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ENGINEERING OPERATIONS IS ESSENTIAL FOR PRODUCT DEVELOPMENT SUCCESS



Learn How Engineering Operations
Can Improve The Results of Your
Product Development Team

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The business of engineering is full of technology and processes. One of our existing clients has 63 engineering applications, 76 systems, several labs and separate networks supporting their product development teams. Each application supports multiple processes to keep teams synced in close collaboration.

It is critical that these applications and systems function smoothly. It is imperative to integrate data silos, and provide visualization and reporting. Workflows need to be automated and manual steps removed. Regulated companies also need engineering and quality systems to be validated. Without these, engineering and operations face growth obstacles.

Essentially, product development needs “Engineering Operations” (EngOps).

Defining Engineering Ops

After working for years managing technology and processes used by engineers, we coined the term “Engineering Operations”.

“Engineering Ops is an umbrella term that describes the people, processes, and technologies that support the work of designing, developing, testing, and releasing products to market.”

Other Ops Definitions

To understand EngOps, it's helpful to look at other popular Ops teams working the present day company.

Marketing Ops

According to [HubSpot](#), "Marketing Operations is an umbrella term that describes the people, processes, and technology that power a business's overall marketing strategy and increases the chance of success."

Sales Ops

[HubSpot](#) also has a pretty solid definition for Sales Ops too, defining it as: "Sales Operations, or Sales Ops, reduces friction in your sales process so your sales people are more productive and successful. This department handles anything and everything that helps your sales teams establish and maintain sustainable growth."

Specific people and teams that understand technology **and** the functioning of that business unit are now crucial. You can see why EngOps deserved it's own acknowledgement.

Changes In The IT Department

In November 2021, the Wall Street Journal published the provocative article, "It's Time to Get Rid of the IT Department" which we addressed in our [blog](#).

Actually, the IT department shouldn't disappear, but it does need to be restructured.

With a quantitative explosion of technology, more Ops teams are now in existence. The increasing adoption of cloud also enables easier application and systems access for staff outside the formal IT department.

