

---

# Contents

<b>1</b>	<b>Introduction</b>	1
1.1	Issues	1
1.2	Approach	2
1.3	Background	3
1.4	Benefits	5
1.5	Structure	6
<b>Part I The GQM<sup>+</sup>Strategies Approach</b>		
<b>2</b>	<b>GQM<sup>+</sup>Strategies in a Nutshell</b>	9
2.1	The Basic Idea	9
2.2	GQM <sup>+</sup> Strategies Model	11
2.3	GQM <sup>+</sup> Strategies Process	14
<b>3</b>	<b>Phase 0: Initialize</b>	19
3.1	Get Commitment	19
3.2	Specify Scope	20
3.3	Plan GQM <sup>+</sup> Strategies Application Process	20
3.4	Train People	20
3.5	Example	21
3.5.1	Get Commitment	21
3.5.2	Specify Scope	21
3.5.3	Plan GQM <sup>+</sup> Strategies Application Process	22
3.5.4	Train People	23
<b>4</b>	<b>Phase 1: Characterize the Environment</b>	25
4.1	Characterize the Environment	25
4.2	Example	28
4.2.1	Characterize the Environment	28
<b>5</b>	<b>Phase 2: Define Goals, Strategies, and Measurement</b>	29
5.1	Identify Existing Assets	29
5.2	Select Relevant Assets	30
5.3	Build Up the GQM <sup>+</sup> Strategies Grid	30
5.3.1	Elicit Context and Assumptions	32
5.3.2	Define Organizational Goals	32

5.3.3	Make Strategy Decisions . . . . .	37
5.3.4	Refine GQM+Strategies Element . . . . .	38
5.3.5	Define GQM Graphs . . . . .	38
5.4	Review and Adjust Grid . . . . .	42
5.5	Example . . . . .	43
5.5.1	Identify Existing Assets . . . . .	43
5.5.2	Select Relevant Assets . . . . .	43
5.5.3	Build Up GQM+Strategies Grid (Management Board) . . .	45
5.5.4	Build Up GQM+Strategies Grid (Insurance Services) . . . .	49
5.5.5	Build Up GQM+Strategies Grid (Software Development Group) . . . . .	56
5.5.6	Review and Adjust Grid . . . . .	67
<b>6</b>	<b>Phase 3: Plan Grid Implementation . . . . .</b>	<b>69</b>
6.1	Develop Strategy Plans . . . . .	71
6.2	Develop Measurement Plans . . . . .	72
6.2.1	Data Collection, Validation, and Storage . . . . .	73
6.2.2	Data Aggregation, Analysis, and Interpretation . . . . .	73
6.2.3	Visualization and Communication of the Results . . . . .	74
6.2.4	Identify Current Practices . . . . .	74
6.2.5	Adjust Current Practices . . . . .	74
6.2.6	Prepare Tools and Infrastructure . . . . .	81
6.3	Train Personnel . . . . .	82
6.4	Example . . . . .	82
6.4.1	Develop Strategy Plans . . . . .	82
6.4.2	Develop Measurement Plans . . . . .	83
6.4.3	Train Personnel . . . . .	89
<b>7</b>	<b>Phase 4: Execute Plans . . . . .</b>	<b>91</b>
7.1	Execute Strategies . . . . .	94
7.2	Collect and Analyze Data . . . . .	95
7.2.1	Collect Measurement Data . . . . .	96
7.2.2	Validate Measurement Data . . . . .	96
7.2.3	Analyze Measurement Data . . . . .	96
7.2.4	Visualize Measurement Data . . . . .	97
7.2.5	Interpret Analysis Results . . . . .	102
7.3	Provide Feedback . . . . .	103
7.4	Example . . . . .	103
7.4.1	Execute Strategies . . . . .	103
7.4.2	Collect and Analyze Data . . . . .	103
7.4.3	Provide Feedback . . . . .	104
<b>8</b>	<b>Phase 5: Analyze Outcomes . . . . .</b>	<b>107</b>
8.1	Validate and Analyze the Measurement Data . . . . .	109
8.2	Visualize and Interpret Data . . . . .	109

