How to balance skills demand with capacity, in a volatile multi-project environment

Barry Muir

Managing Director

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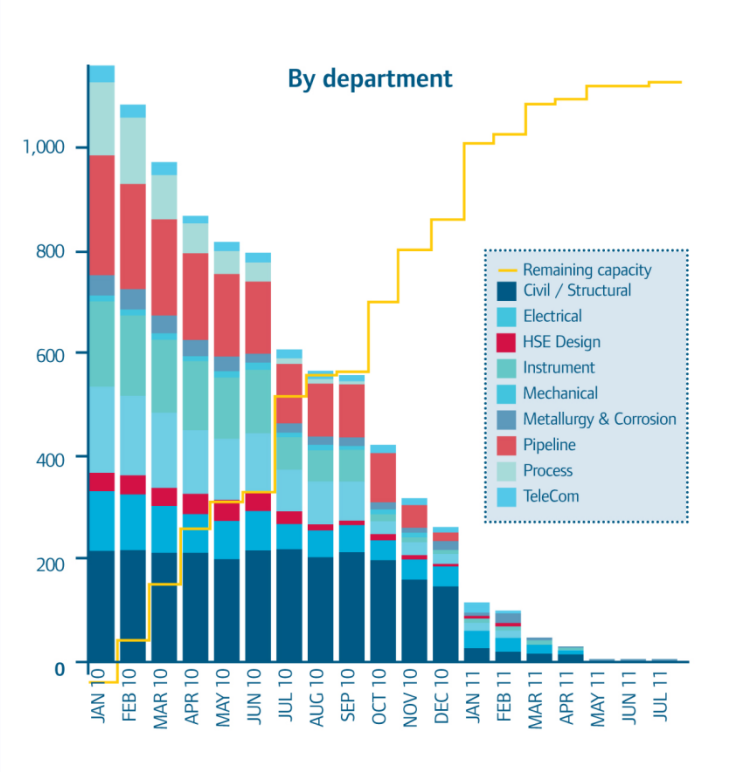
The challenge



'To continuously optimize the utilization of geographically dispersed, multi-disciplinary workforces,

…where each project has its own timeline, priority and competency requirements'

Steve Major, Petrofac

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Striking the right balance

- The consequences of too much or too little spare resource are equally unpalatable
- Re-assess whenever a change occurs in demand or supply

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Striking the right balance

'If fee earners could increase their billable time by 10 minutes per day, the average ACE member would generate 2.3% extra revenue.

…….which could raise profits by 33%'

Association of Consulting Engineers Benchmarking, 2011

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Agenda

- The challenge
- What do you need to know?
- What needs to be in place?
  - Roles
  - Processes
- How well do you score?
- Successfully bridging the gap

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1. What do you need to know?

- Forecast demand v capacity
  - Where are the bottlenecks and spare capacity?
  - Scenarios to show the impact of project awards & change
- Productivity & Utilization
  - How effectively are our teams working?
- Track outstanding requests for resource.
  - Managing the resource allocation process
- Resource performance on each project
  - Is the resource plan still realistic?

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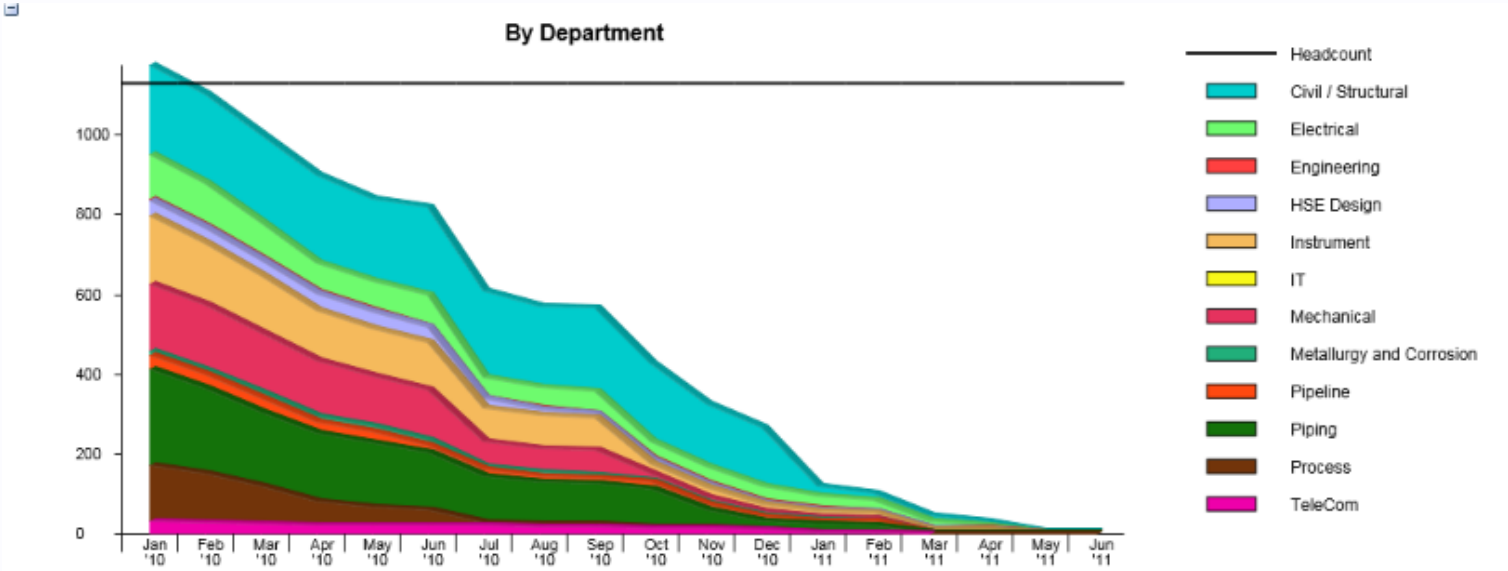
Forward loading 1



