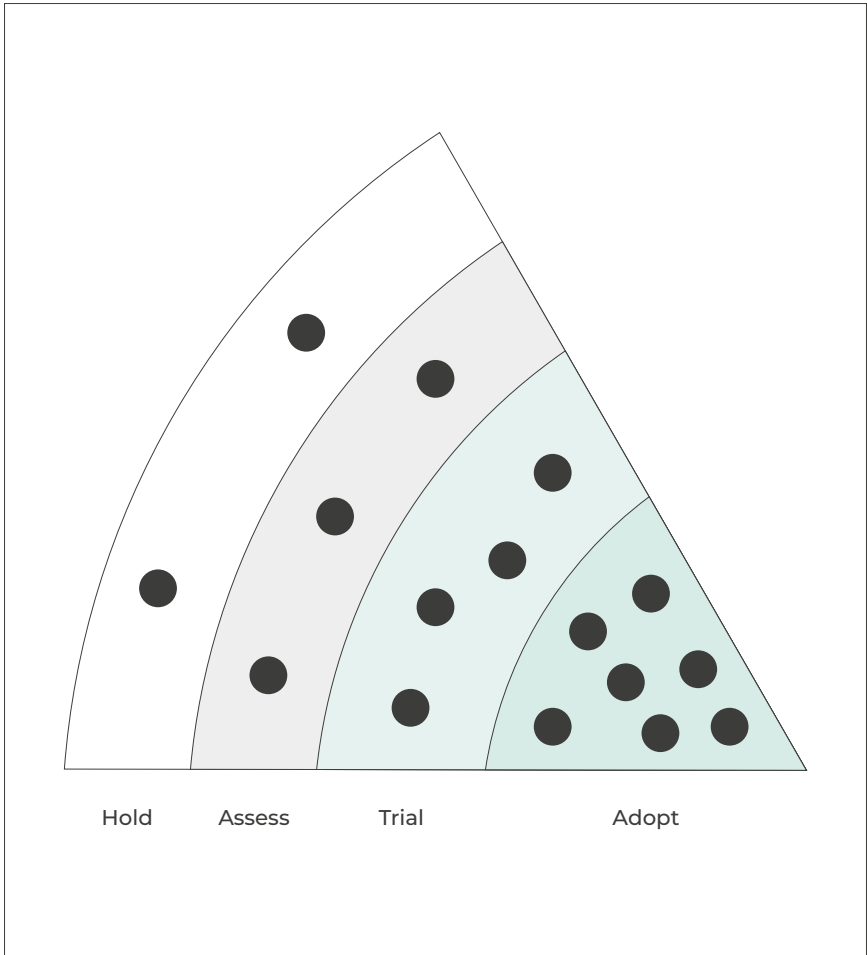
Hold

Proceed with caution. We advise waiting to see how the technology evolves.

Assess

Worth investigating to understand how it may impact your organisation.

Trial

Worth pursuing. You might want to test out this technology with a pilot to get a better idea of how it could perform on a larger scale.
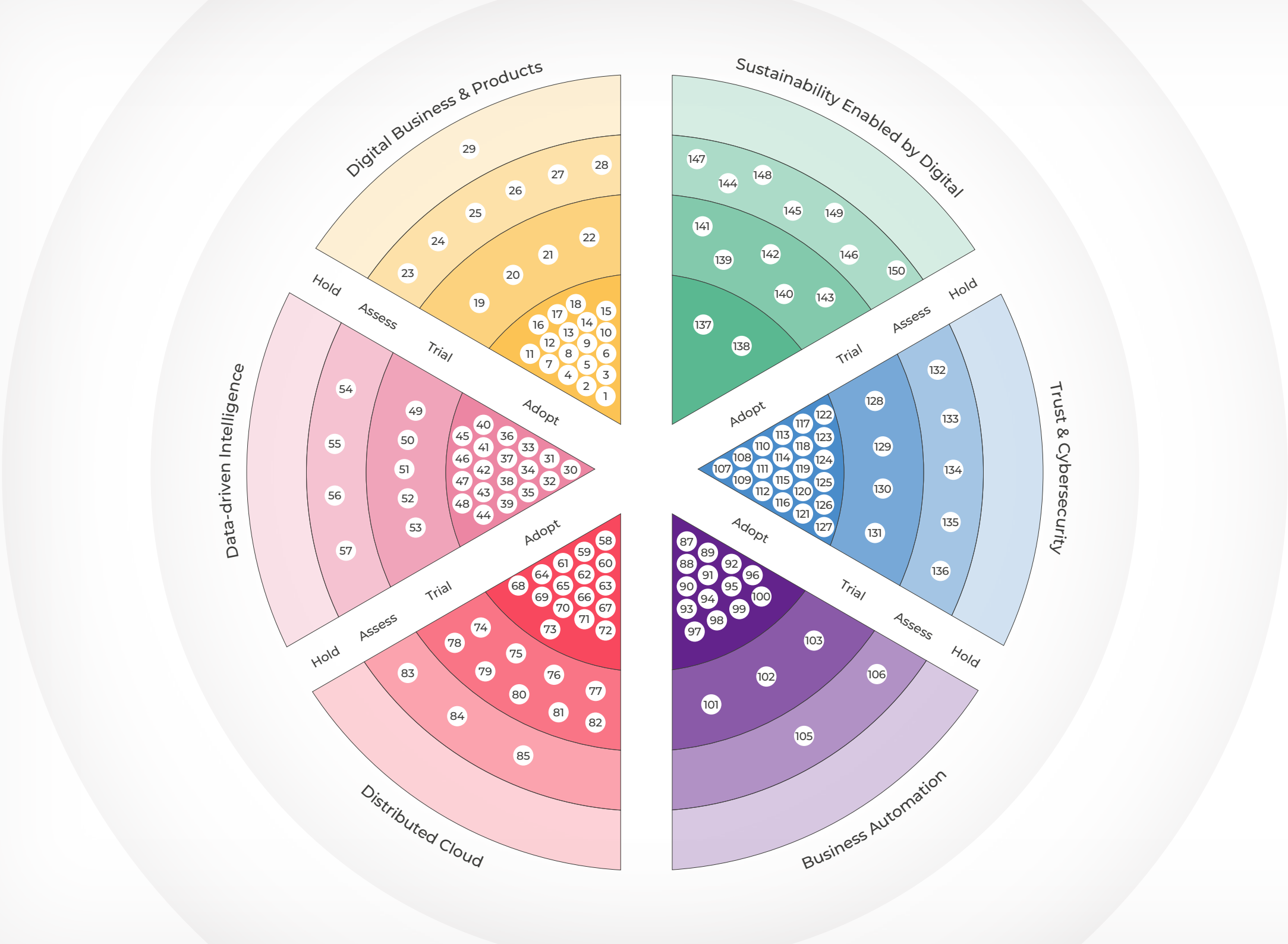
Adopt

We strongly believe that this technology should be adopted by the industry. We use it whenever appropriate in our projects and with our clients.

The Radar

Open to reveal ›

Digital Business & Products

Adopt

1. Apache Kafka
2. Apigee
3. ArgoCD ↑
4. AWS QLDB
5. CAST Highlight
6. Cloud Run N
7. Cypress ↑
8. Flutter
9. GitHub N
10. GitLab N
11. Go (Golang) ↑
12. GraphQL ↑
13. Harbor N
14. JHipster ↑
15. MuleSoft
16. OpenTelemetry N
17. Tekton N
18. Vue.js ↑

Trial

19. Flux CD N
20. Robot Framework ↑
21. Skaffold N
22. Storybook

Assess

23. Backstage N
24. Dapr
25. Deno.js
26. Julia N
27. Microsoft Mesh N
28. Rust

Hold

29. Kotlin

Data-driven Intelligence

Adopt

30. Airbyte ↑
31. Alteryx
32. Apache Airflow N
33. Apache Spark
34. Azure Cosmos DB N
35. Azure Synapse Analytics
36. C3 AI Platform N
37. Databricks Lakehouse Platform
38. Dataiku ↑
39. dbt ↑
40. Fivetran ↑
41. Informatica Intelligent Data Platform
42. Kubeflow
43. MongoDB
44. Monte Carlo Data Observability Platform N
45. Snowflake Data Cloud
46. Tableau
47. Talend Data Fabric
48. Vertex AI N

Trial

49. ClickHouse N
50. Immuta N
51. Matillion N
52. Presto N
53. Starburst N

Assess

54. Apache Iceberg N
55. Collibra Data Intelligence Cloud
56. LOGIQ.AI N
57. Transform.co N

Distributed Cloud

Adopt

58. Ansible
59. Anthos
60. AWS Nitro N
61. Buildah N
62. Fluentd N
63. HashiCorp Consul ↑
64. HashiCorp Terraform
65. Helm
66. Istio
67. Kasten K10 N
68. Knative ↑
69. Kubernetes
70. Linkerd N
71. Longhorn N
72. Portainer.io
73. SUSE Rancher N

Trial

74. Crossplane
75. DCaaS N
76. eBPF N
77. GKE Autopilot
78. KubeVirt N
79. KuboScore N
80. Pulumi ↑
81. Talos Linux N
82. VMware Cloud Foundation

Assess

83. AWS Application Composer N
84. EdgeX Foundry N
85. Kyverno N
86. MinIO N

Business Automation

Adopt

87. ABBYY Vantage N
88. AppSheet ↑
89. Automation Anywhere
90. AWS EventBridge N
91. AWS Step Functions
92. Azure Logic Apps N
93. Celonis
94. Elastic Observabilty N
95. Microsoft Power Platform
96. OutSystems
97. ServiceNow Platform N
98. SS&C Blue Prism
99. UiPath
100. Workato ↑

Trial

101. Lightstep N
102. MuleSoft RPA N
103. Rasa ↑

Assess

104. Dydu
105. Kryon
106. Moveworks N

Trust & Cybersecurity

Adopt

107. Aviatrix
108. Checkmarx
109. Chronicle N
110. CryptoNext
111. CyberArk
112. Elastic Security N
113. Ermetic N
114. ForgeRock
115. HashiCorp Vault
116. Keycloak N
117. Microsoft Entra N
118. Microsoft Sentinel
119. Netskope ↑
120. Okta ↑
121. One Identity Manager N
122. OPA (Open Policy Agent) N
123. SailPoint IdentityNow N
124. ServiceNow Integrated Risk Management N
125. Tenable.ad N
126. Usercube
127. Wiz N

Trial

128. KubeClarity N
129. Prowler N
130. Sigstore N
131. Stormshield Data Security N

Assess

132. CrowdSec N
133. Devo
134. Lacework
135. Trivy N
136. Wazuh N

Sustainability Enabled by Digital

Adopt

137. Google Carbon Assessment ↑
138. Salesforce Net Zero Cloud ↑

Trial

139. Aguaro
140. Energisme
141. Fruggr N
142. Kubecost
143. ServiceNow ESG

Assess

144. Cloud Custodian N
145. EcoVadis
146. Infracost N
147. Sopht N
148. Sweep N
149. Teevity N
150. Verdikt N

N New addition   ↑ Ascending technology

TechRadar

Digital Business
& Products

Accelerate your business by adopting the new
rules of digital. Shape innovative digital businesses,
performant products and remarkable experiences
enabled by technology.

Product Strategy: A pragmatist's perspective

The product strategy sets the ambition, trajectory, and ensures that your product and service offering evolves continuously. However, many companies are struggling to find the right way to implement their product strategies. So how do you create a winning strategy?

Product Strategy for the win

Very soon most large companies will manage their internal organisations as products to increase innovation, responsiveness and competitive advantage. Redefining the Product Strategy is the first step to increase upsell and cross-sell.

While businesses are aware of the necessity of embracing new forms of technology, they often lack a clear strategy for doing so. The digitalisation of processes and technological innovation, as well as changes in consumer behaviour, are among the many challenges to be overcome. Companies thus end up relying on a roadmap that is constrained by user requirements and ultimately reduces the quality of their products. To succeed in the future, businesses will need to develop new strategies for expanding their operations and bringing in additional revenue.

As a result, competition has increased among companies and the role of product strategy is thus becoming increasingly important in the company's overall strategy. This holds true regardless of what that strategy is: diversification, market penetration or product development since it intervenes at all points in the product life cycle.

Devoteam's Recommendation to get started on Product Strategy

The products, services, or offers of companies need to be shaped to adapt to new challenges by leading them towards a sustainable business model and a more efficient operating model that utilises technology potential and a 360-degree analysis of the ecosystem, promotes product culture within the organisation, and controls risks through validated learning to adapt to new challenges.

Despite the growth of product culture, businesses are paradoxically still in the early stages of maturity: everyone says that customer concerns should be at the centre, but only a few companies adhere to this principle. Organisations are still operating in silos. Making the organisation pay attention to subtle cues is one way to show upper management why a Product Strategy is necessary. We recommend using an end-to-end multidisciplinary approach combining strategy, design and build:

- **Strategy** means defining a vision and a path while taking into account the operational and the factual aspects. Some actions include: segmenting the market, choosing the targets and the positioning, setting scenarios and prioritising actions.
- **Design** implies concretising the strategy in tangible elements in order to facilitate easy and effective decision-making. Actions that fall under this phase consist of describing the experience and the offer, the business plan, and also product backlog and testing.
- **Build and manage** the whole product lifecycle by forming strategic partnerships.

Successful first steps often involve focusing on a specific product or service, demonstrating the method's efficacy, and then expanding it to the larger context. Whatever the maturity level of the company's offer, the approach should include evaluating the current offer and the company's environment, understanding the customer base, defining the product's vision and ambition, designing products, services, and experiences, and testing them with customers.
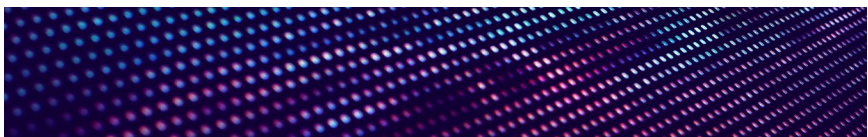

Put forward by **Frederic Fleury**, Consulting Director at Devoteam Digital Impulse & **Florent Noca**, Partner at Devoteam

Digital Business & Products
at a Glance

Caught up in the economic crisis, companies are reviewing their digital investments with the intention of optimising their project portfolios and prioritising those that promise a quick return on investment. They also hope to finally reap the benefits of their innovation efforts of the past few years by accelerating deployments and scaling up. Everywhere there is an effort to do better with less, with a focus on not spending in vain and seeing every initiative through to completion.

In these tough times, value creation therefore depends above all on impeccable execution, and technological developments are both the instrument and the reflection of this desire. This is reflected in the projects by four strong trends, each embodied by key technologies present in this TechRadar 2023: **collaboration** through sharing and sourcing of resources and skills (with Github); **agility**, which involves in particular the appropriation by the business of modular API-based architectures (with Apigee); **resilience and robustness** of applications, which must no longer be produced only quickly but also well (with Cypress, for example); **customer orientation**, to take greater account of the expectations and needs of end users (with Storybook).

Digital investments are therefore not frozen, but redirected to where they will have the greatest impact. From this perspective, Gartner believes that two themes in particular should continue to receive attention: **improving the user experience and improving employee productivity.** In fact, both are part of the same issue, the "**total experience**" **(TE)**, which is becoming the primary focus of the most digitally mature companies. The total experience considers that the customer's experience is indissociable throughout the customer's journey and the actors involved; and that all aspects – user experience, omnichannel, employee experience, among others – must therefore be addressed with the same attention in order to leave no room for dissatisfaction.
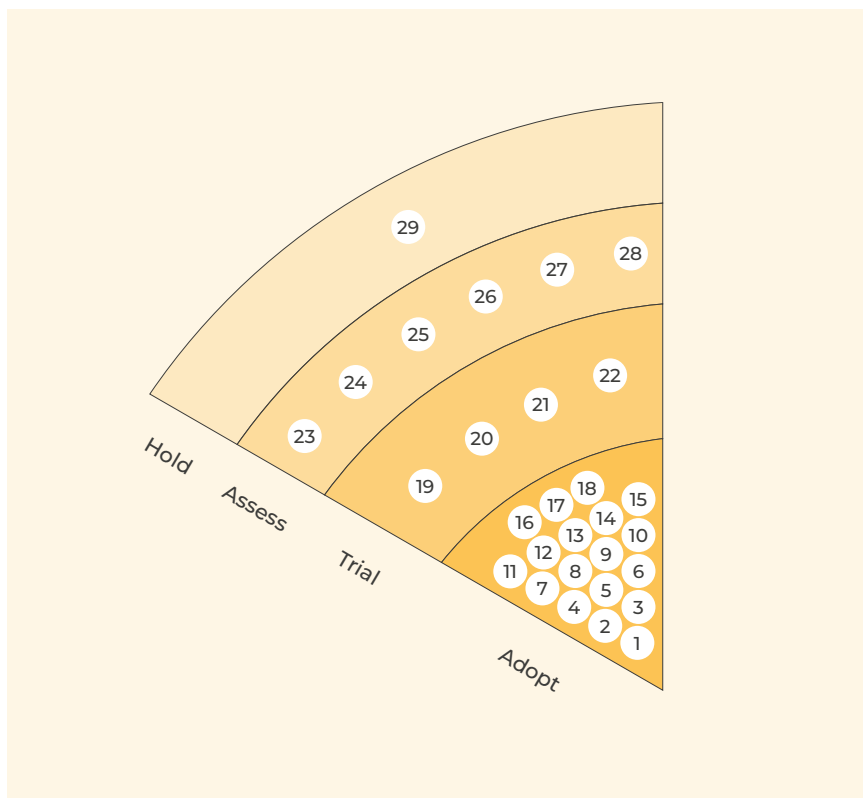
Adopt

1. Apache Kafka
2. Apigee
3. ArgoCD ↑
4. AWS QLDB
5. CAST Highlight
6. Cloud Run N
7. Cypress ↑
8. Flutter
9. GitHub N
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23. Backstage N
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26. Julia N
27. Microsoft Mesh N
28. Rust

Hold

29. Kotlin

N New addition   ↑ Ascending technology

Apache Kafka
Adopt

Originally developed by LinkedIn, Apache Kafka is an open-source data and event streaming platform. Its three key capabilities allow users to implement use cases for event streaming end-to-end. The first is the publication and subscription to event streams, the second is the durable, reliable, and indefinite storage of event streams, and the third is the processing of event streams both in real-time and retrospectively. This is packaged in a platform that's flexible, secure, highly scalable and, perhaps most importantly, fault-tolerant. If any of its servers fail, other servers will take over to prevent the collapse of mission-critical use cases or any other continuous operations. Diverse and reliable, it is recommended for any organisation handling large volumes of data, though its complexity means it should be properly evaluated before implementation.

Apigee
Adopt

With the coming expected growth of the API management market, organisations have to continue innovating to stay competitive. Apigee is one of the leading API platform providers that address new challenges and provides rich feature sets such as out-of-the-box API security policies, event-driven architecture support, GraphQL plugins, and gRPC that helps organisations to onboard a variety of use cases and deployment options of either on-premise, on-cloud or hybrid. Additionally, having Apigee under Google unlocks more options for organisations utilising the Google Cloud feature sets like IAM policies, Cloud Logging, Monitoring and Alerting. More recently, Apigee has introduced local development, allowing developers to deploy and test the APIs locally. API Hub is another new feature of Apigee that helps developers to upload and share the APIs into one place and promotes the utilisation of an API Portfolio.
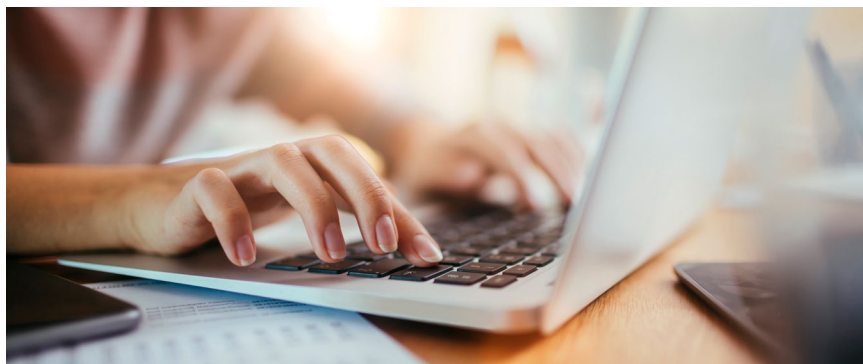
ArgoCD
Adopt

Argo CD is a GitOps, continuous delivery (CD) tool for Kubernetes that is designed to help organisations automate the deployment and management of cloud native applications. Argo is a graduated project of the Cloud Native Computing Foundation (CNCF). With Argo CD, organisations can deliver high-quality applications quickly and safely through the use of continuous deployment, GitOps-based configuration management, ease of use and the ability to scale quickly and flexibly. Argo CD is geared toward organisations that are using Kubernetes to manage their cloud native applications, and it is often used in conjunction with other tools and technologies, such as Helm and Argo Workflows, to build and deploy cloud native applications.

AWS QLDB
Adopt

The ability of blockchain to establish a transparent, unalterable and verifiable log of changes in a digital asset offers exciting opportunities in many areas, but for reasons of cost, complexity, security or compliance, its decentralized nature is often an impediment. AWS QLDB (Quantum Ledger Database) is a private, centralised alternative to public blockchains. Like the blockchain, every new entry in QLDB cannot be deleted or changed, and its author is irrefutably identified, but AWS, not a collective mechanism, is the guarantor. With no real competitor, AWS QLDB is used, for example, in the financial sector and in the public sector for use cases requiring total and indisputable traceability.

Backstage
Assess

Backstage is an open platform for creating ecosystems for developers. It unifies all the tooling, software components, data, and documentation. Powered by a centralised and searchable software catalog, Backstage organises all services, websites, mobile features, libraries, and other software components, regardless of how or where they're running. This enables collaboration and reuse, speeds up onboarding, and reduces infrastructure complexity. Backstage has a growing marketplace of open-source plugins that further expand its customizability and functionality. Product teams can build quickly and ship high-quality code without compromising autonomy. Backstage offers a single, consistent experience that maintains standards and best practices across the entire organisation. Backstage is still at the incubating project maturity level in the Cloud Native Computing Foundation, but major players like Redhat have taken an interest in it and have started contributing to the project.

CAST Highlight
Adopt

CAST Highlight is a solution that does source code analysis of a portfolio of applications. It allows users to categorise applications for potential cloud migration through insights of business impact vs. cloud readiness. Organisations can then understand where their legacy/on-premises technologies stand in cloud migration readiness. CAST also fits in perfectly as a component within an automation pipeline, continuously assessing and monitoring cloud readiness evolution throughout the complete software lifecycle. Additionally, the tool provides information on vulnerabilities, checking licensing violations, GDPR compliance and more. Compared to competitors CAST supports an enormous amount of technologies (PHP, C#, C++, java and much more) and functions with AWS, Google Cloud and Microsoft Azure. In fact, Microsoft now includes CAST in their portfolio of solutions in helping companies migrate their applications from on-premises to Azure.

Cloud Run
Adopt

Cloud Run is a fully managed compute environment that allows developers to deploy and scale serverless HTTP containers. It implements Kubernetes KNative, making the applications using Cloud Run portable and thus avoiding vendor lock-in. With Cloud Run, you can build and deploy scalable containerised apps written in any language, including .NET, Java, Go, Python, Node.js or Ruby. There are two ways to run the code: as a service, responding to web requests or events, or as a job, performing a task, and quitting when that task is done. Standard service features include fast request-based auto-scaling, built-in traffic management, access restriction, and unique HTTP(S) endpoint for every service. Cloud Run is a good choice for code that handles requests or events, such as websites, APIs, microservices, and streaming data processing.

Cypress
Adopt

Marketed as a "complete end-to-end testing experience," Cypress is an open-source tool for testing web applications. Based on front-end frameworks like Angular, Vue, and Reach, it's completely free to use and allows users to easily and quickly set up, write, run, and debug tests. It has several key features that set it apart from competitors including direct debugging from tools like Chrome DevTools, real-time reloads after test alterations, and automatic waiting, in addition to the time travel feature in which Cypress takes snapshots during tests so users can see what is happening during each testing stage. 2022 has seen Cypress' start-up and test

execution performance excel. With big names like PayPal, Disney, and DHL already testing with Cypress, it's no wonder we've upgraded it from "Trial" to "Adopt," making it essential for any front-end developer.

