

# Complete Guide to Site Reliability Engineering

Ultimate Compendium for Non-technical Stakeholders

# Introduction

Since Maxima was founded in 1993, at the start of what is now the IT revolution, we've witnessed and been a part of numerous trends and transformations. Of all the changes during the past 3 decades, nothing hit quite as big or impactful as the cloud era.

During our years of working with clients on modernizing their legacy software and migrating their systems from traditional mainframe-based infrastructure to modern cloud environments, we have discovered a business need rarely discussed by enterprise technology partners.

**Moving to the cloud and maintaining a sustainable cloud infrastructure costs far too much in its current form.**

This discovery led our company to build an automated, enterprise-ready, all-in-one cloud governance solution, **Cloud Orbit**, enabled in huge part by Site Reliability Engineering's tools and best practices.

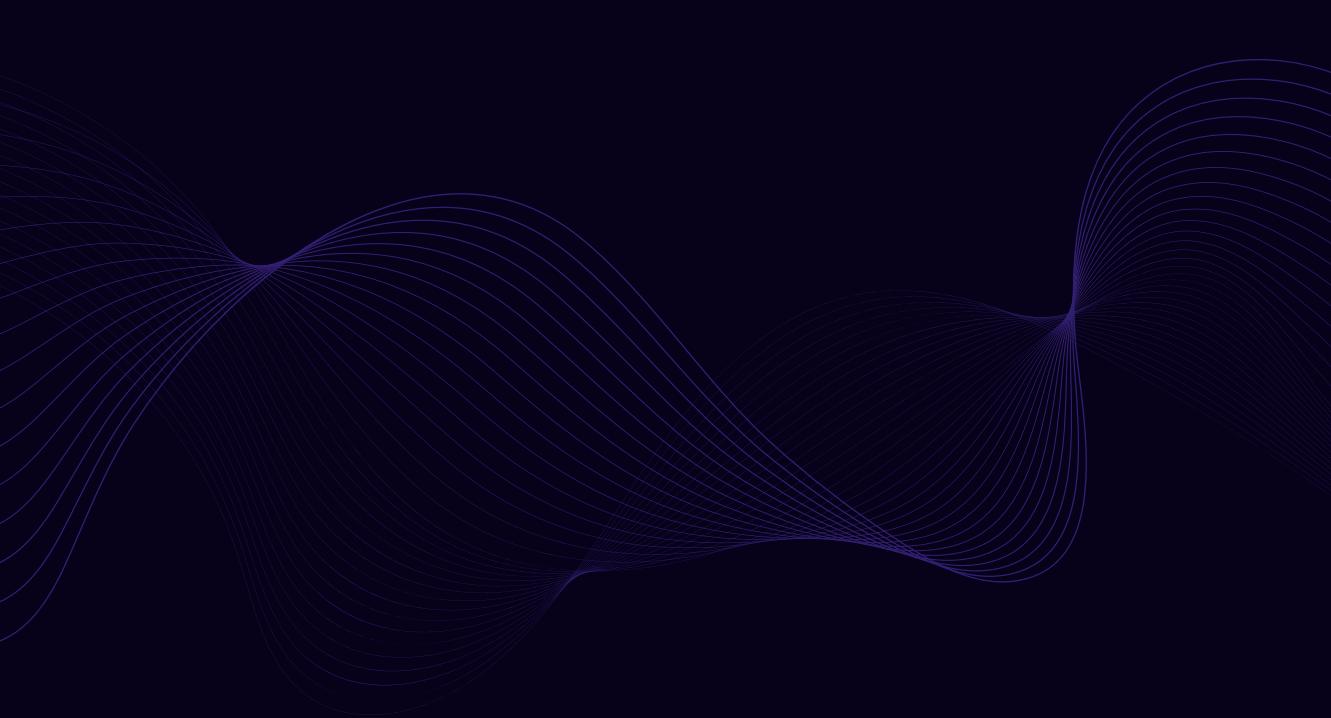
With Cloud Orbit, we were able to optimize the cost and time-to-effect of every cloud-related service Maxima Consulting provides - including migration projects, infrastructure design for cloud-native apps, and everyday cloud management.

That experience inspired us to create the Complete Guide to Site Reliability Engineering, a publication for entrepreneurs and corporate executives who'd like to learn what SRE is and why it may be the best way to optimize cloud costs and performance at the same time.

I'm sure that SRE-based solutions to cloud management and platform engineering are the future, and I'm proud our company can play a part in bringing Site Reliability Engineering to organizations big and small.



Patrick Jamal, CEO at Maxima Consulting



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# Why Site Reliability Engineering?

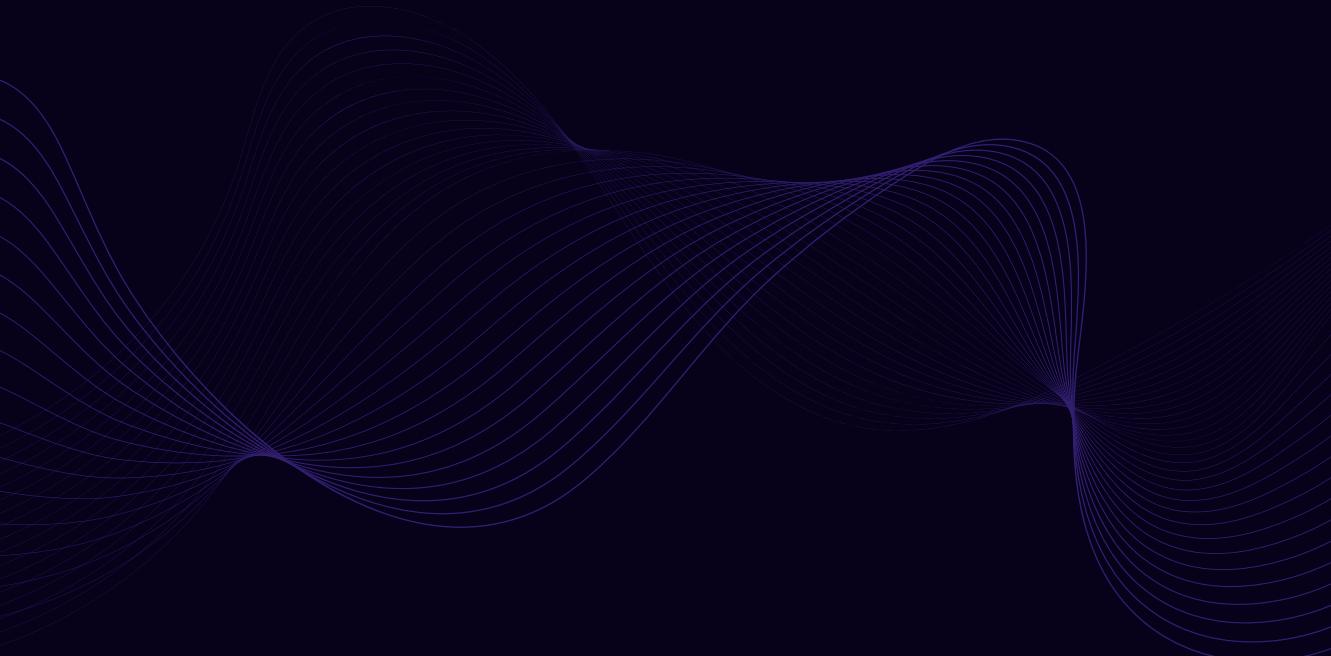
Site Reliability Engineering, often abbreviated to SRE, is a practice of applying a software engineering approach to IT infrastructure and operations. The concept, somewhat similar to DevOps, originated at Google in the early 2000s and was first introduced by Ben Treynor Sloss.

Site reliability engineers use software (both existing tools and custom code) to create scalable and highly reliable cloud environments for software systems. These code-defined infrastructures enable development teams to improve new features' time-to-market while simultaneously enhancing availability, security, and reliability for users.

Cloud Orbit, our newest complete platform engineering solution, uses Kubernetes and containerization technologies to facilitate migration projects and deliver SRE at scale, which is guaranteed to bring tremendous competitive advantage to most organizations worldwide.

We view our role in the ever-changing technology landscape as being the trusted partners who bring Site Reliability Engineering closer to business leaders. This guide was created to advise non-technical stakeholders on the principles and practices of the SRE approach in the most thorough, systematic, and comprehensible way possible. Please enjoy its contents.

*Maxima Consulting's Cloud Orbit Team*



# The Basics of Site Reliability Engineering

*Regardless of your organization's current position in the digital transformation journey, Site Reliability Engineering is an approach worth investigating. The first step is to acquire a good understanding of related concepts and ideas.*



It's hard to imagine thriving in today's dynamic business environment without extensive use of cloud technologies. Keeping up with constantly rising customer expectations calls for continuous improvements to the accessibility, convenience, and dependability of all digital products and services.

