

CGI RCDA:

A responsive,
collaborative approach
to digital architecture
for federal agencies

CGI



Contents

- 4 [The need for a more adaptive architecture](#)
- 5 [Mission agility and architecture](#)
- 7 [Successful architecture in a digital paradigm](#)
- 9 [RCDA in a cloud-based world](#)
- 10 [Balanced architecture](#)
- 13 [Successful agile architecture](#)
- 17 [Benefits for federal digital transformation](#)
- 19 [Putting RCDA to work for your agency](#)

Driving digital transformation across federal agencies involves more than just the deployment of new information technology systems.

Those who have worked in the federal landscape for a while remember when agencies and their industry partners marshaled top-down, gate-controlled governance models to manage their IT. Today, we increasingly rely on collaboration rather than control, and, as a result, have become more responsive to mission and technology changes.

This fundamental change in systems management is necessary to achieve agility, and it has had a profound impact on the digital architecture discipline. Responsive, Collaborative Digital Architecture (RCDA) is CGI's digital architecture approach. It aligns closely with this more agile way of working, transforming the architecture function of organizations across the federal landscape as well as the private sector.



The need for a more adaptive architecture

Historically, agencies took on changes less quickly and less frequently. Then, organizations could predict and plan their operations with reasonable accuracy. Upfront planning and architecture design were the norm for building a stable foundation.

Today, change is less predictable and more frequent. Missions demand greater agility. As a result, we need a different approach to architecture—one that is responsive in a world characterized by volatility, uncertainty, complexity and ambiguity. Missions require an architectural foundation that is not a rigidly designed upfront, but a continuously adaptive landing zone for innovation and new business features.

As technology enables increased mission agility and responsiveness, it is also creating a more dynamic marketplace. Federal organizations must change continuously at speed to become

more agile and innovative. The 2023 CGI Voice of Our Clients confirms that organizations recognize the need for agile transformation. However, challenges persist. Most organizations cite a substantial gap between strategy and agile delivery.

While 43% of federal IT and business leaders say they have a digital strategy, only 13% are producing results at the enterprise level.



The 2023 CGI Voice of Our Clients confirms that US federal agency technology and business leaders recognize the need for agile transformation. However, challenges still remain.