Dapr
Assess

To facilitate the development of cloud native applications, Dapr (Distributed Apps Runtime) proposes an original and promising approach: to completely separate the functional aspects from the technical aspects. The latter are gathered in a "sidecar," i.e. an autonomous execution environment (runtime) linked to the application by means of APIs. It is in this sidecar that exchanges between containers (service calls, events, etc.), observability, state management, and secret management are managed, all of which the developers no longer have to worry about. They can thus concentrate on the business logic and code in their favorite language. Born at Microsoft and accepted in November 2021 by the Cloud Native Computing Foundation (CNCF), the Dapr project benefits from regular improvements thanks to the important support it receives from the community.

Deno.js
Assess

Deno.js is a JavaScript and TypeScript runtime that was created by Ryan Dahl to tackle some challenges that his former JavaScript runtime, Node.js, couldn't handle. Built on top of the high-performing V8 JavaScript engine, Deno is lightweight and easy to use, coming with a rich set of built-in libraries and tools that can be used to build numerous types of applications, such as web servers, command-line tools, and serverless functions. Deno is designed with security in mind, and it includes features such as file and network access controls that are designed to prevent accidental or malicious access to system resources. Ultimately, Deno is best-suited for developers who want an advanced runtime environment they can use to build modern, secure, and scalable applications using JavaScript and TypeScript.

Flutter
Adopt

Just four years after its launch by Google in 2017, Flutter has surpassed React Native to become the most widely used cross-platform mobile development framework. It must be said that this open source SDK fulfills one of the most cherished wishes of app developers: to only have to write one code for both Android and iOS environments. What's more, its rendering engine is also agnostic. Flutter thus eliminates the costs, bugs and inconveniences of all kinds that result from the coexistence of the two platforms. But Flutter also owes its success to its performance, its ease of use and its compatibility with the usual development environments. These are assets that appeal to developers, but also to their employers, because they contribute to simplifying, accelerating, and therefore reducing the costs and deadlines of projects.

Flux CD
Trial

Flux CD is a Continuous Delivery tool that provides GitOps for both apps and infrastructure, enabling users to keep Kubernetes clusters in sync with configuration sources (such as Git repositories) and automate configuration updates when there is new code to deploy. Built from the ground up to utilise the Kubernetes' API extension system, Flux integrates seamlessly with core tooling within the Kubernetes ecosystem like Prometheus Kustomize, Helm, RBAC, etc., and includes multi-tenancy capability, in addition to syncing an arbitrary number of Git repositories. While this may seem like a tool with limited capabilities, seasoned developers can use multiple instances of Flux CD to create intricate scenarios, with each instance having specific RBAC permissions. Initially developed by Weaveworks, Flux was made open-source in 2016 and later donated to CNCF as an incubation project in 2019.

GitHub
Adopt

Since its founding in 2008, GitHub has gained massive adoption and popularity as a hosting service for software development and version control, based on Git (an open-source code management system) that allows developers to change, adapt and improve software from its public repositories for free. Since its acquisition by Microsoft in 2018, Github has begun evolving into a powerful developer platform enhanced with versatile functionalities such as Codespaces for spinning up development environments, Copilot which provides AI-powered code prediction, workflow automation actions, issue tracking, documentation features, and many others. Today, GitHub stands as the largest source code host in the world with over 83 million developers and more than 200 million repositories, and, with the resources and momentum of Microsoft as its back, is on route to becoming one of the premier development platforms on the market.

GitLab
Adopt

GitLab is an open-source and enterprise DevOps platform that aggregates all of the vital and necessary functionalities to accelerate software delivery. It provides a user-friendly unique platform that aims to increase collaboration, reduce onboarding time on new projects for all contributors - especially developers - and deliver software faster, more efficiently, with reduced risks. Their fully mature and complete platform accelerates the adoption of Security by Design through native integration of security feedback into the interface. GitLab enables and facilitates DevOps transformation initiatives at team or large organisation level, up to several tens of thousands of users. This scalability has led the solution to take the lead over competitors and to remain ahead in many aspects, as highlighted by Gartner's Magic Quadrant ratings. GitLab is now even starting to challenge pure players on DevOps functionality segments such as security, notably through the SAST & DAST feature blocks.

Go (Golang)
Adopt

Go (or Golang) is a programming language created by Google in 2009 with the aim of facilitating developments for the then emerging cloud architectures. The options taken at the time of a compiled language, portable, powerful, supporting multithreading and concurrency, and of great simplicity are more relevant than ever as cloud native applications become widespread. With its low hardware and energy consumption, Go is also a strong candidate for serverless approaches, edge computing and frugal software development.

Easy to learn for anyone with programming experience, Go is gaining in popularity and its ecosystem is growing. It is now used in many major open-source projects, such as Docker and Kubernetes, which ensures its visibility and, above all, its durability.

GraphQL
Adopt

Developed by Facebook in 2012 and open source since 2015, GraphQL is an API query language. An alternative to REST (Representational State Transfer) architectures, GraphQL allows queries to be grouped to call only the desired data. In this way, GraphQL limits superfluous exchanges, which improves performance and facilitates the evolution of APIs. REST, on the other hand, still has the simplicity of its unit calls and the resulting cache pooling. Although it is steadily gaining ground, GraphQL is probably still under-utilised compared to its potential. In particular, it is a very relevant solution when data is organised in the form of graphs or trees, a situation for which it was designed, which is increasingly common, and is exceedingly difficult to manage in REST.

Harbor
Adopt

Deploying containers in a production environment, for example via Kubernetes, inevitably involves storing the created container images (executable software bundles) in a container registry. The problem is container images from unknown sources or manipulated images with malware can find their way into production, hence the growing need to mitigate security concerns. Harbor, a CNCF Graduated open-source project, secures artifacts using policies and role-based access control (RBAC). It scans images and ensures they are free of vulnerabilities, marking them as trusted. Harbor is the solution for users that need to self-host a container registry for container images. Harbor can be installed on any Kubernetes environment or on a system with Docker support. As a container registry, Harbor is an excellent solution for achieving compliance, speed, and integration, resulting in improved image management efficiency.

JHipster
Adopt

JHipster is an open-source, low-code development platform that allows you to create modern web applications and cloud-ready microservice architectures very quickly. To do this, JHipster generates a complete stack by combining many common frameworks and tools such as Angular, React and Vue for the front end, Spring Boot, Node.js and .Net for the back end, Docker or Kubernetes for deployment on most major cloud providers. Compatible with the main continuous integration tools, robust and powerful, JHipster allows users to reduce delays and improve development quality, both for new application projects and for legacy modernisation. In direct contact with the community, Devoteam's experts use JHipster extensively, having, for example, conducted a pilot on Open Shift in cooperation with Red Hat.

Julia
Assess

Sometimes it's not a shiny new tool that propels technology forward; it's a programming language. Julia, an emerging dynamic language that is growing in popularity for use in numerical analysis, data visualisation, and machine learning has caught our attention. Created by a group of computer scientists in 2012, Julia is said to combine the speed of C, the dynamism of Ruby, and the practicality of Python. However, even though it was conceived to serve our evolving needs in high-performance computing and data science, it's also perfectly suited as a general purpose programming language. Julia boasts many advantages, including a just-in-time compiler, flexible parametric type system, multiple dispatch pattern, and parsing capability like Perl to name a few. Julia has an active, enthusiastic community of users and has been downloaded 40 million times.

Kotlin
Hold

Created in 2011 by the development tools specialist JetBrains, Kotlin is a programming language based on the JVM (Java Virtual Machine). Designed to meet the requirements of current developments, Kotlin does not lack assets: it is a modern language, concise, natively secure, and portable on all platforms thanks to the Kotlin/ Native compilation technology. Kotlin can be used for any kind of development, especially for Android mobile (it is the official language of the Android platform). Interoperable with Java and compatible with its ecosystem of resources, Kotlin was intended to gradually replace it. However, as the community and the portfolio of projects are slow to reach a critical mass, this possibility seems to be receding, and the next few years will be decisive for its future.

Microsoft Mesh
Assess

Microsoft Mesh is a platform that enables presence and shared experiences through mixed-reality applications. Organisations can design persistent virtual environments called metaverses, which use avatars of real-world objects, places, and people. The Microsoft Mesh SDK provides AI-powered tools for avatars, holoportation, spatial rendering, and other mixed-reality features, enabling developers to create collaborative, cross-platform apps more quickly. Users can join the virtual world with a holographic presence, share across space, and collaborate on persistent 3D content, regardless of their physical locations. The scenarios in which Microsoft Mesh could bring benefits are virtual meetings, training & learning, remote assistance, or 3D design. Because Mesh is based on Azure, Microsoft's cloud computing platform, it has access to Azure's extensive computational resources, data, AI, and mixed reality capabilities, as well as its enterprise-grade security and privacy features.

MuleSoft
Adopt

MuleSoft is a platform that enables organisations to integrate data and systems and automate workflows and processes. Robotic Process Automation (RPA) replaces manual, repetitive tasks with bots that can take action on a user's behalf. The platform offers pre-built templates and activity steps to make the automation cycle easier. Processes can be evaluated, designed, deployed, and monitored in a single place. MuleSoft Composer is a no-code product for business teams and helps automate larger processes that span across multiple actors, apps and systems. Anypoint platform sits at the heart of the systems integration for IT teams. This platform enables users to manage, govern and monitor automations and integration flows across the organisation. Teams

can share assets through Anypoint Exchange, design, test and expose APIs, and plug enterprise integration flows into CI/CD pipelines with built-in support for standard tools/frameworks like Maven, Jenkins, ELK, etc. MuleSoft offers out-of-the-box compliance for ISO 27001, SOC 2, PCI DSS, and GDPR.

OpenTelemetry
Adopt

OpenTelemetry is an open-source standard and set of technologies that assists in implementing observability in solutions. It provides a vendor-agnostic collection of tools, APIs, and SDKs to generate, collect, and export telemetry data (metrics, logs, and traces) to help analyze software performance and behaviour. The main issues OpenTelemetry addresses compared to current solutions are interoperability and vendor lock-in. It can be especially beneficial for organisations that develop distributed systems and work with different tech stacks, cloud providers, and even commercial off-the-shelf applications because integration becomes seamless as the standard is implemented across the industry. OpenTelemetry is being adopted by different parties, from cloud providers (Amazon Web Services, Microsoft Azure, and Google Cloud Platform), to observability tool vendors (Honeycomb, Splunk, Elastic), and open-source observability projects (Jaeger Tracing, Zipkin, Grafana).

Robot Framework
Trial

Robot Framework is an open-source, Python-based platform designed for test automation and robotic process automation (RPA). A key advantage of Robot Framework is its simple yet powerful syntax. It uses a keyword-driven approach that allows users to write test cases and test automation scripts with human-readable commands and minimum overhead. After each test run, Robot Framework delivers a clear and concise HTML test report based on the XML output of the tests. The core framework is complemented by a set of well-documented and actively maintained libraries and tools for a wide variety of testing purposes and RPA scenarios. RPA developers will appreciate how simple it is to handle complex RPA tasks for numerous use cases in sales, HR, and other areas. The large and active community has made Robot Framework arguably the most advanced open-source solution for test automation and RPA.

Rust
Assess

Rust is a general purpose, multi-paradigm compiled programming language developed by Mozilla Research in 2010. Its goal is to provide a safe, powerful and practical language, and to do so by relying only on proven concepts. One of the main features of Rust is the compile-time memory

control that eliminates allocation and call errors – major sources of vulnerabilities. The only language with C accepted for the Linux kernel, Rust is mostly known for system programming and critical software, but its lightness and its integrated concurrency management make it suitable for distributed applications. Demanding at first sight, but very much appreciated by developers, Rust is supported and used by all the biggest names in tech and is growing in popularity as a possible successor to C++.

Skaffold
Trial

Skaffold is a lightweight command-line tool purpose-built to accelerate application development and delivery by automating repetitive, and time-consuming manual operational tasks for developers creating Kubernetes applications. Skaffold provides declarative, portable configuration with a pluggable architecture that handles the complete workflow for building, pushing, and deploying applications, allowing developers to focus their efforts on implementing code changes and see them rapidly reflected on their cluster. The tool further enables DevOps practitioners to easily configure a local development workspace, streamline their inner development loop, and integrate with other tools such as Kustomize and Helm for simplified Kubernetes manifests management, and provides the building blocks for CI/CD pipelines. Developed by Google as an open-source project in 2019, Skaffold stands as a robust solution for organisations looking to accelerate and standardise their development workflow, leading to faster time-to-market for Kubernetes applications.

Storybook
Trial

Storybook is an open-source tool that helps full-stack developers streamline app development focused on UI. It runs alongside other apps and utilises an intuitive interface to facilitate quicker UI development by allowing users to capture component variations as stories that can then be revisited. And because it runs outside of the apps, it won't impact component behaviour. Lately, the Storybook community has done a great job in reducing start and build times. Furthermore, the Application and Documentation designs have been given an overhaul, providing more than 400 integrations for popular JavaScript tools. Its latest release also includes a broad array of testing tools. While valuable for developers, it is in direct competition with another UI tool, bit.dev.

Tekton
Adopt

Tekton (previously called Knative Build) is a Kubernetes-native open-source framework for creating continuous integration and delivery (CI/CD) systems. The framework further enables developers to build, test, and deploy application development across on-premise systems and multiple cloud providers by abstracting away the underlying implementation details. Tekton provides a set of reusable Kubernetes Custom Resources (described in comprehensive YAML) that define the building blocks needed to create and reuse pipelines, in addition to standardised CI/CD tooling and processes across vendors, languages, and deployment environments (VMs, serverless, Kubernetes, or Firebase), and works well with Jenkins, Jenkins X, Skaffold, and Knative, among many other popular continuous delivery tools. Tekton's strength is its modularity and flexibility, as it allows users to build complex pipelines without rewriting the building blocks, and ensures pipeline consistency is maintained with minimal impact from product upgrades.

Vue.js
Adopt

Vue.js is a popular JavaScript framework that is used for building user interfaces, single-page applications (SPA), or progressive web apps (PWA). It was created in 2014 and has since gained a large following among developers due to its ease of use, small footprint, and lightweight nature. The compiler-optimised rendering system rarely requires manual optimisation. Vue.js builds on top of HTML, CSS, and JavaScript with intuitive API. It can manage state and data flow. Vue.js uses a virtual DOM (Document Object Model) to track changes and automatically updates the necessary components when there is a state change. This results in better performance and faster rendering times. Vue.js has an official router, a library that has a component-based structure, and an expressive syntax for defining static and dynamic routes.

When tech meets massive data monitoring

How to become more responsive and agile thanks to a data-driven solution

Who is the organisation and what's its context?

The organisation employs over 6000 employees across 174 operating sites. Their business relies on giving new life to used materials and on turning waste into useful resources such as paper, metal, plastic, compost, etc. With 1 million transactions a week, the daily data tracking and customers' requests are key to operate efficiently and coordinate the 800 collecting trucks.

What needs did the organisation face at the time?

Their in-house built software, designed to create reports and dashboards, eventually couldn't perform efficiently enough to remain competitive and meet deadlines, preventing them from managing customers complaints on time or detecting interface deficiency. The organisation had a goal of reaching 75% recycling rate by 2025, which required a data empowerment solution to address the weaknesses of the current method in terms of scalability, maintenance, but most importantly, data monitoring.

What was the turning point where the organisation had no choice but to adapt its strategy?

The gap between the volume of data to be processed on a weekly basis and the obsolescence of the existing software eventually led to an incapacity to take action by the teams. They realised that they were completely blind in finding the source of any issue, and that it would take them over 3 days to solve a customer problem.

Which factors played an important role in the decision to choose Elastic Observability tech?

- **Getting the right information at the right time:** the global monitoring of all data across Europe (logistics and coordination of 800 trucks, administration, CRM, user app development, APIs) was supported by an in-house designed software that showed its limits and deficiency to anticipate and take actions. Monitoring and analysing data became crucial to back up the organisation's growth, and the solution had to revolutionise the

way employees related to the organisation's data, processes and interfaces.

- **Upgrading the organisation's customer experience:** the lack of issues tracking and the loss of visibility whenever a complaint was raised slightly declined the added value of the organisation for their customers. Creating the right tool supported by data monitoring would improve the user path and relationship with the final user.

What were the immediate benefits for the organisation's clients or employees?

- Creation of a customer portal to become fully customer-centric, combined with the reduction of customer complaint processing time from 3 days to 1 hour

- Tooling for end-to-end & business monitoring and alerting capabilities
- Decrease of one third of the time for coordinating and managing the treatment processes
- Infinite scalability of the solution to support IT, HR or business needs and strategy
- Creation of reports and dashboards to support the business through Azure cloud-based solution
- Replacement of outdated in-house platform to ESB with MuleSoft as new integration platform and ServiceNow for incident management
- Improvement of IT budget forecast, enabling IT budgets to become more predictable and cost-effective

That extra mile that made all the difference

"We replicated the functionality of our previous solution very quickly with Elastic Observability. Additionally, we can extend it to ingest and transform data from new applications and sources with minimal effort."

IT Service Manager at the organisation

TechRadar

Data-driven Intelligence

Drive tangible business outcomes with data and analytics at every opportunity. Differentiate your products, services and customer experiences to surpass your competition with an insight-based approach.

Starting fresh with Data Mesh

Looking for a way to gain a detailed understanding of the relationships between your data? Enter Data Mesh. Based on the organisational strategies for scalability of large-scale software development, Data Mesh is a socio-technical approach that enables an organisation to scale with Data.

From Business Intelligence to Data Mesh

Large-scale data platforms face 3 challenges: The first is the use of centralised monolithic data architectures to respond to omnipresent data from operational systems. Secondly, hyper-specialised tools need a hyper-specialised staff. This creates hyper-specialised silos between data generation and consumption, generating operating friction. Lastly, centralised silo models disconnect the process causing consumers and platform providers to experience the most difficulty here. Either they have trouble bootstrapping large platforms or growing and differentiating.

So, what if we broke this monolith around the concept of decentralisation and inter-connected data domains owned by business users instead of basing it on a pipeline and pipeline stages?

Data Mesh fixes the problems with data warehouses by giving data owners more freedom and flexibility. This makes it easier for data owners to experiment and come up with new ideas, and it makes it easier for data teams to meet the needs of all data consumers through a single pipeline. Data Mesh is based on 4 main pillars namely, Federated Governance, Decentralised Domain Ownership of Data, Data as a Product, and Self-serve Infrastructure as a platform.

Devoteam's Recommendation to get started on Data Mesh

Data mesh brings solid foundational solutions for a company to scale Data, as it's already been done in software development. We anticipate that "embracing data mesh" should replace "having a data mesh" as the default phrasing for this concept in the near future.

The implementation of data mesh should be a long term goal and not all components of each pillar must be implemented immediately, but eventually. This will enable all employees to have access to the data whenever they need it. But, merely adhering to the pillars does not guarantee its implementation. Many organisations are deploying step-by-step practices according to Data Mesh pillars.

Data Mesh has many potential uses, including:

- **Agility and scalability** comes hand-in-hand through the use of data mesh as it works to support decentralised data operations to aid in the reduction of the amount of time needed to bring a product to market, increase scalability, and improve business domain agility.

- **Adoption of a product mindset** with a large variety of outputs (AI, data streaming, APIs, data apps, etc.) no longer limited to reporting and analytics.

- **Introduction of a universal, domain-agnostic, automated approach** for data standardisation by data teams.

- **Cross-team transparency** that is fostered by decentralised data ownership and shared across specialised groups working in different areas.

Since a data mesh is fundamentally a method of organising, it is not a product that can be purchased. However, technology is crucial since it enables data mesh, and only practical and straightforward solutions will win over domain teams. You can build a data platform for your data mesh using the existing offers of cloud providers, which include a sufficient set of strong self-serve data services.

Put forward by **Laurent Letourmy,** Head of Data at Devoteam

Data-driven Intelligence
at a Glance

Data continues to be a top concern for organisations. In the public sector, this trend is fueled by regulatory changes and the need to decompartmentalise information. In the private sector, the drivers are the search for new revenue streams and the ongoing aim to improve operational efficiency. Newer, however, is the recognition that data is sensitive material that cannot be used effectively without taking certain precautions. **The concept that data must be treated as a valuable asset, or "assetisation," is now the primary focus.**

Assetisation refers to the objectives of data quality, reliability, homogeneity and security, which require the implementation of an enterprise-level data operating model, governance, skills and specific tools. Building this foundation is a vast undertaking, and is, above all, based on a data strategy that is in alignment with the new challenges of data, such as monetisation, sharing and compliance. This strategic clarity also gives the guidance for the deep cultural change needed for any organisation to be truly data-driven.

Tooling is also an essential part of the picture. Many of the technologies presented in this TechRadar 2023 show that software vendors have taken note of the needs induced by data automation. Facilitating the use of data remains a major concern, but many solutions now also focus on the upstream processes of data integration and preparation (DataOps, MLOps, etc.), on their industrialisation and on their automation through AI.

There is sometimes a reluctance to make investments where there is not an immediate return; however, with regards to data, it is increasingly necessary. Many organisations have realised that data is a prerequisite for achieving business objectives, whether it be improving operational efficiency, supporting decision-making, reducing costs and environmental footprints, developing new business, understanding and mitigating risk, or meeting regulatory requirements.
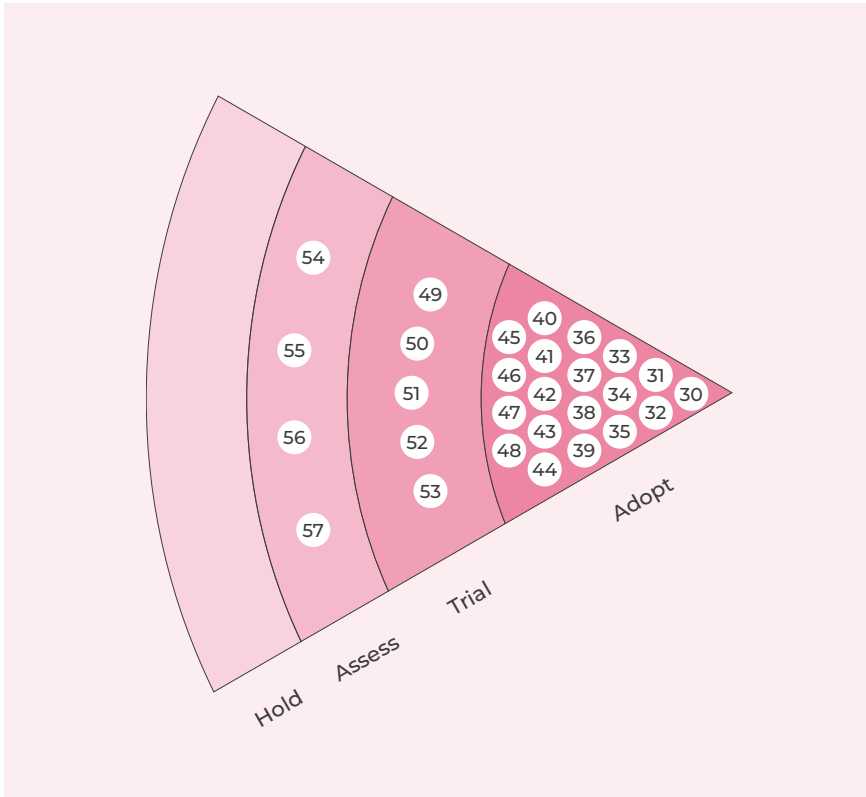
Adopt

30. Airbyte ↑
31. Alteryx
32. Apache Airflow N
33. Apache Spark
34. Azure Cosmos DB N
35. Azure Synapse Analytics
36. C3 AI Platform N
37. Databricks Lakehouse Platform
38. Dataiku ↑
39. dbt ↑
40. Fivetran ↑
41. Informatica Intelligent Data Platform
42. Kubeflow
43. MongoDB
44. Monte Carlo Data Observability Platform N
45. Snowflake Data Cloud
46. Tableau
47. Talend Data Fabric
48. Vertex AI N

Trial

49. ClickHouse N
50. Immuta N
51. Matillion N
52. Presto N
53. Starburst N

Assess

54. Apache Iceberg N
55. Collibra Data Intelligence Cloud
56. LOGIQ.AI N
57. Transform.co N

N New addition   ↑ Ascending technology

Airbyte
Adopt

A flexible open-source data integration platform, Airbyte uses pre-built and custom connectors to replicate data in minutes. It allows users to combine data integration platforms under one reliable and fully managed platform. Users can edit over 300 pre-built connectors or build new ones in hours, negating the need for separate systems. Airbyte can also integrate to your data stack (Kubernetes, Airflow, dbt), while their transparent, volume-based pricing structure is predictable and easy to understand, allowing companies to plan budgets accordingly. And with their community of over 600 contributors to build and update their connectors when source APIs and schemas change, the organisation can focus on insights and innovation. With Airbyte, extracting data from various sources is quick and easy, which is why it's moved from 'Trial' in 2022 to 'Adopt' in 2023.