Maintaining efficient cloud infrastructure becomes a leading priority for most customer-oriented organizations. For many companies and institutions, SRE is becoming the preferred way to improve infrastructure reliability, support system scalability, and enhance security measures while reducing time-to-market and overall cost.

## What is SRE?

**Site Reliability Engineering** brings the development and operations teams together to facilitate the creation of reliable and scalable cloud and hybrid environments,

IT systems, and individual applications. Site reliability engineers approach IT infrastructure and operations like software engineers would approach the software development process. By applying software engineering solutions, such as automation, version control, and shift left security to infrastructure, they reduce the number of human errors, improve the system's flexibility, and simplify day-to-day cloud management. Site Reliability Engineering can be understood as a set of conventions, procedures, and practical recommendations for applying such solutions to I&O.

The Site Reliability Engineering model is mainly concerned with tasks traditionally performed by IT infrastructure and operations teams. Usually, I&O specialists had to address business requirements by operating manually on physical machines. In contrast, site reliability engineers satisfy organizational needs by using code to manipulate IT resources remotely.

The SRE approach was first attempted at Google in 2004 when engineer Ben Treynor Sloss founded the first site reliability team. The book "Site Reliability Engineering: How Google Runs Production Systems," written by Google's employees in 2016, is considered a classic among SRE experts.

Today, Site Reliability Engineering is recognized as a mature and dependable practice across the industry. The methodology helps teams balance a satisfactory pace of new releases with ensuring product reliability for end-users. SRE is closely related to DevOps, and some specialists consider the approach a specific implementation of DevOps.

## What is the goal of SRE?

Site Reliability Engineering aims to improve infrastructure efficiency, reduce time-to-market, and enhance user experience by leveraging software solutions in operational tasks. SRE also heightens software availability, facilitates contemporary security processes, and enhances communication, visibility, and auditability.

## How is SRE different from DevOps?

DevOps and SRE both bring development and operations teams together, and they both demand a significant cultural and philosophical shift. However, while DevOps focuses more on high-level concepts, SRE ensures particular rules and practices are followed.

DevOps is defined as a set of practices that combines software development (Dev) and IT operations (Ops). It's used to hasten the development life cycle, improve software quality, and support the continuous integration and continuous delivery (CI/CD) pipeline. Because of that, some experts consider Site Reliability Engineering to be a characteristic implementation of DevOps.

Similarly to DevOps, SRE concentrates on bringing IT operations and software development closer to improve the delivery speed. Both models draw ideas from Agile, call for excellent communication between all stakeholders, and require a profound shift in company culture to succeed fully. One major difference is that site reliability engineers function inside development teams to remove the potential for communication issues. Another important distinction is that SRE focuses on balancing site reliability and speedy implementation of new code, while DevOps is primarily concerned with creating fast and efficient development pipelines.

*Want to know more? Go to page 13 for detailed information.*

## **What methods and tools are used in SRE?**

Site Reliability Engineering achieves its goals by employing software development methods, such as containerization, integration, automation, version control, and specific software tools for testing, customizing alerts, communication, deployment configuration, improving observability, and data analysis.

*Explore a wide selection of tools used in SRE on page 34.*

## **What is automation?**

Site Reliability Engineering uses automation to streamline operational tasks and standardize functions across cloud and hybrid environments. Automation is defined as utilizing technology to perform tasks independently (or with minimal human input). A core part of SRE, it is a necessary tool for making processes more reliable.

Traditionally, upgrading a website has involved a couple of manual steps. Usually, someone had to manually download a `.zip` file and follow the step-by-step instructions to execute consequent processes on the server.

With automation, human involvement is reduced to clicking a button. The entire step-

by-step process is still there, but it is executed by a previously created piece of code – a little software program that runs in the background. Results? There is no downtime and fewer human-made errors. By automating repetitive tasks, organizations enable software engineers to focus on strategic and creative endeavors like writing code.

Automation is a vital component of all Site Reliability Engineering practice, as it enables the core promise of SRE – to balance deployment speed with system dependability and availability.

## **Impact on time-to-market**

Automating one deliberately selected process can already improve time-to-market, as in the case of automated website upgrades. While the traditional process required scheduled maintenance windows, learning new systems, and performing multiple tests before bringing the systems back up, automation made it simple, reliable, and quick. Just imagine the effect of methodically and continuously automating process after process.

## **Impact on downtime**

Automation significantly reduces the risk of human error. Even an excellent engineer can easily make an unfortunate mistake that leads to downtime or other issues when many manual steps are needed to complete an upgrade.

## **Consequences for business**

If your competitor utilizes website upgrade automation and you still make manual upgrades, your customers receive new features later than their peers who use the rival solution. They also have to endure the scheduled downtime needed to complete all upgrade steps manually. And if anything goes wrong, the website can stay unavailable longer than predicted.

Such a situation could easily lead to customer dissatisfaction and, in some cases, even loss of business. Taking advantage of the latest technological advancements has become a prerequisite to remaining competitive.



## Benefits of Site Reliability Engineering

Site Reliability Engineering facilitates many benefits for organizations, and the list below is not meant to be a complete list of these benefits, but only a couple of examples to help you grasp the gist of it.

### 1. Bring code and infrastructure together

Site Reliability Engineering brings software development, deployment, and monitoring tasks together and offers 24/7 availability for its customers. In an ideal scenario, SRE becomes a cross-functional practice where developers are involved in releasing and monitoring the software they write.

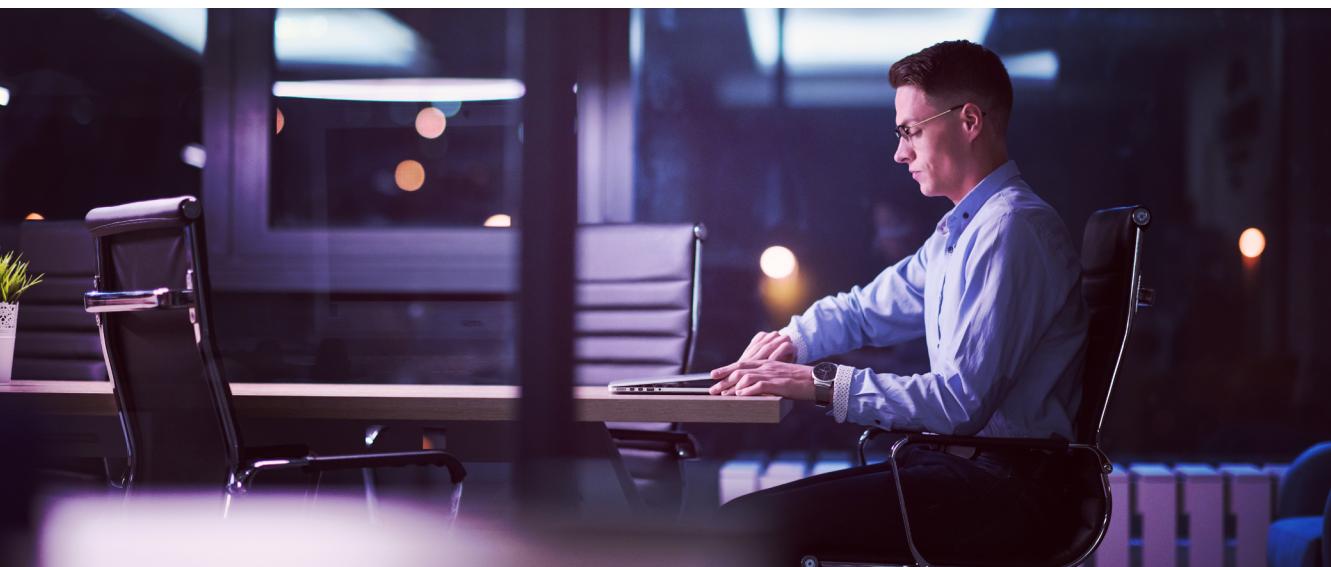
### 2. Enable real-time updates and nonstop monitoring

Site Reliability Engineering supports developer productivity and rapid software release. It allows for accelerated product updates and continuous monitoring by using automation to send product updates without any downtime. When it's needed, the development team can roll back the update as easily and quickly as it can release

new updates. Additionally, with SRE tools, a large number of systems and automated processes can be monitored simultaneously.

### 3. Enjoy enterprise-grade security by default

Site Reliability Engineers follow best practices and guidelines for IT security operations and perform regular audits to ensure compatibility with local standards and regulations. SRE is compatible with the “shift left security” approach, provides cutting-edge tools, and enables continuous scans to ensure instantaneous reaction to all errors and threats.



