FLOW ENGINEERING

From Value Stream Mapping to Effective Action

STEVE PEREIRA & ANDREW DAVIS

FOREWORD BY KAREN MARTIN
COAUTHOR OF *VALUE STREAM MAPPING*

IT Revolution
Independent Publisher Since 2013
Portland, Oregon

IT REVOLUTION

25 NW 23rd Pl, Suite 6314
Portland, OR 97210

Copyright © 2024 by Steve Pereira and Andrew Davis

All rights reserved. For information about permission to reproduce selections from this book, write to Permissions, IT Revolution Press, LLC, 25 NW 23rd Pl, Suite 6314, Portland, OR 97210.

First Edition

Printed in the United States of America
30 29 28 27 26 25 24 1 2 3 4 5 6 7 8 9

Cover, book design, and illustrations by
Julianna Johnson and Kate Giambrone, Bologna Sandwich LLC.
Cover layout by Devon Smith.

Library of Congress Control Number: 2024931067

ISBN: 9781950508457
eBook ISBN: 9781950508464
Web PDF ISBN: 9781950508488
Audiobook ISBN: 9781950508471

For information about special discounts for bulk purchases or for information on booking authors for an event, please visit our website at www.ITRevolution.com.

FLOW ENGINEERING

Dedication

This book is dedicated to everyone brave enough
and idealistic enough to bring humanity
and flow back to the workplace.

Contents

List of Figures vii
Foreword by Karen Martin xiii
Introduction xvii

PART 1 The Flow Landscape

1 The Problem with Scale 3
2 Solutions to Scale 17
3 The Elements of Action 29
4 Flow Engineering 35

PART 2 Mapping the Landscape

5 Outcome Mapping 53
6 Current State Value Stream Mapping 77
7 Dependency Mapping 109
8 Future State Value Stream Mapping 129
9 The Flow Roadmap 145

PART 3 Navigating the Landscape

10 Principles of Flow Engineering 165
11 Leading Flow Engineering 185
12 Traps to Avoid 199
13 Value Stream Management 213
14 Scaling Flow Engineering 227

Conclusion 249
Appendix 253
Glossary 263
Bibliography 265
Notes 271
Acknowledgments 275
About the Authors 276

List of Figures

Introduction

FIG. 0.1 Bolt Global Current State Challenge xxvi

Chapter 1

FIG. 1.1 The Three Human Costs of Scale 5
FIG. 1.2 Misalignment in Teams 7
FIG. 1.3 The Paradox of Scale Illustrated 9
FIG. 1.4 The Checkbox Project: Teams Involved 12

Chapter 2

FIG. 2.1 The Spectrum of Solution Approaches 18
FIG. 2.2 The Three Gaps to Enabling Large-Scale Collaboration 19
FIG. 2.3 The Iron Triangle of Constraints 20
FIG. 2.4 Cybernetic Feedback Loop 22
FIG. 2.5 A Siloed Organizational Structure 23
FIG. 2.6 Effects of Limited Visibility 23
FIG. 2.7 The Value Stream 24
FIG. 2.8 A Simple Value Stream Map 25
FIG. 2.9 The Toyota Production System's Improvement Kata 26
TBL. 2.1 Cybernetic Control Systems in Popular Decision Frameworks 27

Chapter 3

FIG. 3.1 Collective and Individual Flow 30
FIG. 3.2 Effects of the Three Elements of Action 30
FIG. 3.3 The Three Elements of Action 31
FIG. 3.4 Cybernetic Loop with the Elements of Actions 32
FIG. 3.5 The Elements of Action: Value, Clarity, and Flow 32

Chapter 4

FIG. 4.1 The Power of a Map 36

FIG. 4.2 Value, Clarity, and Flow Woven through all Flow Engineering Maps 38
FIG. 4.3 Five Maps of Flow Engineering 39
TBL. 4.1 Addressing the Three Gaps through Flow Engineering 40
TBL. 4.2 Each Map Serves at Least One of the Elements of Action 41
TBL. 4.3 General Facilitator Rules of Engagement 43
FIG. 4.4 A Segment of the Full Value Stream Map 46
TBL. 4.4 Purposes and Benefits of the Five Flow Engineering Exercises 48

Chapter 5

FIG. 5.1 Outcome Mapping Primarily Serves to Identify Value 54
FIG. 5.2 The Five Stages of Outcome Mapping 55
FIG. 5.3 A Rapid Outcome Map 56
TBL. 5.1 Common Situations That Can Be Transformed into Actionable Outcomes via Outcome Discovery 57
FIG. 5.4 Five Categories for Outcome Mapping 64
FIG. 5.5 Stages of Outcome Mapping 65
FIG. 5.6 Example of the Discovery Stage of Outcome Mapping 66
FIG. 5.7 Notes Organized into Themes 67
FIG. 5.8 Example of Voting Using Dots 67
FIG. 5.9 A Completed Outcome Map 70
FIG. 5.10 The Challenge Landscape within Sharon’s Area of Responsibility 72
FIG. 5.11 The Bolt Global Outcome Mapping Process 73

Chapter 6

FIG. 6.1 Value Stream Mapping Primarily Serves to Build Clarity 77
FIG. 6.2 The Five Stages of Value Stream Mapping 81
FIG. 6.3 Simplified Value Stream Map 82
TBL. 6.1 Differences between Customer Journey Maps and Value Stream Maps 84
FIG. 6.4 Customer Journey vs. Value Stream 85
FIG. 6.5 The Traditional Form of Representing a Value Stream Map for Manufacturing 86
FIG. 6.6 A Simple Flow Engineering Value Stream Map 87
FIG. 6.7 Example of a Completed Value Stream Map 89

FIG. 6.8 Identifying a Constraint in the Value Stream 94
FIG. 6.9 Example Value Stream Map for Software Development 95
FIG. 6.10 Sample Value Stream Map Showing Cycle Timing and Wait Timing 96
FIG. 6.11 Annotated Value Stream Map 96
FIG. 6.12 Example Small-Scale Value Stream Map 97
FIG. 6.13 Identifying a Constraint on a Value Stream Map 98
FIG. 6.14 Value Stream Map with VAT and %C&A 102
FIG. 6.15 Sample Value Stream Map with Many Notes 104

Chapter 7

FIG. 7.1 Dependency Mapping Primarily Serves to Enhance the Clarity Built by Value Stream Mapping 109
FIG. 7.2 Dependency Mapping Targets Only Dependencies That Impact the Constraint 110
FIG. 7.3 Example of the Extent of Dependencies 111
FIG. 7.4 The Five Stages of Dependency Mapping 112
FIG. 7.5 Dependency Map of the Constraint: Environment Setup 117
FIG. 7.6 Gap between Sharon's Team and Karl's Team 118
FIG. 7.7 Three Assets for Collaboration 119
FIG. 7.8 The Dependency Map Jointly Created by Karl and Sharon 120
FIG. 7.9 Suspected Constraint Identified in Value Stream Mapping 122
FIG. 7.10 Example Sub–Value Stream Map 122
FIG. 7.11 A Sub–Value Stream Map to Illustrate the Dependent Workflow 123
FIG. 7.12 Direct Causes of Hot Spots 123
FIG. 7.13 Practice the Five Whys to Dig Deeper into the Suspected Constraint 124
FIG. 7.14 A Visualization of Dependencies across the Flow of the Checkbox Project 126

Chapter 8

FIG. 8.1 Future State Mapping Opens the Door to Enabling Flow 129
FIG. 8.2 Current, Ideal, and Future State Maps 130
FIG. 8.3 Flow Engineering Cycle of Mapping as an Improvement Kata 133

FIG. 8.4 The Four Stages of Future State Mapping 133
FIG. 8.5 Current State Map with Bottleneck Highlighted 139
FIG. 8.6 Future State Map with Improvement Areas Noted in Green 140
FIG. 8.7 Future State Map Reduced to Seven Serial Steps and One Parallel Step 140
FIG. 8.8 Future State Map with Cycle Timings 141
TBL. 8.1 Results of Mapping at a Travel Tech Company 143

Chapter 9

FIG. 9.1 The Flow Roadmap Primarily Serves to Enable Flow 145
FIG. 9.2 The Three Stages of a Flow Roadmap 146
TBL. 9.1 Issues Transformed into Actions/Experiments to Improve Flow at Bolt Global 148
FIG. 9.3 Sharon's Completed Flow Roadmap 149
FIG. 9.4 The Flow Roadmap Board 151
FIG. 9.5 The Future State Map Showing Improvement Areas 152
FIG. 9.6 Improvement Opportunities Broken Down into Actions 152
FIG. 9.7 Possible Improvements Ranked by Importance 153
FIG. 9.8 Plot Feasibility along the Horizontal Axis 154
FIG. 9.9 Indicate Dependencies between Activities 154
FIG. 9.10 Improvement Activities Categorized by Time Horizon (Now, Next, Later) 155
FIG. 9.11 Items Arranged in Sequential Order: Now, Next, Later 155
FIG. 9.12 Identified Measure of Progress 156
TBL. 9.2 Gartner's Flow Metrics Cover Technical, Product, and Business Concerns 156
FIG. 9.13 Example of Adding Assigned Owners 157
FIG. 9.14 Flow Roadmap Creation Progressing from Problem Areas and Concerns to Actions 160

Chapter 10

FIG. 10.1 The Five Principles of Lean 168
FIG. 10.2 A Simple Outcome Map Representing Diverse Concerns 170
FIG. 10.3 A Simple Flow Engineering Value Stream Map 172
FIG. 10.4 Value Stream Map Highlighting Wait Times 173

FIG. 10.5 The Efficiency Matrix 175
FIG. 10.6 Theory of Constraints Step 1: Identify the Constraint 176
FIG. 10.7 Theory of Constraints Step 2: Exploit the Constraint 176
FIG. 10.8 Theory of Constraints Step 3: Subordinate Everything Else to the Constraint 177
FIG. 10.9 Theory of Constraints Step 4: Elevate the Constraint 177
FIG. 10.10 Excess Work in Progress Is a Sign of Lacking Pull Systems 180

Chapter 11

FIG. 11.1 A Value Stream Map Depicts Multiple Feedback Loops 187
FIG. 11.2 Business Frameworks Are Templates for Management 189
FIG. 11.3 The Constraint on a Value Stream 191
TBL. 11.1 Examples of Enabling and Governing Constraints 192

Chapter 12

FIG. 12.1 Outcome Discovery and Outcome Mapping Help You Craft a Productive Narrative 201
FIG. 12.2 Outcome Mapping and Discovery Can Bridge Local Incentives by Establishing a Higher-Value Shared Target 203
FIG. 12.3 Limited Visibility Enables Limited Focus 205
FIG. 12.4 Example Value Stream Map with Irrelevant Downstream Precision 206
FIG. 12.5 The Current State Map Depicting the Full Agile Release Train (ART) 209
TBL. 12.1 Visual Activity Classification Legend, Depicting Non–Value-Adding, Testing, Value-Adding, and Coordinating Activities 209
FIG. 12.6 Example Future State Map Depicting Non-Critical and Non-Value Adding Activities 210
TBL. 12.2 Current State Flow Performance vs. Future State 211

Chapter 13

FIG. 13.1 Focus on Project Leads to Ignoring Longer Term Impact 214
FIG. 13.2 Each Cycle of Continuous Improvement Builds on the Previous One 214

FIG. 13.3 Current State Map: Steps, Timing, Roles, Tools, Artifacts 215
FIG. 13.4 Project or Product Orientation Lies on a Spectrum 216
TBL. 13.1 A Comparison of Value Stream Mapping and Value Stream Management 217–218
FIG. 13.5 Phil's Journey at Parchment 221
TBL. 13.2 The Parchment Measurement Journey 222
FIG. 13.6 Waiting for Data Availability and Quality Means Uncertainty Remains High for Longer and Outcomes are Later to Arrive 224

Chapter 14

FIG. 14.1 Value Streams Sharing a Common Constraint 228
FIG. 14.2 The Spectrum of Flow Investment 231
TBL. 14.1 Developmental and Operational Focus Implications 232
FIG. 14.3 Interdependence of Core and Supportive Value Streams 234
FIG. 14.4 A Value Stream Network Map 235
FIG. 14.5 The Y Axis of a Value Stream Network Map 236
FIG. 14.6 The X Axis of a Value Stream Network Map 237
FIG. 14.7 Connections Show Dependencies between Value Streams 237
FIG. 14.8 Example Value Stream Network Map Showing Shift in Internal Dev Platform 238
FIG. 14.9 Example Value Stream Network Map Showing Developmental Shift 238
FIG. 14.10 Flow Enabling Team Interactions with Product Streams 242
FIG. 14.11 The Flywheel of Flow Engineering 246

Appendix

FIG. A.1 Value, Clarity, and Flow 253
FIG. A.2 Calculating Speed: Lead, Wait, and Active Times 256
FIG. A.3 Cycle Time Includes All Value-Added and Non–Value-Added Time Composing Each Stage 257
FIG. A.4 Calculating Quality: Percent Complete & Accurate 257
FIG. A.5 Example Map Board in Progress 259
TBL. A.1 Estimated Costs of Flow Engineering Exercises 261

Foreword

THE JOURNEY TOWARD ORGANIZATIONAL excellence demands commitment to value, clarity, and flow. This requires establishing a clear target, aligning stakeholders, and optimizing workflow. In my decades of experience with value stream mapping, I've seen countless examples of the impact this practice can have in empowering organizational change. I wrote *Value Stream Mapping* in 2013, and the practice continues to grow in popularity every year. Despite its recognized value, a gap exists between value stream mapping as an aspiration and real-world implementation. This book targets that gap, offering practical guidance for any organization.

I first met Steve through LinkedIn in 2020, and I met Andrew shortly after. We immediately recognized a shared passion for thinking of collaborative work in terms of value, clarity, and flow. We shared stories about incredible results achieved through value stream mapping in all sizes and types of organizations. We found that we shared a commitment to sharing those stories and what we've learned by using value streams as a model for work.

