

Capacity Cost Model: Balancing the Demand for Software Changes Against the Supply of Resources

2013 ICEAA Annual Conference – IT Track (IT-2)

19 June 2013

Problem Statement

- Client executives did not have insight into which types of dollars are used for RDT&E, OP, and OM purchases within the Development and Sustainment budgets
- There was no differentiation between fixed and variable costs
- Configuration Control Boards (CCBs) had difficulty understanding what is the current resource or LOE *capacity* to deploy for future releases

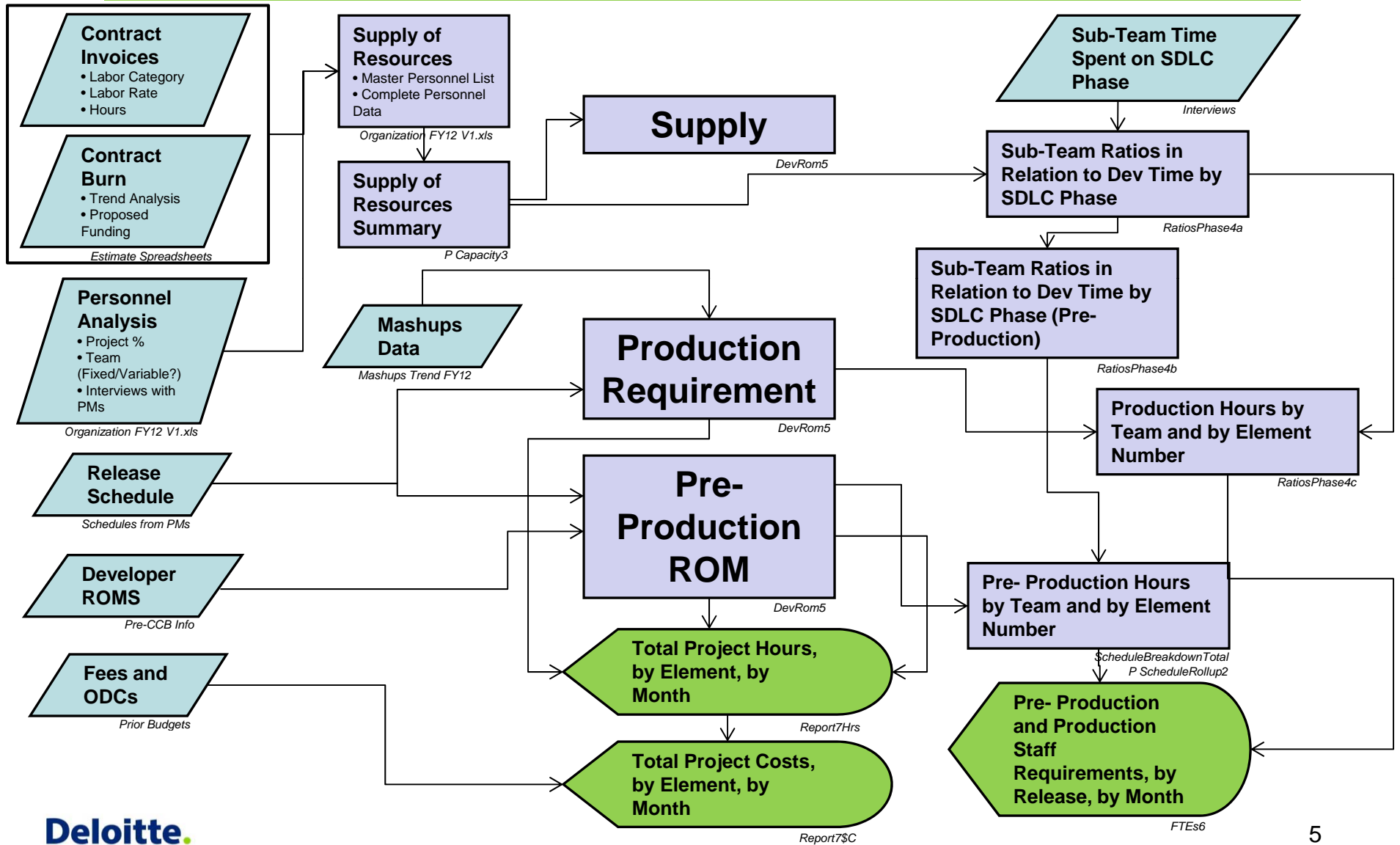
Background

- The model objectives were to:
 - Develop a means of understanding project-level capacity for system changes during Board-level (e.g. CCB) reviews
 - Understand resources needed/spent for project/system sustainment
 - Align appropriate usage of RDTE and OM funds with resource commitments at the major system change level
- The model went through the necessary design, data collection, construction, and preliminary/critical design reviews

