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Digital Architecture

The Spark for Transformation

Gar Mac Críosta
Guest Editor

CUTTER Business Technology Journal

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Opening Statement

by Gar Mac Críosta

We are in the midst of a memetic war; the stories that win will determine the course we take. These stories have lives, and as the stories attract interest, they acquire power. Hype adds heat to these stories — until they become *superhyped*. The release cadence of the major technology players, which has gone from a sedate multi-annual cycle to months, to weeks, and even to minutes, is driving this hype — and superhype — that causes stories to gain momentum. These stories become runaway epistemologies that collapse with increasing rapidity. Yet, in this fast-moving world, we cling to our beliefs even as we see those beliefs being shattered by reality.

The promise of the big and the complicated framework, method, or architecture is our safety. Conformance to norms leads to acceptability in our modern techno-geocentricity: *we are the center, we hold the center, nothing else matters, we know all that needs to be known*. But are we at an inflection point? On the one hand, we have a world dominated by increasingly complicated frameworks detailing each and every aspect of a "transformation," be it agile, digital, or other, along with associated architectures. On the other hand, we can contrast this framework approach with alternatives emerging from complex adaptive systems and complexity science. Unfortunately, those alternatives come with the cognitive load associated with uncertainty and ambiguity, and it is this friction that maintains the status quo. It's far easier to stay somewhere complicated but knowable rather than struggle forever with the uncomfortableness of uncertainty.[1]

My framing of this issue of *Cutter Business Technology Journal* (*CBTJ*) is that digital architecture is the architecture that enables a digital business to effectively extract value from an advantage in a market that exists as a result of digital technologies by directly creating the opportunity or amplifying an existing advantage.

The dynamics of digital business are fundamentally different than the dynamics of traditional business; therefore, digital architectures must enable, address, and support the needs of digital business. The business need that digital architecture fulfills is to enable the enterprise to enter new arenas, establish an advantage, extract value from that advantage, and exit once that advantage no longer exists. We can compare this type of fulfillment to surfing a wave: getting all the energy from the barrel, and exiting before being crushed on the reef.

Digital architecture is a nebulous topic; it means everything, and it means nothing. The term describes any one or more of scaffolding, model, structure, process, product, and the characteristics of stability, resilience, adaptability, and agility.

The business need that digital architecture fulfills is to enable the enterprise to enter new arenas, establish an advantage, extract value from that advantage, and exit once that advantage no longer exists.

As a practicing architect, I have existential moments when I hear the words I'm speaking and cringe, or I see the expressions on the faces of others as we tell each other ever more fanciful stories loaded with jargon to baffle the "outsider," lulling our naive selves into believing we are certain of what we are doing. At times like these, I comfort myself with advice passed down from comedian Ricky Gervais: "No one else knows what they're doing either."[2] Indeed, I have often sat in meetings where a generation of technologists have laughed at a previous generation's decisions, doing so without course or perspective. At those times, I wonder what future generations will find amusing about this generation. I full-heartedly believe they will laugh at the overly complicated technology world we have created.

There appears to be a new school emerging; one that embraces the complex and the uncertain. Some of our authors in this issue of *CBTJ* would certainly identify with that school. Proponents of this new school are

building in areas of common concern — systemic resilience, critical thinking, and mental models — and are introducing variety, design tooling, and governance models. Each is attacking a systemic issue via experimentation, letting reality be the judge of what's useful and what should survive.

The road is dangerous and not for the faint of heart, but if you are fainthearted, remember to favor action over inaction, enjoy the safety of the herd, and beware being crushed by collapsing stories.

In This Issue

In our first article, Barry O'Reilly calls on us to rise above the hype, myth, and storytelling that have created the concept we call "digital architecture." O'Reilly proposes that the concept is part of an ongoing storytelling process that we as humans use to understand and navigate our world; digital architecture isn't a real thing, it's just part of a story to help us find our path. O'Reilly cautions against adherence to dogma and the slavish belief that copy-and-paste frameworks can solve our problems. He counsels that we should recognize that we are in an infinitely repeating cycle of hype. Reality inevitably tears back the curtains to reveal what works; that is, proven heuristics that solve real problems. O'Reilly challenges us to become the scientist, building theory and applying reason and critical thinking at first hand. The alternative is to continue surfing the hype waves and wiping out each time the story fails to fulfill its promise. The road O'Reilly proposes is dangerous and not for the faint of heart, but if you are fainthearted, remember to favor action over inaction, enjoy the safety of the herd, and beware being crushed by collapsing stories.

Upcoming Topics

Blockchain I: New Industry Trends, Developments, Use Cases
Karolina Marzantowicz

Data Architecture: Not Just a Technology Roadmap
Martijn ten Napel

Blockchain II
Karolina Marzantowicz

The next three articles explore different, interrelated aspects that solve specific challenges. First, John Murphy advocates for the use of business capability modeling as a means of describing what's most important. Simon Field then introduces the Solution Architecture Review Method (SARM), a technique that drives to the heart of introducing variety (via alternatives) into the design of an architecture. Next, Mark Greville proposes a way of accelerating change through the decentralization of decision making and the use of a technique he calls "public self-governance."

In his article, Murphy proposes some practical steps to resolve the communication difficulties that still plague transformation programs. He proposes business capability modeling as a way to create shared understanding and bridge the worlds of business, process, and technology information encapsulated in business capabilities. The building of the model reveals unseen dependencies and creates a canvas to reimagine the nature of things. A key benefit of this approach is separating the *what* from the *how*; this abstraction creates the space for optionality as an organization explores using new and ever-faster emerging technologies. Once constructed, the model can be used for a variety of purposes to bring clarity to the nebulous areas of investment planning and digital transformation. The challenge with this model, however, has always been getting started. Murphy provides some high-level guidelines on where and how to begin, including the scrap-heap challenge of information discovery, tips on getting buy-in, the use of language, a focus on outcomes, and alignment with goals. The result of this approach is to create a *lingua franca*, a durable model that can be shared and used by all as a means of driving clarity.

Next, Field integrates business capability modeling into SARM, a formal method for developing and evaluating competing designs for solution architectures. Field shows how this technique can be used to build competing designs for "digital services." SARM focuses on architecturally significant requirements, as these are most likely to be difficult (and expensive) to change once enshrined in the architecture. The framework uses business capabilities as a way of expressing functional suitability, which introduces a layer of

abstraction difficult to achieve through other means. The model supports tradeoff analysis within and across competing designs. This risk-based approach to attribute evaluation makes for easier comparison, dependency analysis, tradeoff analysis, and decision making. Field bases his example on work he is undertaking for Admiral Insurance in the UK. The focus on developing competing designs introduces an intentional step that increases variety where most existing methods tend toward preemptively converging on a design after no or only superficial evaluation of alternatives.

In his article, Greville proposes an alternative to the command-and-control theater that is governance (particularly technology governance) in most large organizations. Greville offers to help the reader accelerate change, distribute decisions, and self-govern transparently. He offers examples of business-model-assassinating decisions from previous generations and lays out a path toward a scalable, sustainable, useful governance approach that avoids the bureaucracy typically associated with governance. Allowing the right person to make the right decision in the appropriate context is the key. Greville introduces the concept of Type 1 and Type 2 decisions, with guidance on how to distinguish Type 1 from Type 2. The article explores decision dynamics (i.e., decision reversibility, ROI on the decision, decision scope). Finally, Greville proposes the method of public self-governance to break up complex governance structures, eliminate governance body queues, accelerate change, and drive accountability and transparency via a modern, decentralized approach.

Our final two articles focus on other aspects of digital architecture. Dinesh Kumar introduces the Digital Capability Maturity Framework (DigitalCMF), an approach to understanding your digital maturity, and Kaine Ugwu offers tips, techniques, and pointers to building effective digital architectures.

Kumar comes at digital architecture from the perspective of business capability maturity: the readiness of any organization is a function of the maturity of a set of digital business capabilities. Kumar goes on to describe the DigitalCMF, including the business capability domains, the digital business capabilities, and various assessments and tools within the framework. The approach goes deeper to look at readiness across processes, people, and technology. The author outlines a roadmap using capability engineering as a way forward to assist organizations on the journey to a digital future.

Ugwu closes out this issue with a series of tips, tricks, and techniques to approach the development of a digital architecture. He offers some clear guidance on putting the experience of customers at the heart of the architecture, positioning digital as a strategic approach to reimagining business models and infusing the organization with agility. Ugwu proposes a pragmatic use of industry reference models and pinpoints the key areas that need to be addressed to kickstart this process: architecture principles, C-suite engagement, design thinking, customer centricity, and emergent innovation.

No matter where you are in your journey or what your stance is on digital architecture (is it real or just story?), this issue will challenge your worldview and, in the words of contributor O'Reilly, challenge each of us "to work as the scientist rather than the consumer of the scientist's work," building and testing our own theories in the laboratory of our own experience. Whether you leave your reading of this issue with a feeling of foreboding and anger, resistance, joy, happiness, and/or excitement, let me leave you with one last quote from another comedian, Joe Rogan: "If you ever start taking things too seriously, just remember that we are talking monkeys on an organic spaceship flying through the universe." The journey we are on needs ideas to be rigorously tested at every turn, because failing that we are doomed to repeat the sins of the past.

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[1]de Berker, Archy O., et al. "Computations of Uncertainty Mediate Acute Stress Responses in Humans." *Nature Communications*, Issue 7, No. 10996, 29 March 2016.

[2]Gervais once tweeted that this was the best bit of advice he ever received.

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A RETURN TO STORYTELLING

Why There's Probably No Such Thing as Digital Architecture

by Barry O'Reilly

The journey from chaos in ignorance to best practice is one we have traveled many times as architects. We will continue to travel this road many more times as technology and society change and influence each other in ever-faster cycles. With each journey, we rush to find the easiest way to simplify and codify our work for mass consumption. Given that we work in complex, unique contexts, these journeys are not described in scientific terms, but instead in terms of narrative, or stories. Professor Emeritus Walter Fisher described this as the "narrative paradigm,"[1] a theory that states that humans communicate ideas through narratives and live in a world of stories, and we must choose which of these stories to believe. These stories progress over time as they are exposed to new evidence and are eventually subsumed by the next wave of thinking. Keeping up with all this evolution is exhausting, and we seem to have fallen into a trap of never-ending hype and hotly discussed abstract ideas that deliver little value. One of these ideas is digital architecture. This article looks at how we as architects approach waves of new technology and the accompanying ideas, along with how we can learn to appreciate and manage trends as an aspect of how people cope with change and complexity.

This is an opinion piece, a story!

Famed biologist Ludwik Fleck once described the idea of a "thought collective,"[2] referring to the way ideas bounce around between researchers, becoming ever more refined and eventually synthesizing toward a new idea. It is an idealistic view of how we approach things, given that it assumes researchers' methods to be both rational and empirical. In the fields of business and architecture, however, rationality and empiricism are not enforced, and the profit-driven thought collectives that drive new ideas in these fields are not always concerned with the intellectual purity of ideas. Progress can be described simply and cynically as a collection of stories that we tell each other and ourselves. These stories describe our world in our language; they help us navigate and collaborate in the face of complexity. These stories are wildly human, and they vary from teller to teller and context to context. They are far divorced from the scientific papers and journals that we STEM folk like to think are the means by which we communicate. However, even though we assume that we are rational and/or empirical and, therefore, rigorous and scientific, our stories tend not to be limited by formalism or rigor.

Instead, our stories are crammed with intuition, revelation, and innate musings that we pretend don't exist and that rationalist philosophers such as John Locke tried to discourage. They are bound to their place and their time, rarely objective, and filled with the biases of the storyteller and the audience. These stories can be enormously helpful, but also damaging when we collectively seek certainty and simplicity and allow these unpolished narratives to guide us where we want to go rather than where we should go.

For centuries before Locke, humans managed the complex universe around us via storytelling: passing knowledge from one generation to another, sometimes losing sight of the original words, but keeping the message intact. Life lessons were passed on as parables and folk stories that played to emotion and culture and had little scientific backing; indeed, we still do this today. The Age of Reason separated us from that reality and, since the Enlightenment, we have seen ourselves as rational, scientific beings, in charge of our destiny and gradually unveiling the workings of the universe. It is not always obvious to us, convinced as we are of the peer-reviewed tenacity of our ideas, that the perversion of the scientific method we know as storytelling is still very much with us.

When we can't describe the universe as a simple set of rules, when we feel uncertain, we step away from the need to be seen as logical, reasonable, data-driven beings, and we return to story. Through the sharing of our stories, and through our imaginations, we collectively chip away at the wall of uncertainty, tinkering and messing, until something gives. In this romantic wandering, we collectively surpass the pseudo-scientific

ideas of planning and control and create the new from seemingly nothing. This creation is a thing of beauty, and yet we treat it as a thing of shame, convinced that the right answers come forth purely through orderly processes and rigorous research techniques.

When enough of us assail a problem with our stories, stories that are flawed but numerous and varied, each story can lead to new ideas, and each idea leads to new tinkering on the edge of knowledge. Eventually, our stories converge with evidence and, for a short while, become the *bona fide* truth, on which others base their stories. This part of science, which involves the random wittering of humanity as the source of our progress, is not welcome in the story of modern data-driven approaches. I have no doubt we will look back on this discouraging need for rigor over humanity with great shame, as a time when our desire for simple, certain answers disconnected us from who we are.

As we progress from story to story, and test the vitality of the story against reality, we gain new ideas. The ideas that were right survive through something called *via negativa* (defining something by what it is *not* rather than by what it *is*), on the premise that it is easier to know when you are wrong than it is to prove you are right. Through this, we eventually arrive at something robust and useful: removing what is not true, we strengthen the story and eventually start to realize something useful. Our history is full of examples of these progressions from a spark of an idea through experimentation to realization: the development of mechanical flight, the invention of the light bulb, the architectures of our cities, and the political structures we coalesce around. In the hard sciences, we can trace every formulated theory back through fanciful stories and metaphors that illuminate the path to knowledge. However, we are rarely aware of where we are within this process and often wrongly assume our current story to be truth.

As our stories progress, they can become bloated and unstable, eventually collapsing under their own weight and leaving only the memory of those pieces that are useful to inspire the next generation of storytellers. This is a natural and useful process.