I was introduced to value stream mapping as a diagnostic, design, and prioritization tool for improving work systems. As I started working with clients to begin to "see" their work systems in a fact-based, data-driven way, I realized that value stream mapping was more than a "tool." It's an essential management practice with benefits far beyond creating flow across interconnected functions and work teams. It also addresses these common organizational problems:

- Siloed decision-making and work design that slows an organization's ability to deliver value to its customers, become agile and responsive, and create high-performing environments.
- Friction between leaders and entire branches of an organization due to misaligned strategic goals and priorities for improving how the organization operates.
- And not understanding how work flows—or, more commonly, doesn't flow—across the organization.

In an increasingly complex and interconnected business landscape, organizations of all sizes face myriad challenges as they strive to scale without losing their way in the process. The complexities of modern enterprises often lead to misalignment, inefficiencies, and a lack of clarity, hindering the organization's ability to effectively and efficiently deliver value to its customers. As we navigate these challenges, it becomes increasingly evident that a holistic approach to understanding and optimizing organizational workflow is essential but often missing.

The power of value stream mapping lies in its ability to provide a balance of both visual and data representations, constructing a useful representation that corresponds to a complete business workflow and layering on information about performance and effectiveness. This shared visual representation of the work process serves as a focal point for team discussions around performance improvement. Rapid implementations of value stream mapping serve as a quick and easy on-ramp for more detailed and comprehensive maps as buy-in increases. Davis and Pereira say: "Map quickly, show promise, go further." The goal is to create a visual, supported by data, that quickly reveals specific improvement opportunities.

Value stream mapping is not only a visualization exercise but also a method of communicating visually. It allows teams to collectively establish a shared mental model of the goal of their work and the method for carrying it out. This seemingly simple exercise provides individuals with the mental context needed to work effectively as a team. The apparent simplicity of a value stream map abstracts a complex collection of perspectives and data, yet this simplicity enables clear representation, conversation, and focus. Simple isn't easy, but this book provides step-by-step guidance to navigate the complexity of building these simple maps. Andrew and Steve have presented *Flow Engineering* as a clear set of practices that help to distill the complex reality of collaborative work into maps that make the invisible visible and reveal hidden insights on the most impactful improvements. This not only enables effective action but also teaches essential Lean and Agile principles by putting them into practice.

Flow Engineering offers approachable, flexible, and scalable practices to address the challenges of scale, visibility, and misalignment in modern organizations. By providing a simple, digital-native starting point on-ramp to effective action through value stream mapping, it meets teams where they are today: distributed, distracted, disoriented, and disconnected. With it, teams can gain a comprehensive understanding of their workflow, identify improvement opportunities, and align their efforts with the value they can deliver. The book serves as a guide to align stakeholders, identify opportunities, and implement performance improvement in complex organizations. The insights and practices shared within these pages will empower leaders to enable focus, clarity, and collaboration as catalysts for meaningful and sustainable action.

—Karen Martin, 2024
Author of *The Outstanding Organization*
and *Value Stream Mapping*

Introduction

WE'VE BECOME VICTIMS OF SUCCESS. Organizations are now so large and interconnected that digital dependencies tie us in knots. Across the organization, our understanding is fractured. We work in a hurricane of distraction, drowning in a sea of data, and we struggle to leverage it to make improvement decisions. We have hyper-optimized much of our work, and yet it can take months to make small business improvements. Organizations are tantalized by the promise of radical transformations (cultural, digital, Lean, Agile, DevOps), but these often devolve into rebranding and renaming the status quo rather than bringing about real change.

All of these challenges are amplified by the issue of scale. The scale of our organizations has grown dramatically as it has become easier to expand globally, to acquire new businesses, and to address new markets. While performance can be optimized in small autonomous teams, no team is an island. Enabling success at scale necessitates some kind of coupling across teams. These threads, which connect everyone and everything to everyone and everything else in the organization, inevitably get tangled in knots.

Effective action in organizations of any size depends on having coherent goals. But having coherent goals depends on having shared clarity. A lack of shared clarity sabotages improvement efforts. And scale makes achieving and maintaining shared clarity nearly impossible. Even at the scale of a "two-pizza team," clarity is often sacrificed at the altar of getting things done. And with the demise of clarity, our ability to get things done withers.

The default approach to addressing the problem of scale is to increase coordination. But the cost of attempting large-scale choreography across an organization is immense. Assembling all the stakeholders to work out their separate goals, incentives, perspectives, mandates, processes, dependencies, and challenges is neither efficient nor effective. Even with extensive collaboration efforts, the path to productivity isn't clear.

We've spoken to organizations that have spent $28 million and twelve months to add a single option to their billing system. We've seen organizations invest in automation that won't improve their time to market by a single percent. We've seen organizations with high-performing, multimillion-dollar "innovation centers" but no way to bring their improvements to market.

As scale increases, waste and delay grow exponentially, and interdependence exacts a massive tax on the business. Before we can descale, simplify, and disentangle our organizations, we need to make effective decisions about where to invest in improvements today within the context of our current state.

We need to be able to chip away at complexity. We need the capability to clearly set a target outcome, assess the current state landscape, and navigate decisions to address constraints and obstacles. We need to dismantle and decouple crippling dependencies and enable effective descaling to improve flow. And because collaboration is critical to this effort, we need effective ways to share perspectives, information, efforts, and ideas to disentangle the complexity.

All of this depends on a shared understanding of value, shared clarity, and a unified flow of activity in the right direction. And yet value, clarity, and flow are elusive within every business at scale. If you're looking to improve performance in a large-scale, complicated environment, this book is for you. It's a practical collection of exercises to help you improve flow across your organization quickly, visually, and collaboratively.

The Struggle for Value, Clarity, and Flow

The raw confusion that we have repeatedly seen in organizations and teams can feel like criminal waste. Enabling people to work toward a meaningful purpose demands a substantial amount of clarity. Teams need to see not only how their efforts contribute to valuable outcomes but also *how* the broader organization's activities are serving legitimate customer needs.

What orients a group of people into being a team is a sense of purpose that is shared rather than fragmented. Once the purpose is clear, the team can proceed to improve their understanding of how to reach shared goals.

Much has been said about having a shared sense of purpose and its power to inspire, engage, and direct. This sense of purpose can be outward looking or inward looking. The team can be focused on bringing benefit to others (benevolence and value delivery) or to the team itself (survival and value extraction). Maturation, whether as an individual, a team, or an organization, can be summarized as shifting our energy from survival to benevolence.

Org charts are, by nature, inward looking. In fact, the customer is nowhere on the org chart. Customer orientation requires a fundamentally different way of thinking about purpose within the organization. To enable an effective and sustainable flow of work, a team's shared purpose needs to be oriented around the customer.

The inward looking nature of the org chart makes it very difficult for teams to become clear on the purpose their work serves for customers and where they fit in the big picture of the organization. If you ask any two people on a team what the most important customer need is, it's a good bet they'll have surprisingly different answers. The larger the distance between efforts and outcomes, the harder it is to effectively connect what you're doing to what matters most. In the absence of a simple purpose oriented around the customer, teams default to acting in incoherent and self-serving ways.

Interestingly, the org chart is one of the only pieces of information in an organization that is kept meticulously up to date. The org chart is the simplest view of the internal power structures that underpin the organization. It is an explicit representation of power hierarchies, and the only obvious goal from looking at the org chart is to try to ascend it.

The power structures embodied in the org chart lead to another significant challenge. Because of organizational power structures and hierarchies, people are often nervous about expressing their real understanding and ideas. Contributors can be unsure about the value of their input and the consequences of sharing it with the group. Under these circumstances, sharing ideas constitutes a risk, especially when those ideas come from people who don't already have organizational power. The only safe ideas are those that are already widely shared.

If we optimize for only sharing what's safe, then new and potentially valuable ideas will never have an opportunity to take hold. This is why a culture of psychological safety is necessary for high information flow. Few organizations have created the visibility, psychological safety, and effective feedback loops required to support truly open information sharing. In the absence of these conditions, you're operating in an ineffective organization.

Attaining clarity depends on understanding the dynamics of group collaboration. In a team of eight people, you will have eight different sets of priorities, eight unique perspectives, and eight distinct behaviors. Being able to operate as a "team" is not something that's easy or automatic; it requires enormous trust and openness, as well as significant effort to keep the group's priorities, understanding, and activities in sync. That investment, however, is powerful since it imbues the group with a collective intelligence that enables effective collective action. As Ken Blanchard has said, "No one of us is as smart as all of us."[1]

The fastest path to clarity is visibility. Thirty percent of the human brain is dedicated exclusively to visual processing.[2] Making a group's most important priorities and understandings visible creates a common shared resource and keeps people's attention on that information by making it central to meetings and workspaces.

By contrast, the default in most organizations is meandering conversations and an endless sprawl of digital documents, spreadsheets, and slide decks. Any one document taken in isolation is easy to misunderstand, as they typically embody a single perspective and lack critical context. This fragmentation of information leads to a fragmentation of thinking and action.

Gaining shared clarity depends on creating a simple, visible, and shared representation of a team's purpose and activity. This view must be oriented around bringing benefit to customers, and teams must be able to pool their collective understanding honestly, openly, and without fear. Otherwise, it's impossible for teams to establish the key element of organizational success: the development of collective intelligence effectively applied to customer outcomes. Without that, you're not getting flow; you're not getting feedback; you're not getting smarter; you're just not getting it.

Unblocking the Stream and Finding Flow

Many contributors and leaders alike find themselves in large, "successful" organizations that still struggle to operate (and, more importantly, cooperate) at a high level of performance. These organizations may work with cutting-edge technology, aiming to optimize digital processes down to milliseconds, while at the same time taking months to deliver results.

The paradox of modern organizations is that the more specialized workers become, the more they struggle to understand the broader system in which they fit. Even the most capable contributors in these organizations—including coaches, team leads, and technical experts—are constrained by the limits of the system in which they work.

Silos are a natural consequence of specialization and scale. They exemplify the difficulty of maintaining clarity across large groups. As silos form, individuals and teams alike fall back to local operation and optimization rather than the big picture of sustained customer value delivery. The more complex the organization, the harder it is to see how localized activity contributes to the overall flow of work and the ultimate delivery of business value. This undermines motivation and makes an effective improvement strategy seem out of reach.

Many people study and admire high-performing organizations like Toyota and Amazon but struggle to understand how to catalyze performance across their own organizations. To catalyze and foster that performance, you need a system to enable effective action. You need to focus and align your efforts to a valuable target state, develop shared clarity on the current state, and establish a flow of activities toward delivering that outcome.

Collaborative mapping develops clarity throughout that process and aligns those involved while enabling understanding for anyone who's part of an improvement effort. Mapping equips changemakers with simple and safe tools to establish and expand pockets of clarity throughout the organization.

As more and more people in an organization build these skills, the organization becomes increasingly capable of high-performance collaboration. Profound change, such as building a Lean, Agile, or learning organization, depends on incremental change at the team and cross-team level. Mapping is a critical ingredient in building the enabling structure, architecture, and expertise of a high-performing technical organization.

Flow Engineering is a series of collaborative mapping exercises designed to connect the dots between an unclear current state and a clear path to a target state. It's an open, adaptive, and engaging series of practices that can take you from complexity to clarity, from friction to flow. The practical goal of this book is to provide you with scaffolding that allows you to confidently map for greater value, clarity, and flow without worrying about how to start or going off the rails.

Flow Engineering has been successfully applied across finance, health care, telecom, government, defense, retail, and education. It's been used to improve every type of workflow you'd find in an organization, from customer onboarding, product development, and hiring to sales, service engagements, and beyond. Some of the results of applying Flow Engineering include:

- $20 million of investment saved by targeting the correct constraint;
- eighteen months of development time saved by targeting key constraints;
- feature development reduced from sixteen weeks to two weeks;
- partner engagement reduced from a twelve-month process to three months;
- client engagement reduced from six weeks to two weeks;
- customer onboarding reduced from one week to one hour;
- customer onboarding (data/integration) reduced from six weeks to four days; and
- addressing a common dependency to unblock five teams with one intervention.

In most cases, these benefits came from just a few hours of mapping. Mapping reveals hidden opportunities that teams can address quickly by eliminating waste, aligning efforts, and adjusting their ways of working. The result is not only improved collective flow but also improved individual flow for everyone involved. (We'll discuss collective and individual flow in more detail later in the book.)

CASE STUDY | **Boeing Employees Credit Union (BECU)**

At the 2023 Flowtopia conference, Taryn Spingler and Doug Mathieu presented their progress after a year of engineering flow across Boeing Employees Credit Union (BECU). BECU started in 1935 to fund loans to support new hires during the Great Depression. Now, it has nearly 1.4 million members, 2,500 employees, and over $28 billion in assets.

In their presentation, they described the previous eighteen months, which brought three org changes, operating model changes, and a renewed focus on value and outcomes. Their story relays a transition from "mayhem" to "wins" enabled by their efforts with Flow Engineering.

Mayhem

- **Lack of Clear Priorities:** Value-based priorities were not clear across all levels.
- **Lack of Leadership Alignment:** Some leaders were adamant that money talks and outcomes without clear financial impact were not a priority.
- **Lack of Alignment across the Value Stream:** Misalignment led to frustration, factions, and pushback (optimization of the whole may seem suboptimal for the parts).
- **Outcomes vs. Tools:** "Roadmap organized around business outcomes? I already have a roadmap based on cool technology."
- **Inspect and Adapt?** Nope, lacking governance and time drove busywork rather than work on the highest-value items.
- **Outdated Project Management:** Their old project management approach made improvement efforts too complex, creating a waterfall flow and not allowing for iteration and delivery of value.
- **Not Enough Time:** Teams were too busy for traditional value stream mapping.

Wins

Flow Engineering allowed BECU to reveal and extract insights from the previously hidden work across the value stream.

The practice of Flow Engineering (Outcome Mapping, Value Stream Mapping, Dependency Mapping, Future State Mapping, and Flow Roadmapping) helped baseline a process to extract insights:

- Outcome Mapping was used to create alignment and shift focus away from implementation to the goal they were trying to accomplish.
- Dependency Mapping highlighted processes characterized by minimal value-added time.
- Now, Next, Later Flow Roadmaps helped drive strategy and prioritization.

- Value Stream Mapping empowered them to quickly (within one to four hours) establish clarity on flow and issues, and it made clear which leaders should volunteer to own each value stream and performance improvement.

