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Evolve Your Enterprise Architecture Practice to Support the Scaled Agile Framework

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Initiatives: Digital Business Change Initiatives; Software Engineering Practices

Adoption of agile delivery continues to grow, and more organizations indicate alignment to the SAFe than any other agile scaling framework. To support successful adoption of SAFe, enterprise architecture and technology innovation leaders must evolve their practice to align with the framework.

Additional Perspectives

- Summary Translation: Evolve Your Enterprise Architecture Practice to Support the Scaled Agile Framework
(18 January 2023)

Overview

Key Findings

- Supporting the architect roles in the Scaled Agile Framework (SAFe) will require adjustments to existing architect roles and/or mapping SAFe-defined architect responsibilities to those roles.
- Organizations struggle to deliver value to the customer when they fail to align SAFe agile release trains (ARTs) to value streams.
- Agile teams that ignore architecture practices create architectural misalignment and technical debt.

Recommendations

To support SAFe, enterprise architecture (EA) and technology innovation leaders must:

- Align architecture roles to the enterprise, solution and system architect roles outlined in SAFe to support SAFe transformation.

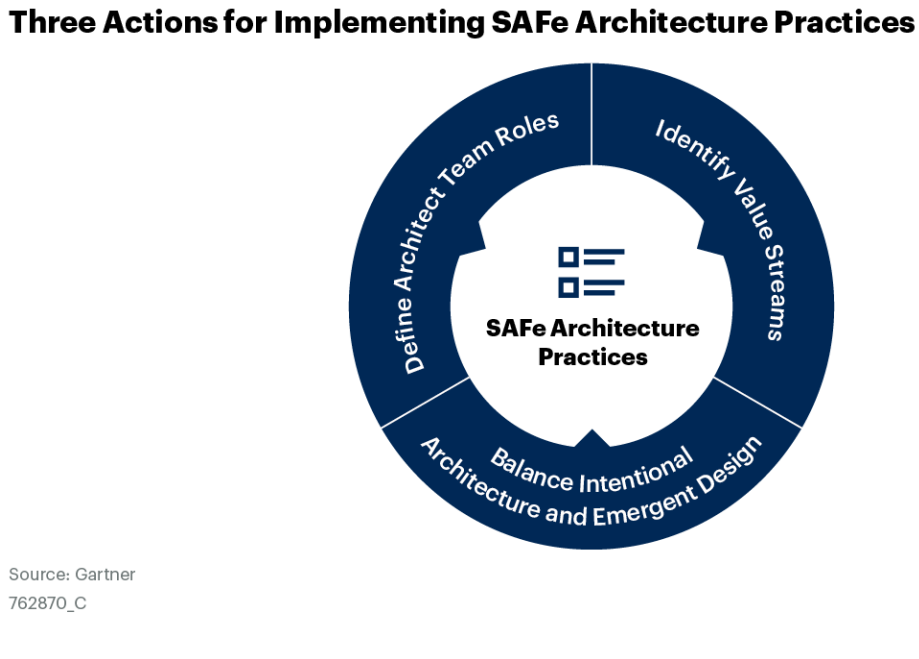
- Ensure that the work of a coordinated ART delivers customer value across multiple business functions and applications. Do so by assigning enterprise architects to serve on the lean agile center of excellence (LACE) and identify the organization's value streams.
- Balance emergent design with intentional architecture to build a resilient enterprise by supporting an architectural runway guided by a minimum viable architecture.

Introduction

Adoption of agile delivery continues to grow, and SAFe is the most used agile scaling framework. In the 15th annual state of agile report, 37% of respondents said they were using SAFe. [1] SAFe's broad appeal is partly due to its support for enterprises of various sizes, from those with only a dozen or so agile teams to large development organizations with thousands of agile team members.

SAFe provides guidance for architecture involvement, including roles and responsibilities and EA. However, architecture teams still struggle to adapt their service model to effectively support SAFe and agile practices in general. It's a subject about which Gartner clients are asking us more questions — Gartner's EA team took almost 26% more inquiries about agile practices from clients in 2021 than in 2020. This research explains three actions (see Figure 1) that EA and technology innovation leaders must take to implement SAFe.