One example of this is the story of the topic of "resilience": at first defined in ecological terms, the story was adapted to fit other fields with initial successes and new understanding arising from exploration. Eventually, resilience itself becomes a meaningless concept under the catchall of "mindset," and the story ceases to be useful.[3] The next generation then picks though the ruins and sparks new ideas, causing the older generation to complain of the wheel being reinvented. The bitter cries of "This is nothing new" from the previous generation of storytellers is almost always a sign of a collapsed story: it is a trigger that should tell us to pay attention because it is almost always an indication that we need something entirely new. The older generation will use its influence to graft old ideas onto the new forms, convinced that everything is already settled. This same story can be applied to any management or technology fad, and often we miss the wood for the trees. We try to reconcile generations of stories rather than accept the revision of stories as a necessary trigger for innovation, getting caught up in the minutiae of fads rather than the trigger that led to someone feeling the need to create a new story. In this way, we focus on the wrong things, putting energy into the narcissism of small differences rather than the stronger, common, residual ideas that have survived over time and the circumstances that make the new generation of storytellers grasp for something new. This defensiveness both slows down the progress of new stories and protects us from getting too enamored of the new.

As we progress from story to story, and test the vitality of the story against reality, we gain new ideas.

In the modern world, where humans are more numerous than we have ever been, more educated, and ever more connected, our storytelling has picked up pace and is now frantic. Stories evolve through contact, and increased contact means more stories and more speed. Being convinced that we are right at every juncture becomes dangerous, and many different stories are promoted at the same time. As the stories progress, there is a market of people desperate to get the final chapter, who will willingly listen to fan fiction theories about where we are headed. Defensiveness from previous generations of storytellers influences this as well, as many focus on selling a story rather than refining a story. The more complex a subject, the more stories and story iterations are associated with it.

Architecture is an obvious candidate for this kind of investigation, and when we look at the stories, and not at the semi-scientific shadow, we see two fields that have a great deal in common: business and architecture. Both struggle to define a clear and solid story, and the result is a litany of permanently collapsing narratives.

However, the need for certainty drives a business model of ever more belief in the current story, which leads to fads, snake oil, disappointment, and the next cycle of storytelling.

Architecture right now is a fairly young story, as is computer science. We are in the phase of tall tales, wild metaphors, and misplaced hopes. There is a huge market for new stories, and the stories are often deeply flawed. The history of architecture is littered with numerous stories collapsing at a frenetic pace, driven by the technology industry's own speedy evolution. The latest phase of this story is "digital architecture." As new stories of digital transformation swarm the business elite, the field of architecture requires a response with coherent stories of its own. Digital architecture is simply a new version of an old story, which in previous versions talked of modeling, TOGAF, centralization, reuse, and the like. That we need a term such as "digital architecture" at all is a hint that the previous stories have collapsed. Digital architecture is simply the next story version, taking what has come before and reimagining and reinventing it for the current time. This is a necessary step, but we always fall into the trap of thinking that this version of the story is "the truth." The story will emerge half-baked from those who wish to profit from selling it, with necessary compromises to bring the earlier generations of architecture storytellers onboard in the interest of market coverage.

Architecture right now is a fairly young story, as is computer science.

To really get a grip on architecture, we need to understand the story's journey, not blindly follow the latest version. Understanding that both business and architecture are stuck in a constant cycle of fad and reinvention gives us a vital clue as to how we should approach digital architecture: it is not really a solution, but rather a story to help us navigate our way to a solution. To act in these circumstances requires that we do not believe in the story but instead use critical thinking to make the best decisions we can in the given circumstances. Falling into the trap of believing the current story has never helped: enterprise architecture is currently drifting from relevance, by now clearly an erstwhile version of the architecture story.

In the world of business, some stories have appeared as fads: Lean, Agile, business process reengineering, or Six Sigma. In architecture, we have the stories/fads of TOGAF, enterprise architecture, and Agile. In technology, we have OOP, SOA, and microservices. The looser and more open to interpretation our stories are, the more longevity, confusion, and argument we inevitably see. Eventually, over time, these stories are subject to reality and begin to either expand or dissolve to make way for the next generation of stories. Sometimes, we discover hard-and-fast heuristics in our stories that will influence many generations of stories. Looser but credible stories will open the door for a great amount of snake oil and broken promises, as these stories influence the decisions made in business and technology. For example, MBAs are based around the case study, a pure storytelling environment, yet graduates often describe themselves as data-driven!

Empirical evidence cannot exist for these stories; complexity means that each project is more or less unique. We do not have the tools or the science to predict how our architectures will be impacted by the absence of a team member, a single newspaper story, or a market shift. Therefore, all attempts to use similar, proven, empirically researched frameworks in a copy-and-paste way are inherently flawed and ultimately dishonest. Frameworks can, however, be a sensible approach; they exist and are encouraged because they very often promote action over inaction. If you take the perspective of capital invested in a number of courses of action, action is more important than inaction. Empirically, someone will get it right, even if it is completely random who that someone is.

For individual actors without the luxury of optionality — who cannot afford to invest in many courses of action — there is a huge advantage in not being one of those who follow other people's stories, but instead one who understands the journey of the story itself. By embracing complexity and understanding that there is no answer, by taking the role of producers of science rather than consumers of simplified rules and frameworks, we give our own effort a greater chance of success.

Thus, we as architects have a choice to make. We can jump in with both feet and embrace whatever "digital architecture" is assumed to be by thought leaders, happy in the knowledge that the concept will do its job of directing action over inaction and of directing our part in this great story. Or, we can try and understand architecture from the perspective of storytelling,

becoming the dissenter and choosing a different, more honest path in pursuit of the goal.

This path is difficult. It means there is no prescribed framework. No team. No operational silo from which we can outsource the blame for failure to other silos. It means that we take responsibility for the result of introducing our architecture into a complex environment, rather than adopting a framework that we can blame afterward. In a world where others readily assume the flawed story *du jour*, having the ability to form your own story creates the advantage of doing something different from the pack as well as the ability to course correct rather than follow instructions.

Recognizing that we are part of a story that is unfurling over time is the important step. Once we do that, we can understand that the latest thinking is not a form of empirical or rational truth, but simply a story constructed to help humans navigate complexity. It will eventually burn away in the flames of reality until only the residue of what actually works is left behind. Understanding this gives you the advantage of not simply favoring action over inaction but allows you to focus on what can actually be achieved. Digital architecture as a concept will expand to absorb many stories, not all of which will be relevant to your work. However, it will also try to address problems that you may be experiencing, so ignoring it is as dangerous as unthinkingly embracing it.

By rising above hype and evangelical storytelling and seeing what is before us in terms of raw empiricism (what works for us rather than what has worked for others), we can master the problems that digital architecture is trying to solve without falling for copy-and-paste techniques. We need to embrace the usefulness of the story, understand that it is deeply flawed, and provide the empirical and rational footing to move forward in our context.

What magical approach can solve these problems? Well, it has been in front of us the whole time. Critical thinking applied to our work will allow us to be rational and empirical, to work as the scientist rather than the consumer of the scientist's work. To accept that we are not in control and that the only frameworks we can trust are those that readily falsify themselves and admit to powerlessness in the face of randomness.

For architects, this means nodding along calmly as the big consultancies line up to show us slide decks describing what *they* think digital architecture is, as well as which mindset we should be adopting and which colorful posters we should hang on our walls. In reality, taking this approach means being prepared to work through difficult problems using our own skills and our ability to think, rather than falling back onto a set of unproven practices pushed upon us by evangelists selling bottled certainty.

Recognizing that we are part of a story that is unfurling over time is the important step.

This is a brave and bold step, but when you think about it, it's not that strange. All we can really rely upon in a complex system is ourselves and our colleagues. The received wisdom from previous projects that did not operate with the same constraints or teams or within the same market, industry, or culture is essentially useless; by following that received wisdom, we are basically admitting that we would not otherwise know what to do, despite our skills, training, and experience. So, by all means, if you so choose, change your title to Digital Architect, select a framework on the basis of its popularity, follow the herd, and enjoy safety in numbers. But if you really want to grow … follow your instincts, dare to be wrong, create your own way forward through your own unique mess of challenges. The results are never guaranteed, but at least you will be the author of your own story.

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JOURNEY THROUGH THE STAGES

Business Capability Modeling:
Propelling Digital Transformation

by John Murphy

Digital transformation has been much discussed, and it is generally accepted that it involves new and ever-changing technology, an aspect with which digital architects are certainly familiar. If you are a businessperson, the fast pace of technology can be confusing, and an argument could be made that it is not incumbent on a businessperson to understand the technology. However, if you are within a technology department, then you likely find deploying and leveraging these new technology stacks interesting and believe they have the potential to solve a myriad of problems. These differing perceptions are just the beginning of what is often, in my experience, a disconnect between what the business wants to do to solve a problem (or implement its strategy) and what technology departments do or execute on to solve those problems. In some extreme cases, the technology side will deploy tools and platforms to solve a perceived business problem but in the absence of a clear business need. Indeed, senior stakeholders often struggle to articulate what it is they want to do and where they want the technology department to focus its expertise. Returning to digital transformation, we face two potential problem areas: (1) where and how to use today's fast and frequently changing digital technology and (2) what important problems need to be solved.

Business capability modeling is a technique that can help digital architects and businesspeople alike. Business capability modeling helps bridge strategy and execution by expressing an organization's most important activities in commonly understood terms, known as "capabilities,"[1] that businesspeople understand. Capabilities are then mapped to data, processes, organization, and technology that members of the technology department and enterprise architects understand. Business capability modeling shows the alignment of data, processes, and technology to the key value chains of the organization. In this article, we examine how business capability models are created and how we can use them to drive the right conversations and ultimately help the business in its digital transformation.

The Challenge

A business architecture initiative such as business capability modeling can be a challenging endeavor in many organizations. Typically, little clarity exists as to what a business capability is, what business capabilities are used for, and why a business needs them. The challenge is to address these concerns while succinctly articulating why adopting business capability modeling is a good idea. Identifying an organization's business capabilities helps the business see and articulate at the earliest stages of strategy formation what needs to change. Such discussions at this early stage are an excellent way of getting buy-in. Discussions can be free-form, and the conversation can move between blue sky thinking and specific system changes and back again. The business architect's job in this scenario is to clarify strategic intentions, identify desired business outcomes, and understand the tradeoffs and impacts of pursuing a given strategy. If the business architect can deliver on these objectives, then the business will see the value regardless of how the objectives are achieved. Using a technique such as business capability modeling, which uses business terms, avoids technical terminology, and facilitates conversation at early stages of strategy formation, tends to be a successful approach and one that creates advocates for the concept of business capabilities.

Sometimes, however, business architects do not have the luxury of having been invited to the earliest stages of strategy formulation and, thus, are unable to use that time to define the organization's business capabilities. Architects must then sell the concept of business capability modeling, emphasizing that defining business capabilities will give the business a more consistent way to communicate its most important needs. Capabilities must resonate with businesspeople — and with the organization. The litmus test for any capability model that gets created is for someone to look at the model — specifically at the capabilities that person owns and/or depends upon — and to relate to those capabilities without needing to have them

explained. Co-creation, which achieves this type of resonance, is important because it ensures that the business architect and the business stakeholder agree on the model being created or, at least, have reached a consensus. In addition, co-creation means that the business stakeholder has "skin in the game" and will back the model as it travels further into the organization.

Creating a Business Capability Model

The creation of a business capability model has three stages:

- **Stage 1** — internal/external research and reference material by the business architect
- **Stage 2** — stakeholder interviews
- **Stage 3** — defining/naming the capabilities

Stage 1: Internal and External Research

Most organizations will have a wealth of information and knowledge that any budding business architect can read to better understand the organization, how it works, and its strategic goals. This information is incredibly useful in drawing a draft business capability model that can be used to aid the co-creation process. Starting from a blank page with stakeholders can be difficult, whereas having a draft, even if it's 100% incorrect, gets the conversation started. The types of information that can help with defining the organization's business capabilities include the following documents:

- Business strategy
- Financial results presentations
- Technology strategy
- Value stream maps
- Business process diagrams or catalogs

These are all internal documents and are great sources of information. External information sources can, depending on the industry, be very useful as well. Within financial services, for example, the Banking Industry Architecture Network (BIAN)[2] has a good model as both a reference and starting point. The telecoms industry has the eTOM framework,[3] a useful reference model or starting point for an organization's specific business capability model.

Stage 2: Stakeholder Interviews

Getting time with the right people to help inform the capability model can be difficult given other priorities, but even more difficult is involving the right people. A stakeholder who is too senior cannot commit the time required to define capabilities, and one who is too junior will not have the knowledge needed to understand how his or her area fits into the organization's strategic goals. The "right" stakeholders are senior enough to have a good sense of the business processes that enable their areas but not so senior that they are unable to devote the time needed. A stakeholder interview should be short and focused, providing an understanding of what activities or high-level processes are most important in the stakeholder's area, the outcomes the stakeholder cares about, and where the stakeholder's area or department creates value for the organization. Some examples of questions to elicit useful information in a stakeholder interview are:

- What are the major activities your area performs?
- What are the top priorities for your area?
- What are your key objectives for this year?
- What information does your area use regularly?
- What management meetings do you attend regularly where decisions are made?
- What other areas or processes are you dependent on?

Most organizations will have a wealth of information and knowledge that any budding business architect can read to better understand the organization, how it works, and its strategic goals.

Stage 3: Defining the Capabilities

Business capabilities should be defined using "business language" for resonance, should have a defined business outcome, and need to be at a higher level than processes, as capabilities can contain a number of different but related business processes. Figure 1 shows the four components that should be contained within each capability: process, organization, technology, and information.

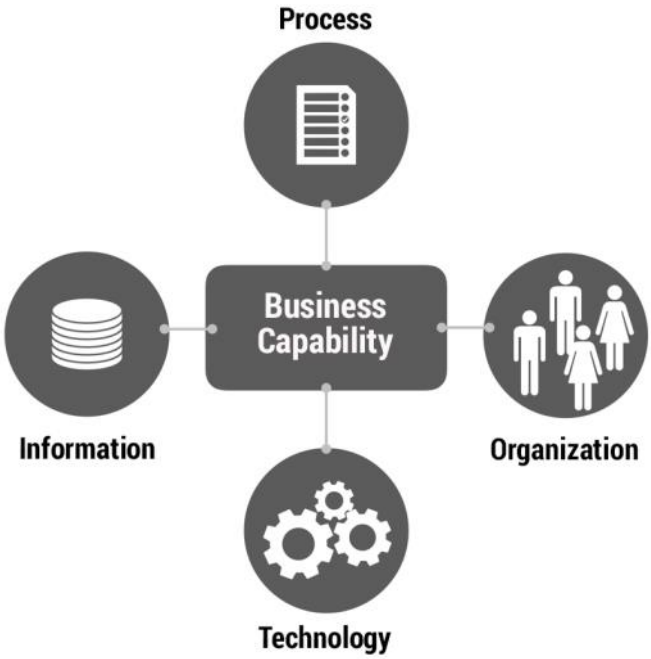

Figure 1 — Four components of a business capability.

