

SAFe® 4.5 Introduction

Overview of the Scaled Agile Framework® for Lean Enterprises

A Scaled Agile, Inc. White Paper
August 2017

Foreword

"Change before you have to... Control your own destiny or someone else will. An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage."

–Jack Welch, former Chief Executive Officer (CEO),
GENERAL ELECTRIC

The lesson from Jack Welch is simple: Enterprises must learn how to adapt quickly to changing technology and economic conditions, or they will become extinct, no matter their size, smarts, or strength. This holds true even for businesses that don't consider themselves Information Technology (IT) or software companies. Professional services, financial services, healthcare institutions, and government entities are all now highly dependent on their ability to produce new technology-based products and services.

Enterprises that effectively embrace innovative new technologies and business models—and attack digital disruption head-on—can positively impact the value of existing products and services offered in the industry. This is why 'disruption' is so powerful—it enables emergence of new digital products, services, and businesses who disrupt the current market, and causes the need for re-evaluation of how businesses innovate, operate and adapt.

SAFe 4.5, based on research from hundreds of implementations, customer and community feedback, as well as advances in Lean and Agile thinking, enables enterprises to embrace digital disruption. SAFe 4.5 is leaner, more Agile, and more supportive of faster innovation and learning than any of its predecessors. Moreover, SAFe 4.5 helps enterprises get better, business results, faster, more consistently and reliably. SAFe 4.5 can be configured to match your organization's needs and is fully backwards compatible to the prior version. SAFe 4.5 helps companies to:

- Innovate and test ideas more quickly using the Lean Startup Cycle and Lean User Experience (UX)
- Deliver much faster with Scalable DevOps and the Continuous Delivery Pipeline
- Simplify governance and improve portfolio performance with Lean Portfolio Management
- Support the full range of development environments, from the simplest to the most complex, using four new configurations of the framework

Organizational change is hard. It requires adopting new behaviors, leadership styles, practices, and culture. SAFe accelerates Lean-Agile transformation with the new Implementation Roadmap, which guides enterprises every step of the way. Practitioners of SAFe are supported by a worldwide network of Scaled Agile Partners and SAFe Program Consultants (SPCs), who can accompany them on the journey.

–Dean Leffingwell Creator of SAFe, and Chief Methodologist, Scaled Agile, Inc.

–Richard Knaster, SAFe Fellow, Principal Consultant, Scaled Agile, Inc.

–Inbar Oren, SAFe Fellow, Principal Consultant, Scaled Agile, Inc.

Table of Contents

| | |
|---|-----------|
| Introduction..... | 1 |
| SAFe Configurations..... | 3 |
| The Spanning Palette..... | 4 |
| SAFe Foundation | 5 |
| SAFe Core Values | 6 |
| The Lean-Agile Mindset | 8 |
| SAFe Lean-Agile Principles | 10 |
| Essential SAFe..... | 13 |
| Essential SAFe Highlights | 13 |
| The Ten Essential Elements | 15 |
| Portfolio SAFe | 17 |
| Portfolio SAFe Highlights..... | 17 |
| Large Solution SAFe..... | 19 |
| Large Solution Highlights | 19 |
| Full SAFe | 21 |
| Full SAFe Highlights..... | 21 |
| Lean-Agile Leaders..... | 22 |
| Implementing SAFe | 24 |
| Summary..... | 26 |
| Learn More..... | 27 |
| Bibliography | 27 |

Introduction

"With a proven framework, we can deliver solutions much faster and with less effort. SAgile defines the roles, teams, activities and artifacts to apply Lean and Agile principles at enterprise scale, and provides outstanding training and coaching materials to increase our chance of success."

–Peter Vollmer, Distinguished Technologist,
HEWLETT PACKARD ENTERPRISE

The Scaled Agile Framework® (SAFe®) for Lean Enterprises is a scalable and configurable framework that helps organizations deliver new products, services, and solutions in the shortest sustainable lead time, with the best possible quality and value.

An extensive body of knowledge, SAgile is based on Lean-Agile principles and values. It provides guidance for the roles, responsibilities, artifacts, and activities necessary to achieve better business outcomes.

The SAgile website—scaledagileframework.com—features an interactive 'Big Picture' graphic, which provides an overview of the Framework. Each icon on this graphic is clickable and links to a supporting article and related resources. The site also includes a variety of additional guidance articles, downloads, presentations, and videos, as well as a glossary that can be automatically translated into multiple languages. Figure 1 illustrates 'Portfolio SAgile,' the default configuration on the website's home page.

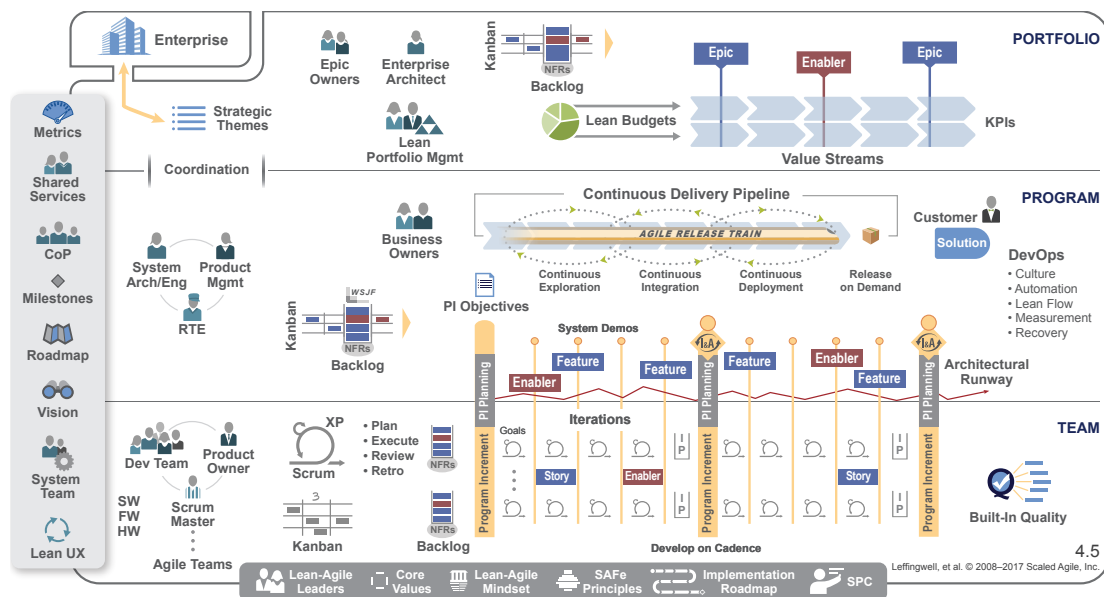


Figure 1. The SAgile Big Picture

SAFe combines the power of Agile with Lean product development and systems thinking. It synchronizes alignment, collaboration, and delivery for multiple Agile teams. As a result, it dramatically improves business agility by accelerating productivity, time-to-market, quality, employee engagement, and more.

SAFe is improving business outcomes for private enterprises and government agencies of all sizes across the globe, resulting in dramatic increases in employee engagement, improved economics, and workplaces that are more productive, engaging, and fun. Benefits from documented case studies include:



Scalable and configurable, SAFe allows each organization to adapt the Framework to its own business needs. It supports smaller-scale solutions employing 50-125 practitioners, as well as complex systems that require thousands of people.

