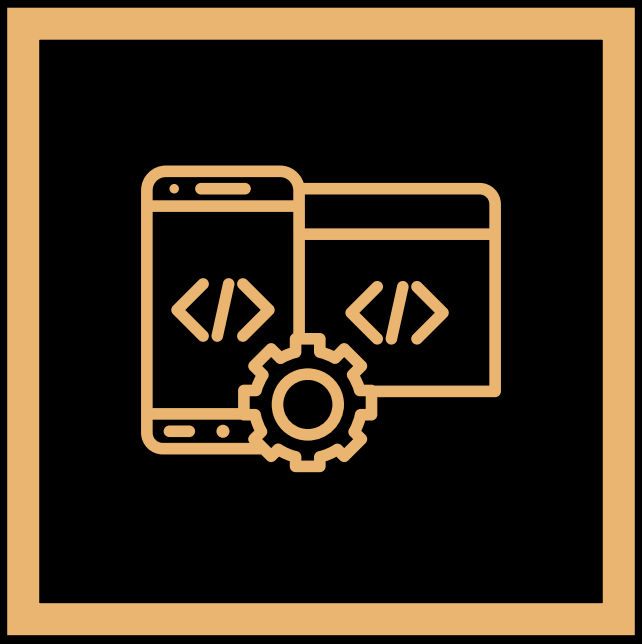


Site Reliability Engineering
Photon's Best Practices

Understanding the principles of SRE

PHOTON®

©Copyright 2023 Photon Interactive UK Limited. All Rights Reserved.

Overview

Site Reliability Engineering (SRE) plays a vital role in bridging the gap between development and operations—delivering applications at a rapid pace while ensuring that they can truly scale without any setbacks. Digitally-focused enterprises today are making sure to establish a robust SRE practice that combines expertise in software engineering and administration along with the ability to embrace and drive automation.

SRE is a multi-dimensional, cross-function practice, involving change management, performance monitoring, availability, efficiency, emergency support, and scaling. This empowers enterprises to manage the complexity of modern software applications and compete more aggressively with digitally-native companies.

What is Site Reliability Engineering?

SRE is a discipline that enables software developers to own the daily operation of their applications in production. The critical goal of SRE is creating ultra-scalable and highly reliable software systems.

Historical view of **DevOps, RunOps, and SRE**

Generation 1: Traditional IT operations

Traditional IT operations were considered the lower end of IT work available with a different class of engineers or administrators performing the menial task of keeping systems alive.

IT operations were mostly split into the operational tasks of monitoring for specific alerts and responding to them within specific Service Level Agreements.

Given the mundane nature of the task, the industry preferred outsourcing this task to managed service providers who are measured by these SLAs.

Automation was an afterthought and was not necessarily a part of many service providers' skill sets.

Pushing code into production was typically handled by a centralized release engineering team that prepared a codebase to be patched and then deployed manually.

Generation 2: DevOps and RunOps

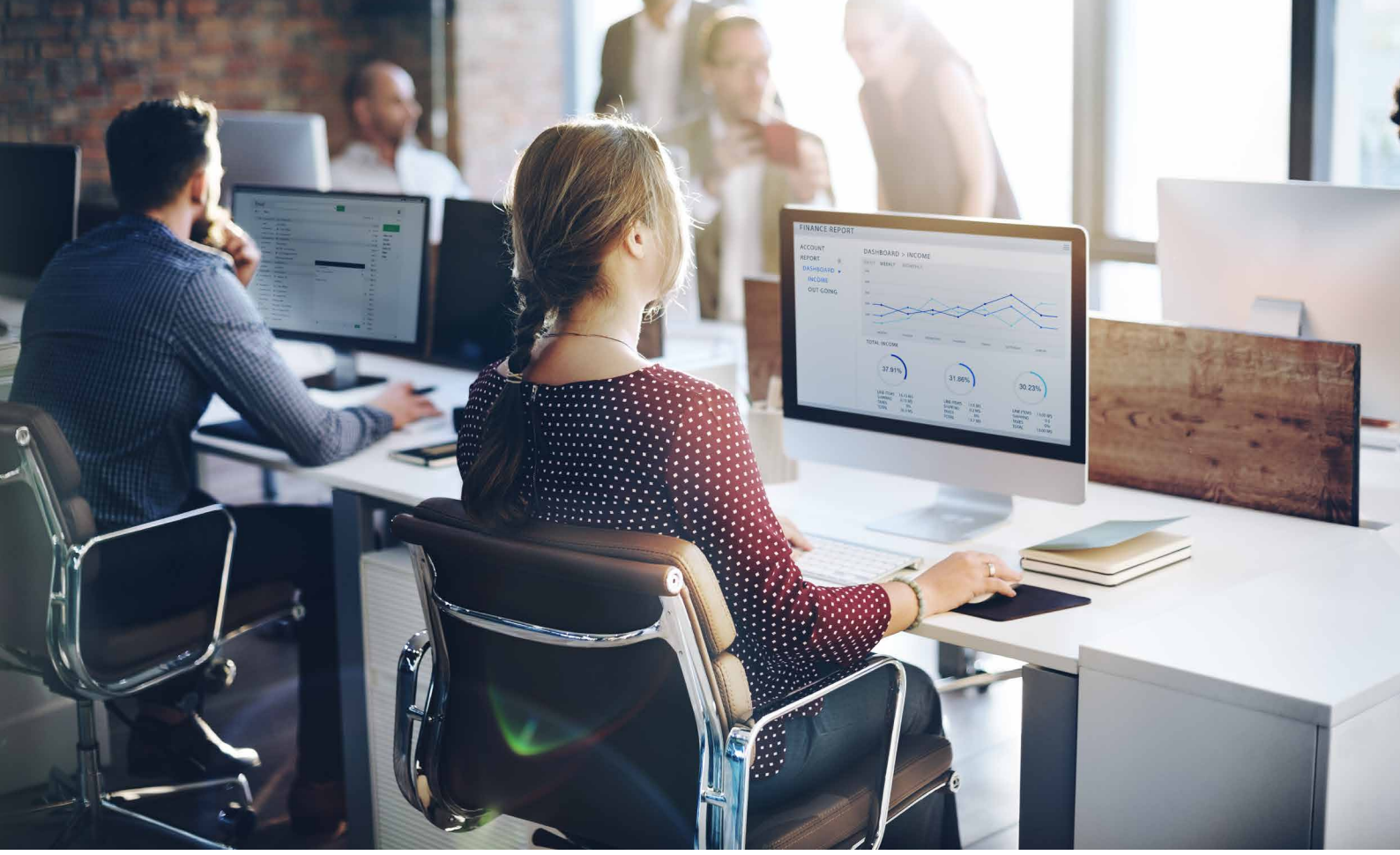
Starting in 2008, more automation was built into systems, which prompted the rise of development operations as a skill set.

