# apm<nowledge

# Planning, Scheduling, Monitoring and Control

The Practical Project Management of Time, Cost and Risk

List of f	igures and tables	xviii
Forewo	rd	xxiv
Preface		xxvi
Acknow	ledgements	xxviii
Peer rev	view	ххх
Purpose	3	xxxi
The PSI	MC process map	xxxii
1 Ove	rview	1
1.1	Part One: Definition	1
1.2	Part Two: Planning	2
1.3	Part Three: Scheduling	3
1.4	Part Four: Monitoring and control	4
1.5	Part Five: Record keeping and learning	6
1.6	A note on the Contents, Index and Glossary	7
1.7	Management issues	7
	1.7.1 Behaviour and resources	7
	1.7.2 Processes and tools (scheduling software)	8
	1.7.3 Common sense	8
Part O	ne: Definition	9
2 Busi	ness case	11
2.1	Definition of the business case	11
2.2	Purpose of a business case	11
2.3	Contents of the business case	12
	2.3.1 Structure of the business case	12
	2.3.2 Planning information	15
	2.3.3 Funding requirements	16
	2.3.4 Resource requirements	16
2.4	Acceptance criteria in the business case	16
2.5	Benefits realisation in the business case	17
2.6	Procurement strategy	17
2.7	Project review and assurance process of the business case	19

<ul> <li>3.1 Definition of scope management</li> <li>3.2 Purpose of scope management</li> <li>3.3 The scope management process</li> <li>3.3.1 Defining the scope</li> </ul>	21 21 22
3.3 The scope management process	
	22
3 3 1 Defining the scope	22
	22
3.3.2 Describing the scope	22
4 Requirements management	25
4.1 Definition of requirements management	25
4.2 Purpose of requirements management	25
4.3 Process of defining requirements	25
4.3.1 Requirement description	26
4.3.2 Factors to consider when defining	
requirements	26
4.3.3 Inputs into requirements management	27
4.4 The requirements management process	27
4.4.1 Capture and define requirements from all	
stakeholders	27
4.4.2 Link requirements to the product breakdown	
structures and work breakdown structures	
where appropriate	27
4.4.3 Decompose requirements	28
4.5 Works information (WI)	29
4.6 Statement of work (SOW)	30
5 Stakeholder management	31
5.1 Definition of stakeholder management	31
5.2 Purpose of stakeholder management	31
5.3 Managing stakeholders through the project	31
6 Project familiarisation	33
Part Two: Planning	35
7 Introduction to planning	37
7.1 Definition of planning	37
7.1.1 Definition of the planning role	37
7.2 Purpose of planning	38
7.2.1 Benefits of planning	39
7.2.2 Success in planning	40
7.3 The difference between planning and scheduling	41

7.4	Princip	al scheduling components	42
	7.4.1		42
		Time-based schedules	42
	7.4.3		43
7.5	Appro	aches to planning	43
	7.5.1	Top-down planning	43
	7.5.2	Bottom-up planning	44
	7.5.3	Agile planning in the software industry	47
7.6	Plannir	ng strategies	49
7.7		ng for risk	51
8 Bre	akdown	structures	53
8.1	Definit	tion of breakdown structures	53
8.2	Purpos	se of breakdown structures	53
8.3		ng breakdown structures	53
	8.3.1	Level 1	53
	8.3.2	Level 2	53
	8.3.3	Level 3 and beyond	55
8.4	Produc	ct breakdown structure (PBS)	57
	8.4.1	What is a 'product' in planning terms?	57
	8.4.2	Definition of a PBS	57
	8.4.3	Purpose of a PBS	57
	8.4.4	Constructing a PBS	57
8.5	Work	breakdown structure (WBS)	59
	8.5.1	Definition of a WBS	59
	8.5.2	Purpose of a WBS	59
	8.5.3	Constructing a WBS	60
	8.5.4	Principles of designing a WBS	60
	8.5.5	WBS dictionaries	61
8.6	0	isational breakdown structure (OBS)	64
	8.6.1	Definition of an OBS	64
	8.6.2	Purpose of an OBS	64
	8.6.3	Constructing an OBS	65
8.7	Respo	nsibility assignment matrix (RAM)	65
	8.7.1	Definition of a RAM	65
	8.7.2	Purpose of a RAM	65
	8.7.3	Constructing a RAM	66
	8.7.4	The step-by-step approach to constructing	
		a RAM	67