13%

of federal leaders say their digital strategies are producing results

76%

say legacy systems are very challenging or somewhat challenging

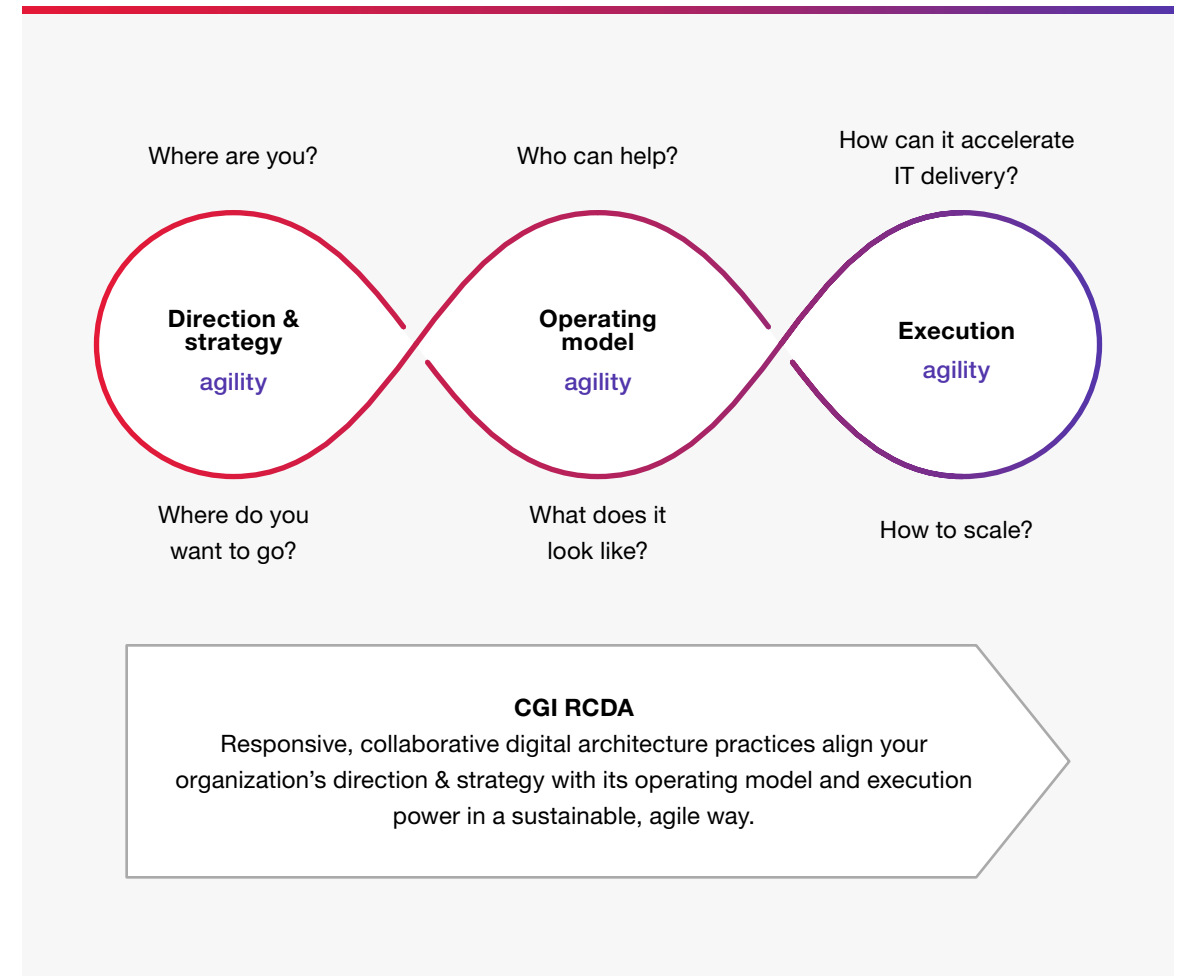
59%

cite culture and change management as the top constraint to achieving mission priorities

Mission agility and architecture

With a heritage of over 45 years supporting federal agencies, CGI understands federal organizations' mission requirements, technology landscape, contracting ecosystem and constraints (budgetary and beyond). This experience shows us the importance of responsiveness and balance when approaching design principles. In this paper, we'll explore CGI's agile architecture approach—Responsive, Collaborative Digital Architecture (RCDA)—and how it can benefit federal agencies as they seek to transform to support the mission.

Business agility and architecture often seem to be opposing forces. A heavy, upfront design process moves too slowly to cope with the speed of change, and architects often have a reputation of being disconnected from the reality of agile teams.



As many federal organizations have experienced, the lack of architectural coherence in a digital landscape can severely impact agility, ability to deliver on the mission and to stay within budget limits.

Over time, we have seen a significant shift in attitudes toward the architect's role. Many agencies prefer to allocate the responsibility for major design decisions to teams rather than to a name architect, who would take on the role of pathfinder, master builder, ninja developer or steward.

In such cases, the role of an architect may have disappeared, but the architecture function still exists as a set of collaborative responsibilities allocated to other roles or teams.



Successful architecture in a digital paradigm

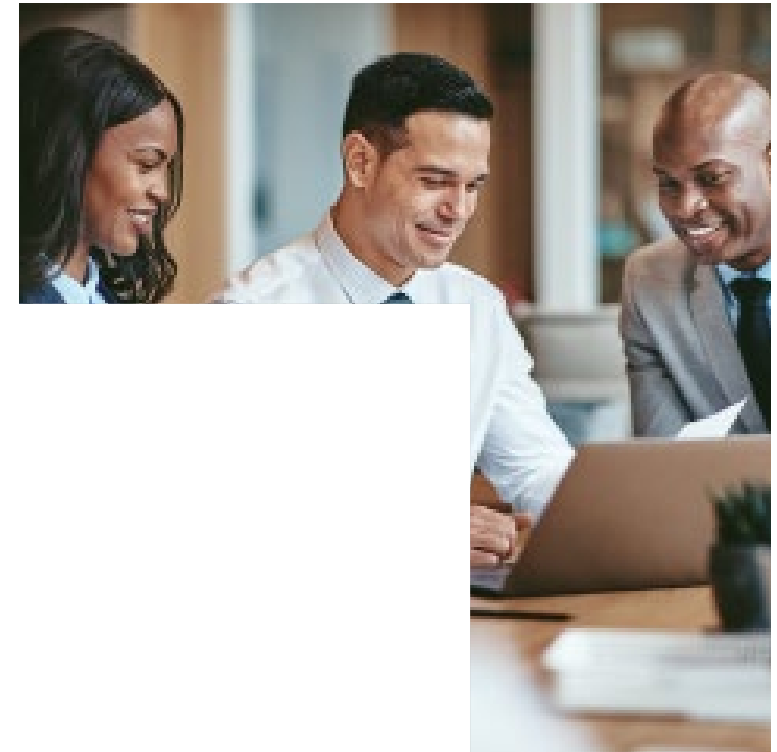
Effective design is key to a successful digital strategy: a strategy in which design decisions are made by a team that continuously learns from new insights generated in an ever-evolving IT landscape, rather than a centralized architecture board that would determine everything at the start of the project.