The business capability process should resolve some questions within these components:

- **Process.** What are the required steps, or workflows, associated with the capability?
- **Organization.** Who is involved in carrying out the capability?
- **Technology.** What are the applications, technical tools, or systems that support the capability?
- **Information.** What information does the capability use or produce?

Figure 2 — Some capabilities in the HR area.

Once the business has defined various capabilities, it can group relevant capabilities together under logical areas. Figure 2, for example, shows some capabilities that logically belong under HR.

A co-created capability model can help the business understand the level of change required to realize a given strategy. By linking process, organization, technology, and information to each capability the strategy impacts, we can determine the scope of the impact of delivering on the strategy.

The Capability Model in Practice

In addition to capabilities being useful to help the business go from strategy to execution in the context of a new initiative, a business capability model can provide insight to the organization. Let's consider two scenarios — investment planning and digital transformation — where using a capability model as a foundation for delivering information can be valuable.

Investment Planning

Organizations have various different ways of carrying out their investment planning process. Regardless of the method, generally the "asks" for investment exceed the level of investment available. Mapping the various investment planning asks against the capability model can help with duplication if multiple business areas are looking for the same capability. The model can help identify synergies where a portion of an investment across multiple business areas could be brought together to deliver value across the enterprise. The model can also help identify where investment requests do not align to strategic goals. Carrying out the three stages discussed earlier to create a business capability model and understanding the organization's goals and objectives will result in a view of what capabilities are strategic to the organization and how changes to them will help or hinder the organization in achieving its goals. A quick heatmap of investment planning asks mapped against the capabilities that have been called out as strategic will allow the business to determine whether spending money on nonstrategic capabilities is really a good idea.

Digital Transformation

Understanding and scoping what actually needs to change to achieve digital transformation can be a

difficult task. In some instances, determining where to start a digital transformation and why is not always clear-cut. Having a base business capability model that has process, organization, technology, and information mapped to each capability is a great canvas from which to plan and roadmap a digital transformation. Capabilities identified as strategic are a good starting point for a conversation on which areas of the business are important today — and going forward. Transformation can then focus on the areas of the business that are the most important and that bring the most business value. Having the process, organization, technology, and information mapped to each capability helps determine what actually has to change to truly digitally transform; for example, what existing processes need to be enhanced or changed, whether new information sources are needed, what organizational changes will be necessary, which people are impacted, and whether any new applications are required. It is far easier to answer these questions when we can connect *what* it is the business wants or needs to do with *how* it is going to be done. In sum, business capability modeling allows organizations to scope out all required changes.

Conclusion

While it may seem like an abstract concept and somewhat challenging to sell to stakeholders, business capability modeling can be a valuable tool in any architect's toolkit. Trust is built up by using language and terms that the business understands and a model that the business has co-created with architects. Business capability modeling helps determine what actually needs to be changed to achieve a strategy. The real value of the model is its use to explain either why certain things need to change (perhaps certain capabilities were previously not appreciated as being a dependency) or why things do *not* have to change (capabilities that are not strategic may not have as high a business value as previously thought). The abstract nature of the model is probably its most valuable attribute, as it is solution- and technology-agnostic and keeps discussion grounded in the "why" and the "what" as opposed to jumping straight to the "how."

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John Murphy is a Chief Enterprise Architect who believes in good work, done well, for the right reasons. From his experience, he has seen enterprise architecture (EA), when performed in an excellent manner, truly enable a business to transform and get the most from its investments. Through his work in senior leadership roles in EA across multiple industries, Mr. Murphy drives his EA teams to be both outcome-driven and pragmatic by applying a just-enough approach to work in order to obtain the best results for the business. His key driver for applying EA is to achieve alignment in what the business does to achieve its goals and where it invests to deliver on its strategic objectives. Mr. Murphy believes that EA methods, such as business capability modeling, create this alignment, enabling the business to articulate "what" it wants to achieve and allowing the technology team to focus on "how" best to achieve it. He ensures his teams create roadmaps and enough direction so that all technology investment aligns to business goals, ensuring scale at pace. He can be reached at john.mmurphy@gmail.com.

A RECIPE FOR SUCCESS

How Can We Evaluate a Digital Architecture?

by Simon Field

A key task for IT architects is the evaluation of alternatives. For a major system, this often takes the form of a formal review, analyzing competing architectures and determining which is the most suitable. It seems reasonable to expect that we can derive similar value from assessing digital service architectures along the same lines in which we evaluate software systems. This article explores that path.

While an interactive software system typically sits at the core, there are often supporting systems and services, relying on people and business processes and other supporting systems to complete the digital experience.

Service Architectures

A digital service might, at first sight, appear to be just a particular type of software system; one that allows a user to interact directly with a service provider via a digital channel, perhaps reaching a satisfactory conclusion in the space of a relatively short transaction. However, digital services are often far more complex. They might involve multiple channels and/or might stretch over a long-running transaction, or even a connected sequence of transactions lasting days or weeks. And while an interactive software system typically sits at the core, there are often supporting systems and services, relying on people and business processes and other supporting systems to complete the digital experience.

Let's consider an example from the world of insurance. At my company, Admiral, the UK's largest auto insurer, we are seeking to improve the digital experience available to customers who need to process a claim. At first sight, a digital claims service might seem to be a short, highly automated experience that starts with the initial notification of a loss and ends with settlement of the claim. But many insurance claims cannot be settled in a single transaction. Indeed, there may be damage to assess, vehicles to repair, lawyers to be instructed, injuries to be treated. Moreover, the case might involve different stakeholders, business processes, and supporting systems, with the result being a long-running collection of connected transactions that can sometimes last for months or even years.

Given that a digital service involves an entire business operating model and not just a software system, why do I still believe that methods to evaluate software systems might be applicable when evaluating digital services? Lynn Shostack, among the first to call out service design as a distinct discipline, is one of many to highlight the similarities between the characteristics of services and those of software systems.[1] So, as I have argued elsewhere in more detail, I believe it is reasonable to suggest that services have architecture and that service architectures can be evaluated using the methods we use today to evaluate software system architectures.[2]

Software Architecture Evaluation Methods

Over the past 20 years, a number of software architecture evaluation methods have emerged, with the Architecture Tradeoff Analysis Method (ATAM) from Carnegie Mellon's Software Engineering Institute (SEI) becoming the most widely used.[3] As the name implies, ATAM is a method for conducting a tradeoff analysis, recognizing that different solution architectures represent distinct tradeoffs among competing quality characteristics. The aim of the analysis is to understand these tradeoffs and their potential impact on the planned new system before settling on a preferred architecture.

A key aspect of ATAM and other similar evaluation methods is the use of quality characteristics as a means of abstracting from the detail of individual requirements. This approach allows the evaluation team to focus on the aspects that are most architecturally significant, drawing into sharper relief the relevant differences between solution options. At Admiral, we have settled on using the standard quality model ISO/

Characteristic	Subcharacteristic	Characteristic	Subcharacteristic
1. Functional suitability	Functional completeness Functional correctness Functional appropriateness	5. Reliability	Maturity Availability Fault tolerance Recoverability
2. Performance efficiency	Time behavior Resource utilization Capacity	6. Security	Confidentiality Integrity Nonrepudiation Accountability Authenticity
3. Compatibility	Coexistence Interoperability	7. Maintainability	Modularity Reusability Analyzability Modifiability Testability
4. Usability	Appropriateness recognizability Learnability Operability User error protection User interface aesthetics Accessibility	8. Portability	Adaptability Installability Replaceability

Table 1 — ISO/IEC 25010 quality model.

IEC 25010 — Systems and Software Quality Requirements and Evaluation (SQuaRE) — System and Software Quality Models.[4] This gives us a common language for describing architecturally significant quality characteristics across the organization and creates the potential for comparison across projects and their architecture reviews. Table 1 shows the structure of the ISO/IEC 25010 quality model.[5]

The model understandably focuses on those quality characteristics that relate to what are commonly known as "nonfunctional requirements," with a single characteristic, *functional suitability*, representing all functional requirements. For a typical business system, a large proportion of business requirements will be associated with this first characteristic (and its three subcharacteristics — functional completeness, functional correctness, and functional appropriateness), with a smaller number spread across the remaining seven characteristics (and 28 subcharacteristics).

When it comes to evaluating competing architectures for a business system, the focus of attention is on the latter group, the architecturally significant characteristics (i.e., characteristics two to eight in Table 1), as these tend to be the ones that are difficult to change once a solution has been deployed. This is because their architecture has enshrined levels of capability for each characteristic and subcharacteristic, and changes to these are likely to demand substantial rearchitecting (and a possible knock-on impact on the levels achieved for other characteristics). This is usually less true of requirements belonging to the first characteristic, *functional suitability*, where variations can often be realized through alternative configurations of a chosen architecture. For example, a claims administration system may have limitations with regard to its total capacity or speed of response (within the *performance efficiency* quality characteristic), while being able to cope with changes to the circumstances in which a claim can be approved automatically via a configuration tool (within the *functional suitability* quality characteristic).

As argued above, this type of quality model can apply to the evaluation of service architectures in the same way that it is used in the evaluation of software system architectures. But it is worth first considering in more detail the precise distinction between the first characteristic, *functional suitability*, and the others (the "nonfunctional characteristics").

Changes to functional requirements of a software system are often accommodated without the need for a change to the underlying architecture; hence, a software system architecture review that focuses on the nonfunctional quality characteristics. My experience at Admiral in designing a digital claims service, however, has suggested that this is not necessarily the case when it comes to service architectures.

Let's reconsider the example given earlier relating to a change to the circumstances in which a claim can be approved automatically. From a software perspective, this might be achieved by a simple change to some business rules via a configuration component of the software system. From the perspective of the service as a whole, such a change might have a much more significant impact. It could, for example, change the skill sets required of the staff who have to deal with the cases that are not automatically approved, and a change in the number of claims processed automatically might place more or less demand on those particular staff members, impacting recruitment, employment, facilities, and so on. Thus, a change to the service that is insignificant from a software architecture perspective can be highly significant for other parts of the business operating model, including business processes and people. For a digital service, the *functional suitability* characteristic would seem to be much more architecturally significant than it is for a software system.

> *A change to the service that is insignificant from a software architecture perspective can be highly significant for other parts of the business operating model, including business processes and people.*

Returning to the ISO/IEC 25010 model, we can see that its focus on nonfunctional characteristics makes it well suited as a basis for evaluating software systems, given the alignment between those characteristics and architectural significance. But it is only partially suitable for evaluating digital services. While the nonfunctional characteristics remain significant from a service architecture perspective, the one characteristic that represents functionality is also likely to be architecturally significant, and that single characteristic typically has to represent most of the requirements. In the case of Admiral's digital claims service, almost three-quarters of the requirements were classified as *functional suitability*.

A key benefit of applying a quality model like ISO/IEC 25010 to an architecture tradeoff analysis is its role in abstracting away from the detail of requirements, allowing the review team to see tradeoffs between quality characteristics and how these vary across the set of competing solution architectures. This benefit is damaged if most of the requirements fall within just one characteristic, especially if that characteristic contains requirements of considerable architectural significance. This was the situation we recognized when seeking to evaluate competing architectures for our digital claims service.

Expanding with Capabilities

To facilitate our evaluation, we decided to replace the overburdened *functional suitability* characteristic with an additional set of elements that could reasonably represent the range of functional requirements that were architecturally significant from a digital service perspective. This would allow a level of abstraction similar to that achieved with the nonfunctional quality characteristics. Since a service contains a combination of people, business processes, and systems, we concluded that the closest equivalent to the quality characteristics used to explore software systems architectures was the set of business capabilities that make up the service.

Returning to our example of automating the approval of claims, we have seen that this automation might not be architecturally significant for the claims administration system, but it would be significant for the claims service as a whole. With an expanded model, something we call the "Quality and Capability Model" (see Figure 1), this requirement forms part of the *Finalization* business capability instead of being one of very many *functional suitability* requirements.

We replaced *functional suitability* with 19 business capabilities, giving our Quality and Capability Model a total of 26 elements after adding in the seven remaining original quality characteristics. As a major part of the project involved selecting a new claims administration system, we further divided the 19 business capabilities between those that would be supported directly by the new system (i.e., "core" capabilities) and those that would be supported by other business systems or services (i.e., "linked" capabilities). As shown in Figure 1, this separation helped us see two

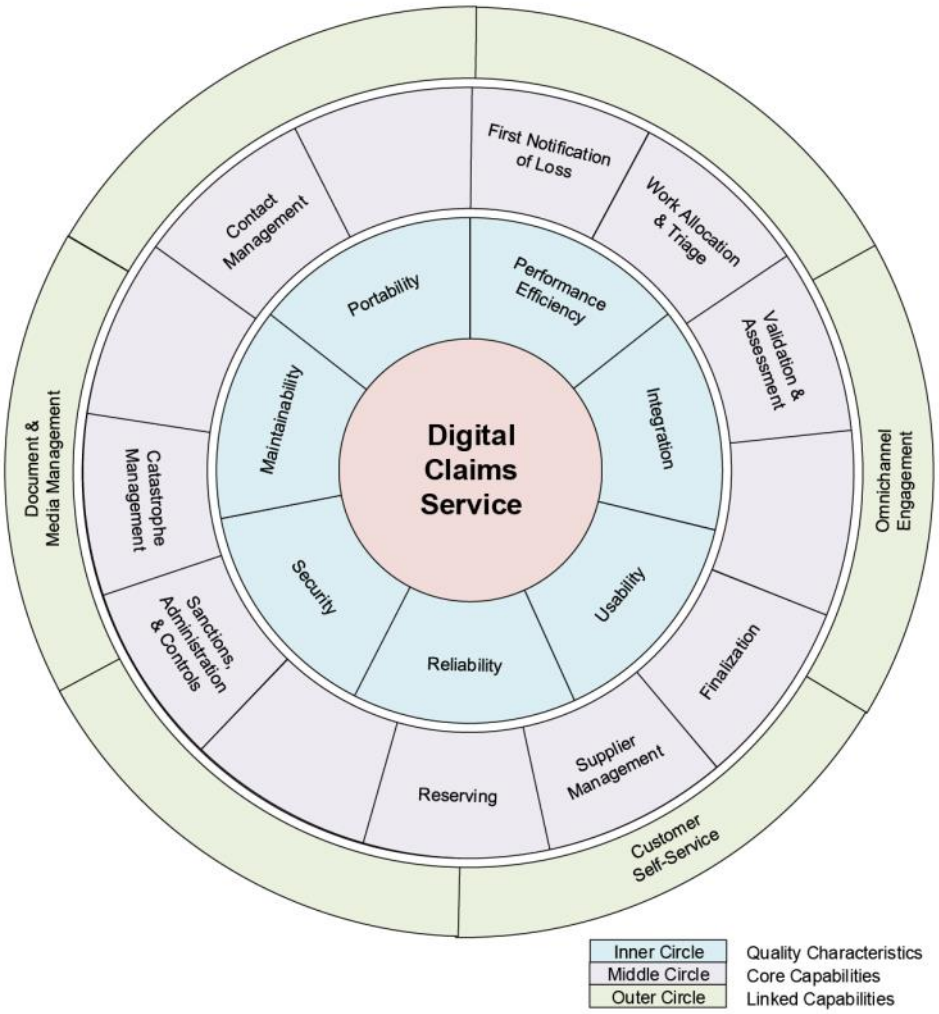

Figure 1 — Quality and Capability Model of a digital claims service.
(Note: some capabilities have been left unnamed to protect commercially sensitive information.)

perspectives in one single view: (1) the parts of the service supported by the new system and (2) the combination of that core set of capabilities with other vital connected capabilities that together form the overall digital claims service. (Note: seven of the capabilities have been left unnamed in Figure 1 to protect commercially sensitive information.)

