



AGILE IT ORGANIZATION DESIGN

FOR DIGITAL TRANSFORMATION
AND CONTINUOUS DELIVERY



SRIRAM NARAYAN

FREE SAMPLE CHAPTER



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Praise for *Agile IT Organization Design*

“Continuous delivery is often described from the perspective of the technicians. This is understandable because that is where it started, but it does the process a disservice. Continuous delivery is a holistic approach. It requires change across the organization and it encourages such change, to the betterment of the groups that practice it. This book addresses that problem and looks at CD from an organizational perspective. It starts from Dan Pink’s ideas of intrinsic and extrinsic motivators and describes how to structure an organization for success—how to encourage a focus on autonomy, mastery, and purpose that will motivate your teams and produce high-quality results. This book takes a look at all aspects of organizational design that impact the ability to deliver regular, small, high quality changes. If you follow the advice in this book, your organization will be the better for it.”

—*Dave Farley, author of Continuous Delivery*

“A number of years ago, Silicon Valley marketing guru Geoffrey Moore quipped, ‘A bank is just a computer with a marketing department.’ Today, technologies—cloud, social, big data, the Internet of Things, and mobile—continue to drive this unprecedented digital transformation in organizations. As such, the need for agility has moved from software development to corporate boardrooms. Sriram’s book makes the case that to thrive in these fast and uncertain times, enterprise leaders need to rethink how IT, not just software development, is organized, structured, and measured. His book provides guidelines, not prescriptions, which enable innovation, adaptability, and responsiveness at scale.”

—*Jim Highsmith, Executive Consultant, ThoughtWorks, Author of Adaptive Leadership*

“Very hands-on and operational book for management of Agile-based development. Provides valuable insight for IT practitioners. A must read for IT professionals.”

—*A.V. Sridhar, Founder, President & CEO Digite, Inc.*

“Agile IT Organization Design is an engaging, enlightening, and immensely practical book. While many authors have addressed Agile software development, very few have tackled the wider topic of the more systemic changes necessary to move from Agile software to an agile organization, and onwards to ‘digital transformation.’ Even fewer have done so at more than a very theoretical level. Drawing heavily upon his substantial practical experience, Sriram Narayan’s

book explores the pitfalls of many of our current ‘organizational wisdoms’ and gently, but convincingly, suggests appropriate and relevant alternatives to try in their place—all the time backed up by real-world examples. I highly recommend the book to anyone interested in, or struggling with, the challenges and opportunities of achieving organizational agility.”

—Chris Murphy, *President and Chief Strategy Officer, ThoughtWorks*

“Agile and continuous delivery transformations require changes in technology, process, and people. This book is the first to tackle the people aspect in depth, and it does this very well. A must read for those taking the journey!”

—Anders Wallgren, *CTO, Electric Cloud*

“Agile IT Organization Design tackles all the problems that we just want to ignore. Relying heavily on hands-on experience rather than theoretical exercises, Sriram provides concrete actions to address the issues with Agile software development and continuous delivery at a structural and organizational level. He clearly addresses issues of finance, accountability, and metrics, not just team structure and team processes, and gives many examples and scenarios to help understand how these issues manifest and how the proposed steps work to resolve the issues. Organizational transformations to Agile often fail, not because the individual processes and practices break down, but because the organization itself—its power structure, its organizational norms, and its culture—fight against the gains that Agile has the potential to bring. Sriram focuses our attention on the systemic problems, but then provides action steps to allow us to address these problems in our context. This book presents no silver bullet, as those don’t exist. However, Sriram provides for organizations a way to start facing reality and moving towards an organization that supports not only Agile software development but organizational and business agility.”

—Rebecca Parsons, *Director at Agile Alliance & CTO at ThoughtWorks*

“Sriram’s book addresses the rarely-approached topic of Agile organization design in a very pragmatic and thorough manner. It does a great job of explaining the value brought by Agile and DevOps approaches in enterprise-scale organizations, and gives strong details on the ‘how’ to get there. It also paints a very practical picture of how the different processes of the company (budgeting, staffing, metrics, etc.) will be affected by the Agile organizational choices. I see it as the perfect companion book for a large-scale Agile transformation effort.”

—Regis Allegre, *VP Software Engineering, Cloudfwatt*

“Businesses today are discovering that if they are to build ‘digital first’ experiences for their customers, they need to rethink how their product, marketing, and technology teams work together. Sriram’s book pulls aside the curtain to reveal that the best-kept secrets of the world’s top performing digital organizations are actually very accessible to all. It serves as a pattern language for management of the modern digital enterprise.”

—*Adam Monago, VP Digital Strategy, ThoughtWorks, @adammonago*

“Agility is so much more than stand-ups and test driven development. Even the best practices won’t yield results unless backed by the right leadership. Sriram’s book is an important contribution to the all-too-bare bookshelf on leadership of IT organizations. He mixes theory and practical insights in the right measures and the result is as readable as it is full of usable insights.”

—*Nagarjun Kandukuru, VP Global South Strategy, ThoughtWorks*

“Sriram covers everything the Scrum coach didn’t tell you. Most books on Agile stop at a team and project level, and that’s exactly where the organizations tend to get lost in the real world of pre-existing organization structures and procedures—which in turn become blockers to achieving ultimate business agility. If you ever wonder why your attempt at Agile is floundering, this is one book where you’ll find some answers for sure.”

—*Puneet Kataria, Vice President Global Sales, Kayako*

“The field of Agile is an evolving, moving target and there is little in terms of guidance for managers and staff that are trying to implement it within an enterprise context. This book provides a complete guide to all of the organizational aspects of implementing Agile within the enterprise context, as well as providing extremely useful examples and cogent advice. I would recommend this book to anyone with a general interest in Agile through to senior managers looking to reenergize their enterprise organizations using the principles and practices of Agile.”

—*Ken Robson, Global Head of Trading Technology, Danske Bank*

“Sriram has pulled off an audacious attempt at a unified theory of IT. This work led me through the incredible range of issues that I recognize, slotting each one into context and building a vision of how things can and should be. If you want to be elevated above the trenches of Agile and DevOps—to get a better view of where they fit in the digital world that includes sales, finance, governance, resourcing, delivery, and most importantly, people—then read this book. A compelling read that I’m already referring back to.”

—*Duncan Freke, Development Director, thetrainline.com*

“Sriram makes a convincing case that digital transformation efforts need IT agility. He also does a great job of explaining how IT agility is more than just engineering and process. This book is a valuable read for those on the digital transformation journey.”

—*Shashank Saxena, Director, Digital and eCommerce Technology, The Kroger Co.*

“Adopting Agile software development practices is not just an IT change, it is an organization-wide change. Sriram goes through every aspect of what this means to an organization and gives options for how to bring changes in, including hard-to-change areas like project funding. This book is thought provoking, an easy read, and includes great examples.”

—*Jeff Nicholas, Director, PB & WM IT Digital Banking APAC, Credit Suisse*

“This book is for anyone who is looking for clear and focused guidance in the pursuit of modern product delivery. Any transformational leader will find this book a great tool that provides answers to many of the problems of Agile transformation at scale. A great jump start for those looking to improve their effectiveness and responsiveness to business, Sriram’s book recognises that people leadership is the DNA of any Agile transformation.”

—*Marcus Campbell, Delivery Director, Semantico*

“Entrepreneurial organizations thrive on continuously adding value, rapidly innovating, and staying close to their customers. Similarly, Agile software development emphasizes continuous, incremental improvements, quick response to change, and close collaboration. Sriram makes a compelling case for Agile design of IT organizations in large enterprises. He goes well beyond describing how an IT organization can adopt Agile development methodologies to explain how any successful digital transformation within a large enterprise must encompass strategy alignment, project portfolios, IT staffing, budgeting, and more. This book is a great read for those who want a digital transformation to have impact both within and beyond their enterprise IT organization.”

—*Ron Pankiewicz, Technology Director, VillageReach*

“Organizational structure is a key enabler for a company to achieve its *raison d’être*. This book lays out the rationale for organizing IT organizations around Agile software development concepts. It provides practical guidance on wide-ranging success factors including tangible org elements such as structure, team design, and accountability, and intangible cultural elements such as alignments and norms. These concepts will certainly help IT companies turn the tide on huge cost and time overruns that are typical on large IT projects.”

—*Paul Kagoo, Engagement Manager at McKinsey & Co.*

“Outcomes matter in an increasingly ‘winner takes all’ digital arena. A true digital transformation undertaking, driven by the need to build competitive advantage, is marked by an increase in responsiveness, insights, and engagement, not just cost effectiveness. IT organization is a key partner in this transformation but is seldom structured to succeed in most enterprises. This book makes a case for how IT organization needs to be weaved within outcome-based teams, not activity-based teams, to drive agility and competitive advantage. In general, organizational design is very expensive to engineer in real world situations but this book takes on this tough problem by providing some frameworks and considerations for the reader to evaluate the validity of outcome-based structure in their organization.”

—*Vijay Iyer, Sr. Product Manager, NetApp*

“I found Agile IT Organization Design to be well organized with an in-depth knowledge of challenges that IT organizations face, while providing possible ways to address those challenges. Moreover, it was eminently readable and I found myself readily recognizing the problems described within. It may seem odd to describe a business-oriented book as such, but I found this to be an enjoyable read!”

—*Randy R. Gore, Program Manager, IBM*

“As enterprises try to ramp up their digital transformation initiatives, there will be an ever-increasing need for better collaboration between IT and business. New org structures will fuel this collaboration. Sriram’s book is a timely elaboration of the importance of org structures for the success of digital initiatives large and small.”