DevOps enforced the discipline of being able to automate the entire cycle of building and deploying code and even standing up and tearing down environments automatically.

This was especially important given the rise of agile software development (with the need to release to production each sprint), and even more so with continuous integration/delivery.

The rise of cloud-based infrastructure made the traditional job of standing up servers and network infrastructure into code assets with software-defined infrastructure and networking.

©Copyright 2023 Photon Interactive UK Limited. All Rights Reserved.



However, there were two models on how to operate the software once deployed, and one was that the product development teams continued to support the runtime environment.

The other model involved separate RunOps teams to handle Level 1 and Level 2 support, while Level 3 changes and modifications flowed back into the product development squads.

Generation 3: The rise of SRE as a practice

Long before its eventual publication in 2016, SRE as a term and practice was invented and in use at Google back in 2003.

However, it resulted in the amalgamation of two powerful concepts, DevOps as a practice and automation of code, which became a well-defined playbook for how to operate platforms at scale.

While DevOps and RunOps processes are philosophical in nature, the term “Site Reliability Engineering” paved the way for a firm and prescriptive manner to manage a software platform at scale (the term “site” itself being the historical reference).

©Copyright 2023 Photon Interactive UK Limited. All Rights Reserved.

Why is **SRE important?**

SRE is all about combining the crucial aspects of development and operations—ensuring quick delivery of applications and ensuring seamless production. SRE teams are tasked with applying their knowledge of applications, products, and business objectives to:

- **Monitor the application performance**
- **Provide emergency support**
- **Maintain operational runbook**
- **Contribute to the overall product roadmap, and more**

Challenges in implementing SRE

Below are some major challenges your enterprise may face while implementing SRE.

- How to implement SRE best practices through production readiness reviews, blameless assessment, and tooling?
- What are the common security issues and how to address vulnerabilities?
- How to ensure network and application availability?
- How to identify performance benchmarks and metrics to monitor the systems?
- What are your application requirements - testing and readiness needs?
- How do you ensure that there is a closed loop support process to solve issues?

Google's SRE book does a great job of outlining what a modern practice should look like in a DevOps world. But what about SRE practices at companies that aren't the size of Google? At Photon, our SRE teams spend less time chasing misleading alerts and focus on delivering the best experience across every touchpoint of customer engagement.

> "Site Reliability Engineering, the combination of two powerful concepts—DevOps as a practice and automation at its code, is a well-defined playbook for how to operate digital platforms at scale."



Mukund Balasubramanian,
Chief Technology Officer, Photon

©Copyright 2023 Photon Interactive UK Limited. All Rights Reserved.

SRE tools and technologies

Site Reliability Engineering is a philosophy and does not predicate a single toolchain, however, SRE assumes everything is “Automatable”. The specific tools mentioned here are representative examples but any public cloud infrastructure will have their own version or variant of these holes to be plugged.

- **Infrastructure as code:** This is possibly the most important part of the equation which includes not just the hardware but also storage and networking must be software-defined.
- **Cluster operating system:** The Cluster Operating System manages the task of allocating specific computing (storage and networking) resources to a job.
- **Distributed file system:** To manage systems at scale and as an autoscaling fabric, it is essential to have a distributed file system that works across the fabric.
- **Persistence layer:** The next layer of the stack is to automate the databases of choice to be operated based on the Cluster Operating System and Distributed Storage Model.
- **Application and networking layer:** These could be either Application Servers, PaaS offerings, or containerized Applications typically on Docker (and sometimes Pivotal Cloud Foundry).
- **Monitoring and incident management:** This should manage both alerts but also tie into a central log aggregator like Elk or Splunk to drive the AI/ML-based self-healing models with tools like SparkML.