Imagine combining the power of a Lean Startup with all the resources of a mature enterprise—Agile Release Trains (ARTs) based on SAFe 4.5 are positioned to be an unstoppable force of innovation. According to Gartner, Inc., “by 2021, more than 50% of established corporations will be leveraging lean startup techniques.”¹

SAFe Configurations

SAFe supports the full range of development environments with four out-the-box configurations:

1. **Essential SAFe** is the heart of the Framework and is the simplest starting point for implementation. It's the basic building block for all other SAFe configurations, and describes the most critical elements needed to realize the majority of the Framework's benefits.
2. **Portfolio SAFe** helps align portfolio execution to the enterprise strategy, by organizing Agile development around the flow of value, through one or more value streams. It provides business agility through the principles and practices for portfolio strategy and investment funding, Agile program guidance, and Lean governance.
3. **Large Solution SAFe** is for developing the largest and most complex solutions that typically require multiple Agile Release Trains (ARTs) and suppliers, but do not require Portfolio-level considerations. This is common for industries like aerospace and defense, automotive, and government where the large solution—not portfolio governance—is the primary concern.
4. **Full SAFe** is the most comprehensive version of the Framework. It supports enterprises that build and maintain large, integrated solutions that require hundreds of people or more, and includes all levels of SAFe: team, program, large solution, and portfolio. In the largest enterprises, multiple instances of various SAFe configurations may be required.

Each configuration is supported by 'spanning palette' and 'foundation' elements, as shown in Figures 2 and 3, respectively.

SAFe's configurable framework provides just enough guidance to meet the needs of a product, service, or organization. An enterprise can start simply, and yet have the ability to grow, as its needs evolve over time.

"Three years into this effort, our SAFe transformation has taken strong root, leading to high-quality, predictable software delivery and architectural runways."

—Robert F. Crudup, Executive Vice President and CIO,
SEI INVESTMENTS

The Spanning Palette

The spanning palette contains various roles and artifacts that may be applicable to a specific team, program, large solution, or portfolio context. A key element of SAFe's flexibility and configurability, the spanning palette permits organizations to apply only the elements needed for their configuration.

Figure 2 illustrates two versions of the spanning palette: the figure on the top is used for the Essential SAFe configuration, while the one on the bottom is for all other configurations. However, since SAFe is a framework, enterprises can apply any of the elements from the larger spanning palette to Essential SAFe.

Below is a brief description of each spanning palette element:

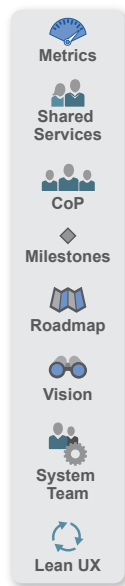
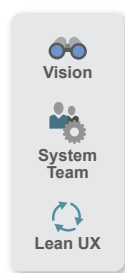


Figure 2.
Spanning
palette

- **Vision** - This describes a future view of the solution to be developed, reflecting customer and stakeholder needs, as well as the features and capabilities proposed to address those needs.
- **System Team** - This is a special Agile team that provides assistance in building and using the Agile development environment, including continuous integration and test automation, and other practices of the Continuous Delivery Pipeline.
- **Lean UX** - Lean UX is the application of Lean principles to user experience design. Through constant measurement and learning loops (build-measure-learn), it uses an iterative, hypothesis-driven approach to product development. In SAFe, Lean UX is applied at scale, with the right combination of centralized and decentralized UX design and implementation.
- **Metrics** - The primary measure of progress in SAFe is objective evidence of working solutions. In addition, SAFe defines numerous additional intermediate and long-term measures that teams, trains, and portfolios can use to evaluate progress.
- **Shared services** - This represents the specialty roles necessary for the success of an ART, but that cannot be dedicated full time to any specific train.
- **CoP** - A Community of Practice (CoP) is an informal group of team members and other experts acting within the context of a program or enterprise who share practical knowledge in one or more relevant domains.
- **Milestones** - This represents planned and specific goals or events. These can include fixed-date milestones, Program Increment (PI) milestones, and learning milestones.
- **Roadmap** - The Roadmap communicates the planned deliverables and milestones over a time line.

SAFe Foundation

As illustrated in Figure 3, the foundation contains the supporting principles, values, mindset, implementation guidance, and leadership roles that are needed to successfully deliver value at scale. Each foundation element is briefly described below.



Figure 3. SAFe foundation

- **Lean-Agile leaders** - Management has the ultimate responsibility for business outcomes. As a result, leaders must be trained in, and become trainers of, these leaner ways of thinking and operating. Lean-Agile leaders are lifelong learners and teachers. They understand and embrace Lean and Agile principles and practices.
- **Core values** - Four core values define the belief system of SAFe: alignment, built-in quality, transparency, and program execution.
- **Lean-Agile Mindset** - The Lean-Agile Mindset is the combination of beliefs, assumptions, and actions of SAFe leaders and practitioners who embrace the concepts of the Agile Manifesto and Lean thinking.
- **SAFe Principles** - These nine fundamental truths, beliefs, and economic concepts inspire and inform the roles and practices that make SAFe effective.
- **Implementation Roadmap** - Implementing the changes necessary to become a Lean enterprise is a substantial shift for most companies. SAFe provides an implementation roadmap to guide organizations on this journey.
- **SPC** - SAFe Program Consultants (SPCs) are change agents who combine their technical knowledge of SAFe with an intrinsic motivation to improve their company's software and systems development processes.

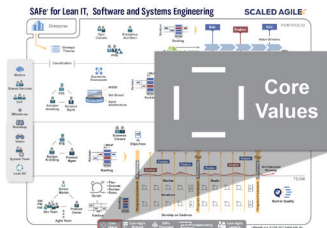
"Our time-to-market is impressive for an enterprise solution. It's a competitive advantage in the market that we can make major product changes every two months."

—Cédric Guyot, CEO
VIRTUAL REALITY, KANTAR RETAIL

SAFe Core Values

"Find people who share your values, and you'll conquer the world together."

—John Ratzenberger



SAFe's Core Values define the ideals and beliefs that are essential to applying the Framework. They act as guides to help people know where to put their focus, and help determine if organizations are on the right path to fulfill their business goals. Each value is described briefly below.

1. **Alignment** - When management and teams are aligned to a common mission, all the energy is directed toward helping the customer. Everyone is on the same team, working toward the same goals. Alignment communicates the intent of the mission and enables teams to focus on how to accomplish it. Alignment occurs when everyone in the portfolio, and every team member on every ART, understands the strategy and the part they play in delivering it.
2. **Built-in quality** - The economic impact of poor quality is much higher at scale. Built-in quality practices increase customer satisfaction and provide faster, more predictable value delivery. They also improve the ability to innovate and take risks. Without built-in quality, the Lean goal of maximum value in the shortest sustainable lead time cannot be achieved. Built-in quality practices also ensure that each solution element, at every increment, achieves appropriate quality standards throughout.
3. **Transparency** - 'You can't manage a secret.' Transparency builds trust. Trust, in turn, is essential for performance, innovation, risk-taking, and relentless improvement. Large-scale solution development is hard; things don't always work out as planned. Creating an environment where 'the facts are always friendly' is key to building trust and improving performance. It enables fast, decentralized decision-making and higher levels of employee empowerment and engagement.
4. **Program execution** - To achieve broader change, the entire development value stream—from concept to release—must become leaner and more responsive to change. Traditional organizational structures and practices were built for control and stability; they were not specifically designed to support innovation, speed, and agility.