—*Dinesh Tantri, Digital Strategist, @dineshtantri*

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Agile IT Organization Design

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Agile IT Organization Design

*For Digital Transformation
and Continuous Delivery*

Sriram Narayan

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For dear departed Amma and Appa



For Swati—my wonderful wife and elixir of my life

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Preface

Enterprise IT has mostly underperformed. It's been a struggle to deliver IT-as-enabler, to say nothing of IT-as-differentiator. Partly as a result, it is common to hear of strained relationships between business and IT. This doesn't augur well for digital transformation initiatives. I submit that a prime reason for the sorry state of affairs is poor organization design. A June 2014 McKinsey Global Survey¹ also bears this out. It found at larger companies that structural issues are viewed as the top hurdle to meeting digital goals.

Organization design is traditionally considered from an industry-agnostic point of view. Although perceived to be the domain of HR, this is rarely the case when planning re-orgs. In contrast, this book explores organization design by IT leadership for IT organizations. It aims to provide a sound basis for IT organization design. This is essential because, in practice, IT organization design is rarely thought out from a baseline of principles. The prevailing design is mostly a product of happenstance, mergers or acquisitions, people-retention compulsions, and the ideas of whoever is in charge at various levels in the organization. It resembles how software accumulates technical debt over time unless we periodically step back and reassess the design.

Organization design in the 21st century is not merely structural but also cultural, political, operational, and physical. I draw upon several sources—my industry experience; the existing literature on organization design, Lean, and Agile; and several well-regarded works on individual and team psychology to present a synthesis for an Agile IT organization design. Many of the structural and operational configurations I suggest are already in place at several new-generation ISVs. I explain how the rest of enterprise IT could benefit from them. On the other hand, the chapters addressing politics and culture are equally relevant to ISVs and the rest of enterprise IT.

A number of reviewers suggested (in good faith) that I use Lean instead of Agile in the title in order to improve marketability. Apparently, Lean is “in” whereas Agile is jaded. However, I chose Agile because its strong people-orientation credentials are core to the solutions I offer.

1. http://www.mckinsey.com/insights/business_technology/the_digital_tipping_point_mckinsey_global_survey_results

Running counter to the trend of inflating an article-length topic into a book, I have packed a wide range of topics into a single book because I believe they are interlinked and a synthesis is required. It is also a sign of the wide scope of an IT leadership role. Yet the coverage isn't exhaustive. Topics such as innovation, knowledge management, people diversity, and performance reviews are not covered or are only mentioned in passing.

Many of the topics covered here come under the scope of IT governance. But conventional IT governance gets into discussing standards and frameworks too soon. The discussion in this text is mostly standards and frameworks agnostic. Besides, the cultural aspects I address are not generally considered part of the scope of IT governance.

This isn't a cookbook. I describe problems, explore causes, and offer solutions. However, I stop short of detailing steps to implement solutions. In a few sections, steps for migrating from existing situations are provided. In addition, the last chapter has a section that suggests a sequence of adoption of various recommendations. But overall, planning migration tends to be contextual. I expect that the intended audience will be able to draw upon the advice provided here and plan their own migration. Besides, I might be available for consulting.

Many of my recommendations here have succeeded in some shape in the real world. Wherever evidence of success or failure is publicly available, I have included it. In other cases, the recommendations are supported by reason and examples from first-hand experience. Once we accept that conventional approaches haven't delivered needed results, it gets easier to consider the alternatives suggested seriously.

I provide many short, example scenario narratives to illustrate problems with the status quo. They are inspired by real situations, but names of companies, people, and other details have been altered. Any resemblance to real entities is coincidental and unintentional. They aren't full stories in that they don't include a resolution. However, the chapter content that follows the narrative provides ways to deal with the problem. The more you are able to relate the scenarios to your own experience, the more you will find the rest of the chapter to be illuminating. Many other inline examples are drawn from e-commerce ("e-tail") so that they remain accessible to a diverse readership.

The first four chapters are a prerequisite to reading the rest of the book. Chapters 8, 9, and 10 on projects, finance, and staffing, respectively, go together. The rest of the chapters may be read independently. There are many cross-references between chapters despite my efforts to keep all the related arguments together. This is a sign that the topics are interdependent.

Given the broad scope, I had to bring up several subsidiary topics without going off on an explanatory tangent. To compensate, I have provided footnotes that link to freely available explanatory material from credible sources on

the Internet (rather than offline or behind a paywall). Readers of the physical version may access these links from the book's companion website at agileorgdesign.com.

Who This Book Is For

- Execs and others who decide on matters of IT organization design or governance
- Senior management at ISVs and Internet businesses
- VP or director or head of IT, product management, engineering, or software development
- Business heads who interface with IT and IT-business partners
- Finance controllers, IT finance analysts, and investment managers
- Investors in digital businesses
- Techies who have the ear of executive leadership
- ICT strategists
- Members of IT governance groups
- Process quality/SEPG group members, process consultants, and coaches

This book is meant for medium to large IT organizations (50 to thousands of IT staff) that are facing challenges with IT and business agility. By IT organizations, I mean those that serve their own business directly (software is the business; e.g., ISV) or indirectly (Internet businesses, enterprise IT). That said, IT suppliers (IT services companies) might be able to use the contents herein to engage more effectively with their clients.

Why have I included investors in the target readership? Problems in organization design do not show up promptly in financial statements. Yet, in the long run, they have the potential to make or break business outcomes. Since investments tend to have a longer tenure than executives do, investors in digital businesses would do well to understand this topic and hold executives accountable.

If you have already achieved IT and business agility, the stuff here may seem obvious or old news. However, you are likely to encounter some new angles, arguments, or techniques. That said, this is not an introductory book by any means. It is assumed that the reader has some experience of software delivery and has at least a passing familiarity with Agile methods like Scrum or XP and the basic ideas of DevOps and continuous delivery.

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Acknowledgments

Although I don't have first-hand experience of caring for a newborn baby, writing this book did seem like how it might be. I could not imagine how my first draft of about twenty thousand words would grow into a healthy one-year-old of more than seventy thousand. And just like any IT project worth its overrun, I (and my editors at Addison-Wesley) have had to deal with scope creep and effort and schedule overruns. But staying true to the advice in this book, we tried to be value driven rather than plan driven. I believe that you will find value in it as well. A lot of it is due to the support, guidance, and encouragement of several people kind enough to help me. I am grateful to all of them.

Pramod Sadalage, a friend, colleague, and author of a number of books on applying Agile engineering techniques to data, was first to help. He recommended my work to Bernard Goodwin at Addison-Wesley, who then became my editor until his retirement at the end of 2014. Christopher Guzikowski then took over and brought this book to a successful launch. Michelle Housley provided great support throughout via developmental editing, coordinating with reviewers, and helping me get through paperwork. Stephanie Geels provided excellent copyediting, and Kesel Wilson and several others at Addison-Wesley ably helped with the production process. There are also others who I didn't personally interact with, like the cover designer, compositor, and the proofreader. They have all been instrumental in bringing this work to fruition.

Pramod also reviewed my manuscript more than once. Early in this process, I was fortunate to receive a gracious offer of guidance from Jim Highsmith—a famous Agilist and also a colleague at ThoughtWorks. Thank you, Jim, for mentoring me over Skype calls and several e-mails. Dinesh Tantri who used to be digital strategist at ThoughtWorks helped crystallize my understanding of the digital transformation phenomenon. Ulrich John Solomon and Suresh Kumar Bellala from ThoughtWorks finance team helped me better understand the nuances of IT finance and validated some of my recommendations. Duncan Freke, development director at Trainline, enthusiastically supported my writing through several reviews and conversations around his own pioneering IT re-org efforts.

Special thanks to full-length reviewers who, despite their busy schedules, took time to read and offer detailed feedback: Aman King, Dave Farley, Dougal

Watt, Gil Broza, Keith Dodds, Randy R. Gore, Nagarjun Kandukuru, Sebastian Silva, Shyam Kurein, and Tom Poppendieck. Thanks also to other reviewers who managed to give the manuscript what time they could: Dave Whalley, Marco Abis, Puneet Kataria, Rajesh Babu, Rebecca Parsons, Sitaraman Dharmarajan, Sagar Paul, and Sunil Mundra. And of course, thanks to all those who read my manuscript and provided endorsements. Several colleagues helped obtain endorsements: Alagu Perumall, Anand Vishwanath, Vishwanath Nagarajao, and Sagar Paul.

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I'd also like to thank Alanna Krause of Enspiral for permission to quote and use screenshots from her projects, Jo Freeman for permission to quote from her essay, and Henrik Kniberg for permission to quote from his writings and adapt one of his illustrations.

In a book on the evolution of buildings called *How Buildings Learn*, author Stewart Brand offers thanks to a “vast network of uncredited influence” that helped shape his work. I am similarly indebted to networks within ThoughtWorks and in the Lean and Agile community at large.

About the Author



Sriram Narayan, an IT management consultant with ThoughtWorks, has provided IT agility guidance to clients in telecom, financial services, energy, retail, and Internet businesses. He has also served as a leadership coach and a director of innovation. He was a founding member of the ThoughtWorks technology advisory board—the group that now authors *Technology Radar*.