Figure 1. Three Actions for Implementing SAFe Architecture Practices



Many organizations operate with a decentralized architecture function, which aligns well with SAFe. Even so, EA and technology innovation leaders should guide implementation of the SAFe architecture function to ensure consistent implementation of architect roles and practices, including those without direct reporting relationships.

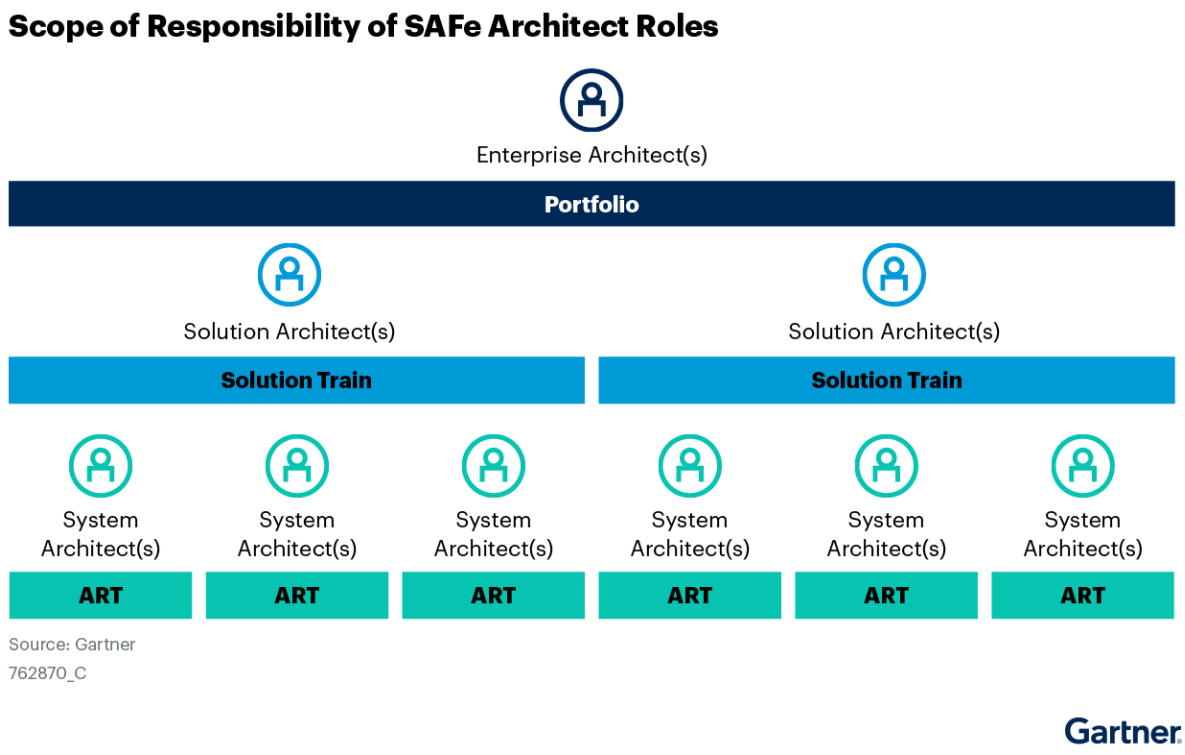
Analysis

Align Architecture Roles to Those Outlined by SAFe

To successfully adopt SAFe, align your organization's architecture roles to the three main architect roles outlined in SAFe's documentation. These three roles form a network of value stream support (see Figure 2):