Capacity Cost Model Capabilities

- This model provides decision-makers with insight into where the dollars are being spent
- It identifies the costs associated with satisfying both technical and functional requirements
- Both fixed and variable costs are shown to give additional insights
- The model compares the *supply* of resources (LOE or capacity) against the *demand* of resources (work package requests)

Capacity Cost Model Data Flows

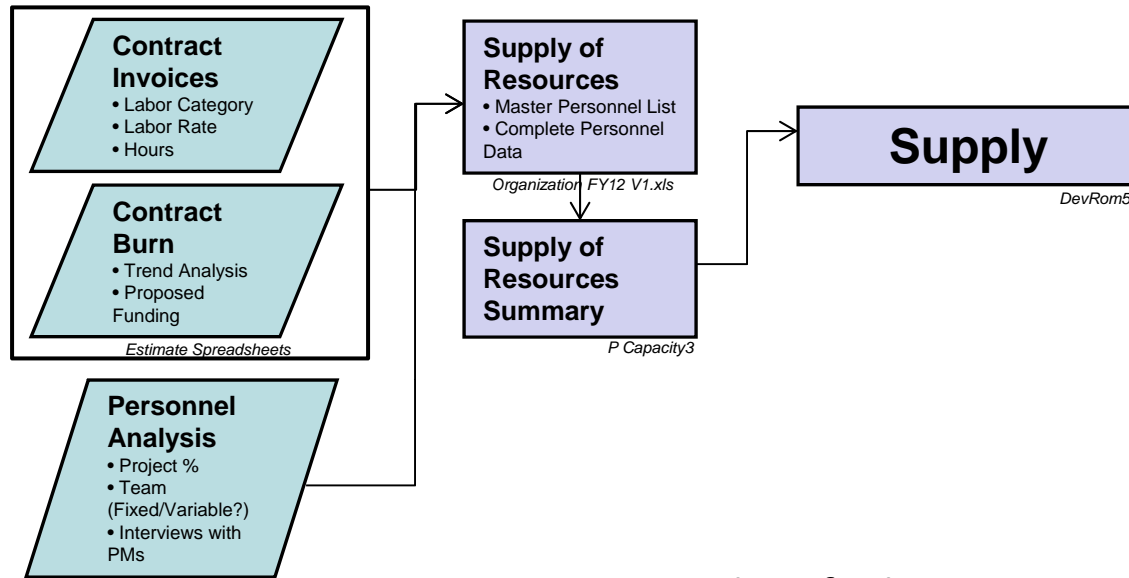


Capacity Cost Model and the DevRom Tab

Dev ROM by Release					
Annual Capacity (Non-Core Hours):	RDTE	OP	OM	Total	← Supply
Developer ROM:	6,620		39,232	45,852	
Total ROM:	70,811		119,278	190,090	
Production Requirement (Non-Core Sustainment Hours):	RDTE	OP	OM	Total	← Production Requirement
Developer ROM:	-	-	13,299	13,299	
Total ROM:	-	-	54,569	54,569	
Availability for Pre-Production Releases (Hours):	RDTE	OP	OM	Total	← Pre-Production ROM
Developer ROM:	6,620	-	20,431	27,051	
Total ROM:	70,811	-	41,899	112,710	
Pre-Production ROM Included (Hours):	RDTE	OP	OM	Total	← Pre-Production ROM
Developer ROM:	5,035	-	17,192	22,227	
Total ROM:	20,659		70,543	91,202	
Pre-Production Balance (Hours):	RDTE	OP	OM	Total	
Developer ROM:				4,824	
Total ROM:				21,508	

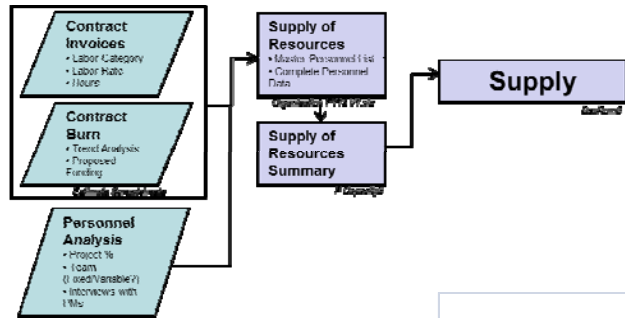
Purpose – Identify supply of resources, subtract the production requirement, subtract the pre-production ROM, and identify remaining balance

Supply



Purpose – Identify the FY12 supply of resources and provide the ability to slice the data into teams, sub-teams, and colors of money