Flow Engineering enabled alignment, visibility into dependencies, and a sense of ownership. Improvement projects were reframed in the context of the value stream, reducing their apparent complexity. This clarity and visibility created a demand for further Value Stream Mapping within the organization.

Experimenting with Flow Engineering led to a repeatable practice and a new way of working. Flow Engineering maps provided a templated approach to scale and sustain the practices as part of their business reference architecture and their standard implementation approach. As a result, their architecture organization now incorporates Value Stream Mapping into early governance activities, aligning all of their efforts for performance improvement to business outcomes and enabling flow as a core capability. Taryn and Doug courageously pioneered these activities based on early articles and presentations on Flow Engineering.

Who This Book Is For

We've written this book for our peers working in technology in large enterprises. However, we've applied and seen the techniques described in this book in contexts far beyond our immediate frame of reference. It's easy to adapt and tailor to varied situations. It's flexible enough to help teams of any skill level, and it's robust enough to be used for ambitious process improvements or day-to-day problem-solving.

We're specialists in digital product development and delivery, but we've seen the need for value, clarity, and flow throughout many roles, industry verticals, levels of seniority, and stages of growth and scale.

This book is written for professionals familiar with the basics of Lean and Agile but unclear how to start, restart, teach, or make measurable progress with confidence. This is a book for curious problem-solvers struggling to help their teams or organizations see the big picture. This is for those grappling with complicated frameworks and operating models and wondering, "How?"

We're aiming to help mid-level leadership in complicated enterprises, but we've applied and seen this material used in a broad range of roles and contexts, like product management, Agile coaching, technical leadership, architecture, marketing, sales, project management, design, customer success, and more. Why does it work in all these cases? It's a simple, flexible practice of building a path from where you are to where you want to go. Once you've grasped the concepts and techniques, you could find yourself applying Flow Engineering in contexts we've never imagined.

If you're looking for a clear, approachable, step-by-step system for building value, clarity, and flow across your organization, this book is written for you.

How This Book Is Organized

We'll begin this book by looking at the gaps that need to be bridged and why they have been so hard to cross in most organizations. We will ground the ideas in research, personal experience, and case studies. Specifically, we'll give additional background on the problem of scale and how it affects our ability to see, understand, and address performance issues.

We'll also introduce the hidden elements of effective action: value, clarity, and flow. Then we'll lay the foundation for Flow Engineering: how to work backward from a shared context and target, and how to connect dots from needs and goals to actionable insights.

Once the framework is set, we'll guide you through the practices of Flow Engineering—a series of quick, collaborative mapping exercises, each meant to bring you progressively closer to value, clarity, and flow. The process starts with Outcome Mapping to clarify a valuable target and potential obstacles for a team. We then use Value Stream Mapping to clarify the current workflow and possible improvements. To address the opportunities revealed in the value stream, we conduct Dependency Mapping and envision improvement opportunities to construct a Future State Value Stream Map. The understanding generated from these sessions is then synthesized into a Flow Roadmap that transforms insights into prioritized, measurable, and assigned actions.

Finally, we'll describe approaches to scale and sustain your progress with Flow Engineering beyond an initial pilot. We'll share how to launch your own Flow Engineering enabling team to expand impact and learning across your organization. Beyond mapping, we'll share how to implement large-scale, continuous, and automated Flow Engineering with Value Stream Management. We'll also share how Flow Engineering can help you navigate key inflection points, like acquisitions and reorgs, as you evolve.

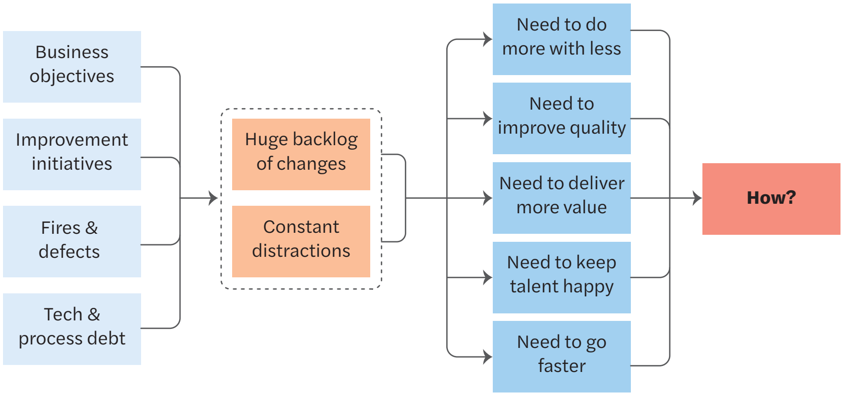
Throughout the book, we'll use the fictional illustration of Bolt Global (see below) to help illustrate the practices of Flow Engineering.

BOLT GLOBAL | **Introduction**

Sharon is VP of Engineering at a Global 2000 company that's struggled with digital transformation attempts over the past ten years. Sharon's case and organization, while fictional, represent an amalgamation of what we've seen broadly across large organizations in various industries.

Sharon's company, which we'll call Bolt Global, is facing a lot of market pressure. Competitive pressure is pushing them to make operational efficiency improvements and to open new lines of business. They've launched several improvement initiatives, which have created a lot of work. Sharon's team now has a massive backlog of changes they're tasked with delivering. She's under pressure to figure out how to deliver twice as fast as she's able to do today. The clear question is how. (See Figure 0.1.)

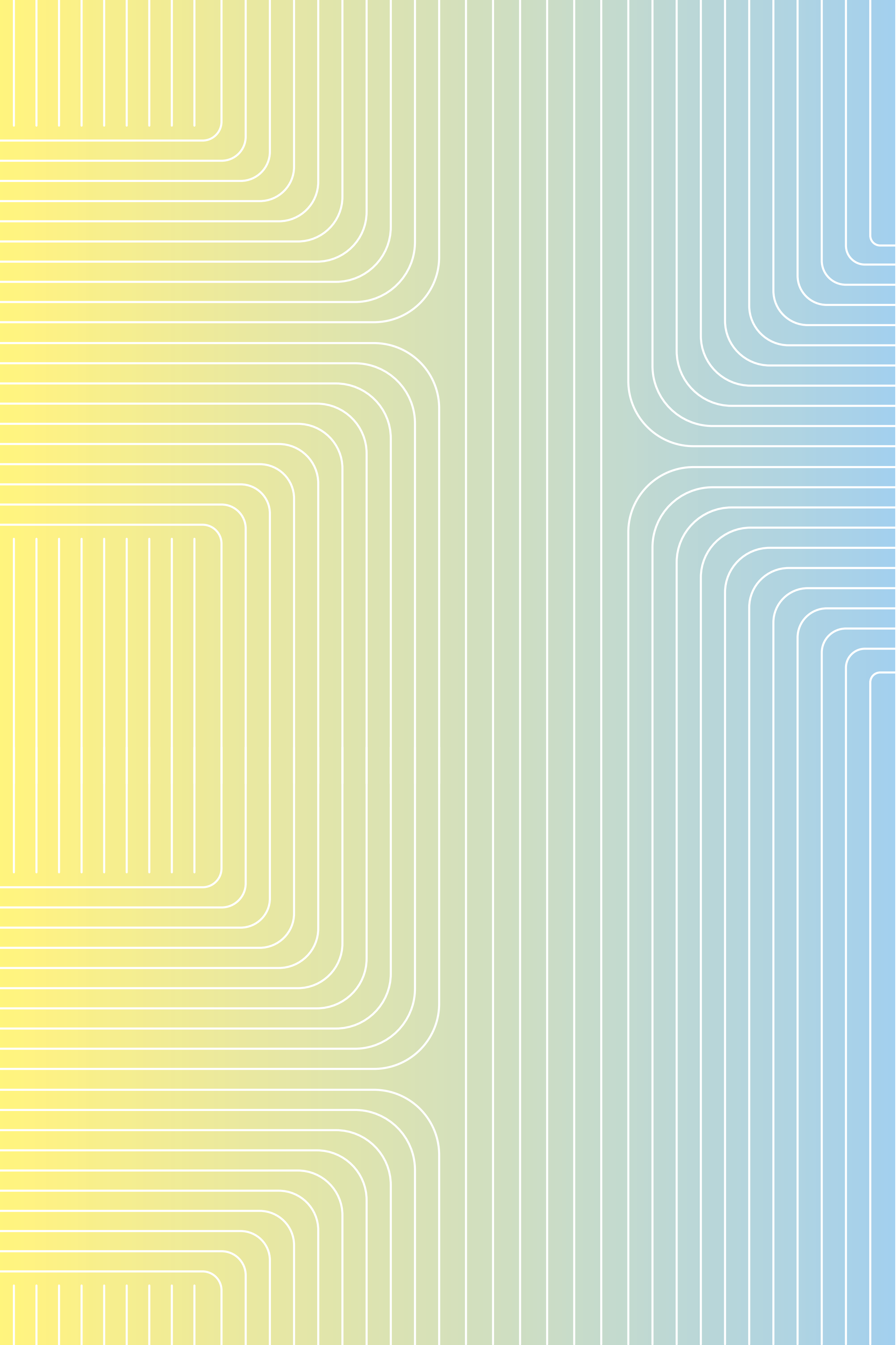
FIGURE 0.1: Bolt Global Current State Challenge


Business objectives
Improvement initiatives
Fires & defects
Tech & process debt
Huge backlog of changes
Constant distractions
Need to do more with less
Need to improve quality
Need to deliver more value
Need to keep talent happy
Need to go faster
How?

Every organization grapples with how to address current state challenges in the face of increasing scale.

Although it’s a fictional scenario, Sharon’s situation is similar to lots of organizations around the world. Many of these massive IT initiatives and digital transformation projects end in failure. If we look at the literature about why many of these initiatives struggle to get off the ground or struggle to succeed, many sources[3] point to an underlying lack of clarity.[4] Either leadership fails to gain the clarity they need; or they fail to share that clarity across the organization, meaning individual contributors don’t gain clarity; or the organization fails to collectively process concerns or dissenting opinions that could reveal flaws in the plan; or they fail to sustain clarity as the competitive landscape changes and technology evolves.

Throughout the book, we’ll use Bolt Global’s fictional situation as an aggregate of organizations we’ve worked with over the years to illustrate how the practices of Flow Engineering have helped alleviate these challenges.



PART 1

The Flow Landscape

CHAPTER 1

The Problem with Scale

> "... companies at all scales are classic complex adaptive systems."
>
> GEOFFREY WEST, from *Scale: The Universal Laws of Life, Growth, and Death in Organisms, Cities, and Companies*

SCALE UNDERMINES THE FOUNDATIONS of effective action. This is not news to anyone who works in a large organization and certainly not to anyone who works in government. The immediate and natural response to the problem of scale might be to quit your job, set out on your own or in a small team, and start enjoying a simpler and more productive life. But you would very quickly find that being a solopreneur brings with it innumerable headaches that were abstracted away when you were working in a larger organization.

Why We Scale

In the words of Peter Drucker, "The purpose of an organization is to enable ordinary human beings to do extraordinary things."[1] The fundamental reason organizations tend to grow is people desire to do ever more extraordinary things. This is made possible by *economies of scale*. This means that organizations that double in size don't necessarily need twice as many accountants or twice as many factories; great increases in output and revenue don't necessarily require great increases in the infrastructure needed to maintain them. Research by Geoffrey West, summarized in the book *Scale: The Universal Laws of Life, Growth, and Death in Organisms, Cities, and Companies*, estimates that organizations continue to benefit from economies of scale as they grow, gaining a 10% efficiency with every doubling in size.[2]

Organizations also scale to address opportunity and competition. With scale comes resiliency, influence, momentum, and attention. Amazon more than doubled its head count from 2019 to 1.6 million employees in 2021 to address increased demand and to leverage vertical integration.[3] Extreme scale requires extreme coordination but even scaling beyond a single individual demands care.

The Costs of Scale

While scale has clear benefits, there are clear challenges and costs as well. This book primarily addresses the challenge of how to enable teams to operate effectively in spite of the very real costs that scale imposes on effective action. To understand how teamwork is impeded by scale, we first need to understand the human costs of scale. The very purpose for which we assemble teams is undermined by the challenge of effectively coordinating them.

The Human Costs of Scale

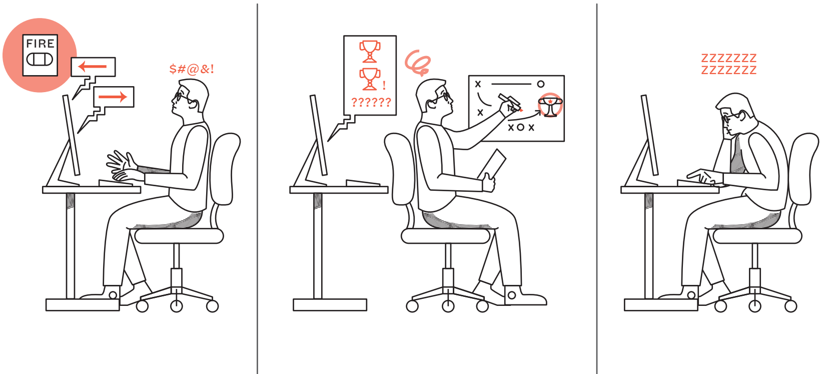
Scale should enable increased capability and leverage, yet most organizations struggle to manage the scale they've created. We often hear things like:

- "We can't understand what's going on."
- "We can't understand where we should focus."
- "We need to do more with less."
- "We're not aligned."
- "We have too many tools, meetings, dependencies, and interruptions."
- "We have too much technical debt and work in progress (WIP)."
- "We spend too much time micromanaging or in the weeds."
- "We're always waiting for something out of our control to happen."
- "We can't retain/leverage/empower our talent."
- "We've always done it this way; that won't work here."

There are also indications that something deeper is eroding our ability to act effectively.

There are three specific human costs brought on by scale: *distraction*, *disorientation*, and *disengagement*. Distraction is a result of the constant interruptions, changing priorities, and demands on our attention. Disorientation occurs from a lack of clarity and alignment toward what matters most. Disengagement occurs when we resign ourselves to treading water without a clear connection to value. (See also Figure 1.1.)