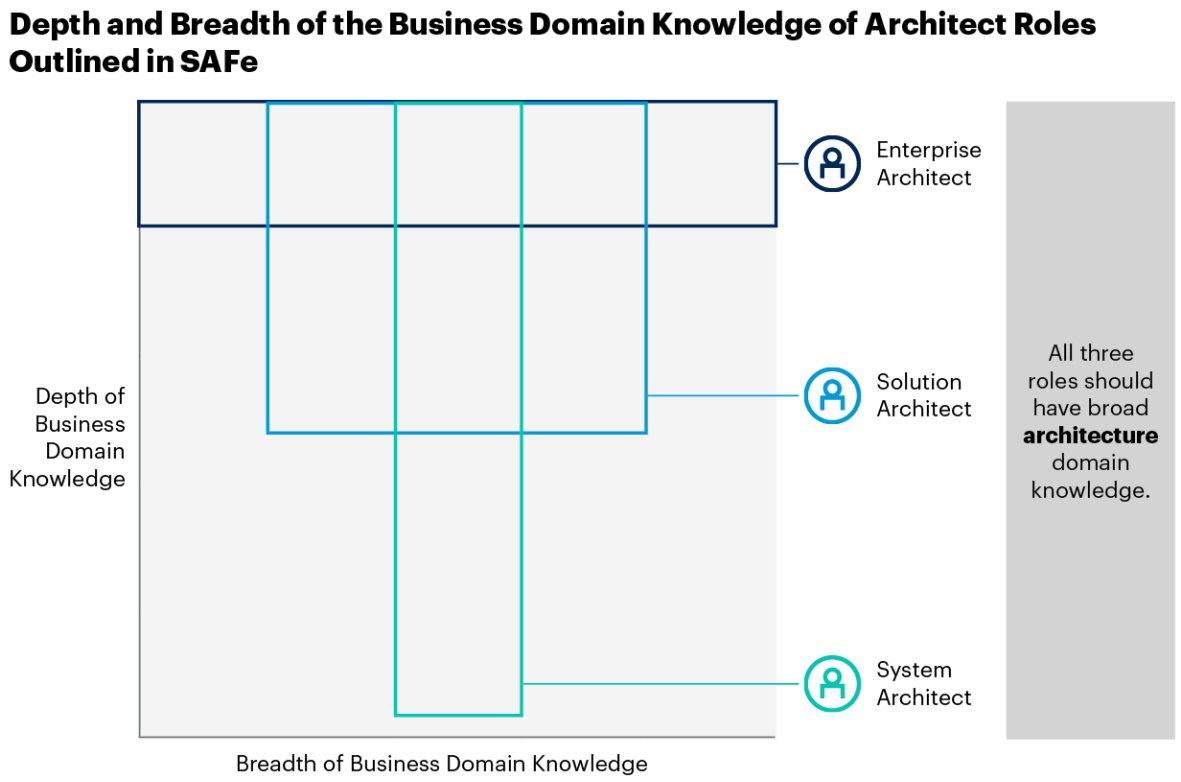
- **The system architect:** This role supports a single system. It aligns to the product architect role emerging in many organizations.
- **The solution architect:** This role supports large solutions composed of multiple systems.
- **The enterprise architect:** This role supports multiple value streams across the enterprise.

Figure 2. Scope of Responsibility of SAFe Architect Roles



Ensure that those appointed to these roles have broad architecture knowledge that spans multiple architecture domains. The roles' depth and breadth of business domain knowledge will vary. At one end of the spectrum, system architects must have more in-depth knowledge of the specific business domains supported by the value stream aligned to their agile release train. An ART is a collection of agile teams working toward a common goal, aligned to a value stream (see Note 1). At the other end, enterprise architects need a moderate depth of knowledge of all business domains (see Figure 3).

Figure 3. Depth and Breadth of the Business Domain Knowledge of Architect Roles Outlined in SAFe



SAFe defines architect responsibility to align to the rest of the team structures and role responsibilities in the framework. Incomplete mapping of SAFe architect role definitions will cause confusion when referencing SAFe training materials and limit the likelihood of a successful implementation.

Use the Appropriate Architect Roles for Your Organization's SAFe Configuration

You may not need to use all three architect roles in SAFe. SAFe offers four configurations, and the specific roles required are different for each model.