During a two-year stint at the products division of ThoughtWorks, he helped with product innovation and advocacy on Go—a tool that helps with continuous delivery. He has also worn the hats of a developer, open-source contributor, manager, product owner, tester, SOA architect, trainer, and Agile coach. An occasional blogger and speaker at conferences, his writings, talks, and contact information are available from sriramnarayan.com. The opinions in this book are his own.

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Glossary

Note: *The definitions here convey the sense in which a term is used in this book. They may not always be industry-standard terms or definitions.*

Activity Action that contributes to an outcome.

Activity-oriented team A team that is responsible for a single activity. Usually a team of specialists (e.g., marketing, sales, support, development).

Agile In the context of this book, the word *Agile* (capital A) is used to refer to a mindset or methodology that is aligned with the values and principles outlined in the Agile Manifesto. It is not used in the sense of the common English adjective.

Asynchronous communication Channels of communication that don't require parties to the communication to be available simultaneously. For example, e-mail and online forums are asynchronous while phone, VOIP, tele/web conference, chat, and face-to-face meetings are synchronous.

Build vs. buy or make vs. buy A decision to build an IT solution (using in-house or outsourced talent) versus buy an off-the-shelf solution (increasingly in the form of SaaS).

Capability In the context of this book, *capability* refers to the people and systems that make up a business-aligned IT capability.

CapEx Expenditure of capital toward creating or enhancing assets (IT assets). It is recorded in the balance sheet. It shows up in the income statement only as an annual depreciation.

Continuous delivery (CD) An approach to delivering software that reduces the cost, time, and risk of delivering incremental changes *to users* through seamless automation from development to deployment that makes production releases uneventful and frequent.

Continuous integration A practice followed by Agile software development teams of frequently checking-in code under

development into a version control system, which then auto-triggers a comprehensive suite of fast-running tests after each check-in. It ensures that the codebase retains its functional integrity in the face of rapid development.

Cross-functional team An interdisciplinary, outcome-oriented team. It may consist of hard-core specialists, generalizing specialists, or generalists.

Cycle time The elapsed time for an item (feature) to progress through the complete value stream. Elapsed time = value-added time + wait time.

DevOps DevOps (development + operations) aims to improve collaboration between the development organization and IT-operations by locating these skills within a single team and by emphasizing culture, automation, measurement, and sharing.

Digital business A business that offers its customers a transaction space that seamlessly bridges digital and physical worlds.

Digital transformation Digital transformation is a change program that aims to transform a primarily brick-and-mortar business into a digital business.

Function lead A catch-all term in this book for people who provide leadership for specialist functions (e.g., VP or director or head of marketing, sales, development, architecture, quality, or program management).

Handoff The act of handing over a work item from one specialist or team to another. A value stream with a series of N specialist activities will have N – 1 handoffs.

Internal scope Scope internal to a feature. Flexible internal scope is key to leveraging a problem-solving approach as opposed to a deliver-to-planned-scope approach.

Internet business A business that doesn't sell software but whose revenues are all (or mainly) via Internet transactions (contrast with ISV).

ISV Independent software vendor (increasingly of the SaaS variety). New-generation examples include companies such as Atlassian, Box.com, and GitHub.

IT-B The part of the IT organization that creates value. The people in charge of conceiving solutions and building (and running) software. Wages of IT-B personnel are mostly treated as CapEx.

IT-I The part of the IT organization that protects value. The people in charge of IT infrastructure and assets. Wages of IT-I personnel are mostly treated as OpEx.

OpEx The ongoing, running cost of IT systems and infrastructure, including the wage cost of people dedicated to this. It shows up as expenditure in the income statement.

Outcome An independently valuable and achievable business outcome.

Outcome owner A catch-all term in this book for someone (below the rank of an exec) who is accountable for and dedicated to a business outcome. For example, product manager/owner/champion, chief product officer, or program/project manager.

Outcome-oriented team A team that has autonomy and accountability for an outcome (e.g., a cross-functional product team).

SaaS Software-as-a-service is a model of distributing software in which the vendor hosts the solution for the customer rather than it being installed on customer's infrastructure.

Silo Organizational silos are units or departments that tend to protect themselves and not work well with other units.

Systems of differentiation or engagement The IT applications that help differentiate a business offering in the market or help drive engagement with customers.

Unscripted collaboration Collaboration between teams is unscripted when it occurs outside of regular, scheduled meetings and without prior planning, permission, or approval.

UX (XD) User experience (experience design).

Value stream A value stream (in this book's context) is a series of activities required to deliver a business outcome.

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Chapter 5

Team Design

The first four chapters were short and introductory. The water gets deeper from here on. This chapter describes how various multiteam configurations, including the matrix organization, reduce organizational agility and how having fewer outcome-oriented, cross-functional teams can help. It explains why activity-oriented teams cannot work with small batch sizes required for lower cycle time. It covers why testing and maintenance are not separate activities and how certain configurations of outsourcing work better than others do. In terms of the key themes laid out in Chapter 3, the discussion in this chapter expands on organizing for responsiveness over cost-efficiency.

5.1 Framing the Problem

Why do business-IT organizations end up in situations where multiple teams are collectively responsible for a single business outcome? Here are some typical reasons:

- The scale of the problem is such that a single team would be unwieldy.
- Organizational boundaries
- Functional (activity-oriented teams)
- Regional (distributed teams)
- Business (product teams)
- Contractual (e.g., outsourcing)
- Shared support services (e.g., IT helpdesk, product support)

Whatever the reason for multiple teams serving a single outcome, once they are in place; it reduces the effectiveness with which the larger outcome may be realized. Why? Because collaboration within a team can be continuous, but collaboration between teams is always discontinuous (discrete). Meetings, for instance, are a great indicator of discontinuous collaboration. Continuous delivery needs continuous (and unscripted) collaboration. Effective collaboration on any given task between two individuals X and Y on two different teams depends on the following:

- Their individual dispositions to collaborate
- Their history of working together (relationship)
- The prevailing interteam communication protocol
- Whether the task has the same level of importance and urgency for both teams

The last two points can be affected by organization design. Can two individuals, X and Y, simply meet with each other, agree on what is required, and go back and do the work? Do they have to involve their respective managers in the process? Do the managers have to sanction the time for it? Does it all have to be via some system of record? The more process and indirection there is, the greater the friction for effective collaboration.

By contrast, people within a team don't have to schedule meetings to collaborate with each other. They collaborate continuously and get into huddles (informal, ad hoc meetings—virtual or face to face) on demand. But given that multiple teams are unavoidable and that it reduces effectiveness, how can we design teams so that the most important outcomes are affected the least? This is the basis for the rest of our discussion in this chapter.

5.2 Activity-oriented Teams

Sales, marketing, product development, support, recruitment, and finance are all examples of specialized competencies. It is quite conventional to have a separate team per competency of this sort. Often called *specialist teams*, we call them *activity-oriented teams* to convey that they are formed around activities rather than outcomes (Section 4.1). Activity-oriented teams are a form of functional organization. In terms of traditional staff and line terminology,¹ all staff and line functions are activity-oriented teams when they are organized separately by function.

1. http://en.wikipedia.org/wiki/Staff_and_line

For example, it is common to organize by specialization for a given line of products and assign a manager (full or part time) per line item below:

- Inside sales
- Field sales
- Sales engineers (pre sales)
- Marketing—content
- Marketing—advertising, social media
- Marketing—SEO, product web site
- Marketing—strategy
- Product management
- Product development
- Architecture
- UX
- Analysis
- Development
- QA
- Release management
- IT operations
- Product support
- Product solutions (custom installations, add-ons)
- Product training and certification

This effectively results in a dozen activity-oriented teams per product. Organizing teams like this isn't the best way to serve the business outcome—that is, a successful product. It results in multiple, high-latency handoffs across teams to get anything done, whether it be developing a new feature, launching a marketing campaign for a product release, fixing a bug identified by a customer, or closing a new deal. Yet, it is what happens when IT-B is organized as a matrix.

5.2.1 Hamstrung by High-Latency Handoffs

As defined in Section 2.4.3, a value stream is a series of activities required to deliver an outcome. N activities require $N - 1$ handoffs for a work item (or batch) to pass through the value stream. Handoffs are simply a result of activity specialization. However, when a value stream is serviced by a series of

activity-oriented teams (functional organization), each handoff is a handoff between teams. This makes it slower and more expensive.

Consider the case where this work item is a software build. If the testing team is separate from the development team, they will not accept builds on a continuous basis but rather have their own schedule by which to take new builds. This means that each new build accepted by QA will have a lot more changes (large batch size) than in the case where new builds from development are automatically deployed into a QA environment on an ongoing basis.

Expensive handoffs encourage large batch sizes to reduce the total number of handoffs. A separate database team will not entertain piecemeal requests for query optimization. They'd rather own the data model and enforce indexing conventions across the board. They won't review or help with unit-level database migration scripts. They'd rather review the whole set of migrations when the application is ready for UAT or some other similar state of maturity. On the other hand, a database specialist embedded in a development team will be much more responsive to piecemeal requests.

Large batch sizes lengthen cycle times. Items in the batch have to wait their turn for processing and, after processing, have to wait until all other items are processed before the batch can be handed over to the next stage. Even when all items are taken up for processing at once, the cycle time of the batch is at least equal to the cycle time of its slowest item. Long cycle times won't do. There is mounting pressure to bring new capabilities to the market faster than ever.

In any system of work, the theoretical ideal is single-piece flow, which maximizes throughput and minimizes variance. You get there by continually reducing batch sizes.