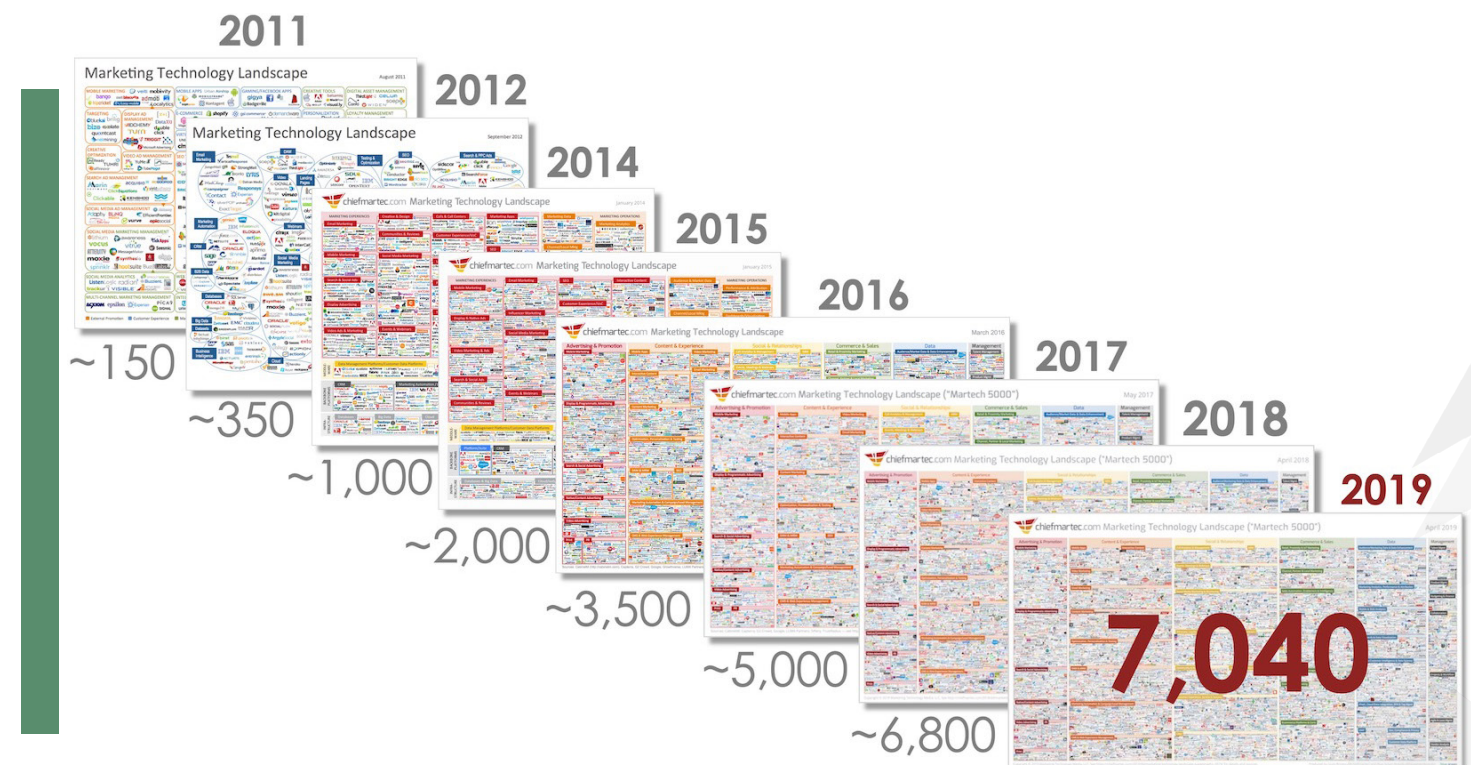


Technology has become intertwined with every aspect of work in every business unit.

But it turns out that the old adages are still true. Technology alone is not the answer. **People, processes, and technology**, working in harmony, improve work.

Applications are only helpful if they improve team workflows. This requires the people and teams implementing or configuring the apps to understand the department's business, including the processes and roles. Asking IT to become experts in every department's business is unrealistic.

In a disruptive and dynamic tech world, it also becomes impossible for IT to be proficient in every single department's applications. This visual for marketing alone shows marketing-tech development solutions 2011-2019:



The Rise of "Ops"

In response to the demand, businesses developed operational teams. In a healthy company, Ops teams work closely with the IT department and their policies – e.g. cybersecurity, infrastructure, standards – while remaining flexible and responsive to the department they are supporting.

Why Is Engineering Operations Important?

There is someone in the engineering department playing this role right now, and there's a high chance they are doing this "on-the-side". Managing EngOps in this manner creates inefficiencies, quality issues, and operational friction.

Having a dedicated resource to manage the complexity of technology and validate it is fit for purpose is extremely important — *this is exactly what Engineering Ops is*.

Often in very large enterprises, a separate engineering support group within IT is formed. These are effectively Engineering Operations teams, provided that they sit with engineering and have some type of reporting structure to R&D.



The Importance of DevOps

Everyone in software engineering knows what DevOps is... or they should. [Wikipedia](#) describes it as:

A set of practices that combines software development (*Dev*) and IT operations (*Ops*). It aims to shorten the systems development life cycle and provide continuous delivery with high software quality. DevOps is complementary with Agile software development; several DevOps aspects came from the Agile methodology.

DevOps is a philosophy, or even an "attitude" of software development, which attempts to remove barriers between the developers and operations personnel. It was one of the first areas of the modern enterprise that decided that having IT outside of the department was creating too much friction and slowing things down.

DevOps As Part of EngOps

DevOps is naturally an EngOps discipline which applies to the software in product development. But product development isn't just software. It's also hardware, devices, or "things". These days, it is often hardware+software+connectivity+data.

Many of our clients develop and release mechatronic products. "Mechatronics" is a slightly old-fashioned term....but it still works well:

[Mechatronics](#) is an interdisciplinary area of engineering that combines mechanical and electrical engineering and computer science.

The world of product development includes an ever-growing technology stack, coupled with the need for more collaboration between engineering disciplines.