Alteryx
Adopt

Thanks to Alteryx's intuitive and low-code graphical interface, business users are able to prepare their data themselves, build their analytical processes and automate them so that they can immediately exploit the results, without any prior coding knowledge. In 2022, Alteryx took a step forward with the acquisition of Trifacta, a cloud native data wrangling company. This acquisition gave rise to Designer Cloud, a cloud-based data engineering tool for data profiling, preparation, and pipeline management running on all major cloud platforms. With collaboration and AI-based features like Auto Insights or Predictive Transformation, Designer Cloud makes data transformation and insight even faster and more intuitive. With the addition of cloud capabilities, Alteryx offers even more flexible deployment options, providing an end-to-end solution at the intersection of data science, process automation, and employee empowerment.

Apache Airflow
Adopt

Apache Airflow is an open-source platform to design, orchestrate and monitor workflows. Created in 2014 at Airbnb, it has today reached significant maturity and has been widely adopted by companies of all sizes to manage complex workflows at scale. While the tool allows users to run workflows of all types, it is particularly well-suited for managing data engineering pipelines. The key strengths of Airflow lie in its flexibility – by designing workflows dynamically through Python code (DAGs); its extensibility – with a rich ecosystem of integrations with other technologies; and its strong and active community – allowing users to work on an ever-evolving platform for which help is always

readily available. Its useful UI also makes it simple to monitor all workflows through a single pane of glass, making it a tool of choice to centrally manage a large set of processing pipelines.

Apache Iceberg
Assess

Created by Netflix, Apache Iceberg is an open-source data format for large-scale, immutable data sets that allows the storage of petabytes of data. Tailored for high performance, Iceberg provides a table abstraction that allows you to interact with your data as if it were a single, large table, even if it is stored in many different files across a distributed file system. It also provides support for data partitioning, schema evolution, and data retention policies, which can make it easier to manage and query large datasets over time (as simply as a SQL query). Apache Iceberg has been adopted by all the cloud hyper scalers as well as big players like Snowflake and BigQuery, who are all implementing Iceberg capabilities into their products.

Apache Spark
Adopt

As an open-source, multi-language engine, Apache Spark builds on the foundations of technologies like Databricks and Hadoop to enable users to quickly process massive, petabyte levels of data. The most widely used engine for large-scale data analytics has transformed the world of Big Data, being utilised by 1000s of companies worldwide, including around 80% of Fortune 500 companies. Key features such as ANSI SQL queries for dashboarding and reporting, analysing large-scale data, scalable machine learning, and processing massive data streams using most programming languages (Python, Scala, Java, SQL, or R) make Apache Spark the most diverse, agile, and developer-friendly engine of its kind. Recent improvements include more scalable state processing, row-level runtime filtering, and Pandas API for unifying small and big data API. Although requiring advanced skill sets and infrastructure, Apache Spark is a must for any large organisation.

Azure Cosmos DB
Adopt

Big data has become the fabric of everyday life. Whether it's online gaming, global retail, or IoT-driven manufacturing and logistics, big data powers our personal lives and drives entire business models. The need to process and retrieve massive volumes (petabytes!) of data instantly around the world has given rise to high-performance cloud-based databases that scale automatically and minimise latency. Cosmos DB, Microsoft Azure's fully managed NoSQL database, is a newer kid on the block, competing with Amazon DynamoDB. For companies already using Azure, Cosmos is the obvious enterprise-ready choice, as it integrates seamlessly with other Azure services. Cosmos DB also supports popular open-source PostgreSQL, MongoDB, and Apache Cassandra. It boasts SLA-backed single-digit millisecond reads & writes, and 99.999% availability. But users get more than speed, availability, throughput, and consistency—they also get Microsoft's commitment to security.

Azure Synapse Analytics
Adopt

As an enterprise analytics service, Azure Synapse Analytics combines pipelines for data integration, SQL technologies used in enterprise data warehousing, and big data analytics. Synapse SQL facilitates data warehousing and virtualisation scenarios across both serverless and dedicated resource models, allowing for predictable performance and cost, while Apache Spark for Azure Synapse offers a simplified resource model that makes managing clusters quick and easy. Synapse also has the same

data integration engine as Azure Data Factory, allowing users to create ETL pipelines without leaving the service. Azure Synapse Analytics takes the headache out of choosing the right data services by combining the best of Azure in an infrastructure that is agile, scalable, and ideal for medium and large businesses.

C3 AI Platform
Adopt

C3 AI is a software-as-a-service (SaaS) solution that delivers a comprehensive, low-code/no-code platform for the development, deployment, provisioning, and operation of enterprise-scale AI analytics and IoT applications, in addition to a portfolio of over 40 industry-specific, turnkey enterprise AI applications. The C3 AI platform stands out for its revolutionary model-driven AI architecture that allows developers to use conceptual models (rather than programming code) for rapid, simple development and deployment of AI and IoT applications. Additional capabilities include polyglot cloud deployment for application portability between cloud vendors, simultaneous runtime of AI and IoT applications across multiple clouds, and interoperability with third-party IDEs, tools, and frameworks. Adopted by a wide range of global enterprises, C3 AI stands as a powerful and highly versatile solution for Enterprise AI and digital transformation.

ClickHouse
Trial

How fast is "fast" for a database? Answer: ClickHouse. Released in 2016, this open-source column-oriented database is making a name for itself for being "blazing fast." It was designed for online analytical processing (OLAP) and performs SQL queries anywhere between 100 and 1,000 times faster than traditional database management systems. Companies running business-critical applications that process and query huge volumes of data are turning their attention to ClickHouse for its speed (of course!), reliability, fault tolerance, and ease of use. Uber, eBay, Spotify, Deutsche Bank, and Cloudflare are among notable enterprises with interesting use cases showing promising results. For example, ClickHouse can be used to monitor millions of real-time web or app performance data points. It works out of the box and offers enterprise-grade security features and fail-safe mechanisms against human errors.

Collibra Data Intelligence Cloud
Assess

Collibra is focused on easing the shift of their clients toward a data-centric culture – a mission they accomplish by enabling data for all stakeholders of the organisation through Collibra Data Intelligence Cloud. The platform is one of the leading solutions to support data

governance and data acculturation and covers multiple facets: data cataloguing, data quality & observability, data governance process & workflow automation, data lineage, data privacy and security management. Although Collibra Data Intelligence Cloud platform is an end-to-end and state-of-the-art solution, it requires having a first-hand experience and a clear vision regarding data governance and alignment with data strategy and data quality goals before implementing and adopting such a solution.

Databricks Lakehouse Platform
Adopt

Due to the explosion of data volumes and diversity, as well as the explosion of analytical needs, organisations sometimes hesitate between the robustness of a data warehouse and the flexibility of a data lake. By using the Databricks analytics engine, created by the developers of Spark, they no longer have to choose between the two. Lakehouse's cloud platform combines both approaches, providing the performance, flexibility and scalability necessary for analytics and artificial intelligence at scale, and promoting the decompartmentalisation of data and organisations to bring together all data stakeholders. This comprehensive platform has recently added Unity Catalog, for data governance, and Delta Live Tables, for data engineering.

Dataiku
Adopt

Founded in Paris in 2013 and now based in New York, Dataiku was one of the pioneers of data science and artificial intelligence tools. Considered by Gartner and Forrester as one of the leaders in this field, the publisher continues to grow despite very strong competition. Dataiku offers a platform that enables end-to-end management of the design, deployment and maintenance of Machine Learning and predictive analysis applications. This solution owes its success to its focus on features that accelerate the spread of controlled, accepted and responsible AI in the enterprise: collaboration (between data scientists, data engineers, data analysts, business users, etc.), governance (of projects, models, etc.), explainability (transparency, detection of bias, documentation, etc.) and performance at scale, particularly thanks to the cloud.

dbt
Adopt

dbt (Data Build Tool) is an open-source tool for transforming data before its analytical exploitation. This essential step (the T of ELT processes), generally carried out by data engineers using relatively heavy tools, is often a bottleneck. With dbt users build reusable data models that get pulled into subsequent models and analysis. Change a model once and that change will

propagate to all its dependencies, leading to a single source of truth model with all analytics (reporting/AI/Data Science) connected to it making multireporting simple. With fervent support from a growing community and major data players like Databricks, Snowflake and Salesforce, who are all among the investors of dbt Labs, dbt is enjoying meteoric success with over 16,000 enterprise users just five years after its launch in 2017.

Fivetran
Adopt

Fivetran is a cloud-based ELT (Extract, Load, Transform) platform that facilitates the quick and easy creation of data pipelines from any source to cloud-based data warehouses, allowing for reliable and secure data centralisation. In an increasingly competitive field, Fivetran has positioned itself as an industry leader courtesy of new connections and releasing new features (dashboard updates, notifications to any email address, an optimised consumption-based pricing model) on an impressively consistent basis. Furthermore, their acquisition of HVR – a software that enables real-time data replication – means companies will soon have a single vendor to integrate and replicate data across multiple platforms and enterprise-grade databases. For these reasons, we've recategorised Fivetran from 'Assess' to 'Adopt' in the space of a year.
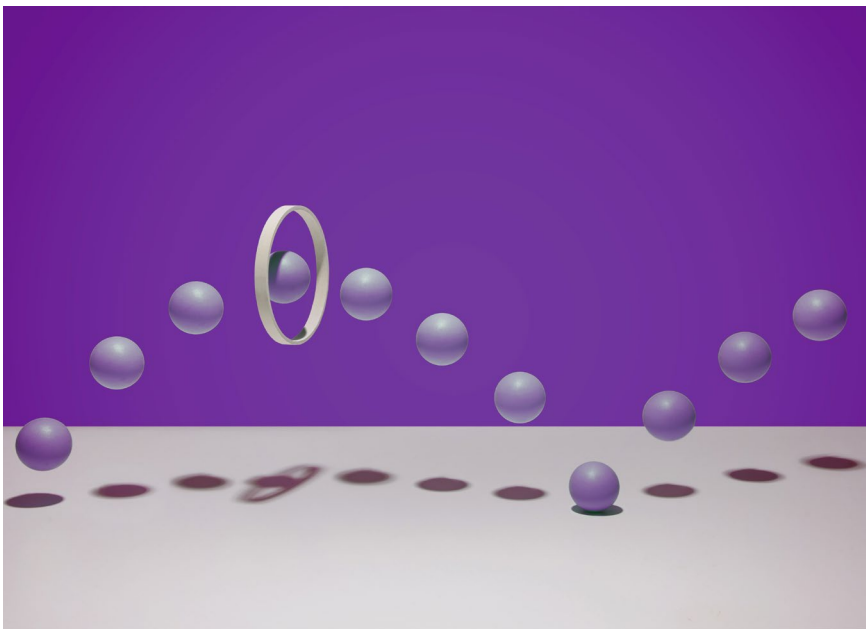
Immuta
Trial

A true leader in data technology, Immuta ensures data access and security at scale with its Data Security platform, where data is identified, secured and monitored within organisations to ensure users have access to the right data at the right time. Its capabilities allow users to seamlessly improve data security and compliance, streamline data access flows or approvals, reduce the volume of policies required with attribute-based access control, and support new data products and data-sharing initiatives. While implementing an effective, centralised data access and security solution is critical for organisations, Immuta clearly stands out for its speed of deployment and ability to integrate with leading cloud data platforms, interoperating with any data catalogue solution already in place and being integrated with major SaaS platforms.

Informatica Intelligent Data Platform
Adopt

Since its inception in 1993, Informatica has continued to innovate to meet the changing data needs of enterprises. Currently, it offers a robust cloud services platform that allows company information to be managed and governed in a centralised, scalable and secure way. This allows clients to have solutions for data integration, data quality, master data management, data catalogue and data governance (among others) from the same platform. As a market leader in data management, Informatica remains at the forefront of emerging methods, such as data mesh, and new issues, such as data governance. With the help of its partners, Informatica has also launched a new business strategy to bring its expensive data integration, management, and governance solutions to all types of customers. Informatica continues to be a solid choice for organisations that want to leverage large, disparate, and siloed data.

Kubeflow
Adopt

As Machine Learning (ML) becomes more widespread, methods are becoming more streamlined and the development cycle now follows a well-established process, from data collection and preparation to training, validation, deployment and maintenance of the model. Kubeflow is an open-source tool for managing this "ML pipeline," which industrialises the model lifecycle and facilitates collaboration between the different actors (data scientists, data engineers, ML engineers). To achieve this, Kubeflow relies on the richness of the Kubernetes ecosystem, which offers tools and an execution environment that are both known and robust. In addition, the use of Kubernetes containers for the models as well

as for all components ensures their portability and scalability. As a pioneer in ML Ops, Kubeflow is one of the most mature solutions in this field.

LOGIQ.AI
Assess

LOGIQ.AI is a full-stack observability data fabric that enables users to manage the entire observability data lifecycle by unifying metrics, events, logs, and traces (MELT data) on a single, cloud native platform with infinite storage scale. Using aggregated log data, performance metrics, indexing data for search, stream processing, and API interactions, LOGIQ.AI enables users to unlock real-time health monitoring of infrastructure and application environments with single-click simplicity. Furthermore, the platform allows users to connect databases (Elastic, Mongo, Druid, MySQL, etc.), to be queried, analysed, and visualised, and can be deployed within the major cloud environments – AWS, Azure, and GCP. Since its founding in 2018, LOGIQ.AI has amassed over $2.55 M in funding and stands as one of the most cost-effective and powerful solutions for data observability on the market.

Matillion
Trial

Large companies have more data to extract, transform, and load (ETL) than ever—but are also facing a shortage of data engineers. Furthermore, enterprise users need fresh data quickly, because in many contexts, data that takes 30 hours to load is old news. Enter Matillion. The Matillion Data Loader is a no-code, drag-and-drop solution that integrates 70+ data sources. It replaces weeks and months of coding and debugging with a few simple clicks. And taking the burden of ingestion and tedious "hand-coding" off engineers' shoulders means they can devote their attention to other important (and more exciting) operations. For enterprise-level organisations, the cost–benefit analysis is clear. However, with only a handful of competitors in this category, keep your finger on the pulse to make sure you're getting the best solution for your needs.
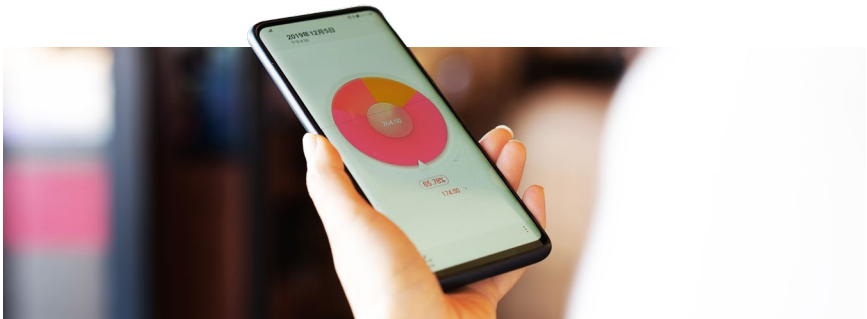
MongoDB
Adopt

MongoDB is a transactional, NoSQL, document-oriented database that can scale horizontally to handle large volumes of data without sacrificing performance. As an operational database, MongoDB isn't designed for advanced analytics, but its elasticity makes database evolution easy, allowing developers to rapidly build products. With real-time ingestion, big data capabilities and model flexibility, MongoDB is a great technology to handle IoT data and data-intensive transactional applications. Thanks to the technology's quick ingestion and response time as dashboard capabilities, users might employ MongoDB for real-time integration use cases, such as cockpit monitoring. The Community version of MongoDB is widely adopted as the preferred backend for open-source websites. In 2022, MongoDB entered a partnership with Google Big Query to create a unified data warehouse offer to address both analytics and operational data in one combined system.

Monte Carlo Data Observability Platform
Adopt

A new data governance tool called Monte Carlo Data Observability Platform has been bringing observability to data. Unprecedented volumes and sources of data are being used to drive everyday business decisions, which means that data downtime due to broken dashboards, ineffective ML, or inaccurate analytics can translate into millions of dollars of lost revenue for large companies. So it has become imperative for data to be accurate, current, reliable, accessible, and easily monitored. Monte Carlo Data Observability Platform offers end-to-end data observability delivered in a user-friendly product. Notable features include ML-enabled data anomaly detection, data lineage for getting to the root of the problem, data quality insights, as well as integrations and interoperability with other data tools. It is proving to be a great solution for monitoring the health of data through its entire life cycle.
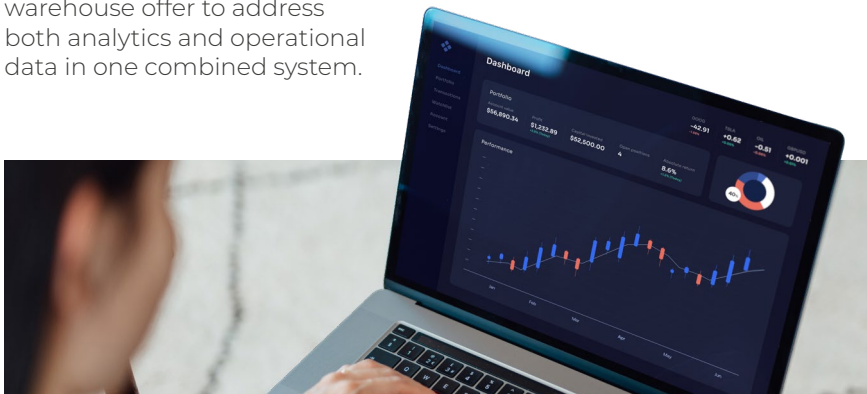
Presto
Trial

Presto (also known as PrestoDB) is an open-source, distributed SQL (Structured Query Language) query engine, built for running rapid, large-scale interactive analytic queries against data sets of all sizes in various siloed data systems in near real-time. Using a simple ANSI SQL interface, Presto enables users to query both relational and non-relational data where it is stored, including Hadoop, Cassandra, Kafka, AWS S3, Alluxio, MySQL, MongoDB, and Teradata, and allows the use of multiple data sources within a single query. Originally developed by Meta (formerly known as Facebook) to scale data size and performance, Presto was released under the Apache License in 2013 and has since been widely adopted by multiple international enterprises including Airbnb, Netflix, Alibaba, and Uber.

Snowflake Data Cloud
Adopt

While data has become the fuel of business, we often overlook the multitude of technical and organisational obstacles that stand between this statement and reality. Snowflake offers a solution to remove these obstacles and enable every organisation to be data-driven. Built from the ground up for the cloud, Snowflake's platform aims to cover the entire data lifetime cycle, from source to end-user, facilitating collaboration between actors (data engineers, data scientists, business analysts), the creation of innovative use cases and their near-infinite scaling. Despite a growing spectrum of use cases (cybersecurity data and transactional data have recently been added), the Snowflake platform remains one single product that is easy to use and scalable, making it suitable for both small organisations, which lack IT and data skills, and large accounts, which can exploit its full potential.

Starburst
Trial

Any medium-to-large business relying on large volumes of siloed data will need a data virtualisation tool. A good contender is Starburst. It allows users to query data in situ, which means users don't need to migrate their data to a single platform. It lets users across the entire organisation access data quickly and easily. However, a solid architecture strategy is needed to implement this technology to avoid potential issues, such as going decades back and connecting data directly from where it resides – since legacy systems will not support at a good scale. Therefore, connecting Starburst to any data lake/data warehouse is still the best approach. This tool offers incredible value for abstracting all those systems and connecting all the information in one place without requiring significant engineering expertise. Starburst is already part of the new data-mesh paradigm shift.

Tableau
Adopt

A visual data exploration tool that enables data discovery, preparation, analysis, presentation and sharing of results with tremendous ease, Tableau has been ranked among the leaders in analytics and BI platforms for years by Gartner. Since its acquisition by Salesforce in 2019, Tableau has been investing heavily to adopt a "cloud first" approach, which will be realised in 2022 with the launch of Tableau Cloud (formerly Tableau Online), available with all major cloud providers. Artificial intelligence is also at the heart of several recent features such as Data Stories, which explains results in an editorial format, Explain Data, which details the origins of a piece of data, and the predictive tool Einstein Discovery. All of these innovations aim to take data out of the hands of specialists and make it available to as many people as possible.

Talend Data Fabric
Adopt

Talend Data Fabric is a complete platform for data integration, data management, and data quality. Talend allows users to build, deploy, and manage data pipelines to extract, transform, and load data from various sources (databases, cloud applications, big data platforms, etc.) into multiple target systems. Originally comprised of several different data products, Talend has now built a fully comprehensive data fabric that can manage the full data lifecycle ensuring smooth cloud migration and access to a range of features that make data integration tasks easy, for Cloud, multi-cloud and hybrid cloud environments. A key component of the Talend Data Fabric platform is TrustCore, which helps organisations secure their data and keep it compliant, enabling them to meet industry or regulatory standards.

Transform.co
Assess

As companies scale and create massive data lakes, managing KPIs becomes an enormous headache. When you have thousands of KPIs to manage, traditional approaches are too disjointed and inefficient for the job, especially since the KPIs are dispersed across multiple analytics platforms. For this reason, many enterprise-level organisations find "metric stores" appealing. A metric store allows companies to centralise all their KPIs onto one single-source-of-truth platform where they can design, manage, deploy, version, and communicate all these KPIs. While there are a couple of other purpose-built tools on the market, Transform.co deserves some attention. Co-founded by a former Airbnb product manager for all infrastructure, Transform.co shows promise in its ability to provide customers with the

accuracy, accessibility, efficiency, and convenience they crave for managing all their KPIs at scale.

Vertex AI
Adopt

Vertex AI is a Google Cloud product for building, deploying, and scaling ML (machine learning) models and AI applications faster, with fully managed tools for any use case. It covers the full MLOps life cycle with a Unified UI for the entire ML workflow including metadata tracking, identifying the best model for a use case, model versioning, feature management and open-source frameworks support such as TensorFlow, PyTorch and scikit-learn. Using Vertex AI users can train models, test them then deploy them and get predictions. Vertex AI Workbench provides a single environment for data engineers, data scientists, and machine learning engineers, allowing teams to work together using a single set of tools. Vertex AI includes AutoML and custom training in one unified data and AI platform. Vertex AI provides an easy-to-use, drag-and-drop interface and a library of pre-trained APIs for natural language, vision, video, and more.
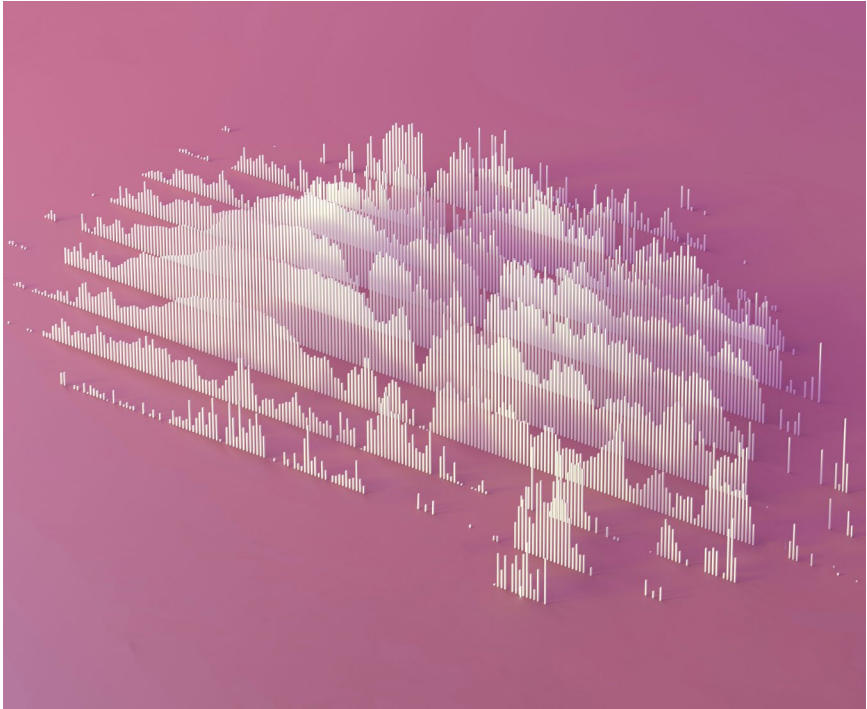
When tech meets data factory

How to become fully data-centric to drive business growth

Who is the organisation and what's its context?