The Tradeoff Analysis

At Admiral, we've been using the Solution Architecture Review Method (SARM), which owes much to ATAM but introduces several key changes.[6] Perhaps the most significant is its use of a risk model. Instead of evaluating quality characteristics (and now also business capabilities) in terms of utility, SARM adopts a risk model. Tradeoffs are therefore expressed in terms of the risk of a given solution option failing to deliver requirements and their associated quality characteristics or business capabilities satisfactorily. SARM also facilitates a cost-benefit analysis, whereby the aspirational total benefits of the program are adjusted according to the outcome of the evaluation. Finally, SARM accounts for different stakeholder perspectives, giving insights into how solution options might appeal to some stakeholders but disappoint others.

The context for the tradeoff analysis is created by associating requirements to the quality characteristics or capabilities in the model and recording the level of interest each stakeholder has in each requirement. The impact on the desired service, should a requirement fail to be satisfactorily achieved, is recorded — this is one element of the risk exposure (the other being the likelihood, which we will consider later). Benefits are then associated with the set of requirements, the total of which represents an aspirational financial benefit for the new digital service.

The tradeoff analysis is conducted in a workshop that starts with a presentation of the competing service architectures. The evaluation team then considers the requirements in turn, assessing each one's likelihood of success for each of the candidate architectures. This allows the supporting tool to calculate a level of risk for each requirement/solution combination, using the widely adopted risk modeling approach of multiplying risk impact by risk likelihood to arrive at overall risk exposure. Once all requirements have been considered, the tool can use the contextual information provided earlier to present an analysis of risk by different perspectives: quality characteristics, business capabilities, stakeholders, and stakeholder classes. This allows the evaluation team to explore the tradeoffs inherent in each competing architecture, compare them, and discuss possible mitigations for standout risks.

The tool is also able to create a revised benefit estimate for each service architecture by combining risk likelihood with the benefit data that was provided earlier. In the case of Admiral's digital claims evaluation, the highest-value architecture showed an estimated total financial benefit close to double that of the lowest. We then developed a graphical representation of the results, showing the relative strengths and weaknesses of each architecture according to our Quality and Capability Model. Figure 2 shows a candidate architecture.

Conclusion

This article described an approach to evaluating digital services that leverages the experience of the IT architecture profession, recognizing that the architecture of a

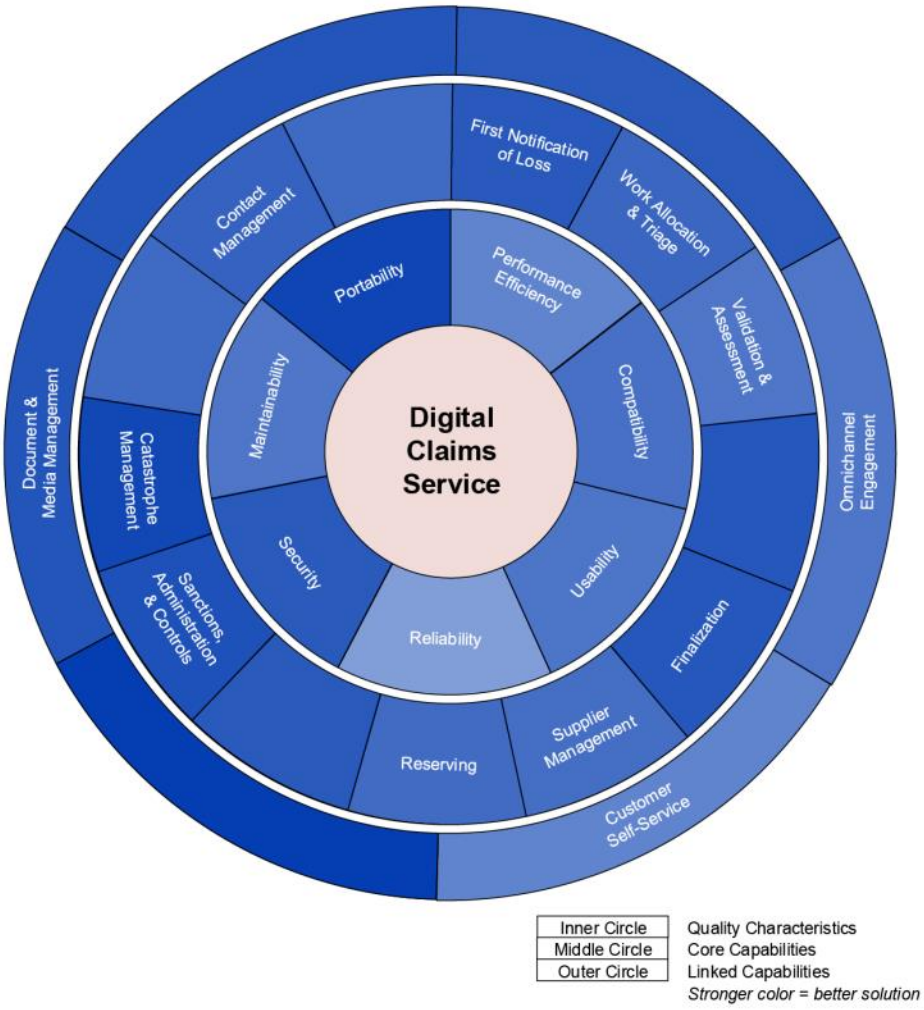

Figure 2 — Representation of a candidate architecture.
(Note: some capabilities have been left unnamed to protect commercially sensitive information.)

service can be tested and evaluated using methods originally developed for evaluating software architectures. A standard model of quality characteristics, widely used to evaluate software architecture, has been extended to reflect the richer mix of systems, business processes, and people that combine to deliver a complex digital service. This extended model has been incorporated into a tradeoff analysis method and supporting tool (SARM), and examples from an insurance digital claims service evaluation illustrate its practical application.

This extended model has value beyond the evaluation process described here. Its first use in the example claims project was to help define scope. It will also help create and maintain a shared language that can ensure clarity of expression and common understanding between different parts of the business and among partners and other stakeholders.

More experience with digital service evaluation will no doubt lead to refinements in the approach to modeling architecturally significant characteristics and capabilities and uncover valuable new perspectives that can help service architects make the right design decisions as they seek to create innovative new digital services. At Admiral, we feel we have taken a useful first step.

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Simon Field is Head of Enterprise Architecture at Admiral. Previously, he was CIO advisor/coach at Gartner, Chief Architect at Emirates Group, and CTO at the UK's Office for National Statistics. Over the past 12 years, Dr. Field has been studying architecture review methods, publishing the Solution Architecture Review Method as part of his research on the evaluation of service designs at the University of South Wales. He can be reached at simon.field@admiralgroup.co.uk.

THE VALUE OF SELF-SERVICE

Buffet-Style Architecture:
The New World of Public Self-Governance

by Mark Greville

> If I had asked people what they wanted, they would have said faster horses.
>
> — Attributed to Henry Ford[1]

The tendency to cling to the past when predicting the future is evident throughout history. This is as true today as it ever has been. Even in the future-defining world of technology, people still cling to anachronistic ideas.

Now, to get the architecture of the business right, a company must reorganize itself around empowered teams that can operate at speed. For architecture truly to be a pivotal piece of the business transformation puzzle, it must leave the old workhorses of the past behind and move to modern transportation. Indeed, architecture must refocus on three core principles: (1) accelerated change, (2) decentralized decisions, and (3) public self-governance.

Why Does Any of This Matter?

Recall these three promising businesses that crashed and burned in the midst of major technological change?

1. At its peak, telecoms giant Nortel had almost 100,000 staff members and celebrated more than 100 years of success. In 2009, it filed for bankruptcy.[2]

2. In 1988, Kodak celebrated 100 years of existence, buying Sterling Drug for US $5.1 billion; in January 2012, it, too, filed for bankruptcy.[3]

3. In 2008, social network Friendster had more than 115 million registered users and was among the top 40 visited sites on the Internet. It shut down all operations on 14 June 2015.[4]

All three businesses attempted to transform themselves far too late. In each case, the company clearly saw a disruptive change emerging in its path. Early on, each business thought that the disruption was merely a fad and that size and history would offer protection from it. Ultimately, they all failed.

The world has not been slowing down since these companies found themselves in difficult times; indeed, it has been speeding up ever more dramatically. In his essay, "The Law of Accelerating Returns," inventor and futurist Ray Kurzweil explains that "technological change is exponential, contrary to the common-sense 'intuitive linear' view. So we won't experience 100 years of progress in the 21st century — it will be more like 20,000 years of progress (at today's rate)."[5]

Kurzweil uses multiple cases to demonstrate that the evolution of technology is increasing at an incredible pace. Figure 1 shows a good representative example, where computing power goes from the equivalent of an insect's brain in the year 2000, up to a human brain's in 2025, to all human brains by 2050. Supporting this type of exponential growth might be the single most important thing a company does for its survival. If a company can't adjust quickly, it may have to shut its doors as new business strategies hand the advantage to competitors.

How Is EA Meeting This Challenge?

The answer to this question really depends on what "enterprise architecture" (EA) means. No single clear identity exists today for architecture in an enterprise. Indeed, the ISO/IEEE site lists 78 separate architecture groups with associated frameworks.[6] These different groups aggressively defend their "one true answer," bringing to mind the poetic words of W.B. Yeats in "The Second Coming":

> The best lack all conviction, while the worst
> Are full of passionate intensity.[7]

While inside the architecture community an argument over the best framework rages, to outsiders it resembles crows fighting over scraps at the dump. The winner is important to the crows and a few bystanders but relatively unimportant to the rest.

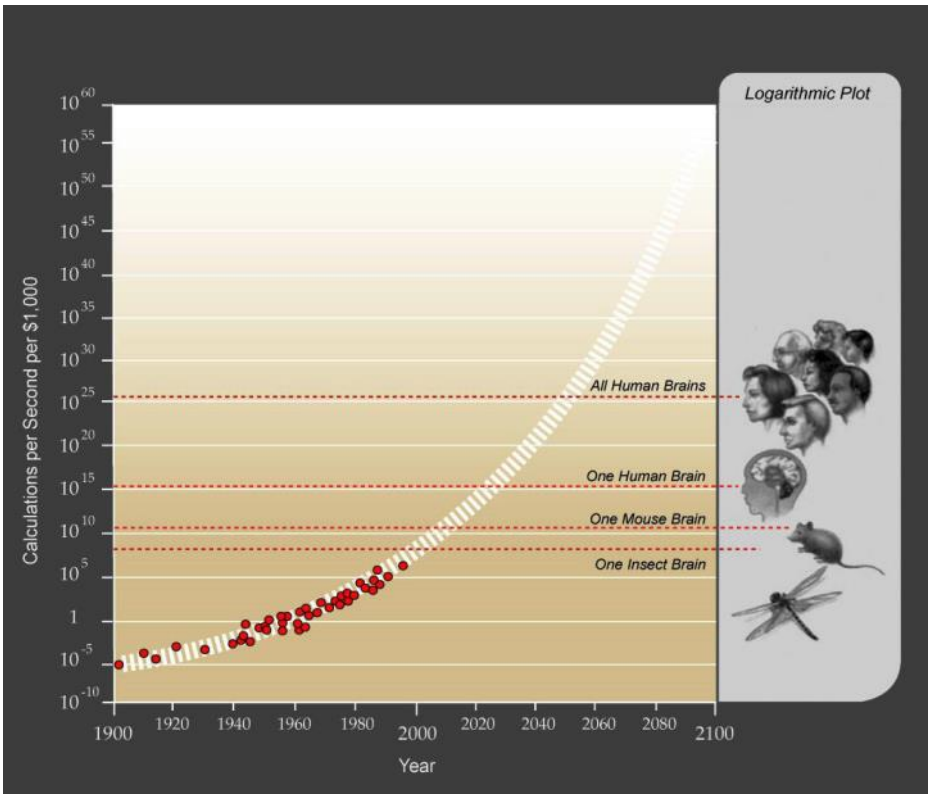

Figure 1 — The exponential growth of computing. (Source: Kurzweil.)

More important than architectural identity is understanding the value architecture brings today. The value of a sales division is clear: to bring in revenue; the finance division's value is to manage the company finances, and so forth. A typical department knows its value proposition thoroughly. A member of a well-run department can explain its contribution in an elevator and still have time to discuss last night's game before reaching the desired floor. However, it is rare for an architect to speak about architecture's value to the company in clear business terms.

In the quest to uncover the value of architecture, academic research fares no better, showing that despite all expended effort, framework-based architectures have failed to deliver. Complexity and the increased rate of change in technology have transformed the business landscape, but architecture hasn't kept pace. The following quotes from academia and industry groups provide some insight:

- "There exists no single comprehensive view of the ways an architectural practice might add value to an organization." — Vasilis Boucharas et al.[8]
- "Measuring EA effectiveness is often deemed difficult by both practitioners and researchers." — Wendy Arianne Günther[9]
- "Useless at best, and harmful at worst." — Svyatoslav Kotusev[10]

What Should Architecture Do?

