

ACE

Accurate Confident Estimating

TSP Symposium
November 4, 2014
Pittsburgh, PA



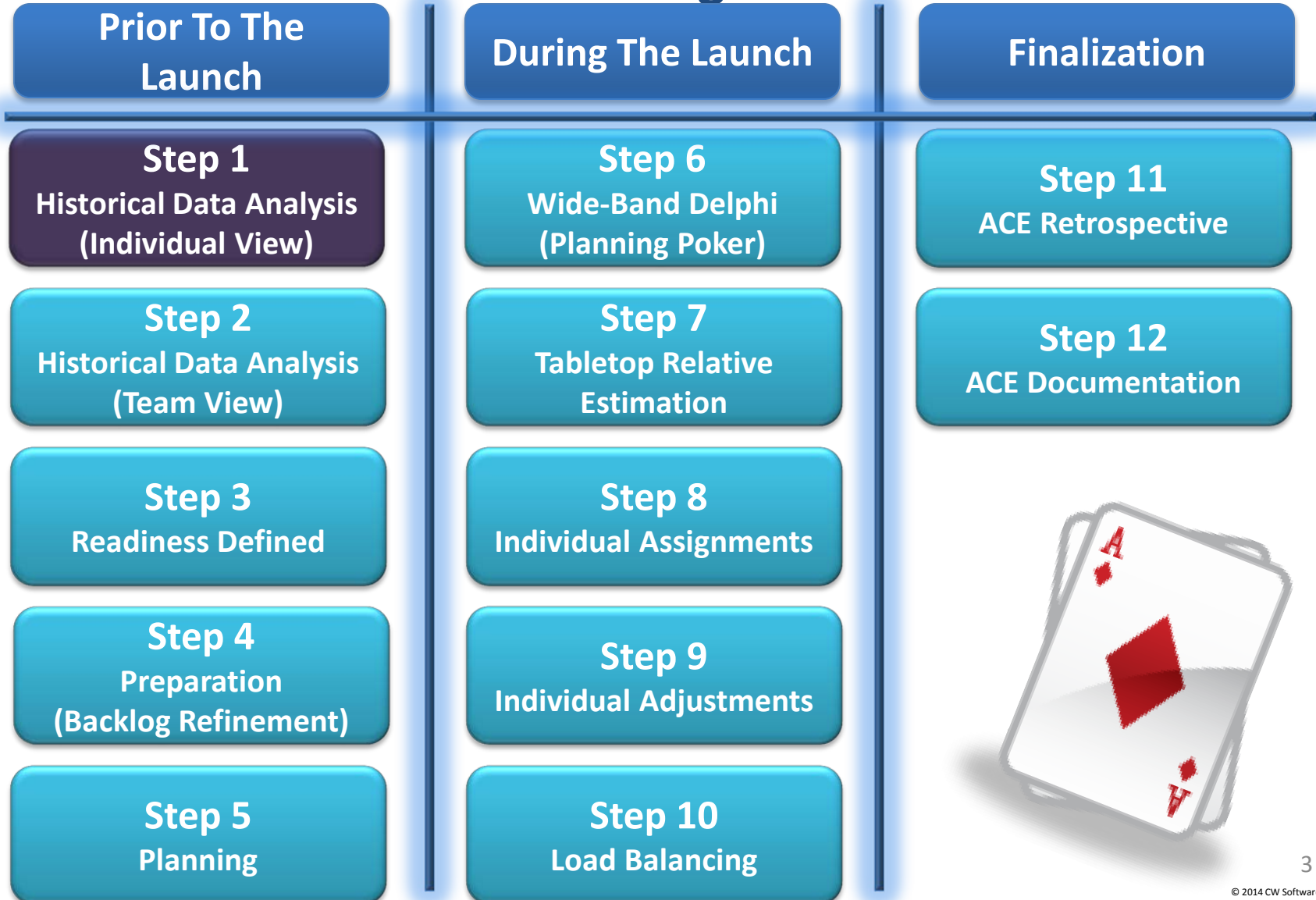
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Step 1

Historical Data Analysis (Individual View)

Software Component		Developer				
Measure	Actual	Estimated			Actual/Estimated	
Size (LOC)						
Time (Task Hours)						
Rate (LOC/Hour)						

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity						
Software Interactions						
Hardware Interactions						
Number of Iterations						

Experience Factor						
Familiarity/Specific Experience In This Area						
Development Environment Experience						

Comments (Assumptions/Retrospective Thoughts)

Step 1

Historical Data Analysis (Individual View)



XYZ Control Software

Asha

Measure	Actual	Estimated	Actual/Estimated
Size (LOC)	450	420	1.07
Time (Task Hours)	78	60	1.30
Rate (LOC/Hour)	5.77	7.00	0.82

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity		✓				
Software Interactions		✓				
Hardware Interactions		✓				
Number of Iterations			✓			

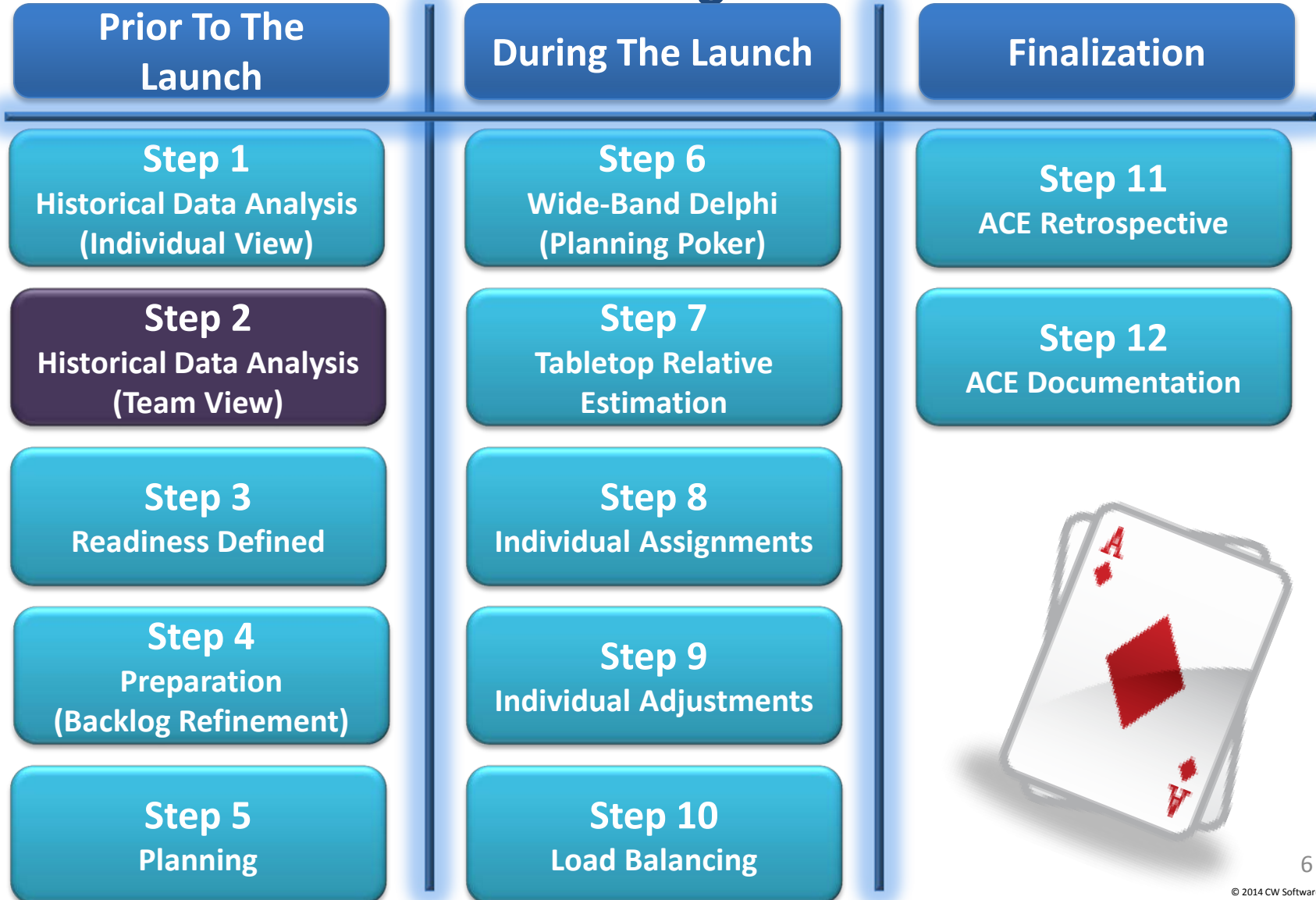
Experience Factor						
Familiarity/Specific Experience In This Area		✓				
Development Environment Experience	✓					

Comments (Assumptions/Retrospective Thoughts)

Component was more complex than expected. There were more interactions and iterations with HW than expected.

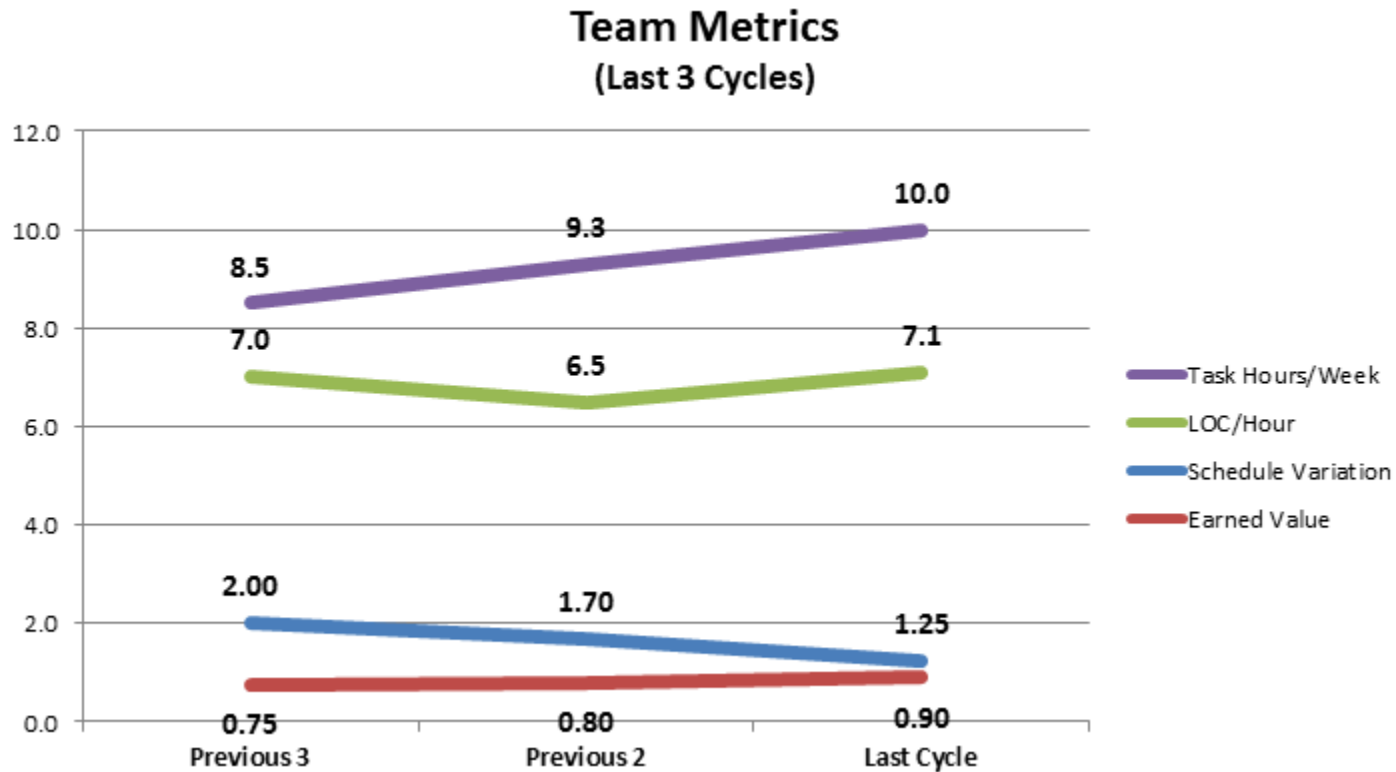
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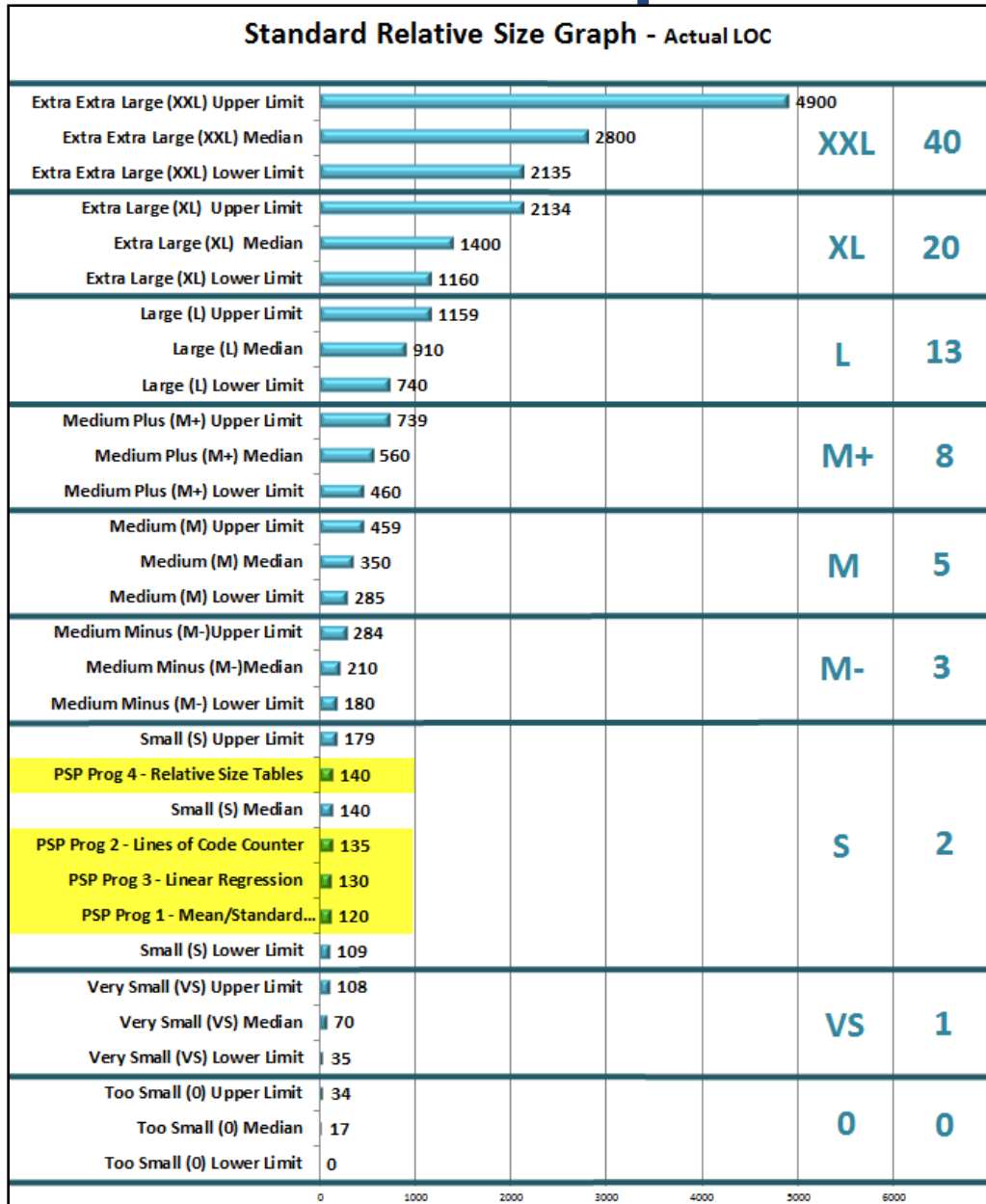