Workarounds such as tiger teams, project-based organizations, and taskforces cannot overcome these constraints. Simply put, the majority of organizations cannot break through the thick walls of functional silos. Instead, SAFe delivers value by creating stable (long-lived) teams-of-Agile-teams, in the form of an Agile Release Train (ART).

According to John P. Kotter, "Most start-ups really are organized as networks because they need to be nimble, swift, and creative in order to grab opportunities."² Essentially an Agile program, an ART operates more like a startup, or a social network of people that work outside the constraints of functional silos and the command-and-control structures of formal hierarchies.

A networked organizational structure like an ART (see Figure 4) is self-organizing and self-managing. It relies on decentralized decision-making to avoid costly delays resulting from information and decisions going up the chain of command.

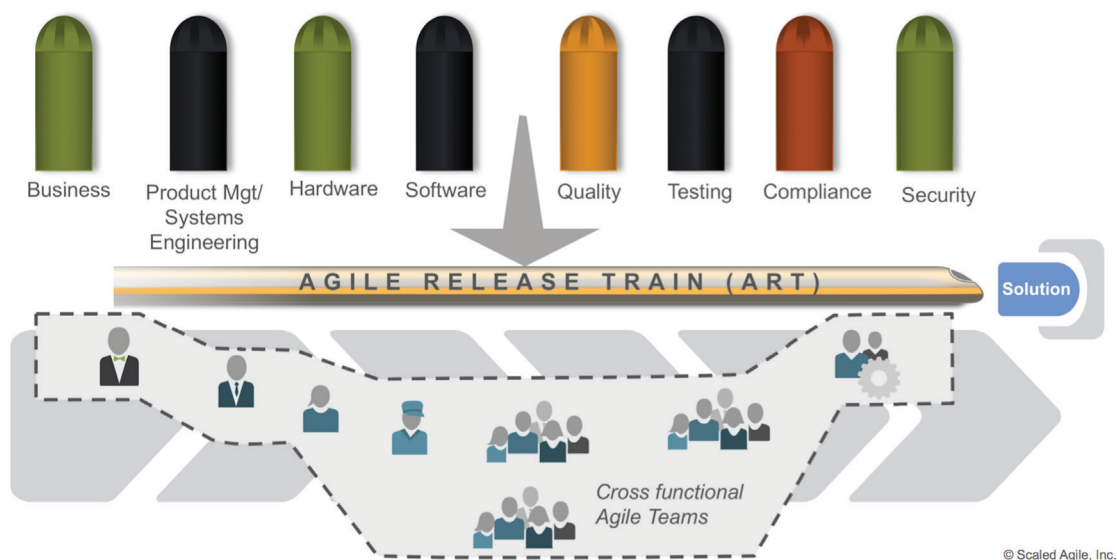


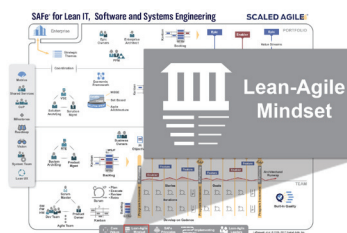
Figure 4. An ART is a fully cross-functional organization designed to work across silos, and optimize the flow of value from ideation to release

The Lean-Agile Mindset

"It is not enough that management commit themselves to quality and productivity, they must know what it is they must do. Such a responsibility cannot be delegated."

"People are already doing their best. The problem is with the system. Only management can change the system."

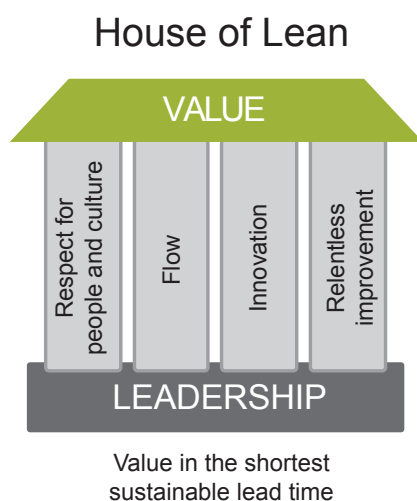
–W. Edwards Deming



Deming's quotes inspire and inform a basic premise of SAFe: The ultimate responsibility for the success of the enterprise, and any significant change to the way of working, lies with management. To this end, SAFe describes a new style of leadership, exhibited by Lean-Agile leaders.

Lifelong learners and teachers, Lean-Agile leaders understand and embrace a Lean-Agile Mindset, its principles and practices, and teach it to others. To achieve that, leaders must first be trained in, and then become trainers of, these leaner ways of thinking and operating.

This mindset is exhibited in SAFe, in part by the House of Lean and the Agile Manifesto, as illustrated in Figure 5.



Agile Manifesto

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

*That is, while there is value in the items on the right,
we value the items on the left more.*

Figure 5. Aspects of a Lean-Agile Mindset

The House of Lean metaphor illustrates several basic Lean concepts:

Value. The roof represents the goal of Lean, which is the delivery of maximum value and quality to the customer in the shortest sustainable lead time. High employee morale, physical, intellectual and emotional safety, and customer delight are further objectives and benefits. Value is supported by the four 'pillars' of the House of Lean:

1. **Respect for people and culture** - Management challenges people to change and may recommend what to improve, but the teams learn retrospective and problem-solving skills and make the appropriate improvements. Leaders understand the role that culture plays, and work to move the culture forward to align with the new value system and principles.
2. **Flow** - Establishing a continuous stream of work is critical to fast value delivery. Emphasis is on avoiding the 'start-stop-start' delay of project-based work, and a high value is placed on work visibility, long-lived teams, continuous knowledge acquisition and sharing, and decentralized decision-making.
3. **Innovation** - Flow builds a solid foundation for the delivery of value. But without innovation, both product and process will stagnate. Innovation doesn't simply 'happen.' The right environment, including dedicated time for innovation, must be allocated. One element of this is the Innovation and Planning (IP) iteration, a free-form iteration that provides the time and intellectual freedom needed for innovation.
4. **Relentless improvement** - An enterprise improves through continuous reflection and relentless improvement. A constant sense of competitive danger drives the learning organization to aggressively pursue opportunities to improve and to respond quickly to challenges and opportunities.

"It usually takes about 36 months to bring a new TV platform to market, but we had a minimally viable product in 18 months. SFAFe helped us build and run a world-class product and guided us when in doubt, showing us the way toward Agile product development flow."

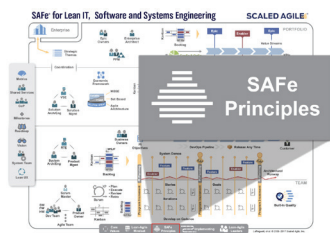
—Simon Berg, Agile Program Manager
SWISSCOM ENTERTAINMENT

Leadership. This is the foundation of the House of Lean. Leaders are trained in these new and innovative ways of thinking, and personally exhibit these values, principles, and behaviors. The other element of Lean-Agile leadership is defined by the 'Manifesto for Agile Software Development' (aka Agile Manifesto).³ Along with various Agile practices, the manifesto provides the foundation for empowered, cross-functional, self-organizing, and self-managing Agile teams and trains. It offers both a value system (Figure 5, right) and a set of twelve principles³ that provide the basic philosophy of the Agile approach. Lean-Agile leaders support the Agile Manifesto, and SFAFe is fully dependent on Agile teams and trains.