- **Essential SAFe** — supports a single ART
- **Large Solution SAFe** — supports a large solution, which consists of multiple ARTs organized into a single solution train
- **Portfolio SAFe** — supports multiple ARTs without large solution support

- **Full SAFe** — the most comprehensive configuration, supporting solution trains and independent ARTs

Ensure that your organization has defined its SAFe configuration, and determine which roles you will need to support your implementation (see Table 1). For example, if your organization is small or isn't implementing SAFe at the enterprise level, Essential SAFe is appropriate. This model supports a single ART. In this situation, your organization will require only the system architect role for SAFe. This doesn't mean that your organization wouldn't also have other architect roles, such as enterprise or domain architects. These are just the minimum roles necessary to support the rest of the structure at this level.

Table 1: The Minimum Architect Roles Your Organization Needs Depends on Your SAFe Configuration

(Enlarged table in Appendix)

Role	Team Alignment	System Alignment	SAFe Configuration: Essential	SAFe Configuration: Large Solution	SAFe Configuration: Portfolio	SAFe Configuration: Full
System architect	One agile release train	One system	X	X	X	X
Solution architect	One solution train	Across systems		X		X
Enterprise architect	Full portfolio	Across value streams			X	X

Source: Gartner (November 2022)

Align the System Architect to an Agile Release Train

Whichever scale of SAFe you're implementing, you'll need at least one system architect. Align one or more system architects to an ART, depending on the nature of the work. Task the system architect to support the ART. The system architect:

- Serves as part of the leadership triad at the product level, working with the product manager and the release train engineer to coordinate the work of the ART.
- Works with the business owners and product managers that guide the ART to support the high-level business/technology alignment of the work that the ART does.
- Supports the architectural runway for the ART that ensures that challenging architecture decisions don't prevent progress. Provides architecture guidance and support to the teams that will be implementing the architecture changes.

System architects should help agile teams internalize architecture skills — this is important because the system architect may not be a dedicated member of a single product team. As the system architect has regular contact with the agile teams of the ART, the system architect can provide coaching in architecture concepts skills.

Appoint a Solution Architect If Developing Large, Complex Solutions

Appoint a solution architect if your organization is developing large, complex solutions. SAFe defines a large solution as one that requires the coordinated effort of more than one ART. In SAFe, one or more solution architects provide support for the work of multiple ARTs, potentially across multiple systems, in a "solution train." The solution architect isn't a mandatory role in SAFe — omit this role if your organization is smaller and mainly supports a collection of smaller, less complex solutions.

Don't have the solution architect work directly with agile teams. Instead, task the solution architect with supporting the work of agile teams through their participation in solution management, which defines the broader context and the use and requirements of the solution. Ensure that the solution architect plays a critical role in helping solution management define the technical scope, requirements and capabilities of the solution and supporting enablers.

Task the solution architect with defining and managing the architectural runway for a solution train. You may find that your system architect can support the architectural runway for the ART to which they are aligned, but some architecture concepts span multiple ARTs and require the leadership of a solution architect.

Ensure that your solution architect provides leadership for system architects. An architecture community of practice is an ideal forum for building relationships and providing guidance. By forming good relationships with system architects, the solution architect can understand and influence the architecture associated with individual ARTs.

Note that many organizations with existing solution architect roles may find that the SAFe definition of solution architect operates at a higher, less technical level than their existing definition.

Assign Enterprise Architects to Oversee Value Delivery Through Architecture

When adopting Portfolio SAFe or Full SAFe, you'll need enterprise architects with responsibilities mapped to the SAFe role definition. Ensure these operate at the highest level, overseeing the enterprise's overall architecture and supporting the full portfolio of systems and solutions. Task them with operating mainly at the strategy level, working with the lean portfolio management function to define the overall technology strategy and roadmap that delivers business value.

Make your SAFe enterprise architects responsible for managing the architectural runway at the enterprise level. Do so to support larger technical enablers by defining epics in the backlog. These may take the form of technical architecture that supports solutions directly or technologies that support the DevOps pipeline.

Ensure enterprise architects share relevant information about the organization's high-level strategic themes with solution and system architects through an architecture community of practice. This will enable solution and system architects to understand the technical and business context of the work they're supporting to ensure the teams they support can deliver the business value aligned with their ART's value stream(s).

Enterprise architects should facilitate and provide leadership for the architecture community of practice in defining a minimum viable architecture (see Note 2) to document the proactive architecture guidance that enables intelligent architecture decision making at agile speed.