Department		Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11
Civil / Structural	Planned Work:	224	226	220	218	205	219	217	203	211	196	159	147	26	18	14	10	2	2
	Headcount:	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219	219
Electrical	Planned Work:	114	107	92	77	76	80	51	53	54	43	41	38	30	26	16	10		
	Headcount:	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104
Engineering	Planned Work:	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	Headcount:	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
HSE Design	Planned Work:	38	40	40	43	42	38	23	13	9	9	8	4	4	3	1	0	0	0
	Headcount:	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Instrument	Planned Work:	173	155	144	125	119	118	85	84	82	26	24	18	14	14	6	6		
	Headcount:	162	162	162	162	162	162	162	162	162	162	162	162	162	162	162	162	162	162
IT	Planned Work:																		
	Headcount:	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mechanical	Planned Work:	168	162	150	139	126	127	62	61	61	16	13	11	9	6	3	2	1	1
	Headcount:	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
Metallurgy and Corrosion	Planned Work:	9	11	13	13	13	13	9	9	7	6	6	2	2	2				
	Headcount:	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Pipeline	Planned Work:	37	36	34	31	29	19	17	16	16	16	13	13	8	8				
	Headcount:	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

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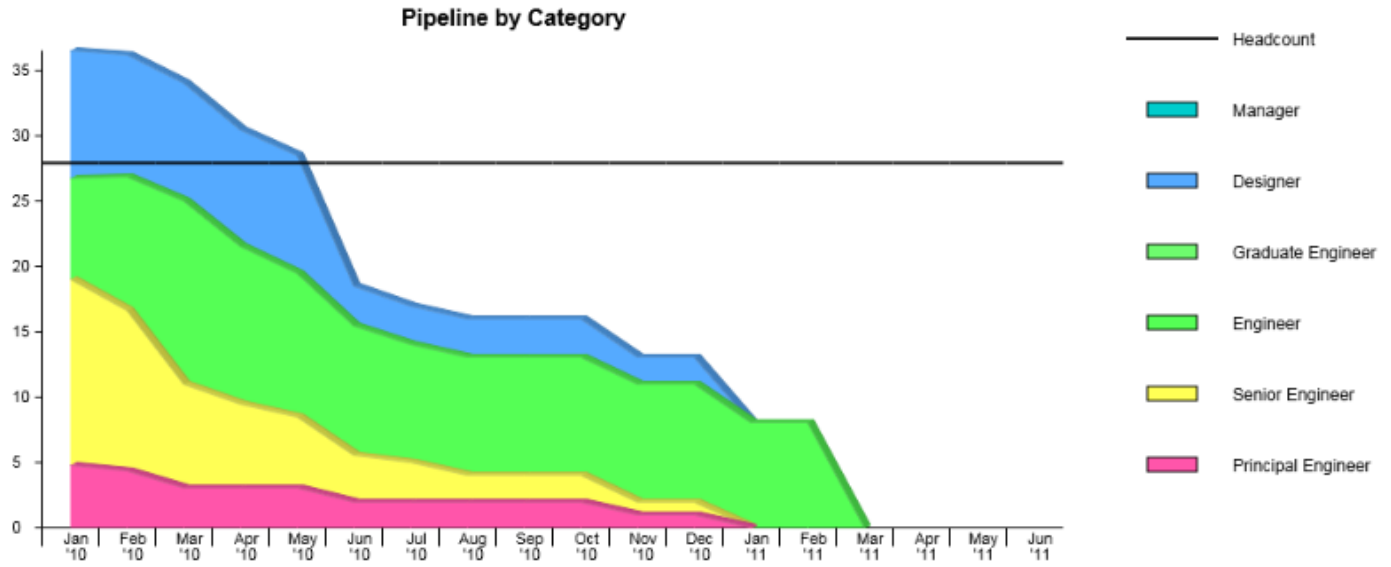
Forward loading 2



Department	Category		Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11
Pipeline	Manager	Planned Work:																		
		Headcount:																		
	Designer	Planned Work:	10	9	9	9	9	3	3	3	3	3	2	2						
		Headcount:	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
	Graduate Engineer	Planned Work:																		
		Headcount:																		
	Engineer	Planned Work:	8	10	14	12	11	10	9	9	9	9	9	9	8	8				
		Headcount:	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Senior Engineer	Planned Work:	14	12	8	7	6	4	3	2	2	2	1	1						
		Headcount:	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	Principal Engineer	Planned Work:	5	4	3	3	3	2	2	2	2	2	1	1						
		Headcount:	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total		Planned Work:	37	36	34	31	29	19	17	16	16	16	13	13	8	8				
		Headcount:	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