---

8.3	Identify Improvement Potentials . . . . .	110
8.3.1	Analyze GQM <sup>+</sup> Strategies Grid . . . . .	110
8.3.2	Gather Feedback from Relevant Stakeholders . . . . .	111
8.4	Example . . . . .	116
8.4.1	Validate and Analyze Measurement Data . . . . .	116
8.4.2	Visualize and Interpret Data . . . . .	116
8.4.3	Identify Improvement Potentials . . . . .	124
<b>9</b>	<b>Phase 6: Package Improvements . . . . .</b>	<b>127</b>
9.1	Revise Grid and Plans . . . . .	128
9.2	Communicate Outcomes . . . . .	130
9.3	Manage Experience . . . . .	130
9.4	Initiate New Cycle . . . . .	131
9.4.1	Cycle Frequency and Intensity . . . . .	132
9.4.2	Exceptional Cycles . . . . .	133
9.5	Example . . . . .	134
9.5.1	Revise Grid and Plans . . . . .	134
9.5.2	Communicate Outcomes . . . . .	139
9.5.3	Manage Experience . . . . .	139
9.5.4	Initiate New Cycle . . . . .	140
<b>Part II Industrial Applications and Relations to Other Approaches</b>		
<b>10</b>	<b>Industrial Challenges and Applications . . . . .</b>	<b>143</b>
10.1	Industrial Challenges . . . . .	143
10.2	ECOPETROL S. A., Columbia . . . . .	150
10.2.1	Application Context and Objectives . . . . .	150
10.2.2	Solution Approach . . . . .	150
10.2.3	Results . . . . .	151
10.2.4	Costs and Benefits . . . . .	154
10.3	Information-Technology Promotion Agency, Japan . . . . .	155
10.3.1	Application Context and Objectives . . . . .	155
10.3.2	Solution Approach . . . . .	156
10.3.3	Results . . . . .	159
10.3.4	Costs and Benefits . . . . .	160
10.4	Japanese Aerospace Exploration Agency, Japan . . . . .	161
10.4.1	Application Context and Objectives . . . . .	161
10.4.2	Solution Approach . . . . .	162
10.4.3	Results . . . . .	162
10.4.4	Costs and Benefits . . . . .	166
<b>11</b>	<b>Relationships to Other Approaches . . . . .</b>	<b>169</b>
11.1	Organizational Performance Measurement . . . . .	169
11.1.1	The Balanced Scorecard . . . . .	170
11.1.2	BSC and Relationship to GQM <sup>+</sup> Strategies . . . . .	172

11.2	Business Process Management . . . . .	174
11.2.1	Business Process Reengineering and Management . . . . .	174
11.2.2	BPM and Relationship to GQM <sup>+</sup> Strategies . . . . .	174
11.3	Software Process Management . . . . .	176
11.3.1	Model-Based Software Process Improvement Approaches . . . . .	176
11.3.2	Model-Based SPI and Relationship with GQM <sup>+</sup> Strategies . . . . .	177
11.3.3	Continuous Software Process Improvement Approaches . . . . .	178
11.3.4	Continuous SPI and Relationship with GQM <sup>+</sup> Strategies . . . . .	179
11.4	Summary . . . . .	179
<b>12</b>	<b>Summary and Future Perspectives . . . . .</b>	<b>181</b>
12.1	Benefits . . . . .	181
12.2	Future Plans . . . . .	182
12.2.1	Tool Support . . . . .	182
12.2.2	Value-Based Software Engineering . . . . .	183
12.2.3	Causality Theory . . . . .	183
12.2.4	Patterns . . . . .	184
12.2.5	Relationships with CMMI . . . . .	184
	<b>Appendix A. GQM<sup>+</sup>Strategies Process Checklist . . . . .</b>	<b>187</b>
	<b>Appendix B. GQM<sup>+</sup>Strategies Evaluation Questionnaire . . . . .</b>	<b>189</b>
	<b>Appendix C. Authors . . . . .</b>	<b>193</b>
	<b>Bibliography . . . . .</b>	<b>197</b>
	<b>The Fraunhofer Institute for Experimental Software Engineering (IESE) . . . . .</b>	<b>201</b>
	<b>Index . . . . .</b>	<b>203</b>



<http://www.springer.com/978-3-319-05046-1>

Aligning Organizations Through Measurement

The GQM+Strategies Approach

Basili, V.; Trendowicz, A.; Kowalczyk, M.; Heidrich, J.;

Seaman, C.; Münch, J.; Rombach, D.

2014, XXVI, 205 p. 61 illus. in color., Hardcover

ISBN: 978-3-319-05046-1