—The Phoenix Project²

Short cycles require small batch sizes. Reinertsen³ argues that reducing batch size helps reduce cycle time, prevent scope creep, reduce risk, and increase team motivation. Reducing batch size is impractical when handoffs are expensive. Recall that a value stream with N activities requires $N - 1$ handoffs per batch. Halving batch size doubles the total number of handoffs needed. This is only feasible when handoffs are inexpensive; that is, when we move away from using multiple activity-oriented teams to service a value stream. Figure 5-1 summarizes the discussion thus far in this section.

2. (Kim, Behr, and Spafford 2013)

3. (Reinertsen 2009)

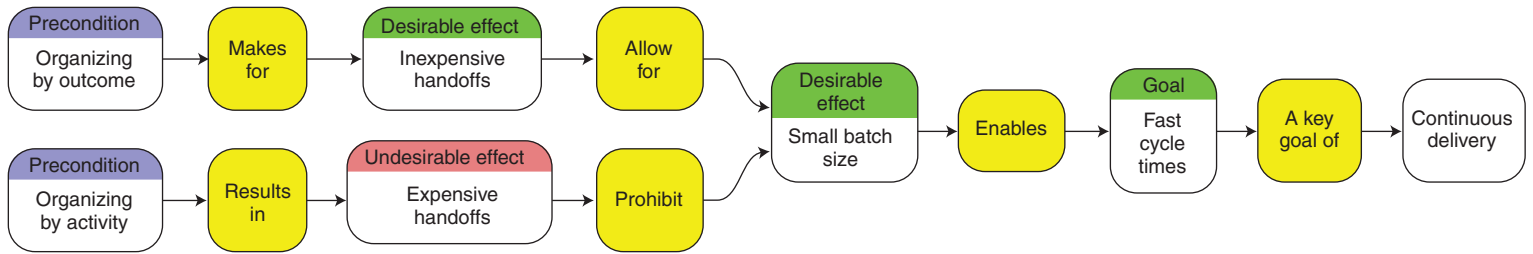


Figure 5-1 *Team design influences batch size.*

5.2.2 The Traditional Lure of Functional Organization

Why has functional organization persisted over the years despite the drawbacks described above? The traditional motivation for specialized teams can be traced to a legitimate desire for:

- Efficient utilization of specialist resources across a line of products: Rather than dedicate, say, two specialists to each of four products with an average specialist utilization of say 60%, it is more efficient to create a shared activity-oriented team of five (since $2 * 4 * 0.6 = 4.8$) people available on demand to any of the four products. This is also an attractive option in a situation where supply of the said specialty in the market is scarce.
- Standardization: As members of a single specialty team, say, a marketing content team, it is easier to standardize templates and formats, achieve consistent messaging across product lines, and coordinate product releases.
- Nurturing the competency by localizing it: When people of a common specialization sit together, it is easier to share knowledge and help each other with troubleshooting, think through a solution, review each other's work, etc. It is also easier for the team manager to ask for a training budget and other resources.

The traditional model has come under question because of the increasingly shorter time *to market* and time *in market*.⁴ Software products have a very short window available to monetize new features or capabilities. We can no longer take for granted an entrenched customer base; it is likely their patience will wear out unless they see a steady delivery of valuable capability. Even in the case of enterprise IT, being responsive to the business is more important than minimizing cost per function (or story) point. The traditional model of activity-oriented teams may be good for cost-efficiency, but it is bad for end-to-end cycle time. It is therefore worthwhile to trade off some efficiency for the sake of responsiveness. As we will see in Section 5.4, a cross-functional team is a good way to achieve this tradeoff.

Just enough standardization and consistency can still be achieved without being part of the same team. It is harder but possible, as we will see later from the Spotify example. On the other hand, specialist teams have a tendency to adhere to a mindless uniformity across all sorts of unnecessary things in the name of consistency across the product line.

4. <http://www.thoughtworks.com/insights/blog/rise-serial-innovator>

As for nurturing competencies, it is important, but not at the expense of the business outcome. Organization design ought to cater to first things first. There are other ways of nurturing competencies like cultivating communities of practice. More on this in Section 5.7.

5.2.3 When Is It OK to Have Activity-oriented Teams?

What about departments like HR, admin, legal, and finance? Are they organized around outcomes or activities? If we go by how we distinguish between outcomes and activities in Section 4.1, it is clear that these support functions don't own independently valuable business outcomes. Therefore, they are activity-oriented teams. Does it then mean they automatically become silos and therefore candidates for being disbanded?

Some activities are closer to the outcome than others. For example, UX is closer than admin to the outcome of product success. Ask whether the realization of the outcome is dependent on repeated successful iterations through some core value stream. If yes, then the activities belonging to this value stream should not be conducted in separate activity-oriented teams. Activities that aren't an integral part of a business outcome's core value stream may be spun off into separate teams without much risk.

Even where they are not part of a value stream, activity-oriented teams tend to standardize their operations over time. Their appetite for offering custom solutions begins to diminish. Complaints begin to surface—"They threw the rule book at us," "What bureaucracy!" and so on. However, as long as they don't directly affect business outcomes, they are allowed to exist.

For example, it is an anti-pattern to maintain a long-lived knowledge management (KM) team. It is an activity-oriented team for what is meant to be a collective activity. Disband it after initial rollout of the KM system. KM is everyone's responsibility. Knowledge is documented via recorded conversations, videos, blog posts, proposals, and reports. Let the relevant community of practice (Section 5.7) curate its content on the KM system. It is generally so specialized that it doesn't help to hire a generalist technical writer or content curator.

5.2.4 Independent Testing, Verification, and Validation

Independent testing is the notion that the team that tests should be different and separate from the team that develops in order to achieve greater rigor in testing. Many IT services vendors offer independent testing services. Doesn't this justify a separate activity-oriented team for testing? In my experience, there is no loss of rigor or conflict of interest in including developers and testers on the same team. Any deficiency in testing is bound to show up in UAT or production and

reflect poorly on the team or the vendor. Given the cost of acquiring new clients, IT suppliers are generally extremely keen to land and expand, that is, cultivate long-term relationships and grow accounts.

On the contrary, independent testing wrecks the flow of work through the development value stream. It discourages collaboration between developers and testers and leads to all sorts of suboptimization by both teams to protect their reputations. The chapter on metrics (Chapter 12) describes a number of scenarios of suboptimization resulting from independent testing.

Hiving off testing for lack of in-house skills is a different matter altogether. For example, it is common to engage a third party for testing security—vulnerability assessments, penetration testing, etc. However, this doesn't come in the way of the development value stream as much because it is somewhat removed from the functionality being built.

Then there are those who argue that verification and validation activity should be conducted at arm's length from each other. But the traditional distinction between software verification and validation⁵ is old school. One distinction is that validation is akin to field tests while verification is closer to lab tests. In case of pure software, A/B tests⁶ and beta customer programs come close to field tests whereas tests of functionality and simulated performance tests are closer to lab tests. Although the distinction makes sense, it is no reason to separate the people that perform field and lab tests from each other and from the rest of the development team. A second oft-quoted distinction also makes sense in this light but is rarely applied correctly. It is said that verification checks whether we have *built the thing right*, and validation checks whether we have *built the right thing*. However, in practice, we frequently find no provision for field tests and so-called validation teams are responsible only for end-to-end lab tests, while verification teams are limited to component-level lab tests.

5.3 Shared Services

Shared services are similar to activity-oriented teams except that they are usually shared across unrelated business outcomes. All shared services are activity-oriented teams, but all activity-oriented teams aren't shared services. For example, if a product development team is split into a team of developers and a team of testers with a manager per team, they are activity-oriented teams but not shared services. Typical examples of shared services include IT helpdesk,

5. http://en.wikipedia.org/wiki/Verification_and_validation_%28software%29

6. http://en.wikipedia.org/wiki/A/B_testing

software product level-2 support (single team serving multiple products), internal private cloud team, and call centers. Although they play a crucial supporting role in the realization of business outcomes, they are often treated and managed purely as cost centers. Shared services cannot be totally avoided, but they shouldn't be encouraged as a way to do more with less. It is usually counterproductive to have enterprise architecture, UX, software testing, IT operations (e.g., for a SaaS product) or even product marketing and sales as shared services. Ethar Alali has written a great two-part article explaining the drawbacks of shared services and activity-oriented teams with a non-IT example.⁷

5.3.1 Shared Services Lose Purpose

When several teams of developers share a common team of testers, what is the purpose with which the testers identify? The developer teams each have a product to develop; their purpose is a successful product or at least a successful release. The shared testing team's purpose often degenerates to that of being an efficient provider of testing services with allegiance to no particular product.

It is important to recognize this aspect of shared services. By definition, shared services are used by teams responsible for different business outcomes. The shared team itself isn't responsible for those outcomes. It is no surprise then that we sometimes get the feeling of dealing with mercenaries when interacting with a shared service team. They don't seem to have their skin in the game.

Shared services struggle to find purpose. An organization design that aims for conditions of autonomy, mastery, and purpose should strive to minimize shared services and eliminate them from mission-critical value streams.

5.3.2 Reducing Friction in Shared Service Interfaces

Interteam collaboration typically requires following a communication protocol enforced by a work tracking tool or a single point of contact. It means meetings between team representatives with documented minutes of meetings. Feedback loops lengthen, reducing our ability to fail-fast (Section 2.4.1). Team managers try to showcase their team's performance with team-level metrics. Incoming work gets queued and prioritized based on some centrally conceived criteria. Dependent teams get frustrated with turnaround times and attempt priority escalations.