FIGURE 1.1: The Three Human Costs of Scale



Distraction **Disorientation** **Disengagement**

Working in larger groups multiplies distraction, which exacts an enormous cost. According to the study “No Task Left Behind? Examining the Nature of Fragmented Work” by Gloria Mark, Victor Gonzalez, and Justin Harris, it takes roughly twenty-five minutes to refocus after interruption.[4]

If we’re working on our own, we’re distractible enough. But the more people we engage with, the greater the chances that one of them will disrupt our attention at any time. Our distractions also lead us to distract others, creating a cascade of interruptions that splinter across the organization like space debris from an exploded satellite. This has made focus one of the most endangered mental factors in the modern world. There’s nothing more fatal to an organization’s ability to get things done than a team that can’t focus on its goal. Scale only exacerbates this problem.

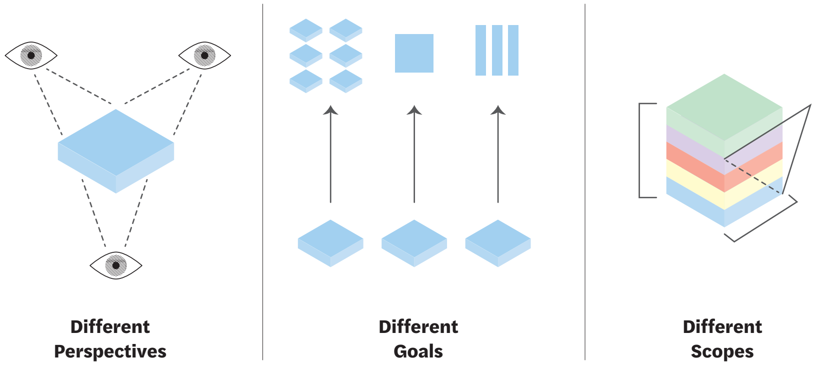
While digital technologies enable coordination at far greater scale and speed, they can make it even harder to get and stay oriented to what matters most. The infinite profusion of information means that relevant details are easily lost. The fast pace of change lends itself to disorientation and to people moving at cross-purposes. Digital reality can be more transient and individual, where individuals decouple from each other far more easily than in physical reality. This means that special effort needs to be made to keep people's digital worlds in sync, especially at the enterprise scale.

Orientation is required for alignment. Every layer of interaction in an organization requires aligning the motivations, understandings, and behaviors of different people. A simple way of understanding this misalignment is shown in Figure 1.2. Even if a group of individuals are observing the same challenge, every observer will have a different perspective, leading to different perceptions, as is illustrated in Judy Katz and Frederick Miller's book *Opening Doors to Teamwork and Collaboration*.[5]

Because of our unique perspectives, we may possess or lack key information. Different people may also have different goals based on what they see to be most important at that time. We can also have different scopes of concern (wider or narrower, sooner or later, micro or macro, strategic or operational) that function like different zoom levels. Technologists are famous for zooming in on challenging technical details when making a decision. Those who are considering a situation from a greater distance may come to entirely different conclusions. All of these different perceptions can offer complementary points of view, but it takes effort to align.

The Gallup organization has tracked employee engagement metrics for thirty years and summarized many of their conclusions in *First, Break All the Rules*. As of their most recent surveys, engagement among US workers still hovers around 33%.[6] According to Gallup's *State of the Global Workplace: 2023 Report*, disengaged employees cost the world an unbelievable $8.8 trillion in lost productivity.[7] Worker disengagement means our innate motivation circuitry is not being activated by our work environment. This could be due to a lack of challenge, but more often it's due to a lack of purpose—or being too far removed from it. In these situations, it is not clear how our work serves a beneficial purpose, apart from a paycheck.

FIGURE 1.2 Misalignment in Teams



Perspectives, goals, and scope vary widely across individuals, across groups, and over time.

Daniel Pink's bestselling book *Drive: The Surprising Truth about What Motivates Us* identifies autonomy, mastery, and purpose as key ingredients for maximum engagement.[8] And Google's Project Aristotle, a study conducted by Google to identify the key factors that make a successful team, found that sense of purpose was one of the five most important factors for high-performing teams.[9]

While it may be tempting to think that finding a sense of purpose requires changing jobs, the fastest and most powerful improvements come from simply understanding the purpose of the business you're in. Scale makes this difficult, since in a large process, the real beneficiaries of our work may be several steps removed from us.

The Organizational Costs of Scale

Scaling organizations brings with it special challenges. At an organizational level, the human challenges just mentioned manifest as misalignment. At scale, teams naturally become more distanced from the customer, from each other, from the purpose of their work, and from critical information. The critical feedback loop from customer need to team activity is stretched and broken.

Distance or closeness, whether physical or mental, is described as "proximity" by social scientists.[10] Empathy, or a worker's emotional connection to the challenges of a customer, is a function of *relational proximity*.[11] Having a shared understanding with coworkers is a function of *cognitive proximity*. These two kinds of proximity predict the likelihood of collaboration.

Coordinating an organization means navigating the invisible world of others' minds by trying to align incentives, forge trust, and clearly understand how to tackle the mountain of challenges and opportunities each team faces. Navigating an organizational ecosystem requires navigating an interdependent network of technical and social nodes (or interconnected components) and understanding that it's increasingly challenging to consider any component or area of the organization in isolation.

This invisible network is described in *Wiring the Winning Organization* by Gene Kim and Steven Spear as the:

> . . . social circuitry, the overlay of processes, procedures, routines, and norms that enable people to do their work easily and well. While individual specialists are focusing their attention on the problems immediately in front of them, this social circuitry establishes the patterns by which information, ideas, materials, and services flow, setting people up for success and integrating individual efforts for common purpose.[12]

This social circuitry is invisible and easily overlooked. As organizations scale, invisible gaps and misalignments become endemic. Avoiding or mitigating these costs of scale requires engineering this social circuitry to establish or reestablish a shared sense of purpose, orientation, and activity.

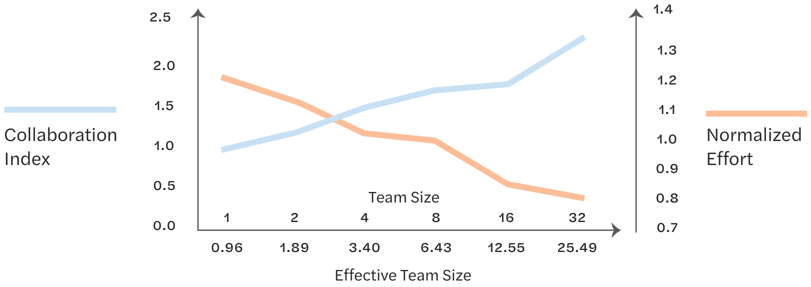
The Paradox of Scale

Even in simple coordination activities, like playing a game of tug-of-war, individual effort declines as group size grows. This loss of effort is known as the Ringelmann effect: as more people are involved in a task, their average performance decreases, with each participant tending to feel that their own effort is not critical to overall performance.[13]

Despite that inefficiency, in 2016 Microsoft and Facebook researchers conducted a study on forty-seven teams sized one to thirty-two people. They found that as team size increased, productivity of teams rose but collaboration costs and errors both increased. The study revealed valuable correlations between scale and performance: "We find that individuals in teams exerted lower overall effort than independent workers, in part by allocating their effort to less demanding (and less productive) sub-tasks; however, we also find that individuals in teams collaborated more with increasing team size."[14] In other words, large teams necessitate increased collaboration, yet the default effect is each contributor doing less.

In the end, the researchers found that "the largest teams outperformed an equivalent number of independent workers, suggesting that gains to collaboration dominated losses to effort."[15] To put it simply, collaborative work is best, but it's not our best work. The waste and cost of collaboration grow significantly at scales beyond the "two-pizza team" or "single-threaded team" popularized at Amazon[16] to address efficiency and scalability.[17]

FIGURE 1.3: The Paradox of Scale Illustrated



The graph shows the relative amount of effort by each individual declining and the prevalence of collaboration rising as the size of the team grows (more person-hours).

Adapted from Andrew Mao et al. "An Experimental Study of Team Size and Performance on a Complex Task." *PLoS ONE* 11, no. 4 (April 2016). https://doi.org/10.1371/journal.pone.0153048.

The study highlights a few aspects of scale we'll address later in the book with an approach to improve collaborative workflow:

1. As an organization grows larger, it will tend to become more inefficient. Effort is reduced and errors increase with scale unless care is taken to offset these risks.
2. These costs are hidden since economies of scale can bring gains that outpace the waste of poor coordination.
3. Cost and waste not only reduce company margins but also impact customer and employee experience.

These hidden inefficiencies also explain how large and established organizations can rapidly lose market share and crumble in the face of more agile competitors. This is massively consequential when we consider modern enterprise workflows comprising hundreds of teams and thousands of individuals as an interdependent network of collaboration at scale.

Challenges of Collaborating at Scale

Despite the enormous inefficiencies of trying to operate in organizations at scale, the incredible opportunities of the modern world and the intensity of competition push organizations to constantly strive for growth. Regardless of the challenges and the waste of large-scale organizations, not acting is not an option. And acting slowly or ineffectively is often as detrimental as not acting at all.

Given these constraints, we must find ways of working together that are effective for businesses, customers, and the workers themselves. Finding better ways of working together depends on finding a deeper understanding of the systems we work in.

Organizations as Socio-Technical Systems

Modern businesses are best understood as socio-technical systems (the combination of social and technical systems). Thinking well and delivering value are challenging even for individuals. Scale amplifies the challenge by complicating communication, coordination, and collaboration. Several laws and theories relating to scale help us understand organizational performance across socio-technical boundaries:

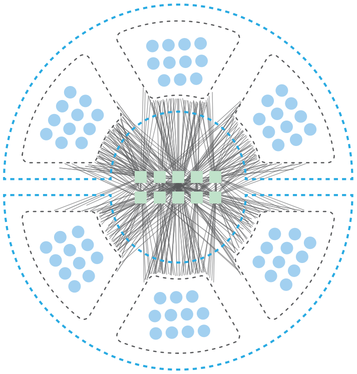
- **Weick's Theory of Organizing:**[18] This theory suggests that organizations are essentially systems for coordinating interpretation and meaning. As organizations scale, the number of interpretations and meanings that need to be managed can become overwhelming, leading to communication challenges.
- **Complexity Theory:**[19] This theory illustrates how complexity will increase nonlinearly with scale, making predictability and control more challenging.
- **Attention Economics:**[20] Herbert Simon's theory states that as information becomes more plentiful, attention becomes scarcer. Attention is a prerequisite to clarity.
- **Transaction Cost Economics:**[21] This theory aims to explain how the costs of coordinating across a large organization can outweigh the benefits of scale, leading to inefficiencies.
- **Metcalfe's Law:**[22] This law implies that the value of a network is proportional to the square of the number of connected users. While it primarily refers to the value of the physical network, it follows that as a network grows, the complexity and cost of coordination within that network increases as the square of the network size.
- **Brooks's Law:**[23] This law posits that adding more people to a late software project only makes it later. It highlights the communication overhead that comes with each new team member, which can slow down a project rather than speed it up.
- **Conway's Law:** Organizations that design systems (including products and services) are constrained to produce designs that are a copy of the communication patterns within the organization. As organizations grow and diversify, maintaining coherent communication becomes a challenge. Incoherent communication patterns can result in incoherent systems that perform outdated functions or are misaligned with current goals. Conway's Law works in the other direction as well. Maintaining fragmented systems puts pressure on the organization to divide teams into specialists for those systems. Winston Churchill captured the spirit of this when he said, "We shape our buildings, and afterward our buildings shape us."[24]

The common thread here is that as scale increases, complex and consequential effects begin to threaten the performance of the organization. Communication, coordination, and collaboration suffer. This not only degrades operational performance but also begins to degrade the very products and services the organization produces.

CASE STUDY | **The Checkbox Project**

“The Checkbox Project” is a case study published in the Fall 2023 *DevOps Enterprise Journal*.[25] It describes a seemingly simple task of adding a single checkbox to customer billing that would fire an API call to resell a partner service and generate millions in revenue with practically zero operational expenditure. It seemed like a clear home run but turned out to be a painful exercise in the challenges of enterprise scale.

FIGURE 1.4 The Checkbox Project: Teams Involved



- - - - Line of Business (B2B, B2C)

- - - - Channel (In Store, Call Center, Digital)

Teams Involved

Delivery Teams ●

Front End
Back End
Middleware Tier 2
Middleware Tier 1
Enterprise Data
Marketing
Notifications
Integration
Networking
Analytics

Shared Teams 🟩

Billing
Finance
PMO
Collections
Compliance
Internal Council
AppSec
Architecture
Procurement
Accessibility

The effort spanned 10+ delivery teams for each of two lines of business (LOB) with three channels for each LOB, each heavily reliant on shared services.

Source: Kamran Kazempour et al., “The Checkbox Project: Learnings for Organizing for Outcomes,” *The DevOps Enterprise Journal* 5, no. 2 (Fall 2023), https://itrevolution.com/product/the-checkbox-project/.

Implementing this change required navigating a complicated web of interdependencies: product development, IT, billing, global legal and compliance, and marketing, to name a few. All spanning and duplicated across multiple channels and lines of business.

Ultimately, delivery of the initiative required managed and close collaboration across over sixty teams in multiple organizational hierarchies across multiple channels and segments, including involvement from many coordination roles and shared services. In the end, the project took over twelve months from conception to completion and cost the company over $28 million to implement. Few stakeholders would consider it a success.

Managing the Invisible

We each understand value, clarity, and flow through our direct experience. We understand the experience of receiving something wonderful, deciphering some mystery, or having a feeling of progress. But all three of those experiences become harder to access when we're dealing with invisible things, especially at scale.

Dominica DeGrandis's book *Making Work Visible* helped popularize the challenge facing knowledge work organizations: our work is invisible. But even physical work benefits from making work visible.[26]

The famous time and motion studies pioneered by Frederick Taylor and Lillian and Frank Gilbreth were among the first efforts to track the way work is performed over time. Their analysis led to doubling productivity while also dramatically simplifying the work.[27]

While time and motion studies are largely focused on physical activity, our modern work demands human creativity, innovation, and dynamic collaboration. Even though they may have visible results, software development tasks themselves, for example, are invisible. Task management systems allow the work to be organized and visualized to a degree. Over time, we might notice trends in the number, duration, or allocation of these tickets. These can reveal patterns that are otherwise impossible to see. But just like the time and motion study can be misused to reduce human work to mechanistic and repetitive actions, misusing task management can lead to unintended consequences.

