Contents

Preface: The Origin of the Book vii Acknowledgments xi

1. FROM IDEAS TO ACTIONS

Using Big Data to Understand How Human Societies Evolve 1 What Is Social Physics? 4 A Practical Science 6 Big Data 8 A Rich Social Science 10 Plan for the Book 15 Data-Driven Societies: Promethean Fire 17 SPECIAL TOPIC: LANGUAGE 19

PART I Social Physics

2 · EXPLORATION

How Can We Find Good Ideas and Make Good Decisions? 25

Pentland, Alex Social physics 2014 digitalisiert durch: IDS Luzern Social Learning 29 Idea Flow 32 Idea Flow and Decision Making 34 Tuning Networks 38 Exploration 39

3 · IDEA FLOW

The Building Blocks of Collective Intelligence 43
Habits, Preferences, and Curiosity 46
Habits versus Beliefs 55
Collectively Rational, Not Individually Rational 58
Common Sense 60

4 · ENGAGEMENT

How Can We All Work Together? 62 Social Pressure 65 Digital Engagement 70 Subjugation and Conflict 75 Rules of Engagement 77 Next Steps 79 SPECIAL TOPIC: THE MATHEMATICS OF SOCIAL INFLUENCE 80

PART II Idea Machines

5 · COLLECTIVE INTELLIGENCE

How Patterns of Interaction Translate into Collective Intelligence 87 Measuring What You Manage 92 Productivity 93 Creativity 96 Improving Idea Flow 103

6 · SHAPING ORGANIZATIONS

Social Intelligence Through Visualization of Interaction Patterns 105 Engagement 108 Exploration 112 Diversity 114 Social Intelligence 116

7 · ORGANIZATIONAL CHANGE

Social Network Incentives Can Be Used to Create Instant Organizations and Guide Them Through Disruptive Change 120 Instant Organizations 124 Organizations in Stress 127 Trust 128 Next Steps 131 SPECIAL TOPIC: SOCIAL SIGNALS 131

PART III Data-Driven Cities

8 · SENSING CITIES

How Mobile Sensing Is Creating a Nervous System for Cities, Enabling Them to Become More Healthy, Safe, and Efficient 137 Behavior Demographics140Transportation144Health and Disease145Social Network Interventions149From a Digital Nervous System to a Data-Driven Society153

9. CITY SCIENCE

How Social Physics and Big Data Are Revolutionizing Our Understanding of Cities and Development 155 The Social Physics of Cities 156 Social Ties in Cities 157 Exploring the City 160 Idea Flow in Cities 165 **Designing Better Cities** 167 Data-Driven Cities 170 Next Steps 171

SPECIAL TOPIC: DIGITAL NETWORKS VERSUS FACE-TO-FACE 172

PART IV

Data-Driven Society

10 · DATA-DRIVEN SOCIETIES

What Will a Data-Driven Future Look Like? 177
The New Deal on Data 180
Enforcement 182
The Wild, Wild Web 183
Data-Driven Systems: Challenges 184
Social Physics versus Free Will and Human Dignity 189

11 · DESIGN FOR HARMONY

How Social Physics Can Help Us Design a Human-Centric Society 193 Natural Law: Exchanges, Not Markets 199 Design for a Networked Society 203 Data for Development: D4D 212 Summary: Promethean Fire 215

Appendices:

REALITY MINING 217 OPENPDS 225 FAST, SLOW, AND FREE WILL 235 MATH 241

Notes 265 References 279

Index 295