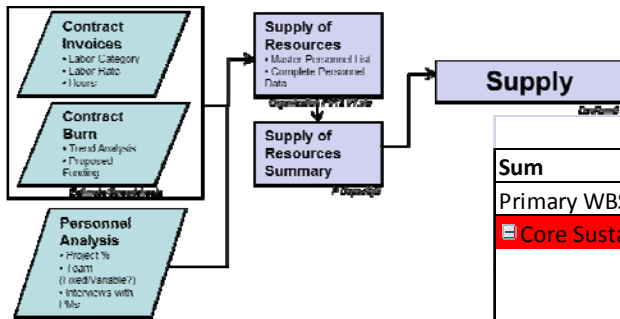
Supply of Resources - Non Core



Purpose – Create pivot table that summarizes the supply of non-core resources in a useful format

			Hours		
Sum			Color		
Primary WBS	Team	SubTeam	OM	RDTE	Grand Total
Core Sustainment			43,333	29,949	73,282
[-] Non Core	[-] Engineering Life Cycle Management	Data Architecture	3,758	2,038	5,796
		Documentation & Training	7,616	2,742	10,359
		Risk Management	688	233	920
		Software QA		269	269
		Test	8,565	14,570	23,135
		Engineering Life Cycle Management Total	20,627	19,852	40,479
	[-] NC/SOA	Core Team		0	0
		NC/SOA Total		0	0
	[-] Product Management	Business Analyst	36,610	24,508	61,118
		Developers	39,232	6,620	45,852
		Help Desk		1,680	1,680
		Product Management Total	75,842	32,808	108,650
	[-] Technical Support	Database Support	10,171	6,824	16,996
		Remote/Local Server Support	12,638	11,327	23,965
		Technical Support Total	22,809	18,151	40,961
Non Core Total			119,278	70,811	190,090
Grand Total			162,611	100,760	263,372

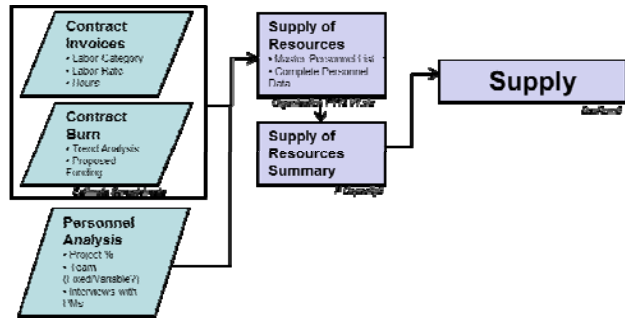
Supply of Resources - Core



Purpose – Create pivot table that summarizes the supply of core resources in a useful format

			Hours		
Sum			Color		
Primary WBS	Team	SubTeam	OM	RDTE	Grand Total
Core Sustainment	Engineering Life Cycle Management	Configuration Management	825	831	1,656
		Engineering Services	3,563	3,383	6,945
		Enterprise Architecture	3,015	1,615	4,630
		Information Assurance	8,346	3,679	12,025
		Project Scheduler	204	900	1,104
		Requirement Management	1,143	698	1,840
		Software QA	619	2,049	2,668
		Management Assistant		681	681
		Management Assistant		596	596
		External Liaison	791		791
	Engineering Life Cycle Management Total		18,506	14,431	32,936
	Product Management	Help Desk	11,040	1,680	12,720
		(blank)		672	672
		Task Manager		1,840	1,840
	Product Management Total		11,040	4,192	15,232
	Technical Support	Development Support	5,733	3,283	9,016
		IT Support	2,657	2,496	5,152
		Platform Support	1,380	1,163	2,543
		(blank)	2,244	333	2,576
		Remote Deployment Support	1,775	1,814	3,588
	Technical Support Total		13,788	9,087	22,875
	Org Support	(blank)		2,239	2,239
	Org Support Total			2,239	2,239
Core Sustainment Total			43,333	29,949	73,282