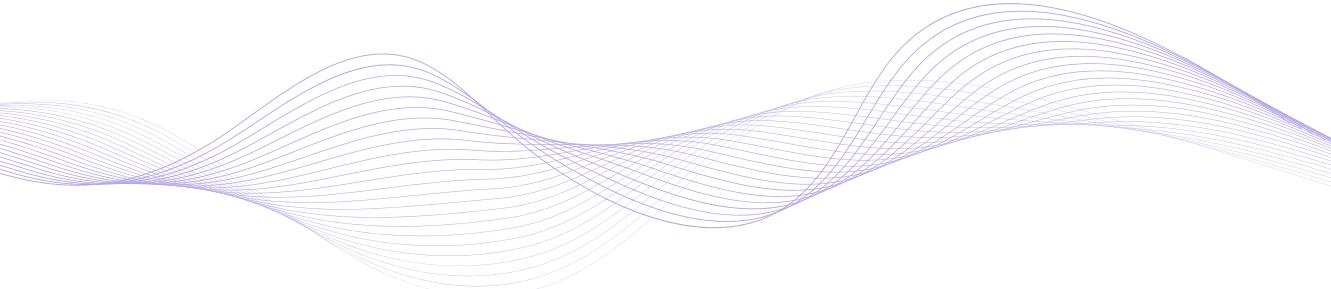
## Transforming infrastructure and operations with SRE

Traditionally, the operations team was responsible for keeping applications up and running in an IT infrastructure. They had to manually install new hardware whenever new requirements came up, set up virtual machines (VMs) to deploy applications, and utilize various monitoring tools, but most of the operations work was very reactive. Only after something went wrong the team would manually let the correct person know about it. Back then, bringing systems back up could have taken anywhere between zero minutes to a couple of days.

Software-defined infrastructure has completely transformed the way companies look at operations. Software-driven operations enabled by Site Reliability Engineering are much more efficient. This is why, as of today, most IT infrastructures are already software-defined. Cloud platforms provide environments where configuration, scaling, and resource allocation are all managed by only using the software.

To make more processing power or storage available, you no longer have to install a new processor or hard disk to a mainframe computer. Instead, you click a button, which triggers an automated response, and the change you requested happens (e.g., more processing power is assigned to your account).

Applications like Uber or Airbnb show us how software has transformed traditional industries. With apps like that, booking a ride or a place to stay on vacation was never easier. Similarly, operations can be transformed by bringing software development practices into the equation.



## SRE vs. DevOps vs. DevSecOps vs. GitOps

*It's true that Site Reliability Engineering and DevOps share some similarities, but ultimately, they are distinct in both focus and practice.*

Both DevOps and SRE bring development and operations teams together, and they both demand a significant cultural and philosophical shift to take place. However, while DevOps focuses more on high-level concepts, SRE ensures particular rules and practices are followed. Both approaches also relate to the concepts of DevSecOps, GitOps, and Agile.

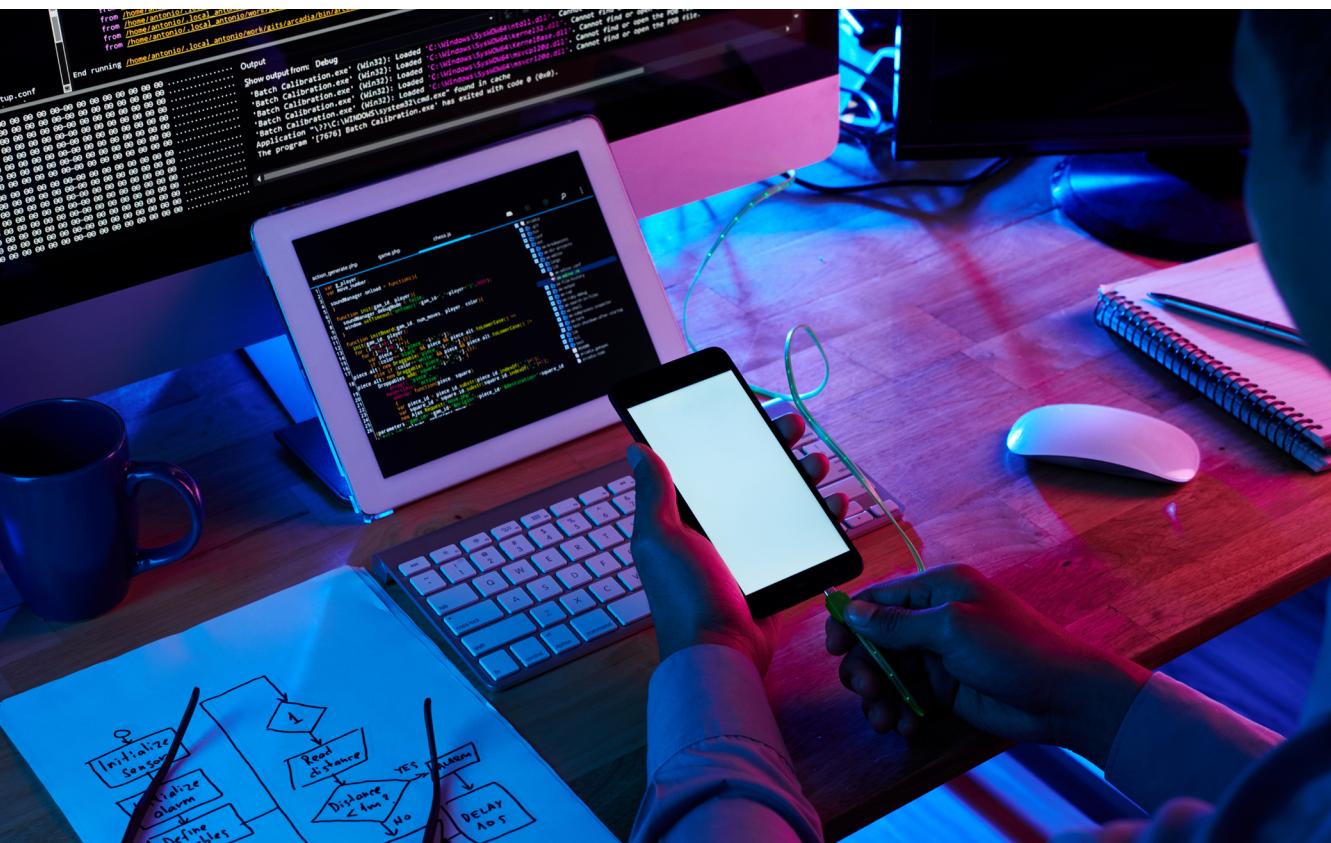
# What is DevOps?

**DevOps** aims to be a holistic approach that brings the software engineering team and operations team together to streamline the software development and deployment processes. It emphasizes collaboration and communication between these traditionally separate organizational silos, making all stages of the software development lifecycle shared responsibility of all teams involved.

The feedback loop, fostered by DevOps culture, ensures that the core development team is always aware of runtime issues, enabling them to improve and optimize their code efficiently. As a result, DevOps practices improve the deployment frequency and accelerate software delivery.

Despite its holistic nature, DevOps lacks specificity, leading to various interpretations and implementation challenges. One DevOps-enabled organization can adopt a very different toolset, team structure, and process than another, which can result in difficulties when working with partners or adopting new tools.

Additionally, while DevOps concerns itself with collaboration between operations engineers and developers, it does not provide explicit guidance on achieving reliable systems, cost-effectiveness, security, and time-to-market goals.



## How is Site Reliability Engineering different?

Site Reliability Engineering can be understood as a particular approach to DevOps that focuses on specific outcomes, such as dependable systems and service reliability.

Site Reliability Engineering addresses DevOps challenges by providing a focused approach to achieving the desired business goals. SRE teams use specific tools and techniques to make sure applications are resilient enough to withstand disruptions, work towards reducing system failures, and maintain availability for end users. SRE minimizes bottlenecks, streamlines the development process, and consequently ensures better time-to-market.

Additionally, SRE is designed to highlight the importance of security, protect software from threats, and avoid vulnerabilities. It also seeks to optimize costs by enforcing efficient resource allocation and automation. SRE-driven automation reduces the likelihood of human error and guarantees consistent and predictable outcomes essential in continuous integration/continuous delivery (CI/CD) pipelines.

*Site Reliability Engineers, heavily specialized in cloud technologies, focus on bridging the gap between software development and IT operations. They approach cloud and hybrid environments with test-hardened toolsets and a primary goal - infrastructure automation that aligns with the principles the development teams use when writing code for applications.*

## The importance of feedback

Achieving such integration requires collaboration and enabling early feedback. Communication channels like Slack and Microsoft Teams and ticketing systems like Jira and ServiceNow are staple tools in SRE and DevOps-enabled teams.