Having a team to manage these tools and optimize them for the design, development, and quality engineers, directly accelerates the product release lifecycle AND improves product quality.

Key Benefits Enjoyed With An EngOps Team

Implementing a formal EngOps team can help your business:

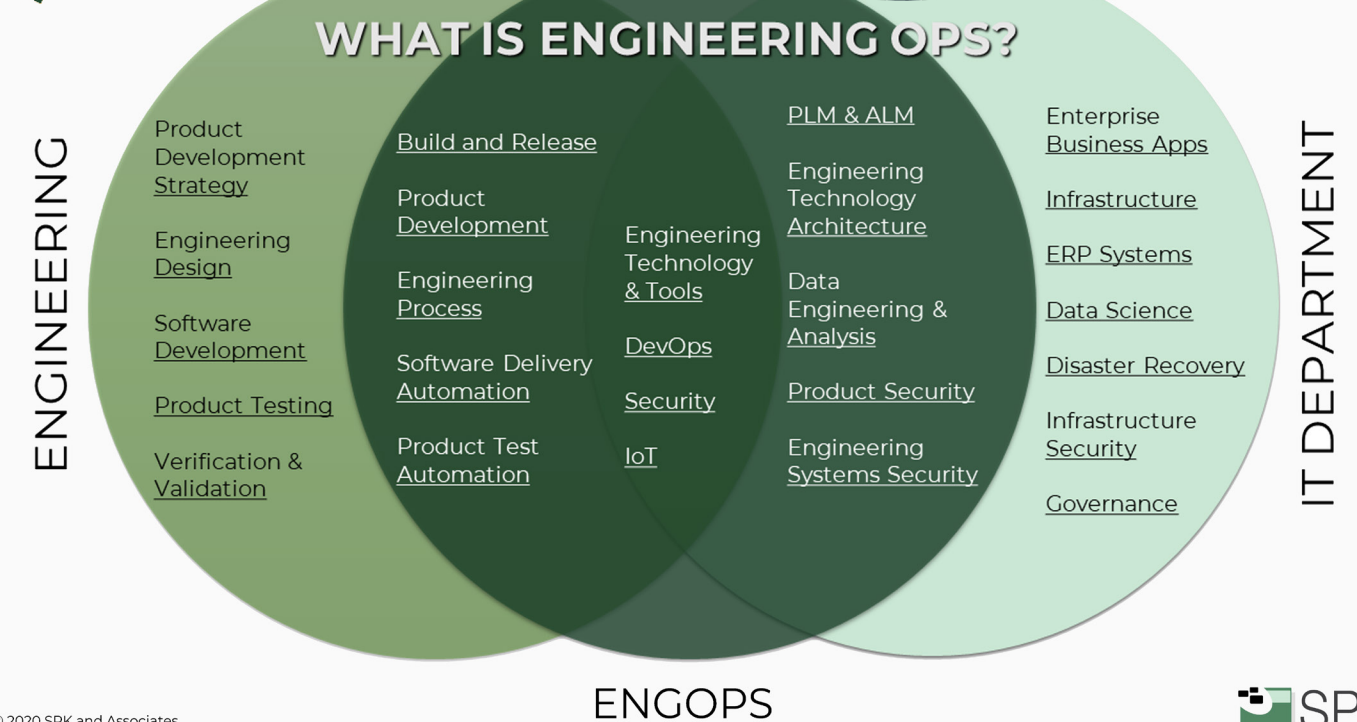
- ✓ Attain the desired investment results from engineering applications;
- ✓ Remove data silos and achieve insightful metrics to improve product releases;
- ✓ Improve productivity for your design or development engineers by granting them more focus on their creative work;
- ✓ Removal of manual engineering process steps;
- ✓ Support IT to adequately manage your engineering technology stack;
- ✓ Provide integrated data and data transparency which is easily accessible and continuously available to engineering stakeholders;
- ✓ Provide ability to scale Engineering and transition from ad-hoc engineering processes to automated, “operationalized” functions;
- ✓ Help develop and support smart (Connected) products.