	8.8	RACI m	natrix	68
		8.8.1	Definition of a RACI matrix	68
		8.8.2	Purpose of a RACI matrix	68
		8.8.3	Constructing a RACI matrix	68
	8.9	Cost bre	eakdown structure (CBS)	69
		8.9.1	Definition of a CBS	69
		8.9.2	Purpose of a CBS	69
	8.10	Resourc	ces breakdown structure (RBS)	70
		8.10.1	Definition of a RBS	70
		8.10.2	Purpose of a RBS	71
9	Depe	ndency	management	73
	9.1	Definitio	on of dependency management	73
	9.2	Purpose	e of dependency management	73
	9.3	Interfac	e scope	74
	9.4	Schedu	le impact	74
10	Healt	h, safe	ty and environmental	75
	10.1	HSE iss	ues at strategic level (planning)	75
	10.2	HSE iss	ues at tactical level (scheduling and method statements)	76
11	Cost	estimat	ing	77
			on of cost estimating	77
	11.2	Purpose	e of a cost estimate	77
	11.3	Cost est	timating and the project life cycle	77
	11.4	Estimate	e types	78
		11.4.1	Scope development estimates	78
		11.4.2	Other types of estimate	79
	11.5	Content	ts of an estimate	80
	11.6	Estimati	ng methodologies	80
			Approximate estimating methods	80
		11.6.2	Definitive estimating methods	82
12	Budg	eting		83
	12.1	Definitio	on of budgeting	83
	12.2	Purpose	e of budgeting	83
	12.3	-	g and budgets	83
	12.4		ng a cost budget	84
		12.4.1	Cost breakdown structure	84
		12.4.2	Cash-flow statements	84
	12.5	Budget	transfers	87

|--|

Pa	rt Th	ree: S	cheduling	89
13	Intro	duction	n to scheduling	91
	13.1	Definiti	on of scheduling	91
	13.2	Purpose	e of scheduling	91
	13.3	The sch	neduling process	92
		13.3.1	Steps in establishing the schedule	92
		13.3.2	Once the schedule is created	93
	13.4	Schedu	lle structure	94
		13.4.1	Schedule density	94
		13.4.2	Detail density: considerations	98
		13.4.3	Network templates (fragnets)	99
14	Туре	s of sch	nedule	101
	14.1	Schedu	lle types: time-based	101
		14.1.1	Development or strategic schedule	101
		14.1.2	Tender schedule (or 'bid schedule')	102
		14.1.3	Contract schedule	102
		14.1.4	Baseline schedule	103
		14.1.5	Summary schedule	103
		14.1.6	Working schedule or 'forecast schedule'	103
		14.1.7	Target schedule	104
		14.1.8	Short- and medium-term schedules	104
		14.1.9	As-built schedule	105
		14.1.10	) Post-build schedule	106
		14.1.11	'What ifs' (scenario planning)	107
	14.2	Schedu	lle types: tracker schedules	107
		14.2.1	Procurement schedules	107
		14.2.2	Design deliverables tracker	109
		14.2.3	Other tracker schedules	109
15	Sche	dule de	sign	113
	15.1	Definiti	on of schedule design	113
	15.2	Purpose	e of schedule design	113
	15.3	Elemen	ts of schedule design	113
		15.3.1	Activity identity numbers (IDs)	113
		15.3.2	Activity descriptions	114
		15.3.3	Different activity types	115
		15.3.4	Activity steps	116
		15.3.5	Time units	118