## SRE vs. DevOps

1. Site Reliability Engineering and DevOps share a common objective of combining and improving software development and operations, but this common goal is approached from different angles.
2. Both approaches emphasize the importance of collaboration and communication

- between all teams involved in the software development lifecycle.
3. DevOps lacks the specific guidelines for achieving reliability, security, and cost-effectiveness that SRE incorporates.
  4. SRE can be understood as a specific approach to DevOps that provides focused and detailed frameworks for attaining business goals through the use of a variety of communication, monitoring, and automation tools.



## What is DevSecOps?

DevSecOps is an attempt to emphasize the role of security within DevOps and integrate it with development and IT operations. Traditionally, security issues were handled at the end of a software development process. When cloud platforms enabled the modern software development lifecycle and accelerated software delivery, this approach to security became a bottleneck. To further improve performance and optimize the process, security had to be integrated with development work and operations tasks from day one to post-deployment.

## How does Site Reliability Engineering tackle security?

Site Reliability Engineering treats security as a critical aspect of all software products. In SRE, the continuous integration of security practices is enhanced with automated testing and utilization of specialized monitoring tools.

## Shifting security left

Both SRE and DevSecOps encourage developers to “shift security left” – move the security activities from the end of the software building process (traditionally depicted on the right side of process visualization) to the beginning of this process (traditionally depicted on the left). By shifting security considerations to the left, software engineers are empowered to build secure software from the project’s inception.

Read more on this topic on page 17.

## Continuous improvement

Both SRE and DevSecOps emphasize the need for continuous testing and improvement of security measures in place. This iterative approach enables steady security enhancements and ensures the system remains resilient against always-evolving threats.

## SRE vs. DevSecOps

1. Compared to DevSecOps, Site Reliability Engineering offers a goal-oriented approach.
2. While DevSecOps provides conceptual frameworks without prescribing specific implementation details, SRE outlines clear goals and advocates for achieving them through automation tools.
3. SRE’s best practices are widely available, contributing to its growth in popularity and increased adoption.
4. When implemented correctly, SRE can easily achieve the goals it shares with DevSecOps.

## SRE vs. GitOps

GitOps is an operational framework that applies SRE/DevOps best practices

to infrastructure automation. With Git, all code responsible for operations and infrastructure is stored in a central repository to enhance collaboration, observability, and security. Site Reliability Engineering can easily integrate GitOps into its own set of practices to leverage this popular distributed version control system in dealing with infrastructure.

## SRE vs. Agile

The Agile philosophy of software development emphasizes rapid iteration and continuous delivery. These objectives closely align with time-to-market, one of the focal points of DevOps and Site Reliability Engineering. SRE is also fully compatible with Agile's iterative feedback loop by providing the development team with a solid foundation of automation and reliability that lets them focus on delivering value by iterating on their products with agility.

Organizations can implement SRE best practices to ensure prompt delivery of new features, fix bugs quickly, and improve user experience. SRE's automation capabilities can be leveraged to implement changes efficiently, utilize A/B testing, and introduce blue-green deployments to the release cycle, where new software versions are deployed in parallel environments.

By gradually rolling out the new version and directing a subset of users to test it, organizations can gather valuable feedback, validate changes, and fine-tune the user experience before a full-scale rollout.

## The synergy potential

While the simultaneous implementation of SRE, DevOps, DevSecOps, and GitOps in a production environment can be confusing, it is possible to adopt all methodologies concurrently. Businesses that decide to do it should focus on navigating the potential complexities that arise from different interpretations and approaches by providing clear guidelines to the development, operations, and security teams.

It's important to remember that clear communication, organization-wide education, and focus on alignment with business goals are essential to leveraging the benefits of SRE, DevOps, DevSecOps, and GitOps.



# Shift Left Security Explained

*Shifting security left with Site Reliability Engineering enables companies to take a more proactive information security stance.*

In 2022, the number of cyberattacks performed globally has increased by 38%. The need for robust security measures increases along with an upsurge in cyber threats. Even SMEs aren't safe - it is reported that 42% of them already experienced a cybersecurity breach. Today, a proactive approach to security is crucial for all businesses.

Meanwhile, with advancements in cloud technologies and the broad adoption of continuous integration/continuous delivery (CI/CD pipeline), the traditional approach to security has become a significant bottleneck for many organizations.

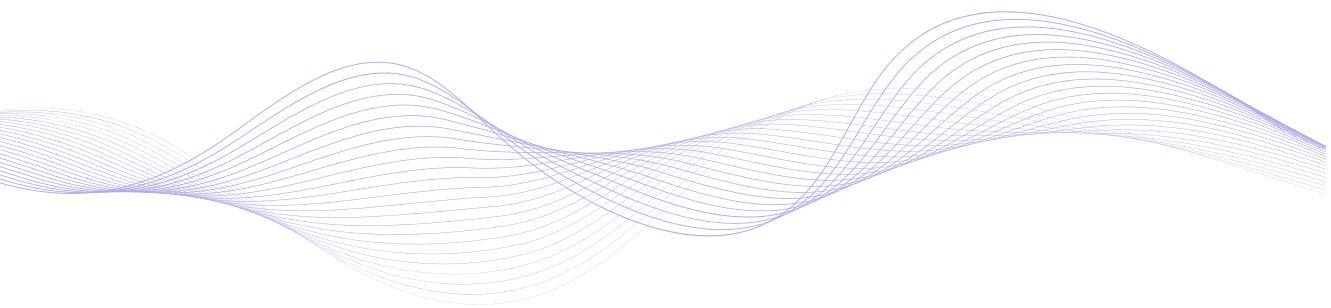
The old-fashioned approach placed developers at the beginning (or "left side") of the development process. Back then, developers didn't care much for security. It was the other teams' responsibility to discover vulnerabilities.

Security engineers were placed at the end (or "right side") of the development process and focused on finding vulnerabilities in otherwise done code. Whenever they found anything, they had to send it back to the development team, who had to fix it before

the deployment.

Site Reliability Engineering shifts security to the left side of the development process. Security considerations become a shared responsibility, resulting in earlier identification of vulnerabilities. Teams can identify security issues during the whole development lifecycle and fix them as soon as they arise. Shifting security left means making it essential from start to finish.

The earlier detection of security issues leads to faster fixes and a shorter time to market, as well as reduces the risk of data breaches and system failures. Ultimately, shifting security left results in a better customer experience and increased revenue.



## Innovation and Experimentation

*The impact SRE has on innovation makes it perfect for organizations that strive to stay ahead of the competition.*

Site Reliability Engineering increases transparency and provides developers with a framework for swift and secure experimentation. Ease of experimentation results in more features being developed in less time, enables faster time to market, and facilitates increasing a competitive edge over time.

## Impact of automation

By making deployment processes automated and repeatable, SRE allows developers to test new ideas and features without worrying too much about the time it takes to

implement them. Security automation results in quick identification of any mistakes and makes them easily reverted, further reducing the fear of failure. Consequently, SRE-enabled organizations decrease time-to-market for new software versions.

## **Value of user feedback**

Blue-green deployments and A/B testing facilitate experimenting in the production environment without affecting the publicly released software version. By enabling such experimentation, SRE allows developers to get feedback from selected real users, leading to valuable insights and quick iteration.