Supply and DevROM

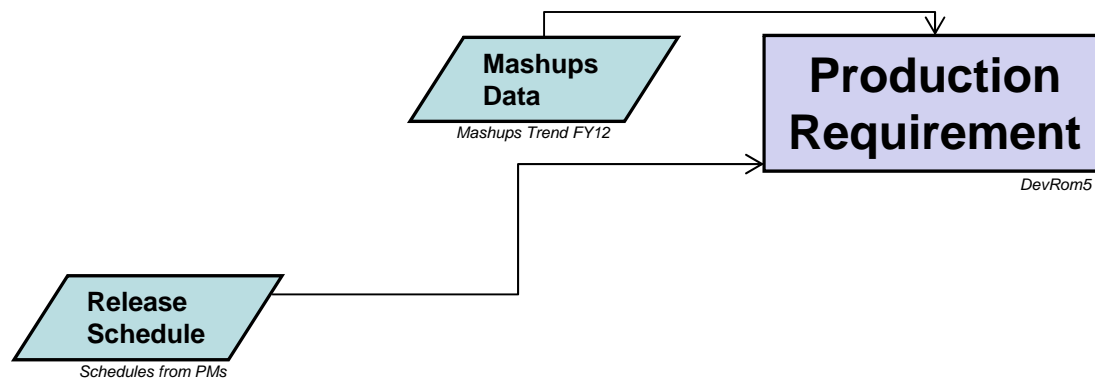


Dev ROM by Release						
Annual Capacity (Non-Core Hours):			RDTE	OP	OM	Total
Developer ROM:			6,620		39,232	45,852
Total ROM:			70,811		119,278	190,090

Supply

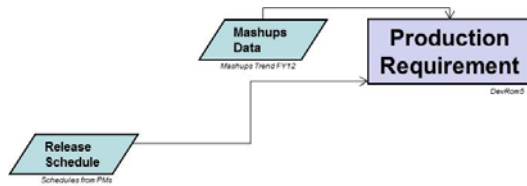
Purpose – Capture Developer ROM and Total ROM available for software development and support for FY12

Production Requirement



Purpose – Identify the Production Requirement by release, by month, and for the FY

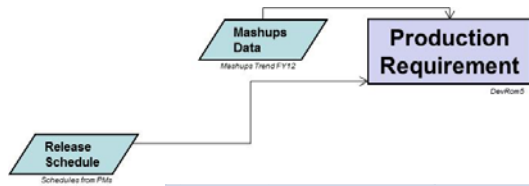
Mashups Data



Purpose – Capture available mashups data and forecast unavailable mashups data

3.0.6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2.1 System Incident Reports (SIRs)	2	0	0	0	0	0							2
2.2 Trouble/Problem Reports (TPRs)	0	0	0	0	0	0							0
2.6 Other Sustainment Changes	0	0	0	0	0	2							2
2.4 Data Patch	17	4	7	13	1	46							88
2.5 ECRs	0	0	0	0	0	0							0
3.0.6 Total	19	4	7	13	1	48							92
3.1.2	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2.1 System Incident Reports (SIRs)	42	9	8	43	135	169	169						576
2.2 Trouble/Problem Reports (TPRs)	8	54	12	10	13	163	163						422
2.6 Other Sustainment Changes	13	2	21	0	9	50	50						146
2.4 Data Patch	0	0	0	34	251	78	78						442
2.5 ECRs	0	82	24	0	0	64	64						235
3.1.2 Total	63	147	65	87	408	525	525	0	0	0	0	0	1819
3.1.2.4	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2.1 System Incident Reports (SIRs)	252	70	199	102	136	152	152	152	152	152	152	152	1822
2.2 Trouble/Problem Reports (TPRs)	0	0	0	0	0	0	0	0	0	0	0	0	0
SCRs (not used, for reference only)	731	136	254	122	57								
2.6 Other Sustainment Changes	336	325	324	341	324	330	330	330	330	330	34	34	3365
2.4 Data Patch	0	0	0	0	0	0	0	0	0	0	0	0	0
3.1 TPRs	683	388	546	191	658	493	493	493	493	493	493	493	5918
2.5 ECRs	14	44	7	0	15	16	16	16	16	16	16	16	192
3.1.2.4 Total	1285	827	1330	756	1190	991	991	991	991	991	695	695	
3.1.1	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2.1 System Incident Reports (SIRs)	1	0	13	3	1	0	0	0	0	0	0	0	0
2.2 Trouble/Problem Reports (TPRs)	0	0	0	0	0	0	0	0	0	0	0	0	0
SCRs	0	0	0	0	0	0	0	0	0	0	0	0	0
2.6 Other Sustainment Changes	6	21	45	1	4	18	18	0	0	0	0	0	0
2.4 Data Patch	454	340	323	205	102	349	349	0	0	0	0	0	0
2.5 ECRs	0	0	0	0	0	0	0	0	0	0	0	0	0
3.1.1 Total	461	361	381	209	107	367	367	0	0	0	0	0	0