Here is an example of how a communication protocol designed for cost-efficiency ends up affecting responsiveness. It is typical for IT support to use ticketing systems. It helps the IT support manager track the workload. Some

7. <http://goadingtheitgeek.blogspot.co.uk/2014/07/the-drawback-of-shared-services.html>

employees who are friends with the engineers in IT support tend to request help directly via chat. This is understandably discouraged because it flies under the manager's radar and does not leave an audit trail. Once a ticket is assigned to an engineer, she is expected to carry out the task and put the ticket in the state of "completed subject to customer confirmation." Sometimes, the ticket lacks some information or it needs troubleshooting on the requestor's computer. Depending on the nature of the ticket, she may choose to:

- Reply to the ticket asking for more information and put the ticket in a state of "awaiting customer response" or
- Get in touch with the requester via phone/chat, obtain the needed information, carry out the task, and close the ticket.

The first option is probably more efficient from an IT support perspective. She doesn't have to look up the requestor's phone number and there is no wasted communication effort if the requestor is not available at that moment. Besides, everything is written down and recorded. The second option is more responsive from the requestor's perspective. It feels less like dealing with a bureaucracy.

The first option can get worse for the requestor if the ticket is reassigned to a different engineer every time the requestor responds. We experience this first-hand when trying to sort out a nontrivial problem with our bank or telecom provider's call center. We are expected to explain the whole problem all over again to a new agent. Being able to switch agents freely on a ticket helps maximize agent utilization. Unfortunately, it also maximizes customer frustration.

Designers of the system may argue that the history of the ticket is recorded, and so the customer should not have to repeat it. However, the recorded history is seldom self-explanatory. Besides, an agent new to a ticket would much rather hear it again first-hand than having to read through and assimilate the record.

What if the situation is level-3 commercial product support for external customers? Getting in touch with the requestor might be unrealistic, but we could at least have the same person responding until the ticket is resolved. What if, in order to provide 24×7 support, level-3 people are located in different time zones? Now we can't help agent switching, can we? Well, at least we can avoid agent switching within a time zone on a given ticket.

5.4 Cross-functional Teams

A cross-functional team (also called multifunctional, poly-skilled, or interdisciplinary) is one whose members belong to different specializations and work together toward a common outcome. They are a necessary consequence of

organizing for business outcomes rather than activities. The realization of any outcome is bound to involve many different activities. This calls for people with widely different skills to be part of the same team. For example, a cross-functional product team may consist of people with all the skills listed in Section 5.2.

The top half of Figure 5-2 shows a conventional stratified IT organization. The product owner is quite removed from daily development. The term development team is only applied to a minimally cross-functional team of developers, testers, database, and UX people. Sometimes it is worse—development team just refers to developers. In either case, the team is not equipped to own a business outcome.

The lower half of the figure depicts what it would take to own an outcome. The inner box represents a well-equipped cross-functional product development team. Architects, business analysts, deployment engineers, and product owners join the team. Some parts of IT operations, marketing, and sales are also folded in. For example, Operations-A provide a virtualized platform that Operations-B uses for test and production deployments. Field sales and inside sales (Sales-A) may sit outside, but sales engineers (pre-sales) could very well be part of the team. Similarly advertising, SEO, promotions, and pricing (Marketing-A) may sit outside, but social media and content (Marketing-B) would do well to be part of the team.

Cross-functional teams aren't a new idea. Only the proposed extent of cross-functionality is new. Agile software development teams have always been

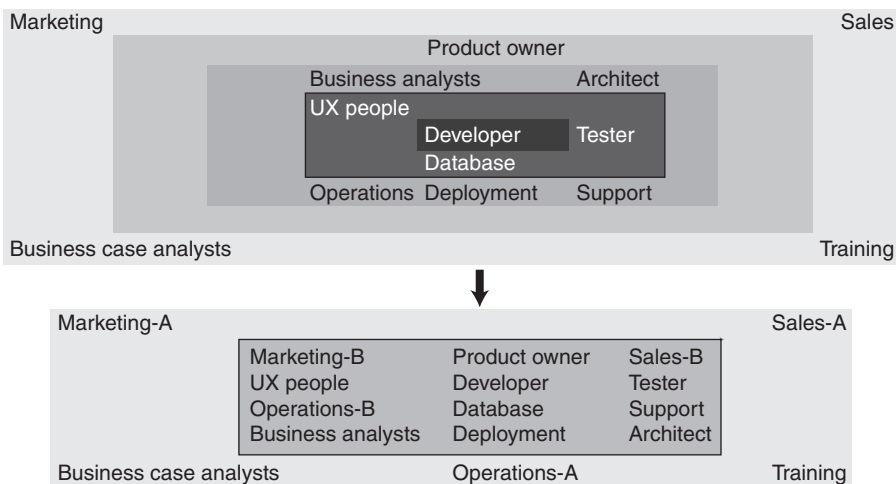


Figure 5-2 Moving from a stratified setup to a cross-functional setup

cross-functional with respect to architects, analysts, developers, and testers. With DevOps, cross-functionality expands to include deployment and some IT operations people. At this point, the cross-functional team is capable of agility in delivery. For full IT and business agility, the circle needs to expand further to include dedicated product owners, UX people, sales, marketing, and support.

5.4.1 DevOps = Cross-functional Dev + IT Ops Team

The DevOps movement advocates a merger of development and related IT operations. It makes a team cross-functional with respect to development and IT operations. Unfortunately, this aspect is often ignored in comparison with the technical aspects of DevOps. From an IT point of view, we broadly have three departments in a typical setup—business, development, and IT operations. There may be many more subdepartments, but this picture is enough to understand what DevOps is not.

In a typical case, once the VP of IT operations is convinced about DevOps, she decides that her team should now acquire so called DevOps capability. Accordingly, they evaluate and buy some product claiming to be a DevOps enabler, do a bit of research on virtualization and infrastructure automation tools, start version controlling their deployment scripts, and then rename their department to DevOps. Is it really DevOps? Well, it isn't DevOps if you don't have IT operations people as part of your development organization. The whole point of DevOps is to locate development and operations skills within a single team. The VP of IT operations is not to blame though. Effecting a DevOps reorg is usually beyond her pay grade and fraught with implications for her future role.

5.4.2 Organizing for Responsiveness

It Works!

@Apple

Apple uses cross-functional teams as part of its Apple New Product process (ANP). Cross-functional teams are used for product discovery and definition, product development, and even to define the ANP.⁸

8. <http://www.roundtable.com/download/db8e1af0cb3aca1ae2d0018624204529/9778d5d219c5080b9a6a17bef029331c>

@Spotify

Spotify is a streaming music Internet business with 40 million+ users and 1,200+ employees.⁹ They are a popular case study for cross-functional organization with 30 teams spread over 3 cities. Their basic unit of organization is a cross-functional team called a squad. Each squad has a long-term mission such as building, running, and improving the Android client, creating the Spotify radio experience, scaling the backend systems, or providing payment solutions.¹⁰ Each squad has a product owner and manages its releases. Related squads are grouped into tribes and physically co-located in the office to promote collaboration. Different specialists (e.g., testing, development) within a tribe have their own chapters to nurture their competency. Chapters are similar to communities of practice except that the chapter lead is line manager for her chapter members and yet part of a squad and involved in day-to-day work.

“This matches the *professor and entrepreneur* model recommended by Mary and Tom Poppendieck. The PO is the entrepreneur or product champion, focusing on delivering a great product, while the chapter lead is the professor or competency leader, focusing on technical excellence. There is a healthy tension between these roles, as the entrepreneur tends to want to speed up and cut corners, while the professor tends to want to slow down and build things properly. Both aspects are needed, that’s why it is a *healthy tension*.”¹⁰

Cross-functional teams fold the entire software delivery value stream into a single team rather than let it span across multiple activity-oriented teams. This reduces the cost of handoffs, allows reduction in batch size, and thereby decreases cycle time (improving responsiveness). Cross-functional teams aligned to outcomes can get meaningful things done within the bounds of the team. In this respect, they are much more autonomous units than activity-oriented teams. They are also more fun to be since autonomy is an intrinsic motivator.

Cross-functional teams aren’t anti-specialization. These teams still consist of specialists. Specialization isn’t the problem; organizing along the lines of specialization is. Functional organization makes for slower and more expensive handoffs.

9. <http://en.wikipedia.org/wiki/Spotify>

10. <https://dl.dropbox.com/u/1018963/Articles/SpotifyScaling.pdf>

5.4.3 Utilization

Will specialists dedicated to product teams be underutilized? Probably yes. This is where the rubber meets the road in terms of trading off cost-efficiency for the sake of responsiveness. Beyond a certain threshold of utilization, responsiveness decreases as utilization increases. This is a well-known effect from queuing theory. Without some slack, we can't have responsiveness. A fully utilized highway is a parking lot.¹¹

Besides, as a side effect of being part of a cross-functional team, specialists usually start to acquire adjacent skills. So developers pick up infrastructure skills while product analysts pick up testing skills. This lets them contribute to adjacent areas during lean intervals and jump back to core areas as soon as something comes up. Pure specialists start morphing into generalizing specialists.¹² Their skill profile changes shape from the letter I (all depth) to the letter T (some breadth).

5.4.4 T-shaped People

Pure specialists are all depth and very little breadth. Although they may be brought together in a cross-functional team, they might face challenges in interacting with their team members from other specializations. For effective cross-functional collaboration, we need some breadth as well as good depth. Breadth provides perspective and empathy. Hard-core specialists are susceptible to caring only about their part of the work. T-shaped people¹³ can relate to and build upon ideas coming from outside their domain with greater ease.