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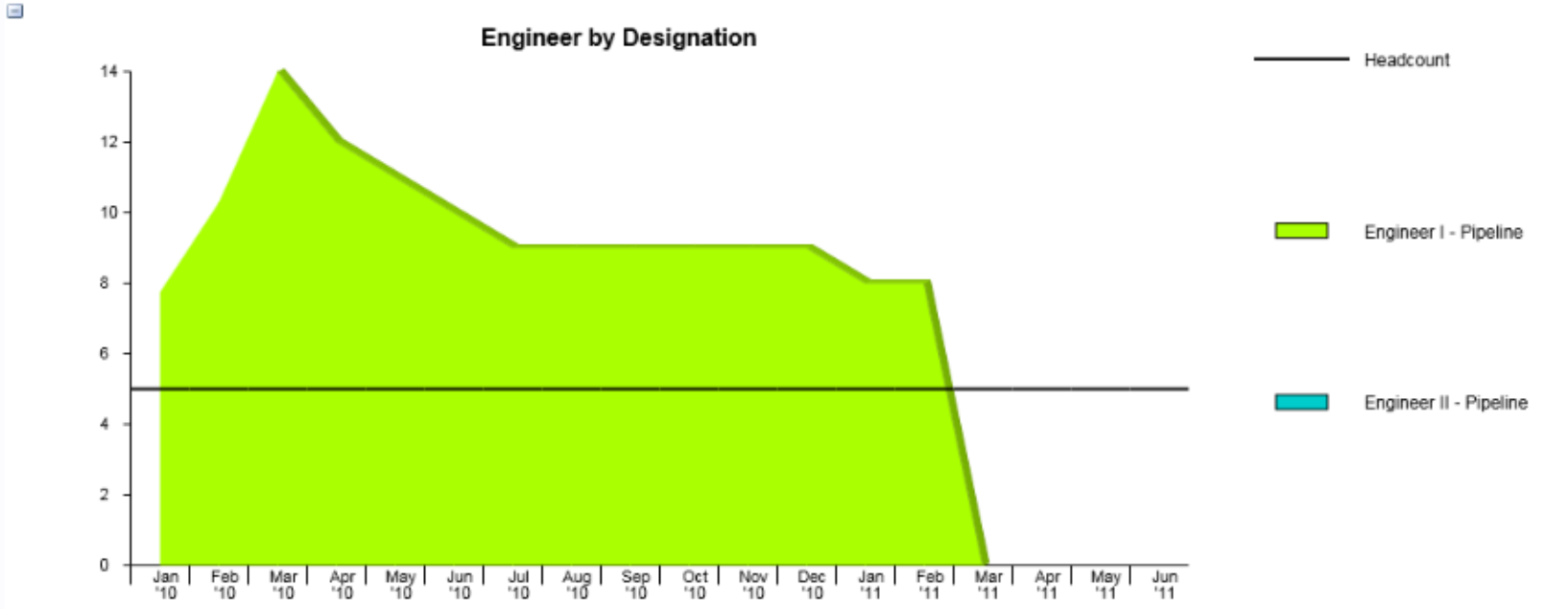

Department	Category	Designation		Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11
Pipeline	Engineer	Engineer I - Pipeline	Planned Work:	8	10	14	12	11	10	9	9	9	9	9	9	8	8				
			Headcount:	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		Engineer II - Pipeline	Planned Work:																		
			Headcount:																		
Total			Planned Work:	8	10	14	12	11	10	9	9	9	9	9	9	8	8				
			Headcount:	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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Forward loading 4

Department	Category	Designation	Resource	Project		Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11	Total
Pipeline	Engineer	Engineer I - Pipeline	Engineer I - Pipeline	J - 142	Planned Work:	1	2	4	4	4	4	4	4	4	4	4	4	4	4					3
				J - 143	Planned Work:	1	2	4	4	4	4	4	4	4	4	4	4	4	4					3
				J-1312E	Planned Work:	1	0																	0
				New Proposal	Planned Work:		1	1	1	1	1													0
				PI-09001	Planned Work:	1	1	1	1	1														0
			Total		Planned Work:	4	6	10	10	10	9	8	8	8	8	8	8	8	8					6
					Headcount:																			
			Daphne Mcintosh	J-132	Planned Work:	1	1	1	1															0
					Headcount:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			Earline Bolden		Planned Work:																			
					Headcount:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			Eddie Hamilton	J-131O	Planned Work:	1	1	1																0
					Headcount:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			Marilynn Dickson	J-131O	Planned Work:	1	1	1	1	1	1	1	1	1	1	1	1							1
					Headcount:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			Oliver Dye	J-131O	Planned Work:	1	1	1																0
					Headcount:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total					Planned Work:	8	10	14	12	11	10	9	9	9	9	9	9	8	8					7
					Headcount:	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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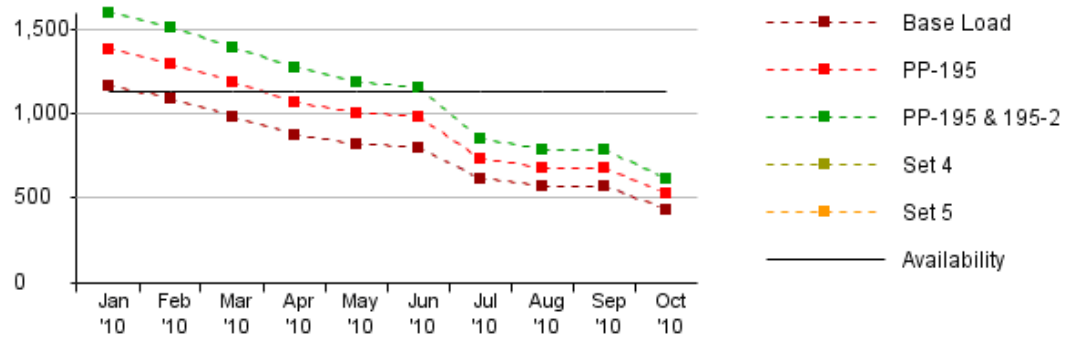
Scenarios