Architecture should play a key role in creating the strategy for a digital business. But strategy alone is not enough. As organizational theorist Jeanne Ross notes:

> A great strategy is valuable only if a company is capable of executing that strategy. And whether or not a company can execute its strategy depends largely on whether it is designed to do so. In other words, it depends on *business architecture* — the way a company's people, processes, systems, and data interact to deliver goods and services to customers.[11]

So, as we hinted to earlier, architecture must go deeper by focusing on three pillars: (1) accelerated change, (2) decentralized decisions, and (3) public self-governance.

The Three Pillars of Digital Architecture

1. Accelerated Change: Optimize for Speed

As we know, external change is happening at an exponential rate. This changes the speed of execution from a useful to a critical success factor. If companies aren't readying themselves and getting their business architecture right today, they increase the chance of becoming irrelevant tomorrow.

Companies slow to change have always been at a disadvantage. My first-person experience of this comes from my time working at a small telecoms company in Ireland in the 1990s, leading a team of three. At that time, telecoms consumers began to ask for additional content, such as recommended listings, sports scores, and local weather. Providing this content meant that operators could charge more and increase revenue.

We spent five months building a new workstation platform that offered these new services and then flew to Nortel in Rochester, New York, USA, hoping to sell it. It turned out that a team of 50 people in Nortel had been working for two years to build the same platform and were nowhere near completion when we showed up. The key difference was that Nortel's organizational structure slowed them down, while ours allowed us to move as fast as we could.

In the end, Nortel took so long in deciding whether to buy our software, we approached a telco directly and won the deal ourselves, in effect becoming a competitor. The world outside started to move faster than the world inside, but Nortel didn't notice until it was too late, contributing to the downfall of this once great institution.

Today, companies must reorganize quickly so that they can move faster, keep up with the external rates of change, and avoid becoming the new Nortel. Optimizing for speed means shortening the time from idea to implementation — from lightbulb to lights on.

2. Decentralized Decisions: Power to the Teams

Hurricane Katrina hit the US in 2006 causing fatalities, lost homes, and devastation in many towns and cities, including New Orleans, Louisiana. The agency with overall responsibility for disaster management was the Federal Emergency Management Agency (FEMA). Most agencies tasked with providing relief, FEMA in particular, did not do so adequately. The top-down chain of command was mostly useless when those on the ground needed to make immediate decisions. People felt disempowered and stifled by bureaucracy.

One notable exception was Walmart. Walmart shipped almost 2,500 truckloads of merchandise and medication to New Orleans before FEMA even began any relief efforts and provided trucks and drivers to community organizations.[12] How was Walmart able to take action almost immediately after the hurricane when the government agencies responsible for providing relief took days (sometimes weeks) to get to affected areas?

A key reason is Walmart's decentralized decision making. The company gives regional managers and store managers authority to make decisions based on local information and immediate needs. As Hurricane Katrina approached, Walmart CEO Lee Scott sent a message directly to his senior staff and told them to pass it down to regional, district, and store managers: "A lot of you are going to have to make decisions above your level. Make the best decision that you can with the information that's available to you at the time, and, above all, do the right thing."[13]

On the ground, Walmart staff turned stores into emergency sleeping quarters, set up temporary police headquarters, and, in one case, ran a bulldozer through a store to collect undamaged supplies and give them to those in need. People could make life-saving decisions because they didn't need to wait for permission. They already had permission as part of their job.

Today, in a world of accelerating change, companies must empower teams like Walmart does. To achieve this, decentralizing the decision-making process is vital as it empowers individuals and reverses bureaucracy, which is toxic to innovation. As world-renowned business thinker Gary Hamel and his coauthor Michele Zanini note in *Harvard Business Review*, "Bureaucracy is the enemy of speed … bureaucracy is a significant drag on the pace of decision-making in their organization."[14]

So how does architecture enable decentralized decision making, reduce bureaucracy, and accelerate work? Public self-governance helps answer this question.

3. Public Self-Governance: From Governance Blockades to Buffet-Style Decisions

Traditional technology governance resembles theater, where various stakeholders play parts in a process

that makes the actors feel satisfied. The decided lack of applause from the enterprise is telling.

Governance committees decide centrally, causing delays in work and frustration to parties awaiting an outcome. They rarely have the same level of information as the team on the ground. Of course, the committees can request more details, but this only increases delays. Sometimes, they even assume knowledge and rule on matters in semi-ignorance, acting like an unaccountable early European monarchy.

The book *Accelerate* discusses highly sophisticated and complex technology projects. In considering the usefulness of a change advisory board (CAB) or central approval process, the authors found that:

> External approvals were negatively correlated with lead time, deployment frequency, and restore time, and had no correlation with change fail rate. In short, approval by an external body (such as a manager or CAB) simply doesn't work to increase the stability of production systems, measured by the time to restore service and change fail rate. However, it certainly slows things down. It is, in fact, worse than having no change approval process at all.[15]

A central approval process is akin to a restaurant with only one waiter. The waiter can handle a small number of tables. As the company grows, the number of tables also grows. The order queue gets bigger and diners face a longer wait. Eventually, diners are upset, the food gets cold, the waiter is exhausted, and ultimately quits. We need instead to move to a buffet model, where diners can serve themselves, the food is hot, and a smiling waiter is on hand in case anything additional is needed.

Enterprises must move away from the old model of centralized decision making to a model of public self-governance. Away from monarchy and toward democracy, giving teams the knowledge and authority to make decisions in the open.

What Is Public Self-Governance?

Public self-governance is a simple process, where teams ask themselves three questions after first stating the purpose of the proposal (see Figure 2):

1. Is there a positive return?
2. Is this a Type 2 decision?
3. Is this easily reversible?

If all three answers are yes, then the team makes the answers available internally and begins work immediately. This process increases the speed of decision making, increases autonomy within teams, and creates a culture for innovative ideas to blossom. Team members are more engaged, and both they and the company reap any rewards that materialize. Let's break down these three questions a bit further.

Submitter/Date	
What is the purpose (in nontechnical language)?	
Is there a positive return?	
Is this a Type 2 decision?	
Is this easily reversible?	
What is the estimated cost to implement?	
What resources are required from outside the team?	
What resources are required from outside the company?	

Figure 2 — The public self-governance form.

1. Is There a Positive Return?

This question concerns the business case and is merely asking whether the ROI is greater than the cost. This simple question, however, has a deep impact, helping people at every level of an organization consider ROI as they dream up new proposals.

2. Is This a Type 2 Decision?

This question considers scope and comes from Amazon. Jeff Bezos, in his 2015 letter to shareholders,[16] explained the two types of decisions within Amazon: Type 1 are high-impact choices, while Type 2 are lower-stakes choices that can be more easily reversed. Amazon leaves Type 2 decisions to its teams.

With public self-governance, an individual at any level can make a Type 2 decision, which provides autonomy and allows immediate action. Type 1 decisions are made by senior stakeholders with consideration of a wider set of factors (e.g., risk, business environment, company performance, alignment with strategic goals). Training individuals to distinguish Type 1 from Type 2 decisions is part of an enterprise's learning journey.

3. Is This Easily Reversible?

This question concerns complexity. If a proposal needs integration into existing systems, or requires new data, complexity increases. The higher the level of complexity, the greater the work needed to reverse the action. To answer this question, one must break it down further and consider the following three categories:

1. **Data.** Is the data protected? Can it be retrieved and/or deleted?
2. **Integration.** Are integrations or custom development required? Is this work easily reversed?
3. **Users.** How does removing the feature impact its users?

The answers to all three general public self-governance questions should be openly available within the company, and the architecture group should perform continuous retrospective reviews. If any issue arises, or if any of the three answers is no, the architecture group then becomes a partner, helping to generate a business case and thoroughly work through the proposal. This proactive approach allows other teams without issues to move forward with no delays.

Public self-governance requires a culture that encourages experimentation and is tolerant of failure. If something is easily reversible, then it is low risk. If it doesn't deliver as expected (i.e., less value, higher cost, more complexity), it can be halted, with learnings noted, and everybody can then move on to the next decision.

Other Considerations

Financial Purse Strings

> Negotiating budget exceptions — often necessary when a company has to move quickly — was also impeded by bureaucracy.[17]
>
> — Hamel and Zanini

In most companies, costs will also need finance approval. Bureaucracy costs money; therefore, it is cost-effective to give blanket approval to all proposals below a set maximum amount.

Danger: Technologists in Control!

A word of warning: it is important to review answers to the public self-governance questions, continue an open dialogue, and support a learning culture. There is a difference between giving increased autonomy to technologists and abdicating any responsibility as a firm. The cautionary tale of Netscape should serve as a stark reminder of too much free rein given to technologists.

In 1995, the Netscape Navigator browser had more than 80% of the market.[18] Riding on this wave of success, Netscape began to rewrite the browser entirely so it would support its newly created JavaScript programming language. In the process, Netscape intended to obliterate the all-conquering Microsoft, making Windows, according to Netscape VP of Technology Marc Andreessen, appear like a "poorly debugged set of device drivers."[19]

To the technologists in the firm, this was an obvious choice: rewrite the entire browser (i.e., the entire business) from scratch, removing old code and old bugs. It was just a matter of cleaning out the cobwebs to prepare for a new paradigm shift.

The full rewrite took two years — two years without new features, without meeting new customer needs, or dealing with competitive threats. By the time Netscape released its new Netscape Communicator browser, Microsoft Internet Explorer was everywhere, and

Windows was the desktop platform of choice. Meanwhile, Netscape's market share began to slide irreversibly, from close to 90% in 1995, dropping to 5% by the end of 2001.[20] Netscape went from total dominance to a vague footnote. Plus, in an ironic twist, the new browser was buggy and slow compared to the old version.

AOL ended up purchasing Netscape in early 1999, and, by 2003, the company disbanded altogether,[21] an ignominious end to what had looked like a brilliant future only eight years earlier. In this case, Andreessen made a major decision solely on a technology basis. Referring back to the public self-governance form (see Figure 2), this was a Type 1 decision made as if it were Type 2. Netscape should have considered an array of factors, including risks, business strategy, and competitive threats. Ignoring these factors ultimately caused its demise.

As we see in the Netscape example, judgment is still necessary in making good quality decisions. Using public self-governance allows a business to scale its decision making, but a business must also reinforce the learning culture so that staff members understand how to categorize their proposals and make better decisions over time.

Conclusion

To survive in this digital age, architecture must evolve. The old monsters of heavyweight governance, centralized authority, and long wait times are impediments in this new arena. Public self-governance breaks up decision hierarchies and speeds up technology decisions in the organization. It encourages a business to move faster. This will have an enormous impact, allowing companies to adjust quickly to customer needs, changes in technology, and emerging business models. Public self-governance is a foundational and necessary step in setting a business up for success in this new era.

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WE'RE ALL IN THIS TOGETHER

Achieving Digital as an Organizational Capability

by Dinesh Kumar

When someone says, "We want to be (more) digital," what comes to mind?

When I follow up that question with, "What do you mean?" the responses vary broadly depending upon the person's role: big data, artificial intelligence (AI), cloud, integration, omnichannel, automation, mobile, predictive analytics, customer insight. These answers may sound good, but as a strategy architect, I know that the need to be digital goes beyond these general concepts. Upon further probing, I often hear, "We want to be agile, responsive, customer-centric, cost-efficient, 'forever' leaders" — terms that define organizational culture. In other words, being digital is not just one thing; it is a way of life. Digital does not solve a specific pain; it creates the ability to continuously and seamlessly anticipate, innovate, act, and adjust. It is therefore not a surprise that current business leaders are excited about *digital*, just as people a few decades ago were excited about *globalization*.

Can an organization become digital with the right information architecture and technology platforms but without the right people skills and process designs? Of course not. An organization cannot connect, collaborate, and change with the needed agility and speed if any one of its assets is not on a par with the others. In the digital space, a weak link will break the organization regardless of how strong the other links are. Any capability that is cross-functional and requires coordination across diverse processes inside and outside the organization must be planned and managed as an organizational capability. Indeed, for an organization to be digital, it must eliminate non-value-adding complexity while capitalizing on diversity across the organization.

Thus, being (more) digital must be viewed and managed as an organizational capability. Any time we have approached an organizational change solely as a technology solution, as we've done with ERP, for example, results have been limited and short-lived. Whenever paradigm shifts were championed primarily by technology professionals, as has been the case with SOA and even cloud, those professionals rarely influenced those on the business side to change their way of planning and managing the business. If past performance is any indicator of future results, organizations that are planning and driving digital capabilities just as they did any shiny change of old can expect similar outcomes of a below-par ROI. So how do we break away from the past so we can plan, achieve, and sustain digital as an organizational capability?

Current Practices Are Not Sufficient

Traditional planning methodologies emphasize a top-down approach to ensure alignment with the stated goals from senior leadership. These methodologies are not very productive when working on organizational initiatives that can span across multiple years, as opposed to quarters, where buy-in and change must happen across the organization. Being digital is quite analogous to being safe, productive, and customer-focused: it is everyone's job, and everyone has the opportunity to contribute to being digital.

Traditional project portfolio and funding practices tend to establish high-level objectives and evaluate proposed projects accordingly. Generally, these projects don't leverage each other and may even produce redundant solutions, each with its own architecture. Project-based portfolio planning inherently promotes localized solutions, as projects tend to be compared with each other primarily on cost and risk. In many cases, these local solutions increase organizational complexity by building islands rather than bridges. Such project and portfolio management practices do not necessarily enable a digital culture where timely, open, and frictionless communication and connectivity are needed for organizational agility, responsiveness, and transparency.

Next Practice: Managing Capabilities, Not Just Projects

We manage projects for on-time and on-budget delivery. For positive profit margins, we manage budgets and cost of goods and services. For quality and schedule, we manage suppliers. In a similar vein, to realize the promise of digital, we need to plan and manage

digital capabilities. Just as we plan and manage processes and technologies, we must organize the practices for managing digital capabilities into three disciplines (each of which is an intentional and planned practice, not an afterthought or something that occurs by accident):

1. **Capability architecture** — providing a map or blueprint for ensuring organizational alignment
2. **Capability engineering** — building and using consistent patterns and practices for delivering the desired outcomes
3. **Capability governance** — managing the portfolio to enable innovation and avoid unnecessary risks and costs for ongoing advantage and affordability

These disciplines include a body of knowledge and methods for organizing and mobilizing all parts of the organization in building the organization's digital fabric while managing non-value-adding complexity and leveraging organizational diversity in people, processes, and technologies. In the following sections, let's take a deep dive into each of these disciplines.