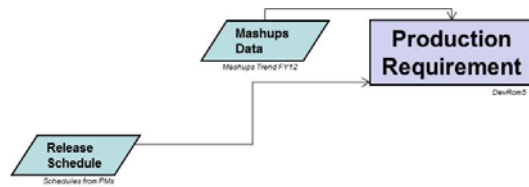
Production Release Schedule



Schedule by Phase		Schedule													
Release	Phase	2011			2012										
		Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12		
3.0.6	Production	1	1	1	1	1	1	1	0	0	0	0	0	0	6
		1	1	1	1	1	1	0	0	0	0	0	0	0	6
3.1.1	Production	1	1	1	1	1	1	1	0	0	0	0	0	7	
		1	1	1	1	1	1	1	0	0	0	0	0	7	
3.1.2	Production	1	1	1	1	1	1	1	0	0	0	0	0	7	
		1	1	1	1	1	1	1	0	0	0	0	0	7	
3.1.2.4	Production	1	1	1	1	1	1	1	1	1	1	1	1	12	
		1	1	1	1	1	1	1	1	1	1	1	1	12	
Total Production		4	4	4	4	4	4	3	1	1	1	1	1	32	

Purpose – Populate production release schedule by month

Production Requirement and DevROM



Production Requirement

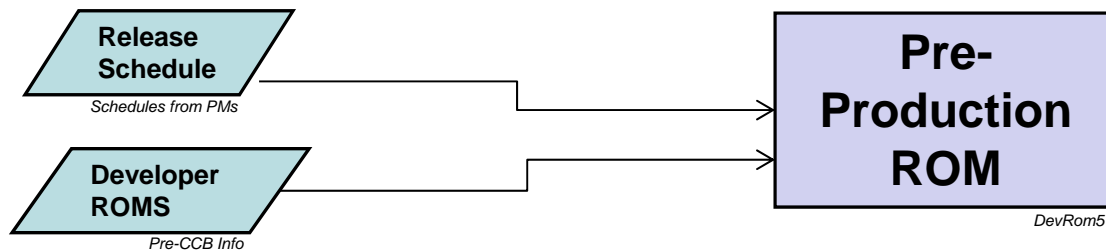
Dev ROM by Release					
Production Requirement (Non-Core Sustainment Hours):		RDTE	OP	OM	Total
Developer ROM:		-	-	13,299	13,299
Total ROM:		-	-	54,569	54,569

Release	% of Total	Year %	Name	SCR#	Developer ROM
3.0.6	1%	100%	Production OM		92
3.1.1	17%	100%	Production OM		2,254
3.1.2	14%	100%	Production OM		1,819
3.1.2.4	69%	100%	Production OM		9,134

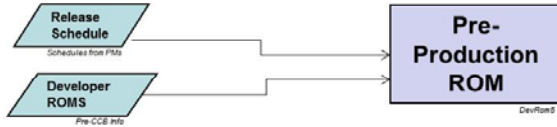
Purpose – Identify the Production Requirement by release, by month, and for the FY

Pre-Production ROM

Purpose – Identify the Pre-Production Requirement by release, by month, and for the FY



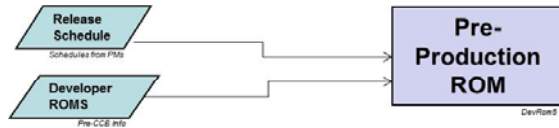
Pre-Production Release Schedule



Schedule by Phase		Schedule													
Release	Phase	2011			2012										
		Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12		
Tech	Requirements														0
Tech	Design														0
Tech	Develop														0
Tech	DIT		1	1											2
Tech	SIT		1	1											2
Tech	Deploy														0
Tech		0	2	2	0	0	0	0	0	0	0	0	0	0	4
DBT	Requirements	1	1	1	1	1	1								6
DBT	Design						1	1	1	1					4
DBT	Develop										1	1	1		3
DBT	DIT														0
DBT	SIT														0
DBT	Deploy														0
DBT		1	1	1	1	1	2	1	1	1	1	1	1	1	13