		Calendars	118
	15.3.7	Project, activity and resource coding	120
16 Build	ing the	schedule	121
16.1	Creating	g a critical path network	121
	16.1.1	Definition of critical path method	121
	16.1.2	Purpose of critical path network	121
	16.1.3	Methods of constructing a critical path	122
	16.1.4	Inputs into a critical path analysis	123
	16.1.5	Introduction to creating a network analysis	124
	16.1.6	Step 1: Create a logical network	125
	16.1.7	Step 2: Forward pass	125
	16.1.8	Step 3: Backward pass	126
	16.1.9	Step 4: Calculation of total float	127
	16.1.10	Step 5: Identification of critical path	128
	16.1.11	Training in network analysis: a note	130
	16.1.12	Float	130
	16.1.13	Types of logic linking	132
	16.1.14	Lags and leads	135
	16.1.15	Use of constraints	136
	16.1.16	Types of constraints	138
	16.1.17	Displaying networks on bar charts	147
16.2	Estimati	on of durations	147
	16.2.1	Three-point estimates	148
	16.2.2	PERT (programme evaluation review technique)	148
	16.2.3	Comparative	149
	16.2.4	Benchmarked data	149
	16.2.5	Resource-dependent	150
	16.2.6	Expert opinion	150
	16.2.7	Personal experience	150
	16.2.8	Social media	151
16.3	Resourc	ing the schedule	151
	16.3.1	Definition of resources	152
	16.3.2	Purpose of resourcing the schedule	152
	16.3.3	Process of resourcing the schedule	153
	16.3.4	Resource smoothing	154
16.4	Horizon	tal and vertical integration of schedules	156
	16.4.1	Horizontal integration	156
	16.4.2	Vertical integration	157

16.5	Schedul	ing interfaces and dependencies	157
	16.5.1	Identification	157
	16.5.2	Coding	158
	16.5.3	Integration and impact analysis	159
	16.5.4	Impact resolution	163
16.6	Time co	ntingencies	164
	16.6.1	Definition of buffers	164
	16.6.2	Use of buffers	164
Comr	nunicat	ing the schedule	167
		-	167
	17.1.1	Presentation considerations	167
	17.1.2	An alternative to bar chart reporting	170
17.2			172
	17.2.1	Creating a line of balance chart	172
			173
	17.2.3	Limitations of line of balance	174
17.3	Time ch	ainage	174
	17.3.1	Definition of time chainage charts	174
	17.3.2	Explanation of the time chainage technique	175
	17.3.3	Advantages of time chainage	177
	17.3.4	Limitations of time chainage	177
17.4	Schedul	e narrative	177
	17.4.1	Scope	179
	17.4.2	Health, safety and environmental	
		considerations	179
	17.4.3	Risks, opportunities and contingencies	179
	17.4.4	Breakdown structures	179
	17.4.5	Project phasing	179
	17.4.6	Stakeholders	179
	17.4.7	Resources	179
	17.4.8	Critical path(s)	180
	17.4.9	Assumptions	180
	17.4.10	Calendars	180
	17.4.11	Activity codes	180
	17.4.12	Details of any possessions, shut-downs or other	
		special working conditions	181
	17.4.13	Consents required	181
	17.4.14	Permits and licences	181
	16.6 <b>Com</b> 17.1 17.2 17.3	16.5.1         16.5.2         16.5.3         16.6         Time co         16.6.1         16.6.2         Communicat         17.1         17.2         17.2         17.2         17.2         17.2         17.2         17.3         17.3         17.3         17.3         17.3         17.3.1         17.3.2         17.3.3         17.4         Schedul         17.4.1         17.4.2         17.4.3         17.4.4         17.4.5         17.4.6         17.4.7         17.4.8         17.4.10         17.4.11         17.4.12	<ul> <li>17.1.1 Presentation considerations</li> <li>17.1.2 An alternative to bar chart reporting</li> <li>17.2 Line of balance</li> <li>17.2.1 Creating a line of balance chart</li> <li>17.2.2 Advantages of line of balance</li> <li>17.3 Limitations of line of balance</li> <li>17.3 Time chainage</li> <li>17.3.1 Definition of time chainage charts</li> <li>17.3.2 Explanation of the time chainage technique</li> <li>17.3.3 Advantages of time chainage</li> <li>17.4 Limitations of time chainage</li> <li>17.4 Scope</li> <li>17.4.1 Scope</li> <li>17.4.2 Health, safety and environmental considerations</li> <li>17.4 Breakdown structures</li> <li>17.4 Breakdown structures</li> <li>17.4.7 Resources</li> <li>17.4.8 Critical path(s)</li> <li>17.4.9 Assumptions</li> <li>17.4.10 Calendars</li> <li>17.4.12 Details of any possessions, shut-downs or other</li> </ul>