The most common mental model of work is that it's like a 100-meter race (not even a 100-meter relay race, just a race)—as if a team is a single runner and can just pick up the pace, improve their conditioning, or improve their technique. Comparing work to a race and your teams to independent athletes obscures the complexity of work and leads to proposed solutions that are little more than just hoping for magical improvements.

Collaborative work is more like a construction project. You can operate, even as a team, at peak performance and watch nothing improve. Until you address dependencies—the permitting process, the handoffs between trades, the supply chain for materials, the cost of inventory, the effects of weather—your efforts will be wasted.

Knowledge work is like a construction project in which the raw materials, the work being done, and the finished product are mostly invisible. As Frederick Brooks said in *The Mythical Man-Month*, "The programmer, like the poet, works only slightly removed from pure thought-stuff. He builds his castles in the air, from air, creating by exertion of the imagination."[28]

What a challenge! Working collectively to build "castles in the air," trying to coordinate invisible dependencies, and trying to understand and improve the invisible process that unfolds over time. No wonder most IT organizations are perceived as "black boxes" by those outside the department.

There are equivalent issues in every department. There are delays beyond our control, there are distractions and interruptions, there are queues and unfinished work, there are shared services, and there are approvals and standards. Until you leverage a paradigm that allows you to see and address constraints, the impact of those constraints will overpower any efforts you put into training, talent, tools, motivation, methodology, or anything else. Without the right paradigm for work, you could miss opportunities right under your nose.

Conclusion

Scale within socio-technical systems exacts a massive human cost through distraction, disorientation, and disengagement. Variations of perspectives, goals, and scope across individuals amplify these effects. Value, clarity, and flow become elusive, and our ability to collaborate and act effectively breaks down. We can't address issues we can't clearly see and understand. With a clear understanding of the specific impacts of scale and the importance of visibility to address them, it's time to talk about solutions. There are many common approaches to dealing with the challenges of scale. Let's look at the typical approaches with a fresh lens to identify the gaps that still exist in achieving effective action.

Key Takeaways ☑

- Scale increases the distance between cause and effect; people's perspectives, priorities, and activities; and the ultimate value and purpose of their work.
- Distanced from the purpose of their work and from a shared view, people become disengaged, disoriented, and distracted.
- These human costs limit the ability of teams to effectively and efficiently deliver value.

CHAPTER 2

Solutions to Scale

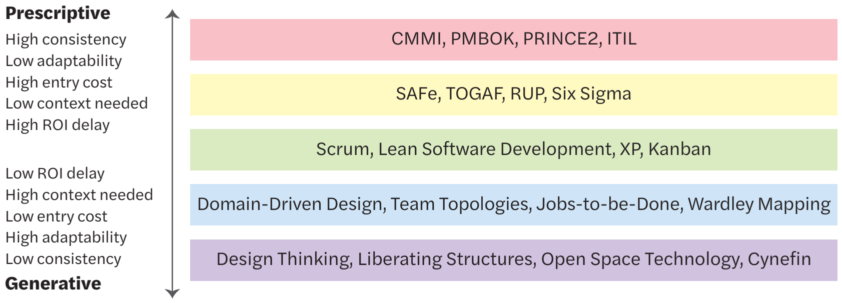
> "In this exquisitely connected world, it's never a question of 'critical mass.' It's always about critical connections."
>
> GRACE LEE BOGGS

PERHAPS YOU FIND YOURSELF in the middle of an effort or system of work that feels slower, less clear, or less productive than it should. In the activity of daily work, it may be unclear how to resolve dependencies, align stakeholders, uncover constraints, measure performance, or focus investment. It's valuable to be able to quickly step back from the work to improve the work. It's important to check if the saw is dulled, if you're using the right tool, or if you're even cutting down the right tree.

A painful truth of enterprise-scale solutions is that what works in one case likely won't work in another. Despite its massive scale and complexity, Amazon stands as an example of an organization that dominates, pioneers, pivots, experiments, and, after nearly a quarter of a century, shows no signs of slowing down. But chances are your organization bears little resemblance to Amazon. It's also unlikely that, like Amazon, you can mandate a descaling effort to break your organization down into smaller, independent teams that can operate productively at scale.

Ever since childhood, we've been cautioned about the risks of trying to be like anyone else. The same holds true in business. Copy and paste is not a viable option. Existing solutions fall along a spectrum ranging from *prescriptive* to *generative*, as shown in Figure 2.1. Prescriptive methods take a centralized approach, relying on a small number of leaders or experts to define precise structures for how teams should be organized and interact. By contrast, generative methods take a distributed approach. They seek to bring together stakeholders throughout the organization and facilitate discussions and exercises in hopes of finding emergent solutions.

FIGURE 2.1: The Spectrum of Solution Approaches


Prescriptive
High consistency
Low adaptability
High entry cost
Low context needed
High ROI delay
Low ROI delay
High context needed
Low entry cost
High adaptability
Low consistency
Generative
CMMI, PMBOK, PRINCE2, ITIL
SAFe, TOGAF, RUP, Six Sigma
Scrum, Lean Software Development, XP, Kanban
Domain-Driven Design, Team Topologies, Jobs-to-be-Done, Wardley Mapping
Design Thinking, Liberating Structures, Open Space Technology, Cynefin

The power of the distributed approach used in generative methods is that you can engage everyone in the activity of cocreating solutions. When people are involved in creating a solution themselves, they are more invested in delivering the outcome. This is often called the "IKEA effect"—we value things we build ourselves more than things we receive preassembled.[1]

The risk of this distributed approach is that it might take longer, and it's difficult to guarantee what conclusions contributors will come to. While it's important to get buy-in, individual contributors can lack important context from looking at the business at a large scale in time or space. The generative end can seem to demand a trust fall into the unknown. These generative approaches can be challenging to convert into clear, actionable business value.

The power of a prescriptive or centralized approach is that it provides more clarity and direction. When insights are distributed across the organization, they become invisible to most people. Those in positions of power can make clear statements about goals, structure, and priorities and ensure that those messages are visible and amplified across the organization.

The main challenge with prescriptive methods, however, is that they tend to be so heavy and constraining that the overhead of applying them dramatically undermines the benefits. Prescriptive models like PRINCE2 have a considerable learning curve and training cost and require specially trained experts and up-front budget approval. It can seem like the prescriptive side demands “all or nothing” and requires massive investment in learning and structure to get started or to scale.

Ultimately, any approach that hopes to solve the challenges of scale must possess three characteristics to overcome the three *D*s of disengagement, disorientation, and distraction:

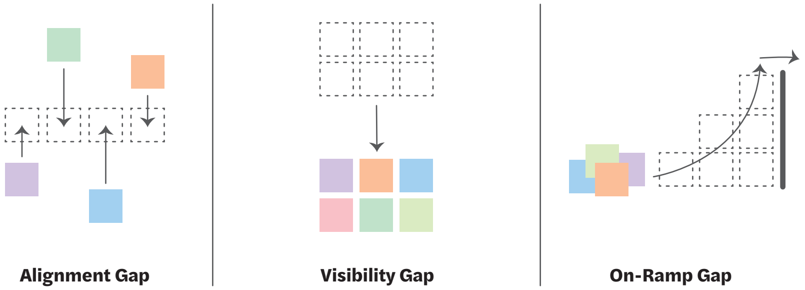
1. Like the generative methods mentioned, the solution you choose must engage all participants to ensure their perspectives are shared and that they feel committed to the solution. This addresses the risk of disengagement.
2. Like the prescriptive methods, the solution must be simple and aligned with the organization’s strategic goals. This prevents the risk of disorientation.
3. But unlike typical prescriptive approaches, the solution must also be fast and easy to put into practice to quickly realize ROI. This avoids the risk of distraction.

We seek interventions that are short, focused, and can yield results before priorities change, keeping participants on a golden path toward their target outcome.

Gaps in Existing Solutions

The common approaches to enabling large-scale collaboration typically suffer from three gaps: an *alignment gap*, a *visibility gap*, and an *on-ramp gap*.

FIGURE 2.2: The Three Gaps to Enabling Large-Scale Collaboration



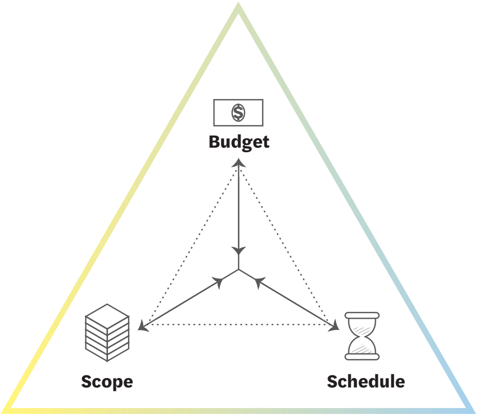
The *alignment gap* refers to the challenges of gathering support and enthusiasm, establishing business value, and connecting contributors to organizational needs and objectives. You can't do everything, so the organization needs to align its focus on what will deliver the results you need.

The *visibility gap* refers to the challenges of creating a shared picture of goals and the current state and making that picture accessible to everyone who's involved and affected. To assemble a complete view of your landscape, you must also include diverse, distributed perspectives. To navigate effectively, you also must be able to see where you're going. Creating a clear view from current to future state is essential to help everyone move together.

The *on-ramp gap* refers to the challenges of getting started, restarting, securing buy-in or investment, and building momentum. A key aspect of the on-ramp gap is the challenge of meeting organizations where they are based on their unique current state.

To truly hit a home run, any approach needs to accommodate the iron triangle of constraints in any large enterprise: budget, scope, and schedule. In other words, to satisfy the needs of a large, constrained, and inertia-bound enterprise, a solution must be inexpensive, minimal, and quick to pilot.

FIGURE 2.3: The Iron Triangle of Constraints



In today's landscape, most organizations lack an effective framework that achieves these things: quickly setting a valuable target, understanding the current state, and enabling effective action across a diverse group of individuals.

The Cybernetic Connection

Any effective remedy to the problems of scale must also be based on scale-free principles—i.e., principles that will hold true at any scale. Cybernetics is one of the most influential intellectual movements of the twentieth century and offers just such a scale-free explanation of how to accomplish goals.

Cybernetics introduced the idea that any attempt to navigate toward a goal depends on effective control systems. A control system is a system that uses feedback loops to continually adjust direction toward a target state. Cybernetics can be applied to understand systems as simple as a thermostat or as complex as a government. If your organization is like a plane, cybernetics is how you effectively fly that plane.

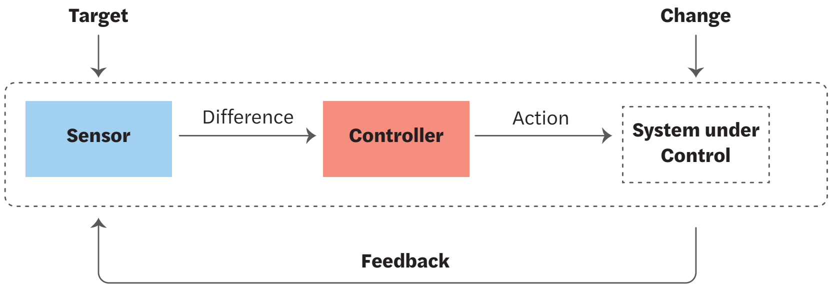
James Martin's 1995 book *The Great Transition* describes his vision for an enterprise of the future—a cybernetic corporation, or "cybercorp," incorporating two aspects of advanced performance: (1) technology enabling fast feedback, automation, scale, and new capabilities, and (2) employee empowerment enabling productivity, focus, collaboration, and autonomy. He decried the perils of separating "the business" and IT. Martin posited that for an organization to reach peak performance in the digital future, it needed to eliminate the gap between its people and its technology—across the enterprise—creating a single cybernetic system.[2]

Terms like "digital transformation" are thrown around casually in the media and in business discussions. It's helpful to reflect on what a profound change that implies: how much organizations already resemble cybercorps but also how much inefficiency remains in the way our organizations operate.

Thirty years ago, James Martin was among the last major authors to point to cybernetics as a way of describing a possible future of work. (A notable exception is Jeff Sussna's *Designing Delivery*.) Now that we're living in that future, it's worth stepping back to understand what's really happening.

From a cybernetic point of view, every activity an organization takes to keep moving in the right direction (whether management, training, IT systems, etc.) is part of a control system, a cybernetic feedback loop (see Figure 2.4 on page 22). (This loop echoes the elements of action loop we present in the next chapter.) None of this is new. None of this is controversial. But it *is* challenging to put into practice, especially in large groups.

FIGURE 2.4: Cybernetic Feedback Loop



A cybernetic loop represents the flow of navigating change through targeting, sensing, and response.

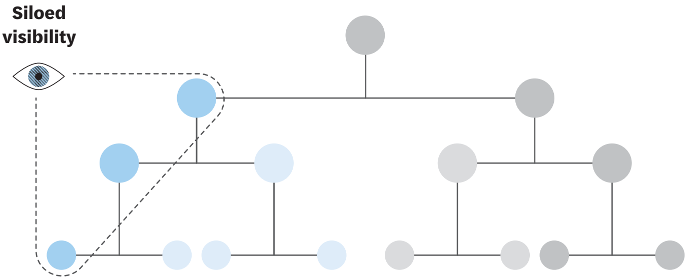
Everyone wants to feel like they have control over complex challenges. Dynamic activities, such as riding a mountain bike, are exercises in control. When we're riding down a mountain path, our target is staying on the trail and not wiping out. Our eyes, ears, and other senses are maximally engaged to maintain clarity about our current operating conditions. A skilled mountain biker will steer the front wheel and adjust their posture dozens of times per second. The experience of flow is undeniable.

Such a sense of progress, clarity, and focus may feel inaccessible at work. But perhaps that's because we've not yet built the cybernetic control systems needed to understand and act on the challenges at work. Our most important work goal should not be just to survive the next quarter. The most powerful goal is to engineer the experience of flow at work.