SAFe Lean-Agile Principles

"The impression that 'our problems are different' is a common disease that afflicts management the world over. They are different, to be sure, but the principles that will help to improve the quality of product and service are universal in nature."

–W. Edwards Deming



SAFe's practices are grounded in nine fundamental principles that have evolved from Agile practices and methods, Lean product development, systems thinking, and observation of successful enterprises. These principles inspire all of the concepts in the Framework, as described below.

#1 Take an economic view - Delivering the best value and quality to people and society, in the shortest sustainable lead time, requires making routine decisions in a proper economic context. This necessitates developing and communicating the strategy for incremental value delivery, and creating an economic framework that defines the trade-offs between risk, Cost of Delay (CoD), operational and development costs, while supporting decentralized decision-making.

#2 Apply systems thinking - Deming observed that the problems faced in the workplace require an understanding of the systems that workers use. Moreover, a system is complex. It has many interrelated components (people and processes) that have defined, shared goals. To improve, everyone must understand and commit to the purpose of the system. Optimizing one component does not optimize the whole. In SAFe, systems thinking is applied to the organization that builds the system, as well as to the system under development. It also acknowledges how that system operates in its end-user environment.

#3 Assume variability; preserve options - Traditional design and life cycle practices encourage choosing a single design-and-requirements option early in the development process. But if that starting point is wrong, then future adjustments take too long and can lead to a suboptimal long-term design. A better approach is to maintain multiple requirements and design options for a longer period in the development cycle. Empirical data is then used to narrow the focus, resulting in a design that creates better economic outcomes.

#4 Build incrementally with fast, integrated learning cycles - Develop solutions incrementally in a series of short iterations. Each iteration results in an integrated increment of a working system. Subsequent iterations build on the previous ones. Increments allow fast customer feedback and risk mitigation. They also may become minimum viable products (MVPs) or prototypes for market testing and validation. In addition, these early, fast feedback points help determine when to 'pivot,' where necessary, to an alternate course of action.

#5 Base milestones on objective evaluation of working systems - Business owners, developers, and customers have a shared responsibility to ensure that investment in new solutions will deliver economic benefit. The sequential, phase-gate development model was designed to meet this challenge, but experience shows that it does not mitigate risk as intended. In Lean-Agile development, integration points provide objective milestones in which to evaluate the solution frequently and throughout the development life cycle. This regular evaluation provides the financial, technical, and fitness-for-purpose governance needed to assure that a continuing investment will produce a commensurate return.

#6 Visualize and limit WIP, reduce batch sizes, and manage queue lengths - Lean enterprises strive to achieve a state of continuous flow, where new system capabilities move quickly and visibly from concept to cash. There are three keys to implementing flow:

1. Visualize and limit the amount of work in process (WIP) to limit demand to actual capacity.
2. Reduce the batch sizes of work to facilitate fast and reliable flow through the system.
3. Manage queue lengths to reduce the wait times for new capabilities.

#7 Apply cadence, synchronize with cross-domain planning - Cadence creates predictability, and provides a rhythm for development. Synchronization causes multiple perspectives to be understood, resolved, and integrated at the same time. Applying development cadence and synchronization, coupled with periodic cross-domain planning, provides the tools needed to operate effectively in the presence of uncertainty, inherent in product development.

#8 Unlock the intrinsic motivation of knowledge workers - Lean-Agile leaders understand that ideation, innovation, and the engagement of knowledge workers can't generally be motivated by individual incentive compensation. After all, individual objectives cause internal competition and destroy the cooperation necessary to achieve the larger aim of the system. Providing autonomy and purpose—while minimizing constraints—leads to higher levels of employee engagement, resulting in better outcomes for customers and the enterprise.

#9 Decentralize decision-making - Achieving fast value delivery requires fast, decentralized decision-making. This reduces delays, improves product development flow, enables faster feedback, and creates more innovative solutions by those closest to the local knowledge.

However, some decisions are strategic, global, and have economies of scale that justify centralized decision-making. Since both types of decisions occur, creating a reliable decision-making framework is a critical step in ensuring a fast flow of value.

The tenets and principles of SAFe provide the foundation for the Framework. However, as valuable as they are, tenets and principles alone provide little guidance on what to do to achieve the benefits implied. For that, more specific guidance is needed such as practices that identify roles and responsibilities, activities and events, and the various artifacts used to manage the work.

Indeed, when making any organizational change, people need to know what to do, and what's expected of them. That's only fair. To this end, the remainder of this white paper describes specific practice guidance at a high level, organized primarily by the four configurations that were briefly introduced earlier, starting with Essential SAFe.

"The products we're developing are bigger than one Agile team. For the teams to interact and plan together, we really needed SAFe as the foundation. It brings the practices and methodologies to coordinate multiple teams working on the same product at the same time."

–Mike Eason, CIO, Commercial Banking,
CAPITAL ONE

Essential SAFe

The Essential SAFe configuration is the heart of the Framework and is the simplest starting point for implementation. It's the basic building block for all other configurations and describes the most critical elements needed to realize the majority of the Framework's benefits, as illustrated in Figure 6.

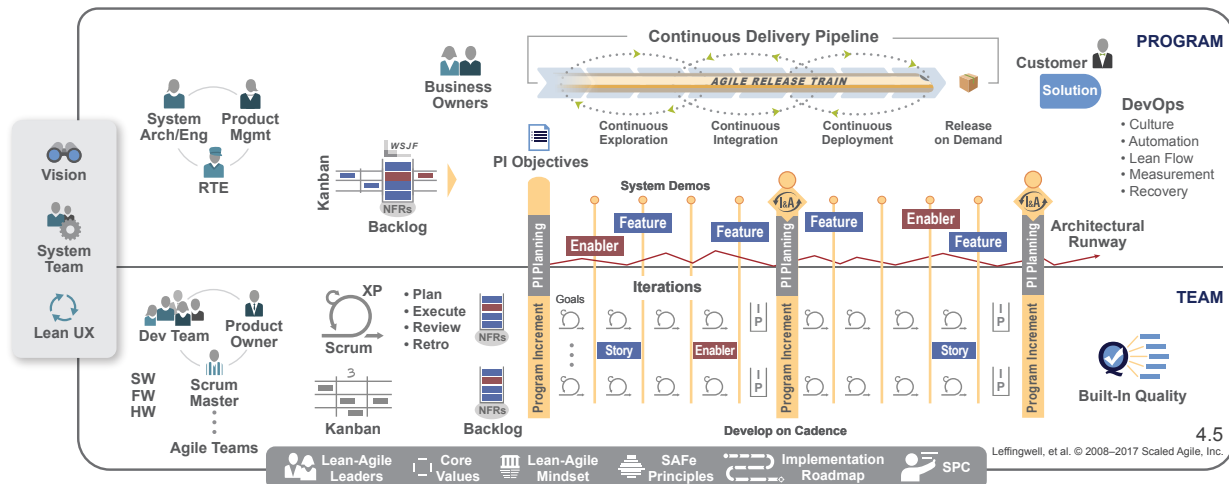


Figure 6. Essential SAFe configuration

Together, the team and program levels form an organizational structure called the Agile Release Train (ART), where Agile teams, key stakeholders, and other resources are dedicated to an important, ongoing solution mission.