Alternatives



Set	Name	Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Title
1	Base Load	1167	1087	977	874	820	798	609	570	567	426	Base Load
2		1380	1297	1184	1071	1001	977	729	679	679	521	PP-195
3		1593	1507	1391	1268	1182	1156	849	788	791	616	PP-195 & 195-2
4		0	0	0	0	0	0	0	0	0	0	Set 4
5		0	0	0	0	0	0	0	0	0	0	Set 5
	Availability	1131	1131	1131	1131	1131	1131	1131	1131	1131	1131	

Potential Projects	Jan '10	Feb '10	Mar '10	Apr '10	May '10	Jun '10	Jul '10	Aug '10	Sep '10	Oct '10	Set 1	Set 2	Set 3	Set 4	Set 5
	9	16	24	25	20	21					☐	☐	☐	☐	☐
Base Load	1,167	1,087	977	874	820	798	609	570	567	426	☑	☑	☑	☐	☐
PP-176T3	37	34	28	19	14	12	2	1	2		☐	☐	☐	☐	☐
PP-182	15	14	13	4	2	2					☐	☐	☐	☐	☐
PP-186	9	8	3	2	2	2					☐	☐	☐	☐	☐
PP-189	24	23	19	11	9	10					☐	☐	☐	☐	☐
PP-190	13	9	7	1							☐	☐	☐	☐	☐
PP-191	23	14	9	9	9	10	6	6	6		☐	☐	☐	☐	☐
PP-195	213	210	207	197	181	179	120	109	112	95	☐	☑	☑	☐	☐
PP-195-2	213	210	207	197	181	179	120	109	112	95	☐	☐	☑	☐	☐
PP-196	46	43	38	31	30	28	14	12	13		☐	☐	☐	☐	☐
PP-197	7	6	6	6	6	6	5	5	5	4	☐	☐	☐	☐	☐
PP-540	38	38	38	38	37	37	38	37	37	26	☐	☐	☐	☐	☐
Availability	1,131	1,131	1,131	1,131	1,131	1,131	1,131	1,131	1,131	1,131					

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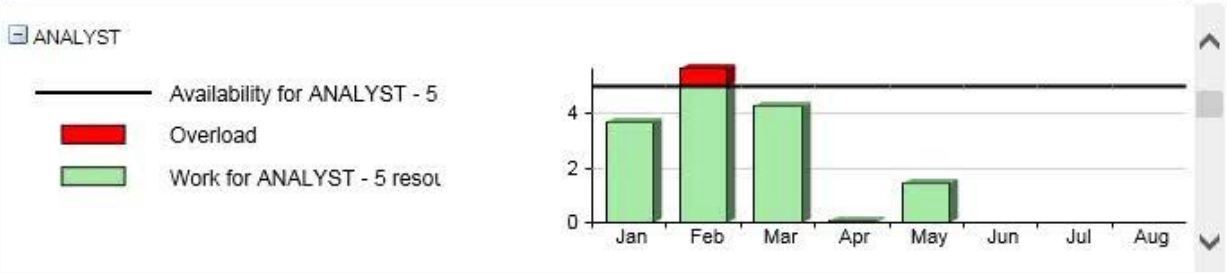
Move projects to minimize bottlenecks

Program	Project	Start	Finish	Q1 2016			Q2 2016			Q3 2016	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
	NEW PROJECT	27 Jan 2016	20 Apr 2016								
BAU	(various)	08 Jan 2016	10 Jun 2016								
Client Projec	(various)	30 Nov 2015	29 Mar 2016								
Marketing	(various)	11 Dec 2015	04 May 2016								
Total				7.8	9.3	9.6	10.3	5.2	0.4		
Team											
ACCOUNTANT				4 0.2	4 0.2	4 0.1	4 0.6	4	4	4	4
ANALYST				5 3.7	5 5.7	5 4.3	5 0.1	5 1.4	5	5	5
DOCUMENTER				2 1.1	2 0.7	2 0.4	2 0.3	2 0.3	2	2	2
PROGRAMMER				6 1.6	6 2	6 3.5	6 6	6 0.2	6	6	6
TECHNICIAN				2 0.6	2 0.7	2 0.4	2 1.3	2 2.4	2 0.4	2	2
TESTER				2 0.6	2	2 0.9	2 2.1	2 0.9	2	2	2
				<<	<					>	>>



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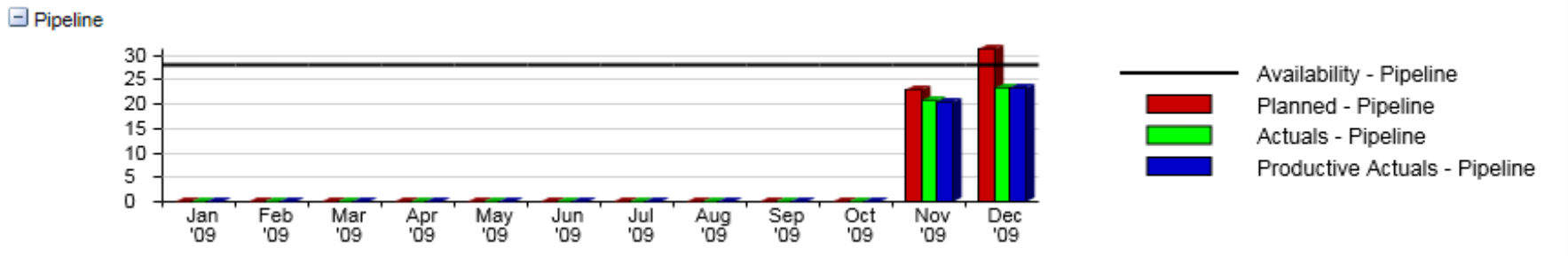
Productivity