18	Sche	dule rev	view	183
	18.1	Definiti	on of schedule review	183
	18.2	Purpose	e of schedule review	183
	18.3	Checkir	ng the schedule	183
		18.3.1	Understanding the project schedule	184
		18.3.2	Components of the schedule display	184
		18.3.3	Critical matters not included in the display	187
	18.4	Plannin	g checks	188
		18.4.1	Administration	188
		18.4.2	Management issues	188
		18.4.3	Contract requirements	188
		18.4.4	Scope	189
		18.4.5	Associated documents	189
		18.4.6	Planning issues	189
		18.4.7	Progress update	190
		18.4.8	Communication of the schedule	190
	18.5	Schedu	ling checks	190
		18.5.1	Activity checks	191
		18.5.2	Logic checks	193
			Float and critical path checks	196
			Resources checks	198
		18.5.5	Review of schedule risk	198
19	BIM	(Buildir	ng information modelling)	199
	19.1	Definiti	on of BIM	199
	19.2	Purpose	e of BIM	200
	19.3	BIM tee	chnology	201
	19.4	The BI/	N culture	201
20	Agile	9		203
	_		on of agile	203
	20.2	Purpose	e of agile	203
	20.3	Method	ds	204
		20.3.1	Advantages	205
		20.3.2	Limitations	206
Pa	rt Fo	ur: Mo	onitoring and control	207
21	Base	line		209
			on of the project baseline	209