Step 1

Historical Data Analysis (Team View)

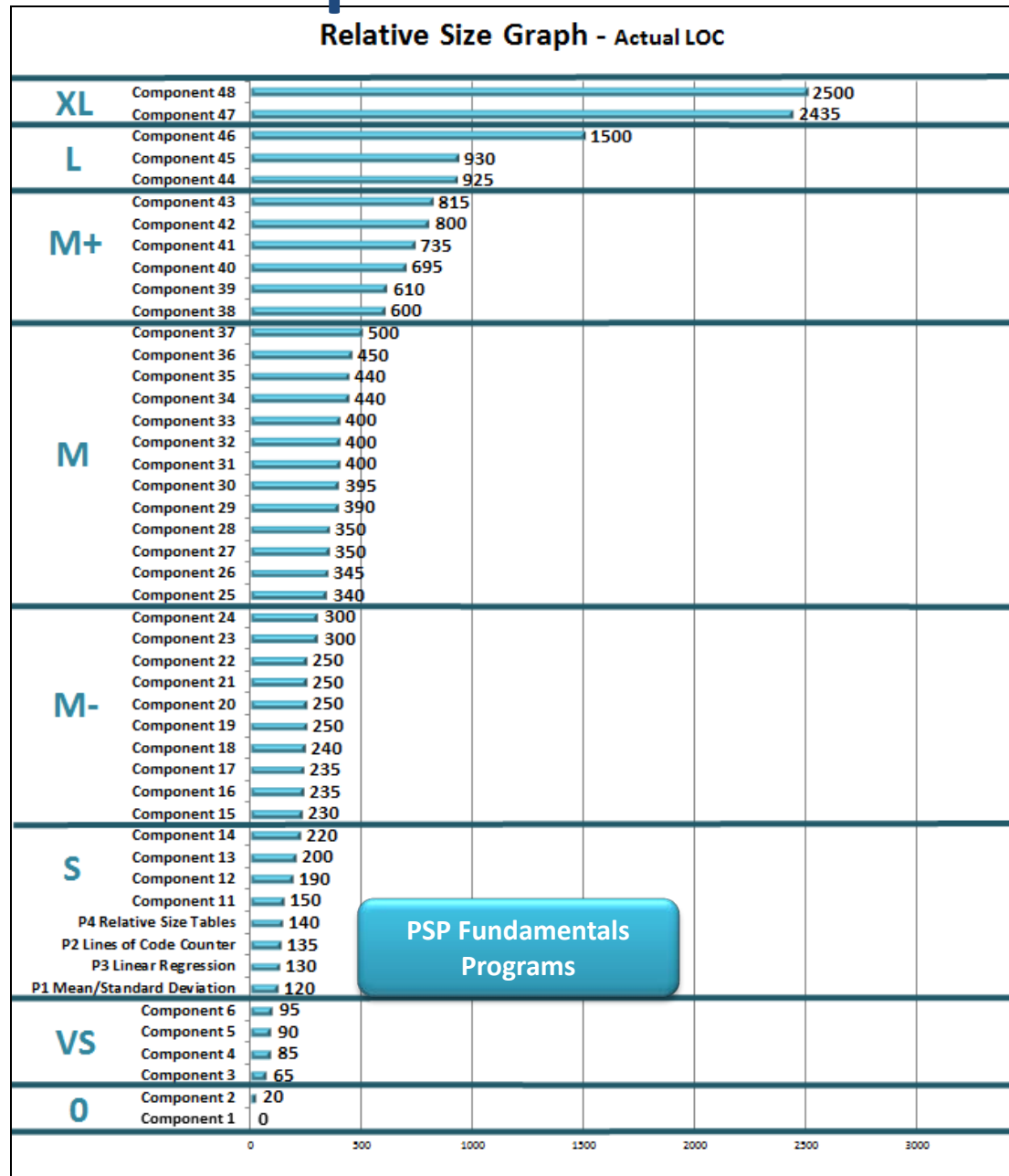


Relative Size Graph – PSP Data Only



Standardized Relative Size Categories			
	Lower	Median	Upper
XXL	2135	2800	4900
XL	1160	1400	2134
L	740	910	1159
M+	460	560	739
M	285	350	459
M-	180	210	284
S	109	140	179
VS	35	70	108
0	0	17	34

Relative Size Graph



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Definition of “Ready” Developed

[illegible]

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Preparation (Backlog Refinement)

Preparation Checklist

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Step 5

Planning

Planning Checklist



1. Ensure the Launch Plan has adequate time for Team Estimating

	New Teams	Experienced Teams
Large Teams (4+)	7 – 10 minutes/item	5 to 7 minutes/item
Small Teams (2-3)	5 to 7 minutes/item	5 minutes/item



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Step 6

Wide-Band Delphi Session (Planning Poker)



Round	VS	S	M-	M	M+	L	XL
1							
2							
3							
4							
5							



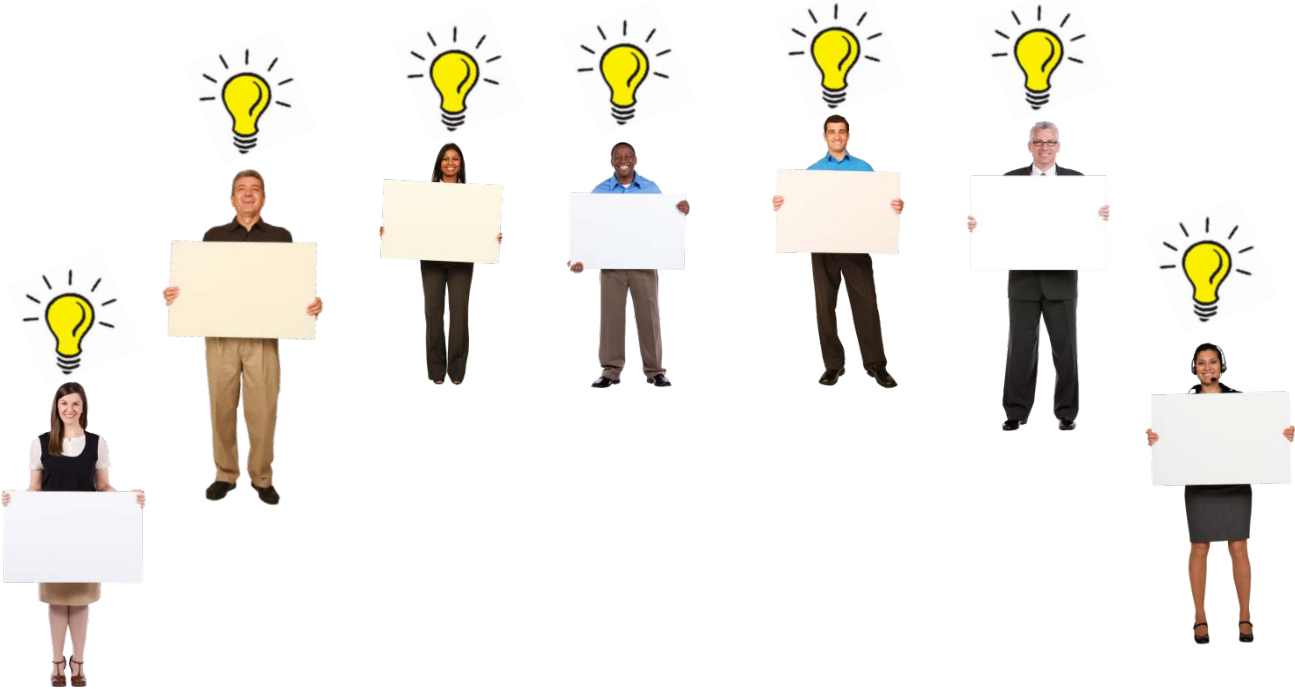
Round	VS	S	M-	M	M+	L	XL
1							
2							
3							
4							
5							



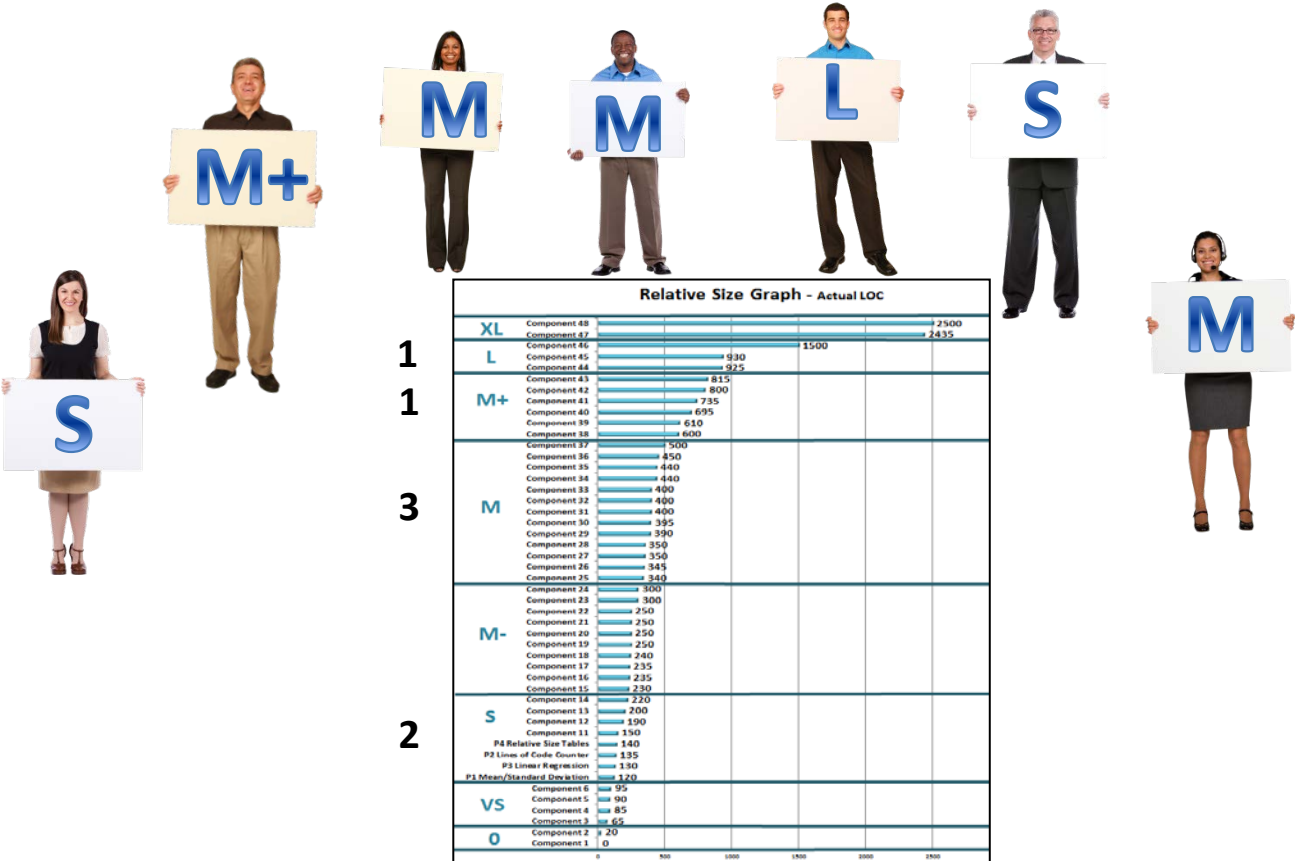
Round	VS	S	M-	M	M+	L	XL
1							
2							
3							
4							
5							



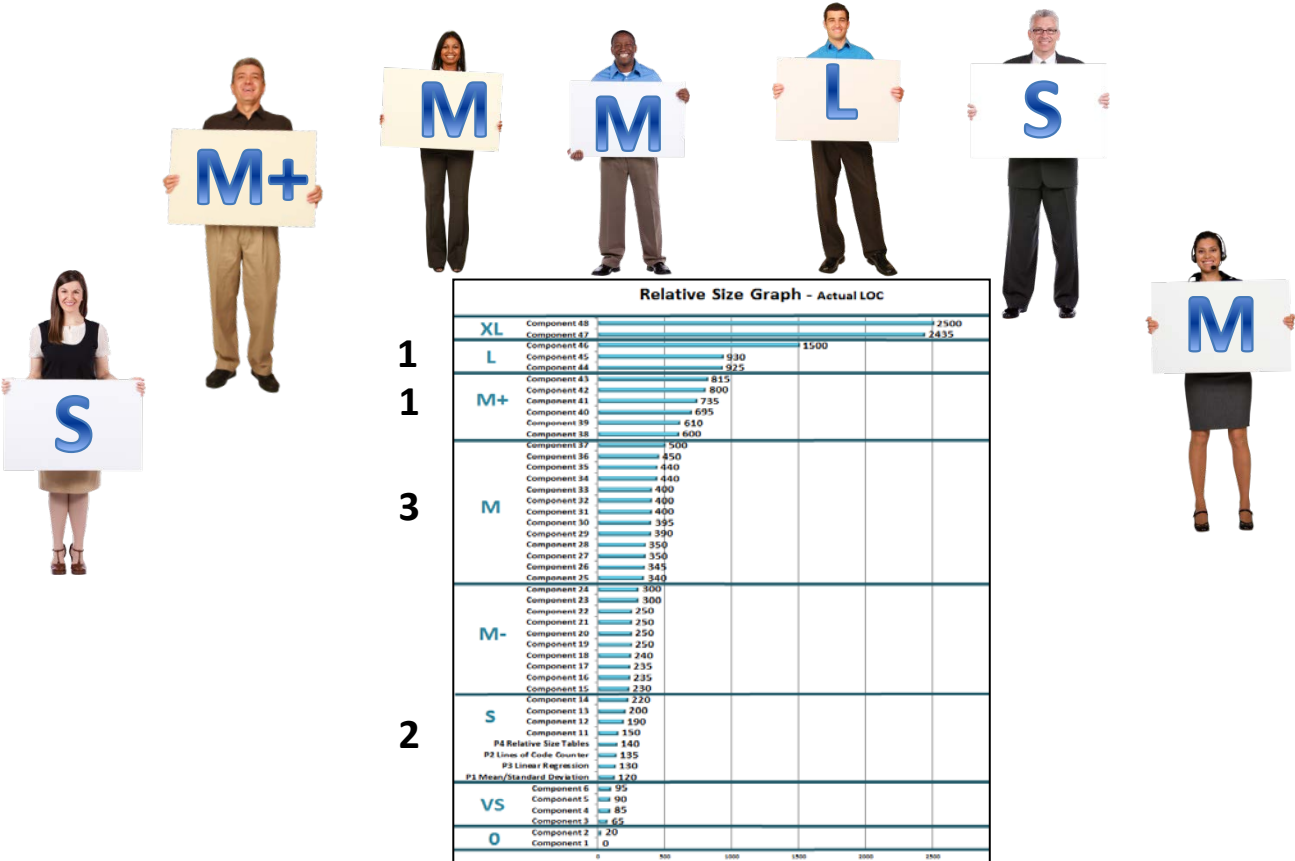
Round	VS	S	M-	M	M+	L	XL
1							
2							
3							
4							
5							