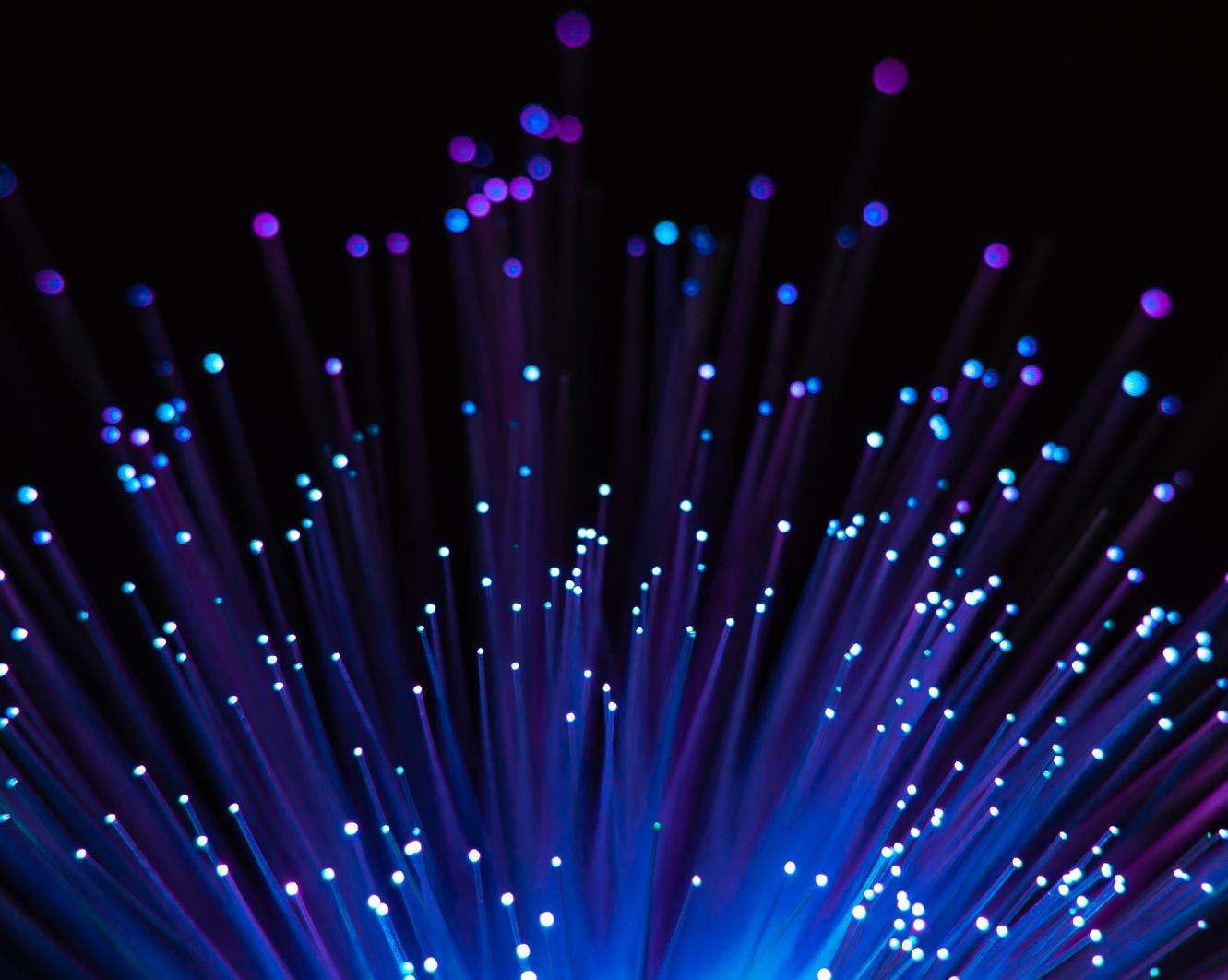
## **Stakeholders' confidence**

SRE provides more visibility into system performance. With it, stakeholders can see the real-time system performance at any time, therefore retaining more control over the software product. As a result, SRE increases their confidence in the development process.

## **Ideas informed by real data**

Increased transparency and visibility causes new, data-informed ideas to sprout more frequently. For example, business analysts or product owners can use SRE dashboards to monitor deployment, commits, and bug metrics to evaluate performance and offer developers valuable insights from their unique perspectives.





# Introduction to Managed SRE Services

*Managed Site Reliability Engineering (also called SRE as a Service) allows companies to utilize SRE expertise without the need to hire infrastructure experts as full-time employees.*

Managed SRE is a perfect solution for organizations that want to reap the benefits of Site Reliability Engineering but prefer to avoid the hassle of recruitment and complex implementation. Managed SRE services, such as Maxima Consulting's **Cloud Orbit SRE+**, allow for scalable utilization of SRE practices without the need to hire a full-time employee.

# In-house IT operations team vs. managed SRE services

In-house IT ops	Managed SRE
Deployment based on internally designed processes	Smooth deployment based on universally acclaimed SRE best practices
Cost-optimization efforts depend on internal processes	Cost- and performance-optimization efforts based on proven methods
Monitoring and observability tools depend on the team's preference	Improved monitoring and observability capabilities guaranteed by best-in-class toolsets
Incident management automation depends on the team's expertise	Automated incident management and issue escalation capabilities
Cooperation with development team depends on communication skills and internal processes	Focus on bridging the gap between operations and development
Cooperation with quality assurance and security teams depends on communication skills and internal processes	The shift left security approach demands integration of software testing and security considerations throughout the entire process
Reactive approach to requirements software changes	Proactive guidance for developers and improved scalability
Commitment to hiring full-time employees	Scalable service
Need for extended recruitment or training to access SRE expertise	Instant access to SRE expertise
High recruitment and upskilling costs	No recruitment and upskilling costs



## Key Benefits of managed SRE

### 1. Instant access to SRE expertise

Implementing Site Reliability Engineering as a service solution means drawing from the experience of your chosen vendor. You work with experts and SRE enthusiasts who have hands-on experience with all common issues and thrive when encountering a new challenge. For example, Cloud Orbit SRE+ is already packed with 140+ out-of-the-box technology stacks, all preconfigured and thoroughly tested, and we add more basically every month.

### 2. Reliability assessment

Software Reliability Engineers start their work with assessing the client's SRE maturity. By examining the enterprise's existing resources, they can prescribe correct priorities, onboard stakeholders, and define steps to increase control over resources and services.

### 3. High availability

Managed SRE services affect not only your digital products and services but also

the underlying infrastructure. SRE ensures your internal digital needs are met and improves the availability of your client-facing apps, which boosts the user experience.

## 4. Bottlenecks removal

Late discovery of an operational bottleneck can generate unexpectedly high costs, but managed SRE services equip you with one pane of glass insights from day one, significantly improving your performance analysis and response time capabilities.

## 5. Dependable system architecture

SRE providers will always recommend the best-in-class solutions to help your business achieve desired levels of reliability and cost-effectiveness quickly. They will also ensure your IT environment is designed and implemented in alignment with the CI/CD model.

## 6. Reliable optimization

Managed SRE service providers are experts in resolving reliability issues related to application, performance, databases, and infrastructure. With their thorough experience, improving the performance of popular technology stacks is nearly instantaneous. Therefore, custom-made solutions get all the attention needed for swift and dependable optimization.

*Maxima Consulting's Cloud Orbit SRE+ service can be used to improve the infrastructure performance, decrease time-to-market for your development teams, and reduce the need for full-time infrastructure and operations employees in favor of a comprehensive, scalable, dependable, and cost-optimized external service.*

# Maturity assessment

*Before attempting to implement SRE throughout the organization, it's important to examine the current state of the company's resources and define ambitious but reasonable expectations.*

Site Reliability Engineering is a must-have for organizations that want to create a highly reliable and scalable system that is fully automated. However, implementing SRE requires a mindset change, a management-level push, and choosing the right toolset, as well as company-wide training on SRE best practices.

## What to expect after SRE implementation?

Site Reliability Engineering moves away from manual interventions into IT environments in favor of automation. While traditional operations teams were expected to actively interface with various tools to address current issues, Site Reliability Engineers will strive first and foremost to automate the response to such issues.

### 1. Reduced downtime

This cultural shift results in fewer human errors and reduced downtime, as bots always follow directions precisely and work faster than manual interventions could ever happen.

### 2. Improved time-to-market

Building a thoroughly automated software release pipeline enables developers to deploy new software versions with a simple push of a button and reverse deployments just as effortlessly in case of any mistakes.

### 3. Streamlined incident management

With a robust incident management system in place, organizations can easily

prioritize and escalate incidents while enabling unparalleled visibility and facilitating accountability.

## 4. Better alert management

Comprehensive alerting systems can be used to automate sending various types of notifications to appropriate people at appropriate times, ensuring a prompt and accurate response to all discovered issues.

## 5. Security shifted left

Shift left security is a proactive practice that saves time and resources in the long run by incorporating security considerations from the very start of the development process.



## Strategy tip: Focus on facts and explore your options

Site Reliability Engineering implementation plan should be based on a thorough analysis of your existing infrastructure and other IT resources, contain the training

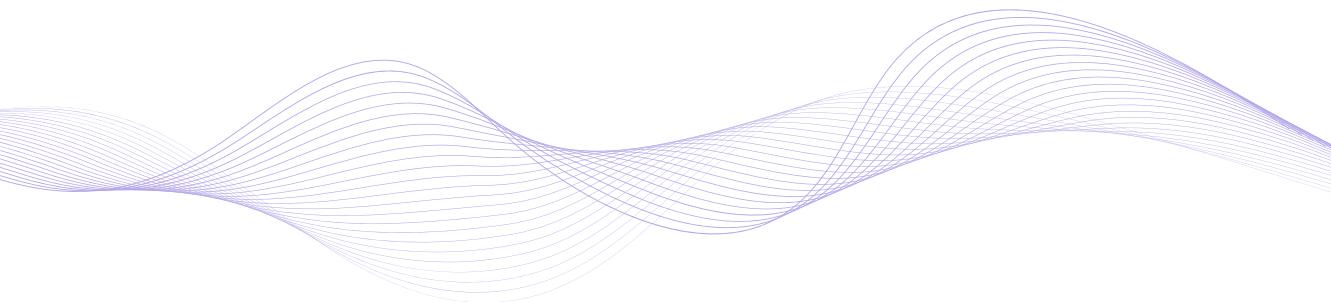
strategy for affected teams, and include quantifiable success indicators.