Essential SAFe Highlights

The Essential SAFe configuration provides the fundamental elements of the Framework:

- The ART aligns management, teams, and stakeholders to a common mission through a single vision, roadmap, and program backlog.
- ARTs deliver the features (user functionality), and the enablers (technical infrastructure), needed to provide value on a sustainable basis.
- Team iterations are synchronized and use the same duration and start and end dates.
- Each ART delivers valuable and tested system-level increments every two weeks.

- Program Increments (PIs) provide longer, fixed timebox increments for planning, execution, and inspecting and adapting.
- Solutions can be released on demand, during, or at the end of a PI, based solely on the needs of the business. Frequent or continuous integration of the work from all teams is the ultimate measure of progress.
- ARTs use face-to-face PI planning to assure collaboration, alignment, and rapid adaptation.
- ARTs build and maintain a Continuous Delivery Pipeline, used to regularly develop and release small increments of value.
- ARTs provide common and consistent approaches to user experience through Lean UX principles and practices.
- DevOps – which is a mindset, culture, and set of technical practices – provides communication, integration, automation, and close cooperation among all the people needed to plan, develop, test, deploy, release, and maintain a solution.

The following roles help align multiple teams to a common mission and vision, with the necessary coordination and governance:

- **System Architect/Engineer** – This is an individual or small cross-disciplinary team that truly applies systems thinking. They define the overall architecture for the system, help define Nonfunctional Requirements (NFRs), determine the major elements and subsystems, and identify the interfaces and collaborations among them.
- **Product Management** – They provide the internal voice of the customer and work with Product Owners and customers to understand and communicate their needs, define system features, and participate in validation. They are responsible for the program backlog and prioritize features and enablers using an economic approach.
- **Release Train Engineer (RTE)** – The RTE is a servant leader and the chief Scrum Master for the ART. They help improve the flow of value in the program using various mechanisms such as the Program Kanban, Inspect & Adapt (I&A) workshop, PI Planning, and more.
- **Business Owners** – They are a small group of stakeholders who have the primary business and technical responsibility for fitness for use, governance, and return on investment for a solution developed by an (ART). They are key ART stakeholders and actively participate in certain ART events.
- **Customer** – They are the ultimate deciders of value. Customers are an integral part of the Lean-Agile development process and value stream, and they have specific responsibilities in SAFe.

Three major activities help coordinate the ART:

1. **PI Planning** – This is a cadence-based, face-to-face planning event. PI planning serves as the heartbeat of the ART, aligning all its teams to a common mission.
2. **System Demo** – This demo provides an integrated view of new features for the most recent iteration delivered by all the teams in the ART. Each demo provides ART stakeholders with an objective measure of progress during a PI.
3. **Inspect & Adapt** – This is a significant event for an ART where the current state of the solution is demonstrated and evaluated. Teams then reflect and identify improvement backlog items via a structured problem-solving workshop.

The Ten Essential Elements

As the foundational building block, Essential SAFe describes the ten minimal elements necessary to be successful with Lean and Agile development, which is applied by all SAFe configurations. If enterprises incorporate these ten elements in how they develop new solutions, they're well on their way to realizing the full benefits of SAFe.

#1 Lean-Agile Principles – SAFe practices are grounded in these nine fundamental principles, allowing practitioners to be confident that they apply in most cases. And if the practices don't directly apply, the underlying principles can guide them to make sure that they are moving on a continuous path to the shortest sustainable lead time.

#2 Real Agile Teams and Trains - Real Agile teams and trains have everything, and everyone, necessary to produce a working, tested increment of the solution. Fully cross-functional, self-organizing, and self-managing ARTs enable value to flow more quickly, with a minimum of overhead. Product Management, System Arch/Engineering, and RTEs provide content and technical authority and an effective development process. Product Owners and Scrum Masters help the development teams meet their objectives. The customer is engaged throughout the development process.

#3 Cadence and Synchronization - Cadence provides a rhythmic pattern, the dependable heartbeat of the development process. It makes routine that which can be routine. Synchronization allows multiple perspectives to be understood and resolved at the same time.

#4 PI Planning - No event is more powerful in SAFe than PI planning. It's the cornerstone of the Program Increment (PI), which provides the rhythm for the ART. When 100 or so people work together toward a common mission, vision, and purpose, it's amazing how much alignment and energy it creates. Gaining that alignment in just two days can save months of delays.

#5 DevOps and Releasability - SAFe's 'CALMeR' approach to DevOps provides the Culture, Automation, Lean-Flow, Measurement and Recovery capabilities that enable an enterprise to bridge the gap between development and operations. Releasability focuses on the business's capacity to deliver value to its customers more often and according to the demand of the market. Together, DevOps and releasability allow an organization to achieve better economic results through more frequent releases and faster validation of hypotheses.

#6 System Demo - The primary measure of the ART's progress is the objective evidence provided by a working solution in the system demo. Every two weeks, the full system—the integrated work of all teams on the train for that iteration—is demoed to its stakeholders. Stakeholders then provide the feedback the train needs to stay on course and take corrective action.

#7 Inspect and Adapt - The I&A is a significant event held every PI. A regular time to reflect, collect data, and solve problems, the I&A assembles teams and stakeholders to assess the solution, and define and take action on the improvements needed to increase the velocity, quality, and reliability of the next PI.

#8 Innovation and Planning Iteration - The IP iteration occurs every PI and serves multiple purposes. It acts as an estimating buffer for meeting PI objectives, and provides dedicated time for innovation, continuing education, and PI planning and I&A events. It is like extra oxygen in the tank: without it, the train may start gasping under the 'tyranny of the urgent.'

#9 Architectural Runway - The architectural runway consists of the existing code, components, and technical infrastructure necessary to support the implementation of high priority, near-term features, without excessive delay and redesign. If there isn't sufficient investment in the architectural runway, the train will slow down, needing to redesign for each new feature.

#10 Lean-Agile Leadership - For SAFe to be effective, the enterprise's leaders and managers must take responsibility for Lean-Agile adoption and success. Executives must become leaders trained in—and trainers of—these leaner ways of thinking and operating. Without leadership taking responsibility for the implementation, the transformation will likely fail to achieve the full benefits.

The Portfolio SAFe configuration helps align portfolio execution to the enterprise strategy by organizing Agile development around the flow of value, through one or more value streams. It provides business agility through the principles and practices for portfolio strategy and investment funding, Agile program guidance and Lean governance.



17

Portfolio SAFe Highlights

This Portfolio configuration builds on Essential SAFe by adding the following Portfolio-level concerns:

- **Lean Budgets** - Lean budgeting allows fast and empowered decision-making, with appropriate financial control and accountability.
- **Value Streams** - Every value stream has funding for the people and resources necessary to build solutions that deliver the value to the business or customer. Each is a long-lived series of steps (system definition, development, and deployment) that build and deploy systems that provide a continuous flow of value.
- **Portfolio Kanban** - It makes the work of the portfolio visible and creates Work-in-Process (WIP) limits to assure that demand matches the actual value stream capacities.

The following roles provide the highest level of accountability and governance, including the coordination of multiple value streams:

- **Lean Portfolio Management (LPM)** - This function represents the individuals with the highest level of decision-making and financial accountability for a SAFe portfolio. This group is responsible for three primary areas:
 - Strategy and investment funding
 - Agile program guidance
 - Lean governance
- **Epic Owners** - Take responsibility for coordinating portfolio epics through the Portfolio Kanban system.
- **The Enterprise Architect** - This person or group of people work across value streams and programs to help provide the strategic technical direction that can optimize portfolio outcomes. The enterprise architect often acts as an epic owner for enabler epics.