Round	VS	S	M-	M	M+	L	XL
1							
2							
3							
4							
5							



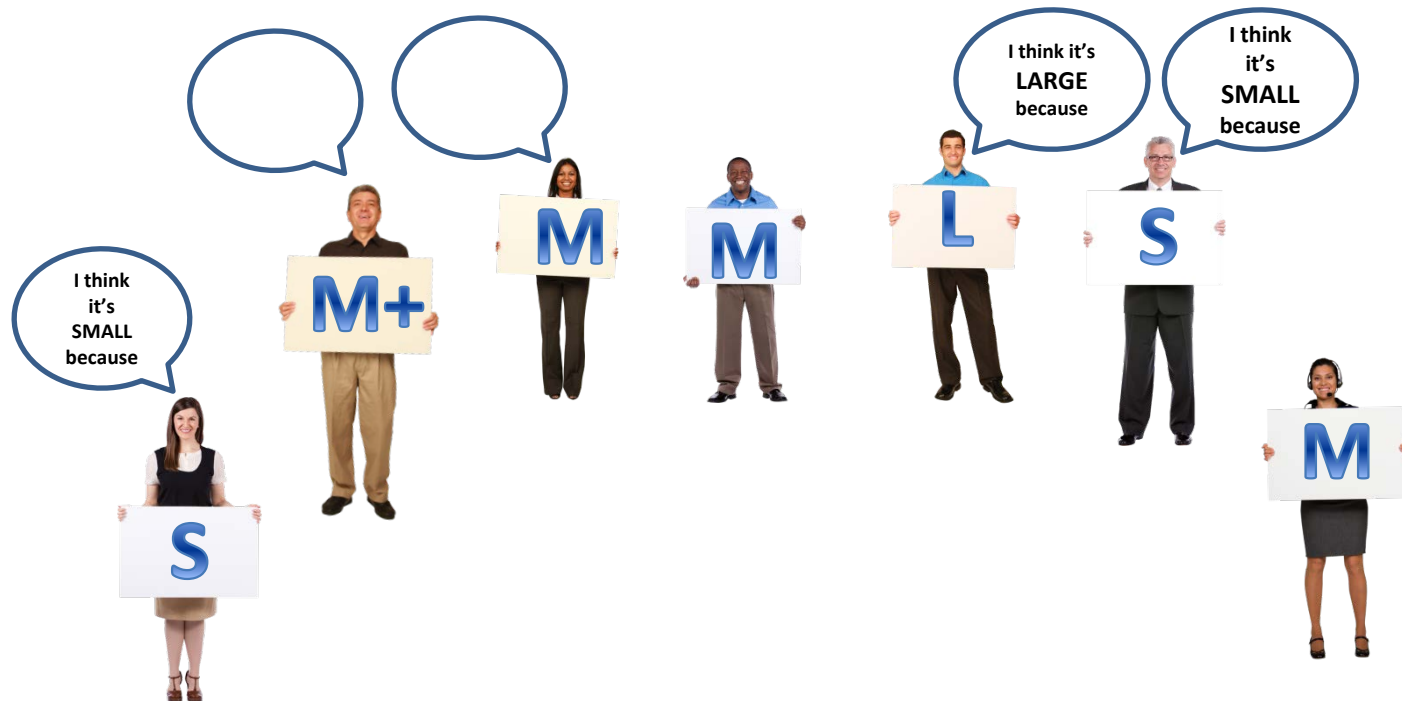
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							

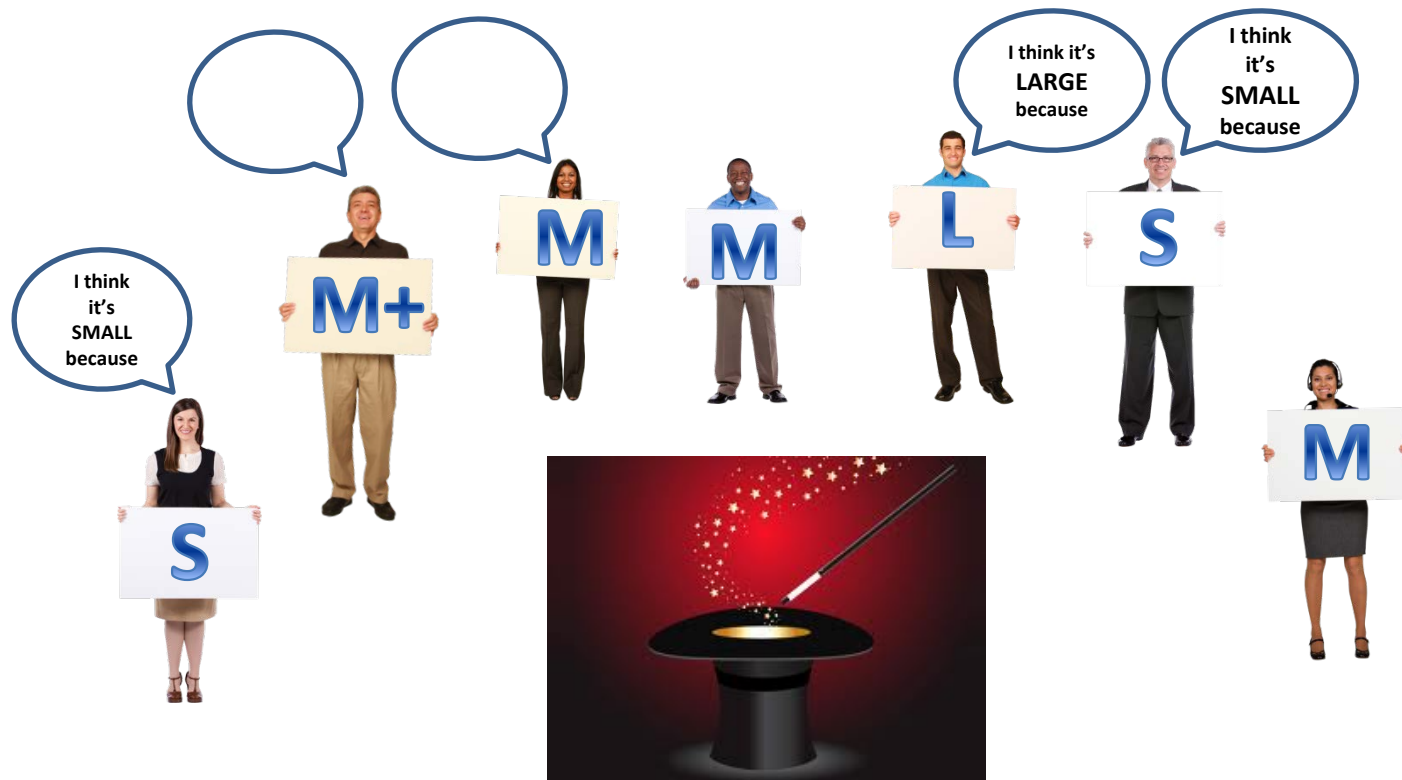


2 Minutes



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							

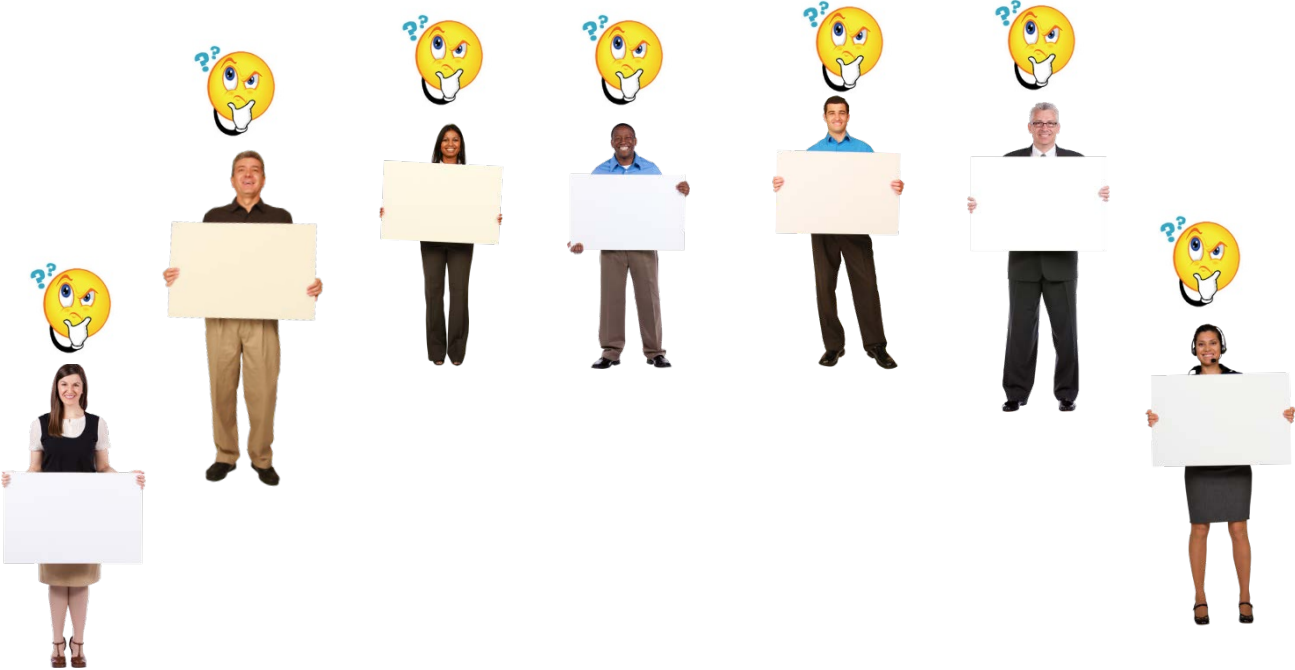
The "OH" Process



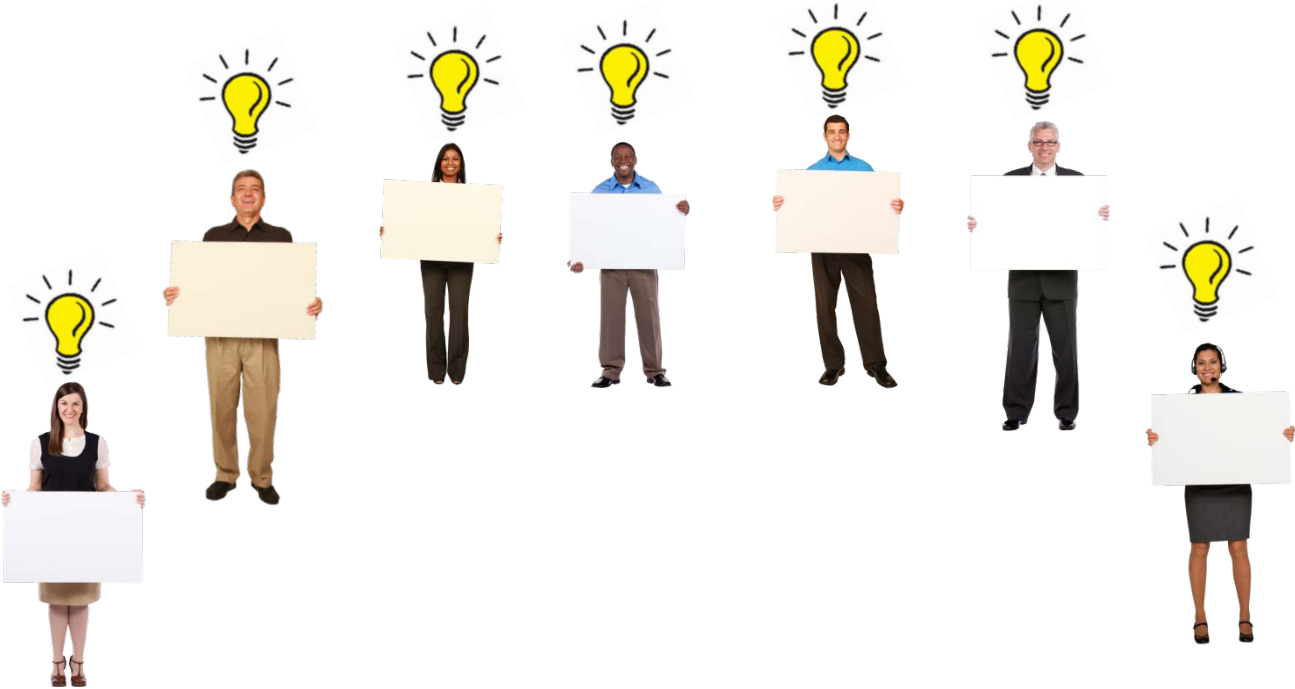
Here's The Real Magic!!!

Reaching Agreement On What The Item Is!!!

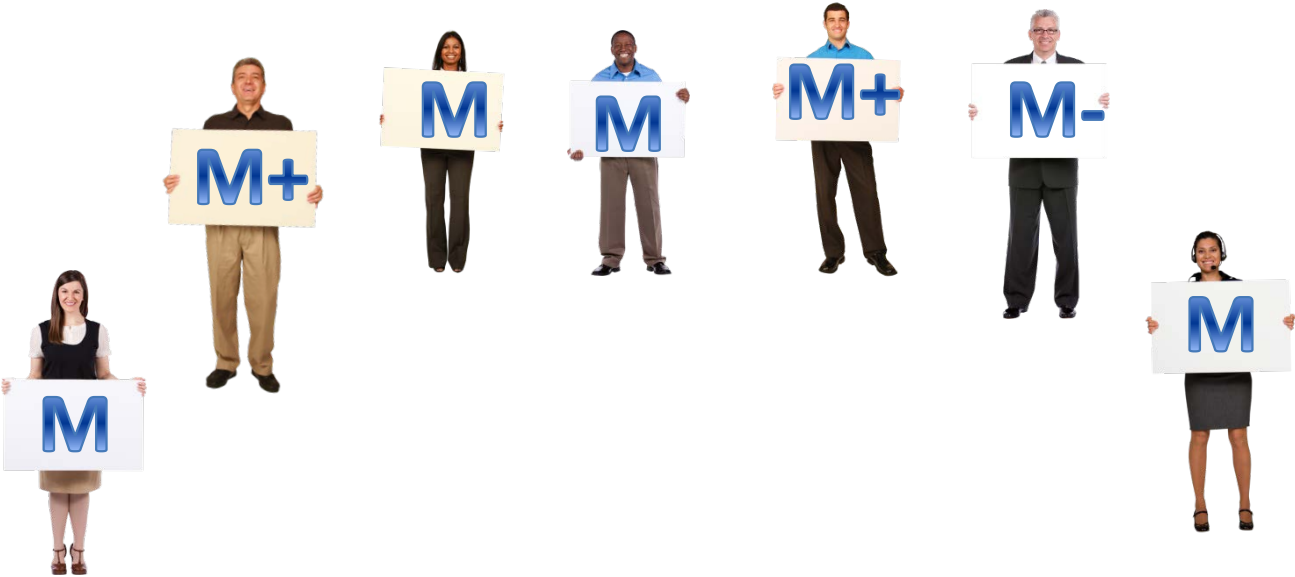
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							



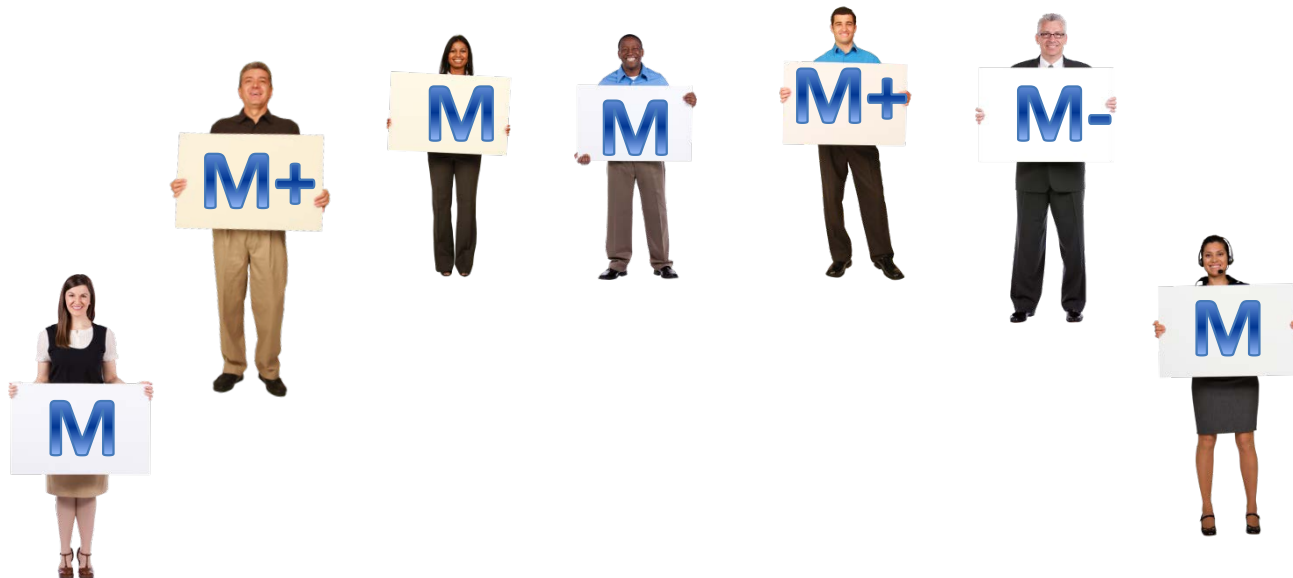
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2							
3							
4							
5							