As a first step, it is imperative to perform a thorough examination of your existing assets and create a detailed implementation plan to establish the overall cost of the investment. A company-wide SRE implementation should lead to a return on investment within the first year.

Introducing the right tools and providing employees with training on how to use them is essential to SRE implementation success. In some cases, additional recruitment might be necessary.

Explore your alternatives and tweak the implementation roadmap until you're satisfied with the projected results. Consult existing partners about their involvement in the project, but dedicate some time to meeting new vendors as well. With more available options for training, staffing, and managing the infrastructure, you will be better positioned to define requirements and negotiate.

*Cloud Orbit clients have reported their total cost of ownership reduced by at least 30%, and the time to market improved by up to 5 times within the first 12 months.*



## Detailed Roadmap to SRE Implementation

*To succeed in SRE implementation, organizations must understand potential challenges, develop a thorough, step-by-step action plan, and know how to evaluate their results.*



## Common challenges and how to approach them

When attempting to implement Site Reliability Engineering, you can encounter many challenges, such as getting your operations and development teams on board, convincing stakeholders to support your idea, providing proper training, and securing beneficial partnerships.

### 1. Hesitant leadership

Convincing the company leaders to support SRE implementation can be tricky if they do not come from a technical background or are convinced that if something works as it is, it shouldn't be messed with. However, combining the knowledge of benefits listed in this ebook with a good understanding of the current landscape of the industry the company is in should be enough to present a convincing case for SRE.

Research your competitors who already implemented SRE and try to estimate their savings. Educating the management by presenting a fact-based comparison is an easy way to comprehend the benefits of Site Reliability Engineering. Getting sufficient funding and priority is crucial to achieving expected results, so leadership resistance can become a significant problem if it's not properly dealt with as early as possible.

## **2. Resistant teams**

Embracing SRE company-wide requires a considerable mindset shift among everyone in the organization. But some of your engineers might feel comfortable with the way things are done now and fear the changes a new approach will introduce. Often, a management-level push is required to reduce such resistance.

It is also necessary to raise awareness about the importance of SRE. Employees have to understand the benefits it brings to be able to support it. Similarly to every other case of successful digital transformation, those in charge of implementing changes need to focus on effective communication.

## **3. Toolset selection**

Even though all big cloud providers offer a selection of tools considered necessary for Site Reliability Engineering, at the end of the day, every organization will have its own unique toolset based on individual needs, preferences, and procedures. It is extremely important to recognize the need to bring in the right monitoring, alerting, testing, automation, deployment, and communication tools as essential for SRE's success. It is strongly recommended to discuss tool selection with external experts and consider how much customization is needed to make your toolset work towards your goals, not against them.

## **4. Effective training**

Even the best strategy and ideal tool selection won't suffice if the employees lack proper training. Everyone whose role will be affected should become acquainted with SRE's best practices. Leaders should additionally research other businesses that have already successfully implemented SRE (many resources are available online). Keep in mind that effective training of employees often calls for expert support.

## **5. Talent acquisition**

While hiring a Site Reliability Engineer might be easier than finding a COBOL expert, it is still a complicated process. Consider partnering with talent acquisition specialists to hire the right person within a reasonable timeframe.

## 6. Following the process

Following the modern software development process is essential for SRE to be able to ensure the reliability, scalability, and savings it promises. From establishing a well-designed pipeline through leveraging GitOps to embracing Shift Left Security, successful Site Reliability Engineering implementation is a complex mechanism that needs to be considered as a whole.

On the other hand, trying to do too much too quickly will only lead to confusion and mistakes, so it's very important to be patient and take a step-by-step approach.



## Step-by-step instructions to implementing SRE

The bine steps below can be considered a complete roadmap to a company-wide Site Reliability Engineering implementation.

### Step 1: Define your goals

Make a thorough list of your organization's specific goals and objectives you want to achieve. Whether you want to reduce downtime, save money, or improve software quality, SRE will be beneficial only if you know your priorities ahead of time and

proceed accordingly. What's more, without such a list, it's not possible to assess if the implementation was successful.

## **Step 2: Get management support**

Pursuing SRE requires a significant investment of time and resources only the top management can secure. Without their commitment, implementing SRE will be very challenging, if not completely impossible.

## **Step 3: Find a suitable partner**

Unless you decide to train your existing team to be able to implement SRE for you, which can take a lot of time and effort, you should focus on finding a reliable partner with significant experience in SRE implementation. Ideally, such a partner has at least some experience in projects within your industry.

## **Step 4: Identify the right tools**

The right tools will help you in automating many processes and make it easier to manage large-scale systems. From our experience, the "one-size-fits-all" approach rarely works, and choosing the right tools is crucial to succeeding. This is why we recommend working with your implementation partner to identify the toolset that will satisfy the unique requirements of your organization.

## **Step 5: Determine what applications to migrate**

Once you have identified the right tools, determine what applications you want to migrate to the cloud. Modernize the ones that will give you the biggest bang for your buck. Usually, this will be the software that is most critical to your organization or apps that are proven to perform better on SRE-enabled environments.

## **Step 6: Communicate with all stakeholders**

Communicate with all stakeholders affected by the migration and make sure that

everyone is on the same page. Confirm that leaders and employees understand the benefits of SRE before proceeding any further.

## Step 7: Roll out the new system

Set up a parallel environment to roll out a new system and preserve the original one for the sake of disaster recovery. Running the new system alongside the existing one allows you to perform thorough tests before shutting down the old solution.

## Step 8: Incorporate migration aspects

Most SRE implementations include data and application migration capabilities, A/B testing, and other migration aspects that make the SRE implementation process progress smoothly.

## Step 9: Maintain and optimize

Once the SRE environment is fully established, switch your focus to maintaining and optimizing your new system. Use real-time monitoring and performance testing to ensure that the system's reliability and continue the optimization process, which you'll find is never really "done." With improvements to visibility, you discover new ways to optimize and customize the system to meet the evolving organizational requirements.

# Evaluating the implementation process

Determining if SRE implementation was successful or not is quite simple.

1. Start with going back to the list of objectives established at the beginning of the project.
2. Assign the value each item on the list holds for your organization.
3. Use your SRE-enabled visibility tools to measure relevant indicators, such as the number of deployments a month, resource utilization, the system's overall performance, etc.

4. Compare your results with available public data from other companies that implemented SRE.

In addition to your company-specific goals, make sure to evaluate the factors listed below.

## Cost savings

Implementing Site Reliability Engineering should lead to a reduction in the amount of required resources (e.g., the number of needed CPUs) and result in significant cost savings over time.

## Resource saturation

Resource saturation (the percentage of available resources being actively utilized) should become more efficient, ideally reaching 50-80%, which further reduces cloud costs.

## System's availability

Properly implemented SRE is auto-healing, which leads to reduced downtime and higher availability to customers (it should exceed the industry median).

## Customer satisfaction

Improved availability, frequent releases, and reliable service should translate to improved customer satisfaction, even if some issues still remain unsolved.

# Overcoming the resistance to change

*Site Reliability Engineering requires a broad cultural change often challenged by stakeholders and employees. Addressing that resistance is key to spreading the SRE mindset across your organization.*

The first technique to gain more support for SRE is to create a space dedicated to demonstrating its proven successes. It can be an internal blog, a list of inspiring case studies, or a series of webinars, as long as you provide people with the opportunity to share their hopes and reservations about SRE. Be open about possible challenges, but stress the importance of the positive impact the implementation will have on the organization as a whole.