Large Solution SAFe

The Large Solution SAFe configuration is for developing the largest and most complex solutions that typically require multiple Agile Release Trains (ARTs) and suppliers, but do not require Portfolio-level considerations. This is common for industries like aerospace and defense, automotive, and government where the large solution—not portfolio governance—is the primary concern.

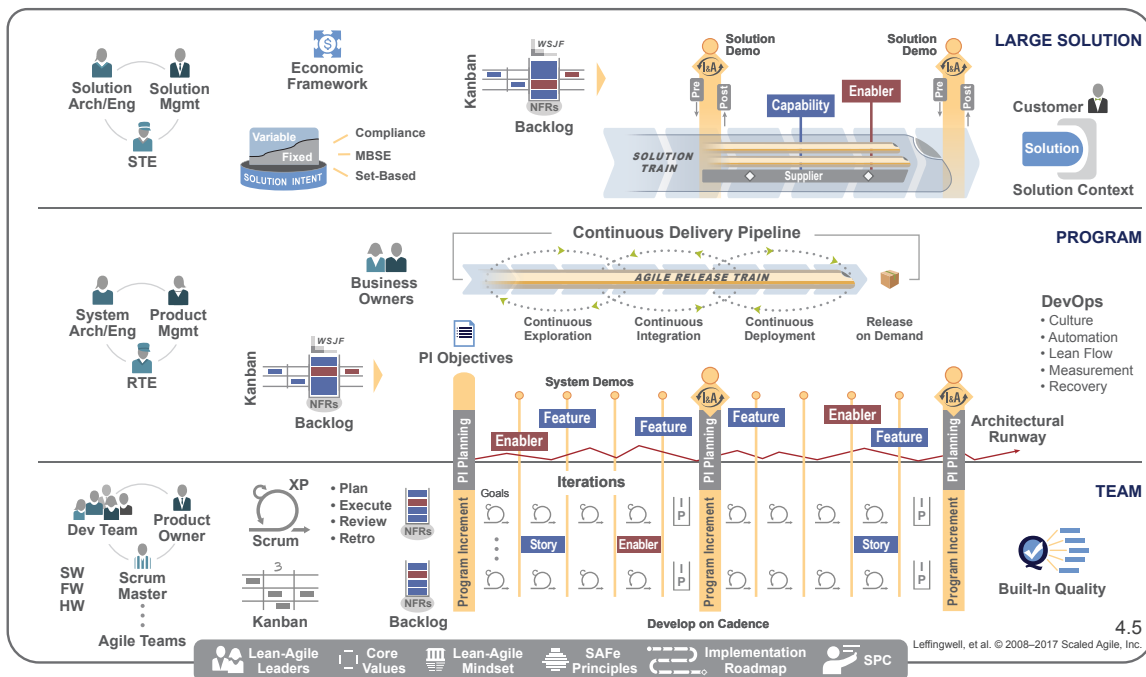


Figure 8. Large Solution configuration

Large Solution Highlights

This configuration builds on Essential SAFe by adding the following Large Solution-level concerns:

- **Solution Train** - The Solution Train is the key organizational element of the Large Solution level, and aligns the people and the work around a common solution vision, mission, and backlog.
- **Supplier** - This is an internal or external organization that develops and delivers components, subsystems, or services that help solution trains offer solutions to their customers.
- **Economic Framework** - It provides financial boundaries for the solution train's decision-making.

- **Solution Intent** – This is a repository for current and future solution behaviors, which can be used to support verification, validation, and compliance. It's also used to extend built-in quality practices with system engineering disciplines, including Set-based Design (SBD), Model-Based Systems Engineering (MBSE), Compliance, and Agile Architecture.
- **Solution Context** – It describes how the system will interface and be packaged and deployed in its operating environment.
- **Solution Kanban** – It visualizes and facilitates the flow of capabilities and enablers for the solution.

The following roles help align multiple ARTs and suppliers to a common mission and vision, with the necessary coordination and governance:

- **Solution Architect/Engineer** – This is an individual or small team that defines a common technical and architectural vision for the larger solution under development.
- **Solution Management** – They have the content authority for the large solution level. They work with customers to understand their needs, create the solution vision and roadmap, define requirements (capabilities and enablers), and guide work through the Solution Kanban.
- **Solution Train Engineer (STE)** – The STE is a servant leader and coach who facilitates and guides the work of all ARTs and suppliers.

Three major activities help coordinate multiple ARTs and suppliers:

1. **Pre- and Post-PI Planning** – These events are used to prepare for, and follow-up after, PI Planning for individual ARTs and suppliers in a Solution Train.
2. **Solution Demo** – This demo is where the results of all the development efforts from multiple ARTs—along with the contributions from suppliers—are integrated, evaluated, and made visible to customers and other stakeholders.
3. **Inspect & Adapt** - (I&A) This is a significant event where the current state of the value stream's solution is demonstrated and evaluated. Representatives of multiple ARTs and suppliers then reflect and identify improvement backlog items in a structured problem-solving workshop.

Full SAFe

The Full SAFe configuration is the most comprehensive version of the Framework. It supports enterprises that build and maintain large, integrated solutions that require hundreds of people or more, and includes all levels of SAFe: Team, Program, Large Solution, and Portfolio.

In the largest enterprises, multiple instances of various SAFe configurations may be required.