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3							
4							
5							



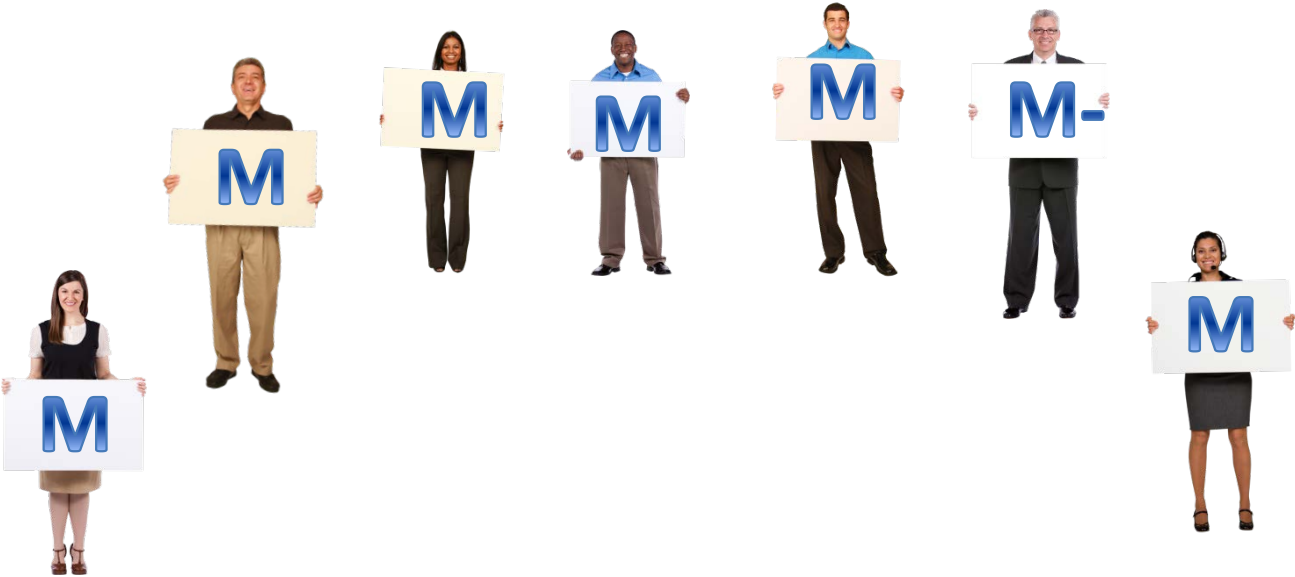
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3							
4							
5							



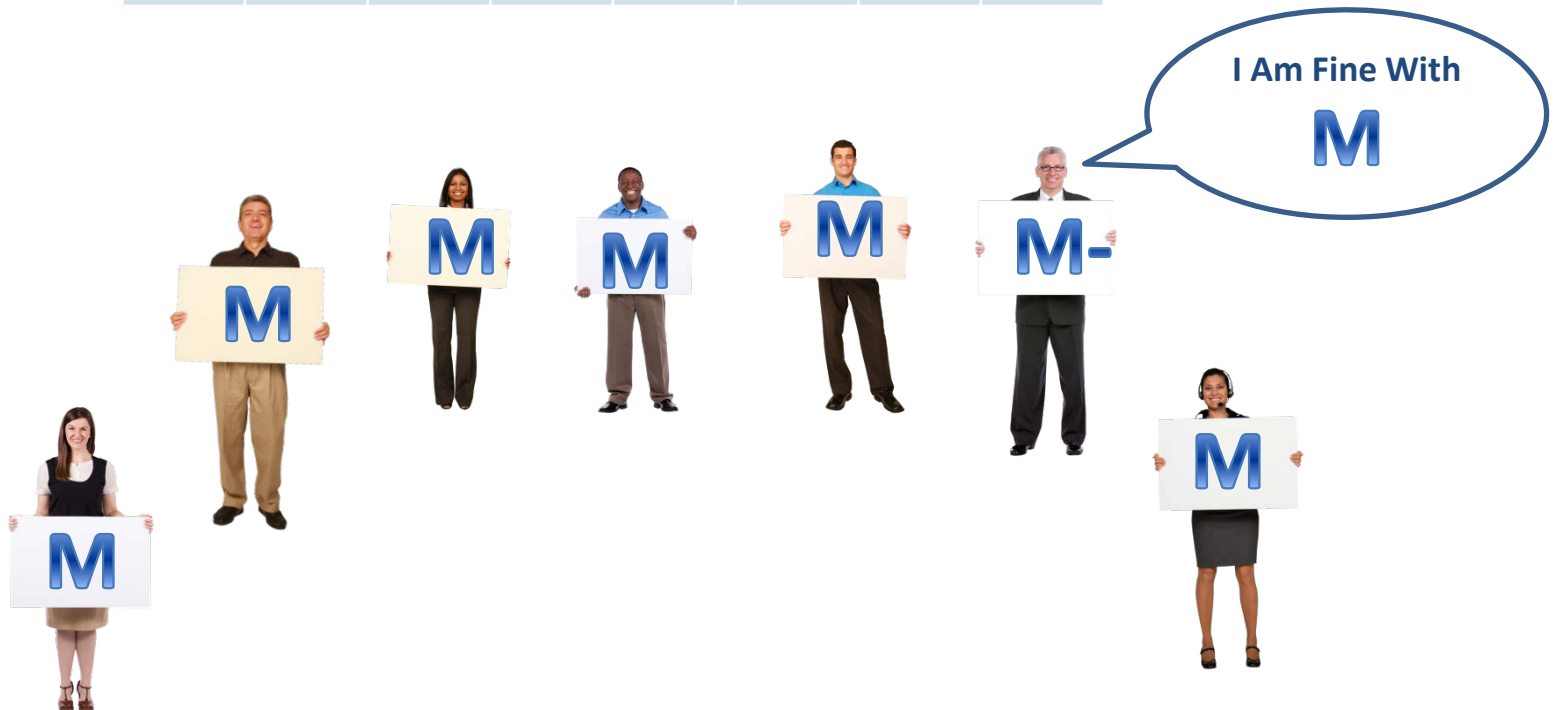
2 Minutes



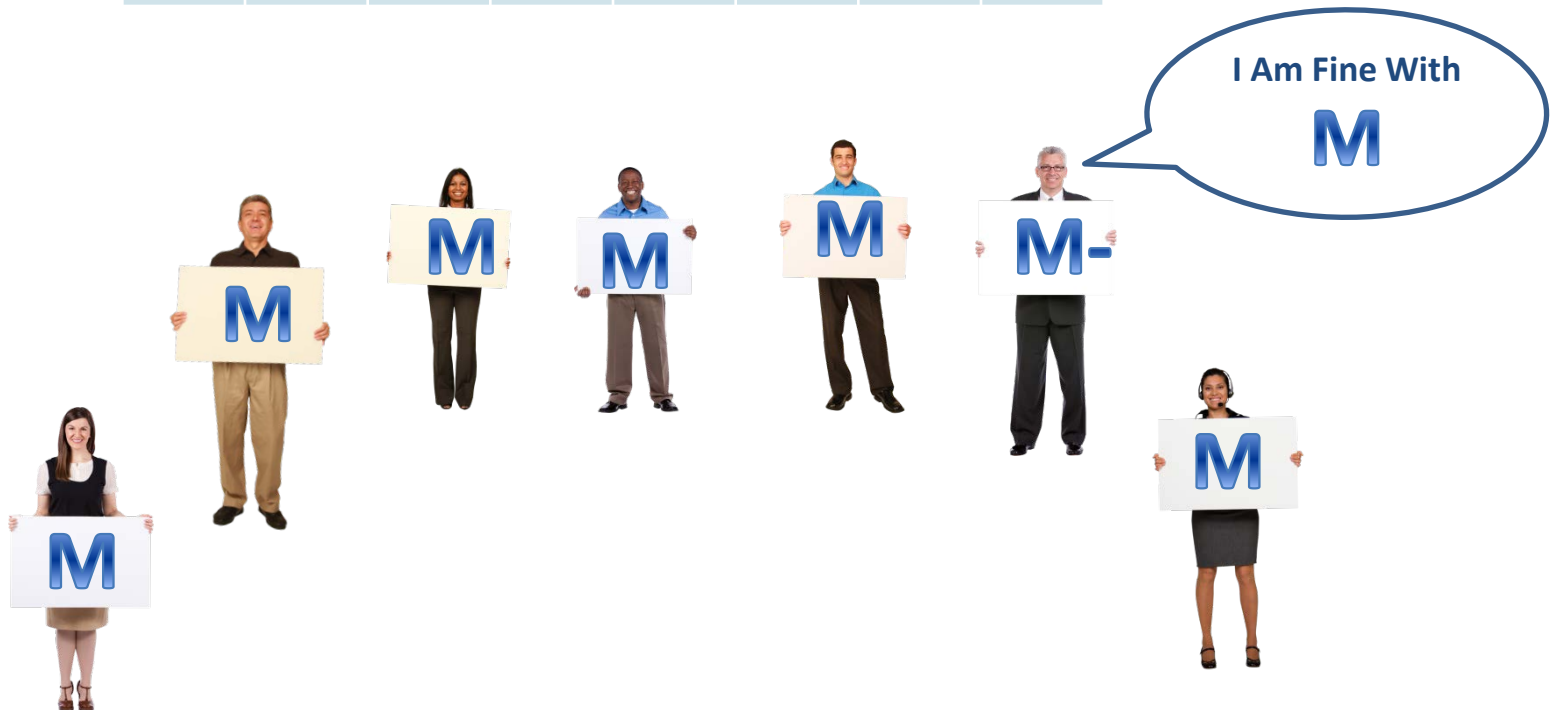
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3							
4							
5							



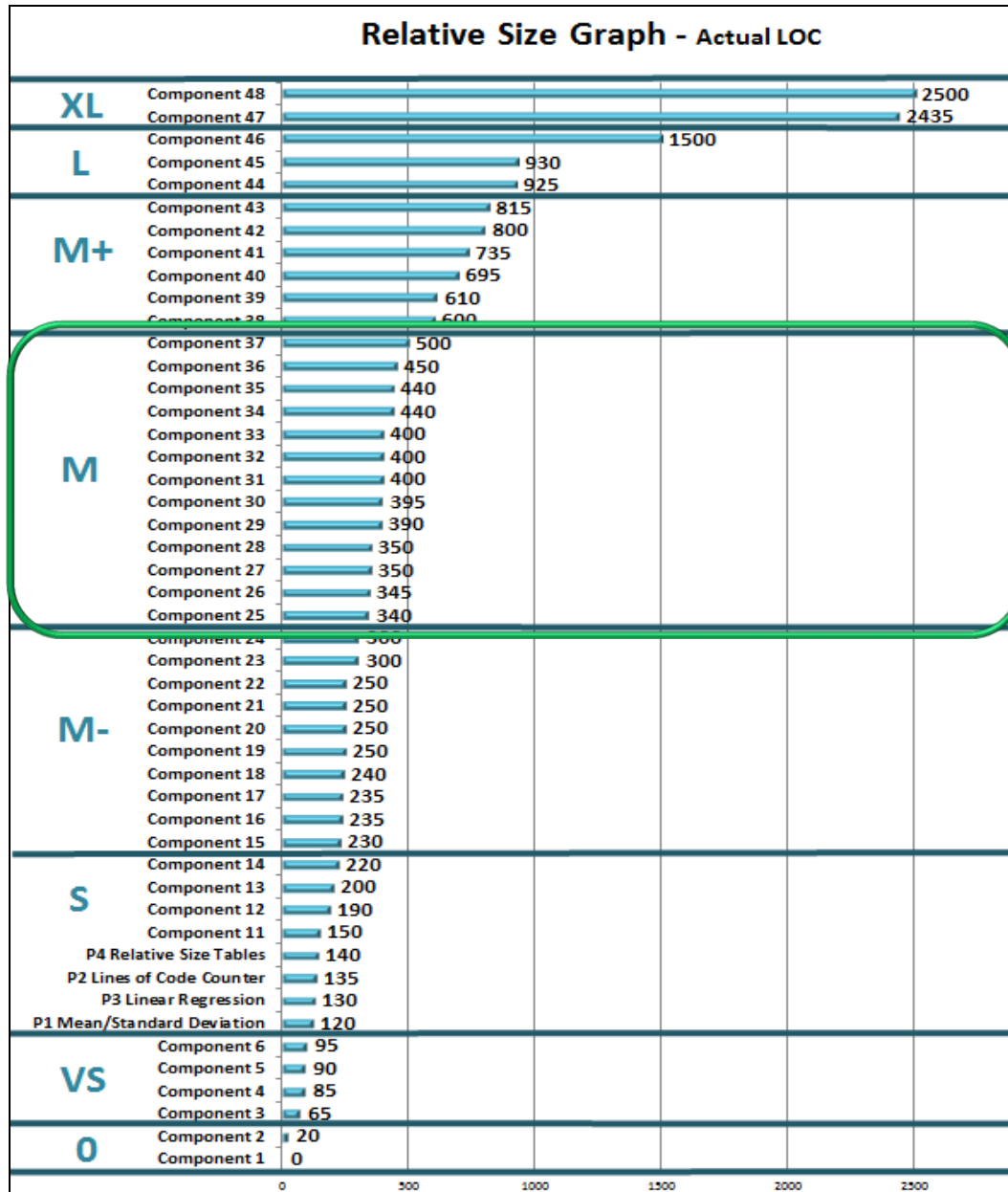
Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3			1	6			
4							
5							



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3			1	6			
4				7			
5							



Relative Size Graph



	Lower	Median	Upper
XL	2435	2468	2500
L	925	930	1500
M+	600	735	815
M	340	400	500
M-	230	250	300
S	120	145	220
VS	65	88	95
O	0	10	20



Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3			6	1			
4				7			
5							
6							
7							

Is everyone fine if we use the **MEDIAN** value for now?