The international organisation is a renowned multi-brand retail company that produces and sells wine and spirits to millions of customers every day, with a network of over 5,500 stores worldwide. The volume of sales, and therefore data management, is considerable to handle production, delivery, customer service, etc. The company eventually decided to move to a Google cloud-based strategy to better collect, absorb and analyse data, which would improve the way they handle data mining and the speed with which they can leverage it.

What needs did the organisation face at the time?

Due to the massive amount of data related to the global production/delivery chain of products, the organisation needed to improve and accelerate data access in order to remain active and responsive. Standard file data reports and limited tools used, varying from brand to brand, made it nearly impossible to get a complete picture of product volumes. Real-time, streamlined and simplified data mining eventually became inevitable to take operations to the next level. The key to this modernisation? Using the Cloud to implement segmentation by activity, brand, country, business unit, domain, products, etc. at the largest possible scale.

What was the turning point where the organisation had no choice but to adapt its strategy?

Collecting all the data from various systems, including SAP, along with its history, took some time before it was fully operational. The difficulty of having a global view in real time impacted the analysis of this data and hindered the fluidity of the decision making process.

Which factors played an important role in the decision to create a Data Factory?

- **Migrating to Google Cloud to serve the business:** the Cloud exploitation was the fundamental base and the essential step to manage the massive volume of data of all the entities worldwide. This tech would maximise the knowledge

and exploitation of data, saving a considerable amount of time for the analysis of the data.

- **Implement a Data Mesh to simplify collaboration and self-service:** the segmentation of data – by business, product, service, etc. – allows to get out of a central Data Lake logic. Instead, the Data Mesh allows each domain to take charge of its own data pipeline and manages a large volume of data sources to process them quickly. The creation of a freshly organised Data Lab team based on use cases could ease the deployment of a Data Catalog, thus facilitating the understanding of new data assets and the decision making process.

What were the immediate benefits for the organisation's clients or employees?

- Migration to the Cloud for greater agility
- Creation of 50+ use cases allowing the different business lines to save time and reinforce the use of data
- Creation of data products and data catalogues in a data factory fed by almost 40 different sources of data
- Facilitation and elasticity of data processing
- Reinforce the maturity of information sharing

That extra mile that made all the difference

"Setting up a Data Factory operating in agile mode with squads in charge of delivering and evolving Data Products is key to getting the business on board, gaining their trust and taking the Data culture to scale."

CTO at the organisation
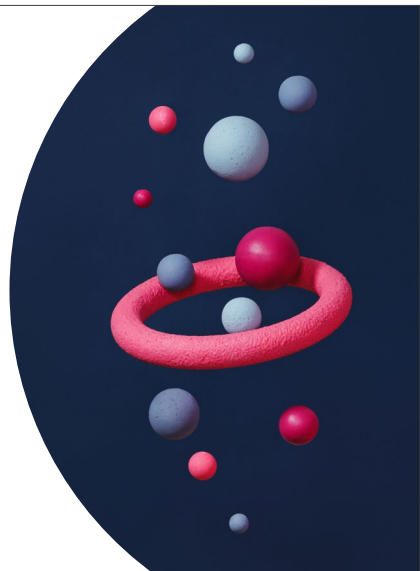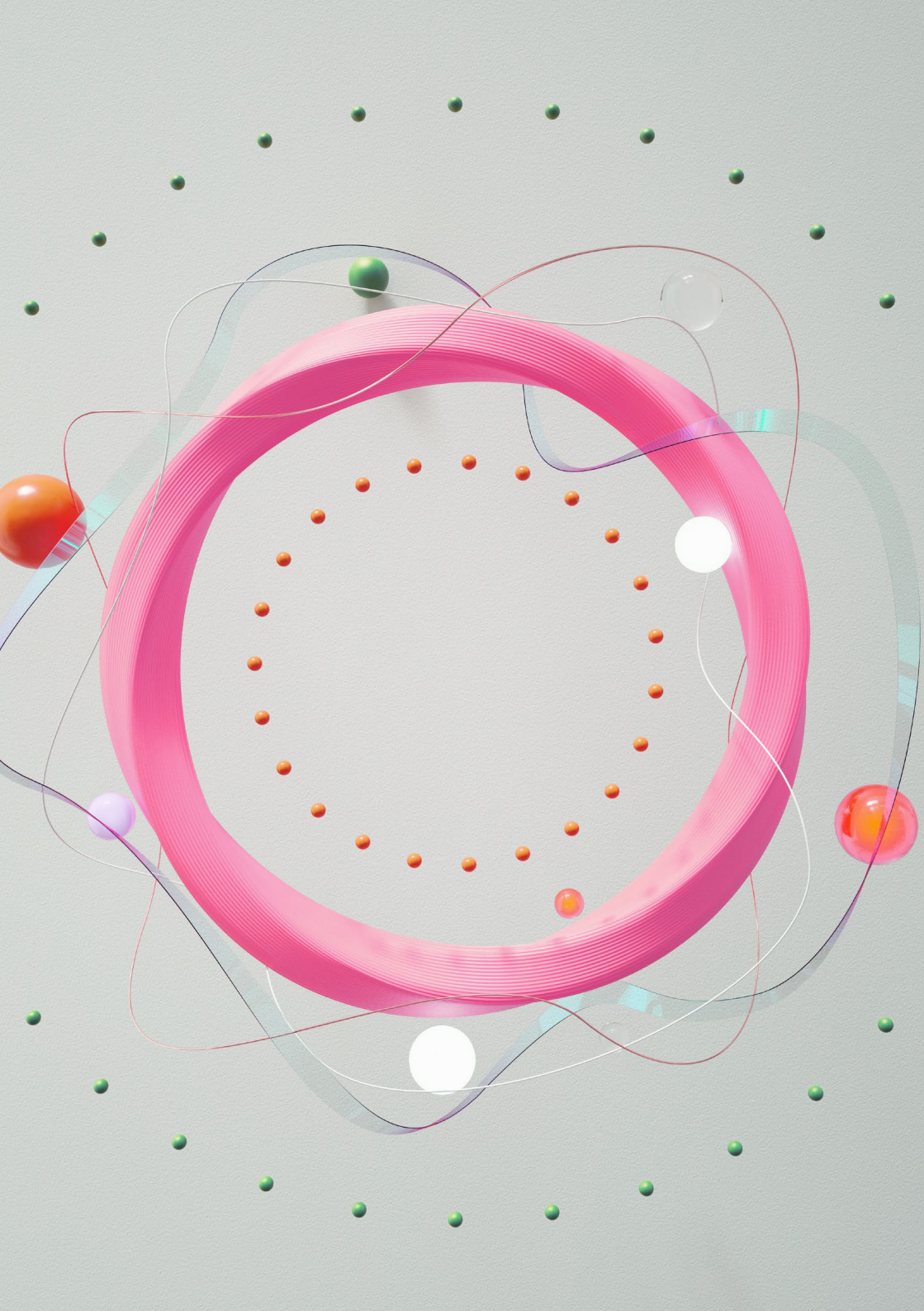
ChatGPT, What's the Hype about?

The AI tool that's been creating the most buzz recently is ChatGPT, an open-source generative AI chatbot. Generative AI refers to algorithms capable of producing new content such as audio, code, images, text, simulations, and videos. In particular, ChatGPT is capable of understanding and generating human-like natural language with unprecedented accuracy and fluency. In fact, here's a description generated by ChatGPT itself:

"ChatGPT is an advanced language AI model created by OpenAI. It generates human-like text based on input data and prompts, making it ideal for customer service, language translation, and content creation. Its ability to understand context and produce coherent responses sets it apart in the field of generative AI."

Who Will Win the Race to Market?

Though still in its beta phase, ChatGPT has proven to be a powerful tool for text generation/processing. However, this development is just one aspect of the larger emerging trend toward generative AI, with new contenders preparing to enter the field. **Microsoft Azure** now offers a similar GPT service, though users are currently required to submit requests with their use case for approval before receiving access. GPT is also used by GitHub in its copilot service of AI pair programming, that is, code generation. Additionally, Google plans to release, in 2023, its own AI service based on transformer models, **Bard**, in answer to – and in direct competition with – ChatGPT.

What's Next for Generative AI?

The field of generative AI based on transformer models is growing at an expeditious rate, and **we expect to see more exciting developments in the near future, particularly in 2023, which is expected to be the year that GPT becomes enterprise-ready – be it ChatGPT, Microsoft, or Google.** In line with this prediction, we hope to feature one or more of these cutting-edge technologies as they mature and become available for enterprise use in the 2024 TechRadar.

Put forward by
Philippe Bournhonesque,
VP Innovative Development

TechRadar

Distributed Cloud

Harness the power of your decentralised
infrastructure to unlock a limitless future.
Embrace cloud as your foundation
for becoming a "digital company."

Managing foreign access with Sovereign Cloud

Data is power in a modern data economy. As a result, cloud services are invariably in the spotlight. Essentially, it's about data: where does it live, where does it flow, and who controls it?

Sovereign Cloud is hot right now – here's why...

EU corporations and organisations store more data in cloud data centres. The EU wants to reduce its reliance on foreign corporations and sees cloud computing as a driver of AI and other technologies. EU rules such as GDPR, Data Act, and Data Governance Act govern cross-border data flow to prevent non-European agencies from accessing data. The guidelines require storing sensitive data on sovereign territory. Now, Chief Data Privacy Officers should know what data is stored in the cloud and if it is transferred outside the EU.

Public clouds are useful for information not subject to data sovereignty regulations, but compliance needs a hybrid or private solution. Private clouds can meet data sovereignty needs, but they need dedicated data centres maintained by the company or a provider with dedicated hardware and are costly and time-consuming. Factors to consider include jurisdictional control, local oversight, data portability and customisability.

Data sovereignty is thus addressed with sovereign clouds. It's like a semi-private cloud that combines public and private features. Using a sovereign cloud is like using a private cloud without the IT headaches.

## Devoteam's Recommendation to get started on Sovereign Cloud

Protecting data as a new strategic asset necessitates sovereign clouds to use data wisely. Customers seek cloud benefits but must also fulfil fast changing data privacy rules, while organisations safeguard cloud data from cyberattacks. As these rules affect business operations, companies are looking for better ways to comply and avoid risks. They require a secure, local platform to store and analyse data without outside intervention.

Sovereign cloud should be considered as part of the cloud strategy of any organisation that deals with sensitive data. It is likely that regulations will change and become more strict over time. This is the time to start preparing how to handle these regulations. That should be driven by the owner of the data in the organisation, the compliance team and the IT team, to create a cloud strategy that can cater to different kinds of needs.

A few quick recommendations are to:

- **Assess your data and manage all risks:** including data sovereignty and foreign access threats.
- **Assign** a Chief Data Privacy Officer or Data Guardian.
- **Adopt** the Cloud Smart approach.
- **Consult with an expert** for multi-cloud strategy advice.

As a result of this, the sovereign cloud should be incorporated into an overall multi-cloud strategy. Data isn't all the same, and clouds differ from one another. Taking the sovereign cloud into consideration is a smart move for your cloud strategy as it helps adjust to the current regulatory maze. Sovereign cloud thus not only provides flexibility and scale for data storage and processing, but also helps in complying with residency and sovereignty requirements.
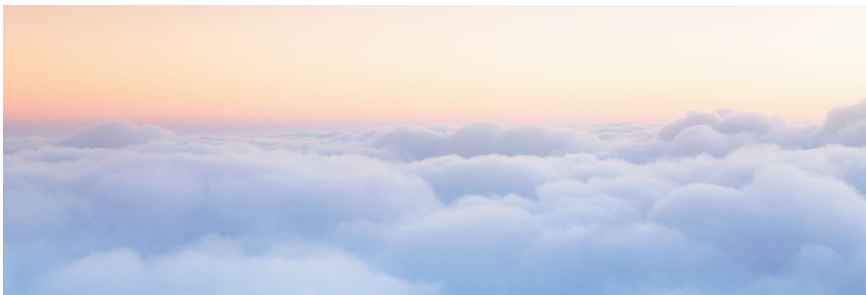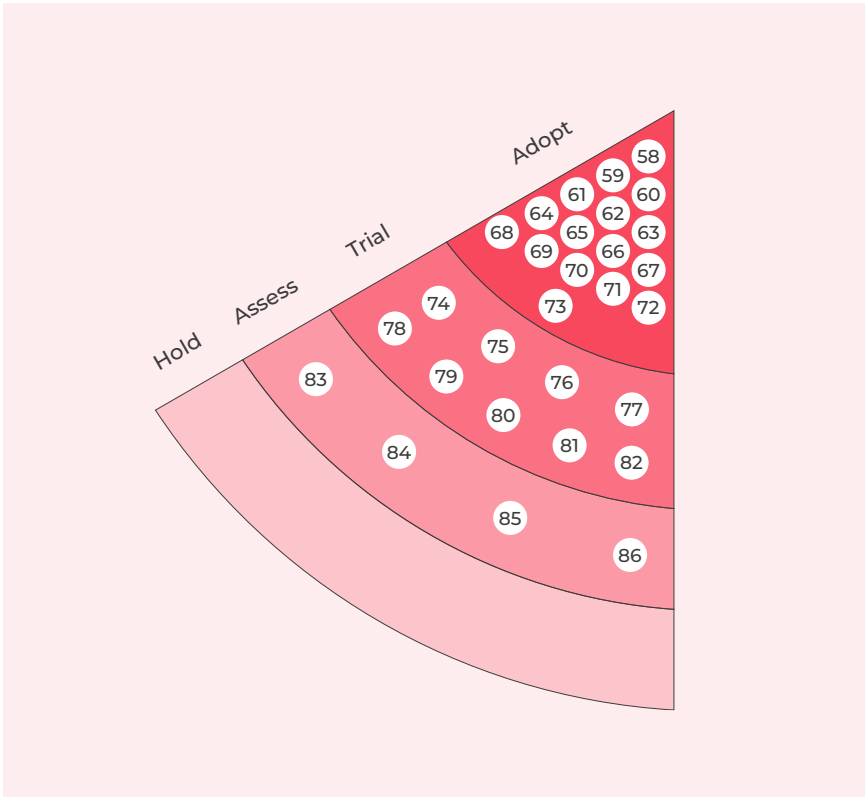

Put forward by **Gert Jan van Halem**, CTO Devoteam Netherlands

Distributed Cloud
at a Glance

At the opening keynote of a recent conference of a major analyst firm, the word "cloud" was not mentioned once. That's no accident. **The cloud is now so ubiquitous, so inevitable,** that there is no need to mention it. Doing so would bring focus to technology and infrastructure, when it is now more crucial to target business model transformation. After disrupting technology, the cloud is about to disrupt business.

This does not mean that nothing is happening on the technology side, as this TechRadar 2023 amply demonstrates, but it is a sign of a certain maturity that allows it to regain its place in the background. **This cloud maturity is mainly due to the maturity of one technology in particular, Kubernetes, which, despite its complexity, is emerging as the cornerstone of all cloud native systems.** Most of the technologies in these pages are either based on Kubernetes or are intended to make it more manageable for enterprises. In general, **there is a widespread desire to make cloud technologies** easier to implement and to make them the answer to today's major challenges. The offer is becoming more and more refined, with ready-to-use, standard components and a verticalisation logic that will culminate in the appearance of industrial clouds and business-oriented platforms.

However, it is at the very moment when the cloud is coming of age that the next stage is already taking shape. **The need to bring intelligence closer to objects to relieve network congestion and minimise response time will accelerate the rise of edge computing.** But in many ways, the Edge is the exact opposite of the cloud: one is decentralised, the other centralised; for one, resources are fixed and limited; for the other, extensible and virtually unlimited; the data of one is ephemeral, the data of the other is durable. In short, **Cloud and Edge** are based on very different technologies, concepts and methods. Yet they must work in close symbiosis, and we are already seeing the emergence of **technologies that seek to bring about this fusion.**

Adopt

58. Ansible
59. Anthos
60. AWS Nitro ᴺ
61. Buildah ᴺ
62. Fluentd ᴺ
63. HashiCorp Consul ↑
64. HashiCorp Terraform
65. Helm
66. Istio
67. Kasten K10 ᴺ

68. Knative ↑
69. Kubernetes
70. Linkerd ᴺ
71. Longhorn ᴺ
72. Portainer.io
73. SUSE Rancher ᴺ

Trial

74. Crossplane
75. DCaaS ᴺ
76. eBPF ᴺ
77. GKE Autopilot
78. KubeVirt ᴺ

79. KuboScore ᴺ
80. Pulumi ↑
81. Talos Linux ᴺ
82. VMware Cloud Foundation

Assess

83. AWS Application Composer ᴺ
84. EdgeX Foundry ᴺ
85. Kyverno ᴺ
86. MinIO ᴺ

ᴺ New addition   ↑ Ascending technology

Ansible
Adopt

Ansible is an open-source community project supported by Red Hat. It is also the most popular tool for configuring, orchestrating, managing and automating IT infrastructures. As its market share continues to grow in a context of strong demand for IT Automation and Infrastructure as Code (IaC), Ansible Automation Platform 2, launched at the end of 2021, which could allow Ansible to consolidate its position against its competitors Puppet, Chef and Salt. Replacing the former Ansible Engine and Ansible Tower, Ansible Automation Platform 2 is a complete and enhanced suite of tools and components to build, deploy, and manage end-to-end enterprise automation solutions at scale. As the de facto solution for enterprise IT automation, it provides a flexible and stable foundation for automation from the hybrid cloud, to container environments, security and networks.

Anthos
Adopt

Anthos is a hybrid cloud platform created by Google in 2019 to allow organisations to build, deploy, and manage applications, clusters and infrastructure across a variety of environments. It includes features such as deployment automation, container orchestration, and infrastructure management, as well as integrations with numerous popular tools and services, such as Istio and Ingress. Anthos is particularly well-suited for organisations that want to leverage the benefits of the cloud, such as scalability, flexibility, and cost-efficiency, while still maintaining complete control over their applications and infrastructure. It is also great for organisations that want to adopt a cloud native development approach, and build and deploy modern, containerised applications and microservices. Recently, Google has extended Anthos to include support for virtual machines (VMs), called Anthos VM Runtime, allowing users to run VMs on top of Kubernetes in the same way that they run containers.

AWS Application Composer
Assess

It is so much easier to build an application when users can see what they're building. That's the premise behind Amazon's new service, AWS Application Composer. It's a visual drag-and-drop builder that lets users design an application consisting of multiple AWS services. This allows developers to focus on functionality first without getting buried in lines of code. Application Composer offers this visual-first approach without sacrificing infrastructure-as-code (IaC) best practices. In fact, the service translates the entire architecture into IaC definitions in the visual editor, or enables it to be exported to perform tests, reviews, version control, and more. AWS Application Composer fulfils the DevOps philosophy of "You build

it, you run it." Plus, it's enterprise-ready, serverless, and pay-per-consumption, and users can rest assured their code is running in a safe, reliable place.

AWS Nitro
Adopt

Launched in 2017, the AWS Nitro System combines purpose-built hardware, purpose-built software, and a hypervisor. It features a series of Nitro Cards and a special Nitro Security Chip. These Nitro Cards offer innovative functionalities, such as network-attached storage with industry-leading bandwidth and innovative hardware root of trust. The Nitro Security Chip has built-in security that is mathematically proven to be unattackable. In fact, this chip has been designed with AWS' "Verifiable/Provable Security" approach, which provides an unforeseen level of security through automated reasoning and built-in security processes. The hypervisor provides strong resource isolation and offers a level of performance that is incredibly close to a bare metal server. Together, this system provides unprecedented reliability, performance, and security, while also removing complexities and room for human error.

Buildah
Adopt

Buildah is an open-source, Linux-based command-line tool developed by RedHat that is used to build Open Container Initiative (OCI)-compatible images through a lower-level Coreutils interface. Buildah makes it possible for developers to use tools like Docker, Podman, or Kubernetes to build efficient container images from scratch, from a container pulled from a registry or using a Dockerfile without the need to execute a container runtime daemon. The key advantage of Buildah lies in its ability to enable the use of ephemeral CI/CD runners into Kubernetes, which isn't possible with tools like Docker Build. Distinguished by its flexibility and efficiency, Buildah allows containers to be mounted, modified, or deleted, and images to be saved based on the updated containers, can be easily incorporated into scripts and build pipelines, and features a rootless mode for enhanced security.

Crossplane
Trial

Crossplane allows users to provision, compose, and consume infrastructure in any cloud service provider using the Kubernetes API, making it possible to create resources on the cloud using simple YAML manifests, and integrate with CI/CD or GitOps pipelines. Unlike most competitors, Crossplane is a control plane that both solves scaling issues with multiple teams, projects, and infrastructure assets, and ensures consistent collaboration/loose coupling across large agile organisations in SAFe model with multiple independent feature

teams. In the Crossplane Resource Model, each infrastructure element is an API endpoint that supports all types of operations, with no need to compute a dependency graph to make changes, allowing users to easily operate on a single database, even if they manage their entire production environment. While Crossplane remains limited to managing K8s infrastructures, there is a real opportunity for large organisations that are seeking to evolve their monolithic terraforming model to a distributed model.

DCaaS
Trial

Datacenter as a Service (DCaaS) is a prepackaged solution of cloud services, providing a pooled OVHcloud resource to their clients, which includes datacenters delivery on premises, hardware setup and full client support (storage, network, data base, etc.). Unlike the majority of market players, OVHcloud is based in France and on a human scale, which allows their DCaaS solution to address major French companies' data challenges (CAC40) in complete reliability and confidentiality, and in respect of governance and network sovereignty. While securing the clients' datacenters in a sovereign, green and trusted environment, DCaaS enables the transformation of clients' CAPEX investments into predictable costs of reversible services (OPEX), the capitalisation on investments by taking advantage of the OVHcloud IaaS and PaaS catalogue, and ensures the clients' benefit from the latest technological improvements and a fully optimised equipment lifecycle.

eBPF
Trial

While the operating system has always been the ideal place to implement security, networking, and observability features, its complicated infrastructure, and abstracted layers make modifying kernel source code or adding modules extremely challenging. This is where the eBPF comes in. eBPF (Extended Berkeley Packet Filter) is a kernel technology allowing programs to run without modifying the kernel source code or adding additional modules. eBPF works by allowing sandboxed programs to run within the operating system, which in turn allows application developers running eBPF programs to add additional capabilities to the operating system at runtime. Then, with the aid of a Just-In-Time (JIT) compiler and verification engine, the operating system ensures safety and execution efficiency as if natively compiled. Common use cases of eBPF include full stack observability, container security, image assurance, runtime threat defense, performance troubleshooting, and much more.

EdgeX Foundry
Assess

EdgeX Foundry is an open-source software from the Linux Foundation that provides a common framework for building, deploying, and managing edge computing systems

that are flexible, scalable, and interoperable. EdgeX works by securely connecting the enterprise IT environment to different IoT devices, transforming the information from the device to IT applications, enabling commands to be sent to the devices, and allowing data processing and analytics at the edge, in addition to scanning containers and cloud infrastructure for potential vulnerabilities. Based on microservices, it exposes APIs for full control together with numerous device protocols (MDTT, Modbus, etc.) and can be customised to meet different organisational needs and use cases. Backed by a robust ecosystem, EdgeX is currently at its 11th community release, and is considered to be a mature technology, suitable for deployment at scale.

Fluentd
Adopt

Fluentd is an open-source log collector, processor, and aggregator developed by Treasure Data to solve common logging challenges such as formatting unstructured data, aggregation from multiple data sources, resiliency, etc. Written in Ruby, Fluentd creates a unified logging layer capable of aggregating data from multiple sources, unifying the differently formatted data into JSON objects, and then routing it to different output destinations to build centralised, reliable, and efficient

logging pipelines. Designed for performance and scalability, a Fluentd deployment runs on 40 MB of memory, is capable of processing over 18,000 events/second, and is considered the log aggregator of choice for Kubernetes. Since its release, Fluentd has developed a rich ecosystem of over 650 built-in and community-contributed plugins, and is currently trusted by more than 5,000 data-driven enterprises worldwide.

GKE Autopilot
Trial

The Autopilot mode in Kubernetes Engine (GKE) removes the complexity from the time-consuming process of managing Kubernetes clusters. Via Autopilot, Google manages cluster configuration, including nodes, scaling, security, and pre-settings. As GKE manages infrastructure, time can be freed up for the building and deploying of applications. At the same time, security patches are applied to nodes when available and adhere to already configured maintenance schedules. Additionally, because GKE manages them, users aren't billed for unused capacity on their nodes. The same goes for system Pods, OS costs, and unscheduled workloads. Some customisability is lost through GKE Autopilot, but recent updates have made it possible to run specialised workloads using GPUs and fault-tolerant workloads via Spot Pods.