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Outstanding requests 1

Show usage in Full-Time Equivalents

Project Job No.	Drilldown	Dec 28	Jan 4	Jan 11	Jan 18	Jan 25	Feb 1	Feb 8	Feb 15	Feb 22	Mar 1	Mar 8	Mar 15	Mar 22	Mar 29	Apr 5	Apr 12	Apr 19	Apr 26	May 3	May 10
F-03030	Departments	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
F-03037	Departments	1	0																		
F-03040	Departments	1	1	1	1	1															
F-03041	Departments	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
F-03043	Departments	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
J - 142	Departments	9	34	34	34	34	50	50	50	50	64	64	64	64	69	78	78	78	79	83	83
J - 143	Departments	9	34	34	34	34	50	50	50	50	64	64	64	64	69	78	78	78	79	83	83
J-1312E	Departments		53	53	53	53	53	27													
J-131O	Departments	8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
J-132	Departments	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
New Proposal	Departments	3	10	10	10	10	17	17	17	17	27	27	27	27	27	28	28	28	26	22	22
PI-09001	Departments	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

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Outstanding Requests 2

Show usage in Full-Time Equivalents

Project Job No.	Resource Department	Drilldown	Dec 28	Jan 4	Jan 11	Jan 18	Jan 25	Feb 1	Feb 8	Feb 15	Feb 22	Mar 1	Mar 8	Mar 15	Mar 22	Mar 29	Apr 5	Apr 12	Apr 19	Apr 26	May 3	May 10
J - 142	Civil / Structural	Categories	1	3	3	3	3	7	7	7	7	8	8	8	8	9	10	10	10	11	14	14
	Electrical	Categories	1	6	6	6	6	8	8	8	8	9	9	9	9	11	14	14	14	14	15	15
	HSE Design	Categories	0	2	2	2	2	3	3	3	3	3	3	3	3	4	5	5	5	5	7	7
	Instrument	Categories	1	2	2	2	2	3	3	3	3	8	8	8	8	10	12	12	12	12	12	12
	Mechanical	Categories	1	2	2	2	2	3	3	3	3	5	5	5	5	5	6	6	6	6	6	6
	Metallurgy and Corrosion	Categories	0	1	1	1	1	2	2	2	2	3	3	3	3	4	5	5	5	5	5	5
	Pipeline	Categories	0	1	1	1	1	2	2	2	2	5	5	5	5	5	5	5	5	5	5	5
	Piping	Categories	1	6	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	9	9
	Process	Categories	2	9	9	9	9	12	12	12	12	14	14	14	14	13	12	12	12	12	10	10
	TeleCom	Categories	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

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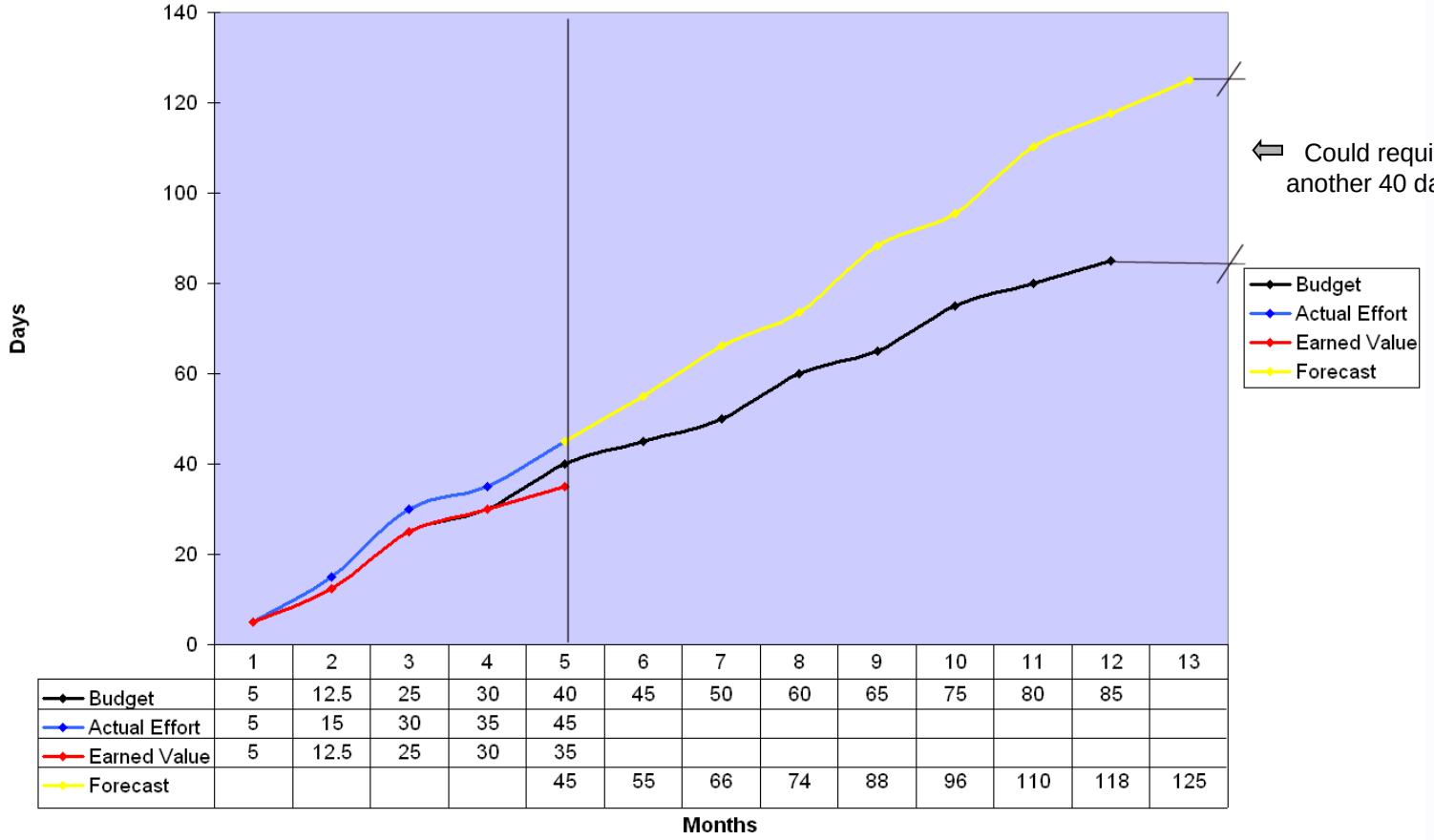
Resource performance on each project