Yes

Yes

OK

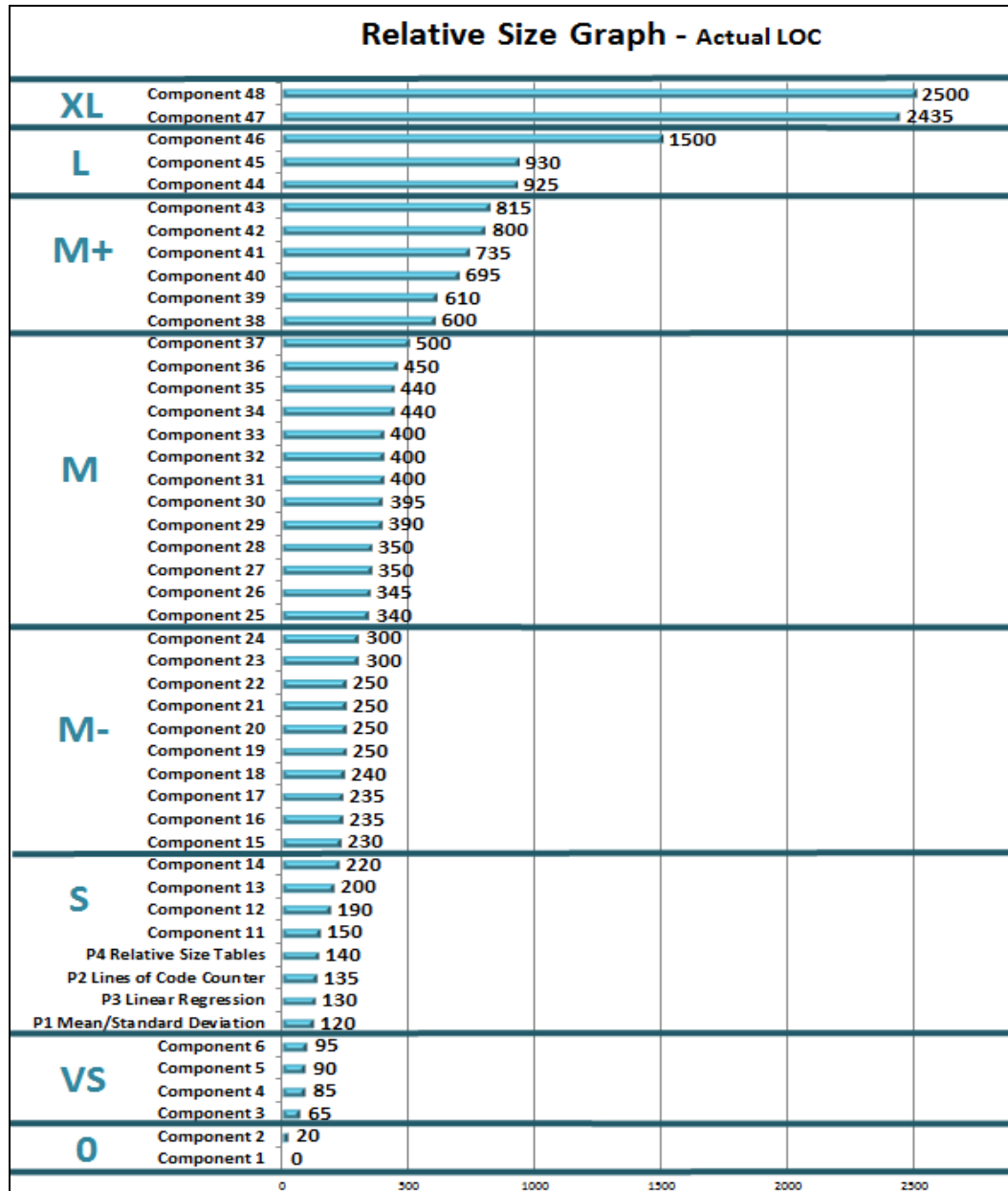
Sure

Yes

Yes

	Lower	Median	Upper
XL	2435	2468	2500
L	925	930	1500
M+	600	735	815
M	340	400	500
M-	230	250	300
S	120	145	220
VS	65	88	95
O	0	10	20

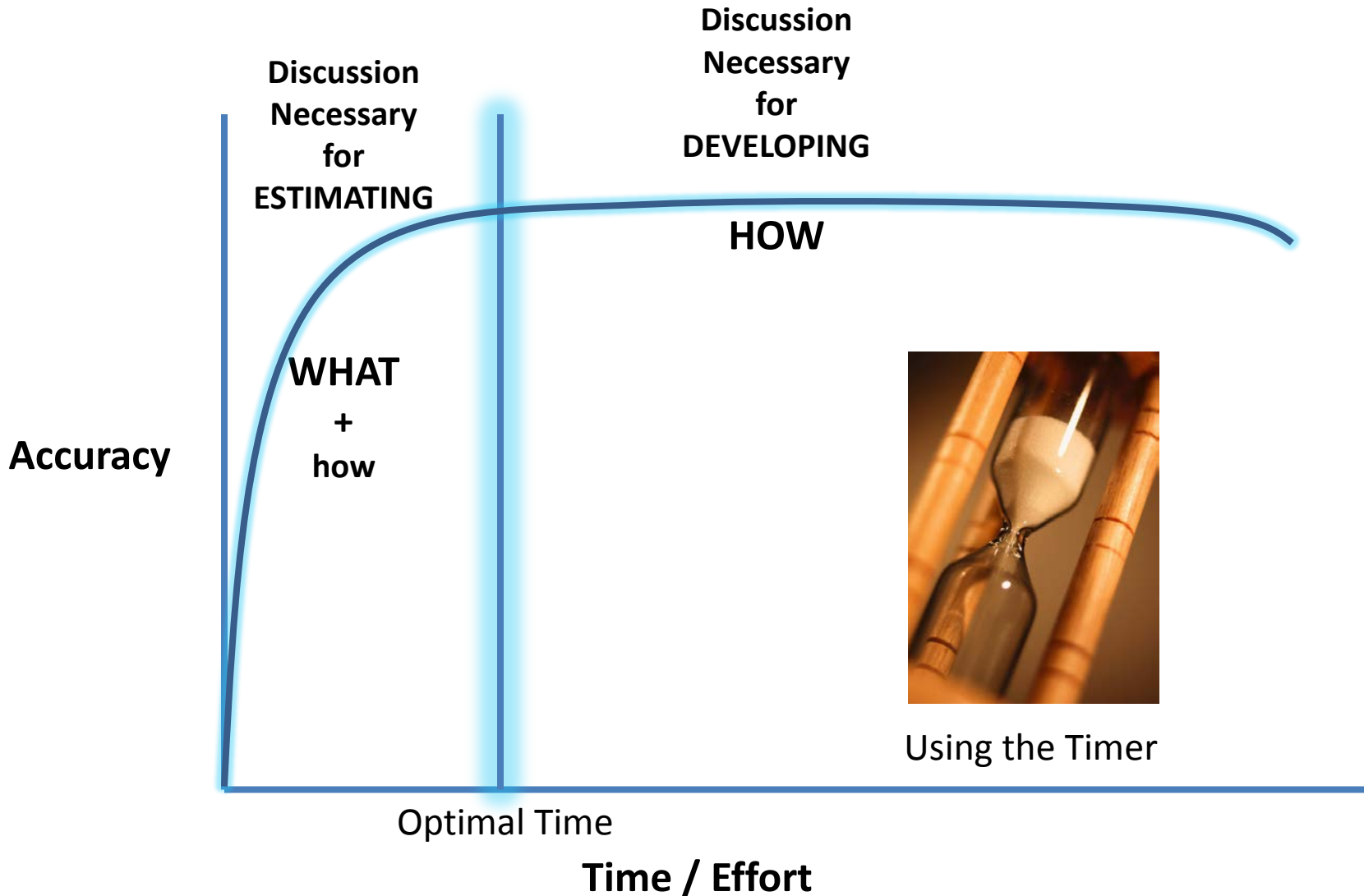
Relative Size Graph



New 1 (400)

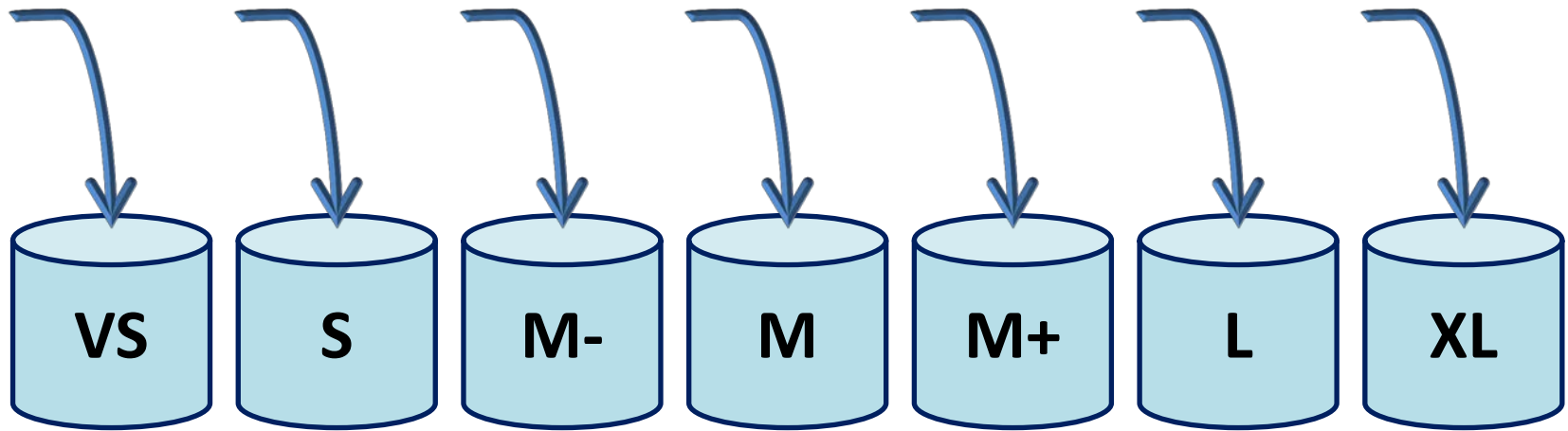
	Lower	Median	Upper
XL	2435	2468	2500
L	925	930	1500
M+	600	735	815
M	340	400	500
M-	230	250	300
S	120	145	220
VS	65	88	95
O	0	10	20

How Much Discussion?



How Much Discussion?

Enough to place the item in the RIGHT CATEGORY

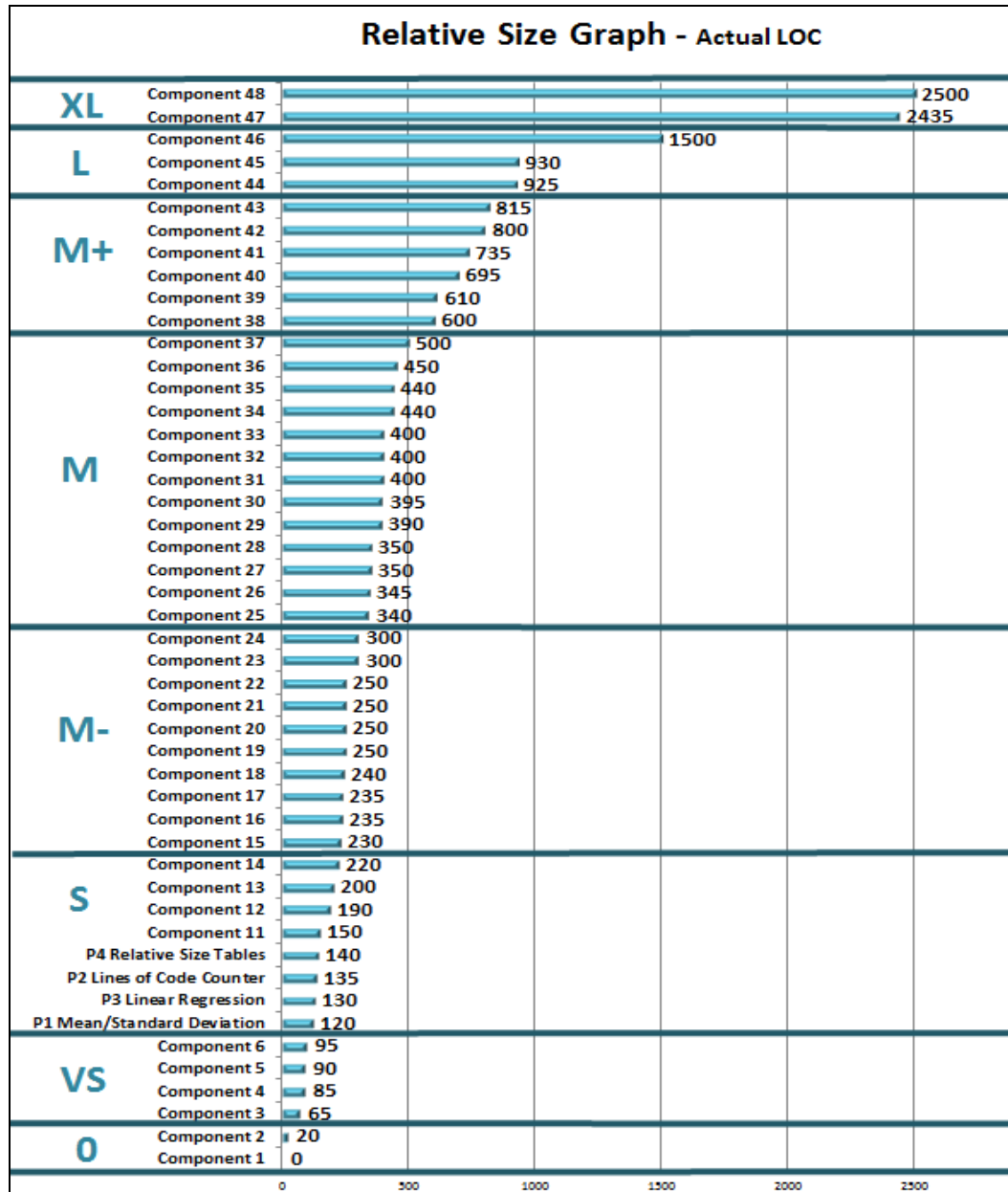


Round	VS	S	M-	M	M+	L	XL
1		2		3	1	1	
2			1	4	2		
3			1	6			
4				7			
5							



- Everyone Participates
- Brings Together Expert Opinions
- Great Discussions Occur
- Agreement
- More Accurate Estimates
- Higher Confidence
- Enjoyable Process

Relative Size Graph



New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (400)

New 2 (340)

New 6 (340)

New 11 (300)

New 4 (250)

New 9 (250)

New 10 (220)

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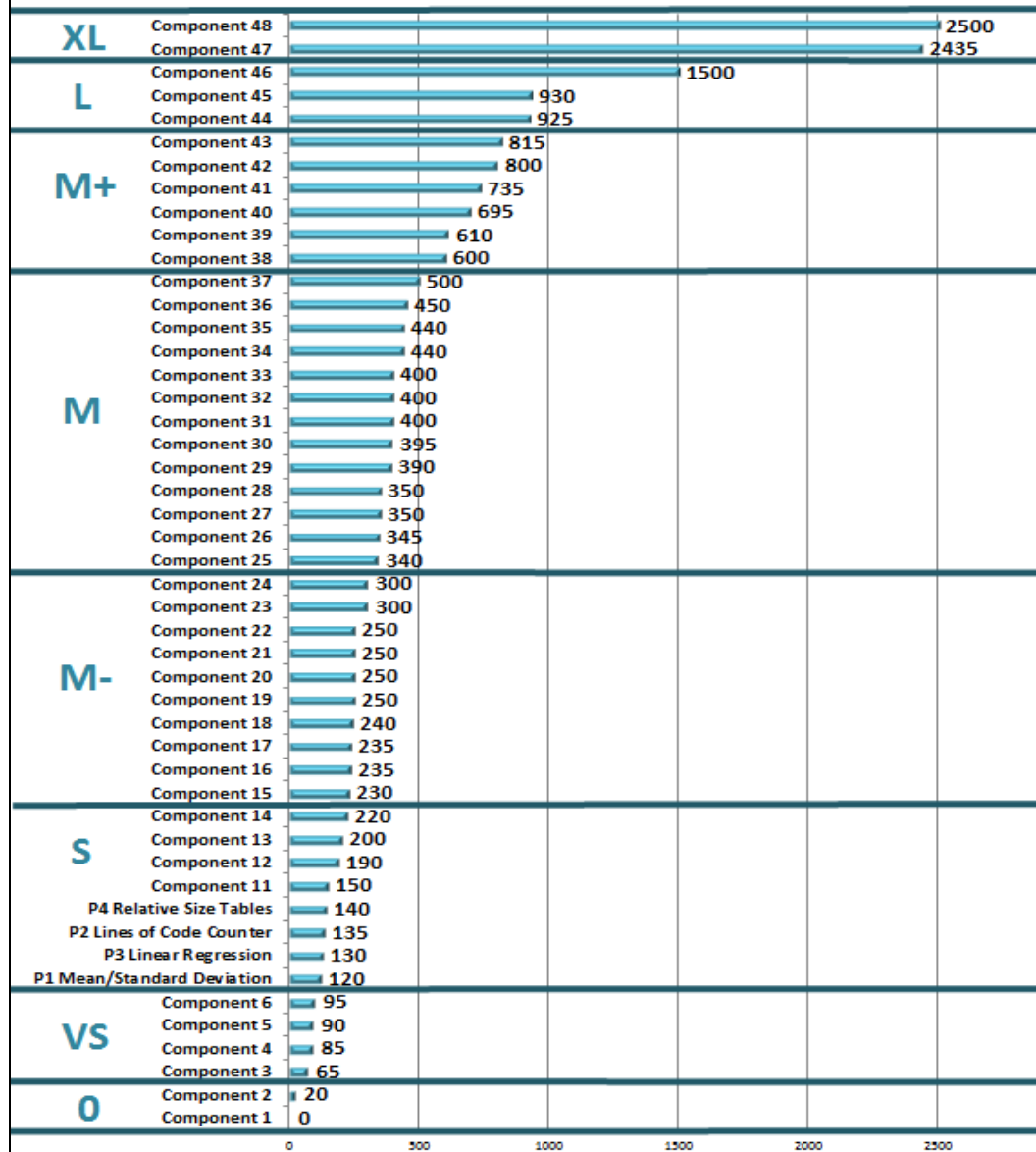
Accurate Confident Estimating