Understanding Work as a Flow

The primary challenge in business is how to enable a group of people to work together effectively to deliver value to customers. Value is defined as benefit compared with cost. Large organizations tend to organize people into functional groups and hand work across in a sort of relay race from customer need to customer satisfaction. The problem with these functional silos (see Figure 2.5) is they end up operating not as a single relay team but as entirely separate teams that train independently and may have differing goals.

FIGURE 2.5: A Siloed Organizational Structure

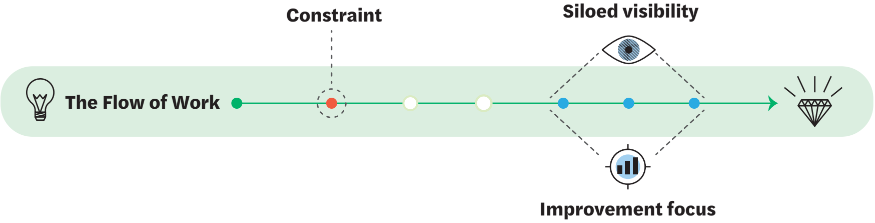


Silos are effective for personnel management but not for cross-organizational flow.

Imagine a relay race where each runner on the team trained alone and then showed up hoping for smooth handoffs mid-race. Not only is that relay team unlikely to perform well, but each racer on the team is also likely to focus mostly on their own performance. Training and measuring independently implies a lack of visibility into what everyone else is doing and how all the contributions come together to deliver value. Runners may spend many hours perfecting their stride but fumble the handoff, which is an order of magnitude more impactful on the ultimate performance of the team.

If we can only improve what we can see and we can only see a subset of the overall flow of work, all our effort could be wasted in comparison to addressing the weakest link in the chain of activities. If our visibility is limited to a subset of the work process, we will direct improvement efforts there. But if we fail to address the real constraint, our targeted improvements won't matter at best and could make things worse. (See Figure 2.6.)

FIGURE 2.6: Effects of Limited Visibility



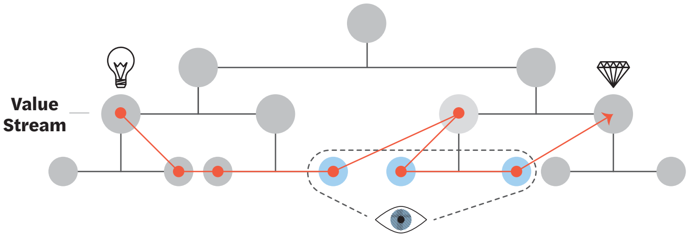
In *The Great Transition*, James Martin says, "A value stream is an end-to-end collection of activities that creates a result for a 'customer,' who may be the ultimate customer or an internal 'end user' of the value stream."[3] The scope of a value stream is the complete loop from customer need to customer satisfaction. A value stream represents a complete cybernetic control system, consisting of a customer target, a change implementation, and feedback processing.

Optimizing the value stream requires looking at this end-to-end work process to increase value delivery while reducing costs such as delay. By more effectively chaining together the work of each contributor, we approach a state where a single piece of work "flows" without interruption for the benefit of a customer.

Value stream optimization goes beyond optimization efforts that focus only on narrow segments of the workflow. For example, Agile principles and practices arose within the software development community to improve flow and customer centricity. Agile improved outcomes but put pressure on downstream deployment, infrastructure, and operations. DevOps later emerged as a solution to address that downstream handoff and accelerated delivery while improving outcomes.

Value stream optimization transcends DevOps to include the full process of delivering value to customers. Improving flow within a single value stream will shift the constraint elsewhere. Using the value stream as a model, we can see opportunities to accelerate and improve outcomes across the entire flow from customer need to customer satisfaction. (See Figure 2.7.)

FIGURE 2.7: The Value Stream



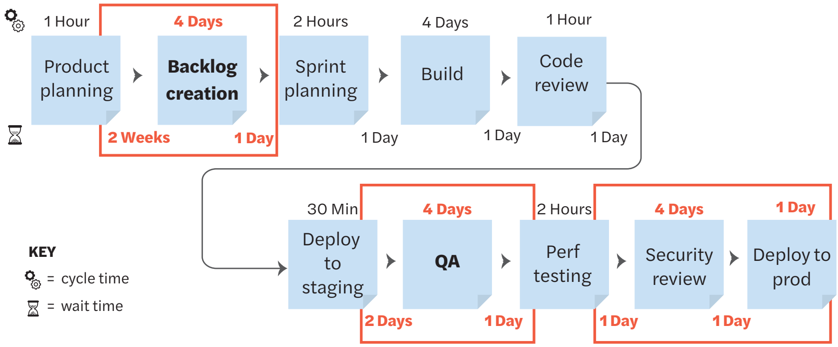
The value stream, the full scope of activity needed to satisfy customers, passes through multiple functional groups.

Making Flow Visible

To manage and optimize the flow of work, we must first *see* the flow of work. To reason about work effectively, we need to create a simple model that represents this flow. In a large-scale working environment, no individual has the full picture. That means we need to pool data and our individual knowledge to create this model.

To do this, we engage in Value Stream Mapping, creating a visual representation of the value stream based on our collective understanding. By mapping the value stream (see Figure 2.8), we can measure performance and identify improvement opportunities. Effectively, we are building a representative model that is easy to see and understand so we can manage a process that is otherwise invisible.

FIGURE 2.8: A Simple Value Stream Map

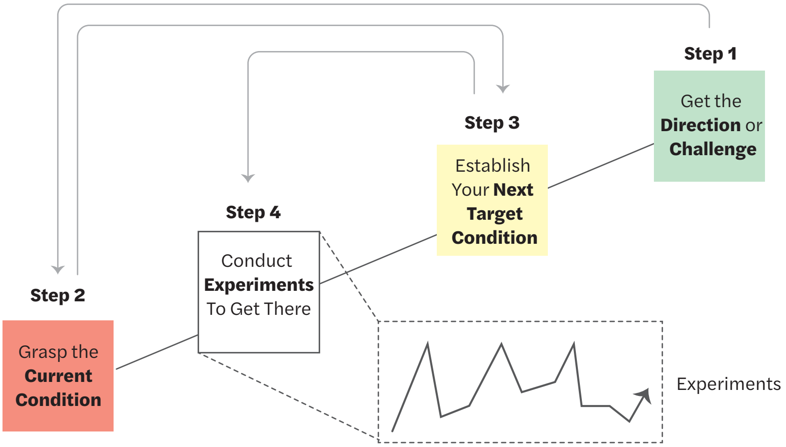

1 Hour
Product planning
2 Weeks
4 Days
Backlog creation
1 Day
2 Hours
Sprint planning
1 Day
4 Days
Build
1 Day
1 Hour
Code review
1 Day
30 Min
Deploy to staging
2 Days
4 Days
QA
1 Day
2 Hours
Perf testing
1 Day
4 Days
Security review
1 Day
1 Day
Deploy to prod
KEY
= cycle time
= wait time

In cybernetic terms, this is the act of creating a control system, a concept we'll return to later. On this basis, we can learn and adapt to improve value delivery over time.

The classic Value Stream Map originated as a “Material and Information Flow” diagram within the Toyota Production System (TPS). TPS is a revolutionary approach to running an organization that led Toyota to dominate the auto industry beginning in the 1980s. Central to TPS is the idea of kaizen, or continuous improvement. This practice was summarized by Mike Rother as the Improvement Kata in his seminal book *Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results,*[4] as shown in Figure 2.9.

The Improvement Kata is a four-step pattern of establishing a target condition, grasping the current condition, establishing the next target, and iteratively working toward that target. The Improvement Kata itself is a cybernetic loop, focused on continuous adjustment while navigating toward a target goal.

FIGURE 2.9: The Toyota Production System's Improvement Kata


Step 1
Get the **Direction** or **Challenge**
Step 3
Establish Your **Next Target Condition**
Step 4
Conduct **Experiments** To Get There
Step 2
Grasp the **Current Condition**
Experiments

Source: Mike Rother, *Toyota Kata: Managing People for Improvement, Adaptiveness, and Superior Results* (New York: McGraw-Hill, 2009).

This pattern is repeated in some of the most influential frameworks of the modern day, as shown in Table 2.1.

Flow Engineering is a set of practices that builds on the foundations of cybernetics and the Toyota Production System to provide a lightweight and iterative way of building value, clarity, and flow. Armed with these techniques for groups of people to externalize and evolve their understandings, we can develop clear focus to facilitate collective action.

In the next chapter, we'll introduce the three elements of effective action (value, clarity, and flow) as a cybernetic model that forms the foundation for a better approach to enable effective action at scale.

TABLE 2.1: Cybernetic Control Systems in Popular Decision Frameworks

Framework/ Methodology	Target	Sense	Compare	Compute	Act
Lean Startup	Set hypothesis	Measure	Learn	Build	Build
OKRs	Objectives	Monitor key results	Compare to objectives	Compute adjustments	Act on adjustments
V2MOM	Vision	Obstacles	Values	Measures	Methods
Scrum	Sprint goal	Standup	Retrospective	Identified improvements	Improvement
Balanced Scorecard	Strategic objectives	Monitor perspectives	Compare to objectives	Compute strategy	Act on strategy
DMAIC	Define goal	Measure	Analyze	Improve	Control
Lean	Define value	Map the value stream	Measure the value stream against target outcome	Identify constraint & causes	Create flow/ establish pull/strive for perfection
TQM	Quality objectives	Monitor metrics	Compare to objectives	Compute corrective measures	Implement measures
OODA	Mission aim	Observe	Orient	Decide	Act
PDSA/PDCA	Plan	Do/observe	Check/study	Check/study	Act/adapt
Toyota Production System	Operational excellence	Observe (Gemba walks, Andon)	Identify waste (muda, mura, muri)	Kaizen bursts	Implement changes (jidoka, just-in-time, continuous improvement)

Key Takeaways

- Common solutions often suffer from an alignment gap, a visibility gap, and an on-ramp gap.
- Value streams provide a model for cross-organizational performance visibility, measurement, and management.
- Cybernetics provides a model for effective action to drive performance improvement.
- Our best methods for driving effective action leverage the cybernetic loop of targeting, sensing, and responding.
- We must leverage the learning of other organizations, but we can't copy success or experience.

CHAPTER 3

The Elements of Action

"Do what you can, with what you have, where you are."

Theodore Roosevelt

SCALE BRINGS MANY CHALLENGES. But perhaps the most insidious are the difficulties of developing and sustaining value, clarity, and flow, the fundamental elements of effective individual and collective action. *Value* informs direction, *clarity* provides understanding, and *flow* lets us get things done. When these elements are present, effective action is possible. When any are missing, effective action is difficult or impossible. These three elements are critical for establishing and maintaining effective collective action at scale.

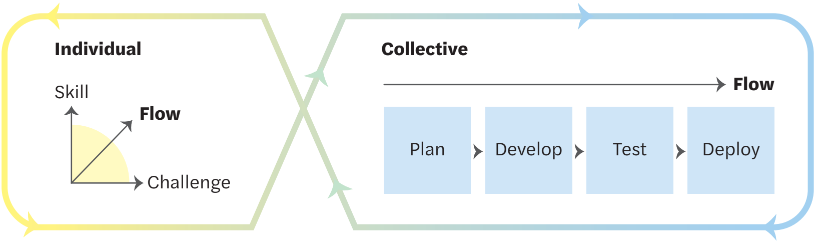
Value broadly describes our individual and shared preferences for some outcomes over others. Essentially, it's why we're in business. Value drives the behavior of organizations on a macroscale and of individuals on a microscale. Value sets the target to be reached by our actions. Value is the pleasant experience of something that solves a problem or fulfills a wish.

Clarity describes the ability to accurately understand the key aspects of our situation. To have clarity means that our mental models align correctly with our observations. Because each of our perspectives and mental models is limited, building shared clarity in a group enables a more reliable perception.

Flow means unobstructed action that emerges from the effective pursuit of value. It refers to smooth, steady, sustainable activity that is both predictable and satisfying. Flow is the delicate balance between execution and adaptation, allowing us to circumvent obstacles and continually experience progress. Individuals are at their best when they can sustain a state of psychological flow, and teams are at their best when handoffs from one person to the next lead smoothly to the creation of value for the customer.

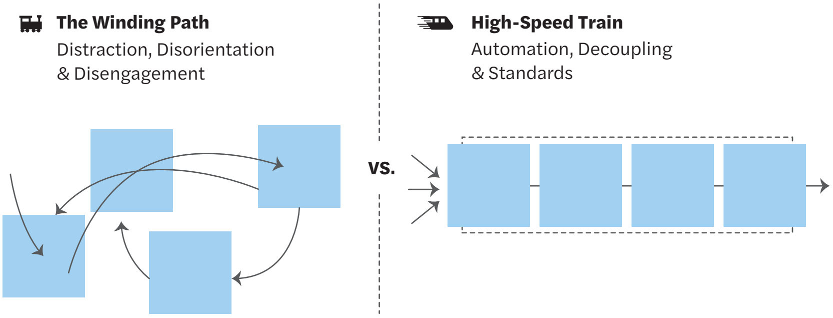
While our target is collective flow, the same factors apply at both a collective and individual level. (See Figure 3.1.) It's impossible to achieve individual flow in a collective environment full of friction, delays, and interruptions. One of the principles of cybernetics is that similar patterns can be seen at every scale. This book is aimed at providing you with clear practices to improve collective flow across individuals and teams and enable individual flow as a by-product of that effort.

FIGURE 3.1: Collective and Individual Flow


Individual
Skill
Flow
Challenge
Collective
Flow
Plan
Develop
Test
Deploy

Flow exists across collective activities and within individual work.
The two levels are interdependent.

FIGURE 3.2 Effects of the Three Elements of Action


The Winding Path
Distraction, Disorientation & Disengagement
High-Speed Train
Automation, Decoupling & Standards
VS.

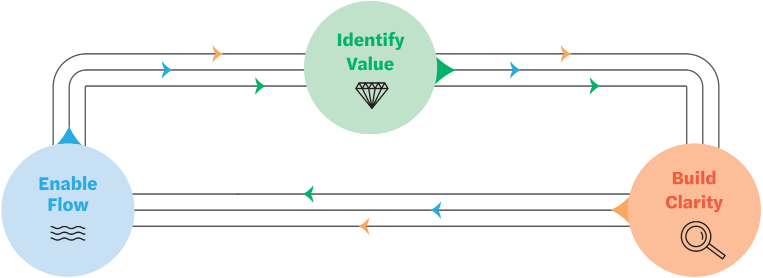
Flow without direction or clarity leads us on a winding path full of waste and confusion. Value and clarity enable you to build high-speed railways for flow.

