Strategy Guide for Automation

Scale your business with IT automation

Magnus Glantz

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Dedicated to

My dad, ***Gert****, who got me into computers and programming.*

My colleagues over the years and the open source community, who taught me so much.

My wife, ***Myriam****, who pushed me along, supported and helped.*

My son ***Vilhelm*** *and daughter* ***Svala****, who are teenagers.*

About the Author

Magnus Glantz has done IT automation for over 20 years, as an operator, developer, consultant, product owner and architect across industries such as telco, retail, FSI, cloud computing and public sector. He has successfully created internationally recognised automation architecture and strategy for many organizations. He has automated many tens of thousands of systems across most technical domains using many different proprietary and open source based automation solutions, including but not limited to cloud provider specific automation, Puppet, Chef, Terraform and Ansible. He sits on the board of Open Source Sweden, Sweden's industry organization for open source, where he works to further the open source ecosystem in Sweden and in Europe. Today his main job is to advise on automation strategy and implementation for customers, working as a Principal Solution Architect at Red Hat, where he also specializes in DevSecOps and Ansible specifically.

About the Reviewers

- **Johnny Westerlund** has over 20 years of experience from the IT industry, working in different roles. He's passionate about technology in general and open source technology in particular and how it can help organizations scale. Automation is a key capability to enable scale and Johnny has helped numerous of his customers adopt and implement automation technology.

  Johnny is currently working as a Principal Solution Architect at Red Hat.

- **Ilkka Tengvall** has expertise from various areas of IT. His professional career includes global companies R&D developer, project management, architecture and later consulting and sales. In his current role as associate principal solution architect at Red Hat he helps enterprise and governmental organizations design their sorftware and services development and delivery operations smooth, robust and efficient, wherever in hybrid cloud it is best to be implemented. Automation being crucial element of the designs.

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Special thanks to Ilkka Tengvall, Johnny Westerlund and Peter Gustafsson. You are all awesome, so very clever, and smart, and I am lucky to have you as colleagues.

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Finally, to you who are reading this: If a book is written, published, and thrown into a forest, and no one reads it, was it actually written? Yes, it was, but I am very thankful for you doing so, nevertheless.

Preface

Creating organization-wide IT automation strategy and related architecture is exceedingly difficult to do. This is in-part because there is little literature on the topic, specifically when it comes to IT automation strategy, but also regarding general purpose vendor neutral architecture which can supports the strategy. This book attempts to fill this void and is based on the authors far reaching in-the-field experience of successful automation, automation strategy and automation architecture.

While this book is thorough in nature and including many details, it attempts to not assume that the reader is already familiar with the topics covered. As such, this book has three parts to it. First, an introduction part where the reader is introduced to the concept of automation. IT automation is also defined in a way so that the reader more effectively can understand what it means to organizations.

The second part is written to be a comprehensive guide to what should be in a successful organization-wide IT automation strategy. Step-by-step each core component of a successful IT automation strategy is reviewed. Including elements such as budget and ownership, strategy performance monitoring, tools strategy, skills development, and key processes for development and collaboration. The reader is taught the impact of both successful implementations and flawed or faulty ones. This allows the reader to look at their current organization and identify things that needs to be fixed with existing strategies as well. This also empowers the reader with relevant knowledge to do cost and return-on-investment estimations related to a strategy.

The third and final part is written to be an extensive review of a ven dor neutral, robust, secure, and highly scalable automation architecture. At the implementation stage of the strategy, architecture needs to be created. There are furthermore many ways that architecture and strategy interact, which means that you need to understand both to properly understand either of the

two. Topics covered in this part includes federated automation, High-Availability and Disaster-Recovery, security, and separation of duty concerns, key trends and Automation as-a-Service (AaaS). It includes useful architectural drawings that can be used to build solutions that also scales for large global organizations with significant security requirements.

Part 1: Introduction

Chapter 1: Success of Automation- To create a solid foundation which better allows you to understand and think about automation, this chapter takes you through how automation has influenced the world through history and features key examples from the past 200 years. This helps you to look at automation of complex IT systems with new eyes. We then move from the past struggles of initial industrialization to modern times featuring global enterprises, modern industry, and digitalized services. You will then review the many different key benefits of automation reaped by enterprises around the world, moving beyond simple reduction of cost and increased speed.

Chapter 2: Ways to Redefine Automation - Today in the world, the prevailing and traditional view of automation is that automation is something external to our IT landscape of applications or something which at best is wrapped around them. We will review what is wrong with this view and what severe consequences it has for our effort to digitize our businesses.