Let’s dig into the responsibilities of EngOps, to clarify how these benefits will be achieved.

Key Responsibilities Of EngOps Team

The way EngOps fits into an enterprise depends upon:

- existing skills,
- technology required,
- the strengths and weaknesses of each team.



This diagram shows a typical (not one-size-fits-all!) relationship between Engineering, Engineering Ops, and IT.



Typically, there are four areas an EngOps team should cover:



1. Engineering Technology and Tools

Engineering Operations is responsible for managing and optimizing the technology and tools used by product development.

Applications

Depending on the company products, the tools could include MCAD, EE, and software applications used to develop products. Each application needs to be implemented, configured, managed, backed up and supported for the engineers. Applications frequently support collaboration and processes. Consequently, EngOps must be intimately familiar with the product development processes.

Cloud and Infrastructure

Some applications may be SaaS, but many are still traditional running on infrastructure – either on-prem or in the cloud. In our experience, EngOps are much more efficient at managing the engineering application infrastructure.

Managing the infrastructure also encompasses more traditional tasks like data backup, system monitoring, and alert response management. The infrastructure is managed in close conjunction with the applications, so the EngOps team creates an integrated approach.

The Integrated Approach

The more traditional IT department monitors infrastructure independently of applications. But monitoring the *application, infrastructure and data in an integrated fashion is a much deeper and more efficient solution*. To do this, you must also have a deep understanding of the engineering application.

Product Infrastructure Management.

There is additional infrastructure in R&D that also requires support. *Products* also typically require infrastructure management and support. This could be the management of a product lab environment, or DevOps software product support.

Whether it is physical infrastructure, cloud, SaaS, or [infrastructure-as-code](#), having a team working closely with or within the Engineering department provides better optimization and support.

The IT Department.

IT still has an important role to play, however, this will evolve just as technology has. Engineering Ops must collaborate closely with IT, ensuring compliance with established policies and procedures. EngOps cannot successfully operate in a silo. It needs to balance the flexibility and responsiveness needed by engineers with the compliance and security defined by IT.

Data

Nowadays, every application and system used in a company collects data. Database management is a key responsibility of the EngOps team.

Viewing database management as an *application task versus an infrastructure task* is nuanced, but important. In larger organizations, there may be database management Standard Operating Procedures (SOP's). Whilst these are required, they may not address the database requirements in relation to the application using it.

The Engineering Ops team understands the application, processes, and users, and applies that knowledge to database management while coordinating with the IT database team to ensure SOP's are met.

At one time, we were managing an IBM ClearCase and ClearQuest environment – two separate applications, closely integrated. When creating the backup procedures for the applications and databases, it was critical to time each database backup to correspond appropriately with the other database and each application backup. Failure to do so would result in each application's data being out of phase with the other.

DevOps

EngOps naturally fulfills some DevOps roles. In a company where the only products are software, DevOps and EngOps are effectively the same. In a company that produces hardware **and** software products, DevOps is a subset of EngOps.

Depending on company size, DevOps could range from one part-time “jack-of-all-trades” DevOps engineer, to multiple dedicated resources. As a company grows, these are generally the roles required:

- Platform and Infrastructure
 - Responsible for the platform on which the software is developed, and the production environments (cloud, infrastructure, infrastructure-as-code, operating systems, networking, etc.)
- Build and Release
 - CI/CD
 - Transparency and visibility across the pipelines
- Site Reliability
 - Monitoring
 - Incident response
- Security Engineer
 - Create and implement best practices for application and infrastructure cybersecurity
- Compliance/Regulatory requirements
- Data Analyst

These roles could reside in DevOps, or in Product Development, or shared between the two. The overarching philosophy is that the Dev and Ops team function with as little friction as possible.

2. Process Automation and Application Integration

Engineering Ops teams should identify manual product development processes ripe for automation.

Identifying Automation Opportunities

Besides creating inefficiency, manual steps are typically filled with human error – particularly for tedious, repetitive tasks.

We intentionally couple process automation with application integration. Automation opportunities are often identified within the transition from one application to another. These transitions often require manual steps, i.e. the need to re-key data

Evaluating The Value Of Automation

Identifying the manual steps worth automating can generally be calculated by:

time required to execute manual step X the number of executions.