HashiCorp Consul
Adopt

Heterogeneity is probably the term that best characterizes modern distributed environments. With Consul, HashiCorp addresses the need to know and interact with the myriad of services that run locally on virtual machines or as containers in the cloud. HashiCorp Consul maintains a centralised dynamic registry (i.e., a service catalogue) of all services in real-time in an automated fashion, allowing them to be discovered, located, and their availability and health status to be known at all times. HashiCorp Consul also controls access to services and secures their interconnections (Secure Consul Agent Communication with TLS Encryption). Finally, HashiCorp Consul allows users to automate certain network tasks such as load balancing (Automate load balancers). Open source and agnostic, HashiCorp Consul can be deployed on any platform or on the cloud platform of the editor, HashiCorp Cloud Platform (HCP).

HashiCorp Terraform
Adopt

HashiCorp Terraform is an open-source infrastructure as code (IaC) tool that enables developers to define, modify and version infrastructure in a safe, efficient, and reusable manner. Using the HashiCorp Configuration Language (HCL), developers can define their desired infrastructure,

for which Terraform will generate and execute a plan to achieve using two key concepts: providers, to establish gateways to the necessary resources, and modules, reusable infrastructure components. In particular, HashiCorp Terraform provides DevOps teams with greater flexibility and versatility to build, deploy and manage standardised infrastructure across hybrid and multi-cloud environments. A highly mature technology, Terraform is quickly becoming the IaC tool of choice with a registry that includes over 1800 providers and more than 8400 modules and, with the release of version 1.3 in September 2022, has further improved the extensibility and maintainability of Terraform modules.

Helm
Adopt

Helm is an open-source package manager that simplifies the defining, deploying, and managing of applications on Kubernetes across their entire lifecycle. With Helm, users can easily create and manage all resources attached to a Kubernetes cluster using a package of pre-configured templates known as a Chart, which can be easily versioned, shared, and managed in repositories, enhancing collaboration and efficiency. Additionally, Helm provides a command-line interface (CLI) for managing charts and performing common tasks such

as installing, upgrading, and uninstalling applications. In essence, Helm makes application deployment simple, standardised, and reusable, thus increasing developer productivity, reducing complexity, improving operational readiness, and accelerating the adoption of cloud native applications. Helm is a graduated project of the Cloud Native Computer Foundation (CNCF) since 2020.

Istio
Adopt

The more distributed architectures expand, the more difficult it becomes to know and manage the exchanges between microservices. A service mesh is a dedicated infrastructure layer, directly implemented in the application. By intercepting incoming and outgoing packets, it provides observability, traffic management, regulation and security capabilities. Thus, the technical aspects are decentralised at the application level and can be managed by developers without strong skills, or even automated thanks to templates established by the architects. A pioneer in service mesh, Istio is a robust and proven open-source solution integrated with Red Hat's OpenShift. Facing competition from Cilium in particular, Istio continues to innovate, with, for example, the possibility of using eBPF technology for better performance.

Kasten K10
Adopt

Acquired by Veeam Software in 2020, Kasten is a leader in data backup, disaster recovery, and mobility for Kubernetes, and the developer of the Kasten K10 platform. Kasten K10 is a Cloud Native data management platform for Day 2 operations, that provides a simple, scalable and secure system for backup/restore, disaster recovery, application migration, application copy management, and mobility for Kubernetes applications whether public cloud or on-premise. The platform provides a native Kubernetes API and includes features such as database integrations, automatic application discovery, multi-cloud mobility, integrated observability and monitoring, and comprehensive end-to-end security including enterprise-grade encryption, identity, and access management roles, role-based access controls, and more. Distinguished for its operational simplicity, Kasten K10 stands out as a policy-driven and extensible solution capable of delivering consistent backups across microservices, while eliminating the need to write and maintain time-intensive scripts.

Knative
Adopt

The serverless cloud model relieves developers of technical concerns and reduces computing resources, and their cost, to the bare essentials. Knative's goal is to bring this dual benefit to Kubernetes environments. To do this, Knative adds components to Kubernetes that enable the deployment, management and execution of containerised applications, in particular Serving and Eventing. Knative eliminates server provisioning and management tasks, allowing developers to focus exclusively on the business side of their code. Accepted by the Cloud Native Computing Foundation in March 2022 and supported by many companies (Google, VMware, IBM...), Knative is one of the most popular and promising open-source projects today.

Kubernetes
Adopt

Does Kubernetes still need to be introduced? In just a few years, the open-source container orchestration platform has become so essential that it has been dubbed the "OS of the cloud." Born in the fold of Google and now overseen by the Cloud Native Computing Foundation, Kubernetes (K8S) automates the deployment, management and scaling of containerised applications, independent of the underlying cloud infrastructure. Kubernetes therefore plays a key role in the widespread use of cloud and microservices architectures. This is why the platform is now supported and offered by the vast majority of cloud providers and software vendors. This enthusiasm ensures that

Kubernetes is supported by a large and dynamic community and a growing ecosystem of related solutions. Faced with the skills gap, Devoteam supports its customers with over 200 certified employees.

KubeVirt
Trial

KubeVirt is an open-source project originally developed by RedHat to help facilitate the move from virtual infrastructure to a Kubernetes and container-based infrastructure by enabling Kubernetes to provision, manage, and control Virtual Machines (VM) alongside container resources. Using Kubernetes' Custom Resource Definitions (CRD) API, KubeVirt allows Virtual Machines (VMs) to be run and managed as pods inside a Kubernetes cluster and features the same native constructs of Kubernetes – scheduling, storage, networking, monitoring, and tooling – using kubectl. As a result, KubeVirt not only enables developers to use their existing Kubernetes toolset to natively manage VMs, it also ensures that organisations and DevOps teams have the space

and flexibility to utilise a single infrastructure framework and leverage modernised and more efficient workflows.

KuboScore
Trial

With so many companies adopting Kubernetes to run workloads, we see many tools are entering the market to assist with the various challenges that arise with managing the clusters. KuboScore, created by French company Kubo Labs, is a tool that helps ensure that clusters are configured using proper production-environment parameters. KuboScore is especially helpful for configuring clusters according to best practices for security, performance, and resiliency. To name just one use case, companies can use KuboScore to configure role-based access control (RBAC) and detect misconfigurations, so that the right users have the right privileges – which is crucial to security. KuboScore can connect to any type of Kubernetes cluster in all major public or private clouds. It offers high-level analyses for free, and more detailed ones for a fee.
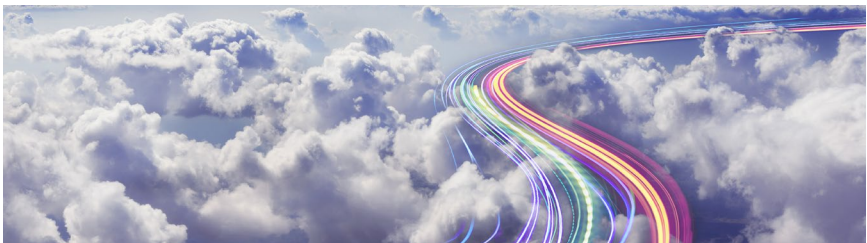
Kyverno
Assess

Few Kubernetes enthusiasts get excited about policies. But the reality is, standardising configuration practices in Kubernetes is critical. Especially in larger companies with hundreds – even thousands – of developers. Kyverno is an open-source tool that allows users to enforce rules, parameters, and other policies to ensure best practices and consistent engineering quality across the entire Kubernetes environment. Over 200 policies can be readily applied—pod tagging and description practices, root privileges, maximum allowable disk space, and more. Once a company adopts Kyverno, it is easy to work with because it is Kubernetes-native and doesn't require learning a new language. Standardisation with Kyverno delivers many business benefits, including faster onboarding, infrastructure cost control, auditing capabilities, and risk management. Kyverno was accepted into the Cloud Native Computing Foundation in 2020 and is at the "Incubating" maturity level.

Linkerd
Adopt

Microservices architectures continue to evolve and service-to-service communication has become a significant challenge to manage. As enterprises scale and add more microservices, they may encounter complexity issues, performance bottlenecks, and compromised security in their distributed system. Now is the time to consider a service mesh for improved resiliency and security. A service mesh is a dedicated infrastructure layer for facilitating service-to-service communication within a microservices architecture. Linkerd is an ultra-lightweight open-source service mesh that adds critical security, observability, and reliability features. It is a CNCF graduated project that is experiencing rapid growth and competes with Istio and Consul. Linkerd has a reputation for being the easiest to configure and operate due to its simple architecture, flexibility and minimised resource requirements. Linkerd is also known for its high performance, as demonstrated by benchmarking tests.
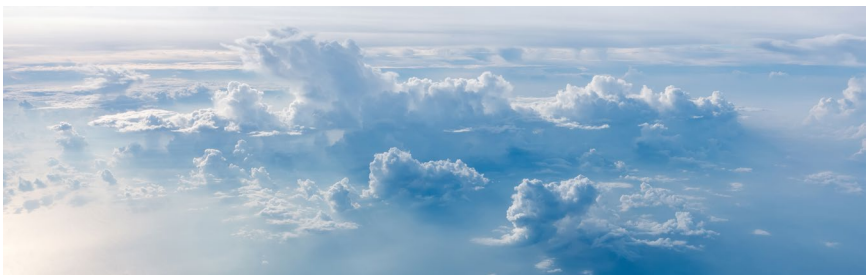
Longhorn
Adopt

Adding replicated storage to Kubernetes clusters has historically been challenging for DevOps practitioners. As a result, most non-cloud-hosted Kubernetes clusters don't support persistent storage, while external storage arrays are typically non-portable and expensive. That's where Longhorn comes in. Longhorn is an open-source, cloud native distributed block storage system that enables users to secure, provision and back up their storage across any Kubernetes cluster. In addition to persistent block storage, Longhorn delivers features like incremental snapshots and backups for data safety and cross-cluster disaster recovery. Known for its ease of use and scalability, Longhorn can be easily deployed and upgraded using Helm Charts or CLI (kubectl). Longhorn was initially developed by Rancher Labs and SUSE Development until it was donated to the CNCF in 2017.

MinIO
Assess

Object storage is an approach to managing data that differs from traditional file or block storage systems. Because the architecture is flat, highly scalable, and highly available, it is critical to business cases that handle massive volumes of data. Cloud-based object storage, such as the popular AWS Simple Storage Service (S3), has been around for a while. But in 2016 one solution, MinIO, emerged as a Kubernetes-native open-source option for on-premise software stacks. Like S3, MinIO uses buckets to organise objects, while also being fully AWS S3-compatible. MinIO is enterprise-ready, excels in literally any environment, and is known for its performance, resilience, and security. With its state-of-the-art encryption, it meets the strictest compliance requirements. Currently, no equivalent exists, and MinIO is deployed across all industries, from financial and insurance to automotive and military defence.

Portainer.io
Adopt

Portainer is an easy-to-use centralised platform that allows for the efficient deployment and management of containerised applications and services. The beauty of Portainer is in its simplicity, allowing for container management without in-depth knowledge of the command line. Key features include a user-friendly interface, simplification of single and multi-cluster container deployments, and standard templates and default configurations. Portainer supports Docker, Swarm, Nomad and Kubernetes, allowing for hybrid, multi-cloud, multi-cluster, and multi-device container management. As the most feature-rich and user-friendly container management GUI on the market, any organisation

working towards large-scale multi-cloud containerised environments should seriously consider adding Portainer to its arsenal.

Pulumi
Trial

Pulumi is an Infrastructure-as-Code platform (IaC) that allows users to build cloud-based applications and infrastructure in the programming language of their choice and even allows for deployment on any major cloud platform or Kubernetes. Pulumi provides a set of APIs and libraries that can be used to create and manage resources on popular cloud platforms, such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform. It also includes features such as version control, team collaboration, and integrations with popular tools and services. With Pulumi, users can even define policies using code that can help enforce standards and best practices for the deployment and management of cloud-based resources. Recently, Pulumi has added a service option to their offering called Deployment-as-a-Service (DaaS) that allows developers to automate the deployment and management of cloud-based applications and infrastructure using code.

SUSE Rancher
Adopt

Rancher is an open-source software platform designed to simplify the process of running multiple clusters in production, whether it's physical servers on-prem, VMs in the cloud, hosted Kubernetes clusters like EKS or GKE, and even on the edge. Rancher provides the entire software stack needed to manage multiple clusters in production across four key components: Infrastructure Orchestration, Container Orchestration and Scheduling, Application Catalog, and Enterprise-Grade Control. Furthermore, the solution consolidates all clusters into a single, managed Kubernetes Cloud with centralised authentication, access control, and observability, in addition to delivering security, lifecycle management, cluster templates, specific CLI, and continuous delivery. As an open-source solution with zero lock-in, SUSE Rancher stands as a versatile and cost-effective solution for any multi-cluster, hybrid, or multi-cloud container orchestration strategy.

Talos Linux
Trial

Talos is an open-source, container-optimised distribution of Linux purpose-built to excel at one thing: maintaining Kubernetes clusters. Talos is considered to be an effective alternative to CoreOS provided by RedHat on Openshift Kubernetes distribution, and

is differentiated as a minimal, ephemeral, and hardened OS that delivers a unique set of features and benefits such as a completely immutable file system, a full management API for automated and scalable operations (without SSH, shell, or console), task automation, in addition to a high level of security and predictability for simple, stable and scalable deployment. Additionally, Talos enables users to run Kubernetes consistently and securely across all platforms, whether cloud, virtual, bare metal, and even within Docker and on SBCs like Raspberry Pi – all from a single, API-driven platform.

VMware Cloud Foundation
Trial

VMware Cloud Foundation solutions such as VMware Cloud (VMC) on AWS, Azure VMware Solution (AVS), and Google Cloud VMware Engine (GCVE) implemented within the major cloud providers have clearly enjoyed a significant adoption curve in 2022. The capabilities of these solutions to enable seamless extension or migration to the public cloud have attracted many clients. These solutions are now enhanced by the implementation of VMware Aria's multi-cloud and hybrid cloud offers, which focus on three key areas: operations, automation, and pricing. This strongly enhances the appeal and adoption of this type of technology by enabling a cross-functional view and management of all these cloud capabilities.

When tech meets unlimited potential

How to become the first fully cloud-based financial organisation

Who is the organisation and what's its context?

The organisation is Norway's largest asset manager, employing more than 1500 employees worldwide and selling life insurance, banking products and pension savings contracts to individuals, businesses and public enterprises. To keep its leading position in the Nordic market and improve the way it serves its 2 million customers daily, the company recently decided to entirely embrace cloud technology.

What needs did the organisation face at the time?

Because all current and future innovations are based on the Cloud and through the major Cloud providers, the organisation wanted to completely transition to the Cloud and become a digital pioneer. To pass this innovation milestone, i.e. to gain scalability and to be able to easily develop new services for customers, meant no longer depending on outsourcing and hosting providers. The company mandated an external audit from a third party to identify levers for improvements.

What was the turning point where the organisation had no choice but to adapt its strategy?

The audit raised a critical issue: they didn't know how to address the red flags detected, nor how to resolve them outside of full cloud technology integration.

Because the organisation was outsourcing most of its IT activities, with different layers of tools, it could not move forward at the desired speed or develop more capabilities in-house and at its own pace. In addition, the security issues identified by the audit were too costly to effectively be addressed with the current IT structure. Finally, the lack of resources in the market made it nearly impossible to create a set-up and infrastructure designed in an automated operating model.

Which factors played an important role in the decision to choose Azure, Google Cloud and ACE GitOps?

- **Migrate completely and quickly into Azure Cloud:** The need to have a 100%

independent structure for all future developments clearly led the organisation to become the world's first asset management firm to fully Azure-based financial organisation. The ability to build their own system and have access to real-time data was only possible if all of the technology, tools, solutions and IT processes were integrated into a cloud-based structure.

- **Be independent to gain agility for their customers:** Because automation and delegation of control was key to become fully self-reliant, the company implemented Azure to address the issues of agility and speed of access to data. Coupling with ACE GitOps enabled full lifecycle support of IaC code for governance, policy control, workload deployments, and operations in Azure, effectively strengthening the completeness of security.

What were the immediate benefits for the organisation's clients or employees?

- Speed of deployment of any new solution through the cloud, and faster upgrades from day one
- Faster replication of the environment
- Delegation of self-monitoring/ self-management to increase the pace of development teams
- Reinforcement of DevOps teams to share techniques and knowledge
- Huge improvements in speed and scalability lead to more controllable environments, moving part of the delivery to Microsoft Azure and mapping their security and compliance requirements to actionable policies
- Implementation of Microsoft Sentinel (SIEM)

That extra mile that made all the difference

"The cloud solution is a bit like switching from a broom and dustpan to a high-tech vacuum cleaner."

Executive Vice President of Technology at the organisation

Business Automation

Scale your digital transformation mandates with mix of modern automation capabilities to drive customer focused agility, employee efficiency and digital innovation.

From Robotic Process Automation to Business Automation

All companies have repetitive and laborious processes with little or no added-value for employees. Thanks to digitalisation, many of these processes are now computerised and can easily be automated.

Hyperautomation can help you change the way you work

Robotic Process Automation (RPA) allows you to automate tasks by creating computer-based robots that mimic human actions. By combining them with other technologies, in an orchestrated manner, we can automate processes that are more complex. We call this business automation.

For instance, Process Mining allows us to discover the candidate processes that can be improved and accordingly helps in prioritising the automation pipeline. Then, Intelligent Document Processing (IDP) will classify and digitise data from scanned documents to exploit them. Another example is AI powered conversational Chatbot that replicate human language. All these technologies (and others) put together can provide very powerful automation.

Business automation can be used in any sector. The only constraint is to have highly repetitive processes that are worth automating. The benefits of automation depend on the company's automation strategy. The main benefits of automation are across productivity gain, faster go to market, compliant operations and experience elevation that lowers operational costs and raises customer loyalty.

# Devoteam's Recommendation to get started on Business Automation

There is a growing trend towards Business Automation in the banking and insurance industries. Nevertheless, any industry can benefit from it. Regardless of how advanced a company is in its journey, RPA is generally the first step in its Hyperautomation journey without being a prerequisite. When companies have mastered RPA, other technologies can be integrated to go even further in automation. Today, many RPA vendors are expanding their activities to include Hyperautomation, which makes it easier than ever to integrate RPA with technologies such as Process Mining, AI, and IDP.

The role of Business Automation becomes clearer when you have large amounts of executions of the same process. Companies easily find value and a better ROI in such cases.

Note that automation doesn't come with a one-size-fits-all strategy, so it's essential to start the journey by investigating the maturity of your processes to model and prioritise automation use cases where "quick wins" with low complexity and higher ROI, are first. Then, select the right combination of business automation tools to ensure the needed governance and solution is well architected to implement and influence organisation culture for automation adoption while continuously improving your automation program.

Some examples of areas where automation can be deployed for increased efficiency are:

- **Accounts Payable to** receive, classify, process, and pay out invoices (RPA + IDP)
- **Customer Service** to answer customer questions and deal with claims (chatbot/callbot + RPA)
- **Customer onboarding** to help with screening, compliance, processing documents and creation of accounts (RPA + IDP + Chatbot)
- **IT migration** for transfer of data and backup (RPA)
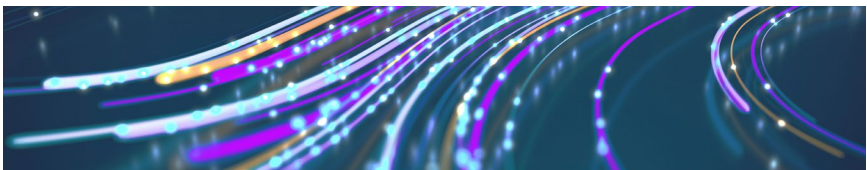
Put forward by **Jean-Vincent Vallee**, Career Manager & Senior Consultant

Business Automation
at a Glance

Despite the nuances, the terms "Hyperautomation," "Intelligent Automation," or "Business Automation," which we prefer at Devoteam, cover the same reality: **the end-to-end automation of business and IT processes** through the combined and orchestrated use of a multiplicity of efficient tools or smarter platform, including low-code oriented development, RPA (Robotic Process Automation), BPM (Business Process Management) process mining, chatbots, intelligent document processing, workflow orchestration, etc., that **accelerates business transformation**.

The offer is rapidly being structured in this direction, as this 2023 edition of our TechRadar clearly shows. Leveraging acquisitions and/or partnerships, the mega-vendors are weaving their platforms with one or more business automation-enabled technologies to deliver data-driven end-to-end process orchestration across any system for service, sales, industries and more in one package. In essence, these vendors are filling out their own offerings and entering new markets with the converged platforms that share the common long-term vision of creating a modern agile environment which will continue to accelerate and mature through 2023 and beyond.

This **technological convergence** is an additional catalyst for a strong-growth market that Gartner now estimates hyper-automation enabling technologies spending to reach **720 billion dollars in 2023.** It is true that these platforms, which enable **substantial savings** by eliminating operational inefficiencies and attaining faster time to value, are particularly welcomed in the current economic climate, especially as the returns on investment can be quite rapid.

On the other hand, the stage is set in 2023 for organisations to embrace a **composable enterprise model** (i.e. doing more, faster and with less), where organisations will resort to business automation-enabled technologies more than before. This will result in displacing some employees, especially middle managers, as these platforms take up the orchestration role. Despite this, it will actually create more new roles than it displaces, making it essential to take employees' fears into account, and to **evolve their roles through an effective re-skilling program** to make the most of Business Automation initiatives.
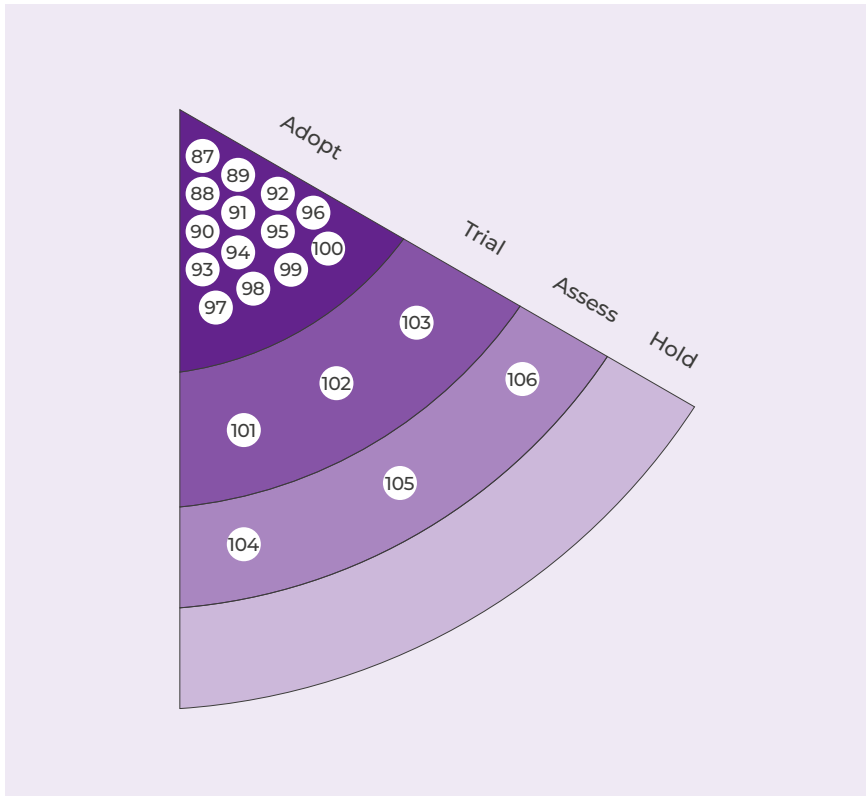
Adopt

87. ABBYY Vantage N
88. AppSheet ↑
89. Automation Anywhere
90. AWS EventBridge N
91. AWS Step Functions
92. Azure Logic Apps N
93. Celonis
94. Elastic Observabilty N
95. Microsoft Power Platform
96. OutSystems
97. ServiceNow Platform N
98. SS&C Blue Prism
99. UiPath
100. Workato ↑

Trial

101. Lightstep N
102. MuleSoft RPA N
103. Rasa ↑

Assess

104. Dydu
105. Kryon
106. Moveworks N

N New addition   ↑ Ascending technology

ABBYY Vantage
Adopt

ABBYY Vantage is a cloud-based Intelligent Document Processing (IDP) solution that utilises Optical Character Recognition (OCR) and Machine Learning (ML) technology to automatically capture, extract, and process data embedded in structured, semi-structured, and unstructured documents. Equipped with a built-in library of "Skills," Vantage provides users with pre-configured capture workflows for hundreds of the most common documents, which are then connected to their determined import and export destinations using a simple point-and-click interface, saving hours or even days of development time. It's important to note that Vantage is not entirely autonomous, and may require human intervention to review captured data based on the accuracy score generated by the algorithm. With that in mind, for any company looking to enhance efficiency, increase employee satisfaction and accelerate digital transformation, ABBYY Vantage is already a must-have.