These three qualities (value, clarity, and flow), while common in our language, are often hard to establish. And once gained, they are easily lost. The connection to value may fade over time. Clarity can become muddied. Flow can become blocked or slowed as conditions change. A problem with any one of these three qualities can spell disaster for a team or an organization. And these problems are exacerbated with scale. (See Figure 3.2 for more.)

How Value, Clarity, and Flow Interrelate

Value, clarity, and flow are mutually dependent. Our orientation or sense of value dictates what information we seek and how we interpret what we see. Thus, value is preliminary to building clarity. Clarity, in turn, allows us to see where we have opportunities or constraints and thus enables action. In particular, a high degree of clarity is required to achieve the skillful and continually adapting type of action we describe as flow. Flow makes optimal use of our energy to develop value, which unlocks new possibilities as we receive feedback. Flow enables the cycle to continue or accelerate. This mutually supportive relationship is shown in Figure 3.3.

FIGURE 3.3: The Three Elements of Action

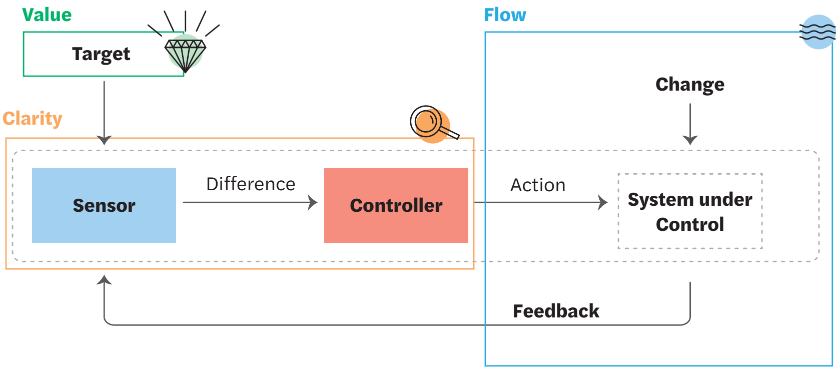


The elements of action—value, clarity, and flow—
are interdependent and feed each other.

A key aspect of the three elements of action is that they apply at any scale. As individuals, we must go through the loop of identifying value, building clarity, and enabling flow on an ongoing basis, shown in Figure 3.4 (see page 32). At larger scales, both teams and entire organizations must do the same:

set a target, understand their current state, and take action collectively. The problem of scale emerges when teams or individuals move in separate directions without establishing shared value, clarity, and flow.

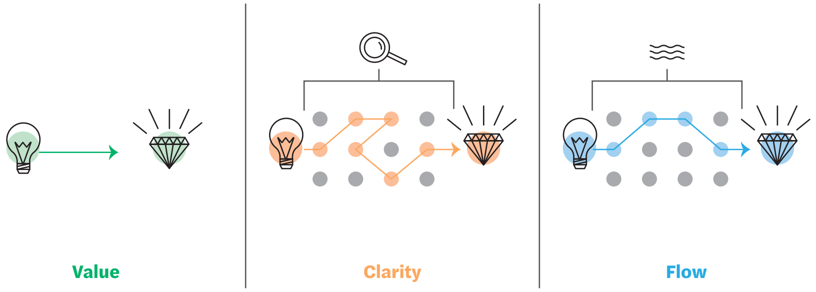
FIGURE 3.4: Cybernetic Loop with the Elements of Action


Value
Target
Flow
Change
Clarity
Sensor
Difference
Controller
Action
System under Control
Feedback

Value, clarity, and flow summarize the cybernetic loop.

As is represented in Figure 3.5, value, clarity, and flow help to align teams for collective action. Value represents the shared goal of the team or organization, clarity allows the team to understand a path to that goal, and flow reveals the optimum path to that goal.

FIGURE 3.5: The Elements of Action: Value, Clarity, and Flow


Value
Clarity
Flow

Value is our target; clarity allows us to understand a path to that target; and flow is about optimizing that path.

Conclusion

Effective action depends on value, clarity, and flow. And effective action at scale requires those elements to be shared across individuals and teams. Human collaboration doesn't scale naturally. Varied perspectives, goals, and contexts breed too much confusion when trying to work toward a common purpose. Confusion, waste, and friction are the leading causes of transformation failures.

Organizations rise or fall depending on their systems of collaboration. Systems of collaboration require a foundation of value, clarity, and flow. As we'll see in the upcoming chapter, mapping is a lightweight superpower for building the three elements of action. Different types of mapping can be used to clarify challenges with goals, processes, or dependencies. And mapping can be scaled and repeated to meet the demand for change.

Mapping in the form of Flow Engineering is ideal for effective collaboration and is the process for developing value, clarity, and flow. In the next chapter, we'll demonstrate how a clear sequence of collaborative mapping activities can identify value, create clarity, and enable flow.

Key Takeaways

- The elements of action (value, clarity, and flow) are invisible factors that are missing in considerations of business in the digital age.
- Because organizations rise or fall depending on their systems for effective action, value, clarity, and flow are critical factors for organizational performance.
- Collaborating on making work (and obstacles to work) visible is a powerful method for building value, clarity, and flow.

CHAPTER 4

Flow Engineering

"In a dialogue, each person does not attempt to make common certain ideas or items of information that are already known to him. [They are] creating something new together."

DAVID BOHM, *On Dialogue*

WE DISCUSSED IN CHAPTER 2 that the distance inherent in scaled organizations leads to disengagement, disorientation, and distraction. We looked at how tackling the gaps in solutions requires a rapid start, alignment from leadership to contributors, and visibility from start to finish. In this chapter, we take a look at collaborative mapping as a superpower to counteract the costs of scale.

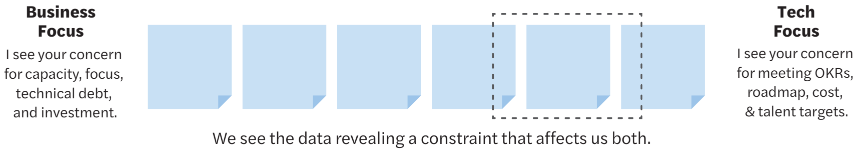
Mapping can be highly effective in gaining alignment and action in teams. It's visual, interactive, and collaborative, which makes it highly engaging. It provides a space to pull together contributors and context, which allows a team to orient themselves as a group. It gives you a platform to distill many perspectives into something well-defined, focused, and shared, which enables clear next steps. The act of mapping enables you to learn by doing. Armed with the right methods for mapping, you can counteract disengagement, disorientation, and distraction. Additionally, with the right series of maps, you can develop value, clarity, and flow and quickly enable effective action.

The Abilene Paradox[1] describes a situation where a group collectively decides on a course of action that is counter to the preferences of most or all of the individuals in the group. It's based on a story of a family who collectively decides to take a long, uncomfortable trip to Abilene—despite none of them individually wanting to go—because each mistakenly believes the others want to go. The paradox occurs when members incorrectly believe their own preferences are contrary to the group's and, therefore, do not raise objections. This results in a situation where no one is happy with the outcomes, even though everyone believes it's what the group wants. In collaborative environments, a lack of clarity and alignment can take you places nobody wants to go.

Maps as Rosetta Stones

Maps can function as a Rosetta Stone, translating the distinct languages in an organization, such as "business" and "tech". The map bridges the perspectives of each side, serving almost as a mediator. Typically, when two people are looking at the same problem or the same set of data, they are perceiving different things based on their perspectives, their backgrounds, and so forth.

FIGURE 4.1: The Power of a Map


Business Focus
I see your concern for capacity, focus, technical debt, and investment.
Tech Focus
I see your concern for meeting OKRs, roadmap, cost, & talent targets.
We see the data revealing a constraint that affects us both.

Maps allow individuals to have higher-quality conversations on specific areas of focus.

But when they jointly build maps, two individuals can construct a mental model that synthesizes both of their views. The map allows them to decode each other's language, pointing them both toward the same understanding

(Figure 4.1). The maps in Flow Engineering aim to address the gaps in understanding that arise from silos of activity, concern, and visibility.

Value Stream Mapping is an extremely powerful technique for driving performance improvement in organizations. It's even easy to start. So why isn't everyone doing it all the time?

We often hear some version of the same complaint when Value Stream Mapping is brought up in enterprises: "We want to do it. We know we have to do it, but we're not ready for it." Despite the value, many leaders don't feel they can take the time, secure commitment or budget, learn the techniques, or try something new. Some leaders who are familiar with Value Stream Mapping associate the practice only with manufacturing or feel it can't be adapted to their complex environment.

It's easy to put off adoption of this technique in favor of the status quo. You may be convinced you can't do it yourself because traditional Value Stream Mapping has highly specialized language, symbols, and an official ISO standard. It can be challenging to connect a mapping exercise to higher-level objectives to establish alignment and justify the effort. These challenges are some of the primary reasons for creating a simple, sequential mapping approach for organizations that need to act, not just map.

Introducing Flow Engineering

Based on the need to enable effective collective action, we've developed a series of mapping practices to help teams arrive at shared clarity that we call Flow Engineering. Flow Engineering embodies these activities as a structured set of visual mapping exercises that draw out insights and align the efforts of a group of collaborators. If you can host a board game, you can host these mapping exercises.

Flow Engineering builds upon mapping's benefits to go beyond engagement, alignment, and focus. It enables effective collective *action*. Flow Engineering allows us to identify value by connecting current state context to a clear target outcome. It connects that outcome to specific benefits for customers and stakeholders. It keeps that value present as a north star so that contributors can make the best decisions about what will help boost and uncover value through their efforts.

Flow Engineering allows us to build clarity by making it easy for contributors to connect the dots from efforts, activities, and improvements to the most critical focus for the organization. Based on a more complete and holistic view of the full system of work, everyone can grasp their place in improving the system. The minimal design enhances clarity by avoiding a lot of less valuable context and noise.

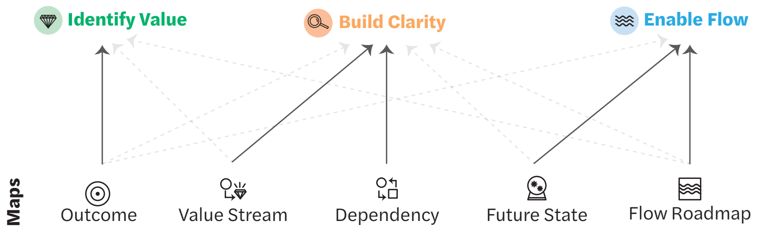
Finally, Flow Engineering allows us to enable flow not only by uncovering the constraint most affecting the flow of work but also by building relationships, which unblock conversational and informational flow across stakeholders and contributors. By aligning everyone to one target outcome, one stream, and one constraint, everyone can move forward together rather than against or away from each other. The concise format makes it easier for teams to step away from daily distractions and gain clarity, so they can come back to daily work with renewed energy, awareness, and focus.

Five key Flow Engineering maps enable the three elements of action:

1. **Outcome Map**: To identify your target outcome.
2. **Current State Value Stream Map**: To reveal the current state and constraints of your workflow.
3. **Dependency Map**: To identify dependencies by studying constraints.
4. **Future State Value Stream Map**: To create a future state definition of flow.
5. **Flow Roadmap**: To organize insights, actions, and ownership into an improvement roadmap.

You can see how each map supports value, clarity, and flow in Figure 4.2.

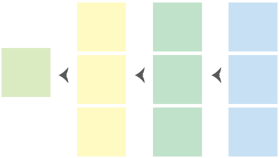
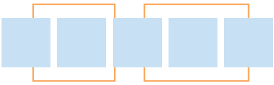
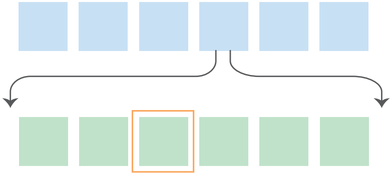
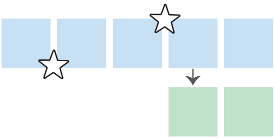
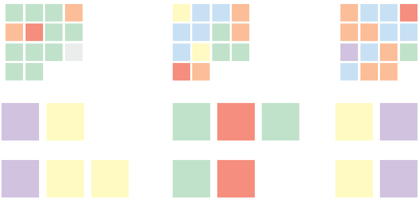
FIGURE 4.2: Value, Clarity, and Flow Woven through all Flow Engineering Maps



Solid lines indicate a direct contribution, dotted lines indicate indirect contribution.

These mapping exercises are designed to guide you through the essential steps to establishing team flow. They're adaptable and extendable to meet the unique needs of your team(s). And importantly, they are quick, clear, and easy to execute, allowing teams to remain agile and move at the speed of change.

FIGURE 4.3: Five Maps of Flow Engineering

Maps	Purpose	Simplified Diagram of Maps
Outcome Map	Discover and align on value	
Value Stream Map	Find and measure key constraints	
Dependency Map	Connect constraints to dependencies	
Future State Map	Design improved flow	
Flow Roadmap	Create and plot clear next steps	

The full set of Flow Engineering exercises involves creating five maps: an Outcome Map, a Current State Value Stream Map, a Dependency Map, a Future State Value Stream Map, and a Flow Roadmap.

Filling the Three Gaps

Flow Engineering addresses the challenges presented by the alignment, on-ramp, and visibility gaps, as seen in Table 4.1:

TABLE 4.1: Addressing the Three Gaps through Flow Engineering

Need	**Gaps**		
	Alignment	**On-Ramp**	**Visibility**
Establish and maintain focus on a valuable target	✓	✓	✓
Visual and collaborative in real time	✓	✓	✓
Flexible and easily integrated into current practices	✓	✓	
Accessible to aspiring and novice facilitators		✓	
Inclusive and equitable	✓	✓	✓
Remote friendly	✓	✓	✓
Simple, quick, and affordable	✓	✓	✓
Scalable from pilot to enterprise-wide	✓	✓	✓
Complete program to address flow challenges	✓	✓	✓
Has its own flow (obviously)		✓	

With the goal of fostering the three elements of action, the maps of Flow Engineering each specifically serve one of the three elements but also support the others as a secondary benefit (as shown in Table 4.2). As we introduce each map in later chapters, we'll share which practices they're based on and viable substitutes for each should you have an existing practice in place or a substitute you'd like to employ instead.