	1	2	3	4	5	6	7	8	9	10	11	12	13
Budget	5	12.5	25	30	40	45	50	60	65	75	80	85	
Actual Effort	5	15	30	35	45								
Earned Value	5	12.5	25	30	35								
Forecast					45	55	66	74	88	96	110	118	125

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If individual plans are unrealistic…..

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2. What needs to be in place?

- Key Roles
- Demand management
- Resource allocation
- Progress tracking

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2.1 Key Roles

- Project managers
  - Defining the demand
  - Requesting resources
- Line managers
  - Skills capacity in balance with demand
  - Satisfy requests for resource
- Senior managers
  - Assign priorities and resolve disputes

2.2 Demand management

- Change comes from:
  - New projects and proposals
  - Client delays free up resources unexpectedly
  - Changes in project scope, or poor estimating
  - Key resources leave
- Require scenarios to:
  - Assess the impact – new bottlenecks or spare capacity?
  - Explore alternatives …whilst preserving the live data

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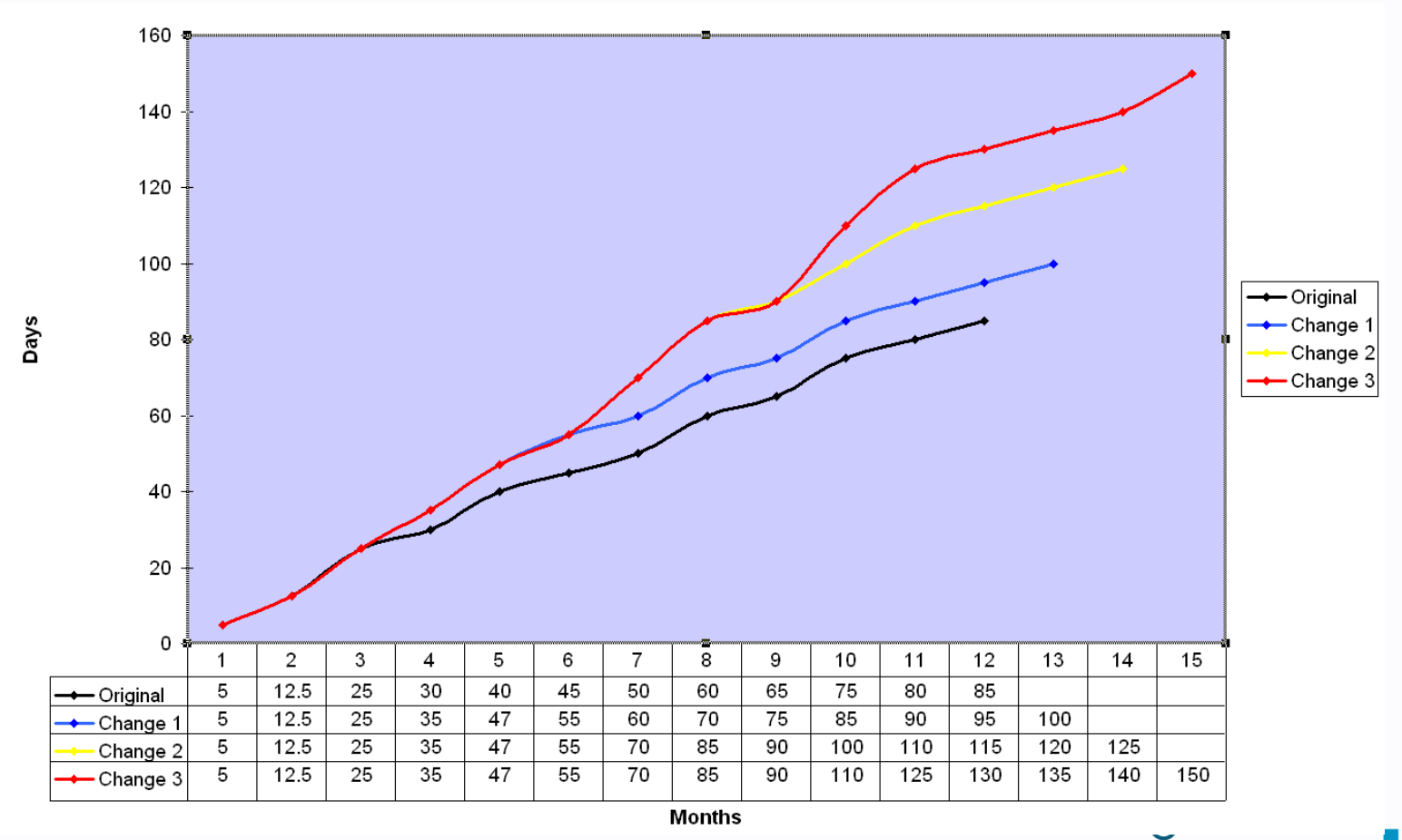
Impact of changes