Then compare this result with the time required to automate.

Separately, one should also consider the cost of errors, particularly within zero-tolerance industries (regulated or safety conscious). Within these industries, implementing automation and removing human error is worth it without considering time savings.

Application Integration

Application integration is another form of automation. Doing a good job with integration removes unnecessary manual steps. An additional benefit is the ability to combine data from disparate application sources.

*We recently completed an **integration for a MedTech client** where product quality is critical. We developed a tool called MasterManager to integrate data between SolidworksPDM™ (Product Data Management System) and MasterControl™ (a Quality Management System). The small company immediately saved \$42K annually in engineering costs. The integration resulted in a reduction of manual steps, created time efficiencies, and eradicated data errors.*

3. Data, Analytics, and Insights

“Data is the new gold.” It is overused, but it is really true.

The recent advances in technology related to cloud, data engineering, data analytics visualization, and machine learning, have created a new environment. Obtaining meaningful data insights is faster and more cost efficient than ever. Data analytics or data science is no longer unattainable for the small or mid market company. Enterprise no longer holds a competitive edge.

To extract the greatest data insights, several things need to happen or be present:

1. Disparate data sources need to be engineered into an easy-to-use format and supported by smart integrations between applications (and therefore data). Data should be engineered to create an accessible data lake, or alternative data source.
2. Business engineering acumen must be applied to the data to provide insightful visualizations or reporting. Someone with technical expertise in PowerBI, or Tableau, or a similar data visualization application, needs to translate the data and definitions into dashboards/ reporting.
3. For additional benefits, one should apply machine learning or AI to provide enhanced insight correlations.

An EngOps team provides these skill sets. By applying technical data expertise to an understanding of product development, it produces modern-day gold for the engineering leadership.

4. Cybersecurity and Smart Products

Cybersecurity policies, procedures, and awareness are at the forefront of technology teams. EngOps must consider cybersecurity requirements for both the internal applications, the systems they manage and the products due for market release.

EngOps is frequently involved in the smart product and IoT (internet of things) development lifecycle by providing technical expertise in networking, systems, operating systems, and so on.

If this looks and feels like DevOps, it is. However, in a mechatronic product company, DevOps may not be identified as it is in a software-only company. The EngOps team brings a DevOps approach to a predominantly hardware team, allowing them to enjoy the benefits.

In addition to supporting smart product development, the EngOps team is a natural candidate to provide operational support for customer-facing systems. They monitor and respond to alerts from the customer-facing platform, often acting as an L2 or L3 escalation point for Customer Service.



5. Regulatory Compliance

Engineering Operations must remain vigilant when working within R&D in regulated industries such as Medical Device or Biotech, where SOPs and specific quality requirements are critical.

For example, in Med Device, computer systems used to develop products often need computer system validations (CSVs). In engineering, applications that support requirements management, product data management, or quality management need to be validated. A team that understands CSVs, **and** the application, **and** the processes, are the most efficient team to execute these. CSVs should be incrementally revisited each time the computer system or related processes change - not just during implementation.



How To Get Started With An EngOps Team

Now that you understand more about Engineering Ops team responsibilities let's illustrate the first steps for starting your own EngOps team.

Separate The EngOps Roles From Product Engineers

It is tempting to pick a Product or Software Engineer in your group and assign them the exciting honor and responsibilities of an EngOps engineer... in their spare time. But, this rarely works and could land you with further time and cost inefficiencies. This is the opposite of what you are trying to achieve.

The role of a Design or Development Engineer requires a significantly different mindset. While they are certainly very intelligent and capable of stepping into the EngOps role, don't request that they take on additional responsibilities side-of-desk while continuing to design.

What To Look For In An EngOps Candidate

Your EngOps team needs data management, data engineering, and data analytics skills. Ideally, the team should also have data science skills. This is a high bar. Consequently, this is an area that is initially best outsourced, until you can build that skill within your team.