5.4.5 Team Size

Common recommendations for development team size range from three to nine.^{14,15} Another idea called the two-pizza team (number of people that two pizzas will suffice for) comes from Amazon. As long as the architecture is modular (via services or otherwise), these are reasonable heuristics for team size of a single module or service. However, highly cross-functional, outcome-oriented teams, as in Figure 5-2, are likely to be much bigger if the outcome (or suboutcome) requires it. It doesn't mean humungous standup meetings or that everyone communicates regularly with each other. The cause of responsiveness is

11. Tweet by Paul Sutton, @FragileAgile.

12. <http://www.agilemodeling.com/essays/generalizingSpecialists.htm>

13. http://en.wikipedia.org/wiki/T-shaped_skills

14. <https://www.scrum.org/Forums/aft/680>

15. <http://www.infoq.com/news/2009/04/agile-optimal-team-size>

served by having a single, dedicated outcome owner for the whole team of teams. The cause of autonomy and purpose is served by having a team big and capable enough to own a business outcome (or suboutcome).

5.5 Cross-functionality in Other Domains

The notion of cross-functional organization is also pertinent to disciplines other than IT. It is only fair to indulge in a few interdisciplinary analogies while on the topic of interdisciplinary (cross-functional) teams.

5.5.1 Hospital Pod Teams

A study¹⁶ conducted at the emergency department (ED) of a city hospital corroborates the advantages of moving from an activity-oriented team design to a cross-functional one. Their initial design had three activity-oriented teams of nurses, residents, and attending physicians servicing a value stream that consisted of the following activities:

- Triage incoming patients
- Begin patient care work (nurse)
- Order tests, make decisions about diagnosis, treatment, and disposition (resident)
- Approve or change the orders and decisions (attending physician)

The study notes that back-and-forth discussion was not enabled by this design. Responsiveness was poor—an average of 10% of patients left without being seen because of delays. As a redesign, the ED teams were divided into pods (cross-functional teams). Each pod had the personnel and equipment necessary to treat any type of ED patient; that is, it had the ability to service the entire value stream above. The study found that the pod system delivered a 40% reduction in cycle time (in this case, cycle time is the average amount of time a patient spends in ED) without any significant difference in any other aspect of the quality of care. Note that the rest of the hospital functions can continue with an activity-oriented organization, as they are not directly part of the patient-care value stream.

16. Valentine, M. A., and A. C. Edmondson. 2014. *Team scaffolds: How meso-level structures support role-based coordination in temporary groups*. Cambridge: Harvard Business School.

5.5.2 A Cross-functional Museum Layout

The Rijksmuseum in Amsterdam is a good example of the power of cross-functional organization. Traditionally, museum galleries have a functional organization—one gallery for sculpture, another for ceramics, a third one for paintings, and so on. Each gallery is managed by a specialist curator—the museum analogue of our function lead. But the new Rijksmuseum has opted for a more integrated or, shall we say, *cross-functional* organization. Each section is now devoted to a different century, and within that section you will find all the artifacts from that period arranged in an integrated holistic display that effectively conveys the story of the age.

An article about the reopening of the museum in *The Guardian*¹⁷ describes the new layout. A Rembrandt gallery, for example, displays some of his early work alongside period-piece furniture, glass and silver artifacts made by people he knew, and a portrait by an art-patron friend. Rijksmuseum’s director of collections, Taco Dibbits, says, “You get a sense of the world in which Rembrandt was producing his art.” This is similar to how a product analyst gets a sense of the world into which the product is deployed by working in a cross-functional team that includes deployment specialists.

A cross-functional layout is arguably more work for the curators to manage and maintain. It may also nettle expert visitors who may be interested, for example, in sculpture but not ceramics. But from the point of view of majority generalist visitors to the museum (the outcome that matters), a cross-functional layout is probably more meaningful.

5.5.3 Taskonomy

Design guru Dan Norman talks about taxonomy versus taskonomy in the context of human-centered design.¹⁸ Imagine how much less usable a word processor or spreadsheet might be if it only supported main menus, that is, no support for context-sensitive (right-click/pop-up menu) actions. As exemplified by Figure 5-3, the main header menu of an application is taxonomy whereas its myriad context-sensitive menus are taskonomies. Taxonomy is a functional classification or arrangement whereas a taskonomy is a cross-functional arrangement based on the needs of the task at hand. Taxonomies provide navigability—they offer a map of available functionality. Taskonomies provide ease of use and responsiveness—they are responsive to the needs of the user in context. In a user interface, both have their place. In organization design, the

17. <http://www.theguardian.com/culture/2013/apr/05/rijksmuseum-reopens-long-refurbishment-rethink>

18. http://www.jnd.org/dn.mss/logic_versus_usage_.html

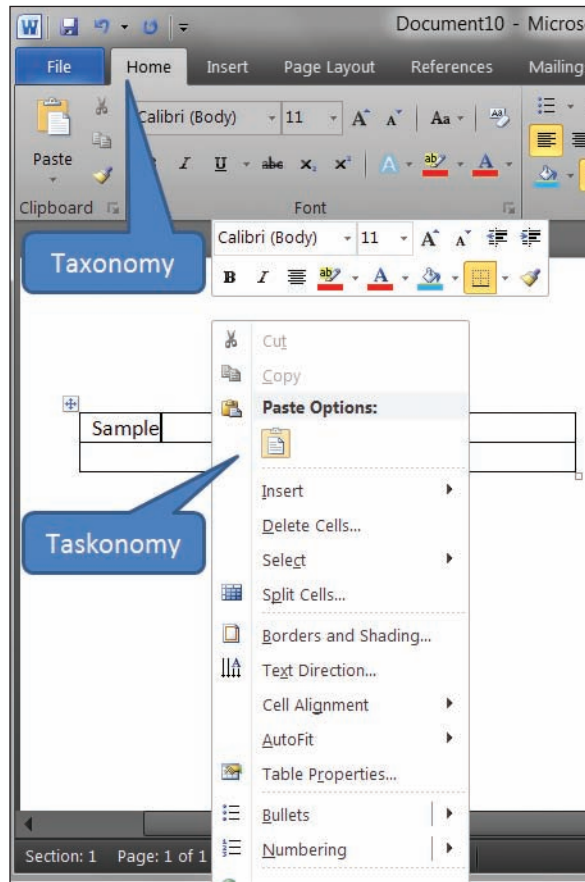


Figure 5-3 *Taxonomy is to taskonomy as functional arrangement is to cross-functional arrangement.*

org chart provides enough taxonomy. For responsive day-to-day work, we need taskonomies, which is what cross-functional teams are.

5.6 Migrating to Cross-functional Teams

It is quite disruptive to move from an IT-B matrix organization (or other functional organization) to self-sufficient, cross-functional teams. Here is one method of doing it gradually:

1. Identify products/capabilities that differentiate the business. You will need as many cross-functional teams as the number of differentiating business products/capabilities.

2. Identify a product/capability for piloting the transition. Ideally, the candidate won't have too many dependencies with other products/capabilities. Make sure there is a full-time outcome owner (Section 4.1.2) available.
3. Have the product owner come up with an initial product roadmap and backlog.
4. Identify people from existing activity teams that will make up the pilot team. Explain to them the rationale for the pilot. Use the penny game¹⁹ to drive home how small batches and inexpensive handoffs help reduce cycle time.
5. Make sure the pilot team has all the skills required to be self-sufficient.
6. Let the new team start working through the backlog.
7. See how it goes for about three months before deciding to spin up another cross-functional team.

This only addresses the structural aspects of migration. Operational, cultural, and political aspects are addressed in the following chapters.

5.6.1 Separation of Duties

Sometimes, IT governance people say that cross-functional teams are not permitted by accounting and investor protection regulations such as SOX and payment regulations such as Payment Card Industry Data Security Standard (PCI-DSS). In particular, they speak of a control called *separation of duties*.²⁰ In effect, it aims to separate authorization for making changes to an application/system from authorization to release those changes into production. Traditionally, this hasn't been a problem because the production deployment team was different from the development team. However, even if separation of duties requires that the same person not have both authorizations, it does not prohibit two people with the combination of authorizations from working together on the same team.²¹

19. <http://www.leansimulations.org/2014/04/variations-of-lean-penny-game.html>

20. http://en.wikipedia.org/wiki/Separation_of_duties

21. <http://continuousdelivery.com/2012/07/pci-dss-and-continuous-deployment-at-etsy/>

5.7 Communities of Practice

We saw earlier that a cross-functional team encourages its members to morph from pure specialists to generalizing specialists. This does not have to come at the cost of mastery in their specialization. A community of practice (CoP) is an alternative solution to nurturing a competency in the absence of a functional organization. A CoP does not require its members to be all part of the same team. It functions like a loose, professional association of specialists with mechanisms for online and offline interaction and knowledge sharing.

A lead is usually elected, nominated, or appointed per CoP. The lead comes from the same specialist background and is someone with people and organizing skills. The CoP lead is by no means a full-time role—she continues to work as a first-class member of some product team while devoting maybe 20% of her time to CoP work. CoP leads sponsor brown bag sessions, training programs, internal conferences, and sponsor members to participate in external conferences. They weigh in on tools and modes of collaboration within the community. They are accountable for the health of the community.