Re-baseline the plan, as necessary



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Original	5	12.5	25	30	40	45	50	60	65	75	80	85			
Change 1	5	12.5	25	35	47	55	60	70	75	85	90	95	100		
Change 2	5	12.5	25	35	47	55	70	85	90	100	110	115	120	125	
Change 3	5	12.5	25	35	47	55	70	85	90	110	125	130	135	140	150

Months

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2.3 Resource allocation

- Track each Request
  1. Requested
  2. Proposed
  3. Accepted/declined
  4. Confirmed
  5. Date & work changes

- Many variations:
  - the dating agency approach

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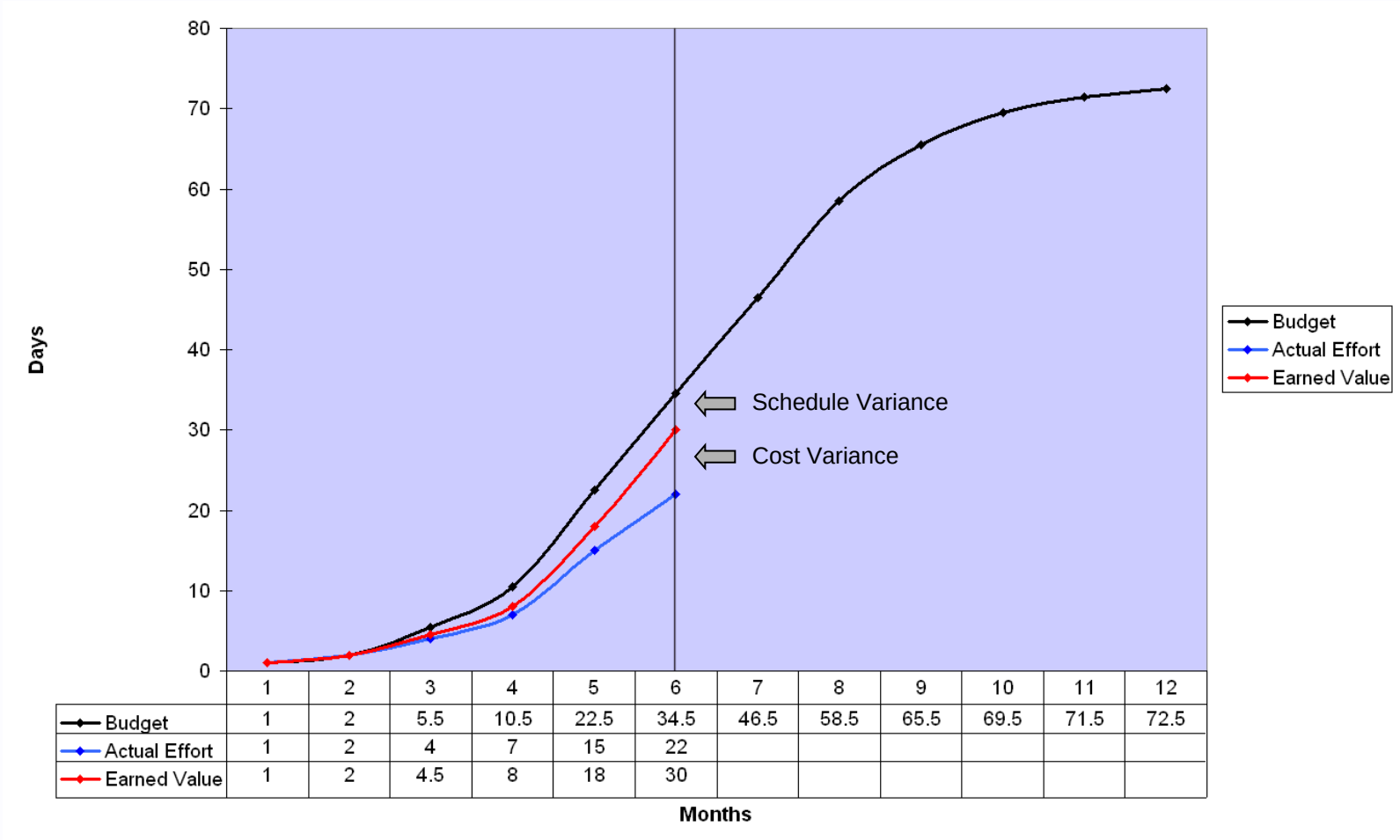
2.4 Tracking effort & progress

- Actual performance will affect the project outcome
- So, used Earned Value approach
  - Establish performance baseline – the project budget
  - Track actual effort – timesheets
  - Assess progress – value of work done
- Re-estimate to completion
  - Can performance to date really be improved?