	21.2	Purpose	e of a project baseline	211
	21.3	Principle	es of project baselining	211
	21.4	When t	o set the baseline	212
	21.5	Establis	hing the baseline schedule	212
	21.6	Definitio	on and purpose of baseline maintenance	213
		21.6.1	Definition of baseline maintenance	213
		21.6.2	Purpose of baseline maintenance	213
		21.6.3	Baseline maintenance as a result of schedule changes	213
		21.6.4	Illustration of the principle of baseline	
			maintenance	214
	21.7	Re-base	elining: re-planning	216
		21.7.1	When to consider re-planning	217
	21.8	Re-base	elining: re-programming	218
		21.8.1	When to consider re-programming	218
	21.9	Notes a	nd rules for schedule maintenance, re-planning and	
		re-base	0	220
	21.10	The link	between change management and the project	
		baseline		220
22	Perfo	rmance	e reporting	221
	22.1	Definitio	on of performance reporting	221
			on of performance reporting of performance reporting	221 222
	22.2	Purpose		
	22.2	Purpose Evaluati	e of performance reporting	222
	22.2	Purpose Evaluati 22.3.1	e of performance reporting ng and recording progress	222 223
	22.2	Purpose Evaluati 22.3.1 22.3.2	e of performance reporting ng and recording progress Progress assessment	222 223 223
	22.2	Purpose Evaluati 22.3.1 22.3.2 22.3.3	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule?	222 223 223 223
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report?	222 223 223 223 223 224
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method	222 223 223 223 223 224 224
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring	222 223 223 223 224 224 224 224
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method	222 223 223 223 224 224 224 224 224
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2 22.4.3	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method	222 223 223 224 224 224 224 224 224 226
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2 22.4.3	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart	222 223 223 224 224 224 224 224 226 228
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2 22.4.3 22.4.4	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart Cash-flow monitoring Resource monitoring	222 223 223 224 224 224 224 224 226 228 229
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2 22.4.3 22.4.4 22.4.5	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart Cash-flow monitoring	222 223 223 224 224 224 224 224 226 228 229 230
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Varianco 22.4.1 22.4.2 22.4.3 22.4.3 22.4.4 22.4.5 22.4.6	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart Cash-flow monitoring Resource monitoring	222 223 223 224 224 224 224 224 226 228 229 230 230
	22.2 22.3	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Varianco 22.4.1 22.4.2 22.4.3 22.4.3 22.4.4 22.4.5 22.4.6 22.4.7 22.4.8 Perform	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart Cash-flow monitoring Resource monitoring Cost value analysis Quantity tracking mance analysis methods of progress monitoring	222 223 223 224 224 224 224 224 226 228 229 230 230 231
	22.2 22.3 22.4	Purpose Evaluati 22.3.1 22.3.2 22.3.3 22.3.4 Variance 22.4.1 22.4.2 22.4.3 22.4.4 22.4.5 22.4.6 22.4.7 22.4.8	e of performance reporting ng and recording progress Progress assessment What needs to be recorded in the schedule? What else needs to be recorded in a report? How often is progress recorded? e analysis methods of progress monitoring Drop line method Activity weeks method Milestone monitoring Progress on a line of balance chart Cash-flow monitoring Resource monitoring Cost value analysis Quantity tracking	222 223 223 224 224 224 224 224 226 228 229 230 230 230 231 231

23	Cost	control	251
	23.1	Definition of cost control	251
	23.2	Purpose of cost control	251
	23.3	The cost control process	252
		23.3.1 Performance measurement baseline (PMB)	252
		23.3.2 The link between cost control and change control	252
		23.3.3 Performance measurement	253
	23.4	Learning lessons from cost control	253
24	Short	-term planning	255
		Definition of short-term planning	255
		Purpose of short-term planning	255
	24.3	The short-term planning process	255
		24.3.1 Make ready needs	257
		24.3.2 Coordination meeting	257
		24.3.3 Performance reporting	257
25	Chan	ge management	259
		Definition of change management	259
		Purpose of change management	259
		Principles of change management	260
	25.4	Change control	260
		25.4.1 Why change control is needed	260
		25.4.2 Change control considerations	261
	25.5	Project-level change: process overview	261
	25.6	Raising a change request	263
		25.6.1 Drafting a change request	263
	25.7	The change log	263
	25.8	Initial evaluation of the change request	264
	25.9	Estimating impact of change	264
	25.10	Detailed evaluation of change request	264
		25.10.1 Rejected request	265
		25.10.2 Deferred request	265
	25.11	Approved request	266
		25.11.1 Change orders	266
		25.11.2 Scope transfers	267
		25.11.3 Schedule revisions	267
		25.11.4 Corporate governance	267
	25.12	Implementing the change	267
		25.12.1 Adjusting schedule in line with change	268