Chapter 3: Key Elements of Implementing Automation Strategy - Strategy comes before architecture and implementation, if it does not, it is rarely strategy, but either some retrofit of what is already at the organization or something which deals with non-strategic concerns. Successful automation strategy has several distinct areas, which are important to know before diving into each one, as they are both related to each other and related to architectural and implementation. Commonly issues also bleed into one from the other. To decrease creation time and make the roll out strategy as problem free as possible, there is an optimal sequence in which

it is done, which this chapter outlines – together with the distinct elements of automation.

Part 2: Creating Successful Automation Strategy

Chapter 4: Things that Matter: Budget and Ownership - While the way we operate in the IT space has become increasingly agile, when it comes to both budget and ownership, it is more common that we work in a more static fashion. Planning of budgets happens most often on a yearly basis. Ownership is commonly not reconsidered except for during more impactful re-organizations, when ownership of strategic components and technologies may change. This often means that we must navigate this organizational rigidity when both creating and implementing our automation strategy. For sure, it is not always that you have the luxury of creating things from scratch. With that in mind, in this chapter we will not only review key topics within budget and ownership, but also explore what may happen when we get this wrong. This enables you to recognize and fix problems for an existing roll out of an automation strategy.

Chapter 5: Performance Monitoring of Automation Strategy - When there is no measuring in place which can tell us about the impact on the organization and our systems, we are driving blind. It goes beyond not knowing exact results though. If we step back and think about what we have learned in the past chapters, which is that automation is a prerequisite for digital transformation, that means that for each year of running an ineffective automation strategy, is a year where we have postponed the digitalization of our organization. Learn about what happens when you do not do performance monitoring and what objectives and outcomes you should look at.

Chapter 6: Selecting Right Tools and Platform - In the world of IT automation tools and platforms, the one ring to rule them all eludes most organizations, also in the overseeable future. There are many reasons why this is, such as that a singular automation platform for the complete organization would have to be able to manage and often integrate to all systems and software. At the same time, if we do not manage the growing complexity which is

born out of having an ever-increased pool of different technologies, our scaling of IT (and our business) may easily grind to a halt due to increasing inefficiency, costs and time-to-deliver. We have some tough decisions to make when it comes to selecting the right tools and platforms and this chapter attempts to guide you through them.

Chapter 7: Approach to Automation Skill Development - Let us start by reflecting on something fundamental. All change starts with people. Even if that is so, in the world of information technology, we often end up talking about technology instead. To help you tackle skills development related to your automation strategy, this chapter teaches how to understand, implement, and support skills development as a part of your successful automation strategy.

Chapter 8: Key Processes for Development and Cross-team Collaboration - The relationship between process and technology will be explored in-depth in this chapter, including a review of the most important processes for development of automation and cross team collaboration. We will also focus on how we can make things more future proof, as changing how hundreds or thousands of people work is the most demanding thing you can do in an organization.

Chapter 9: Catering for a Digitized Future - Now that you know about the main components needed to be dealt with in your automation strategy, it is time to discuss current and future trends and how they may and will impact your strategy. The Greek philosopher Heraclitus is credited with the idea that the only constant is change. The broader question you should ask yourself related to this, as you construct your automation approach, is what change would disrupt your plans. Related to this, we will delve into a discussion about how an ever-heterogeneous landscape impacts us and how this can be dealt with in your automation approach.

Part 3: Automation for Architecture that Matters

Chapter 10: Scaling Up Automation to Organization-wide - There is one thing which alone breaks all systems, and that thing is scale. Your system can manage 5 million customers, but it cannot manage 5 billion customers rushing through the system requesting data and

interacting. In this chapter you learn how federated automation can provide a solution to your scaling needs.

Chapter 11: Establishing High Availability and Disaster Recovery- As automation becomes more fundamental to your IT landscape and digitalization strategy, many organizations automation journey arrives at the point where there is a need to re-assess the availability and recovery requirements for the automation platforms used. This is natural as lower automation maturity includes less important use-cases, no or lacking automation strategy and few standardized platforms. This chapter discusses common automation use-cases to be on the lookout for, when it comes to high availability (HA) and disaster recover (DR) requirements and outlines a general-purpose architecture for HA/DR, possible to apply to different automation platforms.

Chapter 12: Security and Separation of Duty Requirements - As a part of automation touching more systems in the organization, it is natural to assess the security of your automation. At the end of the day, automation gives you better security, so it makes sense that your automation systems touch your systems which have the highest requirements for security. At the same time, this means that if you have not hardened your automation systems, they can easily become the weakest link in your security chain. With all this said, this chapter delves into both security for automation and automation for security.

Chapter 13: Explore Automation-as-a-Service (AaaS) - There is a good reason this is the last topic of this book, which is that it is one of the final developments in organizations development journeys, going from opportunistic islands of automation to automated cross-organizational processes which enables new business or organizational capabilities. Automation-as-a-Service (AaaS) means that we provide a service which not only runs automation for others, but also helps to create high quality automation by providing related services. Review a general purpose, vendor neutral architecture for AaaS, when done correctly it is exactly what the doctor ordered.