Organizations adopting less complex SAFe configurations (Essential or Large Solution SAFe) may still utilize enterprise architects to support higher-level architecture strategy, especially in organizations that adopt SAFe for just a portion of their delivery organization. In this case, enterprise architects do need to align to the role as defined in SAFe, but they should understand the definitions of the SAFe architect roles.

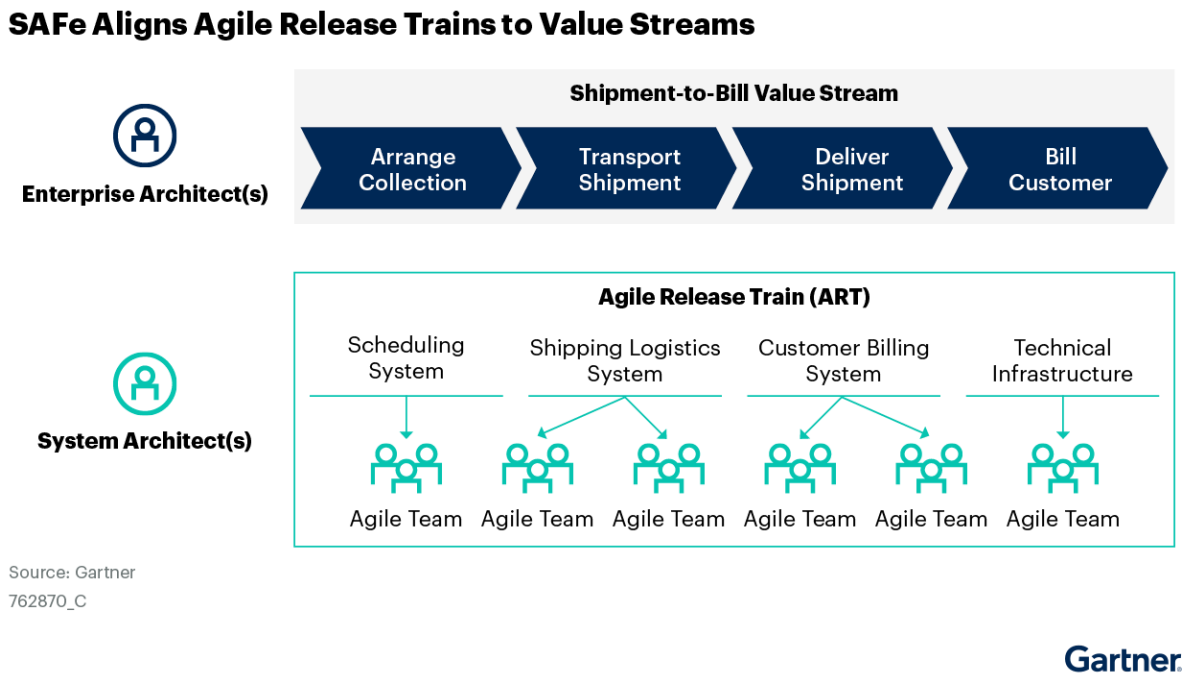
Use Domain Architects When Necessary

SAFe provides little guidance on the use of domain architects roles, such as business architects, technical architects and security architects. But adopting SAFe doesn't mean that you can't use them. Use them as specialized architects at whatever level they are needed: system, solution or enterprise. They should focus on supporting a specific domain when a deeper level of expertise is needed than can be supported by one of the three generalist architect roles. For example, if you need somebody to dig deeply into business architecture to support business strategy, use a business architect. You may also temporarily assign domain architects to a specific ART or Solution Train to help with a novel, architecture-domain-specific challenge where existing enterprise guidance is insufficient.

Identify Existing Architects for Early Involvement in Value Stream Identification

SAFe organizes team structure around value streams, whereas traditional delivery teams often align to business functions or applications. This means that SAFe aligns each ART to one or more value streams (see Figure 4). Small organizations that adopt the Essential SAFe configuration may have only one ART, which supports all of the organization's value streams.