25.1	3 Communicating the change	269
25.1	4 Monthly change reporting requirements	269
	25.14.1 Managing the schedule change process	271
26 Risk	management	273
26.1	Definition of risk management	273
26.2	Purpose of risk management	273
26.3	Risk management plan	274
26.4	The risk management process	274
	26.4.1 Planning	274
	26.4.2 Risk identification	276
	26.4.3 Risk assessment	277
	26.4.4 Risk response	280
	26.4.5 Risk review	280
	26.4.6 Risk reporting	281
26.5	Risk draw down	281
	26.5.1 When risks are mitigated	283
	26.5.2 When risks are realised	283
	26.5.3 When risks are closed	283
	26.5.4 When opportunities are realised	283
	26.5.5 Documenting changes in the risk budget	284
26.6	Quantitative schedule risk analysis (QSRA)	284
	26.6.1 Definition of QSRA	284
	26.6.2 Purpose of QSRA	285
	26.6.3 Key requirements for a QSRA	286
	26.6.4 The stages of schedule risk analysis	286
	26.6.5 Distribution types	288
	26.6.6 Application of risks to schedule activities	291
	26.6.7 QSRA output	292
	26.6.8 Reporting	294
26.7	Quantitative cost risk analysis (QCRA)	296
	26.7.1 Definition of QCRA	296
	26.7.2 Purpose of QCRA	296
	26.7.3 The QCRA process	297
27 Fore	ensic analysis	303
27.1	Definition of forensic analysis	303
27.2	1 2	303
27.3	5	303
	27.3.1 As-planned versus as-built method (AP v AB)	304

	27.3.2	Impacted as-planned method (IAP)	305
	27.3.3	Collapsed as-built method or as-built but	
		for (CAB)	306
	27.3.4	Time impact analysis method (TIA)	307
	27.3.5	Windows analysis	309
	27.3.6	Other considerations	309
Part Five: Record keeping and learning			311
28 Record keeping			313
28.1	3.1 Definition of record keeping		
28.2	2 Purpose of record keeping		
28.3	3.3 How to record		
28.4	What to	o record	314
28.5	Method	ds of keeping records	315
29 Document management			317
29.1	Definiti	on of document management	317
29.2	Purpose	e of document management	317
29.3	Document control systems		
29.4	Version control		
29.5	Handover of documentation		
30 Handover and closeout			319
30.1	Handov	/er	319
	30.1.1	Definition of handover	319
	30.1.2	Purpose of the handover process	319
	30.1.3	Planning handover	320
	30.1.4	Issues in the management of handover	321
30.2	Project	closeout	322
	30.2.1	Definition of project closeout	322
	30.2.2	Purpose of project closeout	322
	30.2.3	The project closeout process	322
31 Lessons learned			325
31.1	Definition of lessons learned		
31.2	Purpose of lessons learned		
31.3	Productivity data		
31.4	Qualitative lessons learned		
	31.4.1	Stakeholders involved in a lessons learned review	326
	31.4.2	Considerations	327

The final word	329
Glossary	331
Acronyms	343
Index	345



# **Overview**

Effective project management requires effective planning and control. Effective planning and control requires:

- the clear definition of the project;
- a robust approach to planning the project;
- selection and use of the appropriate scheduling techniques;
- rigorous monitoring that enables proactive control of the project;
- a sound basis for this is good record keeping, which also facilitates the virtuous feedback and learning cycle.

This book offers tried and tested techniques and principles covering these aspects of project management. It introduces some lesser-known and emerging practices, some of which will move into mainstream project management in the years to come.

The book is structured into five main sections reflecting these requirements, and a brief introduction to each section and chapter follows.

## **1.1 Part One: Definition**

At a strategic level, there are a number of fundamental questions that need addressing:

- Why is the project required?
- What does the customer want the project to deliver?
- How will the success of the project be measured?
- How will the project be procured?
- What is the attitude of its customers (or its funders) to risk?
- Similarly, what is their attitude to quality (including scope)?
- When does the client want the capability delivered by?

Part One of this guide describes the principal processes that define the project, and answers these questions.

Planning, Scheduling, Monitoring and Control

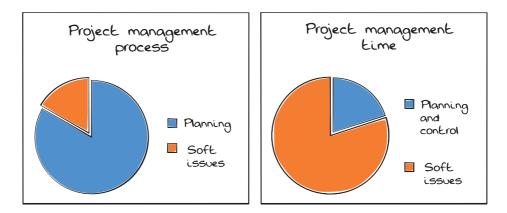
The first topic dealt with is the creation of the business case (Chapter 2). This is the starting point in the life of any project, and it is a vital step in ensuring that the project is viable, affordable and desirable. It sets the scene for all that follows – the planning, scheduling, monitoring and control, and, not least, the delivery of the project.