Relative Size Graph



Relative Size Graph - Actual LOC



New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (400)

New 2 (340)

New 6 (340)

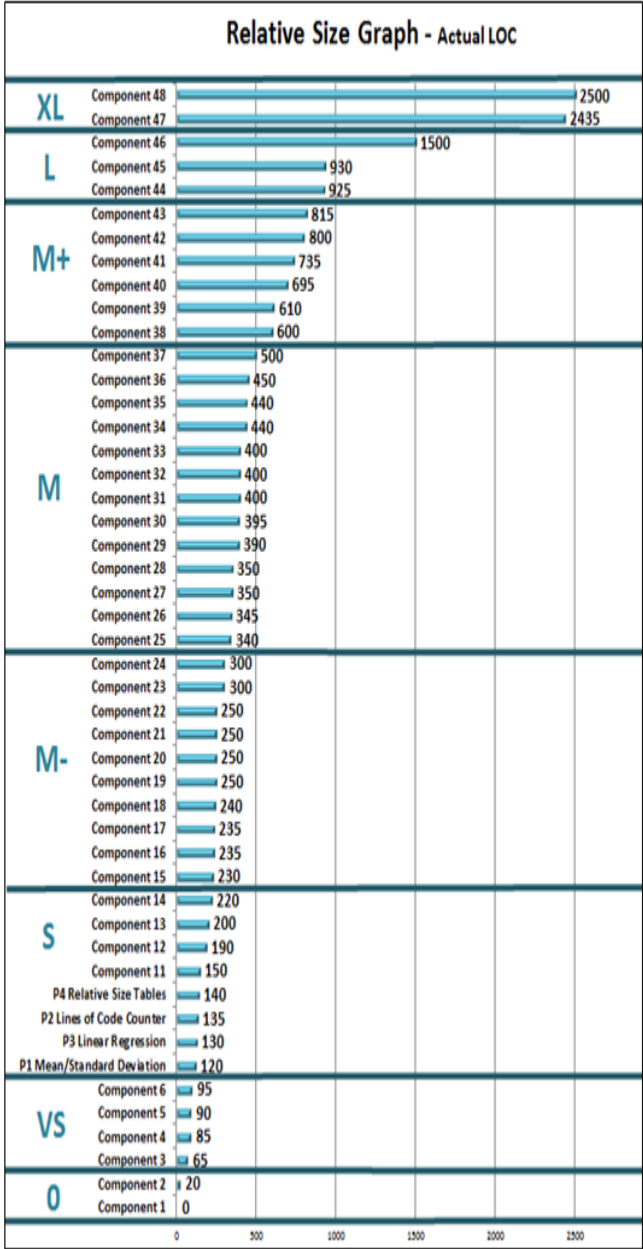
New 11 (300)

New 4 (250)

New 9 (250)

New 10 (220)

Relative Size Graph



New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (400)

New 2 (340)

New 6 (340)

New 11 (300)

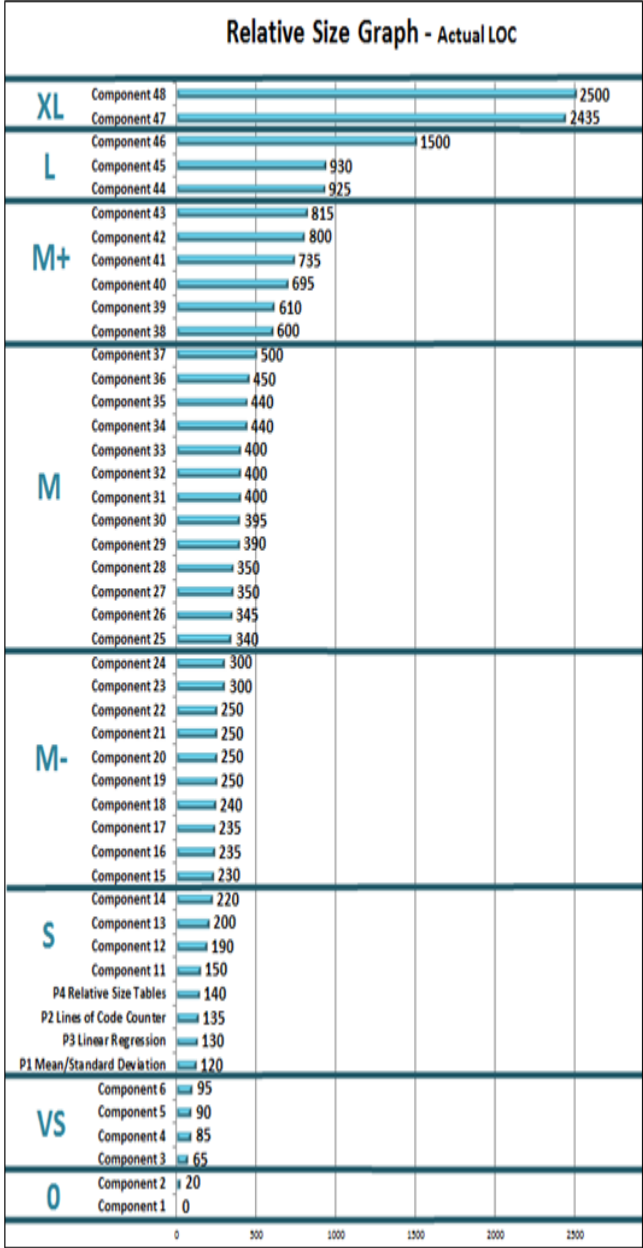
New 4 (250)

New 9 (250)

New 10 (220)



Relative Size Graph



Now that I see all of the new components together, I think New Component 7 will actually be larger, maybe 500 LOC

New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (400)

New 2 (340)

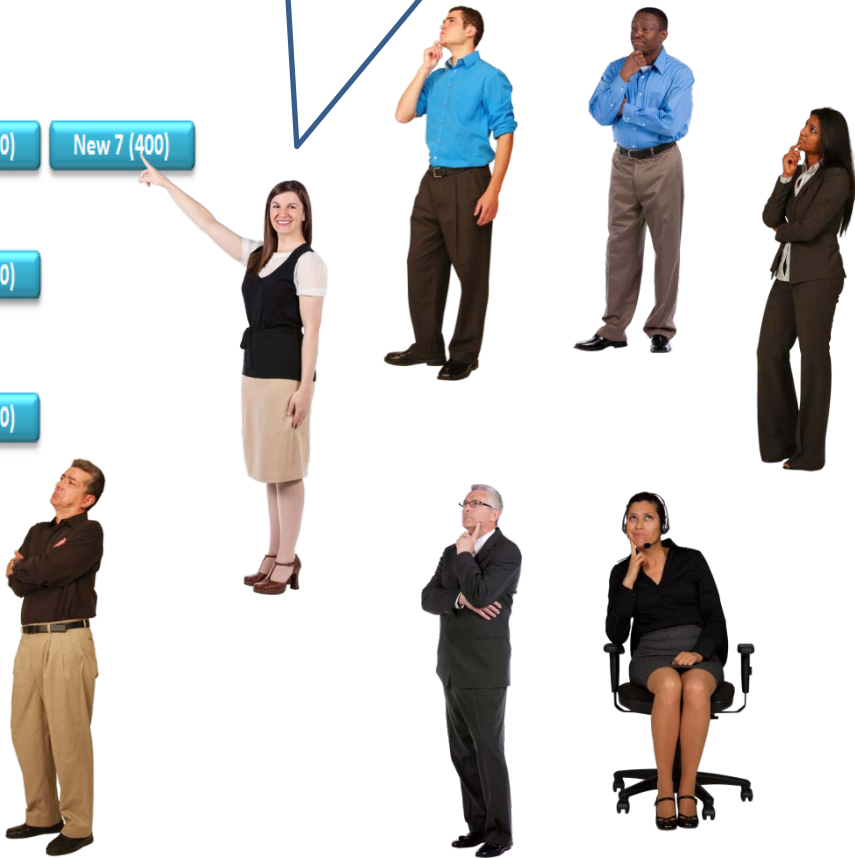
New 6 (340)

New 11 (300)

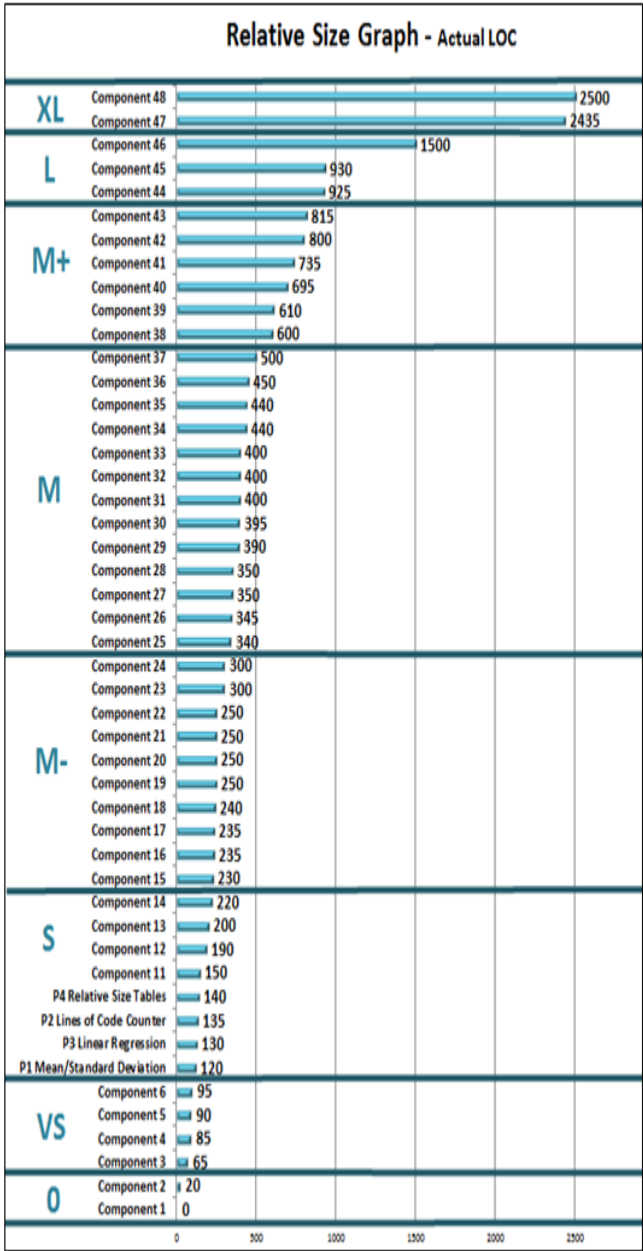
New 4 (250)

New 9 (250)

New 10 (220)



Relative Size Graph



New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (400)

New 2 (340)

New 6 (340)

New 11 (300)

New 4 (250)

New 9 (250)

New 10 (220)

Yes, let's move it

I think you are right

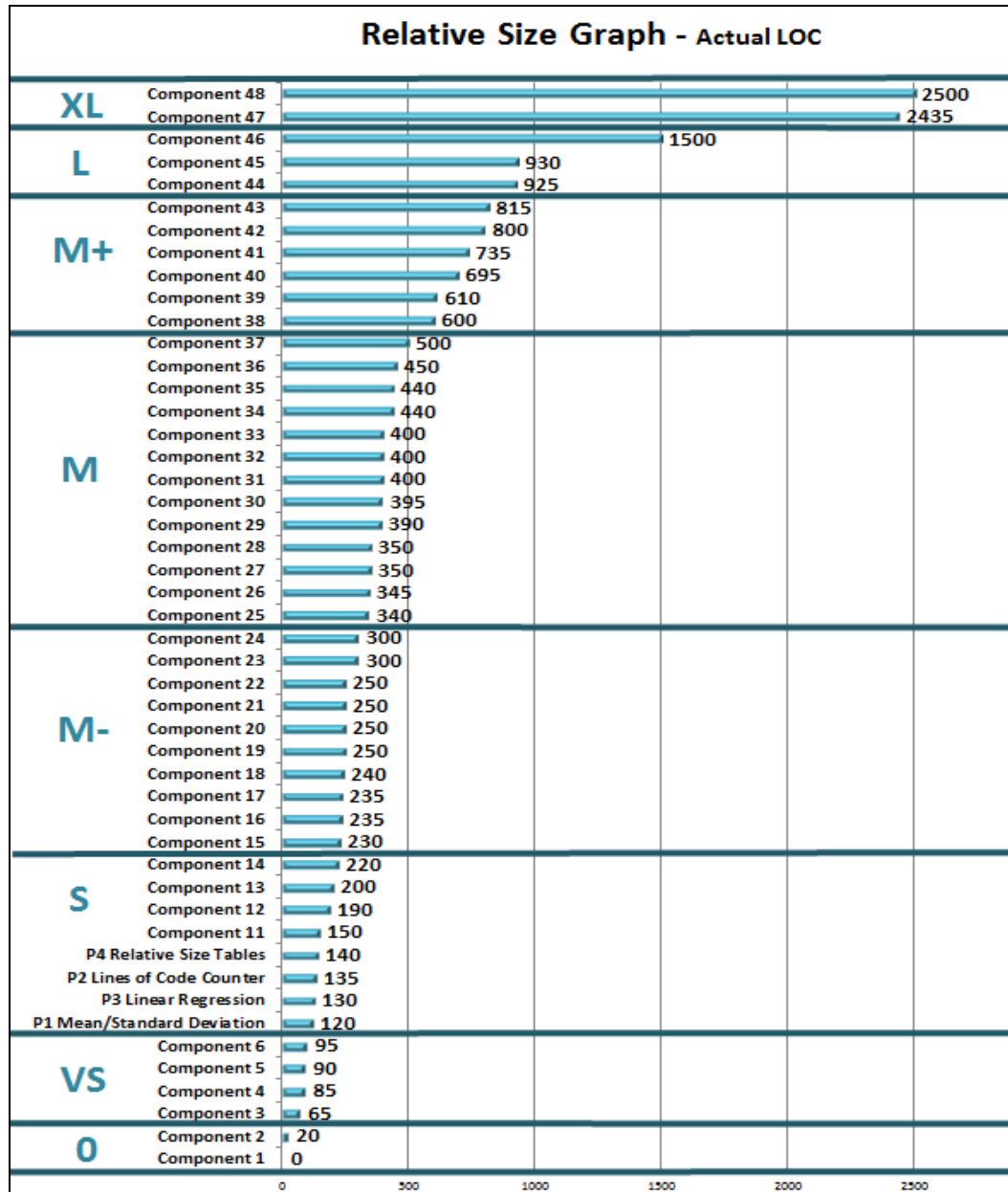
I agree

I agree

Yes

Agreed

Relative Size Graph



New 8 (930)