Figure 4. SAFe Aligns Agile Release Trains to Value Streams



SAFe describes two types of value streams:

- Operational value streams that deliver value to the customer (as in Figure 4)
- Development value streams that deliver value to the operational value stream

Aligning ARTs to operational value streams enables the delivery organization to ensure that the work of a coordinated ART delivers customer value across all business functions and applications associated with a product. As a result, a single application, platform or business function may be supported by multiple agile teams spread across multiple ARTs. For example, it may require four agile teams to support a given customer billing system. However, in our shipment-to-bill example in Figure 4, two agile teams that support the customer billing system are integrated with other teams that support the shipping logistics system and the scheduling system.

SAFe outlines a process early in implementation for identifying operational and development value streams and the structure of agile teams and ARTs that support them. If your organization has enterprise and/or business architects that have experience in defining value streams, consider assigning them to your organization's lean agile center of excellence to assist in or even lead this effort. SAFe recommends that this process is led by one or more SAFe program consultants (SPCs), a role that experienced enterprise and business architects may be well-suited for.

Ensure that system and solution architects understand the concept of the value stream(s) that are supported by the ART or solution trains they are assigned to. Use the architecture community of practice to mitigate the fracture of teams that support a single application or business function across multiple ARTs. This will ensure there is architectural alignment despite their assignment to different ARTs.

Balance Emergent Design With Intentional Architecture by Building an Architectural Runway

Some agile implementations give agile teams almost complete autonomy on architecture decisions. This leads to emergent design — meaning, the structure of the product or the solution the team supports becomes clear over time as design decisions are made. But when agile teams at scale have this level of autonomy, it can lead to challenges that are even greater than waiting for centralized architectural approval for a design decision.

So follow SAFe's advice and balance emergent design with intentional architecture — the high-impact architecture decisions that are critical to the success of ART's ability to deliver customer value. Strike this balance by building an architectural runway that defines the enablers that are necessary for an ART to deliver what it's working on.

Plan the Architectural Runway by Documenting Architecture Decisions

Build the architectural runway at the team level by tasking the system architects to work with the agile teams to explicitly identify the architecture decisions that need to be made. For example, you may need to decide:

- What technology should we use to support a given technical capability?
- We have customer data in five different databases — where should we obtain it?
- How should we integrate two application components?
- How should we secure the system?
- What tool should we use for sending email to customers?

Next, decisions to be made should be added to the program backlog. During program increment (PI), planning architecture decisions should be identified for delivery along with all other backlog items as part of the PI. The system architect provides guidance to the members of the ARTs on making those decisions. In this way, architecture decisions serve as conceptual enablers of work to be done in a future PI.

The system architect can identify architecture decisions that carry risk or compliance ramifications as requiring a specific decision in support of intentional architecture. For example, some decisions may have already been made for the team in the organization's minimum viable architecture. For other decisions, the system architect may share guidance on how to make an appropriate decision but leave it to the team to make the decision, in support of emergent design. The system architect may also work with the team to identify new capabilities that will need delivery support from an external team to further support intentional architecture. Architects should use this opportunity to coach agile teams in architecture thinking to further support their work in emergent design.