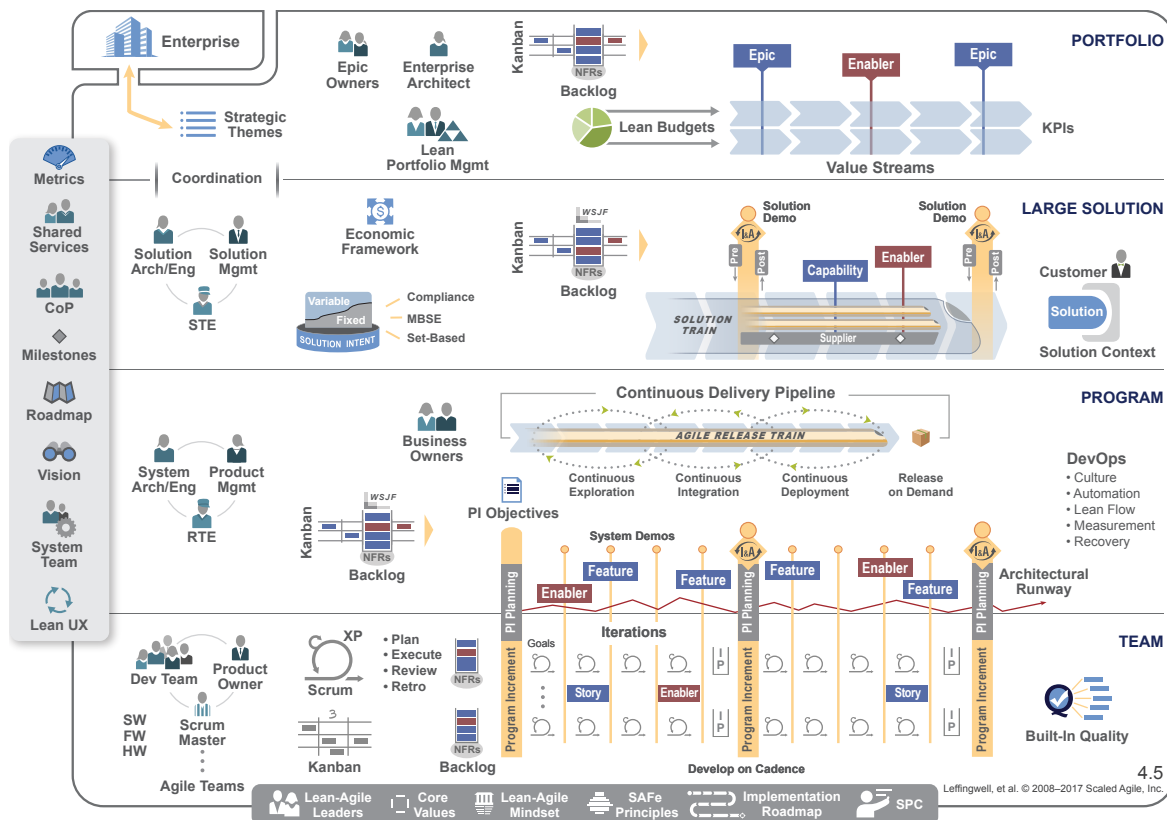


Figure 9. Full SAFe configuration

Full SAFe Highlights

This configuration builds on Essential SAFe by adding the Portfolio and Large Solution-levels, and it:

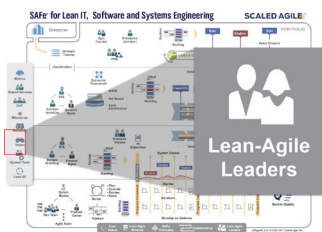
- Enables organizations to combine multiple instances of various SAFe configurations
- Provides the most comprehensive and robust configuration to meet the needs of the largest enterprises

Lean-Agile Leaders

"It's not enough that management commit themselves to quality and productivity, they must know what it is they must do.

Such a responsibility cannot be delegated."

–W. Edwards Deming



The enterprise's executives, leaders, and managers are responsible for Lean-Agile adoption and success. Managers must become leaders who are trained in, and become trainers of, these leaner ways of thinking and operating.

These behaviors are briefly described below.

#1 Lead the change - Steering an organization toward Lean and Agile behaviors, habits, and results cannot be delegated. Leaders must exhibit and communicate the urgency for change, collaboratively build a plan, understand and manage the change process, and quickly solve problems. Leaders must have knowledge of organizational change management and take a system view for implementing the transformation.

#2 Know the way; emphasize lifelong learning – Leaders must create an environment that promotes continuous learning, and fosters formal and informal groups for learning and improvement. Encourage team members to build relationships with customers and suppliers, and expose them to other world views. Strive to learn and understand new developments in Lean, Agile, and contemporary management practices.

#3 Develop people - Focus on developing people's knowledge and skills rather than on being the go-to expert or orchestrating the work of others. Create a team that is jointly responsible for success. Learn how to solve problems together in a way that develops people's capabilities and increases their engagement and commitment. Respect people and culture.

#4 Inspire and align with the mission - Provide an inspirational mission and vision, while eliminating demotivating rules, policies, and procedures. Minimize constraints. Organize Agile teams and trains around value. Understand the power of self-organizing, self-managing teams.

Create a safe, failure-tolerant environment for learning, growth, and mutual influence. Build an economic framework for each value stream and teach it to everyone.

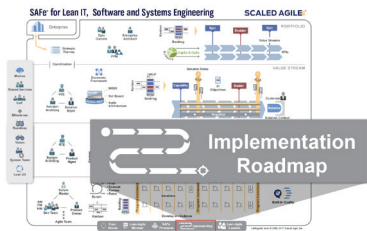
#5 Decentralize decision-making - Establish a decision-making framework. Empower others by setting the mission, developing people, and teaching them to solve problems. Take responsibility for making and communicating strategic decisions—those that are infrequent, long lasting, and have significant economies of scale. Decentralize all other decisions.

#6 Unlock the intrinsic motivation of knowledge workers - Drucker notes: "Knowledge workers are individuals who know more about the work that they perform than their bosses." ⁴ Given that context, managers can't 'out-think' their people. Rather they need to focus on communicating the mission and vision, and improving the system that determines how people work. For example, it's essential to understand the role that compensation plays in motivating knowledge workers, and evolve from individual to shared rewards. Leaders create an environment of mutual influence, so that all knowledge workers can contribute equally. They eliminate any and all processes that cause harmful internal competition. They align performance evaluations to support Lean-Agile principles and values. Leaders provide autonomy, mastery, and purpose to help workers achieve their business, personal, and professional goals.

Implementing SAFe

*"Any successful change requires a translation of ambiguous goals into concrete behaviors. To make a switch, you need to script the critical moves."*⁵

–Dan and Chip, Heath, Switch: How to Change When Change is Hard



Implementing transformative change, such as moving to a new Lean-Agile way of working, is a significant effort for any enterprise.

The Implementation Roadmap (Figure 10) describes a series of twelve steps, or ‘critical moves,’ an enterprise can take to ensure an orderly, reliable, and successful SAFe rollout.

Designed to achieve early wins, as well as sustainable longer-term gains, the roadmap provides a clear path that organizations can follow with confidence.

From training and certification, to identifying value streams and launching ARTs, the roadmap provides in-depth guidance for each step of the way. For certified SAFe Program Consultants (SPCs), there are valuable toolkits and other resources designed to support each critical activity on the roadmap:

- SAFe Executive Workshop toolkit
- SAFe Value Stream Workshop toolkit
- SAFe Implementation Roadmap toolkit
- Essential SAFe toolkit
- Program Increment toolkit
- SAFe LPM Workshop toolkit
- Regulatory and Compliance toolkit
- Role-based Communities of Practice (CoPs)
- Courseware delivery enablement
- Professional development videos and Learning Management System (LMS)