Over the years, SPK has hired product engineers, software engineers, and IT engineers to fill EngOps positions. After trial and error, we concluded that engineers from these disciplines can make good EngOps engineers... with two important caveats.

1. Development engineers must be willing and able to embrace Ops work.

Few development engineers are keen to do Ops work. It has a different tempo, requires multitasking, and non-serial work. Ensure your candidate has the temperament for this.

2. IT engineers must be willing and able to learn the business of product development, and approach technology from a different perspective.

IT engineers love technology. They're not as interested in the business reasons for the technology. An EngOps engineer needs to understand the business of engineering. They need to be dedicated to meeting product release goals, over all else. Technology is critically important, but only as it serves the product release goals. Your EngOps engineer that comes from IT must be able to make this mental shift.

Your chances for success are much higher if the engineer is solely focused on EngOps, and not time sharing with development tasks. If your company is not large enough for a dedicated resource, outsource this role to a partner.

The Need For A Team

The initial challenge of starting an EngOps function is the lack of a team, or the temptation to assign only one person for the EngOps role. This is a challenging situation as one engineer does not have a broad enough, or deep enough, technical skill set to be that effective.

But, that shouldn't stop you from getting started:

- Pick one or two applications or systems that are most important to your engineering team, say PDM, or Atlassian, FEA, or CI/CD. Have the EngOps engineer focus on managing those environments well. Gain advantage in at least one area.
- Outsource management of other engineering systems to an EngOps service provider.
- Grow your own EngOps team as your R&D department grows. Or, continue to outsource the function.

Engineering Technology Help Desk

Any service provider, whether one person or a team, should organize their assistance with a “help desk” approach. If you are operating with just one or two EngOps team members, refrain from setting up a group email address and instead, extend the Engineering team’s issue tracking system to EngOps, or, utilize existing IT help desk software.

Jira supports engineering workflows very well and can be easily extended to include Jira Service Management, which effectively supports service desk.

Tools like Jira track requests, build a knowledge base, track response metrics, effectively share work within the team, and more.

Develop Self-Serve Capabilities

Self-serve technology requests is now common practice. People expect that knowledge content is easily accessible via a quick search. The more EngOps builds a knowledge base and documents answers, the happier their customers will be. This also creates a reduction in labor intensity for EngOps. It’s a win-win.

We use an Engineering Services Catalog for our customers. This is an ITIL-type tool that allows engineers to:

- View technology services available to them;
- Know how to access the service;
- Link to self-service access.

Below is an example of a typical catalog.

Search...	All					Download table as CSV
Asset Name	Vendor	# of owned licenses	Category	Summary	Star Rating	Highest Version Available
Acrobat	Adobe	N/A	Technical Writing	Acrobat Reader supports viewing, printing and annotating of PDF files.	★ ★ ★	See Acrobat page for details.
Agile	Oracle	N/A	File/Data Management	PLM repository for all things Endoscopy.	★ ★ ★ ★ ★	See Agile page for details.
Allegro/OrCad/Capture CIS	Cadence	13	ECAD	Suite of tools used for Electrical Engineering & PCB Editing	★ ★ ★	17.2
Altium Designer	Altium	6	ECAD	PCB and Electronic Design Automation Software	★ ★ ★ ★ ★	21.1.1
Ansible	N/A	N/A	Software, Software-SQA	Open-source application-deployment tool	★ ★	See Ansible page for details
ANSYS Multiphysics	ANSYS Tools	50	Simulation	An engineering simulation software for use across the product life cycle.	★ ★ ★ ★ ★	19.3
AQTime	SmartBear	N/A	Software, Software-SQA	Performance profiler and memory/resource debugging toolset	★ ★ ★	8.81.54.7
ArborText	PTC	20	Technical Writing	Create, edit, publish and manage XML content	★ ★ ★ ★ ★	7.0
Arduino	Arduino	N/A	Software, Software-Design	C++ IDE for Arduino-compatible micro controller programming.	★ ★	See Arduino page for details.
AutoCad	AutoDesk	None	MCAD	Computer-aided design (CAD) software for 2D and 3D drawings.	★	2010

Search...