TABLE 4.2: Each Map Serves at Least One of the Elements of Action

Map	Primary goal	Secondary benefits
Outcome Map	Assemble context and identify value	Provide clarity and alignment across multiple perspectives
Current State Value Stream Map	Clearly identify the most impactful constraint	Build clarity on current state workflow and performance
Dependency Map	Build clarity on causal factors	Build an artifact to share with external stakeholders
Future State Value Stream Map	Define improved flow	Identify valuable experiments and actions to improve flow
Flow Roadmap	Prioritize and plan flow improvements	Provide clarity on next steps and flow from today to future goals

Next, we'll look at each of the five maps of Flow Engineering, go over how to get started, and show you how to facilitate your team's progress through value, clarity, and flow.

The five mapping exercises in this book are presented as Liberating Structures. Liberating Structures are microstructures or patterns of interaction that can be used by groups to engage and enable all participants. They are based on principles of complexity science and follow a consistent format to make them easy to facilitate and engaging for participants. You can find more information in the book *The Surprising Power of Liberating Structures* by Henri Lipmanowicz and Keith McCandless or at liberatingstructures.com.

When to Start Flow Engineering

If you find yourself in a large-scale enterprise environment, at any moment it's likely you're faced with at least one of the following circumstances:

- You need to cut costs, boost efficiency, or improve time to market.
- You're planning in the midst of or recovering from a reorg.
- Your calendar is being eaten up by meetings.
- You're acquiring or have been acquired.
- You need to onboard staff into a complicated workflow.
- You just need to figure out what's going on, where to focus, and what to do.

Each one of these is a great opportunity to map, so let's look at how we can make it work.

Where Flow Engineering Happens

Steve started mapping with clients before work was shifted to remote-first, when groups could routinely be present in the same room to map. The energy, sense of connection, and tangibility of an in-person workshop can't be matched in a virtual space. But virtual mapping has many advantages. It's far easier for everyone to work at once, there's no facilitator blocking the board, and handwriting is never a problem. It's also far easier to start than booking a conference room with the ideal equipment. With virtual mapping, you can easily export, share, preserve, and update the results. You can save a lot of time working across teams and sessions by using templates. Even if you have a fully colocated team, you might consider virtual mapping to capture all of those benefits along with the advantages of in-person activity.

Flow Engineering Tools and Timeline

Any collaborative visual tool will work well for these maps in a virtual or hybrid environment. There are dozens of free tools that allow for real-time collaboration, and many offer anonymous voting and other powerful facilitation capabilities.

The important part is to build the maps collaboratively or at least get fast and varied feedback from everyone involved and affected. These days that means online, but this is all possible with a dry-erase board, paper, sticky notes, or almost anything you can write on together. For each map, you'll likely need two hours for an extremely skilled facilitator with prior experience or three hours for a new attempt.

Who's Involved in Flow Engineering

It's important to involve representation from at least the responsible and accountable parties within a given value stream. That means if design is part of the stream, someone from design should be present during mapping. That also means that leadership and those who are able to change the system, workflow, and team must be present and involved. Once you identify your key bottlenecks, you can narrow the involved parties to those who are critical to those areas. In general, it's good to include as many voices and perspectives as possible, but we find that twelve people is the maximum manageable size.

Facilitators are essential for collaboration. They can alleviate participants' fears, encourage creativity, and create a safe space for sharing ideas. They have the ability to open up and expand discussions while also narrowing down and refining them. Ideally, the facilitator has no skin in the game. They're neutral and supportive of the group's process. This helps move activity forward and keep it out of the weeds. An easy guide for facilitators is shared in Table 4.3.

TABLE 4.3: General Facilitator Rules of Engagement

✓	Facilitators talk as little as possible outside of guiding the mechanics of the process; they let the participants own most of the dialogue.
✓	Facilitators should caution any individual from talking too long; aim to stay within the duration of an elevator ride. In a larger group, a single sentence constraint can keep the effort moving.
✓	Promote a standard, non-disruptive interruption method (i.e., hand raise) to provide participants a way to voice their thoughts.
✓	Encourage participants to reach out to other participants who haven't spoken to ensure we hear from everyone.
✓	Keep participants comfortable with ranges and guesses; trust but verify with the group.
✓	Facilitators emphasize the need to stay focused on the time horizon in question. If we're looking at the current state, avoid talking about solutions or how things ought to be.

With all that said, you're ready to dive in. It's worth noting here that once you have completed the full Flow Engineering mapping sequence, you can remap maps individually depending on your need. Say, for example, your team still doesn't seem like it's aligned on a target outcome, you can revisit Outcome Mapping. Or, if you feel that maybe you're missing a dependency, you can go back to Dependency Mapping.

CASE STUDY

What Flow Engineering Enables

One of Steve's earliest clients was a Fortune 100 company with massive scale and resources. They could execute any initiative they focused on and deploy incredible amounts of support to achieve their desired outcomes. The only challenge was choosing the right focal point and aligning all of the stakeholders toward that objective. This is no small feat, especially with the complexity we face with modern knowledge work.

This organization had tens of millions of dollars to spend on improvements and automation with the aim of reducing time to market. The department leader hired some new staff to assess what they were doing differently than other successful organizations like Google and Facebook. They discovered that deployment automation was common among all these big players but was something they didn't have. Reasonably enough, they formed the hypothesis that they would go to the board and ask for the budget to roll it out.

They were about to follow the typical enterprise path and deploy millions of dollars toward automating deployments, the stage in the value stream when new packaged code is distributed to servers to be enabled for use by customers. Sounds like a great idea if you believe deployment will be improved through further automation. It would surely make the release process faster and simpler and perhaps even improve quality. What's not to love?

But step back a moment and consider the larger picture. If they pick deployment automation as their primary focus, they're making an assumption that it represents the best opportunity for improvement. How do they know that?

The budgetary process in the organization required that they make a case for any large investment, which is typically sponsored by a key stakeholder. In the past, they would point to industry best practices, aspirational examples, models and frameworks, and other resources outside the organization. They'd also compile opinions from trusted advisers who leveraged the same resources, as well as their own perspectives from within the organization. Typically, this doesn't follow a formal structure or process. This means they have no way of truly inspecting how the decision is made. They're not able to check the math and ensure the recommendation is the best one, given all the information available. They're operating on assumption and opinion.

On this occasion, the leadership team wanted to make a data-driven case to their board for funding. They wanted to be sure. They wanted to build and foster trust between the business and technology groups involved to reach a higher level of collaboration. The mandate was to collect data on the release process to support the proposal for automating deployment.

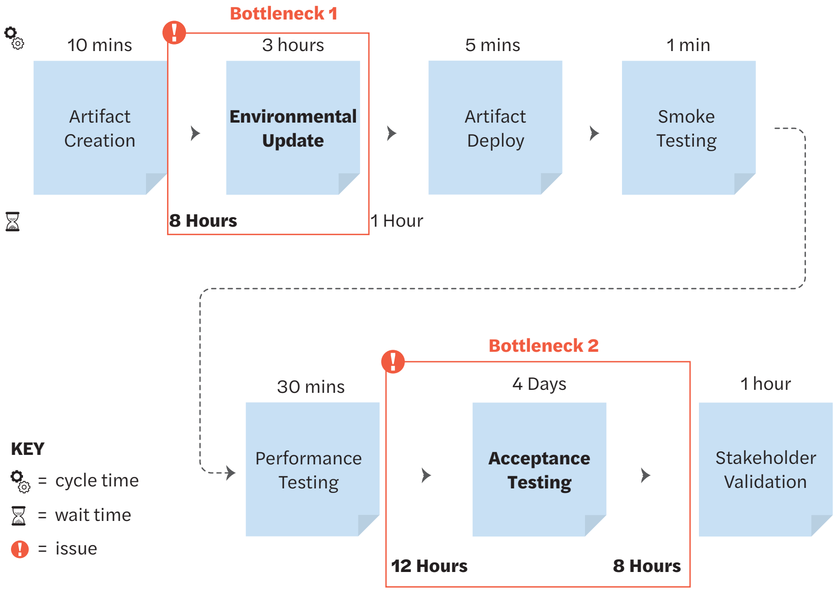
Consider yourself in the situation of our large, Fortune 100 enterprise. If you were able to ask for resources to spend in a few areas to tackle your most critical opportunities for the next year, what would you want to have at your disposal? How would you answer questions like "Why this?" or "Why now?" with confidence?

To address these questions in advance and ensure they had, in fact, picked the highest-priority opportunities for investment, the client engaged Steve to facilitate Value Stream Mapping their release process. Within a few hours of collaborative workshopping, it became clear that not only was artifact deployment a minor portion of the overall value stream, but there were also two other big bottlenecks waiting nearby.

The actual bottlenecks were in environment updates and acceptance testing. The bottleneck in acceptance testing was a surprise to everybody. The QA process had been operating in a stable state for a very long time. Nobody had been paying attention to it. Of course, it hadn't gone entirely unnoticed; some people had been talking about this "environment update" thing for ages, but they couldn't convince anybody to spend any time on it because they didn't have a way of describing it properly. They did have a visual method of showing the data to make their case; they were just arguing.

When you're just arguing, you're only as good as your negotiation skills, your role power, your experience, your credibility, your social capital, all these things that have nothing to do with the facts—making it a waste of time, in most instances. However, with Value Stream Mapping, all of a sudden these people who had been complaining about environment updates for years felt vindicated. They felt empowered knowing that now everyone could clearly see what they'd been trying to say for years.

FIGURE 4.4: A Segment of the Full Value Stream Map


Bottleneck 1
10 mins
3 hours
5 mins
1 min
Artifact Creation
Environmental Update
Artifact Deploy
Smoke Testing
8 Hours
1 Hour
Bottleneck 2
30 mins
4 Days
1 hour
Performance Testing
Acceptance Testing
Stakeholder Validation
12 Hours
8 Hours
KEY
= cycle time
= wait time
= issue

This mapping exercise disproved the assumption that automating artifact deployment would make a meaningful improvement. Two other bottlenecks were found instead.

By collecting the data across the value stream, three major opportunities for improvement were revealed, with the smallest being an order of magnitude more impactful than deployment automation. All of the stakeholders involved could see the same picture, the same data, and the same insight. Not only could they see the data pointing to three major opportunities within the value stream, but these opportunities could also be easily prioritized based on data collected on timing, quality, and value.

Let's review the outcomes of this investment, which took only a few hours of mapping:

- Twenty million dollars of investment rerouted to where it would have a dramatic impact.
- Eighteen months of time wasted on the wrong improvement was avoided.
- Stakeholders and contributors who had never met (yet worked in the same value stream) built relationships and understanding.
- The data enabled clear prioritization based on the relative investment and trade-offs.
- The department lead avoided an embarrassing, wasteful misstep and could instead present a clear and data-backed case for a preferable alternative.
- Not only leadership but each stakeholder and contributor inside and beyond the value stream had a visual artifact to aid common understanding and productive dialogue.
- The organization gained a new tool to understand their environment, make valuable decisions, and build trust across business and technology groups.

One stakeholder, a program manager overseeing their transformation efforts, described the value of the exercise with a shocking statement: "I've been here for nineteen years, and this is the first time I've seen our process from start to finish!" This case illustrates a number of benefits provided by a mapping-first approach to improvement. A fresh, minimal approach to mapping fit the need in terms of not only speed of creation but also simpler understanding and clearer insight.

Conclusion

The mapping practices in Flow Engineering are not a one-size-fits-all approach. And Flow Engineering is not a copy-and-paste methodology, which we know doesn't work. It's not a heavy framework that imposes a specific structure or operating model onto your company. Instead, it involves creating clarity with a particular team for that team and based on their unique situation. In the process of discovery, mapping, and definition, each team learns about how to improve performance by connecting their unique target outcome to the actual work that will deliver it. They reveal the constraints, obstacles, and insights that often stay hidden behind the scenes. And key information can be made visible, including the diverse perspectives across the value stream.

This process of choosing direction, mapping the business landscape, and navigating is at the heart of Flow Engineering. The ultimate goal of these efforts is to sustainably improve the flow of value to customers.

In the chapters that follow in Part 2, we introduce the five maps, which each serve a distinct purpose. The purpose of these five mapping exercises is summarized in Table 4.4. It's important to understand the underlying purpose of each exercise and what it seeks to overcome. Once we understand the purpose, we can adapt the mapping process or substitute a comparable process to meet the needs of our teams.

TABLE 4.4: Purposes and Benefits of the Five Flow Engineering Exercises

Mapping Exercise	Purpose	Risk It Averts
Outcome Mapping	Align all members of a team around the value they need to deliver.	Investing in irrelevant improvements.
Current State Value Stream Mapping	Clarify the most likely constraints in an end-to-end workflow.	Optimizing a process that is not the constraint.
Dependency Mapping	Enhance the team's clarity around likely constraints.	Inadequate understanding of the constraint.
Future State Mapping	Jointly envision a value stream with improved flow.	Failing to create a visible target for change.
Flow Roadmapping	Define the minimum set of steps to achieving improved flow.	Failing to effectively act on insights.

Flow Engineering can also include other visualizations and practices beyond these five maps if they help organizations understand what will deliver their target outcome.

Flow Engineering is about improving flow via collaborative mapping. You can create and customize your own unique version for your organization and its needs based on the goals, principles, and practices described in this book. In Part 2, we'll go through the details and instructions for each of the five maps of Flow Engineering, beginning with the Outcome Map.

Key Takeaways ☑

- Collaborative, visual mapping is a superpower for knowledge work. It's remote-friendly, persistent, and easily shared.
- Flow Engineering is not a one-size-fits-all approach but rather involves designing improved flow within a particular value stream or team for their situation based on their unique target outcome.
- Flow Engineering was designed to address alignment, on-ramp, and visibility gaps and to reduce disengagement, disorientation, and distraction.
- Flow Engineering is easy to start, justify, and apply, so you can start doing it today.