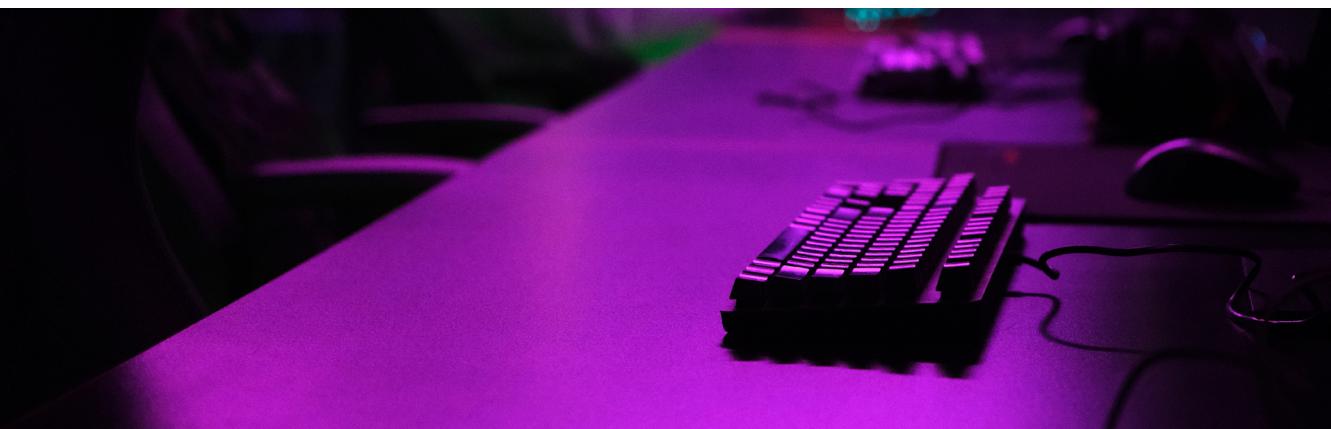
Secondly, it is crucial to celebrate the “popsicle moments,” as SRE practitioners call situations, where significant improvements are clearly visible. Make sure everyone knows that it was Site Reliability Engineering practices that prevented downtime or reduced time-to-market last quarter. Sharing such moments will help your coworkers see the genuine benefits the company owes to implementing SRE.

Last but not least, being open about failures is equally important, as it builds trust and gives the possibility to address fears. An organization needs an easily accessible way to share feedback and propose improvements. Accepting the stakeholders' feedback as an expression of new requirements will allow you to adapt your Site Reliability Engineering solution to better suit the needs unique to your organization. Commitment to transparency and self-improvement will help to build a culture of collaboration and innovation, where resistance to change withers away.

# Tools and Technologies

*The effective utilization of tools and technologies is pivotal in driving automation, streamlining processes, and ensuring reliable software development.*

Site Reliability Engineering relies on effective utilization of software tools that facilitate automation, streamline processes, and enhance observability. Empowering development and operations to deliver dependable infrastructure, high-quality software, prompt response to issues, and continuous improvement of their SRE practice demands a considerate and purposeful tool selection.



## Popular SRE tools overview

Version control with Git, automation pipelines, deployment tools, observability platforms, and communication software integrations are the cornerstone of any SRE implementation. Tools listed below enable organizations to unlock better efficiency, time-to-market, reliability, and scalability of their IT systems.

## Comprehensive automation

Automation empowers development and operations to let go of repetitive tasks and focus on innovation. Tools discussed above allow for automating many daily activities:

code version control, software build processes, security scanning, deployment, and observability, to name a few.

## Version control with Git

First popularized by software engineers who used it as a dependable source code version control, Git's capabilities proved indispensable for Site Reliability Engineers. Git serves as the starting point for most SRE processes, enabling organizations to maintain far-reaching control over their software code, infrastructure configuration, and automation scripts with one tool.

## Automated release management

For the purpose of streamlining software delivery, SRE practice makes use of robust automation pipelines and powerful release management tools. Solutions like Azure Pipelines, AWS CodeCommit, and AWS CodePipeline enable continuous integration by automating the build process and facilitating binaries creation. Tools, including SonarQube and Snyk Code, are seamlessly integrated into the pipeline, enabling automated security scanning throughout the entire software development process.

## Configuration and deployment management

Ansible and Terraform are popular configuration management tools that allow Site Reliability Engineers to regulate meticulous configuration needed for consistent deployment across several environments. Kubernetes' manifests and configuration management capabilities serve as a comprehensive toolset for managing deployment.

## Improved observability and quick analytics

Observability tools facilitate the accumulation of relevant system data for further analysis that is needed to ensure reliability and performance improvements. Data visualization software facilitates resource utilization monitoring and identification of performance patterns. Integrating the usage of visualization, analytics, and monitoring tools into the software delivery process enables making data-driven

decisions, ensures the dependability of your systems, and facilitates swift resolution of issues, consequently improving overall user experience.

Prometheus is commonly used for collecting performance metrics, including CPU and memory utilization; Fluentd and DataDog are popular tools for capturing and analyzing application logs, and Grafana is a visualization tool of choice for teams that need instantaneous access to meaningful insights from collected metrics.

## Ticketing system integration

Seamless integration with ticketing systems is needed to facilitate quick identification of security incidents and allow for their efficient management. Jira and ServiceNow are popular choices that integrate with SRE platforms well and enable automation of incident response and effective issue tracking, simplify communication, and prioritize critical incidents for quick resolution. Incident response systems often leverage Zapier to effortlessly escalate critical incidents by generating alerts and notifications integrated with external channels like Slack and WhatsApp.

## Communication tools

Collaboration and communication tools are simply necessary to reach the goals posed by Site Reliability Engineering. Involving other team members in issue resolution, sharing insights, and resolving incidents collectively creates more room to identify the next areas for improvement. Slack and Microsoft Teams are often used for real-time interaction between the SRE and development teams to facilitate teamwork and quickly resolve issues.

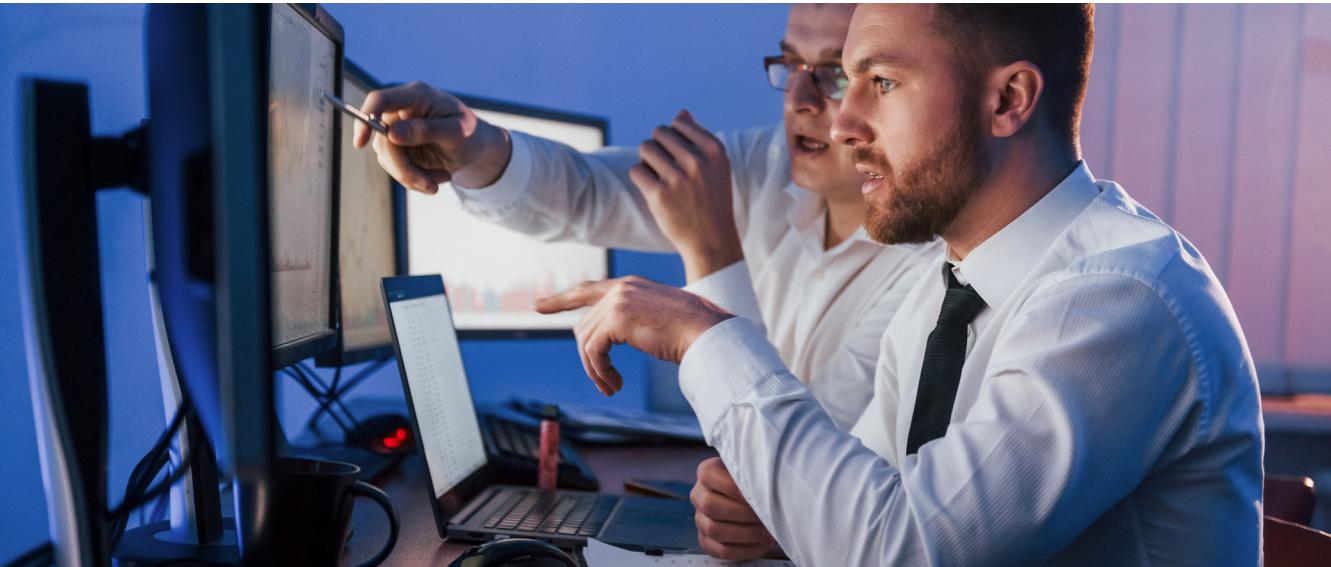
Preserving the history of discussions, resolutions, and workarounds in the form of a shared knowledge base (e.g., in Confluence) improves transparency and offers valuable insights for the future.

## Testing and verification tools

Automated testing and verification tools are essential to establish solid foundations for quality assurance efforts and achieve reliable deployments. Organizational SRE practice vastly benefits from using functional testing tools like Selenium and

performance testing software like JMeter.

Integration of tests enables constant monitoring and verification of system health, which results in quick response time and better overall reliability. Automation is used to facilitate seamless execution of unit test cases as part of the deployment pipeline.



## How to choose the correct tools for your organization?

Picking the right SRE tools is a complex but important process that will be different for each organization. To make the best decisions, weigh the benefits and drawbacks of each tool and compare them against your organization's individual requirements. Consider open-source and licensed products, but remember to take factors such as budget, scalability, and integration capabilities into account.