New 3 (500)

New 1 (400)

New 5 (400)

New 7 (500)

New 2 (340)

New 6 (340)

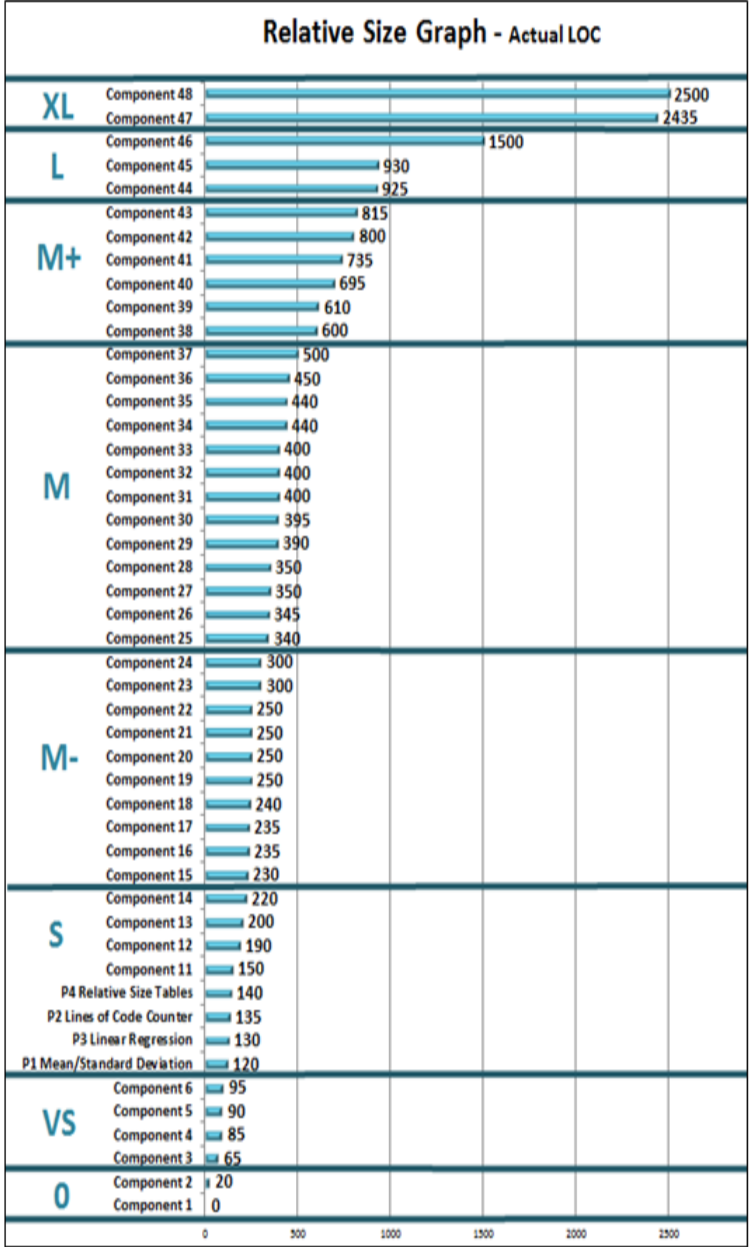
New 11 (300)

New 4 (250)

New 9 (250)

New 10 (220)

Relative Size Graph



New 8 (930)

New 3 (500)

New 1 (400)

New 2 (340)

New 11 (300)

New 4 (250)

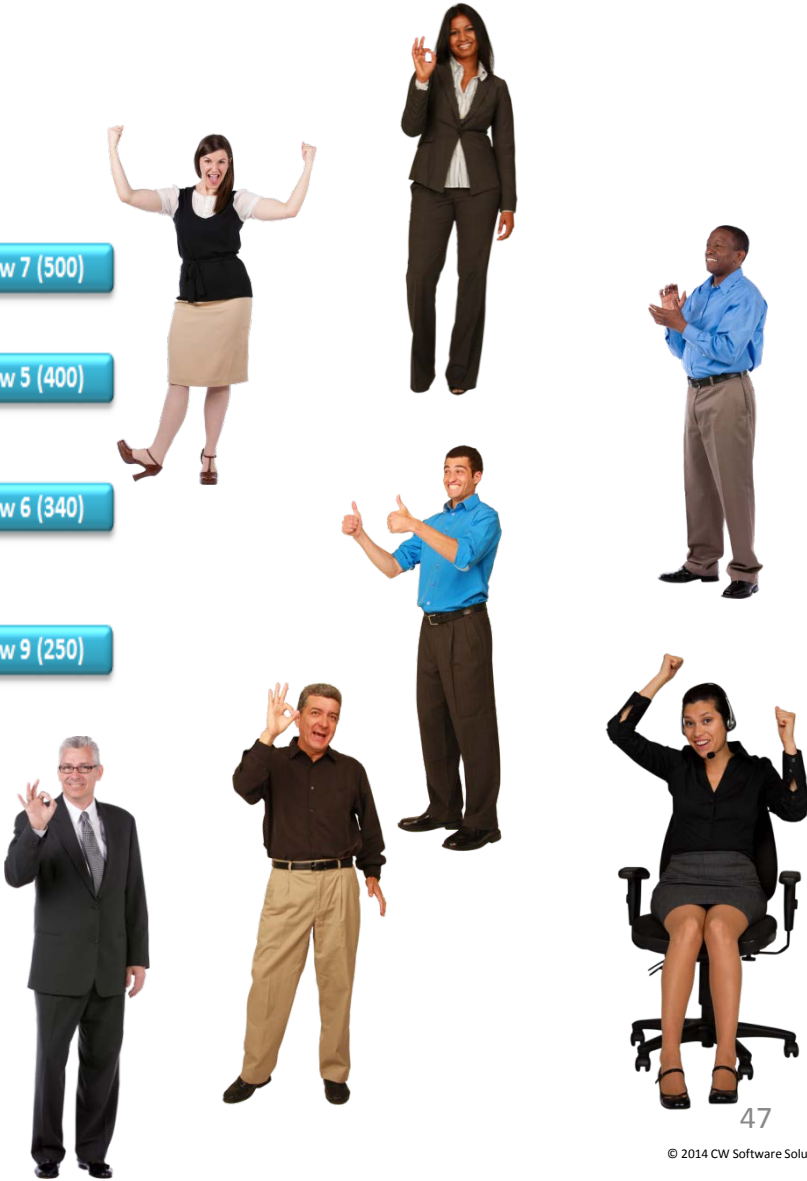
New 10 (220)

New 7 (500)

New 5 (400)

New 6 (340)

New 9 (250)



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Step 8

Individual Assignments

New 11 (300)

New 4 (250)



New 8 (930)



New 2 (340)

New 3 (500)



New 6 (340)



New 10 (220)



New 7 (400)

New 1 (400)



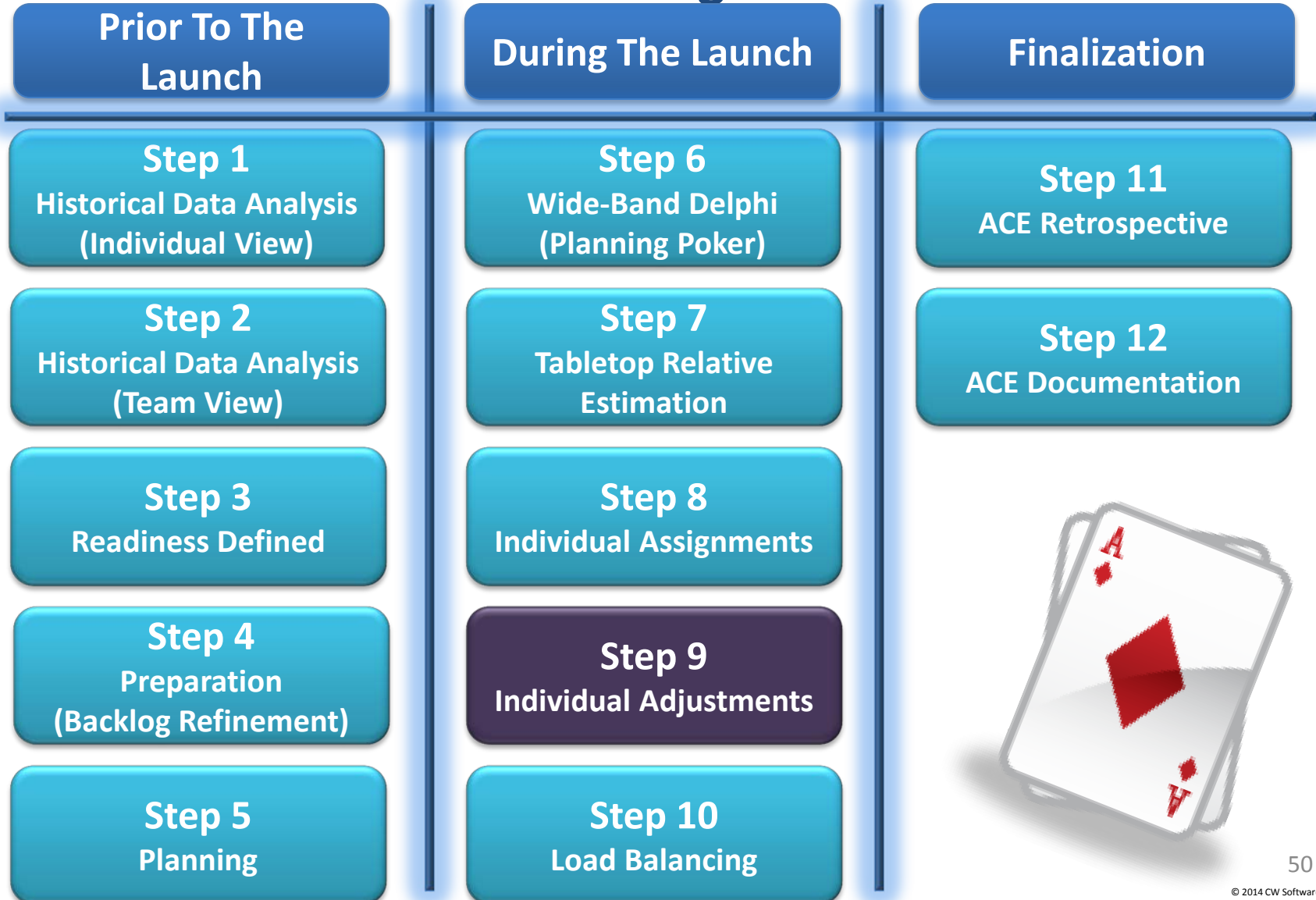
New 5 (400)

New 9 (250)



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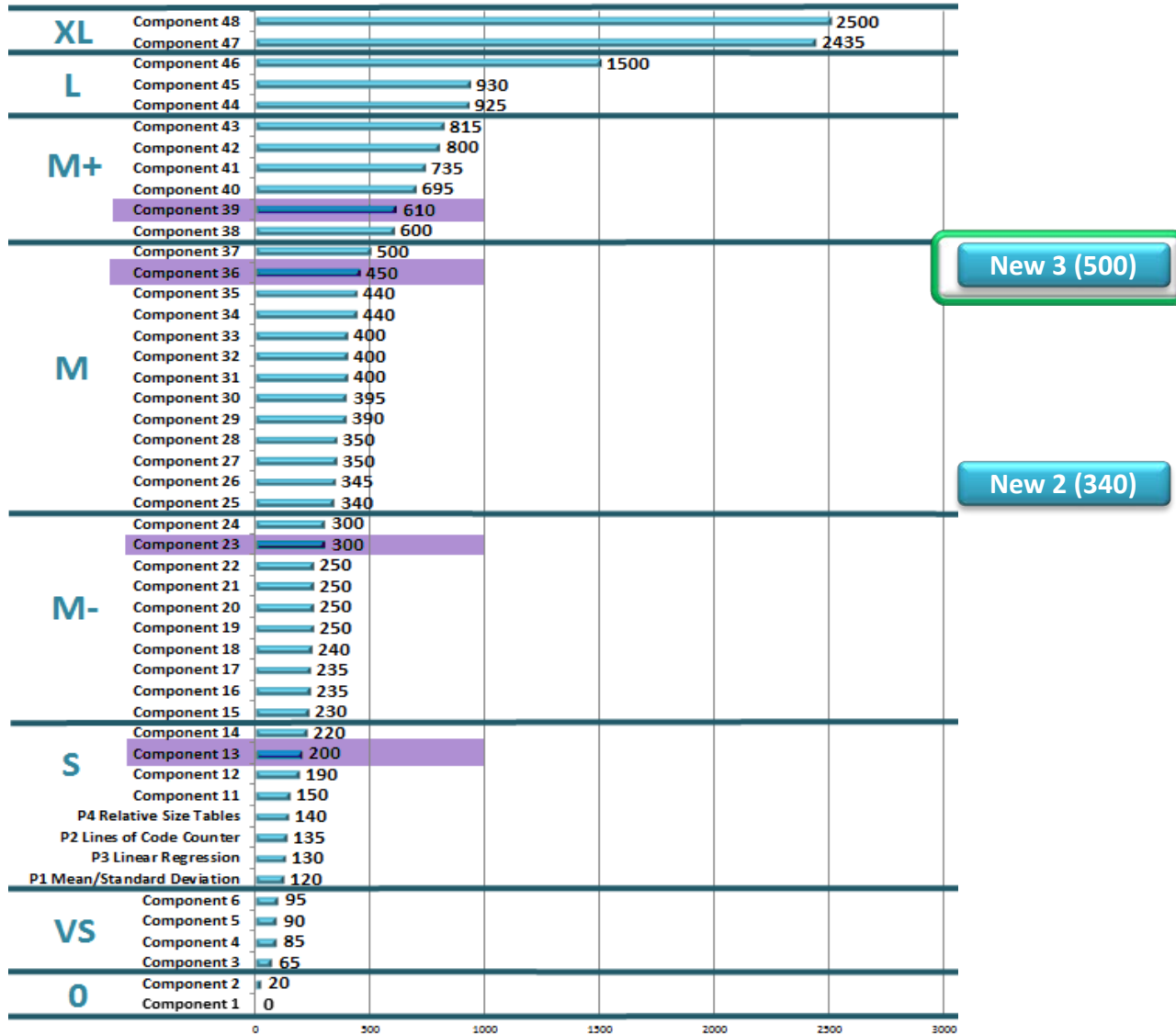
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Step 9