Assuming the business case is approved, the scope of the project must be defined and agreed with all stakeholders (Chapter 3). Defining the scope will begin the process of making key decisions about the project, defining and selecting from various options until a preferred solution is agreed and approved.

Once the scope has been agreed, the details of the requirements are determined. See Chapter 4 (*Requirements management*).

Stakeholder management (Chapter 5) is dealt with briefly, as the responsibility for this falls mainly on the project manager (see Soft Issues – Project Management Time in Figure 1.1).

Chapter 6, the final chapter in Part One (*Project familiarisation*), is a checklist of the project documentation that has been created during the definition stage. These are the key documents that must be read and understood to enable the planning – and subsequent processes detailed in the guide – to be carried out in an informed way.





## 1.2 Part Two: Planning

The planning phase of the project needs to answer some fundamental questions, such as:

- How much will the project cost?
- How long should the project take?
- Are there benefits to finishing early, and what are they?
- What are the costs of an earlier completion, and do they outweigh the benefits?
- On the other hand, how is funding released, and are there any limits on this?
- How will the performance of the project be measured, through all its phases?
- Can the project be delivered safely?

Chapter 7 introduces planning – the team approach to working out how to deliver the project. After discussing and defining the difference between planning and scheduling (a point worth making to help define the two terms) – these terms are often used interchangeably, but they are two very different processes and require different skill sets – the opening chapter of this section goes on to discuss the principal components that will make up the overall project plan – the various schedules and narratives. It is important to understand these at the planning stage, and, whilst they are introduced here, they will be covered in further detail in Part Four.

Chapter 8 defines and discusses the purpose of the various breakdown structures that are used in project management. We also propose a method of creating these structures. Chapter 9 introduces the concept of dependency management. This theme is returned to in Part Four, when the specifics of schedule dependencies are defined in greater detail.

A critical concern of all project management must be the highest standards of health, safety and environmental management (Chapter 10). We cannot do justice to this topic in a book aimed across all industries, but it is a very important aspect when planning any project. It will have a fundamental influence on the project – how it is planned, designed/engineered and constructed.

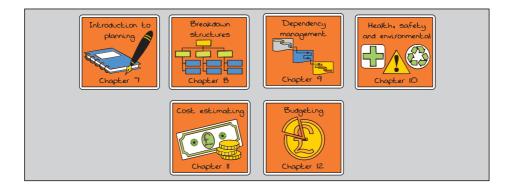
Finally, in Chapters 11 and 12, we discuss the cost-estimating process and the budgeting process that follows it. The former is an essential step in the definition and planning (and, indeed, scheduling) of the project. The latter is essential in the creation of targets and baselines that will form the basis of monitoring and control.

### **1.3 Part Three: Scheduling**

A fundamental question is: who owns the schedule? The answer is, of course, that it is the project manager, with the support of the whole project team. The schedule is created by collating the thoughts of many people; the specialist

# Part Two

# Planning



'Failing to plan is planning to fail.'

Alan Lakein



# 7.1 Definition of planning

Planning is the process of identifying the methods, resources and activities necessary to accomplish the project's objectives. It achieves this by drawing on the expertise, experience and knowledge of organisations and individuals (including the lessons that it has learned from previous projects), and on external parties if appropriate, in order to:

- understand the need, problem or opportunity that the project will address and the benefits that it will deliver;
- define what has to be accomplished and delivered, typically stated in terms of scope, time, budgets and quality;
- develop a plan to deliver the project.

Planning is the activity of determining how raw materials and other resources are delivered into a desired outcome. It is also the process that will deliver a competitive edge to organisations competing to win contracts to deliver work.

## 7.1.1 Definition of the planning role

Planning is an art rather than a science; it is based on experience, industry or sector knowledge and technical skill, and a key ingredient is innovative thinking. Planning is the activity of a team working together to determine the strategy for delivering the project. To achieve this, the project team determines the method or methods that will be used to deliver the project as well as how the project is to be procured.