Purpose – Populate pre-production release schedule by month

Developer ROMs



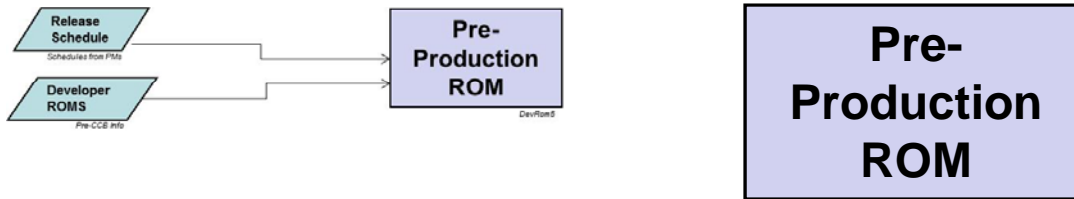
TECH	A	17%	SCR	1,280	Oct-11	Jun-12	y	OM	2.3.2 Interface/Trading Partner Change (OM)
TECH	N	17%	SCR1	60	Oct-11	Jun-12	y	OM	2.3.3 External Mandate Driven Change (OM)
DBT	AF	75%	SCR2	1,447	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	AF	75%	SCR3	862	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	N	75%	SCR4	1,469	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	N	75%	SCR5	1,283	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	A	75%	SCR6	864	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	A	75%	SCR7	441	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	A	75%	SCR8	746	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)
DBT	AF	75%	SCR9	190	Oct-11	Mar-13	y	OM	2.3.1 Internal Driven Change - Process Improvement (OM)



Totaled and then scaled to reflect the months that correspond to the release

Purpose – Apply schedule to Program Manager supplied DevROMs and identify SCR type, color of money, timeframe, Service, and whether discretionary

Pre-Production ROM and DevROM

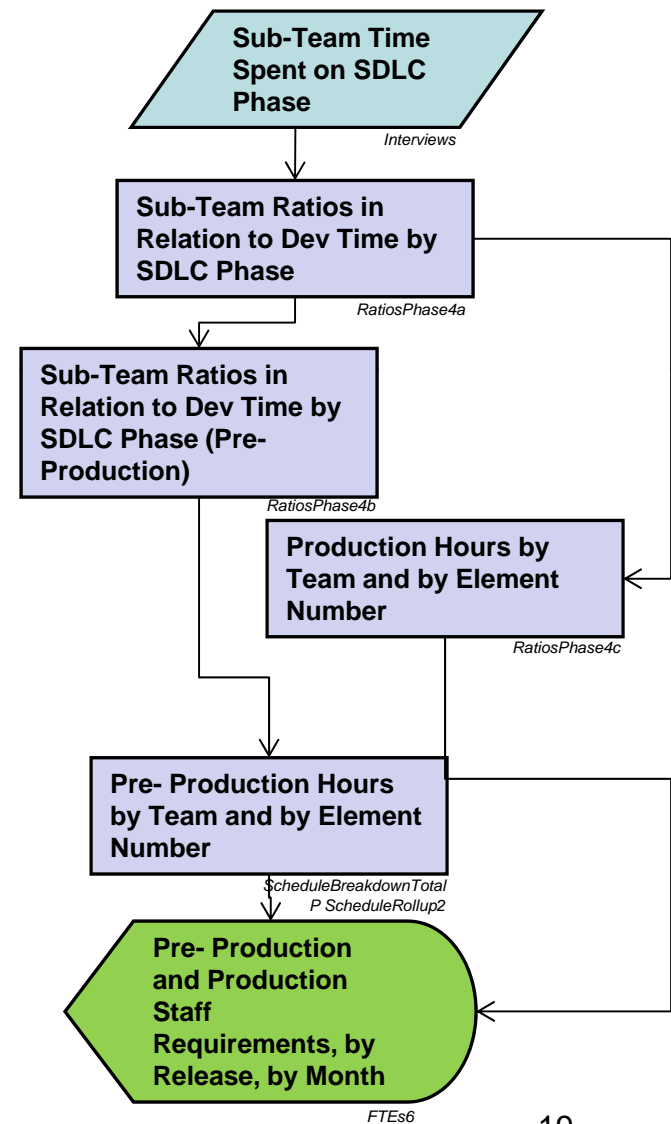


Dev ROM by Release				
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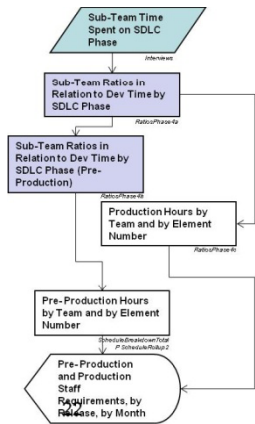
Purpose – Subtract Pre-Production ROM from Availability to determine Pre-Production Balance

FTE Report

Purpose – Create a report that shows the number of FTEs required by month by production and pre-production release