Earned value



	1	2	3	4	5	6	7	8	9	10	11	12
Budget	1	2	5.5	10.5	22.5	34.5	46.5	58.5	65.5	69.5	71.5	72.5
Actual Effort	1	2	4	7	15	22						
Earned Value	1	2	4.5	8	18	30						

Schedule variance = Budget – Earned value

Cost variance = Earned Value – Actual Effort

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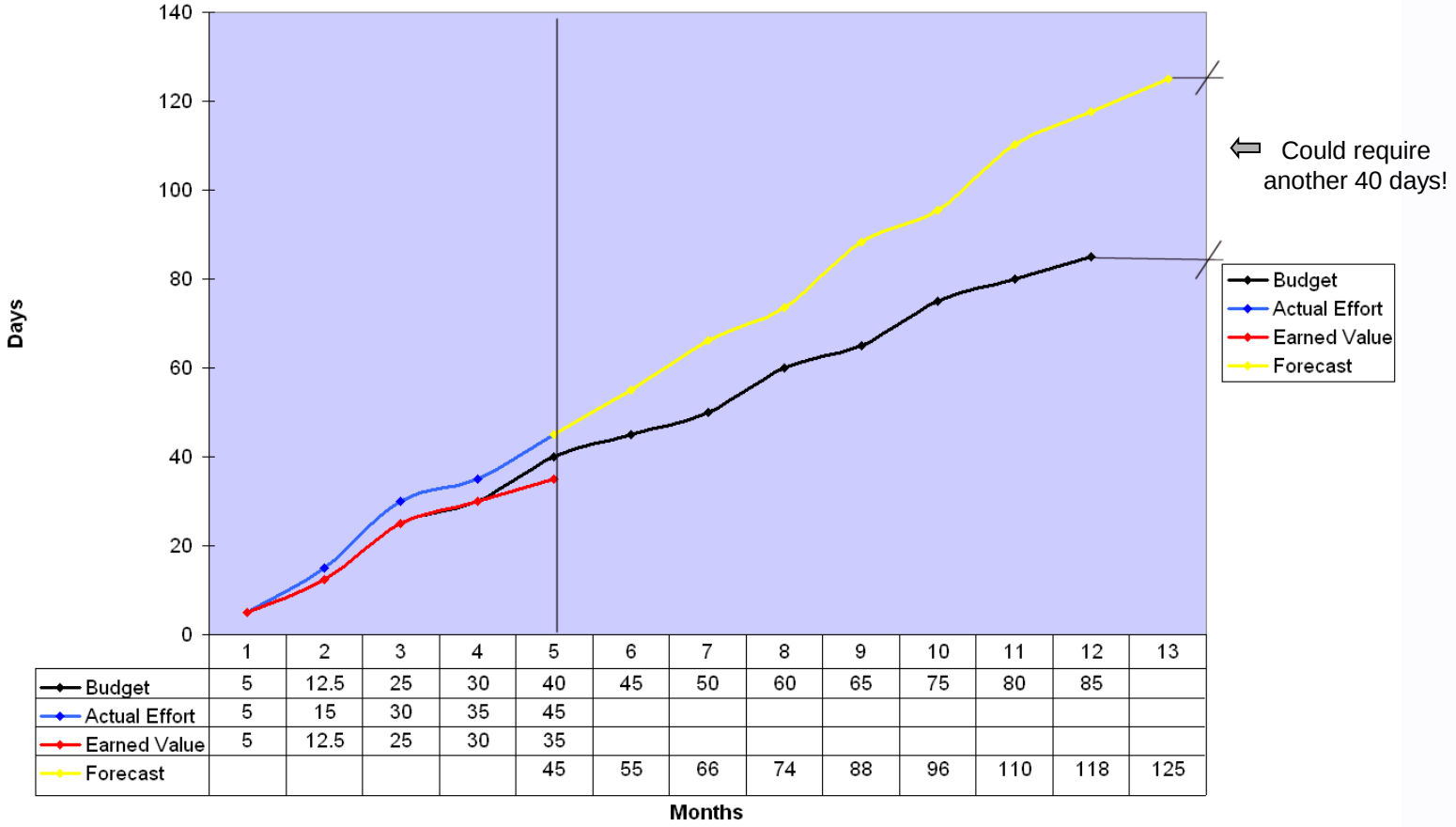
Forecast to completion

based on continuance of actual cost & schedule performance



	1	2	3	4	5	6	7	8	9	10	11	12	13
Budget	5	12.5	25	30	40	45	50	60	65	75	80	85	
Actual Effort	5	15	30	35	45								
Earned Value	5	12.5	25	30	35								
Forecast					45	55	66	74	88	96	110	118	125

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3. What needs to be in place?

- Roles & responsibilities of the key stakeholders.
- Demand management - assessing the impact of new projects and other changes
- Resource allocation process
- Tracking effort & assessing progress on each project.

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4. How well do you score?

- Projects often centrally registered, with financial parameters defined
- Multiple spreadsheets for resource planning, often department or regionally based
- Resource allocation process is often poorly defined, inconsistent procedures & communication
- Roles and responsibilities can be inconsistent in large organizations
- Tracking effort often done, measuring progress less so.

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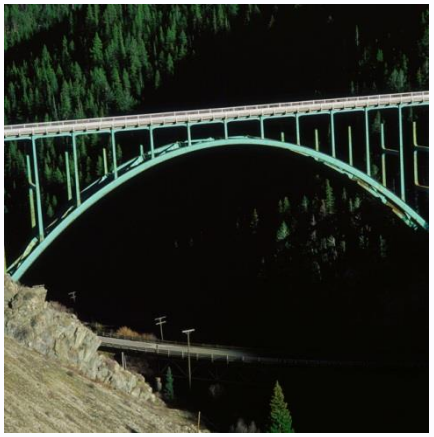
5. Bridging the gap

- Build on what's in place
  - Minimise cost, risk & disruption
- Review business processes
- Use appropriate software tools
  - Improve collaboration



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The potential rewards

- Cost savings
  - If the improved quality of Information gains only 2% productivity improvement ….
  - Annual cost savings could exceed £100k for 100 resources
- Substantial increase in profits

- Improved performance on individual projects

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Any Questions ?

- Please visit us at Stand 52

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