Our experience with successful agile architecture teams has led to the defining of five responsibilities that lie at the heart of RCDA.

Architecture responsibilities

Research shows that applying architecture practices significantly improves the quality of software solutions, along with the risk and cost control of their delivery. If federal organizations want to reap these benefits without having a named architect, they need to consider the maturity of the architecture function on an organizational level. In RCDA, we see this function as a set of responsibilities: understanding, modeling, deciding, validating and delivering.

This model helps organizations assess how well they are doing in terms of their architecture and where they can improve—with or without named architects. We have fine-tuned this maturity model by applying it in practice for years, and it has proven to help organizations recognize their weak spots and find ways to improve.



Fulfilling the five responsibilities in isolation is not enough: they should be fulfilled in a coherent way:

- **Understanding** context, the basis of all good architecture
- **Deciding on design**, based on the specific context and informed by models
- **Delivering** the architecture in operation, while maintaining the architectural runway and keeping architecture debt under control.
- **Validating** the architecture to make sure stakeholder needs are fulfilled
- **Modeling** to create structures that represent abstractions in order to analyze solutions and deal with their complexity

The five responsibilities of the architecture function



RCDA in a cloud-based world

Federal agencies have embraced utilization of cloud services including platform as a service (PaaS) and software as a service (SaaS) offerings.

Cloud services drive continuous modernization, delivering new features and updating existing system behaviors in response to the changing business landscape and advancements in security posture. As such, architects must be aware of cloud service roadmaps for their implementations to be both current and stable.

Continuous modernization of cloud services is included in the deciding and delivery responsibilities of RCDA. RCDA's tenet of agile architecture performed as a team is highly supportive of continuous modernization of cloud services, thus helping federal implementations remain viable.

The 2023 CGI Voice of Our Clients shows that the adoption of cloud is top of mind for federal leaders, with IT modernization and cloud cited as the top industry trend impacting federal agencies.

Looking ahead, agencies plan to accelerate modernization and cloud migration leveraging IaaS, PaaS, and SaaS. Leaders continue to focus on modernization and adoption of cloud-based services as a means to achieve it.

| | Current state | Next 2 years |
|--|---------------|--------------|
| Modernized >20% of portfolio | 36% | 45% |
| Migrated >20% portfolio to a cloud service | 9% | 36% |
| Migrated >20% of portfolio to a SaaS provider | 18% | 27% |

Balanced architecture

The best architectures result from paying proper attention to all five responsibilities.

However, this can be challenging due to factors including cultural pressures, dogmas, assumptions and misconceptions. Many organizations ignore some of the responsibilities, resulting in a flawed architecture function.

Paying proper attention to all five responsibilities, however, does not mean always paying equal attention. Depending on the context, modeling may require more attention than decision-making, and validation may be more critical in some situations than in others.

When talking to teams, architects and stakeholders in different organizations, we noticed some interesting patterns in the way they took up these responsibilities. We created caricatures to highlight the difference among patterns and called them the Waterfall Wasteland and the Agile Outback. Please note that these are, indeed, caricatures with exaggerated features. While these caricatures are intentionally amusing, they can be useful in making a point.