Planning, Scheduling, Monitoring and Control

The best plans will be created by a team of project managers, engineers, production/design managers and commercial managers working together. Specialist planners may guide and facilitate the process. In principle, planning is an activity that precedes scheduling.

During the planning process, the main interfaces will be identified. It is important that during this process the assumptions made, the risks, opportunities and issues are identified and recorded.

At the planning stage of the project, it is important that the project control and reporting methodologies that will be used are defined so that decisions around the methods of planning effort and toolsets adopted will be adequate.

The outputs of planning are therefore:

- overall strategy for the project;
- overall methodology for the project;
- breakdown structures for managing the project;
- the identification of key dependencies;
- · contributions to the project risk and opportunities register and issues log;
- the identification of interfaces.

# 7.2 Purpose of planning

Planning is used to determine how, when and which project deliverables must be achieved in order to deliver the products (or actions) needed for the project's success. This includes recording any organisational or management approaches and processes that will be used. The planning discipline assesses how and when activities need to take place and defines the acceptable standard required for completion, as well as balancing standards and targets within agreed time, cost and quality parameters. The management approach information will be recorded within the project management plan (PMP) – also known as the project execution plan (PEP) – and the relevant timings for the activities identified will be recorded within a project schedule, included within the PMP/PEP.

Planning enables the project manager and their team to determine what methods and techniques they intend to use to deliver the required outputs, products and activities. Adding the activities to a schedule helps to understand the logical relationships between activities, the impact on resource distribution, the expenditure profile and reporting implications. In a well-planned project, the means of achieving the well-defined outputs, to an agreed standard, have been examined, thought about, optimised and recorded, and are regularly reviewed.

Planning and scheduling are essential to the authorisation of the project delivery stages. Without a robust and realistic PMP and schedule, advancement through the project stages should not be approved. The approval at each stage will look closely at the plan and schedule and consider whether the project is on course to deliver its intended business benefits in accordance with the business case.

Once agreed and authorised, plans and schedules are an essential mechanism for communicating the project strategy and the deployment and tasking of staff, contractors and other resources.

### 7.2.1 Benefits of planning

- A well-planned project will identify and document the right activities and products to achieve the outputs and will secure the optimum resource level to support this.
- Planning determines what activities and products need to be carried out, when, to what standard and using which resources, including monetary funds. Well-planned projects, where the tasks that need to be undertaken, how and when have been carefully considered, are much more likely to successfully deliver desired outcomes.
- Comprehensive scheduling ensures the optimal allocation and release of resource and the effective control of project activities within time constraints.
- Planning is central to the control of the project and early identification of where the project might be starting to fail.
- Planning is an integral part of problem solving at all stages of the project.
- The project schedule, risk and budget are used to form a baseline against which the position of the project in terms of cost, time and risk, and therefore the performance of the project, can be managed.
- Establishing a baseline enables the project team to check the progress of the project, to measure success, and to identify and assess the impact of deviation from the baseline. Early identification of deviation will allow the maximum time for corrective action and assessment of impact on other planned activities.
- With good planning, it is possible to predict whether the project remains on target to deliver its outputs within the time, cost or performance constraints.

*Planning, Scheduling, Monitoring and Control* is a comprehensive guide for anyone involved in planning, scheduling and controlling projects.

Written to be accessible to all levels – from student to senior project managers – it gives practical guidance on all planning aspects of preparing to undertake a project, executing a project, controlling its delivery to budget, time and quality, and delivering it safely.

### **Association for Project Management**

Ibis House, Regent Park Summerleys Road Princes Risborough Buckinghamshire HP27 9LE 
 Telephone
 +44 (0) 845 458 1944

 Facsimile
 +44 (0) 845 458 8807

 Email
 info@apm.org.uk

 Web
 apm.org.uk