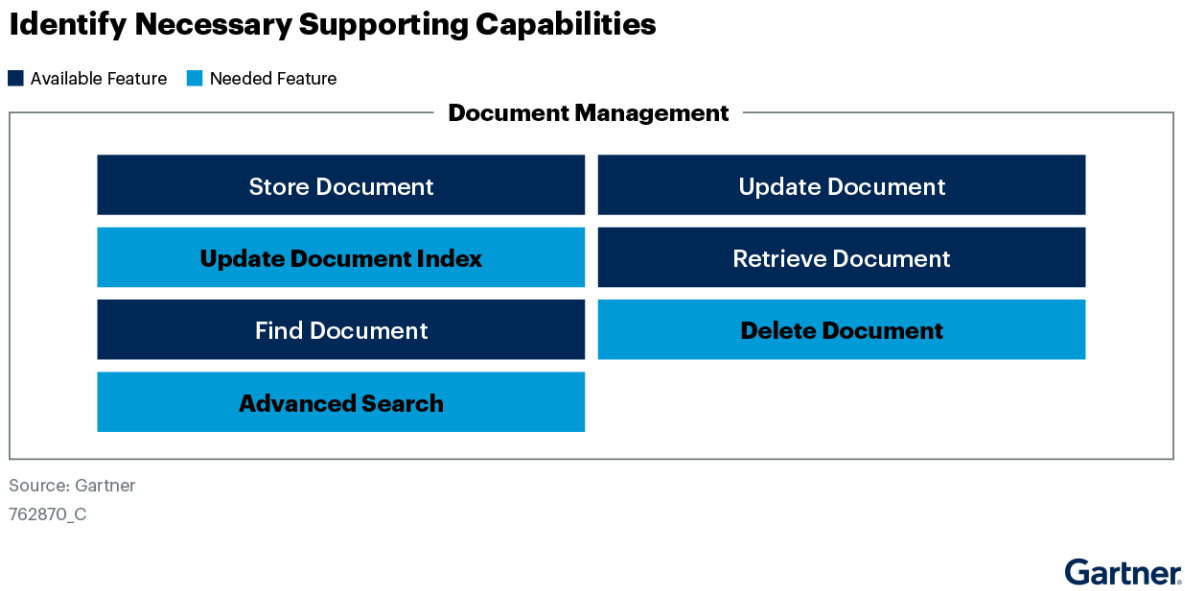
Team-level architecture decision making should be informed by enterprise-level architecture decision making. Enterprise architects should work with the architecture community of practice to develop a minimum viable architecture that contains predefined architecture decisions in the form of standards, design patterns and decision frameworks.

Identify the Needed Capabilities and Features

SAFe describes the architectural runway as the existing code, components and technical infrastructure that systems and solutions are built on. Devise the architectural runway by identifying the capabilities each agile team needs and the features each capability must include in support of the architecture decisions that support product requirements.

For example, in the case of a mobile banking app, a document management capability might be required. This might be needed to provide structure for the storage of PDFs of customer statements so that customers can download them. The document management capability has features such as the ability to store a document, search for a document, find a document and display a document. Figure 5 shows how you might assess needed capabilities and features for a document management system.

Figure 5. Identify Necessary Supporting Capabilities



Once missing capabilities and features have been identified, they can be added to a backlog for implementation as enablers of the work of agile teams. Enterprise or solution architects may identify capabilities or features for the solution or program backlog if they require solution- or program-level coordination for implementation. Following this approach means teams will have enough “runway” to support their work through structured coordination with other teams to do that work.

Architects at all levels should work with teams to identify capabilities that are critical to support systems, solutions or the enterprise. Ask them to design the system or function that will realize the needed capability. Architects should identify needed capabilities as an ongoing process in collaboration with ART members.

Build the Missing Capabilities

Once missing capabilities are identified, they must be implemented. How you do so will depend on the complexity and scope of the missing capability. If the missing capability is small or specific to the ART, it may be implemented by ART team members or a supporting team. For large or shared enterprise capabilities, coordination across ARTs may be necessary, or the enterprise may choose to dedicate an ART to building the enablers during times of significant investment in new technology.

Evidence

[1] 15th Annual State Of Agile Report, Digital.ai.

Note 1: Value Streams

A value stream defines a high-level set of processes that deliver value to a customer. The value stream starts with a triggering event and ends with the accomplishment of a customer goal that delivers value. Value streams are often named after the trigger and the goal (for example, the ship-to-bill value stream). SAFe differentiates between operational value streams that allow the organization to deliver value to a customer and development value streams, which describes the process of implementing technology-enabled solutions that, in turn, deliver customer value.

Note 2: Minimum Viable Architecture

The minimum viable architecture (MVA) is a standardized package of enterprise architecture viewpoints, principles, reference models, patterns and decision frameworks used by product/fusion teams to ensure the timely and compliant development, and iteration, of minimum viable products. The MVA is developed by the architecture community of practice and provides governance on product-level architecture decision making.

Recommended by the Authors

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Enterprise architect	Full portfolio	Across value streams			X	X

Source: Gartner (November 2022)

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