AppSheet
Adopt

With the global shortage of developers showing no signs of slowing, no-code development will become more and more prominent in the coming years. Acquired by Google in January 2020, AppSheet is a no-code tool used to build and develop mobile and web applications quickly and easily around numerous data sources (Excel, Google Sheet, Salesforce, Azure SQL, etc.). The AppSheet Editor automatically generates prototypes and offers smart suggestions, while newly created bots can automate manual jobs to free up time for other tasks. AppSheet can also leverage device capabilities to add data such as GPS locations, barcode scanning, and character recognition. No matter the size of the organisation – whether a small start-up or a larger enterprise – AppSheet is the perfect platform for quick and easy app development.
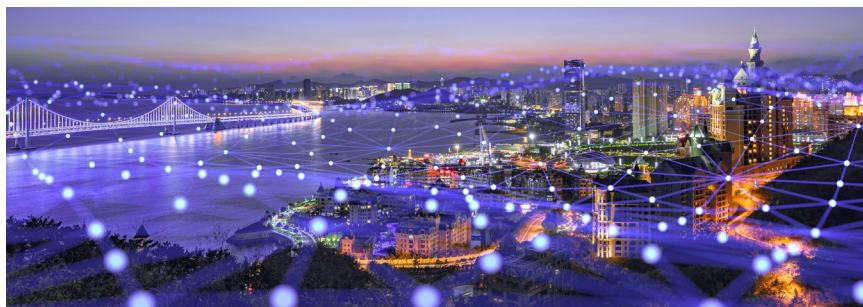
Automation Anywhere
Adopt

Whether it is to reduce costs and lead times, address skill shortages, make jobs more attractive, eliminate waste, or adapt to sudden changes, RPA (Robotic Process Automation) is at the heart of today's challenges. Continually ranked as a leader by Gartner (+31% by 2021), Automation Anywhere offers Automation 360, a cloud native, user-friendly RPA platform. Renamed Automation Success Platform, Automation 360 offers more and more features based on artificial intelligence (Intelligent RPA), such as the detection of automatable processes, the AARI business assistant or document processing. With these numerous innovations, Automation Anywhere helps companies address the main challenge of RPA: scaling up.

AWS EventBridge
Adopt

Released in 2019, AWS EventBridge is an enterprise-level serverless, fully-managed bus. It lets users build event-driven applications at scale and is highly interoperable with services outside AWS, including popular SaaS applications like Datadog, Zendesk, Salesforce, Auth0, or even custom applications. An "event" is a record of an action that has taken place (e.g., a file being saved in an Amazon S3 bucket). The bus ingests event data from various sources and takes further action based on the rules that the user has imposed on it. EventBridge is a more advanced, evolved version of the AWS service formerly known as CloudWatch Events. It is backwards compatible, plug-and-play, and offers many new features such as content-based filtering and a schema registry. Enterprises love it for the ability to pull data from a variety of sources and leverage it in their AWS environment.

AWS Step Functions
Adopt

AWS Step Functions is a cloud service that allows developers to create workflows of business-critical processes with a drag-and-drop visual console. It is designed to help organisations stitch together multiple AWS services, including computing ones such as AWS Lambda or Amazon ECS and databases like DynamoDB, to create rich, complex and robust workflows, all while allowing users to manage each microservice component independently. AWS Step Functions is a cost-effective way to quickly build scalable, distributed workflows using simplified code. The service is also capable of handling errors and giving supreme visibility by providing a visualisation of the workflow execution, as well as integration with CloudWatch to help users monitor and debug their application. Finally, Step Functions enables the creation of more complex yet reliable Serverless applications, therefore freeing up resources associated with build time, computing costs and maintenance of infrastructure.

Azure Logic Apps
Adopt

Azure Logic Apps is a platform that allows you to create and run automated workflows for integrating various types of apps or data across the Cloud or on-premise. Azure Logic Apps has an extensive list of pre-built connectors and a visual designer that makes it easy to use for developing highly scalable integrations with little to no code. A workflow starts with a trigger and can include one or more actions to process the data that goes through that workflow or move the workflow to the next step. An existing app can be saved as a template and reused to automate deployments across other environments. Azure Logic Apps can be used by medium to large enterprises because it supports hundreds of integrations out of the box and it can connect modern apps to legacy apps that are still in production.

Celonis
Adopt

Celonis is a software company that specialises in the exploration, analysis, and diagnosis of business process efficiency. Based on artificial intelligence machine learning algorithms, its EMS (Execution Management System) solution analyses processes during high-volume transactions and identifies patterns and anomalies in the data, providing key insights for improvement.

With nearly a hundred off-the-shelf connectors, it also offers the ability to create inter-application integration paths to implement these recommendations without development. This dual dimension of analysis and implementation is what makes Celonis unique. Celonis is actively developing through partnerships, most notably with ServiceNow and Accenture in 2021, and has since acquired tech companies, which developed real-time streaming data tools and analytics process mining tools, in order to widen their platform's capabilities. Celonis is now valued at $13B following a new investment in early 2022.

Dydu
Assess

Dydu is a French software editor for Conversational agents such as chatbot, voicebot and callbots. The solution features an algorithm for natural language processing and is naturally integrated with all popular communication channels (WhatsApp, Microsoft Teams, Google Chat, etc.). Compared to competitors, the build cycle with Dydu is much shorter because it is a license-based, low-code solution with drag-and-drop functionality that allows users to effortlessly create and manage their bots. Dydu comes with two of its own standard knowledge bases that are a large reason the technology is successful. One knowledge base covers HR services and payment, while the other is used for customer service purposes.

Recently, Dydu has integrated live chat alongside their chatbots with a seamless transition between the two while continuing to expand their field of connected systems such as Workday.

Elastic Observability
Adopt

Elastic Observability is an open, extensible solution that provides users with a comprehensive view across their entire hybrid and multi-cloud ecosystem, uniting all observability data into a single, unified platform. Built on the proven ELK Stack, the Elastic Observability platform effectively breaks down data silos and enhances visibility by converging logs, infrastructure metrics, uptime data, application traces, user experience data, and synthetics. The platform additionally enables users to ingest data directly to Elasticsearch, where it can be further processed, enhanced and then analysed in Kibana, Elastic's built-in data visualisation dashboard, delivering end-to-end observability and actionable insights. One of the most popular platforms on the market, Elastic has been adopted by more than 11,000 enterprises and was recently named a Visionary in the 2022 Gartner Magic Quadrant for Application Performance Monitoring (APM) and Observability.

Kryon
Assess

Kryon is a Robotic Process Automation (RPA) platform designed to support the full lifecycle of automation projects. Kryon works by automatically discovering and mapping an organisation's systems, workflows, and processes, highlighting opportunities for optimisation. From there, users can utilise a low-code tool and library of pre-defined actions to create "bots" to perform a range of manual tasks like data entry, document processing, customer service, etc., allowing for the automation of both human-assisted and autonomous processes. In addition, Kryon offers features for scheduling, monitoring and reporting, analysis, and management, as well as integration with other tools and platforms, all from a centralised console. Acquired by Nintex in early 2022, Kryon continues to expand the possibilities and benefits of RPA and remains a strong asset for organisations wanting to enhance process optimisation, efficiency, and productivity.

Lightstep
Trial

Regardless of size, organisations running workloads in the cloud will face difficulties with troubleshooting if they limit themselves to traditional approaches to monitoring. With cloud native resources in the mix, getting to the root cause of complex issues can get tricky. An application might be down, and yet the legacy diagnostics appear "green." To detect anomalies, a dedicated observability platform is needed. Lightstep, which was acquired by ServiceNow in 2021, is a mature observability platform that provides developers and site reliability teams with a powerful and convenient way to monitor the health of cloud native applications. For example, users can utilise it to trace latency between microservice transactions—data that wouldn't otherwise be easily accessible. Lightstep uses a distributed tracing technology built on OpenTelemetry, which was co-founded by Lightstep, that is an industry-standard widely adopted by most cloud environment vendors.

Microsoft Power Platform
Adopt

Microsoft Power Platform is a collection of software services, apps, and connectors that enable organisations to analyse, build solutions and automate processes by bringing together four key components: Power BI, Power Apps, Power Automate, and Power Virtual Agents. Power BI is a suite of business analytics tools for data visualisation and reporting; Power Apps, a low-code platform that allows users to build custom business applications for data collection, process automation,

and customer relationship management; Power Automate, which enables users to create and automate workflows; and Power Virtual Agents, which allows users to build chatbots for customer service, employee onboarding, and other purposes, using natural language processing and machine learning to understand and respond to user inputs. Overall, the Microsoft Power Platform is a dynamic end-to-end solution for organisations looking to maximise efficiency, streamline business processes, and make data-driven decisions.

Moveworks
Assess

Moveworks is an innovative AI platform that delivers automatic, intelligent chatbot support for common requests across IT, HR, finance, and more. Where similar tools simply provide recommendations for common issues, Moveworks uses advanced natural language understanding (NLU), machine learning (ML), and conversational AI for full-scale problem resolution including intent classification, conversation handling, real-time decision-making, automatic resource ingestion, and multilingual support – with little to no human intervention. The platform features a built-in database of over 30 million pre-trained tickets and can be integrated as an automated assistant on popular business applications such as Slack, Salesforce, Servicenow, etc. Since its founding in 2016, Moveworks has grown into a market leader, reaching a valuation of $2.1 Billion and earning recognition as the Best Chatbot Solution at the AI Breakthrough Awards in 2021.

MuleSoft RPA
Trial

Released in June 2022, MuleSoft RPA is a new Robotic Process Automation platform developed by MuleSoft (owned by Salesforce) following the recent acquisition of RPA vendor, Service Trace in 2021. Although a young technology, MuleSoft RPA promises to deliver the next generation in workflow automation, providing no-code capabilities to automate repetitive and time-consuming manual tasks, enhanced by the integration and API power of MuleSoft's Anypoint Platform and Composer. This easy-to-use solution enables users to automate complex processes and workflows across any system or application, including disconnected legacy systems, empowering end-to-end automation at scale and comprehensive support across the RPA lifecycle. MuleSoft RPA can be used across all business areas and is a particularly valuable addition to large organisations pursuing hyperautomation for improved productivity, quality, and user satisfaction.

OutSystems
Adopt

OutSystems is a high-performance/low-code development platform for building and deploying custom applications quickly and efficiently, throughout the entire dev lifecycle. It provides a visual development environment and a set of pre-built components and integrations that allow developers to create applications with minimal code. OutSystems provides features such as a drag-and-drop interface, a visual workflow designer, and integrations with popular tools and services like Microsoft Azure, Amazon Web Services, and Salesforce. Recently, the platform has developed a new product called OutSystems Development Cloud, which is built to develop cloud native applications on top of Kubernetes. It is the first high-performance/low-code cloud-based development environment focused on cloud native microservice application development on Kubernetes, of which there is no equivalent on the market today.

Rasa
Trial

Rasa is a business automation solution that allows users to build AI-driven chatbots, call bots, and virtual assistants. Rasa is built on a Python framework that is divided into two engines: Rasa NLU (natural language understanding) and Rasa Core, which handles the flow and actions. Bots built via Rasa can be deployed on standard platforms such as Slack, Facebook Messenger and more. So far, Rasa's open-source version has over 25 million downloads, and they continue to invest in themselves with the creation of a new offering called Rasa-as-a-service. This premium service

connects businesses with Rasa professionals and offers quicker project building and less overall time commitment. For those not ready to invest in the most premium option, there is also Rasa Pro, a step above the open-source version, which allows access to more features, extra services and additional APIs.

ServiceNow Platform
Adopt

ServiceNow is a scalable cloud-based platform that offers a range of modules, workflows, and processes powered by machine learning (ML) to deliver workflow automation. With its comprehensive development environment and no-code/low-code capabilities, the ServiceNow platform enables even non-technical users to easily build, test, and implement automated workflow applications for challenges such as case management, operations management, and services management. ServiceNow stands out for its highly responsive native mobile design, which provides a versatile and intuitive self-service experience, and an extensible networked system for IT and beyond (Customer Service Management, Field Service Management, HR, etc.), that enables real-time communication, collaboration, and resource sharing, in addition to providing insightful, productivity-boosting performance analytics. Since its founding in 2004, ServiceNow has

become the leading enterprise service management platform, adopted by more than 21,000 enterprises worldwide.

SS&C Blue Prism
Adopt

Founded in 2001 and coining the term Robotic Process Automation (RPA) in 2012, Blue Prism publishes a mature RPA solution with a reputation for robustness. Capable of handling complex processes and very large numbers of bots, offering an intuitive user experience and valuable features like dynamic debugging and an unparalleled overview, the platform is cut out for robotic process automation at scale. Since its acquisition in spring 2022 by the American holding company SS&C, Blue Prism is also accelerating its development in multiple areas. Ranked again among the leaders in RPA by all analyst firms (Gartner, Everest Group, IDC…), Blue Prism claims more than 2,800 customers worldwide.

UiPath
Adopt

The rise of low-code/no-code technologies has allowed people with non-technical backgrounds to create digital products and automate repetitive tasks without the need for a full team of developers. UiPath, still the market leader in Robotic Process Automation, allows end users in a

low-code environment to create what we could call "disposable" software that is so easy to build that one can start from scratch at any moment to change direction or implement new features. UiPath, therefore, allows business teams to be more agile and lean than ever. UiPath continues to invest in its offering by adding incremental updates instead of opting for complete reinvention like some other technologies. These recent incremental updates have included more renewal and support on different platforms and allow UiPath to stay ahead and remain a leader in the industry.

Workato
Adopt

Workato is an award-winning Enterprise Integration and Process Automation platform that enables secure, code-free integration of popular business applications, and workflow automation across cloud and on-premises. As a low code/no code iPaaS solution, Workato makes it easy for users with limited technical expertise to integrate and automate complex business logic, multilayered workflows, and conditional actions. Using Machine Learning and patented intelligence technology, the solution allows users to configure integration paths by implementing one of more than 1000 SaaS software pre-built connectors and 500,000 recipes covering workflows across marketing, sales, finance, HR, IT, and other many other business processes, or creating their own integration scenarios using drag-and-drop connectors. Workato has quickly risen to become a leader in the market, adopted by over 11,000 enterprises and 70,000 users across all digital integration fields and domains including banking, retail, healthcare, e-commerce, logistics, and more.

When tech meets IT infrastructure revolution

How to become more agile in managing highly sensitive data

Who is the organisation and what's its context?

The organisation, which employs 25,000 internal & external personnel, is one of the largest airports in the Nordic countries and among the busiest in Northern Europe. The airport handles more than one million passengers per month travelling to and from 49 different countries, which represents 9,147,762 passengers per year and more than 10,000 flights per month. The volume of data to manage the 3 terminals is substantial and the IT infrastructure progressively started to show some weaknesses and blind spots in data optimisation.

What needs did the organisation face at the time?

The airport was using 5 different sources to feed the configuration management database (CMDB) in order to get an accurate overview of the IT infrastructure and dependencies. Due to the large amount of data, the time required to integrate data and maintain these sources gradually became an issue, in addition to generating complexity in getting accurate overviews and analyses.

What was the turning point where the organisation had no choice but to adopt a new strategy?

The lack of a global overview in a single and unique solution and the fact that 5 different and homemade solutions were used for reporting and tracking also prevented them from identifying and collecting data outside of the software scope. The organisation decided to use a single, out-of-the-box and easy-to-use solution that would automate integration and limit all manual activities they were handling on a daily basis: ServiceNow Discovery.

Which factors played an important role in the decision to choose ServiceNow Discovery?

Automating data monitoring was the key objective of this digital transformation, which aimed to accomplish 5 crucial goals:

- Limit the number of sources and complexity
- Build a strong foundation for the CMDB

- Use a product that can be used for future initiatives
- Have a product that is supported by a current vendor
- Give CPH the ability to expand with company-specific requirements

What were the immediate benefits for the organisation's clients or employees?

- A ServiceNow Discovery implementation time of only 12 weeks from the first kick-off to go live, with the full collaboration of multiple stakeholders to keep all parties involved interested

- One simple, user-friendly and scalable foundation that supports all teams' activities and offers full visibility of the IT infrastructure
- One tool that will be able to cover 90% of present and future requirements for collecting data
- The access to a solution providing better security assessments, reporting capabilities, service mapping and CSDM
- An up-to-date and accurate record of devices in use with visibility into ownership
- Full automation of processes

That extra mile that made all the difference

"Implementing ServiceNow Discovery requires cooperation with several different people, and is not a matter of writing a lot of code. The can-do attitude and willingness from everybody made the implementation possible and successful."

IT Director at the Airport

TechRadar

Trust & Cybersecurity

Inspire trust with a "cybersecurity at scale" strategy. Understand your evolving threat landscape and swiftly address business risks to evolve with adequate measures and ultimate security features.

Prepare & protect against the Post-quantum threat

What if we told you that in a few decades, a quantum computer that is realistically robust might be able to decrypt virtually all of today's encrypted data on the Internet? It's time to be ready.

How can organisations deal with the post-quantum risk?

Quantum computers will be able to break certain types of current cryptography that are important to enable trust in a digital economy and that protect confidential intellectual property from being leaked. Electronic signatures, secure key exchanges, or authentication based on Public Key Infrastructure could all be defeated. Previously secure messaging applications, protected websites or VPNs may also be compromised.

There is no reason to panic as quantum computers will take years to be strong enough to break current cryptography. Still, security issues may become relevant much earlier for organisations that need long-term protection of data confidentiality or integrity.

The National Institute of Standards and Technology (NIST) is currently selecting new quantum-safe cryptography standards, with the goal of publishing standardisation documents by 2024.

Even though it is not clear when quantum computers will be ready to break current cryptography, organisations should evaluate their risk and start planning for the post-quantum cryptography era as the process of defining and executing a post-quantum cryptography strategy may take many years.

Devoteam's Recommendation to get started on Post-quantum Threat

There are many ways to build a quantum computer resistant cryptosystem, but how do you know which is the best? Quantum-resistant security should definitely use hybrid solutions that combine conventional and quantum-ready technologies. This ensures that existing security stays intact while adding new post-quantum cryptography techniques.

Organisations need to first assess their existing cryptosystem solutions and proceed to build a concrete strategy that incorporates quantum computer cybersecurity resilience into the organisation's existing cybersecurity risk assessments. Steps to achieve this should consider the following elements:

- **Create awareness** among decision makers and IT leaders to understand what is different with new quantum-safe cryptography and what the implications are for an organisation.
- **Assess the risk** to enable your organisation to understand exposures to quantum-based cryptography attacks.
- **Create strategic guidance** and education to prioritise quantum-safe initiatives for organisations tailored to organisational risk, IT strategy, supply-chain dependencies, and ecosystem operations.
- **Create a migration plan** towards agile and quantum-safe cryptography to enable organisations with modern and flexible paradigms, such as cryptographic services.

Managing the transition once enough strategic maturity is achieved is possible through partnerships with solution providers that offer cryptographic agility and a proven migration path that avoids collateral damage and lock-in situations.
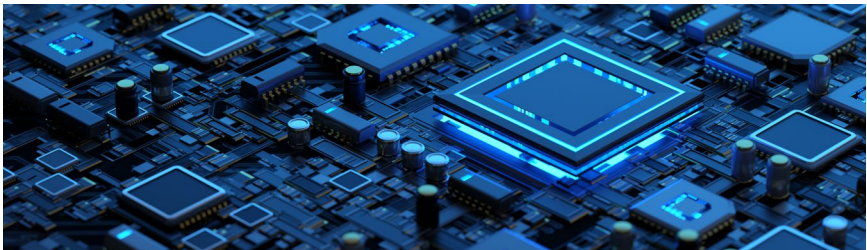
Put forward by **Martin Esslinger**, Partner at Devoteam
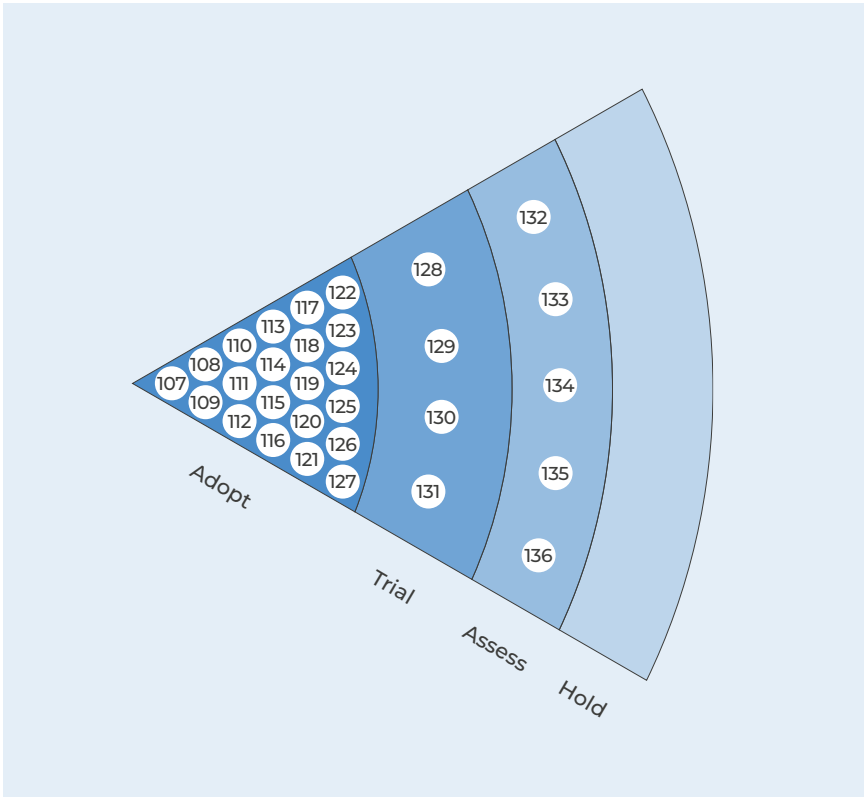
Trust & Cybersecurity
at a Glance

When the cloud first emerged, hosting systems in the cloud rather than a data centre was considered less secure. Recently, this concept has radically reversed; **the cloud now appears to offer superior security, while on-premise systems become targets of a new wave of ransomware.** Experts are sparse, and most organisations lack the resources to attract, recruit and utilise their talent like major cloud players. This is what keeps hyperscalers on top of ever-increasing threats.

Cybercriminal organisations grow increasingly sophisticated. They recruit, innovate and reinvest their gains to continually increase their leverage. It is estimated that it now takes less than an hour from the discovery of a vulnerability to its malicious exploitation. Faced with such formidable efficiency, small and medium-sized businesses, local authorities and critical infrastructure institutions are facing a tough challenge.

Cloud services may be highly secure, however, they are still vulnerable to administrative mistakes, negligence in access control, or bad code introduced by its users, and therefore subject to security risks. That is why TechRadar 2023 strives to prioritise **cloud native security technologies** which aim to improve security posture and cyber resilience, promote more rigorous practices, such as DevSecOps, and compensate for skill gaps by automating incident prevention, detection and remediation, and by implementing state-of-the-art processes for identity and access management.

Moving forward, companies must ideally integrate two new aspects into their cybersecurity strategy. First, **a sharp increase in regulations and compliance standards; second, are the lessons learned from the war in Ukraine.** After months of conflict, direct cyberattacks on infrastructure were less frequent and less destructive than feared. Conversely, social networks and deep fakes, disinformation, manipulation, harassment and destabilisation offer attackers an excellent cost/impact ratio for industrialisation of fraud and propaganda, with devastating effects across our society.