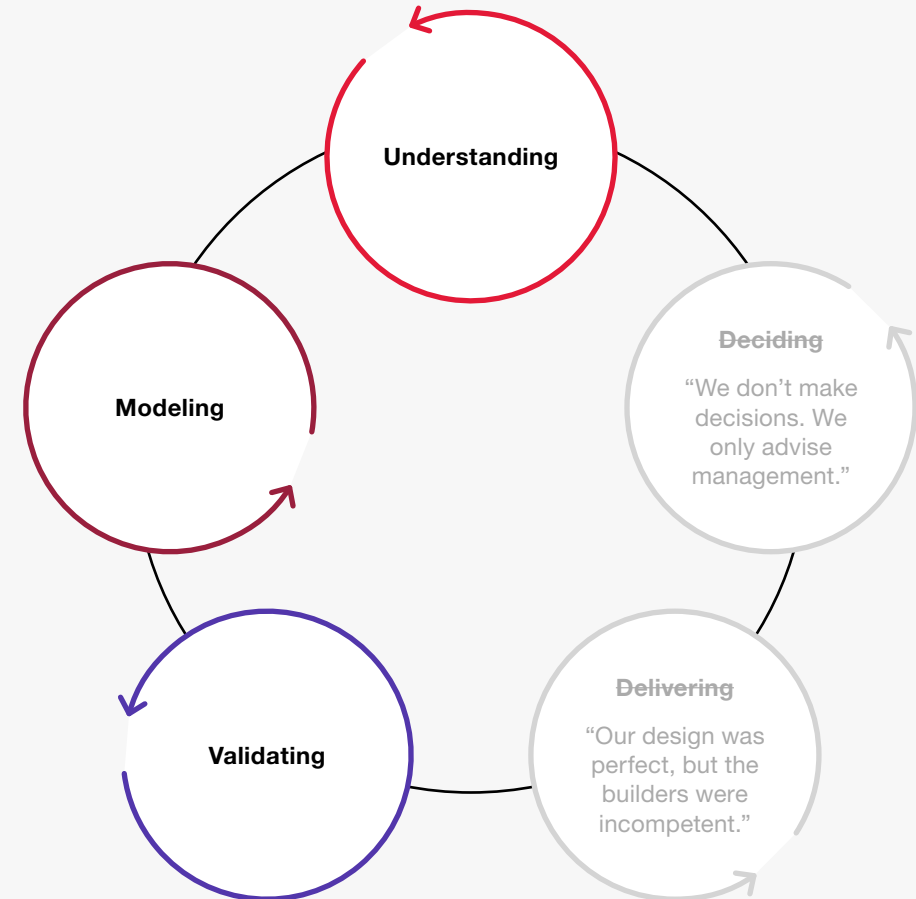


Caricature one: Waterfall Wasteland

In the Waterfall Wasteland, architects sometimes live in an ivory tower. They ignore decision-making and delivery responsibilities, considering them someone else's problem. They have a clear job description—to create perfect models and validate them against stakeholder needs. If the resulting solution is unsuccessful, that lies with the failure of others.

Organizations in the Waterfall Wasteland typically have trouble adapting to change. The carefully modeled and validated designs have a limited shelf life and are hard to adapt to new insights gained during delivery. There is a long feedback cycle between architecture and delivery. The often-hefty architecture documents are not in sync with reality.