Capability Architecture

We need to think of architecture not as a target or end state, but as an assembly and presentation of concepts, observations, progressions, constructs, interrelationships, and outcomes. When we do this, we can better understand the current state of the organization, its functions, processes, and individuals; better envision the state we want to be in; and better identify the building blocks for getting us there. Architecture allows us to define and build pieces in such a way that they will all "fit," ultimately producing a masterpiece.

A capability architecture defines *what* we are and do at any given time, whereas process, information, platform, and other architectures describe *how* we accomplish what we are or perform what we do at any given time. As we improve or mature, what we do and/or how we do it changes over time, meaning that both our capabilities and the enabling architectures evolve.

The Digital Capability Maturity Framework (DigitalCMF) is a capability architecture for understanding and roadmapping digital maturity at the organizational and operational levels. The DigitalCMF organizes all digital capabilities into five domains, as presented in Figure 1.

1. **Digital engagement** — enabling customer centricity with personalized and collaborative capabilities with consumers, customers, and partners across the ecosystem
2. **Digital operations** — enabling intelligent, flexible, adaptive, and integrated processes capable of sensing and responding to change in operating conditions and context in real time
3. **Digital insight** — enabling an information fabric with accurate, complete, predictive, and timely content from human and non-human sources to any authorized user or process
4. **Digital workplace** — enabling anyone to work from anywhere with reliable and flexible access to people, information, applications, and processes
5. **Digital trust** — enabling a seamlessly secured environment with transparent safeguards for open collaboration

Collectively, these five domains in the DigitalCMF represent the range of business capabilities that enable the organization to be:

- **Agile** — to sense and respond to behaviors, sentiments, conditions, or events in decision making; in interactions with customers, partners, and employees; and when performing tasks
- **Transparent** — to drive trust, empowerment, self-governance, and accountability

Figure 1 — The DigitalCMF's five digital domains.

- **Visible** — to know what anyone, internal or external to the organization, needs to know
- **Efficient** — to deliver products and services internally or externally at an optimal cost and speed
- **Resilient and trusted** — to be reliable, safe, and secure in all business interactions

Building an organizational capability is a long journey, and as is the case with any long journey, keeping everyone in the organization in lockstep is just not feasible or practical. Various parts of the organization may be at different places in the journey or may choose a quick detour for short-term priorities. What's important is that all parts of the organization are directionally aligned and ultimately headed toward the promised land, and that any variations or detours in their routes and starts/stops along the way will not land them on a deserted island. To establish the destination, provide the direction, and enable all to find their place and develop their own roadmap, the DigitalCMF expands the five domains into a capability maturity model. Table 1 provides a top-level maturity model across the five domains of the DigitalCMF.

The top-level view of the model is excellent for establishing the overall digital posture and providing direction at the organizational or business unit level. To

Capability Domain	Level 1 Initial	Level 2 Basic	Level 3 Standard	Level 4 Competing	Level 5 Leading
Digital Engagement	EDI, file sharing, websites	Supplier/customer portals, online info and support	Workflows, search, tracking, social, driven by user experience *Multichannel*	Self-services, communities, collaborative	Personalized, contextual, real-time, transparency *Omnichannel*
Digital Operations	Standard lines of business applications, standard operating environment	Enterprise data management, configurable processes	Cross-functional integration, building blocks, just-in-time	Business services, discoverable, seamless flow of information and transactions, risk-aware	Connected sensors and monitors, intelligent/ dynamic processes and automation, people-centric processes, continuous learning
Digital Insight	Operational data reporting/insight	Retention policies, document/content management	Data integration and analytics, enterprise search	Predictive insights, search data and documents, classification	IP management, real-time notification/ subscription, machine learning
Digital Workplace	Multiple apps, paper forms, remote access	Enterprise apps, wireless, conferencing	E-forms and workflow, availability/ presence status, mobility, portals, online	Exceptions-centric, anything/ anywhere access	Multilingual, event-driven, follow-me/ find-me *Omnichannel*
Digital Trust	Global directory, detection/prevention	Role-based controls, security zones, security policies	Federated controls, encryption, threat management	Usage rights, single sign-on, configuration management	Digital signature, data loss prevention, zero-trust design

Table 1 — Top-level maturity model for DigitalCMF.

assist specific business functions, processes, and roles with detailed assessment and planning, the model further breaks down each domain into a set of capability building blocks, each with its own maturity levels. Table 2 presents an example of next-level details for the Digital Engagement domain.

With the DigitalCMF, everyone in the organization is planning similar capabilities and moving in the same direction using the same map. This map also guides the design and development of the enabling architecture by identifying and building common, shared, or reusable patterns, practices, and (macro and micro) services. The

Capability Building Block	Level 1 Initial	Level 2 Basic	Level 3 Standard	Level 4 Competing	Level 5 Leading
Customer Experience	Static websites for general information	Up-to-date product catalog and support information available on website	Conduct business across online channels (e.g., order and check status online via Web and mobile)	Cross-channel (e.g., order online/ pickup at store), joint development and planning, predictive	Personalized and contextual
Customer Connection	General marketing and account management	Direct email and phone support	Event streaming, social media sites, multi-channel customer engagement	Community forums, self-service/ on-demand engagement, cross-product marketing, real-time customer support (staffed and robotic)	Gather customer sentiments and proactively respond, contextual ads, omnichannel customer engagement
Partner Experience	Static websites for general information	Product catalog; details and support information available	Product configurator and sales support	Joint development and planning	Personalized and contextual relationship and support
Partner Connection	General marketing	Direct email and phone support	Order and check status online, partner-focused communication	Partner forums, partner account management and self-service capabilities, cross-product marketing	Gather partner sentiments and proactively respond, contextual joint advertisement
Process Integration	EDI and file sharing	Business (supplier and customer) portals	Process workflows	Discoverable services and process elements, intelligent and dynamic design/ execution	Connected sensors and monitors
Information Exchange	Product information through websites and email	Product configuration, programs, and support information via Web-based tools	Free-form search for products, parts, support, and related information; order status and history	Pipeline and research data, machine data, mobile support	Real-time access and visibility into business processes and product development

Table 2 — Digital Engagement maturity map.

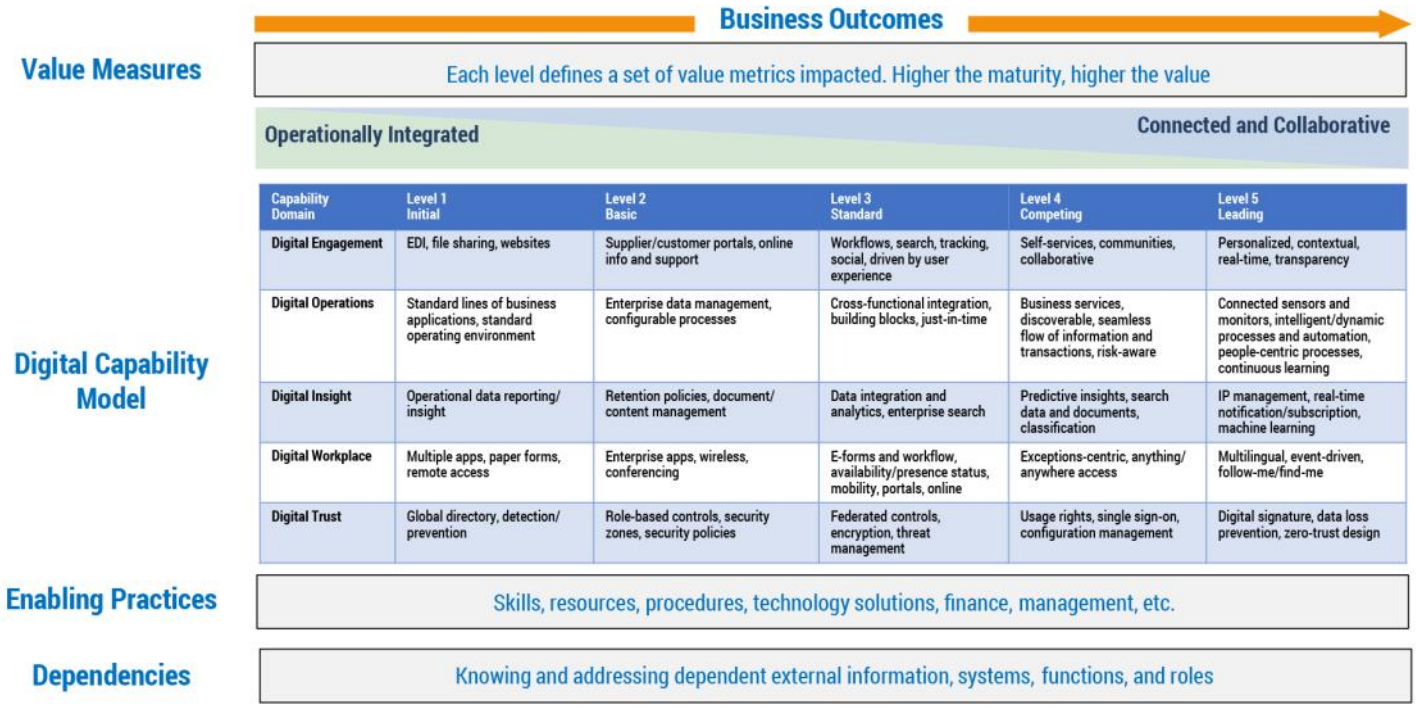
map creates a perfect push-pull: the business is seeking new capabilities based on the capability map, while delivery teams are proactively identifying and providing solution components for the capabilities in the map, thus accelerating the benefit realization and minimizing the cost — the behavior and outcome expected from a digital organization. Now let's examine how we can use the DigitalCMF to assess, plan, and deliver digital capabilities.

Capability Engineering

An impressive strategic vision and precise roadmaps don't create value by themselves. Change creates value. Customers, partners, employees, and organizations must make changes in their behavior or processes for visions and roadmaps to lead to any benefits. By using a structured model and framework such as the DigitalCMF, people can anticipate and plan farther ahead, and they are also able to execute and monitor progress against the plan.

The capability engineering process goes beyond the typical software development cycle. First, to fully realize the potential of a digital capability, we must assess, plan, improve, and manage people, process, information, and technology capabilities. Second, to keep everyone motivated and productive on a long digital journey, we must establish and measure performance indicators or milestone metrics along the journey. These milestone metrics are leading indicators of ultimate outcome metrics. Therefore, in the capability maturity model outlined in the previous section, on the one hand, the maturity levels imply a value roadmap with defined metrics, and on the other hand, each level articulates the underlying requirements and dependencies. Figure 2 visually outlines how knowledge about a capability's value contribution helps plan where we want to be, and knowledge about its construction helps plan and manage the underlying architecture and delivery.

For example, at the low end of the maturity (or value) curve, organizations or individual business functions are operations-centric; thus, value or contribution metrics will be operational in nature. Metrics will include items such as process efficiency, quality of information, and number of incidents. As the organization seeks to become more externally focused, metrics related to being connected and collaborative inside and outside the organization will come into play. Such metrics might include time to detect and respond, customer sentiment, level and quality of engagement, and incident avoidance. These metrics will drive advancement in the maturity and scope of digital capabilities.



Capability Domain	Level 1 Initial	Level 2 Basic	Level 3 Standard	Level 4 Competing	Level 5 Leading
Digital Engagement	EDI, file sharing, websites	Supplier/customer portals, online info and support	Workflows, search, tracking, social, driven by user experience	Self-services, communities, collaborative	Personalized, contextual, real-time, transparency
Digital Operations	Standard lines of business applications, standard operating environment	Enterprise data management, configurable processes	Cross-functional integration, building blocks, just-in-time	Business services, discoverable, seamless flow of information and transactions, risk-aware	Connected sensors and monitors, intelligent/dynamic processes and automation, people-centric processes, continuous learning
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Digital Trust	Global directory, detection/ prevention	Role-based controls, security zones, security policies	Federated controls, encryption, threat management	Usage rights, single sign-on, configuration management	Digital signature, data loss prevention, zero-trust design

Figure 2 — Knowledgebase for predictive engineering.

Digital Workforce (People)	How ready is the workforce for, and how effective is it in using, digital capabilities to drive productive outcomes?
Digital Business (Process)	How agile and responsive are processes with digital capabilities to execute business strategies and achieve desired outcomes?
Digital Solutions (Technology)	How timely and relevant are technology solutions, and how mature are IT capabilities in meeting current and future needs?

Table 3 — Digital readiness.

Now that everyone in the organization understands the objectives and the required capabilities and metrics to measure progress, the next step is to understand the current state of readiness of people, process, and technology in the context of the organization's required capabilities. Using the model, any aspect of the organization can be evaluated for its digital readiness. Table 3 lists the key readiness questions for evaluating the core building blocks of an organization — its people, processes, and technologies.

As an example, let's briefly review how a large, global manufacturing organization improved its digital trajectory. It was investing in technology but was unsure how ready its people and processes were when it came to adopting and leveraging these new technologies. The organization first conducted an internal assessment of more than 400 people across various roles. The assessment identified where people were already comfortable using digital technologies and where the organization needed to drive additional awareness and training to fully realize the return on technology investments. Figure 3 shows the workforce readiness distribution, which was used to develop the communication and improvement plans.