In addition, mastery in IT specialist areas may be sustained by getting involved in groups and activities outside one's organization. Specialist user groups and conferences are thriving in many cities. The Internet has many great resources for specialist skill enhancement. Even just following relevant Twitter hashtags goes a long way toward staying up to date. After all, individual mastery is at least as much the individual's responsibility as the organization's.

5.8 Maintenance Teams

Cross-functional product teams own their product—they shape it, build it, maintain it, and run it. However, many organizations retain separate teams for maintenance (bug fixes and minor enhancements) and IT operations.

Figure 5-4 shows a traditional cycle. Maintenance and IT operations work on what is released while development works on the next release. To cater to users who cannot upgrade to newer releases promptly, there is usually a support window of current minus N releases ($N = 1$ in Figure 5-4).

There is common but flawed notion in enterprise IT circles that maintenance work requires less skill than full-scale development. As a result, project sponsors looking to reduce cost opt for a different team of lower-cost people for maintenance work. This is false economy. It hurts the larger business outcome

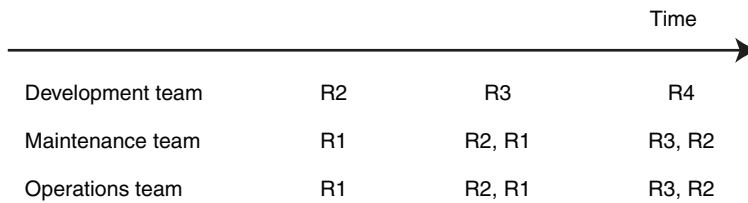


Figure 5-4 *Typical software release cycle*

and reduces IT agility. When the same product team does development and maintenance, there is no handoff at release time. It is easier to merge bug fixes from release branch to trunk because the team is familiar with the ongoing changes in trunk. What’s more, trunk-based development²²—a branchless technique that is gaining adoption—is nearly impossible with separate development and maintenance teams.

End-of-life support is one situation where a maintenance team might make sense. This team keeps an old app/product running while a new replacement is built. Other than that, it is all about tearing down potential silos such as separate maintenance teams. Even in case of end-of-life support, a capability-oriented IT organization may choose to have the old and new coexist in a single capability team (Section 8.2). A separate maintenance team is a dinosaur in an age of continuous delivery and DevOps.

5.9 Outsourcing

When IT-B work is outsourced, we need to take care that the resulting team design does not violate the conditions of responsiveness, autonomy, mastery, and purpose discussed previously. Otherwise, business outcomes may be at risk. For example, the CapEx-OpEx distinction results in separate contracts/teams/vendors for development and maintenance. Some organizations go a step further and outsource even IT operations to a different team/vendor under a separate contract. The rationale is to stick to core business competency and outsource everything else (let vendors compete with each other for our slice of IT). Depending on how critical an application is for revenue generation, this strategy of “divide-and-conquer IT” can be frustrating at best and suicidal at worst. Internet businesses and ISVs typically outsource little to none of their IT-B. This is simply because having to orchestrate between three teams/vendors for every new feature is a huge drag on the ability to go to market quickly.

22. <http://paulhammant.com/2013/04/05/what-is-trunk-based-development/>

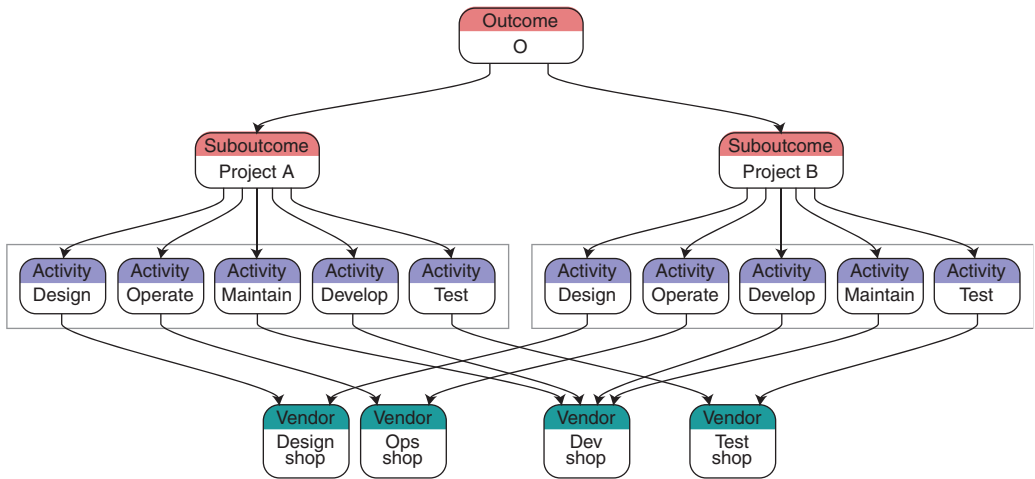


Figure 5-5 *Avoid activity-oriented outsourcing.*

Equally important, the feedback loop is badly constricted at contractual boundaries. Designing formal, service-level agreement (SLA)-driven protocols of communication between business, development, IT operations, and maintenance is a recipe for bureaucracy and indifference.

Outsourcing along outcomes is better than outsourcing along activity lines—that is, consider outsourcing application A to vendor X, B to vendor Y, and C to vendor Z (Figure 5-6) rather than handing development of A, B, and C to vendor X, IT operations to vendor Y, and maintenance to vendor Z (Figure 5-5).

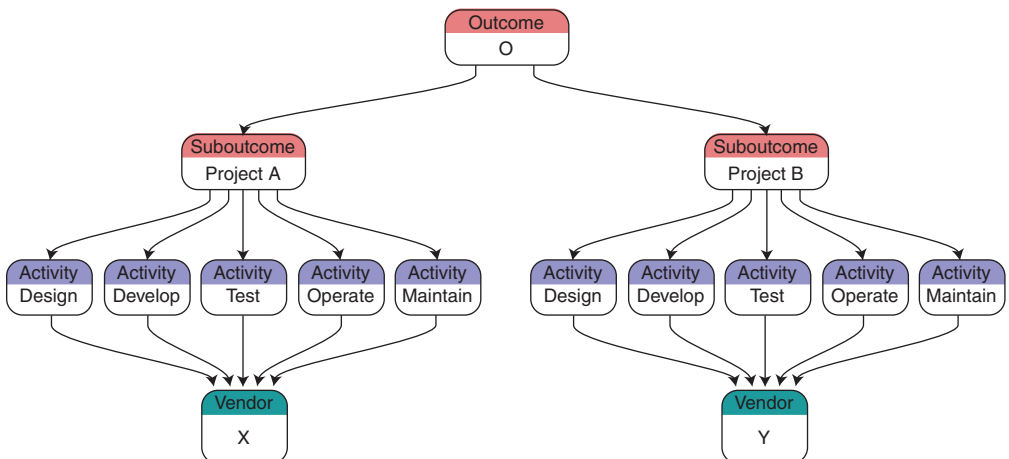


Figure 5-6 *Adopt outcome-oriented outsourcing.*

Outsourcing outcomes (or suboutcomes) is the first step. The next step is to ensure that the vendor follows the same practice while internally organizing for delivery of the outcome. Many vendors adopt a utilization-friendly, activity-oriented organization internally, thus defeating the intent of the outsourcing configuration.

On the other hand, it may be that your business doesn't change that often or your application isn't strategic. If so, it is useful to ask, "Why make (build)? Why not buy?" SaaS is mainstream. It is likely that someone is offering your bespoke application as a service. At the cost of some tweaks to your business process and a one-time migration, you might end up with a better application at lower cost. The SaaS vendor in turn is likely running a fully in-house IT-B setup.

5.10 The Matrix: Solve It or Dissolve It

Half the world is so used to matrix management as to take the scheme for granted.

The other half just thinks it's bizarre.

—Tom DeMarco in *Slack*,²³ p. 15

A matrix structure is one whose members have two bosses—typically a project manager for day-to-day work and a longer-term function lead for performance appraisals and training. In case of IT-B, the project managers work with product owners who either come from the business or liaise with people from the business. Function leads in IT-B have titles like head/VP/director of architecture, development, UX, database, testing, or release management. Function leads own "resources" (e.g., developers, testers) who get assigned to projects as needed. Given that IT is itself a "function," an IT-matrix represents a functional organization within a functional organization—a near guarantee of pain. From business's point of view, they are the verticals (lines of business) in the matrix and the different IT functions are horizontals. From IT-B's point of view, the functions are verticals and the different projects are horizontals. As shown in Figure 5-7, we use the latter frame for our discussion. The verticals in an IT-B matrix are activity oriented whereas the horizontals (projects) are outcome oriented. As work moves through the software delivery value stream, it is handed over from one vertical to the other in the IT-B matrix. As explained in Section 5.2.1, these handoffs present a structural impediment for short cycle times.