Figure 2 Waterfall Wasteland

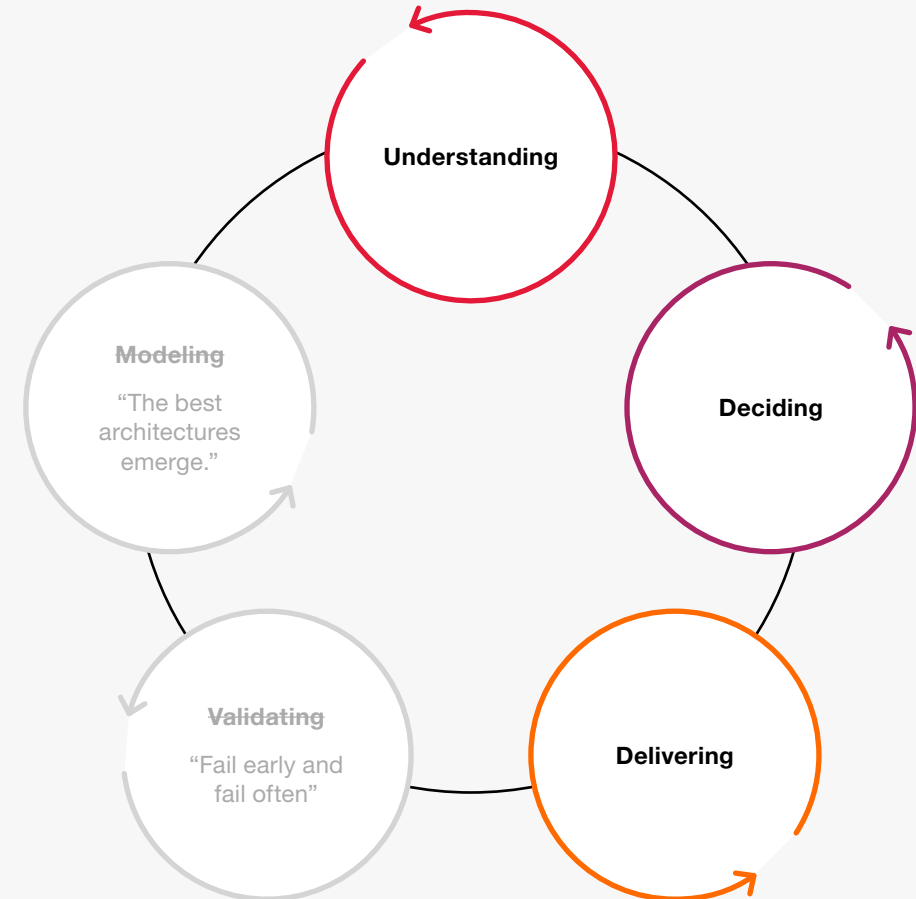


Caricature two: Agile Outback

In the Agile Outback, teams usually do not have architects. They avoid modeling since, according to the Agile Manifesto, “The best architectures...emerge from self-organizing teams.” This could be misinterpreted to mean that modeling is unnecessary or even counterproductive. Teams in the Agile Outback rarely reason about or validate designs using models. Instead, they rely on quick feedback from failures.

Organizations in the Agile Outback produce a lot of direct value at high velocity in the beginning of a product’s life cycle, but in our experience, they tend to have problems sustaining that velocity. They often must revisit decisions and rework due to a lack of forethought. Some architectural decisions are not easy to refactor, and a few hours spent generating and evaluating alternatives are well worth it.

Figure 3 The Agile Outback



¹ <http://agilemanifesto.org>

Successful agile architecture

How can federal organizations avoid falling into the extremes of the Agile Outback or the Waterfall Wasteland?

Teams need to find the right balance via an adaptive architecture. Over the years, CGI's architects have developed and extensively validated four key principles that help organizations become effective at agile architecture:

- 1 Shorten your architectural feedback loop
- 2 Focus on business/mission impact
- 3 Achieve "just enough" anticipation
- 4 Architect as a team