The organization also evaluated core applications, processes, and dependencies and developed a roadmap with a list of clearly defined key performance indicators (KPIs). In addition to employing DigitalCMF to evaluate digital capabilities, the organization used other capability maturity models to assess the state of various business and technical capabilities. Figure 4 shows the capability map, indicating the maturity of the various business and technical capabilities and the dependencies between them. The map is color-coded based on the maturity levels, with red and yellow indicating Level 2 and Level 3, respectively. The relationship between capabilities shows that improvement in digital workplace capability would help improve sales

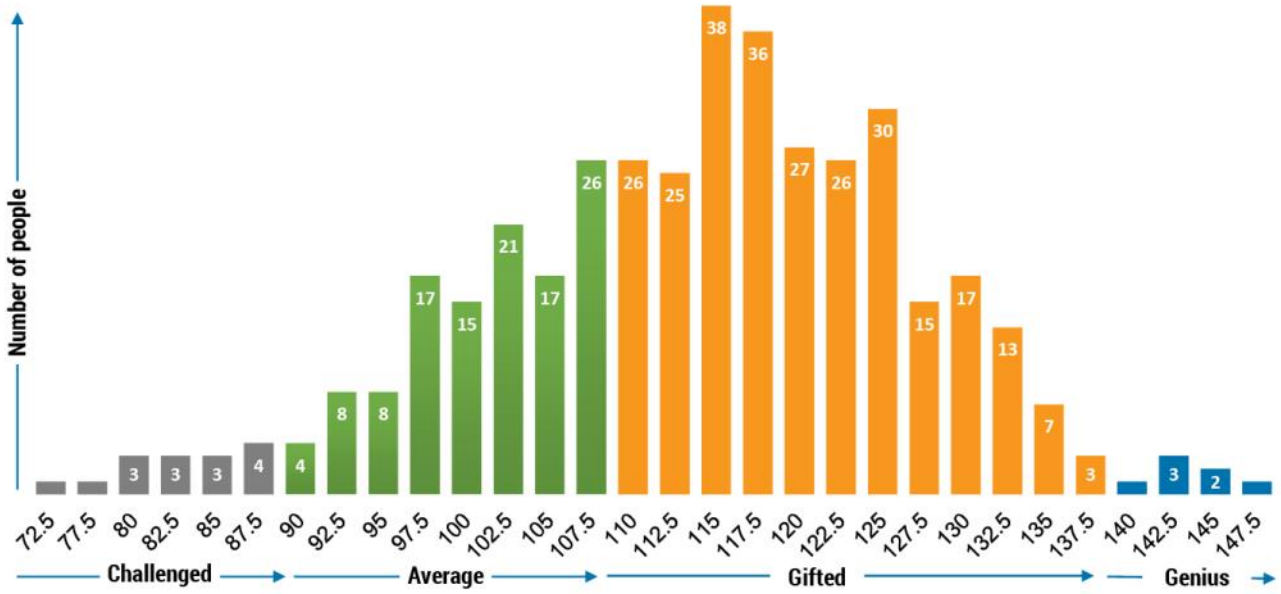

Figure 3 — Workforce readiness.

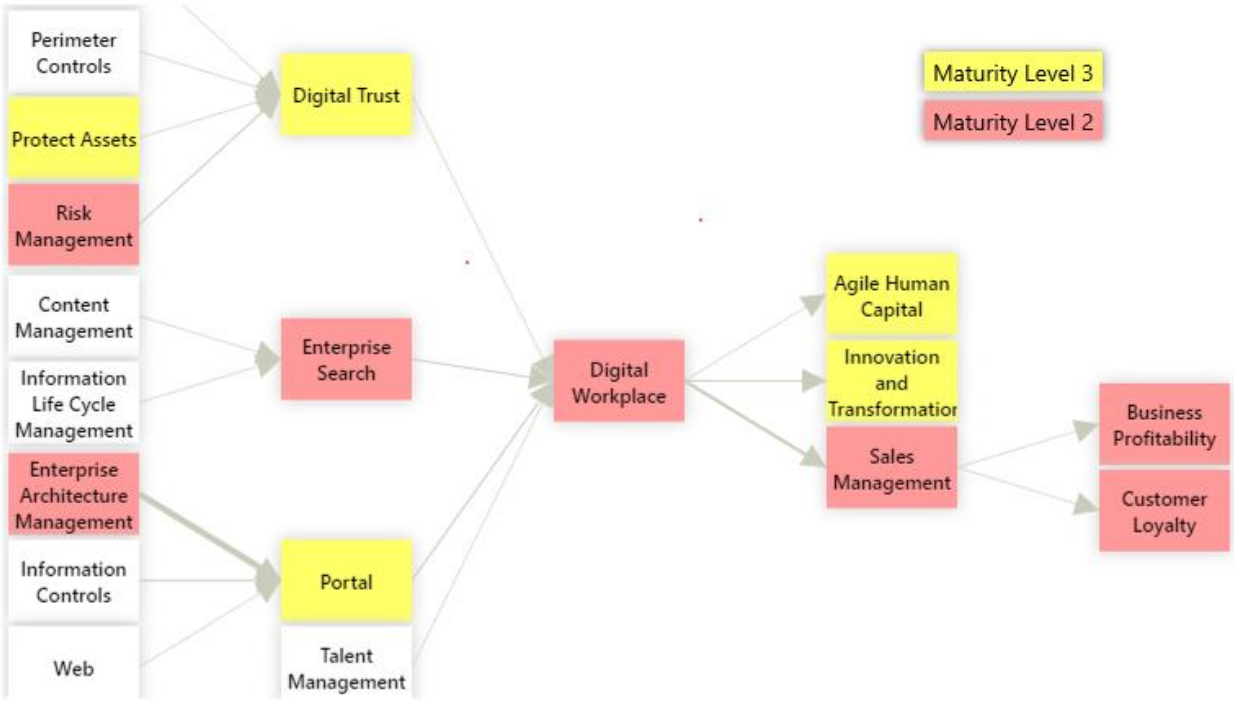

Figure 4 — Assessment of dependent capabilities.

management, which, in turn, would help drive business profitability and customer loyalty.

At the same time, to improve innovation, the organization would need to improve digital trust, search, and other capabilities. The value flow map (i.e., interdependencies with the state of these capabilities) shown in Figure 4 created an aha moment when people recognized the barriers in moving beyond a certain maturity level in their journey. The organization used this insight to develop an outcome-oriented roadmap (see Figure 5) in order to show the necessary business and dependent capabilities.

In parallel to business planning, the process and technical architects used the digital capability map to define business and technical services, identify technologies, define architecture patterns, and develop reusable components, resulting in accelerated delivery of the capabilities in the roadmap at a lower cost. The team developed the architecture roadmap based on the guiding and design principles discussed below.

A digital architecture must be agile, transparent, secure, and frictionless by design for the organization to be digital (i.e., an agile, transparent, secured, and frictionless organization). As architects, we can't expect that the organization will stop the clock, build the architecture, and start again. Thus, to be successful, we need to:

- **Deliver short-term wins and ROI** while building and advancing the "digital" culture
- **Transform an old gas guzzler into a digital electric car** while riding in it
- **Help people achieve their objectives** so they are motivated to accept, adopt, and do things the "preferred" way

So how do we architect change without disruption? How do we enable change at the pace acceptable or needed to support the business? As we review the capabilities across the five digital domains in the model shown in Table 1, particularly at maturity Levels 3-5, four architectural pillars emerge for building, refactoring, and extending any capability or solution component in the ecosystem (see Figure 6):

1. **Event-driven** — seamlessly embracing a continuously increasing list of actors (producers and consumers) with demand for real-time access and action, without disrupting anyone else
2. **Plug-n-play** — transparently connecting anything to everything (i.e., data, people, processes)
3. **Distributed** — embracing a preference for keeping things where they are, rather than consolidating and aggregating just for cost and control

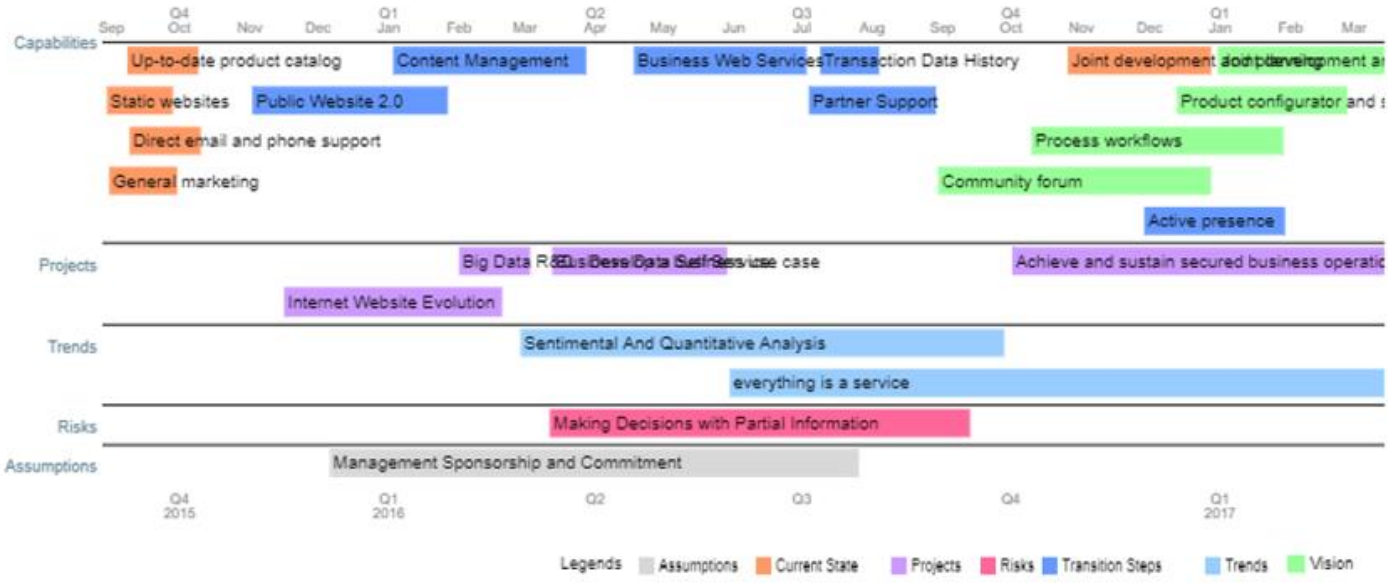

Figure 5 — Outcome-oriented roadmap.

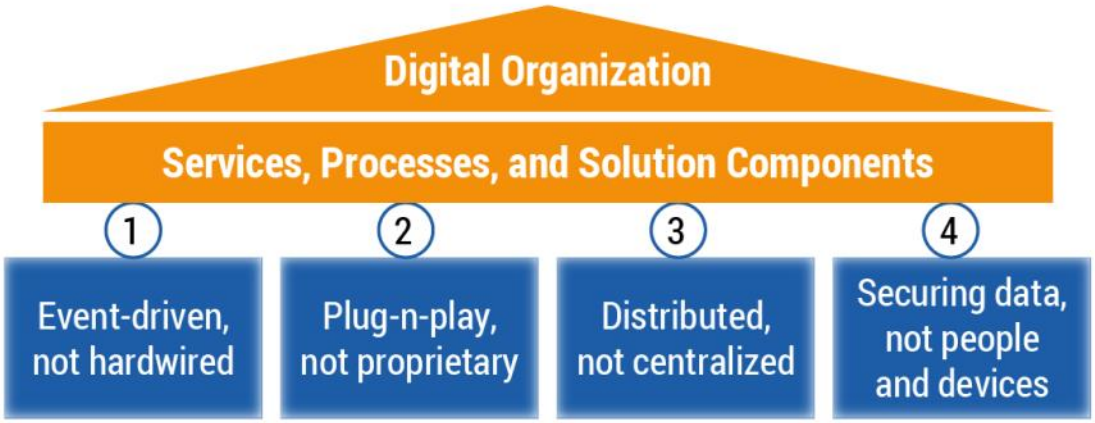

Figure 6 — The architecture pillars of the digital organization.

4. **Securing data** — safeguarding what is at risk (i.e., information), rather than controlling the device, location, or tool someone may use

To advance the digital posture of the organization incrementally and iteratively, the underlying business and technical architectures must be built on these four pillars. We have seen in the past that wherever there was dissonance between the business and technology operating models — for example, centralized IT with diversified businesses, data warehouses for dynamic markets, outsourcing in vertically integrated operations — the architecture models either failed to deliver or went through many reengineering efforts. To avoid the same costly rework and underperformance, we should be engineering capabilities with an underpinning of business and technical architectures based on the same principles and objectives.

When the capability map described in Figure 2 is understood and used as a guidepost by both business-people and technologists, engineering becomes simple, predictive, and cost-effective, and the roadmap to being digital is accelerated.

Capability Governance

It is self-evident that good hygiene and discipline are critical to staying healthy, including in an organizational context. We also know complexity adds a tax on practically everything we do. At the same time, we live

in a diverse world with many good, sometimes competing ideas for how to carry out the various missions we serve. If the organization is serious about becoming digital, it must be diligent about maintaining the health of its portfolio, avoiding non-value-adding complexity and capitalizing on diversity. While the organization is pursuing new digital capabilities, management must ensure policies, principles, and decisions avoid building (and stress removing) unnecessary cost, risk, and barriers to innovation and execution. "Good to great" organizations govern their portfolio following three major disciplines:

1. **Simplification** — keeping things simple. If something does not reduce cost, mitigate risk, or add value, it is not in the portfolio. That something could be a skill, activity, or technology.
2. **Management of technical debt** — ensuring technologies in use continue to be fit for purpose and fit for use. Anything that is no longer a fit is replaced or retired; otherwise, it is well-managed to ensure business continuity.
3. **Freedom within the governance framework** — enabling innovation, local relevance, and cost optimization while ensuring organizational alignment and avoiding silos. Many corporations have established enterprise-wide standards and policies. While "one size fits all" may be great from the point of view of standardization and achieving economies of scale, adaptive sizing is often the more practical approach to leveraging local strengths and variations for speed and acceptance. Let's not forget that time is money, and adaptation is a prerequisite for any benefit realization. Therefore, establish a governance framework that capitalizes on favorable local conditions and controls local variations that create discontinuities.

Savvy and well-governed organizations have adopted many of the following practices, which enable organizations to keep the digital train moving with minimal friction, cost, and effort:

- **Simplification**
  - One in, two out. (For every technology introduced, two are retired/replaced.)
  - Maintain and publish a portfolio of capabilities (business and technology services) and list of technologies used for each capability. Decisions are made everywhere, every day — not just in review meetings. The more we know about our portfolio, the better we will be at making informed decisions. This is core to enabling self-governance.
  - Leverage what we have and be willing to accept what may not be perfect but works; get 80% of what is needed at 20% of the time and cost of a new solution.
  - Search for and use an existing technology/process within the portfolio when seeking a similar capability. Require a valid justification for using multiple technologies or processes to perform similar activities and create similar outcomes.
  - Establish systems of record for highly dependent information — at enterprise and functional levels.
  - Avoid proliferating copies of data; require justification for any data that is copied and persisted.
  - Minimize custom engineering; leverage out-of-the-box solutions and public infrastructure (e.g., using vendors' standard software images, Windows updates, and the Internet rather than creating your own private network).
- **Management of technical debt**
  - Maintain technology at the current or next-most current version. Don't allow anything older than that for technologies that support core business operations.
  - Have an exit strategy for each technology, process, or skill — know when and how to get out of it.
  - Practice risk-based portfolio and lifecycle management — maintain multiyear budget plans incorporating business, technology, and vendor risks.
  - Understand value contribution, cost of ownership, and cost of change for each technology, process, and skill to enable optimal prioritization and planning.
- **Freedom within the governance framework**
  - Define the governance framework — establish which decisions are negotiable, and which are non-negotiable (e.g., users can have their choice of devices but can't purchase or build a solution that may not integrate with other solutions in the future).