Matrix structures are probably okay where the verticals don't have to engage with each other in a fast-moving value stream; for example, a sales organization

23. (DeMarco 2002)

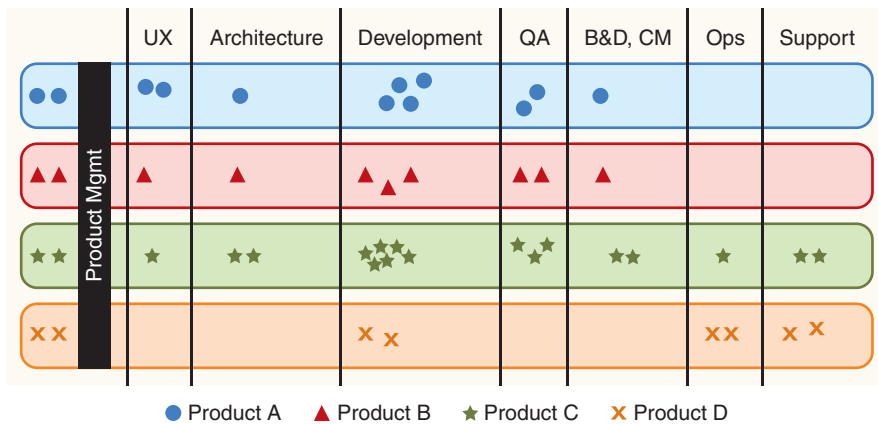


Figure 5-7 Typical IT-B matrix

may be set up as a matrix with verticals for different product lines and horizontal for different regions. However, a matrix is inappropriate for an IT-B organization that aims for continuous delivery. Continuous delivery requires continuous collaboration—a lot of it unscripted. It is something with which the verticals in a matrix simply can't cope.

While no matrix structure is suitable for continuous delivery, some are worse than others. In the following section, we'll explore different types of matrices and contrast them with cross-functional teams.

A handoff between two verticals in a matrix can be represented as a queue; for example, development does its work and puts it in the queue of the testing team. A vertical may have a single queue for all incoming work or one queue per project. In the latter case, specific people may be assigned to handle a given project's queue or it might just be a capacity allocation without fixed people assignment. The relative merits of various configurations are illustrated in Figure 5-8 and discussed below. Modern business by necessity trades cost-efficiency for responsiveness because business agility is a critical success factor.

5.10.1 Matrix of Shared Services

A matrix of shared services allocates both capacity and people just in time i.e. all projects share a single queue for a given function. There is no certainty of available capacity for projects. Wait times are indefinite but resource utilization is maximal. This is the worst possible matrix configuration for continuous delivery.

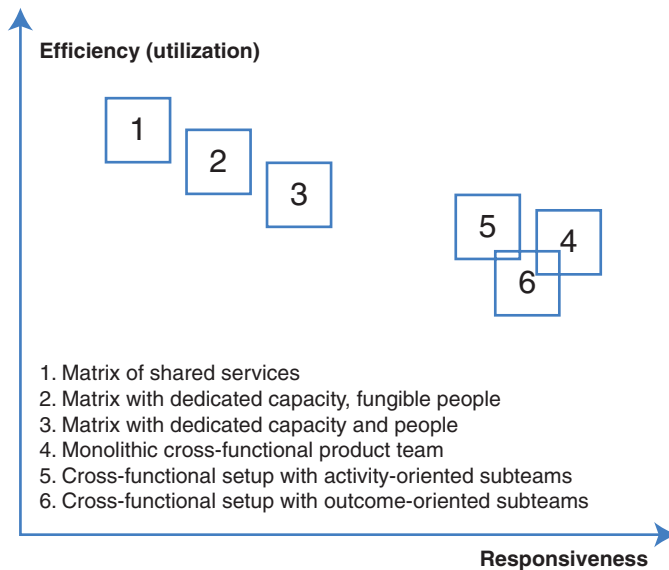


Figure 5-8 Performance characteristics of various team designs

5.10.2 Matrix with Dedicated Capacity and Fungible People

In this case, every project gets its own queue and a certain number of full-time equivalents (FTEs) to service the queue, but the actual people who make up the FTEs aren't fixed. Although this makes for flexible work assignment, there is drastic loss of context as people switch tasks.

5.10.3 Matrix with Dedicated Capacity and People

Here, we assign a fixed set of people to a product for an agreed-upon period of time. Product owners still have a tough time getting their work done through the different layers from left to right. Occasional power struggles break out between outcome owners and function leads. It is still bad in the sense that there are too many handoffs. There is a tendency for batch size to go up. It does not encourage continuous collaboration, and hence, we see a lot of meetings taking place.

In my experience, a matrix organization can achieve monthly releases at best. But release interval is not the same as cycle time. Monthly releases imply a minimum cycle time of a month, very likely much higher; for example, it might take six months for a new feature to move through all the verticals of a matrix before it is released.

5.10.4 Monolithic Cross-functional Product Team

Figure 5-9 shows self-sufficient cross-functional product teams. The product team is fully accountable for the success of the product. It is almost like a different business unit except that they still depend on external shared verticals such as finance, admin, legal, and HR. Each product team has one person in charge as the outcome owner.

5.10.5 Cross-functional Setup with Activity-oriented Subteams

A single monolithic team may be unworkable after a certain size. At that point, the outcome owner may choose to assign an additional manager to the largest groups of specialists, for example, a manager for the developers or the inside salespeople.

5.10.6 Cross-functional Setup with Outcome-oriented Subteams

It is better to scale big product teams by creating teams that own suboutcomes rather than activities. Apart from the advantage of responsiveness, this also

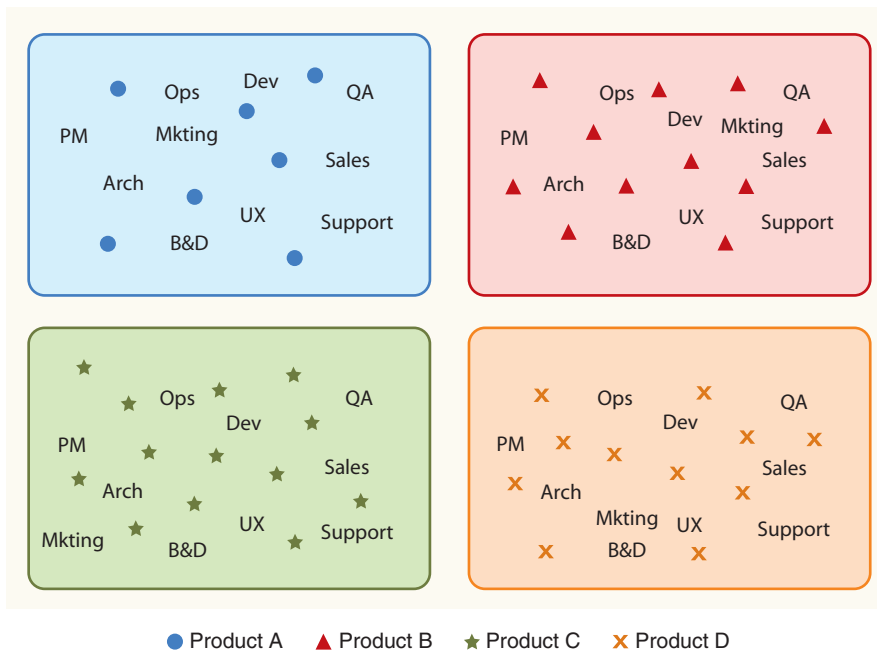


Figure 5-9 *Monolithic cross-functional product teams*

promotes modular software architecture. Conway's law²⁴ states that the design of a system is likely to reflect the communication structure of its team. Accordingly, monolithic teams tend toward monolithic architectures, layered teams (separate teams for front end, business logic, persistence, etc.) tend toward layered architectures, and teams that own different product modules will tend toward a modular architecture. The *ThoughtWorks* Technology Radar called it the "Inverse Conway Maneuver."²⁵

5.11 Summary of Insights

- Collaboration within teams tends to be unscripted—on demand, just in time, and continuous. Collaboration across teams tends to be discontinuous and discrete (e.g., via meetings). This can be factored into team design by locating all roles that require continuous collaboration within a single team.
- Handoffs are mostly a result of specialization. Organization design cannot reduce these handoffs, but it can make them faster and cheaper by making them occur inside a single team.
- The biggest promise of continuous delivery is a reduction in IT delivery cycle time. It requires the delivery value stream to process work in small batches, which ultimately calls for a single team (or as few as possible) responsible for the whole value stream.
- A cross-functional team consists of people with different primary skills working toward a common goal. They are an example of valuing responsiveness over cost-efficiency.
- Cross-functional teams aren't anti-specialization. Specialization isn't the problem; organizing along lines of specialization is.
- It is okay to have activity-oriented teams for activities that aren't an integral part of a business outcome's core value stream.
- Release interval is not the same as cycle time. Monthly releases imply a minimum cycle time of a month, very likely much higher.
- Given that IT is itself a "function," an IT-matrix represents a functional organization within a functional organization—a near guarantee of pain.

24. <http://www.thoughtworks.com/insights/blog/demystifying-conways-law>

25. <http://www.thoughtworks.com/radar/techniques/inverse-conway-maneuver>

5.12 Summary of Actions

- Shift from activity-oriented organization to outcome-oriented cross-functional teams. They tend to be self-sufficient (autonomy) and business goal-directed (purpose).
- Communities of practice complement outcome-oriented organization. In the absence of a functional organization, they provide the necessary umbrella to nurture specialist competencies.
- If needed, divide work among multiple teams by splitting the outcome into suboutcomes (e.g., modules of an application or different applications) rather than activities (development, testing, etc.). The same applies for geographic distribution and outsourcing.
- Don't encourage creation of shared services that service critical value streams. They tend to lose the sense of business purpose and this hurts responsiveness.
- Don't commission separate teams for maintenance. It is an example of unnecessary handoff created by team design. Besides, rarely is anything in a pure maintenance mode. It always coexists with forward-looking development. A separate maintenance team is a dinosaur in an age of continuous delivery and DevOps.
- Move away from an IT-B matrix to outcome-oriented teams aligned with business verticals.

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