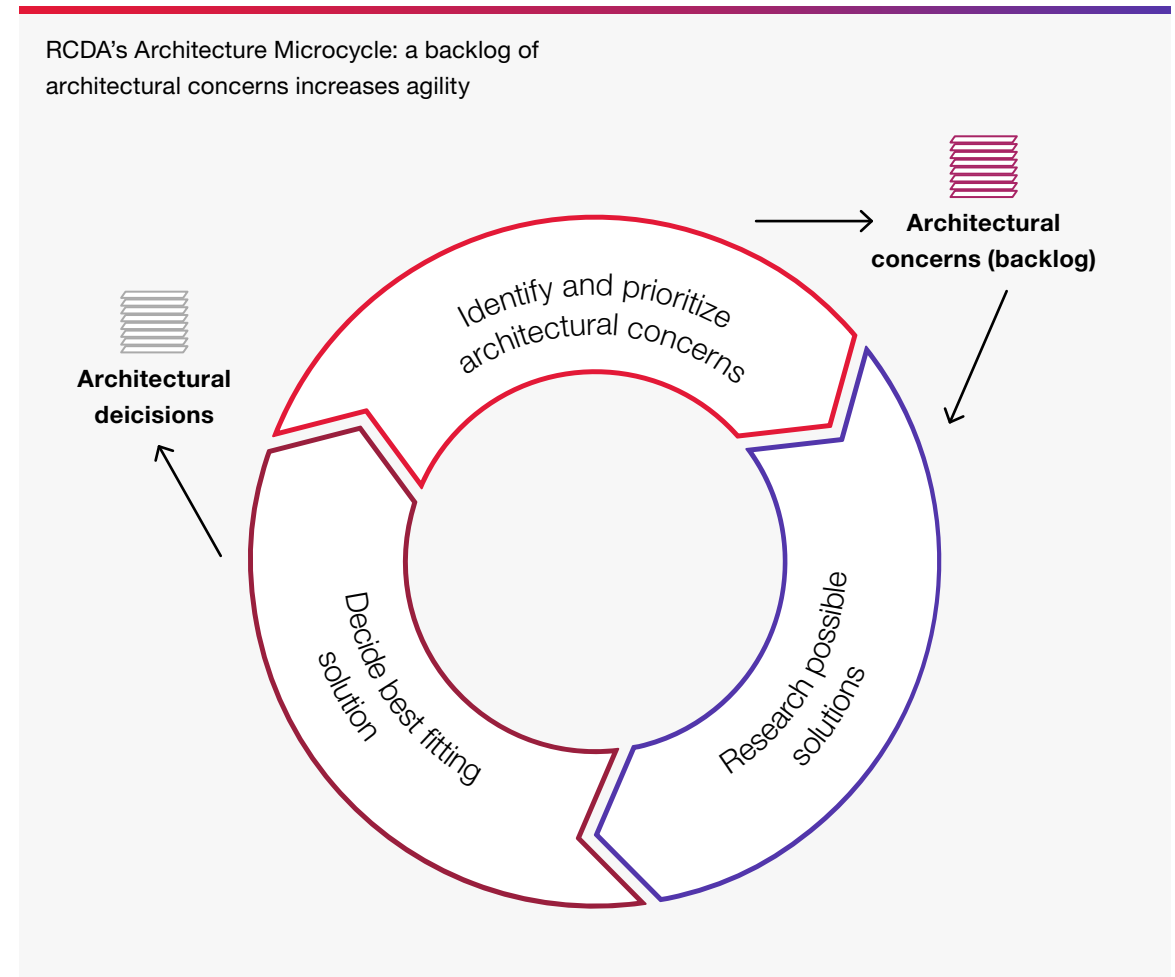
Shorten your architectural feedback loop

Perhaps the most vital lesson architects can learn from the agile mindset is the importance of short feedback loops. The quicker we receive feedback on an architecture, the faster we learn about its effect within a specific solution text. Architecture is a matter of reducing uncertainty by gathering knowledge and making decisions, and a shorter architecture feedback loop speeds up that uncertainty reduction, leading to better architectures. On top of this, shorter loops lead to shorter reaction times when things change, which increases agility.

An agile architecture is not a big upfront design, but rather a continuous stream of architectural decisions, made step by step.

The secret of a short architectural feedback loop is to change our view of the main deliverable of the work. This helps to control the uncertainties and risks surrounding complex digital solutions. How much architecture to build is determined not by agile dogmas like “You Aren’t Gonna Need It” (YAGNI), but by economic trade-offs, considering the real value of architecture in context.

The key change we need to make is to no longer view architecture as a design document for project but as a continuous decision-making process for gaining control over costs, risks and uncertainties with a short feedback loop. Only then can architecture deliver the value add and flexibility required by the modern digital world.



Focus on business impact

A key benefit of using a short feedback cycle in handling a backlog of architectural concerns is that we can quickly reprioritize the architecture work when circumstances change. Most of our attention should focus on concerns

that have the highest business impact. The impact can consist of enabling new business/mission value and opportunities, but, very often, it is about risk and cost control.

Achieve “just enough” anticipation

How do we determine the right amount of architecture? According to the first principle, architecture is a flow of architectural decisions made as part of a short feedback loop. This flow should be ahead of solution development and delivery with “just enough” anticipation.

The Scaled Agile Framework® uses the metaphor of a runway that is continuously being extended while in operation, so that it is always just long enough to accommodate the new planes that are anticipated (the planes in the metaphor representing upcoming solution requirements).

The new, bigger planes can land only after the runway’s extension. Dependency analysis determines which runway extensions are required to land which planes.