Sub-Team Ratio Tables

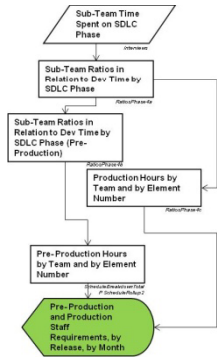


Team	SubTeam	Release Team Ratios	Rqmnts	Design	Develop	DIT	SIT	Deploy	Production	Sum with Prod	Sum without Prod
Engineering Life Cycle Management	Data Architecture	13%	48%	48%					4%	100%	96%
	Documentation & Training	23%	32%	14%	5%	5%	5%	32%	8%	100%	92%
	Risk Management	2%	17%	17%	17%	17%	17%	17%		100%	100%
	Test	50%			27%	27%	28%		17%	100%	83%
NC/SOA	Core Team										
Product Management	Business Analyst	133%	19%	19%	8%	6%	3%	2%	45%	100%	55%
	Developers	100%	7%	13%	30%	7%	5%	5%	34%	100%	66%
Technical Support	Database Support	37%		9%	44%	18%	18%		12%	100%	88%
	Remote/Local Server Support	52%			21%	21%	21%	21%	18%	100%	82%

Purpose – Interview team leads and get percent of time that sub-teams spend on SDLC phase and then calculate with and without production

Team	SubTeam	Release Team Ratios	Requirements	Design	Develop	DIT	SIT	Deploy	
Engineering Life Cycle Management	Data Architecture	13%	50%	50%					100%
	Documentation & Training	23%	35%	15%	5%	5%	5%	35%	100%
	Risk Management	2%	17%	17%	17%	17%	17%	17%	100%
	Test	50%				33%	33%	34%	100%
NC/SOA	Core Team								
Product Management	Business Analyst	133%	34%	34%	14%	10%	5%	3%	100%
	Developers	100%	10%	20%	45%	10%	7%	8%	100%
Technical Support	Database Support	37%		10%	50%	20%	20%		100%
	Remote/Local Server Support	52%				25%	25%	25%	100%

FTE Report

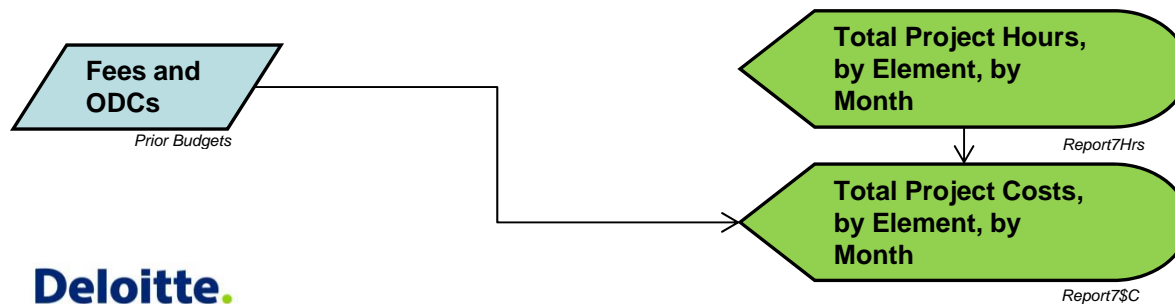


FTEs				2010			2011								
		% of Release Total	Total	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
3.0.6	Release FTEs (Production)														
	Engineering Life Cycle Management	21%	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Product Management	57%	1.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	Technical Support	22%	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Total Release FTEs		2.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1
3.1.2	Release FTEs (Production)														
	Engineering Life Cycle Management	21%	10.0	1.2	1.2	1.2	1.2	1.2	1.2	0.9	0.3	0.3	0.3	0.3	0.3
	Product Management	57%	26.5	3.3	3.3	3.3	3.3	3.3	3.3	2.5	0.8	0.8	0.8	0.8	0.8
	Technical Support	22%	10.2	1.3	1.3	1.3	1.3	1.3	1.3	1.0	0.3	0.3	0.3	0.3	0.3
	Total Release FTEs		46.7	5.8	5.8	5.8	5.8	5.8	5.8	4.4	1.5	1.5	1.5	1.5	1.5
3.1.2.4	Release FTEs (Production)														
	Engineering Life Cycle Management	21%	61.9	7.7	7.7	7.7	7.7	7.7	7.7	5.8	1.9	1.9	1.9	1.9	1.9
	Product Management	57%	164.7	20.6	20.6	20.6	20.6	20.6	20.6	15.4	5.1	5.1	5.1	5.1	5.1
	Technical Support	22%	63.1	7.9	7.9	7.9	7.9	7.9	7.9	5.9	2.0	2.0	2.0	2.0	2.0
	TEWLS														
	Total Release FTEs		289.7	36.2	36.2	36.2	36.2	36.2	36.2	27.2	9.1	9.1	9.1	9.1	9.1
35.5	Release FTEs (Pre-Production)														
	Engineering Life Cycle Management	21%	123.6	9.0	12.3	12.3	9.0	9.0	18.0	9.0	9.0	9.0	9.0	9.0	9.0
	Product Management	57%	328.8	23.9	32.7	32.7	23.9	23.9	47.9	23.9	23.9	23.9	23.9	23.9	23.9
	Technical Support	22%	125.9	9.2	12.5	12.5	9.2	9.2	18.3	9.2	9.2	9.2	9.2	9.2	9.2
	Total Release FTEs		578.3	42.1	57.6	57.6	42.1	42.1	84.2	42.1	42.1	42.1	42.1	42.1	42.1
	Capacity			99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
	FTE Requirement			55.5	70.9	70.9	55.5	55.5	97.6	52.1	45.4	45.4	45.4	45.4	45.4
	Excess FTEs			43.5	28.1	28.1	43.5	43.5	1.4	46.9	53.6	53.6	53.6	53.6	53.6

