Stages of a Modernization Plan ........................................ 51
No Silver Bullets .................................................. 53
Full Rewrite ......................................................... 54
Iteration in Place .................................................. 55
Split in Place ........................................................ 56
Blue-Green .......................................................... 56
The Hard Cutoff ..................................................... 57
Putting It Together .................................................. 57

4 Why Is It Hard? ..................................................... 59
The Curse of Hindsight .............................................. 60
Easy and Also Impossible ........................................... 63
Overgrowth: The Application and Its Dependencies .......... 64
  Shifting Vertically: Moving from One Abstraction Layer
to Another ......................................................... 66
  Shifting Horizontally: Moving from One Application
to Another ......................................................... 67
  Shifting from Client to Server .................................. 67
  Shifting Down the Dependency Tree ......................... 68
Cutting Back the Overgrowth ..................................... 68
Automation and Conversion ....................................... 69
  Transpiling Code .................................................. 69
  Static Analysis ..................................................... 71
A Guide to Not Making Things Harder ............................ 72

5 Building and Protecting Momentum .......................... 75
Momentum Builder: The Bliss of Measurable Problems .......... 76
  Anatomy of the Measurable Problem ......................... 78
Momentum Killer: The Team Cannot Agree ....................... 80
  Step 1: Define a Scope .......................................... 81
  Step 2: Check for Conflicting Optimization Strategies ....... 83
  Step 3: Perform Time-Boxed Experiments .................... 83
Momentum Killer: A History of Failure ........................................... 84
Momentum Builder: Inspiring Urgency ........................................ 87
Protecting Momentum: A Quota on Big Decisions ......................... 89
Protecting Momentum: Calculating Opportunity Costs ................. 90
  The Cost of Not Adding New Features .................. 93
  The Cost of Not Fixing Something Else .................. 94
  The Cost of Not Deprecating in Favor of a Different Solution ... 95

6 Coming in Midstream ................................................................. 97
  Finding the Bleed ........................................................................ 98
  Mess: Fixing Things That Are Not Broken  .................... 101
    Figuring Out Whether Something Needs to Be Fixed........ 105
    But ... What About Conventions? ........................ 106
    When Does Breaking Up Add Value? .......................... 107
  The Compounding Problem: Diminishing Trust .................. 108
  Solution: Formal Methods ........................................... 109
  Mess: Forgotten and Lost Systems .................................. 111
  The Compounding Problem: Crippling Risk Avoidance .......... 112
  Solution: Chaos Testing ........................................... 112
  Mess: Institutional Failures ........................................... 114
  The Compounding Problem: No Owners ...................... 115
  Solution: Code Yellow ............................................. 116
    Calling a Code Yellow ........................................ 120
    Running a Code Yellow .................................... 121
  Mess: Leadership Has Lost the Room ................................ 122
  The Compounding Problem: Self-Sabotaging Teams ............ 125
  Solution: Murder Boards ........................................... 125
  Stopping the Bleed .................................................. 127

7 Design as Destiny ................................................................. 129
  Designing Technical Conversations .................................. 131
  How to Run a Design Exercise .................................... 132
More About Follow-ups: Why vs. How ................. 134
Some Useful Design Exercises for Engineering Teams ......... 134
   Exercise: Critical Factors .................................. 135
   Exercise: The Saboteur ...................................... 135
   Exercise: Shared Uncertainties .............................. 136
   Exercise: The 15 Percent .................................... 137
Exercises Specifically for Decisions ....................... 138
   Exercise: Probabilistic Outcome-Based Decision Making .... 138
   Exercise: Affinity Mapping .................................. 139
Team Structure, Organization Structure, and Incentives .... 140
   Individual Incentives ........................................ 142
   Minor Adjustments as Uncertainty .......................... 145
   Organization Size and Communication ...................... 147
   Manager Incentives .......................................... 148
Designing a Team: Applications of Conway’s Law .......... 149
Reorgs Are Traumatic ........................................... 151
Finding the Right Leadership ................................. 152
   Exercise: The Smallest Testable Unit ..................... 153
Structuring the Team to Account for Past Failure .......... 155
   Exercise: In-Group/Out-Group .............................. 158
Takeaways .......................................................... 159

8 Breaking Changes .............................................. 161
   Being Seen ..................................................... 162
   Who Draws the Line? ........................................ 167
   Building Trust Through Failure ............................ 168
   Breaking Change vs. Breaking .............................. 170
   Why Break Things on Purpose? ............................. 171
   Projecting Impact ............................................. 172
   The Kill Switch ................................................. 177
   Communicating Failure ...................................... 178
   Failure Is a Best Practice .................................... 179
9 How to Finish .......................... 181
  Revealing Assumptions ....................... 182
  Approach 1: Success Criteria .................. 182
    Example: Adding Continuous Integration/
    Continuous Deploy ......................... 183
  Approach 2: Diagnosis-Policy-Actions .......... 184
    Example: Upgrading a Database ............... 184
  Comparison ................................ 185
  Marking Time ................................ 186
  Postmortems on Success ....................... 187
    Postmortem vs. Retrospective ............... 188
    Running Postmortems ....................... 188
  The Tale of Two War Rooms .................... 190
  Working Groups vs. Committees ............... 191
  Success Is Not Obvious If Undefined .......... 194

10 Future-Proofing ......................... 195
  Time .................................... 196
  Unescapable Migrations ...................... 199
  Failing Gracefully .......................... 200
  Less Time Between Upgrades, Not More .......... 202
  A Word of Caution About Automation ............ 206
  Building Something Wrong the Correct Way ....... 207
  Feedback Loops ............................. 210
  Don’t Stop the Bus .......................... 214

Conclusion ................................. 217