- Publish standards and leverageable "common" components and services — make it easier and cost-effective for people to adopt something rather than buy/build.
- Architect solutions for change. Current leading-edge solutions should not become barriers to innovation and competitiveness tomorrow. Organizations must be able to adopt and integrate new, different, or cost-effective alternatives at the right time at the right cost.

Start Anywhere, Go Everywhere

Unless the organization is already disrupted, the digital journey should not disrupt the organization. It should transform the organization and its culture in such a way that it seems natural. Any business or IT functional area, process, or part of the organization can pursue improvements in digital capabilities. This happens when everyone in the organization feels they are part of the journey — when they take ownership and are willing to be accountable. It happens when everyone can relate their objectives and activities to organizational objectives. The connection should be obvious. It is enabled when we use a framework and model that allows everyone to see where they are, where they want to be, why they need to be there, and how they can get there — in such a way that whatever they decide to do, they will all be naturally aligned and supportive of each other. With the digital capability model and the engineering approach described above, any step anyone takes in improving digital capabilities is another thread seamlessly woven into the organization's digital fabric, another milestone on the digital journey. You can truly start anywhere and go everywhere on the digital map to contribute to or create a digital culture.

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IN THE EYES OF THE CUSTOMER

Defining Digital Architecture:
Shifting the Focus to Customer Centricity

by Kaine Ugwu

The digitalization of industries has created the need to define a new type of architecture, one that provides a robust foundation to enable change. As of now, the term "digital architecture" does not have a common industry definition. Nonetheless, with the emergence of digital technologies and the demand for increased business agility, some industry frameworks have emerged to guide the definition of the term. This article provides context for the definition of digital architecture and reveals that customer centricity is at its core.

What Is Digital Architecture?

The concept of digital architecture has been used to describe aspects of IT architecture that emphasize the use of digital technologies to achieve business outcomes. Although this emergent field has not yet been fully defined, the digital revolution has heavily influenced it.

Several known architectures deal with design at different layers. Enterprise architecture (EA) deals with planning from a strategic, big-picture standpoint and comprises various domains. The business architecture domain explains how a company needs to operate to achieve business goals. Data architecture provides an understanding of how to address data management issues. Application architecture deals with application models relevant to business functions, while technology architecture manages the structure and interaction of platform services with logical and physical technology components. Finally, solution architecture glues all the domain architectures together around a particular solution.

Digital architecture is more an architectural discipline applied to solution architecture than an architectural domain of its own. It is a discipline that redefines the solution design process and shifts the focus from the business problem to the customer experience. Digital architecture involves internal stakeholders shifting paradigms from thinking of solutions from within to fully incorporating external stakeholders (customers) in the solution design process.

The Drivers of Digital Architecture

Different organizations leverage various approaches to achieve this paradigm shift, but one of the main drivers of digital architecture is customer centricity. This section highlights this driver as well as some of the other most critical ones.

Customer Centricity

Digital architecture is all about "experience" — creating unique digital experiences for the customer. Architects may achieve experience through several concepts, one of which is "omnichannel" — the cross-channel content strategy that organizations employ to improve the customer experience. Through the omnichannel strategy, cooperation is designed and orchestrated across all customer touchpoints, ensuring the flow of the customer experience. Architects, while designing solutions, must consider the whole customer and service lifecycle and all interactions with the organization.[1] However, the digital architect must be more concerned with providing a great customer experience than with fulfilling business requirements. These architects are advocates of change and, in their solution design, always afford primacy to customer interest. This mode of thinking often means challenging the established dogma in traditional enterprises.

> [Y]ou've got to start with the customer experience and work backwards for the technology.
>
> — Steve Jobs[2]

Digital Leadership

As digital is considered carefully with the adoption of new technologies, being hands-on yet strategic is the differentiating factor for digital architects. The onus is

on the architect to promote new and emerging hardware and software — as well as communications technologies, products, services, methods, and techniques — and to assess their relevance and potential value as business enablers to improve cost/performance or sustainability. Because of the unprecedented pace of change and innovation, digital architects often find themselves surrounded by individuals who bypass standard processes all in the name of "digital." These persons come from both the business and technology sides, and they usually push for quick product releases without consideration for the organization's overall goals and target state. Hence, establishing a robust governance structure is more critical than ever for digital, as the pace of innovation means chaos and unmanageability can set in very quickly. With digital architecture, this is a balancing act, as the traditional governance processes we are accustomed to may create bureaucracy. The digital architect role is a leadership position; this individual enables organizations to leverage digital technologies and must be a digital leader to be effective.

Digital architecture is also about disruption. For the enterprise, this means riding the next wave and evolving with the trend while ensuring adequate governance structures exist.

Digital Strategy

As part of an organization's business strategy, digital strategy aims to answer the question, "How should our business evolve to survive and thrive in an increasingly digital world?"[3] As a driver of digital architecture, digital strategy focuses on how to leverage emerging technologies and digital capabilities to provide favorable business outcomes.

A digital strategy must be tied to the organization's vision and goals to be successful. Indeed, it has been argued that digital strategy represents the influencing of business strategy by leveraging digital resources to create unique value.[4] Several approaches exist for the formulation of a good strategy for digital, especially for legacy companies. For these companies, it's not a question of whether they should change, but rather *how* they should change.[5]

Complementarity and network effects are typical examples of how legacy organizations can begin to leverage digital. In regards to complementarity, digital technologies and core business functions are synchronized and form the digital strategy.[6] Network effects can be direct or indirect. With direct network effects, the value of a product or service increases as more users consume that product or service. Indirect network effects occur when the addition of complementary products or services to a platform or business increase the value of a given product or service.

However, as famed management consultant Peter Drucker allegedly said, "Culture eats strategy for breakfast." If the people driving your digital strategy aren't passionate about the change and committed to it, then there is no strategy to execute.

Digital architecture is also about disruption. For the enterprise, this means riding the next wave and evolving with the trend while ensuring adequate governance structures exist.

Agile and Evolutionary Architectures

Organizations achieve agility by adopting the underlying principles of Agile and the corresponding practices that have made DevOps so critical today. Operational models such as two-speed IT aim to attain speed by releasing half the organization from cumbersome controls and processes. Agile is a mainstay in today's digital world, but the concept of Agile itself is not new. The Agile Manifesto, written in 2001, advocates:

> *Individuals and interactions* over processes and tools
> *Working software* over comprehensive documentation
> *Customer collaboration* over contract negotiation
> *Responding to change* over following a plan[7]

Cutter Consortium Fellow Emeritus Jim Highsmith, one of the original signatories of the Agile Manifesto, has stated that:

> The Agile movement is not anti-methodology, in fact, many of us want to restore credibility to the word methodology. We want to restore a balance. We embrace modeling, but not in order to file some diagram in a dusty corporate repository. We embrace documentation, but not hundreds of pages of never-maintained and rarely used tomes. We plan, but recognize the limits of planning in a turbulent environment.[8]

Digital architecture deals with the entire experience and not just the solution delivery. Hence, customer feedback means that defined architectures will change and evolve. The concept of evolutionary architectures supports incremental, guided change as a first principle

across multiple dimensions and is one of the core drivers of adopting digital architecture. Examples of evolutionary architectures in practice include concepts such as architecture governance automation using fitness functions, defined as "a mechanism that allows architects to objectively define governance goals and principles and automate their application."[9] By establishing an architectural fitness function, architects can reconcile software and EA. In cloud computing, many cloud service providers have introduced solutions that automate compliance, such as infrastructure as code, which can automate provisioning based on architectural principles and provide continuous monitoring.

Most digital transformation initiatives fail not because they lack capabilities or intelligent, talented people but because they lack precise objectives, digital leadership, and an innovative mindset.

Digital Architecture as an Enabler of Digital Transformation

> Any company that hopes to survive in the digital age must move beyond zero sum thinking. The recipe is easy to understand, but hard to implement; leaders must set and communicate clear business goals in terms of time to market, quality, and cost. They must then invest the necessary resources for everyone in the organization to collaborate so they can solve the problems that prevent them from achieving these goals. Nothing should be out of scope — enterprise architecture, process, budgeting, and governance, risk and compliance.
>
> — Jez Humble[10]

Companies that cannot distinguish between digitization and digital transformation are making a severe blunder in this age. Digitization refers to changing analog data into a digital format. Digitalization, in contrast, refers to using digital technologies to improve business models. Digital transformation usually involves several digitalization initiatives. In essence, we digitize information and digitalize processes and business operations, but we digitally transform the business and its strategy. Leveraging technology to enhance business performance fundamentally and introduce digital capabilities, as well as enhance the use of legacy platforms such as CRM to change customer relationships, internal processes, and value propositions, is an example of how you transform a business digitally.

In addition to this, we can take digital transformation a step further with the crossing of digital architecture with other disciplines — such as customer experience, cloud computing, data science, manufacturing, and physical and life science such as biology, chemistry, biochemistry, and physics — to birth new business models and revenue streams. Digital transformation involves rethinking a business's value proposition and not just its operations. At the core of this transformation is digital architecture.

Unfortunately, most digital transformation initiatives fail not because they lack capabilities or intelligent, talented people but because they lack precise objectives, digital leadership, and an innovative mindset. Goals — such as what the target business outcomes are — must be clearly defined because a digital transformation journey on its own is already a very complicated endeavor. Digital architecture is what simplifies the journey and makes sense of it. It is vital to begin with a clear objective in order to create the right architecture.

Another leading cause of failed digital transformation initiatives is a lack of technical adaptation to changing consumer, customer, and emerging technologies. A digital architecture, which should be agile and evolutionary by nature, helps embrace uncertainty and efficiently deals with change. In a bid to hastily launch "digital applications," companies without a supporting digital architecture introduce complexity to their IT landscape, making it tough to manage.

Frameworks and References for Digital Transformation

Some reference architectures and frameworks for digital transformation exist today, and more are in the works. In the telco industry, for example, the TM Forum's Open Digital Architecture (ODA) project is a "more agile replacement for traditional operational and business support systems (OSS/BSS) architecture.… It combines proven cloud-computing best practices with TM Forum's work on zero-touch orchestration operations and management; digital ecosystem management; data analytics; artificial intelligence (AI) and a suite of more than 50 Open APIs in use today by over 600 companies worldwide."[11]

The Open Group, a global consortium that works to develop open, vendor-neutral technology standards and certifications, has released the Digital Practitioner Body of Knowledge Standard (DPBoK Standard), which maps to the consortium's IT4IT reference architecture: "The IT4IT reference architecture is elaborate enough to support the largest digital delivery organizations and includes components that are critical from the earliest days of an organization's evolution."[12] At the time of writing, the consortium was also working on the Agile Architecture Framework Standard (aka O-AAF Standard), which is "a comprehensive revision of core architecture practices — updated to compliment [sic] modern, digital operating models and agile development methods."[13] From a software architecture perspective, reference architectures such as the Internet of Things (IoT) Reference Architecture and the Microservices Reference Architecture support digital transformation.

Digital Architecture in Practice

There is no silver bullet for executing a digital strategy, and while several approaches for formulating one exist, execution requires a clear plan. The first step usually is to define a digital operating model and digital enterprise architecture that allow for the rapid integration of new digital technologies to fuel the business transformation. What happens next depends on several factors, such as the industry and the company's core competencies and offerings. However, the suggested next steps and techniques for execution include:

- **Revamp traditional EA principles.** EA teams should revise traditional architecture principles, policies, and standards to enable the adoption of digital architecture tenets and best practices. These principles should not only emphasize operational aspects, but they should also focus on customer centricity; that is, the customer lifecycle, customer experience, and customer value.

- **Leverage design thinking.** Digital architects may provide a more desirable solution if they collaborate with the customer and listen to these end users in order to improve their experience. Architects can drive the solution by facilitating design workshops and using techniques such as design thinking.

- **Ensure C-suite stakeholder engagement.** Architecture teams can help fast-track a company's digital transformation initiatives by engaging in conversations centered around business strategy, which now deals more with technology. Enterprise architects can develop a close alignment between business and IT by helping to interpret, in business-speak for business leaders and managers, architectural issues or opportunities with emerging technologies.

There is no silver bullet for executing a digital strategy, and while several approaches for formulating one exist, execution requires a clear plan.

- **Focus on customer pain points.** Digital transformation involves recreating existing business models with digital technologies and platforms. This statement implies that almost every business right now is an IT company. Hence, instead of concentrating on the enablement of "business" priorities, these companies should focus on the delivery of digital experiences for the customer using the technology. Digital architects can align the IT function's priorities with the business's priorities by tracking their accomplishments concerning the business capabilities that the architecture delivers. Such capabilities should focus on providing solutions to specific problems that the organization's customers are experiencing and should result in delivery of specific business outcomes; for example, implementing predictive analytics to know what the customer may want next and proactively suggesting these products or services to the customer.

- **Enable innovation with emerging technologies.** Experimenting with innovative ideas and rapid prototyping are crucial capabilities for digital companies, especially for large ones, where innovation is usually stifled. Introducing a digital architecture would enable prototyping and proof of concepts via regular hackathons and open source communities.

Conclusion

The combination of digital architecture and digital experiences with business operations and digital

platforms and capabilities is the winning formula in the digital revolution era. Hence, for architects, key questions to reflect on include:

- Is your organization getting the results it needs quickly?
- Is your enterprise architecture relevant and pragmatic, or is it "ivory tower"?
- Is your architecture flexible enough to support increasing business demands and changes arising from customer feedback?
- What is your digital enablement strategy?
- Leveraging digital platforms and technologies, what new unique capabilities are you considering in order to win in the market?
- Finally, as an architect and digital leader, are you more of a gatekeeper or an enabler or both?

Having a vision is not the hurdle. The hurdle is carrying out the logical breakdown of (digital) strategy to business capabilities to architecture to programs to projects — and executing this in the digital transformation context.

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