SAFe® Implementation Roadmap

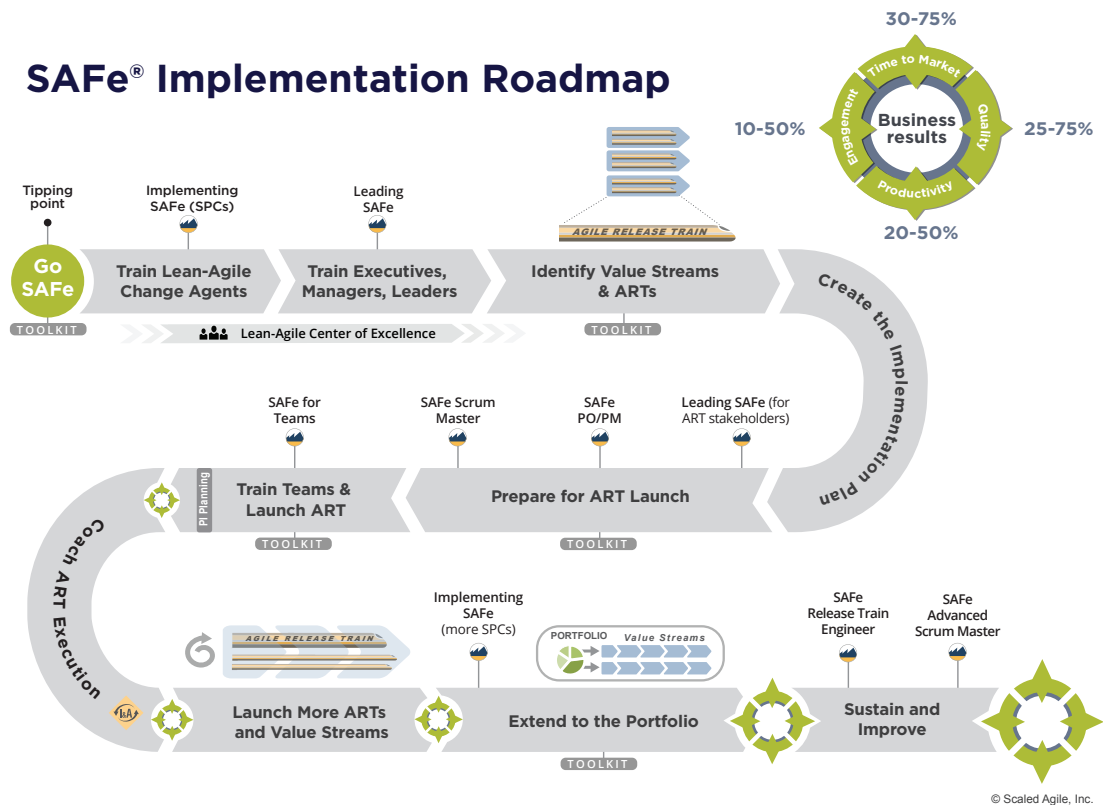


Figure 10. The SAFe Implementation Roadmap

While no two adoptions are identical, and there is rarely a perfectly sequential step-by-step implementation in any enterprise, businesses that get the best results typically follow a path similar to the one shown in the Implementation Roadmap. It includes the following 12 steps, each of which is described in a SAFe website article:

1. Reaching the Tipping Point
2. Train Lean-Agile Change Agents
3. Train Executives, Managers, and Leaders
4. Create a Lean-Agile Center of Excellence (LACE)
5. Identify Value Streams and ARTs
6. Create the Implementation Plan
7. Prepare for ART Launch
8. Train Teams and Launch ARTs
9. Coach ART Execution
10. Launch More ARTs and Value Streams
11. Extend to the Portfolio
12. Sustain and Improve

Summary

This white paper introduced the Scaled Agile Framework (SAFe version 4.5), including its core values, principles, and practices, along with a roadmap for implementation.

SAFe provides guidance and training for scaling Agile development across the portfolio, large solution, program, and team levels. The Framework is flexible and configurable, allowing each organization to adapt it to its own business model.

Its four core values are what make SAFe effective: Alignment, Built-in Quality, Transparency, and Program Execution. SAFe's practices are rooted in nine fundamental principles that have evolved from Agile methods, Lean product development, systems thinking, and observation of successful enterprises.

The House of Lean metaphor is used to describe many of fundamental Lean concepts used in SAFe. The goal of Lean is to deliver maximum value and quality to the customer in the shortest sustainable lead time.

SAFe's configurable Framework provides just enough guidance to meet the needs of a product, service or organization. Enterprises can start simply, and yet have the ability to grow as needs evolve over time. SAFe supports the full range of development environments with four out-the-box configurations:

- **Essential SAFe** is the heart of the Framework and is the simplest starting point for implementation. It's the basic building block for all other SAFe configurations, and describes the most critical elements needed to realize the majority of the Framework's benefits
- **Portfolio SAFe** brings strategy, investment funding, Agile program guidance, and Lean governance to a set of value streams, and provides for coordination of activities and solutions across value streams
- **Large Solution SAFe** is intended for enterprises building large and complex solutions that require the contribution of multiple ARTs and suppliers, but do not require Portfolio-level concerns
- **Full SAFe** meets the needs of the largest enterprises, those that are looking to gain the full benefits of the truly Lean and Agile enterprise

Lean-Agile leaders are essential to the success and adoption of SAFe. Such leaders are lifelong learners and teachers who help teams build better systems through understanding and embracing a Lean-Agile mindset, principles, practices, and systems thinking. SAFe accelerates Lean-Agile transformation with the new Implementation Roadmap, which guides enterprises on their journey.

Learn More

To learn more about SAFe, please visit these websites:

- Read about real world implementations at **scaledagileframework.com/case-studies**
- Browse the Framework at **scaledagileframework.com**
- Find role-based SAFe training and certification at **scaledagile.com**
- View SAFe presentations and videos at **scaledagileframework.com/videos-and-presentations**
- Read SAFe Distilled: Applying the Scaled Agile Framework for Lean Software and Systems Engineering - **bit.ly/SAFeDistilled**
- Read Agile Software Requirements: Lean Requirements Practices for Teams, Programs, and the Enterprise - **bit.ly/AgileSWReq**
- Watch LiveLessons: Leading the Lean Enterprise with the Scaled Agile Framework - **bit.ly/leading4**

Bibliography

1. Gartner, Smarter with Gartner, Why Big Companies Need Lean Startup Techniques, September 28, 2016, September 28, 2016, http://www.gartner.com/smarterwithgartner/why-big-companies-need-lean-startup-techniques/?cm_mmc=social_-_rm_-_gart_-_swg)
2. Kotter, John P. Accelerate: Building Strategic Agility for a Faster-Moving World, 2014.
3. Manifesto for Agile Software Development. <http://www.agilemanifesto.org/>
4. Drucker, Peter F. The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management. Harper Collins, 2001.
5. Heath, Chip; Heath, Dan. Switch: How to Change Things When Change Is Hard. The Crown Publishing Group.

About Scaled Agile, Inc.

Scaled Agile, Inc., the provider of SAFe, helps enterprises build better systems, increase employee engagement, and improve business outcomes through adoption of Lean-Agile principles and practices based on the Scaled Agile Framework® (SAFe®). Scaled Agile supports over 160,000 practitioners of the Framework through training, certification, services, and a global partner network that reaches over 35 countries. Scaled Agile is a contributing member of the Pledge 1% corporate philanthropy and community service movement.

Contact

Scaled Agile, Inc.

5480 Valmont Rd, Suite 100

Boulder CO 80301 USA

+1.303.554.4367

support@scaledagile.com

scaledagile.com



scaledagileframework.com / scaledagile.com

Guiding the Lean Enterprise

Everything needed to plan, prepare, and execute a successful SAFe transformation

SCALED AGILE®

Provider of SAFe

Advancing SAFe
courseware, certification,
and community

scaledagile.com



Freely available knowledge base,
downloads, and resources for the
Lean Enterprise

scaledagileframework.com

SCALED AGILE®

PARTNER NETWORK

Facilitating and accelerating
business results
with SAFe

scaledagile.com/partners

SAFe role-based curriculum

Scaled Agile offers a portfolio of seven professional credentials designed to meet the needs of Lean-Agile professionals. Each certification is supported by world-class courseware and value-added resources that prepare the individual to succeed as a key player in a SAFe enterprise.



EXECUTIVES, MANAGERS,
& STAKEHOLDERS

Leading SAFe



AGILE TEAMS

SAFe For Teams



PRODUCT OWNERS,
PRODUCT MANAGERS

**SAFe Product Owner/
Product Manager**



LEAN-AGILE CHANGE AGENTS
& CONSULTANTS

Implementing SAFe



CORE

SAFe Scrum Master



ADVANCED

**SAFe Advanced
Scrum Master**



RELEASE TRAIN ENGINEER

**SAFe ReleaseTrain
Engineer**

SAFe SCRUM MASTER
CURRICULUM

scaledagile.com/calendar