All

ECAD

File/Data Management

MCAD

MCAD-Design

MCAD-Laser Marking

MCAD-Manufacturing

Math/Statistics

Simulation

Simulation-Electronics

Simulation-Optics

Simulation-Thermal

Software

Software-Design

Software-DevOps

Software-SCM

Software-SQA

Technical Writing

Test Automation

Test Automation-General

Test Automation-Security

Download table as CSV

		# of owned licenses	Category	Summary	Star Rating	Highest Version Available
		N/A	Technical Writing	Acrobat Reader supports viewing, printing and annotating of PDF files.	★ ★ ★	See Acrobat page for details.
		N/A	File/Data Management	PLM repository for all things Endoscopy.	★ ★ ★ ★ ★	See Agile page for details.
	e	13	ECAD	Suite of tools used for Electrical Engineering & PCB Editing	★ ★ ★	17.2
		6	ECAD	PCB and Electronic Design Automation Software	★ ★ ★ ★ ★	21.1.1
		N/A	Software, Software-SQA	Open-source application-deployment tool	★ ★	See Ansible page for details
	Product Simulation and Design Tools	50	Simulation	An engineering simulation software for use across the product life cycle.	★ ★ ★ ★ ★	19.3
	AQTime	SmartBear	N/A	Software, Software-SQA	★ ★ ★	8.81.54.7
	ArborText	PTC	20	Technical Writing	★ ★ ★ ★ ★	7.0
	Arduino	Arduino	N/A	Software, Software-Design	★ ★	See Arduino page for details.
	AutoCad	AutoDesk	None	MCAD	★	2010

Manage It Like An Ops Team, Not A Dev Team

Product and software engineers are “development” people – creative, inventive, deep workers (hopefully) focusing on one thing at a time. It’s how great development work should be done.

However, as discussed in an earlier section, the EngOps role is an operational role. Besides selecting the right people with the correct temperament, it must also be managed as an Ops function.

We’ve already detailed that the first step for good Ops management is a Help Desk. With service desk software, you can set up service level agreements (SLA’s) to respond to and resolve requests in a timely manner, with appropriate communication.

The first measurement of success for EngOps is to closely manage, respond to, and resolve engineers’ issues.

The second measurement of success is proactive monitoring and problem resolution of the engineering systems.

As discussed previously, reactive response is no longer enough. Excellent support requires robust, proactive system monitoring to identify issues **before** users experience them. 24x7 operations response is often required, particularly for “smart” products. Your EngOps team is often managing the customer-facing platform as well. The critical role of EngOps is always to *accelerate product development* and remove roadblocks. This often requires having on-call EngOps engineers.

The monitoring system must be integrated with your Help Desk system. It should automatically create issues and alert the team, particularly for P1 (high priority) problems.

At SPK, we developed a deep monitoring system that meets EngOps requirements.

Data Dashboards

The EngOps team manages various databases for engineering systems, both internal and (potentially) customer-facing. EngOps should have a constant focus on integrating the data silos in order to identify actionable correlations.

Your EngOps team should be experts at creating effective data reporting and visualizations with tools such as PowerBi or Tableau.

Project Management

An EngOps team cannot function properly without project managers, or project management skills. As with other IT and operations teams, it is difficult to successfully implement new applications, perform upgrades, or make process improvements without a project manager, or at least a lead engineer with project management abilities.

The EngOps project manager typically needs to understand Agile methodology, particularly within DevOps programs

CONCLUSION

This “Ops function” has been a market gap for too long. Businesses across the world have been completing this vital function side-of-desk, creating inefficient working practices. After more than a decade of practicing Engineering Operations, our lessons learned are an opportunity for other businesses to effectively implement their own specialized EngOps team.

Use our insights to take the first steps towards accelerating product development with this dedicated, specialized resource.

SPK and Associates is focused on improving Engineering with smart information technology solutions. SPK understands the systems, processes, data and applications critical to successful product development, and dedicate ourselves to helping clients build, test, and release products faster and better. For 25 years, we have helped our customers harness technology to optimize engineering and accelerate product delivery.



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