Contents

Part I Motivation for Lean Software Development

1	Intro	duction	3
	1.1	Introduction	4
	1.2	Tame and Wicked Problems	8
	1.3	Software Development Is a Wicked Problem	10
	1.4	Taylorism and Software Development	11
	1.5	Summary	15
	Probl	ems	16
		rences	16
2	The Lean Revolution		19
	2.1	Introduction	20
	2.2	Henry Ford	23
	2.3	Taiichi Ōno and the Toyota Production System	26
	2.4	Creating a "Radiography" of the Production Process	27
	2.5	Worker Involvement	31
	2.6	"Pull" and Not "Push"	33
	2.7	The Right Parts at the Right Moment at the Right Place	35
	2.8	The Right Information at the Right Moment at the Right Place	39
	2.9	Quality Management	41
	2.10	Summary	45
	Probl	ems	46
	References		47
3	Towards Lean Thinking in Software Engineering		49
	3.1	Introduction	51
	3.2	Value	52
		3.2.1 Risk as a Value-Maximizing Strategy	54
	3.3	Knowledge	57
	3.4	Improvement	59
		-	

	3.5	"Push" vs. "Pull" in Software Engineering:	
		"Requirements-First" Development	62
	3.6	"Push" vs. "Pull" in Software Engineering:	
		"Bottom-Up" Development	64
	3.7	Summary	65
	Proble	ems	66
	Refer	ences	66
4	A gile	Methods	69
•	4.1	Introduction	72
	4.2	Keeping the Process Under Control	76
	4.3	Job Enrichment	79
	4.4	Endogenous and Exogenous Control Mechanisms	81
	4.5	Synchronizing the Flow of Work of Multiple People	82
	4.6	Extreme Programming (XP): A Paradigmatic Example	-
		of Agile Methods	83
	4.7	The Building Blocks of XP	84
	4.8	The XP Practices	87
		4.8.1 Business Practices	89
		4.8.2 Integration Practices	89
		4.8.3 Planning Practices	89
		4.8.4 Programming Practices	9
		4.8.5 Team Practices	92
		4.8.6 Uncategorized, Generic Practices	93
	4.9	Control and Coordination Mechanisms	9:
	4.10	Summary	99
	Probl	ems	99
	Refer	rences	100
5	Icono	s in Agile Methods	103
3	5.1	Introduction or "the Hype of Agile"	10.
	5.2	The Dark Side of Agile	110.
	5.3	The Skepticism Towards Agile Methods	110
	5.4	The Zen of Agile	120
	5.5	Summary or "What Stops us from Moving from Agile	121
	5.5	Towards Lean Software Engineering?"	12:
	Drobl	ems	120
		ences	120
6		oling Lean Software Development	129
	6.1	Introduction	130
	6.2	Existing Proposals to Create "Lean Software Development"	130
	6.3	Share a Common Vision	134
	6.4	Deprive Gurus of Their Power	14:
	6.5	Disarm Extremists	140
	66	Summary	14

Contents xiii

		olems	147 147		
Part		The Pillars of Lean Software Development	14/		
rarı	. 11	The Finals of Lean Software Development			
7	The	GQM+Strategies Approach	151		
	7.1	Introduction	152		
	7.2	What Can We Measure?	154		
	7.3	What Should We Measure?	155		
	7.4	Applying the GQM Step-By-Step	160		
	7.5	Alignment	164		
	7.6	Summary	168		
	Prob	plems	169		
	Refe	erences	169		
8	The	Experience Factory	171		
•	8.1	Introduction	172		
	8.2	Why Plan-Do-Study-Act Does Not Work			
	V. <u> </u>	in Software Engineering	172		
	8.3	The Experience Factory	174		
	0.0	8.3.1 Work Distribution	175		
	8.4	The QIP Step-by-Step	177		
	8.5	The Role of Measurement	181		
	8.6	Summary	183		
		blems	183		
		erences	184		
Λ.		ı-invasive Measurement	105		
9	9.1		187		
	9.1	Introduction	188		
	9.2	Does Measurements Collection Pay Off?	195		
		Non-Invasive Measurement	197		
	9.4	Implementing Non-invasive Measurement	207		
	9.5	The "Big-Brother" Effect of Non-invasive Measurement	211		
	9.6	Summary	214		
		olems	214		
	References				
Part	III	Lean Software Development in Action			
40	ans.				
10		Integrated Approach	221		
	10.1		222		
	10.2		228		
	10.3	U 1			
		Software Development	237		
		10.3.1 Visualizing the "Right" Data	239		
		10.3.2 Visualizing Data "Right"	240		
		10.3.3 Putting the Pieces Together	243		

xiv Contents

	10.4	Summary	245
	Proble	ems	246
		ences	246
		Cl. B4 Dv In 4 . A 4	240
11		Software Development in Action	249
	11.1	Introduction	249
	11.2	Evaluating Action Research	254
	11.3	Introducing Measurement Programs in Companies	256
		11.3.1 Plan	257
		11.3.2 Act	258
		11.3.3 Observe	261
		11.3.4 Reflect	263
		11.3.5 Revise Plan	264
	11.4	Case 1: Exploration or Exploitation?	264
		11.4.1 Theoretical Framework	266
		11.4.2 The Study	270
		11.4.3 Results	277
		11.4.4 Discussion	278
	11.5	Case 2: Non-invasive Cost Accounting	279
		11.5.1 Theoretical Framework	289
		11.5.2 The Study	291
		11.5.3 The Role of the Experience Factory	
		in Cost Accounting	317
		11.5.4 Results	318
		11.5.5 Discussion	318
	11.6	Case 3: Developing a Lean GQM Graph	319
		11.6.1 Theoretical Framework	319
		11.6.2 The Study	321
		11.6.3 Results	348
		11.6.4 Discussion	348
	11.7	Summary	349
		ems	349
		ences	350
12	Conc	lusion	355
	12.1	Introduction	355
		12.1.1 Lessons Learned	356
	Probl	ems	357
	Refer	ences	357
A	If Ar	chitects Had to Work Like Software Developers	359
В	A Pos	ssible Architecture for a Measurement Framework	36
-	B.1	Scenarios	362
	B.2	Logical View	364
	B.3	Physical View	372

Contents xv

	Process View Development View	
Solutions		
Index		391