Sometimes you may temporarily extend the runway with an inferior material for the sake of speed. This represents technical debt that you will need to repay (repave) at some point to prevent accidents. You should base all decisions (when to extend or repave the runway) on sound economic reasoning.

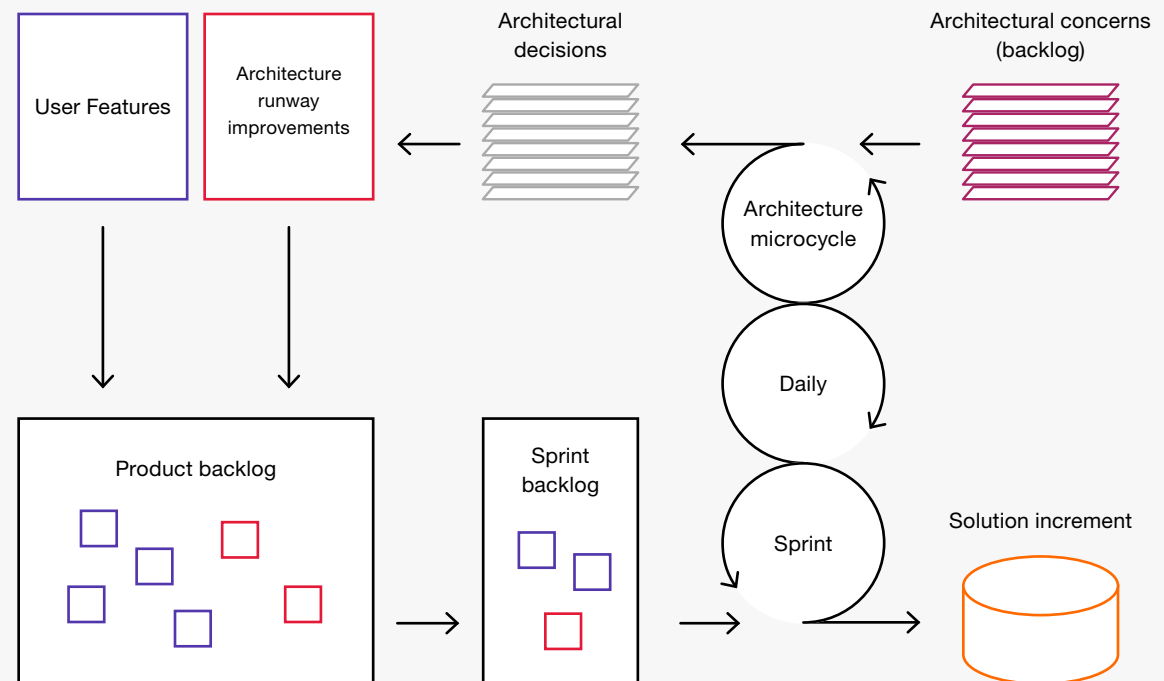


Architect as a team

Depending on the agency or department governance model and appetite for central coordination, federal digital leaders may have dedicated architecture roles at the CIO level or more distributed architecture functions within offices or programs. Organizations apply RCDA practices by embedding the principles of agile architecture into the ways of working, irrespective of whether they have named architects, architecture owners on teams or crowdsourced architectural decisions.

A key consideration is that the consequences of architectural decisions affect the delivery (agile or DevSecOps) teams, not as commands from a higher authority but as user and enabler stories that extend the architecture runway with “just enough” anticipation.

Aligning the Architecture Microcycle with the scrum cycle to facilitate collective architectural decision-making



Benefits for federal digital transformation

RCDA is an approach that has built an impressive track record in a relatively short period of time, helping large commercial and public sector organizations modernize their architectures. Its benefits include:

- A modern view of architectural design that complements the speed and flexibility of agile development and helps organizations find the balance between long-term predictability and quick business/mission value by enabling “just enough” anticipation.
- Support for teams in gaining control of risks and finding a sustainable pace that prevents excessive build-up of technical debt.
- Creation of an environment where architects base design choices on a clear and agreed upon understanding of the business context, using objective and economically oriented tradeoffs rather than hypes or personal preferences. RCDA stimulates such an environment by introducing practices that objectify architectural decisions and priorities and putting them in the appropriate business/mission context.