## Open-source vs. licensed products

Generally, open-source software offers flexibility, customization, and often cost savings. However, licensed products, especially those offered by cloud providers, are also rather cost-effective and come with additional support.

- In security scanning, licensed products often outperform open-source alternatives. For example, Snyk provides advanced security scanning essential for identifying vulnerabilities and ensuring security.
- In observability, licensed products like DataDog and Splunk offer more comprehensive visualization and analysis features than open-source alternatives.

It is crucial to evaluate each use case individually, as for various functions (e.g., infrastructure monitoring, security scanning, observability, visualization), very different software can turn out to be the most beneficial.

## Costs

Licensed products usually charge based on factors like the volume of data processed, making it essential to balance the value gained from the tool and its associated costs.

## Scalability

While picking your toolset, have in mind that tools should be capable of scaling alongside the organization's requirements without hindering efficiency or incurring substantial additional costs.

## Integration

Seamless integration with your existing systems and tools facilitates efficient teamwork and decreases the number of needed customizations. Easy integrations enhance the effectiveness of the entire ecosystem.

*When it comes to SRE, the sheer number of tools available can become overwhelming, especially if you lack niche technical expertise. This is why Maxima Consulting's managed platform engineering service, Cloud Orbit, simplifies tool selection by curating the selection of outstanding open-source tools and configuring them to work seamlessly together.*



# Go beyond efficiency with Cloud Orbit

*Discover Maxima Consulting's complete platform engineering solution. Cloud Orbit is a managed platform engineering service that revolutionizes the way businesses interact with the cloud.*

Heavily customizable, automation-driven, and cost-optimized platform engineering solution for seamless migration, cloud-native apps, cost and performance optimization, and day-to-day management based on SRE best practices.

## Cloud Orbit SRE+

Cloud Orbit SRE+ provides reliable Site Reliability Engineering assistance on an as-needed basis, allowing our clients to reduce costs while improving their cloud environment's performance, security, accessibility, and scalability. Perfect for companies of all sizes, as the solution can be scaled up and down based on current requirements.

[\[Visit the website for more information\]](#)

## Cloud Orbit Migration Factory

Our cloud migration solution makes modernizing apps and transferring data from traditional infrastructure to the cloud environment as straightforward as it gets. Based on previous migration experience, we have developed dozens of predefined cloud adoption templates, making the process quick and dependable.

[\[Learn more at our website\]](#)

## Cloud Orbit Greenfield

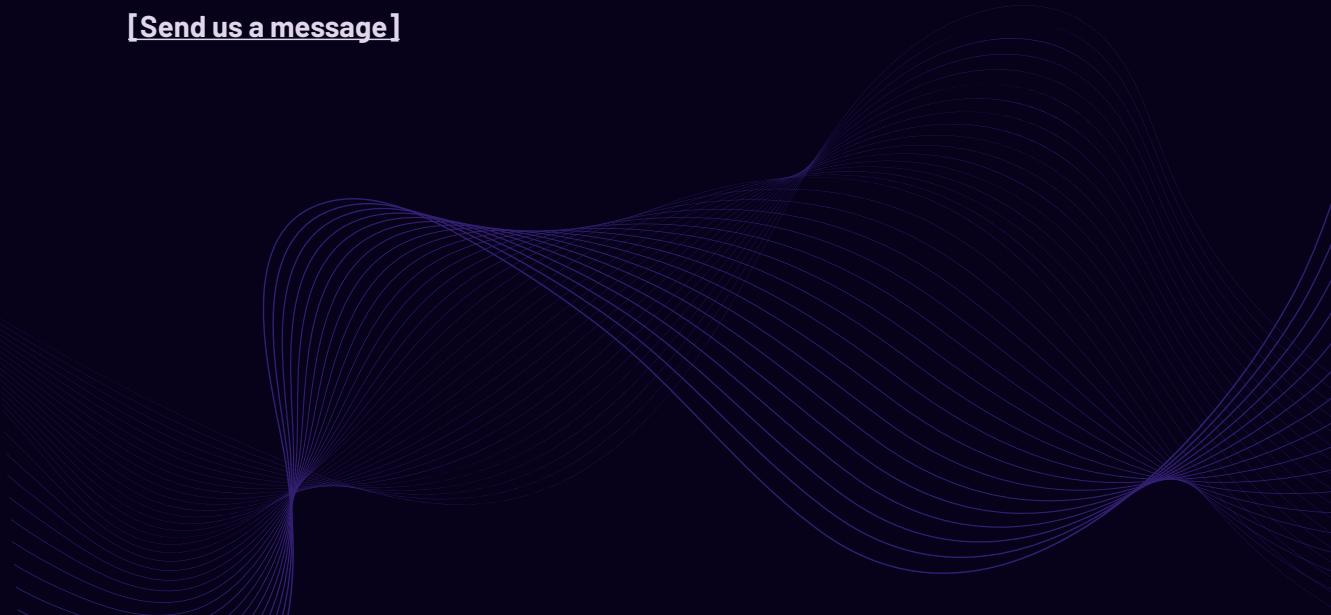
Build an optimized cloud environment within minutes with a cloud-native launching point for development teams, filled to the brim with cutting-edge technology that to use out-of-the-box. Created to let organizations kick off new projects in less time, lower development and infrastructure costs, and facilitate positive developer experience.

[\[Learn more at our website\]](#)

## Assess your eligibility

Schedule a complimentary meeting with our platform engineering experts to assess your organization's current cloud needs and learn how Cloud Orbit services can help your business.

[\[Send us a message\]](#)



# Get Ready for Hyperscalers

*The term hyperscale computing rapidly grows in popularity. Discover what it means and how it is relevant to SRE to stay ahead of the competition.*

The word “hyperscalers” is rapidly growing in popularity but for busy executives focused on business, it might be tempting to discard it as the cloud-related buzzword of the month. In this article, you will find simple definitions, a list of benefits, and an outline of what impact hyperscale computing might have on business. Without technobabble.



## Who are hyperscalers?

In the most general terms, companies called hyperscalers provide their clients with flexible cloud infrastructure capable of hyperscale computing, which is a method of processing data where the resources are added instantly when needed, even if the increase in demand is gigantic.

## What are examples of hyperscalers?

While there is no universal standard to deserve being called a hyperscaler, it is expected that a hyperscaler cloud vendor is capable of enabling its clients to use hyperscale computing at their convenience. The term usually describes very large cloud providers, such as Amazon Web Services (AWS), Google Cloud Platform (GCP), Microsoft Azure, IBM Cloud, and Alibaba Cloud.

## Top four hyperscale benefits

### 1. Cost-effective infrastructure

Hyperscale data centers are **extremely cost-efficient** compared with traditional enterprise data centers. Instead of maintaining huge servers needed to perform complex calculations, companies can utilize such machines anytime they are required through the cloud and pay only for the time they were really used.

### 2. Unparalleled scalability

Hyperscale enables **unparalleled scalability** by seamlessly adding needed resources via software solutions. Hyperscalers enable businesses to say goodbye to downtime and latency issues. Consequently, organizations can offer a smooth experience for their customers.

### 3. Efficient use of resources

With hyperscale capabilities, **resources are used more efficiently**. Companies use only as much as they require and pay only for as much as they use. There is no need to maintain infrastructure just because heightened processing power might be required once a year.

### 4. Reduced complexity

**Reduced infrastructure complexity** offered by hyperscalers plays an important role

for organizations that were struggling with optimizing their servers before. Hyperscale data centers are designed with efficiency in mind and are highly automated to reduce the impact of human errors. From a client's perspective, adding resources is **as easy as clicking a button**.

## Five reasons to choose hyperscale

1. Greater operational efficiency, cost-effectiveness, and overall improved performance gained from hyperscale cloud computing power provide companies with a competitive advantage over market rivals.
2. Hyperscale computing increases organizations' ability to process and analyze large amounts of data quickly and with greater efficiency.
3. Hyperscale adoption allows businesses to use optimized big data analytics, gain a better understanding of their customers, and quickly adapt to their changing demands.
4. Improved scalability of hyperscale solutions provides support for innovation and automation.
5. Using hyperscale solutions speeds up the software development process as a whole, especially when the cloud environment developers use is defined in accordance with Site Reliability Engineering principles.

## Should your organization embrace hyperscale?

Hyperscale computing is a vital tool for staying competitive in the globalized market of today, and it can be a real game-changer for businesses focused on innovation and growth. However, enabling the rewards calls for expert implementation.

Maxima Consulting has supported many organizations in their cutting-edge technology needs since 1993. Contact us to unlock the hyperscale benefits for your business with Cloud Orbit, our comprehensive managed **platform engineering** solution.