Levels of maturity and efficiency leveraging **DevOps and SRE**

Traditional IT Model

Traditional IT requires a sample set of 100 people for management and monitoring of IT operations

100

Support Process Automation

This analytical model can be leveraged for automating many of the recurring tasks in a support desk further bringing costs down to the “ideal state” model

20



Cloud, Compliance, Automated Provisioning & Networking

By leveraging the high degree of automation and compliance certifications, the need for human intervention is decreased significantly

80

Machine Learning & Proactive Monitoring

Machine learning and automated searching of common issues, knowledge bases can predict failures before they occur based on past trends

40

60

Auto Scaling & PaaS Adoption

Further efficiency is gained by leveraging higher level abstraction of PaaS and auto-scaling features of the cloud



Photon's best practices to **build an effective SRE team**

Let's take a look at the best practices that need to be put in place at each stage of the digital journey.

Parameters	The old way	The SRE way
Skill sets required	Traditional IT systems development and operations have had myriad roles such as engineers, analysts, quality engineering, DevOps, and systems administration. Of these, it is clear that with increasing automation, the role of systems administrator shall diminish if not disappear. However, there are more changes to be prepared for.	SREs are mostly engineers but with a finite subsection having both engineering and administration skills. SREs spend, as is popular in the press, less than 50% of their time on operational tasks vs. development and automation tasks. Therefore, it is important to note that there is a difference in skill and intent to hire and build an SRE.
Business alignments: Service level objectives & indicators	Service Level Agreements (SLAs) typically define the contractual agreement between the business and an operations team with well-defined penalties for breaches both in terms of contractual and financial obligations.	Service Level Objectives are aligned to the business objectives and Service Level Indicators align to the service level "Objectives." Rather than trying to stay within the boundaries of the SLA with humans, the SRE team is expected to engineer your way into minimizing the Mean Time to Failure and Mean Time to Resolution without laying blame.
Process: Operations Vs **Development**	Operations and development were not only two different skill sets but also typically teams at odds with each other, with operations teams preferring not to embrace change since changes continue to be the single largest reason for failures in any system.	Embraces change and makes de-risking change a core component of what will be engineered into the system. In a model of progressive rollouts, throttling the old and the new, the process ensures the risk budget is calculated for maximizing acceptance of change over and above the skill set alignment.
Self-healing systems: Predictive analytics and automation	Operational tickets ended with a Root Cause Analysis with the contractual obligation to provide a Preventive Action Plan to be implemented in case of a recurring failure.	The 50% of the time that the SRE dedicates to engineering tasks is to operationalize the preventive actions immediately and also to instill self-healing principles. It also starts leveraging predictive analytics to automate the key aspects before they occur by processing data that already exists.

How Photon's **SRE best practices** help organizations achieve better and faster results

Photon's SRE best practices combine agile with expertise in cloud, big data, and mobile to create custom solutions that help Fortune 500 clients make timely decisions and increase productivity. Below are instances wherein Photon helped global companies embrace a successful SRE transition.

1. **A Fortune 100 retail pharmacy company** sought Photon's help for new site intake and maintenance. Photon optimized the new site SRE practice with Automated Performance Testing as part of the Continuous Integration Pipeline.
2. **The worldwide leader in beauty** partnered with Photon to build a Website Factory (WSF) Framework. The transition from Dev + DevOps to SREs happened as a part of the ongoing journey to continuously improve the site reliability. Photon successfully adapted a Repeatable SRE state in 6 months.
3. **One of the largest financial data and software companies** wanted to launch the developer portal and a single Analytics Engine API to a small group of its customers. Photon performed a thorough assessment of the API management and Developer portal and came up with strategic recommendations for the vision of 2020.

A robust SRE strategy is imperative, particularly for forward-looking digital companies that are transitioning to cloud-native platforms and delivery models. Photon's SRE services help you create highly reliable and scalable applications and manage hyperscale infrastructure using automation, all while minimizing expenditure.

Connect with Photon now to ensure an effective SRE implementation and build an agile and scalable IT infrastructure.

"Aside from creating operational runbooks and driving development tasks, SRE team contributes to the entire product roadmap, making them invaluable assets to the organization."

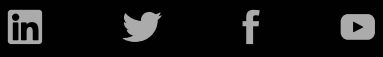


Muhamad Daud,
SVP, Engineering &
Head of Photon Labs



Connect with Photon now and accelerate your
digital transformation journey.

Photon works with 40% of the Fortune 100 as their digital agency of choice. One of the largest and fastest-growing global agencies, Photon supports over 1 billion daily consumer digital touchpoints. Photon has the largest pool of experienced digital engineers with over 6000 across offices in the US, UK, Canada, Mexico, India, France, Sweden, China, and Indonesia.



www.photon.com | sales@photon.com | +1 (972) 243-3233