Adopt

107. Aviatrix
108. Checkmarx
109. Chronicle ᴺ
110. CryptoNext
111. CyberArk
112. Elastic Security ᴺ
113. Ermetic ᴺ
114. ForgeRock
115. HashiCorp Vault
116. Keycloak ᴺ
117. Microsoft Entra ᴺ
118. Microsoft Sentinel
119. Netskope ↑
120. Okta ↑
121. One Identity Manager ᴺ
122. OPA (Open Policy Agent) ᴺ
123. SailPoint IdentityNow ᴺ
124. ServiceNow Integrated Risk Management ᴺ
125. Tenable.ad ᴺ
126. Usercube
127. Wiz ᴺ

Trial

128. KubeClarity ᴺ
129. Prowler ᴺ
130. Sigstore ᴺ
131. Stormshield Data Security ᴺ

Assess

132. CrowdSec ᴺ
133. Devo
134. Lacework
135. Trivy ᴺ
136. Wazuh ᴺ

ᴺ New addition   ↑ Ascending technologies

Aviatrix
Adopt

For large international groups as well as for digital startups, which are increasingly diversifying their cloud providers, mastering multi-cloud architectures is becoming crucial. It is necessary to be able to control and monitor service levels (SLAs), performance and security policies across different zones, independently of the disparate tools provided by the providers. This explains the growing interest in MCNS (Multicloud Network Software) such as Aviatrix, which overcome the limitations of the usual tools in the face of this heterogeneity. Now fully automated with Terraform, Aviatrix integrates with CI/CD pipelines and enables the deployment of an advanced and homogeneous network and security functionalities on different clouds. In particular, Aviatrix can be the foundation for a Zero Trust approach based on harmonised security controls and governance.

Checkmarx
Adopt

While applications remain the primary vector for cyberattacks, OWASP recently created an "insecure design" category in its Top 10 application vulnerabilities, highlighting the importance of integrating security into the development process #SecuritybyDesign. Recognised for several years by Gartner as the leader in application security

(AppSec), Checkmarx continues to expand its Checkmarx One cloud platform to cover all dimensions of the application lifecycle: static code analysis (SAST), open-source component analysis (SCA), supply chain security (SCS), API, container and infrastructure code security (IaC) and dynamic analysis (DAST). To bring these tools closer to developers, who are sometimes reluctant to use them, Checkmarx also offers a self-training platform, Codebashing, as well as a tool that illuminates test results, Fusion.

Chronicle
Adopt

Chronicle Security Operations is a cloud native security analytics platform that enables detection, investigation, and threat hunting at Google speed and scale. It provides an integrated experience with its three components: Chronicle SIEM (Security Information and Event Management), Chronicle SOAR (Security Automation Orchestration and Response), and Threat Intelligence. SecOps teams can detect, investigate, and respond to cyber threats by leveraging Google's cyber intelligence. Chronicle SIEM helps answer the usual SIEM legacy architecture issues, makes threat hunting efficient, extends detection capabilities and limits cost based on the pricing model and the log retention period. Chronicle SOAR enables SecOps teams to respond to cyber threats in minutes, and track real-time

SOC metrics and KPIs with out-of-the-box interactive dashboards. Automation is used for closing false positives and remediation sequences (block URLs on FW, reset user credentials, delete similar emails, etc.).

CrowdSec
Assess

CrowdSec is a modern, crowd-based IPS (Intrusion Prevention System) that detects, alerts, and prevents malicious attacks. 60,000 machines provide data and alerts in real-time, feeding the CTI (Cyber Threat Intelligence) database. If a threat actor is actively attacking a community member, then the entire community is informed, and the attacker's IP address is automatically blocked everywhere. The platform can be linked with different technologies in different places in the architecture, while ingesting data coming from CTI. It can be integrated with any kind of environment, Cloud or on-premise, and only needs logs access to get started. CrowdSec is cross-platform and it supports various types of logs out of the box, and it can parse custom logs using the CrowdSec API. As CrowdSec is also open source, everything can be examined and improved by the community: detection rules, scenarios, and log parsing.
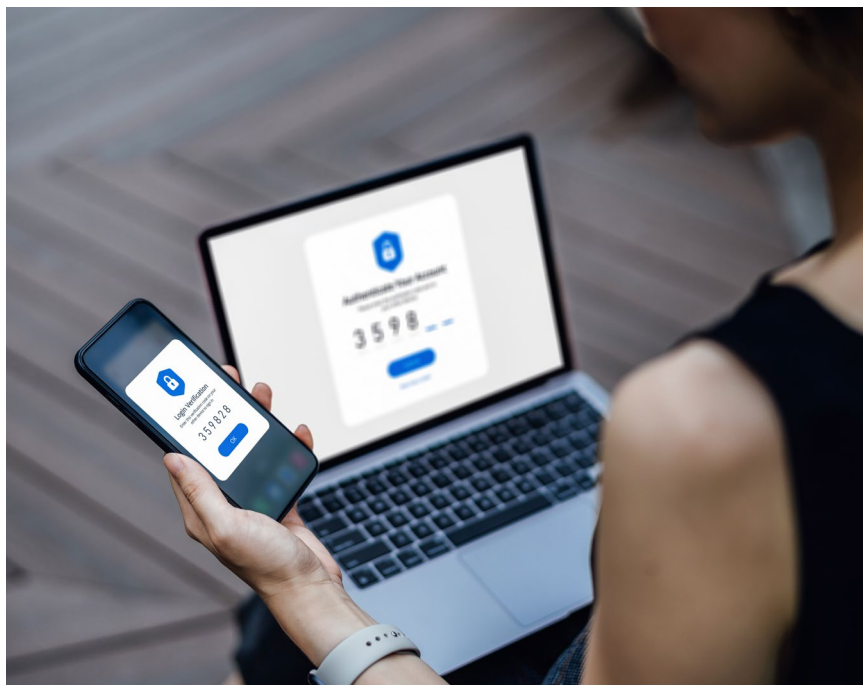
CryptoNext
Adopt

It will be a few more years before quantum computers arrive, but the threat they represent is already here. Indeed, thanks to quantum machines, it will be possible to break the usual public key encryption (RSA-2048). Hackers can therefore collect data today that will retain their value for a long time (health data, bank data, property titles, plans...), and then wait until they have the ability to decrypt them. To protect against this "harvest now, decrypt later" tactic, the French startup CryptoNext has developed a hybrid post-quantum cryptographic library that allows users to protect their data now against all types of threats. To achieve this, the CryptoNext solution combines classical and post-quantum encryption algorithms, similar to those predicted by NIST for its future cryptographic standard.

CyberArk
Adopt

CyberArk is a global leader in identity security, grounded in Zero Trust and intelligent privilege controls. Its focus is on privileged access management (PAM), which involves securing and managing access to privileged accounts and secrets used to access critical systems and data. CyberArk offers a complete security solution for all identities, human or machine, spanning business apps, distributed workforces, hybrid cloud workloads, and the entire DevOps lifecycle. There are six core products, covering identity security from end to end: identity management, secrets management, privileged access, endpoint privilege security, cloud privilege security, and workforce & customer access. Over half of the Fortune 500 organisations use CyberArk to secure their most valuable assets. Having 248 patents and pending applications worldwide and many third-party integrations, CyberArk innovates constantly and helps organisations with continuous identity threat detection and protection.

Devo
Assess

Until recently, Devo was best known for its main reference, the US Air Force, but in 2022, the American publisher changed dimension. In addition to being ranked by Gartner as a major player in the SIEM (Security Information Event Management) field, Devo has acquired Kognos, which automates threat hunting using AI, and above all LogicHub, a specialist in SOAR (Security Orchestration, Automation and Response). With these acquisitions, Devo can now offer a complete, cloud native solution for detection, assessment and automatic response to security incidents. In other words, Devo is getting closer to its stated ambition of automating the SOC. Appreciated by users for its

performance and ergonomics, the Devo platform allows the analysis of all data sources and logs of the company's systems to provide real-time visibility.

Elastic Security
Adopt

Elastic Security is an open platform that enables organisations to prevent, detect, and respond to threats at speed and scale. Elastic is a known player in search and observability, so this platform includes powerful features like search & discovery based on natural language processing and full-stack visibility in complex environments. One key benefit of Elastic Security is its ability to provide real-time threat detection, as well as threat hunting by leveraging machine learning. It can detect anomalies, analyse logs and traces, highlight correlations across metrics, and make predictions with classifications and forecasting. Elastic Security is easy to deploy, either on Cloud or on-premise. It features a user-friendly interface, custom connectors, one-click integrators, and community-built plugins. The pricing is based on the resources used and it's independent of the deployment model or use case.

Ermetic
Adopt

Increased public cloud use means the attack surface is growing and new security risks are on the rise.

Ermetic offers SaaS solutions for better security practices. It allows you to remediate access risks and vulnerabilities, often in an automated fashion. With Ermetic, you get granular visibility into all cloud assets—in AWS, Azure, and Google Cloud—and a way to grant the right access to the right cloud resources to the right entities. It even detects anomalies and has built-in remediation capabilities to enforce the principle of least privilege (PoLP) so that privileges reflect actual use. It is an identity-first solution that secures cloud infrastructure and entitlement management (CIEM) and cloud security posture management (CSPM), with a full lifecycle approach. While all existing solutions in this emerging market are new, Ermetic offers a mature, industry-leading product.

ForgeRock
Adopt

ForgeRock is an Identity and Access Management (IAM) software with global reach across industries as diverse as retail, healthcare, financial services, and government. A true leader in the field, it's the industry's only end-to-end, AI-driven platform for all identities (workforce, clients, etc.). With ForgeRock, organisations of all sizes can securely access their infrastructure through a platform that's robust, flexible, compliant, scalable, and user-friendly. With ForgeRock, end-users benefit from multiple layers of personalisable security

protocols such as passwordless authentication, single sign-on, lifecycle management, API security, consent management, legacy integration, and more. Its diversity and accessibility mean it can be used on-premises, via the cloud, and in as-a-service environments. Since its foundation in 2010, ForgeRock has positioned itself as the leader of the IAM world, making it an essential platform for any company needing to shore up access protocols.

HashiCorp Vault
Adopt

Information system security relies on a certain amount of particularly sensitive information (passwords, certificates, tokens, encryption keys, etc.) called "secrets." To prevent developers from having to know and manipulate them, which is both risky and inconvenient, HashiCorp Vault proposes to centralise the management of secrets, to automate it and to make it both auditable and compliant with the company's security rules. The solution covers the entire lifecycle of secrets: dynamic generation, encryption, storage, access, renewal and revocation. With Vault, secrets are up-to-date, protected, and only authorised and authenticated users and applications can access them, dramatically improving the security of multi-platform application environments and development productivity.

Keycloak
Adopt

Keycloak is an open-source, single sign-on (SSO) software product that is used to secure web applications and services by allowing users to authenticate and authorise access to multiple applications and services using a single set of credentials. The security solution includes features such as multi-factor authentication, user management, and social login, as well as integrations with popular identity providers, like Google and Facebook. Keycloak consists of two components, the Keycloak server and the Keycloak application adapter, the former houses the API and UI, while the latter houses a set of libraries. An open-source tool, Keycloak is widely used by organisations of all sizes due to the ease of access and control given by accessory features such as a central admin and account management console in addition to its core SSO and identity functionalities.

KubeClarity
Trial

Developed by Cisco's OpenClarity, KubeClarity is a next-generation DevSecOps tool for scanning, detecting, and managing Software Bill Of Materials (SBOM) and vulnerabilities of container images and filesystems. In addition, KubeClarity performs fine-grained security scanning in both Kubernetes runtime clusters

and CI/CD pipelines for enhanced software supply chain security. KubeClarity works by utilising multiple content analysers and vulnerability scanners in parallel and then combines their output into a unified result using the KubeClarity CLI. Finally, KubeClarity groups scanned resources (images/ directories) under defined applications to navigate the object tree dependencies (applications, resources, packages, vulnerabilities), generating a comprehensive analysis for the sources scanned. With its simple and intuitive UI, users can easily access a comprehensive list of application-specific vulnerabilities and remediations that will provide insight into an organisation's current security posture and the steps needed to plug any leaks.

Lacework
Assess

Lacework is a data-driven cloud native application protection platform (CNAPP) that learns how an environment is supposed to run and raises alerts when it deviates. Lacework uses patented data mining and machine learning techniques to collect and analyse data about the organisation's clouds. The platform learns what's normal first. Then it provides security by automatically giving precise, high-fidelity alerts on unusual activities without relying on manual rules. Lacework has full context and history for every

event: why it was picked up, who did it, what, where, and when it happened. Deployment is flexible, agent or agentless, leaving no gaps in coverage or visibility. The agent handles HIDS, FIM, host vulnerability assessment, Kubernetes, containers, and workloads security. Agentless handles coverage for AWS, Google Cloud, and Microsoft Azure, continuous monitoring of cloud configuration, and runtime threat defense.

Microsoft Entra
Adopt

Microsoft Entra is an Identity and Access Management solution that ensures flexible access and secure authentication, regardless of location or device type, across hybrid or multi-cloud environments. Microsoft's solution offers a seamless experience and gives organisations a single unified platform to manage employee, customer, or partner access to digital assets. It integrates with a wide range of third-party applications and services, making it easy for users to access the resources they need without having to remember multiple login credentials. Entra expands beyond traditional identity and access management solutions with five products: Azure Active Directory, Microsoft Entra Permissions Management, Microsoft Entra Verified ID, Microsoft Entra Workload Identities, and Microsoft Entra Identity Governance. Microsoft

Entra is a mature product, being recognised as a six-time leader in the Gartner® Magic Quadrant™ for Access Management.

Microsoft Sentinel
Adopt

In recent months, Microsoft has invested heavily in integrating Sentinel within its portfolio of security solutions and developing new features that simplify the work of SecOps and improve their efficiency and experience. Microsoft Sentinel helps SecOps conduct investigations, set alerts, build playbooks and initiate remediation. Additionally, Sentinel offers cost-effective cloud-based log storage plans tailored to current volumes and usage. Also worth mentioning from the Microsoft security portfolio is Microsoft 365 Defender, the company's integrated XDR (extended Detection and Response) suite for enterprise user environments. Microsoft 365 Defender has unparalleled security monitoring and incident response capabilities, enabling it to anticipate, detect, characterise and neutralise attacks on endpoints, identities, email and applications. To address increasingly virulent attacks, Defender continues to be enhanced with automated containment of infected assets, analysis-based preventive recommendations, and visual tools to facilitate investigations.

Netskope
Adopt

Netskope is a leader in cloud security, focused on SASE (Secure Access Service Edge) and adaptive Zero Trust, based on AI and ML. SASE combines security and networking services in a cloud-based architecture to protect data and ensure reliable user access, regardless of data and user location. Inside the global SASE offer, Netskope provides a range of security products, including Intelligent Security Service Edge (SSE) like Nextgen firewalling, Secure Web Gateway Threat protection, Cloud Access Security Broker (CASB) to protect against Shadow IT and unexpected usage of unmanaged applications and Private Access for Zero Trust Network Access (ZTNA) – a next-gen VPN to securely connect each application individually without any incoming flows. In 2023, Zero Trust architectures from the Cloud Security Alliance and NIST frameworks will get their first concrete applications, as customers are willing to harmonise their security policies for any usage (insiders and outsiders) and for any Cloud-oriented or legacy applications.

Okta
Adopt

Okta is one of the world's most trusted brands that puts identity at the heart of the organisation, enabling secure apps and multi-cloud environments management across a single identity platform. Okta's technology is designed to be neutral, meaning that it is not tied to any specific technology or application. This allows organisations to use Okta's services with their existing systems and processes, rather than having to adopt new technologies or change their workflow. It has more than 7,000 integrations in the Integration Network and the Auth0 Marketplace, 14 SDKs with language-specific libraries, and 31 API endpoints to customise user authentication, configuration, and access control. Okta has two main products: customer identity and workforce identity. Key features include universal login, single sign-on, passwordless, adaptive multi-factor authentication, attack protection, and automated lifecycle management.

One Identity Manager
Adopt

One Identity Manager is a full-stack Identity and Access Management (IAM) platform that helps organisations manage and secure access to data, systems, and applications. One Identity Manager ensures holistic governance on every digital identity through automated, dynamic & role-based privilege administration, full audit & traceability and deep integration of target systems. People have access only to the resources they need, and only when needed, regardless of the environment: on-premise, cloud,

or hybrid. There are many benefits for enterprises using One Identity's IAM solutions. The main strength is its integration capability into multiple systems and workflows. Privileged Access Governance is one critical example of this. It also helps organisations reduce the risk of security breaches, protect against unauthorised access to sensitive data, and get improved visibility and control over their most important assets.

OPA (Open Policy Agent)
Adopt

The Open Policy Agent (OPA) is an open-source, domain-agnostic, general-purpose policy engine for cloud native environments. It offers administrators a unified toolset and framework for fine-grained control, across a wide range of technologies, in any service setting or any layer of the stack. Policies can be enforced in microservices, CI/CD pipelines, API gateways, Kubernetes, and more. OPA allows users to decouple and offload policy decision-making from policy enforcement. This means that policies can change independently of the application life cycle and they can be shared across teams and functions. OPA is context-aware and it provides a high-level declarative language that lets users specify policy as code. When users need to make a policy decision, they can query OPA using structured data, such as JSON and it will generate a decision after evaluating the query input against policies and data.

Prowler
Trial

Prowler is an open-source security tool designed for best use with AWS services. It performs assessments and audits against more than 240 established controls and security frameworks, from CIS and ISO27001 to HIPAA and GDPR, as well as AWS Foundational Technical Review (FTR). As such, Prowler is key to a robust and comprehensive AWS cloud security strategy. With Prowler's scans, users get visibility into the security status of all AWS services in one place. They can also integrate it with AWS Security Hub, Amazon's native security posture management service, and take advantage of the best of both tools. The reports generated in Prowler can be filtered by standard, type of service, region, and more – showing clearly if and which resources have any compliance gaps. But more than that, the tool provides detailed information on how to remediate them.

SailPoint IdentityNow
Adopt

SailPoint is the leader in the Identity Governance and Administration (IGA) space, which is part of the larger umbrella of Identity and Access Management (IAM) initiatives. SailPoint IdentityNow takes care of the authorisation side (as opposed to simply authentication). It allows companies to automate the process of creating and managing identities and their respective accounts based on the Principle of Least Privilege (PoLP), where the goal is to avoid giving excessive access to any of the identities. IdentityNow is a mature cloud-based SaaS solution perfectly suited for companies with a cloud-first approach and a robust security strategy. An exciting part of this technology is that it offers advanced machine learning and artificial intelligence capabilities to improve internal "Join, Move, Leave" lifecycle processes. SailPoint also has a strong, efficient partner ecosystem.

ServiceNow Integrated Risk Management
Adopt

The ServiceNow platform brings processes across all business units – from IT operations and finance to HR and security – under one roof. To leverage end-to-end data on the platform, ServiceNow has also expanded its original governance, risk, and compliance management (GRC) module into an integrated risk management (IRM) tool that covers additional vectors: vendor risk management, business continuity management, and continuous monitoring. It allows organisations to monitor, manage, and communicate risks in real-time, run audits, and maintain compliance. Importantly, like the rest of the suite, the IRM is loved for its UX/UI. It can be deployed in as little as six to eight weeks. It is enterprise-grade and used by many global

conglomerates in highly regulated industries such as banking, insurance, and oil and gas. But it can also be scaled down to suit the needs of smaller businesses.

Sigstore
Trial

Sigstore is a unique trust and security player that provides a set of tools to automate, sign, verify and protect software components and artifacts. Designed and developed to address the development and source tracking challenges of large organisations, Sigstore enables companies to standardise a secure and risk-free chain of custody for their developer teams and security experts. The solution is a new project of the Cloud Native Computing Foundation (CNCF) and is supported by a strong community. While Sigstore still needs to mature to allow for better scalability, the solution remains singular and unique in providing protocols to improve software safety through temporary keys, timestamp validation, strong authentication via SSO and centralised signatures.

Stormshield Data Security
Trial

With our growing reliance on workloads and workspaces running on globally distributed public cloud infrastructures, data sovereignty and data security are primary concerns. Sure, cloud native applications in AWS,

Azure, or GCP can encrypt data, but the platforms hold the key and can ultimately access the sensitive data. On the frontier of this issue, Stormshield Data Security (SDS) is a new solution that offers end-to-end data encryption for all cloud data, both in transit and at rest. SDS offers a tried-and-tested use case for Google Workspace that encrypts Google Drive, Google Meet, and email on Gmail. Features include agentless operation, traceability, client-side encryption, and integrations, and the product is designed to be easy to implement and use. With Stormshield Data Security, companies can maintain exclusive control over the keys and comply with stringent security compliance requirements.

Tenable.ad
Adopt

Microsoft Active Directory remains the most widely used directory service, with an estimated 95% of companies using it to manage access to their on-premise resources. This has made it a heavily-targeted attack vector. Attackers use a method called privilege escalation to first retrieve privileged administrator-level credentials stored in the memory cache. Then they leverage known flaws and misconfigurations to gain lateral movement across a company's systems. Enter Tenable.ad—a solution designed to secure the Active Directory. Tenable helps users discover and address weaknesses in any AD

domain, reduces exposure, and offers step-by-step remediation guidance. What's great is that users can integrate it with existing SIEM and SOAR tools, enabling them to feed real-time monitoring data to their security team, sharpen incident response initiatives, and improve security posture as an organisation.

Trivy
Assess

Popular among DevOps and security teams, Trivy is an open-source scanning tool that checks for misconfigurations and vulnerabilities in cloud native infrastructures and application stacks. Trivy is maintained by Aqua Security and can be used to scan Git repositories, filesystems, virtual machine and container images, Kubernetes clusters, AWS accounts, and more. It supports Infrastructure-as-Code (IaC) security scanning covering Docker, Kubernetes, and Terraform. The Trivy K8s CLI allows users to scan Kubernetes cluster resources and generate an NSA/CISA Kubernetes compliance report to quickly harden the environment. Trivy also fits the DevSecOps methodology as it can be integrated into CI systems. Trivy is versatile, reliable, fast, user-friendly, and its vulnerability database is updated every six hours via the associated Aqua Security GitHub repository. It is Red Hat certified and the integrated default scanner for Harbor and GitLab's Container Scanning functionality.

Usercube
Adopt

Usercube is an IGA (Identity Governance and Administration) solution that enables organisations to manage digital identities and automate the identity lifecycle management process, including tasks such as user onboarding, offboarding, and role changes. Usercube creates a repository of the organisation's users and assets, by pulling data from various sources, becoming the centralised location for accurate and reliable information. This repository is powered by the real-time movement of people and it communicates with other programs to exchange organisational and hierarchical knowledge. Usercube integrates with HR systems and numerous third-party applications, like CRM, ERP, DMS, ITSM, or PLM. Optional modules that manage granular access to SharePoint and network-shared files are also available. Usercube can be used in the Cloud or installed on-premise, on Windows virtual servers, allowing for easy integration with cloud services, as well as legacy applications.

Wazuh
Assess

Wazuh is a free, open-source security information and event management (SIEM) solution for public and private clouds and on-premise data centres. A great selling point is that it

unifies what are often separate security functions into a single agent and platform – covering endpoint security, threat intelligence, security operations, and cloud security measures such as workload protection and container security. The logs that are ingested into Wazuh are compared against the MITRE ATT&CK database, which is continually being updated with known and evolving adversarial behaviour. Wazuh is an effective two-fold way to increase the security of AWS infrastructure: monitoring AWS instances using the Wazuh agent, and monitoring AWS-based services using the Wazuh AWS module. These complementary features allow users to both monitor activity inside their instances and collect and analyse log data about the infrastructure.

Wiz
Adopt

Wiz is a SaaS solution that helps organisations secure their infrastructure, detect vulnerabilities, and protect against threats across different clouds (AWS, GCP, Azure, etc.) and hybrid environments (VMware vSphere, or Kubernetes). An advanced CSPM (Cloud Security Posture Manager), Wiz offers a range of features and capabilities including asset discovery and inventory, security configuration assessment, threat detection and response, and compliance with 35 compliance frameworks built-in. Furthermore, Wiz is an agentless solution that works by scanning containers and virtual machines, before providing a complete view of the applications and their various cloud services (IaaS, PaaS, or serverless) in a graph database. As a highly mature and powerful security tool that delivers robust CNAPP (Cloud Native Protection Platform) capabilities that offer complete visibility of the new world of cloud native applications, Wiz is already a must-have.

When tech meets massive security management in the financial sector

How to become safer and more reliable in identity security

Who are the organisations and what's their context?