Purpose – Create a report that shows the number of FTEs required by month by production and pre-production release

Total Project Cost Reports

Purpose – Create reports for each project that show the number of hours and costs required by month by cost element #



Total Project Cost Report – Hours/Costs for Core Sustainment, Sustainment, Development

1.0 Core Sustainment	
	1.1 Project Management
l	1.1.1 Contractor Labor Costs
f	1.1.2 Government Labor Costs
f	1.1.3 Fixed /TMA Costs
f	1.1.4 Contracting Fees
f	1.1.5 Contracting ODCs
f	1.2 Hardware Maintenance and Upgrades
f	1.3 Commercial Software Maintenance and Upgrades
l	1.4 Production Site Support
	1.5 Infrastructure Support
l	1.5.1 Infrastructure Labor
f	1.5.2 Infrastructure Non-Labor Fixed Costs
f	1.5.3 Technical Support Office
	1.6 Core Information Assurance
l	1.6.1 IA Labor
f	1.6.2 IA Non-Labor Fixed Costs
l	1.7 Core Help Desk
	1.8 Core Configuration Management
l	1.8.1 Software Configuration Management
l	1.8.2 Non-Software Configuration Management
f	1.9 Core Database Maintenance
	1.10 Quality Assurance and Process Improvement
l	1.10.1 Quality Assurance Improvements
l	1.10.2 Process Improvements
l	1.11 Core Requirements Planning and EA
l	1.12 Core Systems Engineering
f	1.13 Deployment of Technical Refresh

2.0 Sustainment	
m	2.1 System Incident Reports (SIRs)
m	2.2 Trouble/Problem Reports (TPRs)
	2.3 System Change Requests (SCRs)
d	2.3.1 Internal Driven Change - Process Improvement (OI)
d	2.3.2 Interface/Trading Partner Change (OM)
d	2.3.3 External Mandate Driven Change (OM)
d	2.3.4 Technical Refresh Driven Change (OM)
d	2.3.5 Service Driven Minor Upgrade in Design (OM)
d	2.3.6 Service Driven Minor Upgrade for New Rqmnt (OM)
m	2.4 Data Patch
m	2.5 ECRs
m	2.6 Other Sustainment Changes
	2.7 New Hardware
	2.8 New Commercial Software
	2.9 New Infrastructure
	2.10 New Information Assurance
	2.11 New Help Desk
	2.12 Database Support
	2.13 Configuration Management
	2.14 Project Scheduling Support
	2.15 Documentation and Training for SCRs
	2.16 Risk Management for SCRs
	2.17 Requirements Management for SCRs
	2.18 Data Architecture for SCRs
	2.19 Testing for SCRs
	2.19.1 Testing Labor
f	2.19.2 Testing Non-Labor Fixed Costs
	2.20 Remote Support

3.0 Development	
m	3.1 TPRs
	3.2 SCRs
d	3.2.1 Interface/Trading Partner Change (RDTE)
d	3.2.2 External Mandate Driven Change (RDTE)
d	3.2.3 Service Driven Major Upgrade in Design (RDTE)
d	3.2.4 Service Driven Major Upgrade for New Requireme
d	3.2.5 New Baseline Driven Major Upgrade (RDTE)
m	3.3 Other Development Changes
	3.4 New Hardware
	3.5 New Commercial Software
	3.6 New Infrastructure
	3.7 New Information Assurance
	3.8 New Help Desk
	3.9 Database Support
	3.10 Configuration Management
	3.11 Project Scheduling Support
	3.12 Documentation and Training for SCRs
	3.13 Risk Management for SCRs
	3.14 Requirements Management for SCRs
	3.15 Data Architecture for SCRs
	3.16 Testing for SCRs
	3.17 Remote Support

Purpose – Capture hours/costs, by project, that show the number of hours/costs by element #

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