- Enhancement of the quality of solutions. RCDA practices contain guidance for early and effective evaluation of a solution's quality attributes and other key requirements.

- Transparency in solution costing structures. RCDA provides traceability from architectural requirements to the costing model.

RCDA contains 13 practices to improve architecture effectiveness. These practices received international recognition when the Carnegie Mellon University's Software Engineering Institute conferred its prestigious Linda Northrop Award to CGI thought leader Eltjo Poort for his work on RCDA in 2016.

Open Group

Recognized in the certified architect program

13

Proven practices

Linda Northrop Award

Software Engineering Institute

Putting RCDA to work for your agency



Architecture is all about design decisions that have the highest impact on digital solutions. RCDA is an architecture approach developed to close the gap between architecture and the agile mindset. It combines the extensive scope of enterprise architecture with the pragmatism and agility of modern software development methods.

RCDA offers especially effective guidance in translating architectural concerns and priorities into business terms like cost, risk and value, enabling architects and teams to communicate more effectively with business stakeholders. RCDA practices are based on a powerful set of agile principles and accompanied by extensive guidance on how to apply the approach in various frequently occurring contexts.

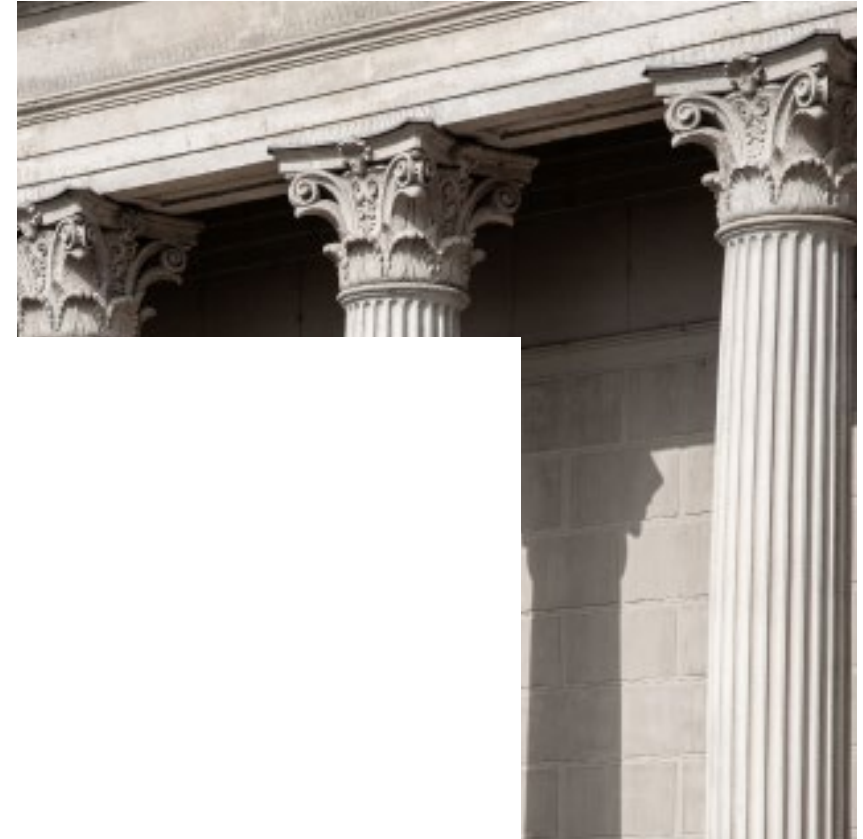
Architecture is an essential discipline for safeguarding the quality and sustainability of modern, complex digital government solutions. Architecture does not need to obstruct agility. Rather, RCDA offers a proven architecture approach that is well suited to today's need for a more agile government.

Insights you can act on

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. We provide comprehensive, scalable and sustainable IT and business consulting services that are informed globally and delivered locally.

CGI works with federal agencies to provide insights-driven solutions for civilian, defense, space and intelligence, federal health services and national security missions. Our teams have deep roots in the public sector, bringing a diverse range of capabilities and experiences, and a rich historical understanding of our customers' challenges and operational requirements. We operate at the intersection of bold thinking and disciplined execution to rapidly achieve mission outcomes at scale.

cgi.com/federal



CGI