Financial and banking organisations are subject to strict regulations and mandatory compliance requirements. As a result, they must align with these guidelines to conduct their business and remain compliant in the marketplace, especially in terms of security solutions. The enormous amount of money involved, large extent of personal data, compliancy standards (i.e., ISO, GDPR, etc.) and ever-changing technology adoption driven by a steep digital transformation requires an effective and efficient cybersecurity strategy.

What needs do organisations face?

Digital transformation, cloud migration, remote work and DevOps have fuelled the proliferation of identities, both in number and type. Each identity – whether it's human or machine – represents a path for attackers to gain access to an organisation's most valuable assets. Many enterprise institutions with large IT landscapes, typically start by implementing built-in security solutions provided by the technology or platform. These solutions do not facilitate interoperability toward other technologies causing the organisation to suffer from a lack of consolidated audit and access control. It becomes difficult to delegate authority to manage subsystems in any standardised way and avoid "security islands."

What is the turning point where those organisations had no choice but to adapt their strategy?

To remain in control of their data, identities and access management, organisations seek to implement a holistic security solution within their IT landscape. The key factor is the ability of this solution to handle different technologies: legacy systems, hybrid solutions, SaaS services, etc. The primary objective of this centralisation is to have a

single pane of view for all access controls, centralising the entire ICT technology landscape, providing detailed transaction audit and reporting capabilities and organising for efficient security operation. CyberArk is known as the most reliable and recognised solution in that area.

Which factors play an important role in the decision to choose CyberArk with Devoteam?

- **Implementing the solution and seamless change management:** It is essential to ensure uninterrupted operational activities and day-to-day management in parallel with the integration. The new solution has to handle millions of potential accounts and integrate with technology solutions already in use by IT teams. Therefore, a smooth transition is essential to effectively deploy CyberArk: audit/analysis of the existing systems, training for the teams in charge and support on technical issues are key to this transition.

- **Secure a distributed workforce:** The new solution must offer broad integration capabilities and compatibility with existing and future technologies. Organisations leverage these technologies to improve workflows and deploy new code efficiently. They often lack security or have their own mechanisms for managing security policy and access control. A holistic security solution tackles this issue and helps the organisation to properly organise the access of their workforce.

What are the immediate benefits for the organisation's users?

- Reduction of exposure risks and better protection of customer systems and data
- Secured Continuous Integration/Continuous Delivery (CI/CD) pipeline
- Centralised and secure account management within a single platform
- Alignment with regulatory requirements for the organisation's customers

That extra mile that made all the difference

"CyberArk offers a secure and centralised account management platform with benefits such as reduced exposure to risks, improved protection of customer systems and data, secure CI/CD pipeline, and regulatory alignment."

Head of Compliance at the organisation

TechRadar

Sustainability Enabled by Digital

Accelerate your Environmental, Social and Governance impact with digital technologies. Build and power your ESG strategy to secure growth and resilience in a changing world economy.

Eco-Efficient IT: Saving Green by Going Green

Get ready to join the green revolution and elevate your company's ESG standards with sustainable IT operations! With the goal of reducing our impact on the environment, sustainable IT is the perfect blend of being socially responsible and fiscally smart.

Harnessing the Power of Green IT

As the clock ticks, the value of energy and resources soar higher and higher. But fear not, by approaching IT operations with a mindful and considered attitude, we can tackle not only climate change but also shift the way we think about technology. With most big applications and services now residing in the cloud, the effects may feel distant to those using them. But we mustn't overlook the hidden costs and impact of these complex systems and the mountains of data they generate.

The good news is, sustainable IT operations aren't reserved for the big players, small businesses can join the green revolution too! It does take a strong willpower to break old habits, but with the help of tools such as the "Sustainability Best Practices Framework," businesses can empower their employees to make more sustainable choices and change their mindset. Always remember, it's important to do your own research and tailor any framework to your specific needs.
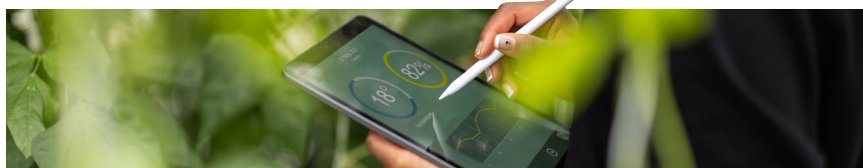
Devoteam's Recommendation to get started on Sustainable IT Operations

Tech for Good: Join the green movement with sustainable IT. Make the most of all the sustainable technologies, services, and consulting agencies that are dedicated to reducing the environmental impact of computing. It's time to start small and make a big difference. Set your MDM to automatically go into energy-saving mode after 20 minutes of non-use, use low-carbon data centers and clouds for your workloads, and consider refurbishing your IT equipment instead of buying new. These simple steps can help you maximise your ESG KPI and make a significant impact on the future.

But that's not all, being environmentally friendly and ethical is now the need of the hour and it is not just for tree-huggers anymore. IT hardware life cycles, including manufacturing, use and end-of-life, have significant effects on the environment and resources. These include energy use, greenhouse gas emissions, water consumption, raw materials, and need to be addressed for future generations. Not only will you be doing your part for the planet, but your customers and employees will also take notice of your commitment to being a responsible corporate citizen.

Sustainable IT Operations can help increase efficiency in the following areas:

- **Cost savings** come easy using energy-efficient systems, you'll be able to power down your electricity bill and watch your savings grow.
- **Boost your reputation** as a socially responsible business. As a result, customer loyalty will soar and new business opportunities will sprout up faster than you can say "reduce, reuse, recycle."
- **Turbocharge your productivity** with sustainable IT practices. By streamlining your operations, you'll be able to get more done in less time. Imagine your team working like a well-oiled machine, every gear in perfect sync.
- **Manage risks** related to resource shortages and environmental issues. Adopting sustainable IT practices can help your business stay ahead of the game, instead of playing catch up.
- **Meeting certain environmental regulations and standards** by implementing sustainable IT practices can help businesses comply with these regulations and avoid fines and other penalties.

Sustainable IT operations = Win-Win! Save money and resources while building a better reputation and reducing your environmental impact. It's time to take the first step towards a greener future for your business.

Put forward by **Felix UELSMANN**, Principal Consultant

Sustainability Enabled by Digital at a Glance

From the year 2025, covering the 2024 financial year, approximately **50,000 European companies will be required to publish their negative environmental and social impact** and the governance put in place to reduce them. The report will include **84 key metrics** including climate change, diversity in leadership, and human rights, while providing a detailed carbon footprint analysis of emissions, including their supply chain.

This so-called "non-financial reporting" is increasingly relevant and technologies like AI, data visualisation, business automation and business intelligence are now vital. With compliance becoming increasingly competitive and the **spotlight on Corporate Sustainability,** many tech companies stand ready with an arsenal of new systems to collect and consolidate data, and support reporting against international standards.

The new standard of compliance will mean setting up processes to automate the collection, validation and analysis of data, specific to each business area. This will require new skills from staff, but also specialised tools at the enterprise level. Major digital players are positioning themselves with increasingly mature solutions. Their presence in the 2023 TechRadar indicates that they have identified a market, and therefore that companies are determined to act. However, choosing and implementing such solutions requires a thorough understanding of corporate sustainability itself.

Companies must be careful not to drown in manual reporting, but rather focus on impact as the end goal. This necessitates putting data into action to build new solutions, where each department is setting its objectives and operating independently. One of the major leadership challenges will therefore be to balance between the use of digital tools that are specific to a department, and the centralised reporting and disclosure of progress. **New 'sustainability enabled by digital' tools emerge daily, and while many of them will be gone in a few years, some are on their way to becoming an integrated part of enterprise IT systems.**
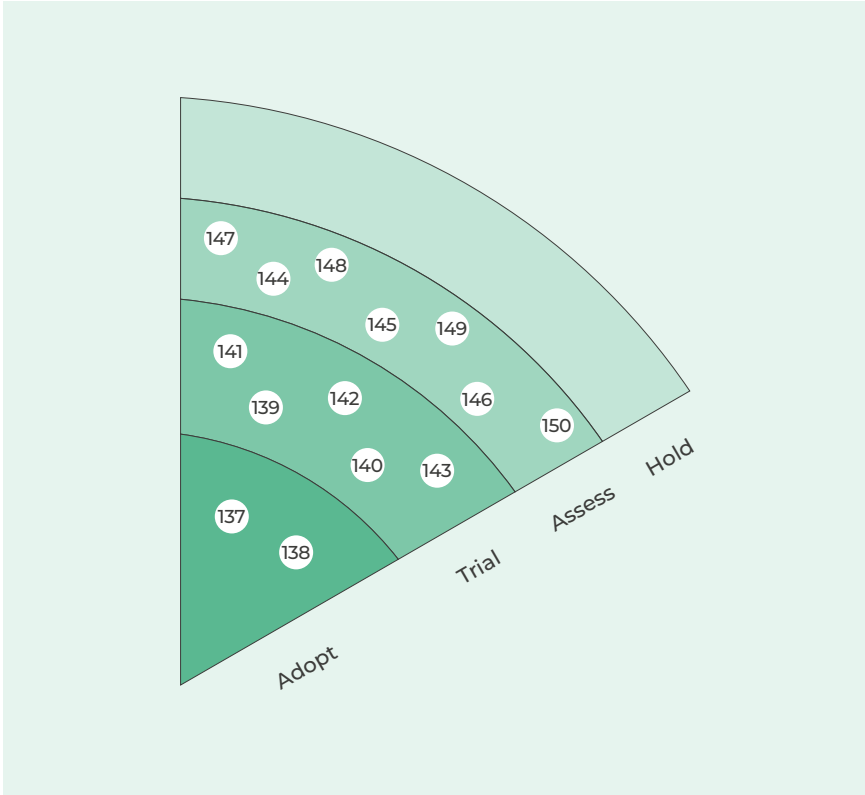
Adopt

137. Google Carbon
     Assessment ↑
138. Salesforce Net
     Zero Cloud ↑

Trial

139. Aguaro
140. Energisme
141. Fruggr N
142. Kubecost
143. ServiceNow ESG

Assess

144. Cloud Custodian N
145. EcoVadis
146. Infracost N
147. Sopht N
148. Sweep N
149. Teevity N
150. Verdikt N

N New addition   ↑ Ascending technology

Aguaro
Trial

Aguaro is a green-IT solution for embedding sustainability in the daily IT functions of organisations. Aguaro's product is a software extension for ServiceNow called My IT Footprint, a tool that helps organisations define strategy, measure usage and make improvements by breaking down silos and increasing coordination. My IT Footprint allows users to facilitate data collection and make collecting further data easier all while automating measurement based on thousands of emission factors. After data collection, users can tap into a detailed analysis of the data and get usage forecasts in order to predict low-carbon trajectories quantitatively. Completely certified by ServiceNow, My IT Footprint has natural integrations with other processes like risk management and innovation management and makes it possible to have feedback loops that fuel continuous improvement.

Cloud Custodian
Assess

Cloud Custodian is a YAML-based governance-as-code tool offering a stateless rules engine to define and enforce various policies. While use cases are most often FinOps- and security-related, companies can use Cloud Custodian to enforce other kinds of compliance and consistency (e.g., resource naming and tagging consistency) across cloud environments. The drivers behind this open-source technology are a more secure cloud environment by, for example, encrypting all storage resources and applying more restrictive rules on firewalls. Another advantage is that policies can be applied to delete underutilised or unused resources, thus reducing cloud costs—perfect for enterprises with a large cloud usage footprint. However, to run Cloud Custodian at scale, a platform team is needed to implement the tooling, as the technology still lacks some capabilities in terms of tracking, drift detection, and cleanup of old policies.
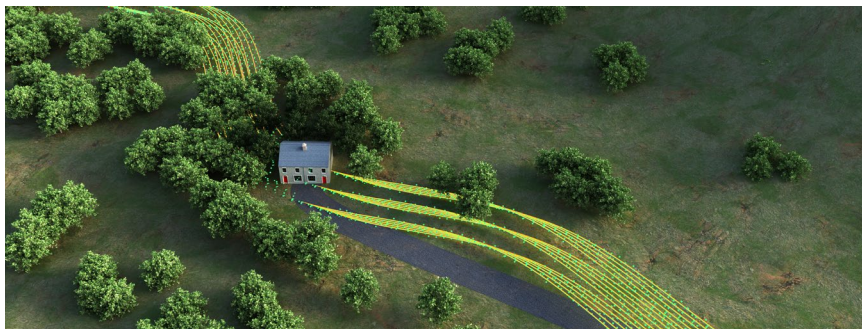
EcoVadis
Assess

EcoVadis is a universal sustainability rating and assessment platform that helps organisations to measure and improve their environmental, social, and ethical performance. Their portfolio includes a sustainability scorecard, benchmark reports and tools which are designed to help organisations understand their sustainability performance in relation to their peers and industry benchmarks. EcoVadis scores are marked from 1 to 100 and are based on a combination of self-reported data and third-party verification. EcoVadis scores are important to present to potential clients and partners who may value sustainability as a factor in deciding to do business with an organisation. EcoVadis is a good tool for organisations to measure & track the sustainability of their suppliers & partners, while helping in identifying paths for improvement.

Energisme
Trial

Energisme is a software platform that helps organisations from cities, to buildings, to industries optimise their energy consumption. The infrastructure of Energisme's platform, called N'Gage, is designed to evolve in complex environments and is capable of working continuously with a large amount of heterogeneous, real-time data. Energisme enables its clients to track their production flows and overall energy consumption by making data visible and optimising usage and processes through automating analysis and providing custom outputs on how to manage multi-fluid energy performance and reduce carbon footprint. Energisme has recently made public its software infrastructure, called Loamics, which processes data in a fully industrialised way to make data quickly available to users. Loamics allows users to virutalise data in a data lake to allow for data governance and connectivity to algorithms, and tools for data visualisation and business intelligence without limits.

Fruggr
Trial

Fruggr is a deeptech cloud software developed by Digital4Better, a company committed to ecological improvement, that offers an eco-minded platform designed to help enterprises reduce their digital carbon footprint. The SaaS platform works by automatically analysing the environmental and social impact of digital applications and platforms, then delivering the company's ecological "Fruggr Score," in addition to daily expert-generated tips and recommendations to help improve the score over time. These tools can be used both in the development phase or in production, however, it's worth noting that Fruggr analyses client-side behaviours only, with

a focus on user experience and devices used, but does not take into account carbon footprint on the server side. Developed in 2021, Fruggr is a young technology with the potential to be a valuable asset to enterprises looking to improve sustainability efforts.

Google Carbon Assessment
Adopt

No longer a buzzword for companies to use in marketing campaigns, sustainability practices are now a key cornerstone of any sizable organisation's operations. With Google's Carbon Assessment tool, companies can measure, assess, and improve upon the carbon footprint of their Google Cloud usage. The tool allows companies to view the gross, location-based emissions from their Google Cloud usage. Users can also monitor their usage over time by project, product and even region to help CIOs identify where they can become more eco-friendly. Google will even publish their detailed calculation methodology, enabling users to confirm that their emissions data meet GHG (Greenhouse Gas) protocols. So, for any organisation that's embarking on a sustainability drive, this non-intrusive platform is a must. Google also offers a Google Carbon Assessment tool that allows users to assess the Carbon Footprint of on-premise data centres and estimate the Carbon and cost reduction of migrating to Google Cloud Platform.

Infracost
Assess

Infracost is an open-source tool that estimates cloud cost for Terraform. One of the issues we see with cloud cost is that it's being managed after the money is spent. Infracost sits in the CI/CD workflow and shows the engineering teams how their code changes are going to affect cloud costs by leaving a comment and providing a detailed breakdown of all the resources and their financial impact. At the same time that users perform a code review for quality and security, they can also analyse the cost of code changes. With Infracost, organisations can be proactive about cloud cost instead of reactive. It doesn't need cloud credentials because it reviews the Terraform code. Infracost can be integrated into any CI/CD system (GitHub Actions, GitLab, Azure DevOps, etc.).

Kubecost
Trial

Controlling costs and, if possible, reducing them, remains a fundamental issue for enterprise systems. Yet, this financial aspect is often a blind spot in Kubernetes clusters because it is difficult to assess and take into account during development. Created in 2019 to meet this need, Kubecost provides a centralised, real-time view of the operating costs of the various clusters. To facilitate management and billing, these costs can be aggregated by

application, team or department. Kubecost also provides alerts and recommendations to help users right-size the resources required by the pods, thus avoiding drift when scaling up and achieving savings from up to 30-50%. As a sign of the interest in this young solution, AWS has selected it as a cost tracking and management tool for EKS.

Salesforce Net Zero Cloud
Adopt

Salesforce Net Zero Cloud is a sustainability management solution that delivers carbon accounting across Scope 1, 2, and 3. It includes access to waste management, SBTI alignment, forecasting, analytics, reports, audits, and out-of-the-box dashboards on carbon accounting. This solution performs what-if analysis scenarios with interactive and visual ways to plan and forecast carbon footprint and save/share those outcomes. The External Engagement Management feature in Salesforce Net Zero Cloud provides access to the Supplier data model. There are many drivers for adoption: mandatory GHG reporting to comply with National, EU, and International regulations, investment and financing due diligence, stakeholder and shareholder communication, staff engagement, and tenders requirements for business contracts. Net Zero Cloud works with Tableau for data visualisation, MuleSoft for complete integration into Customer 360, and Slack to collaborate with the stakeholders.

ServiceNow ESG
Trial

ServiceNow ESG helps organisations manage their CSR programs and elevate their environmental, social, and governance initiatives in a structured and transparent manner. Organisations can track and measure their ESG performance, identify areas for improvement, and report on their ESG efforts to stakeholders. The solution includes features such as a centralised repository for ESG data (information on carbon emissions, water usage, and waste generation), tools for tracking and managing sustainability goals, including the ability to set targets and track progress, integration with external data sources, such as sustainability rating agencies, to provide a more comprehensive view of an organization's ESG performance, and automated reporting capabilities. Built on the Now platform, ESG benefits from the single data model that eliminates information silos and uses machine learning to reduce manual work and improve resolution times with intelligent automation.

Sopht
Assess

Sopht is a software-as-a-service solution designed to help IT teams drastically reduce their carbon footprint. It also helps companies optimise costs through the measurement of their IT infrastructure and equipment's environmental impact. Although it's a relatively new company, Sopht have already seen their solutions successfully implemented within France's banking sector and are continually expanding their customer base. As an end-to-end platform, key services include multi-cloud monitoring, IT asset management, energy usage analysis, and drawing decarbonisation roadmaps. For companies looking to improve and reduce their carbon footprint, Sopht may just be the solution. However, they are still growing, and so more research needs to be done before we can move them from the "Assess" category.
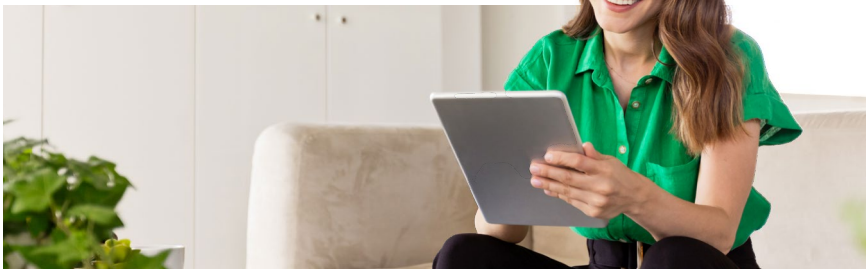
Sweep
Assess

Sweep is a platform designed to track the carbon footprint of any type of organisation or sector, but above all it enables its users to build long-term action plans using granular and accurate sources of data. While other market players also offer this type of carbon tracking system based on global and updated criteria, Sweep's uniqueness lies in its ability to integrate a financial dimension into the system, allowing full visibility on the profitability of ESG investments. This means that not only does the solution help users understand areas for improvement, but it also helps organisations detect, analyse and evaluate sustainable business growth, ensuring that all teams are working together with a focused and committed purpose, whether they are in marketing, RH, finance, IT, etc.

Teevity
Assess

Teevity is a 5 year-old software-as-a-service platform that helps FinOps teams optimise their use of cloud infrastructure and platforms. It provides users with a single place to view and manage their cloud usage while offering data reporting, simulations, and recommendations for optimisation. It also gives companies the ability to implement their own chargeback rules, as well as offering detailed information on the cost of usage of all cloud resources (from virtual machines to cloud native systems). Intelligently and robustly built, Teevity is based on an open-source solution developed by Netflix. While mostly targeted at organisations with significant cloud usage, it is also useful for those with lower levels of cloud consumption. It can help reduce cloud and multi-cloud complexity, improve decision-making, and optimise cloud resource consumption.

Verdikt
Assess

Verdikt is a platform designed to help companies align IT operations with their sustainable development goals. It gives scores and recommendations for actionable reduction levers courtesy of a methodology based on the three pillars of sustainability: environmental, social and economic. With this bridge between IT and CSR, Verdikt targets any organisation that wants to implement a multi-year plan focused on improving IT environmental impact. As a relatively new platform that was founded in 2020, its efficacy still has to be robustly tested. While its infancy means a lack of quantitative data such as inventory, staff, etc., its foundations are firm, well-designed, and quite user-friendly. However, more research still needs to be done, which is why organisations should continue to assess Verdikt in 2023.

When tech meets ESG strategy effectiveness

How to become more efficient and better track your ESG strategy

Who is the organisation and what's its context?

Founded over a century ago, this world leading life science organisation decided to audit and empower its data-driven sustainability activities. Employing more than 40,000 people around the world, the need to implement a solution that would generate accurate KPIs and analytics on their performance in terms of ESG objectives at a global level became crucial to design a successful internal ESG strategy.

What needs did the organisation face at the time?

The organisation multiplied and extended its internal initiatives within all its entities worldwide, such as labs, factories and offices: avoid water waste, use only renewable energy, limit flight travel, drive social initiatives supporting rural areas, ensure and measure equal opportunities to its employees, and strongly promote diversity and inclusion into processes. Getting an overview of these initiatives eventually became the cornerstone of the current and future ESG strategy.

What was the turning point where the organisation had no choice but to adapt its strategy?

With as many areas of social, ethical, environmental or people innovation across the group, they progressively started losing sight of the overall performance of their ESG initiatives, with no possibility to get a comprehensive and full-scale overview of what they put into actions in terms of ESG initiatives.

This lack of insight ultimately hindered consistent insights and communication about the ESG and made it difficult to access relevant data for external communication.

Which factors played an important role in the decision to choose Alteryx and Tableau techs?

- **Automate data collection from any source with high scalability:** Initially connecting to 25 data sources of relatively low complexity, but growing to 45+ data sources spanning

from excel sheets to DWH live connections. Also, data providers come from 25+ countries and are both internal parties and external affiliates.

- **Enable teams to process and analyse data for decision-making:** Building on skills already present in the organisation, the tools enabled it to understand current performance and adjust action plans to progress towards specific targets.

What were the immediate benefits for the organisation's clients or employees?

- Capacity to drive a concrete action plan aligned with the global long-term ESG strategy
- Assessment of effects from global sustainability activities within 4 months
- Collecting and structuring of data input
- Analysis of data and calculation of impact of ESG activities
- Visualisation of impact and future intent: an internal communication platform and external exposure to contribute to transparency towards vendors and stakeholders on a specific website.

That extra mile that made all the difference

"The ability to stay on top of the complexity from many data sources and loads of stakeholders while making the reporting come alive while we were still trying to get our heads around what we wanted to do was excellent. We could not have done it without you."

Strategy Lead Sustainability Manager at the organisation

SUSTAINABILITY
ENABLED BY DIGITAL

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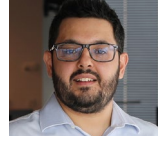
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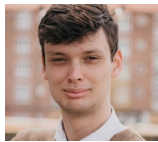Ernyei

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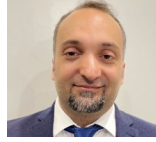
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Thank you

Devoteam is a learning company and our talent is the spark that lights our way. The Devoteam TechRadar is the result of a collective effort from our talented team of Tech Experts from across EMEA who helped gather information for this guide. We want to thank them for their integral role in helping us create this useful resource and hope that it will also inspire other talents to join us.

Want to explore your infinite possiblities and participate in the next TechRadar?

devoteam.com/join-us

About Devoteam

Devoteam is a leading tech consulting firm focused on digital strategy, tech platforms, data and cybersecurity. By combining creativity, tech and data insights, we empower our customers to transform their business and unlock the future.

With more than 25 years' experience and 10,000 employees across Europe, the Middle East and Africa, Devoteam promotes responsible tech for people and works to create better change.

Creative tech for Better Change

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Creative tech for Better Change