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Part - 1
Introduction

Chapter 1
Success of Automation

Introduction

The world of automation is a difficult place to make it in, and it is full of enterprises and organizations with failed automation strategies and initiatives. For you as a creator, architect, or manager to successfully author, oversee, and execute a successful IT automation strategy and architecture, you first need a solid pair of glasses through which you can properly view and assess the things that matter in your enterprise or organization. In a complex IT world full of buzzwords and ever-changing trends and efforts, it is easy to lose track of what is important, what to focus on, and what to spend less time worrying about. If you are a creator, you can easily get lost in technology choices. If you are an architect, you can get lost in requirements and frameworks that no longer apply to today's business challenges. If you are a manager overseeing things, you can get lost in all these things as people tries their best to create budget space for well-meant but misdirected programs of change. This chapter hopes to make things clearer to you.

To create a solid foundation that better allows you to understand and think about automation, this chapter takes you through how automation has influenced the world through history and features key examples from the past 200 years. This helps you to look at the automation of complex IT systems with new eyes. We then move from the past struggles of initial industrialization to modern times featuring global enterprises, modern industry, and digitalized services. You will then review many different key benefits of automation reaped by enterprises around the world, moving beyond simple reduction of cost and increased speed. At the end, we will review what the enterprises that have succeeded with large-scale automation does differently than the many that fail.

Structure

In this chapter, we will discuss the following topics:

- Historical view of automation
- Modern time automation
- Benefits of automation
- What do successful companies do differently

Objectives

This chapter provides the reader with a good understanding of automation fundamentally, how it influences the world, and how to think about it. These things are paramount to be able to reap benefits.

Historical view of automation

Automation can simply be viewed as a task being done in an automatic fashion instead of a human doing it manually. From that perspective, bicycles automate the task of walking. Automation has since long been a key factor for disruptive change across markets and society, even though the word automation was first coined by the automotive industry in the 1940s. My favorite historical automation example starts with what many consider one of the most important inventions in modern times, the steam engine, which can be traced back to the start of the 17th century. The steam engine would become the cornerstone of another great invention later in the 19th century.

This invention was the train. Before the introduction of trains, the only way to move people and goods over greater distances was by horse or by boat, where the latter would often not be an option. Trains enabled people to travel in a completely new way, moving thousands of kilometers in days instead of weeks or months. They also enabled companies around the world to cut their time-to-market by a factor of many. It is easy to imagine the business impact of this if your company made a living by selling products to a market some distance away.

Imagine if you used horseback to freight your products to market and your competitor was an early adopter of trains. Your competitor would not only be able to deliver goods many times quicker than you but also at far greater volumes. The risk that you would become disrupted would be high.

Let us have a look at the disruption in the 19th century caused by the adoption of trains, as shown in *Figure 1.1:*

***Figure 1.1**: The world in the 19th century*

Modern time automation

Later in history, during the 20th century, the computer became another example of automation. Instead of humans making calculations using a counting frame or slide rule, computer programs can today almost flawlessly perform calculations over and over again. Instead of humans filing a piece of paper in a filing cabinet, computers can now file and transfer information in milliseconds. With these fantastic capabilities, computers have helped companies cut time-to-market

and allow them to also increase the volumes of products possible to ship. Let us have a look at a prominent example, the distribution of videos. Computers revolutionized many things, for example, how videos and film are now distributed. First, we had humans visiting stores where video cassettes were sold or rented out. This developed into streaming media distributed almost instantly by computers to TVs, mobile phones, and computers in our homes or wherever we happen to be. There is a huge difference in time-to-market and distribution volume between the two. Consider what a video store would look like, which would feature the current content of today's video and streaming services, and you quickly realize that such a store would not even be physically possible to stand up.

But let us not get lost in the complexity of computerized systems. At the end of the day, we automate because of the same reasons companies came to establish increasingly automated factories.

Benefits of automation

Time-to-market and distribution volume are two things that we see benefit greatly from automation. But there are more benefits, such as delivery precision. It is challenging for humans to perform even simpler tasks over and over again with the same method and result. Moving forward to more complicated tasks consisting of dozens or more steps, delivery precision suffers increasingly. Due to this, in order to produce large amounts of products that have similar quality and experience, automation is required. Because of the large number of manual tasks in the IT world, scale is increasingly a challenge at the heart of many types of **Information Technology (IT)** systems. Examples of such manual tasks may be to install a computer, install an application, patch a system, add a user to a system, add capacity to existing systems, or manage security and networking.

If we start and look at how scale is introduced into IT, the number of customers is a main driver of scale. The interconnection of physical traditional business places like a store or a sales office with IT then applies the same scale factor to IT. For example, a retail chain with