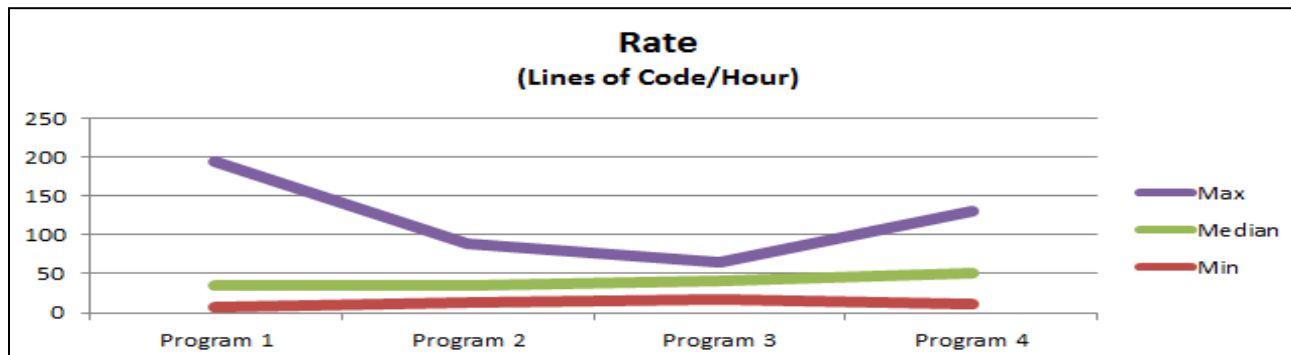
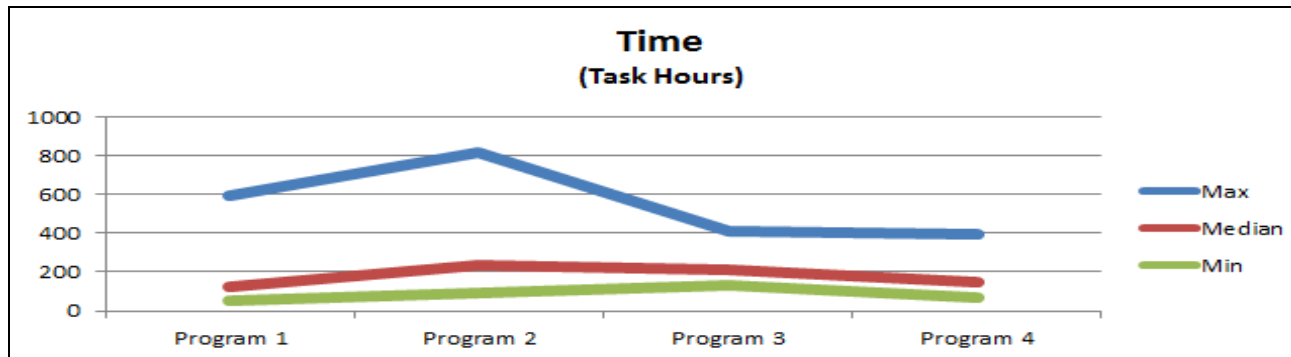
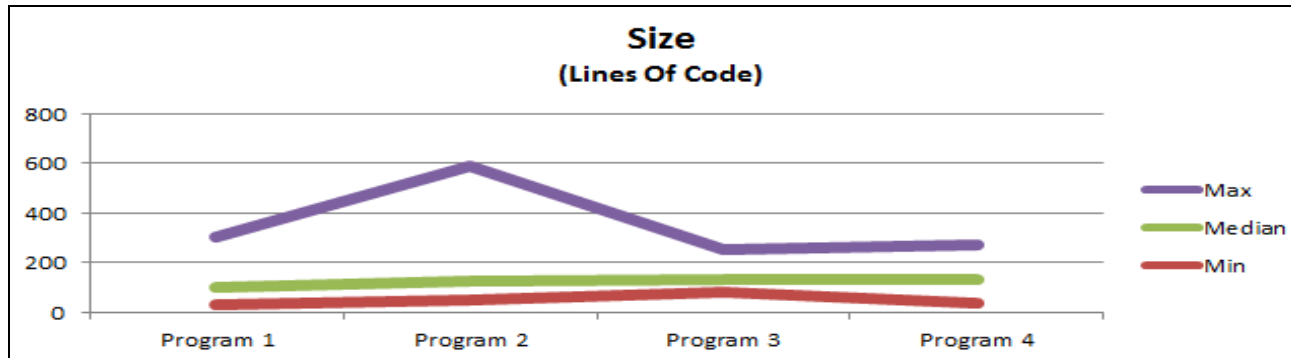
Individual Adjustments

Relative Size Graph - Actual LOC



Step 9

Individual Adjustments



Step 9

Individual Adjustments



15-20 Lines of Code/Hour



10 – 15 Lines of Code/Hour



5 – 10 Lines of Code/Hour



3 – 4 Lines of Code/Hour



1 – 3 Lines of Code/Hour

Step 9

Individual Adjustments

New 3

Asha

Measure	Actual	Estimated	Actual/Estimated
Size (LOC)		500	
Time (Task Hours)			
Rate (LOC/Hour)			

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity					✓	
Software Interactions						✓
Hardware Interactions					✓	
Number of Iterations						✓

Experience Factor						
Familiarity/Specific Experience In This Area					✓	
Development Environment Experience				✓		

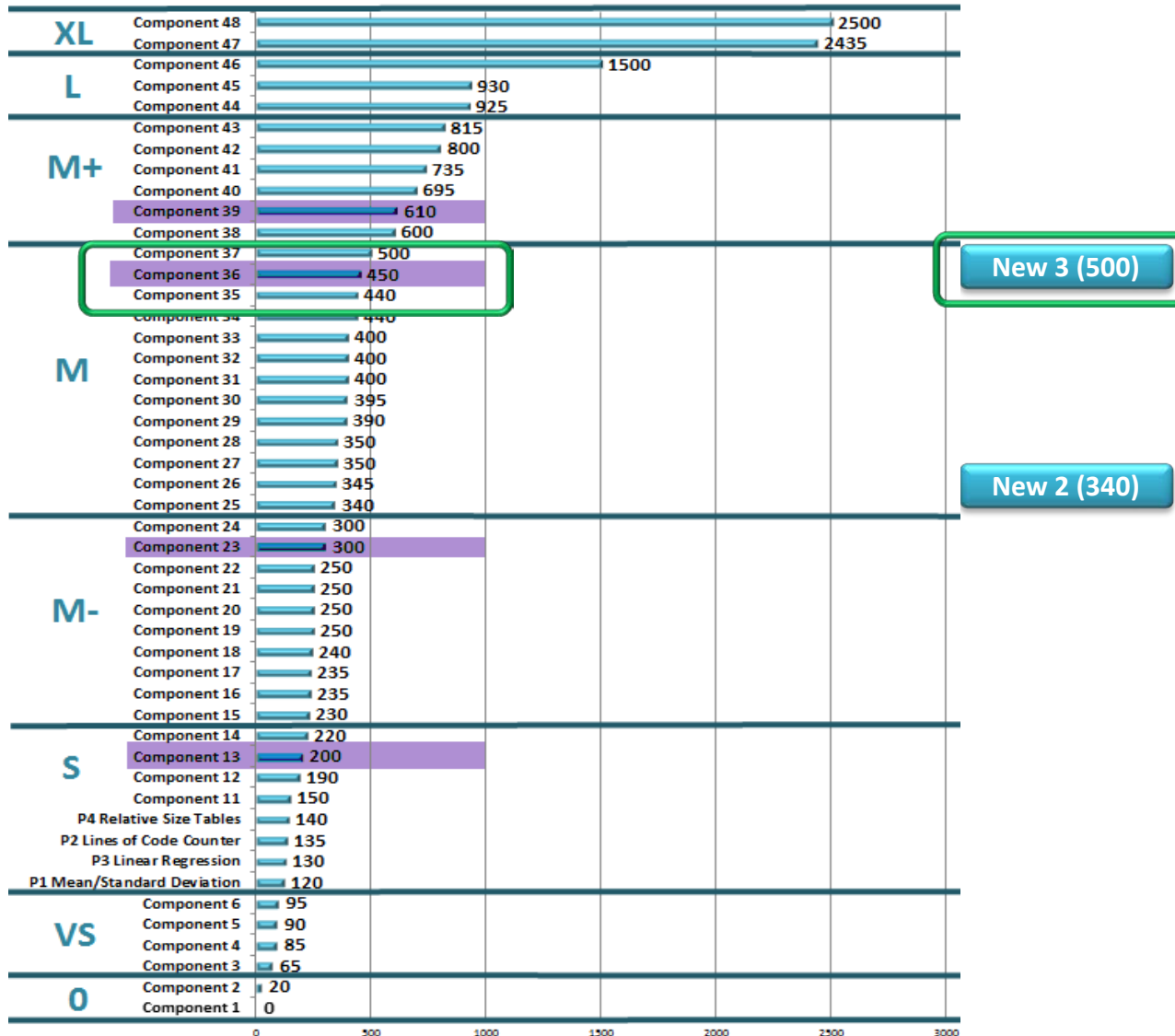
Comments (Assumptions/Retrospective Thoughts)

Step 9

Individual Adjustments



Relative Size Graph - Actual LOC



Step 9

Individual Adjustments

Step 9 Individual Adjustments

New 3		Asha				
Measure	Actual	Estimated	Actual/Estimated			
Size (LOC)		500				
Time (Task Hours)						
Rate (LOC/Hour)						

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity					✓	
Software Interactions					✓	✓
Hardware Interactions					✓	
Number of Iterations						✓

Experience Factor		High	Medium	Low
Familiarity/Specific Experience In This Area			✓	
Development Environment Experience		✓		

Comments (Assumptions/Retrospective Thoughts)						

Step 1 Historical Data Analysis (Individual View)

XYZ Control Software		Asha			
Measure	Actual	Estimated	Actual/Estimated		
Size (LOC)	450	420	1.07		
Time (Task Hours)	60	60	1.00		
Rate (LOC/Hour)	5.77	7.00	0.82		

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity		✓				
Software Interactions		✓				
Hardware Interactions		✓				
Number of Iterations			✓			

Experience Factor		High	Medium	Low
Familiarity/Specific Experience In This Area			✓	
Development Environment Experience		✓		

Comments (Assumptions/Retrospective Thoughts)						
Component was more complex than expected. There were more interactions and iterations with HW than expected.						

“The SIZE is about the same”

“The Component and Experience Factors are about the same”

“However, it took 7% more code to develop than I estimated”

“And I developed the software at 5.77 Lines of Code per Hour, not 7.00”

So I'll use 550 Lines of Code and a Rate of 6.00 Lines of Code per Hour



Step 9

Individual Adjustments

New 3

Asha

Measure	Actual	Estimated	Actual/Estimated
Size (LOC)		550	
Time (Task Hours)		91.67	
Rate (LOC/Hour)		6.0	

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity					✓	
Software Interactions						✓
Hardware Interactions					✓	
Number of Iterations						✓

Experience Factor						
Familiarity/Specific Experience In This Area					✓	
Development Environment Experience				✓		

Comments (Assumptions/Retrospective Thoughts)

Step 9

Individual Adjustments

Task Name	Time In Phase %	Total Time in Phase (Task Hours)
Planning	2.00	1.83 ✓
Requirements	2.00	1.83 ✓
Requirements Personal Review	1.00	0.92 ✓
Requirements Inspection	6.00	5.50 ✓
Test Plan	2.00	1.83 ✓
Design	15.00	13.75 ✓
Design Personal Review	7.00	6.42 ✓
Design Inspection	15.00	13.75 ✓
Code	15.00	13.75 ✓
Code Personal Review	7.00	6.42 ✓
Compile	2.00	1.83 ✓
Code Inspection	15.00	13.75 ✓
Static Analysis	2.00	1.83 ✓
Unit Test	2.00	1.83 ✓
Integration Test	3.00	2.75
Software System Test	3.00	2.75
Postmortem	1.00	0.92
Total	100.00	91.67

I think the requirements will take a lot more than 1.83 hours. I'm going to update that to 5 hours.



Step 9

Individual Adjustments

Task Name	Time In Phase %	Total Time in Phase (Task Hours)
Planning	2.00	1.83 ✓
Requirements	2.00	1.83 ✓
Requirements Personal Review	1.00	0.92 ✓
Requirements Inspection	6.00	5.50 ✓
Test Plan	2.00	1.83 ✓
Design	15.00	13.75 ✓
Design Personal Review	7.00	6.42 ✓
Design Inspection	15.00	13.75 ✓
Code	15.00	13.75 ✓
Code Personal Review	7.00	6.42 ✓
Compile	2.00	1.83 ✓
Code Inspection	15.00	13.75 ✓
Static Analysis	2.00	1.83 ✓
Unit Test	2.00	1.83 ✓
Integration Test	3.00	2.75 ✓
Software System Test	3.00	2.75 ✓
Postmortem	1.00	0.92 ✓
Total	100.00	91.67

And I have a Medium level of Hardware Interaction so I am going to increase my Integration Test Time to 6 hours.



Step 9

Individual Adjustments

Task Name	Time In Phase %	Total Time in Phase (Task Hours)	
Planning	2.00	1.83	✓
Requirements	2.00	5.00	✓
Requirements Personal Review	1.00	0.92	✓
Requirements Inspection	6.00	5.50	✓
Test Plan	2.00	1.83	✓
Design	15.00	13.75	✓
Design Personal Review	7.00	6.42	✓
Design Inspection	15.00	13.75	✓
Code	15.00	13.75	✓
Code Personal Review	7.00	6.42	✓
Compile	2.00	1.83	✓
Code Inspection	15.00	13.75	✓
Static Analysis	2.00	1.83	✓
Unit Test	2.00	1.83	✓
Integration Test	3.00	6.00	✓
Software System Test	3.00	2.75	✓
Postmortem	1.00	0.92	✓
Total	100.00	98.08	✓

OK, I've made the updates. Now the new Total is 98.08 hours. I'm much more comfortable with that.



Step 9

Individual Adjustments

New 3

Asha

Measure	Actual	Estimated	Actual/Estimated
Size (LOC)		550	
Time (Task Hours)		98.08	
Rate (LOC/Hour)		5.61	

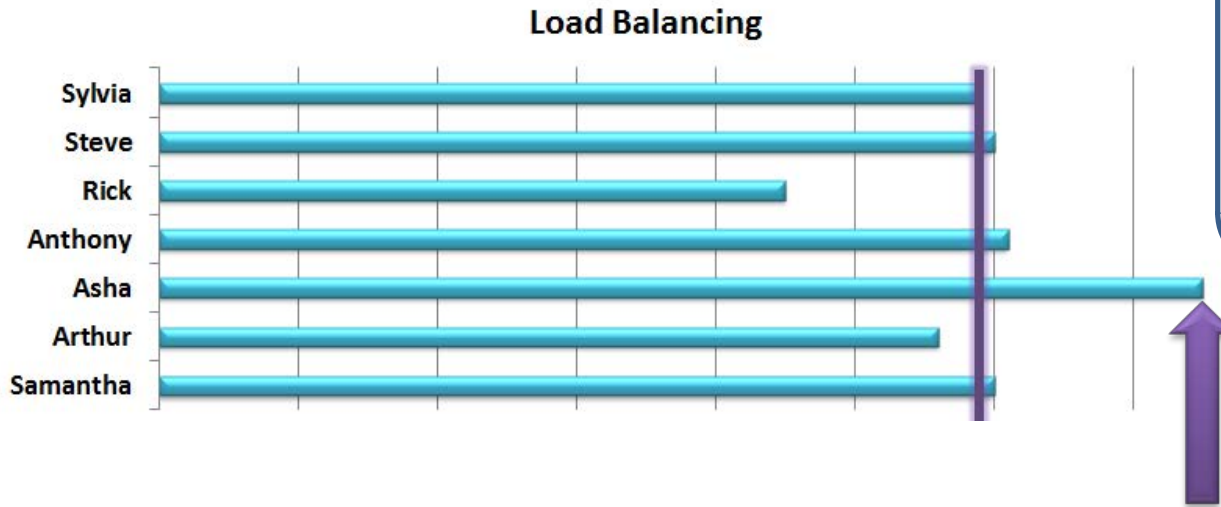
Component Factor			Estimated		
	High	Low	High	Medium	Low
Complexity				✓	
Software Interactions					✓
Hardware Interactions				✓	
Number of Iterations					✓

Experience Factor					
Familiarity/Specific Experience In This Area				✓	
Development Environment Experience			✓		

Comments (Assumptions/Retrospective Thoughts)

Step 9

Applying Individual Task Hours/Week



I see that I have been averaging 11.0 Task Hours per week.
When I apply this it results in the following duration.



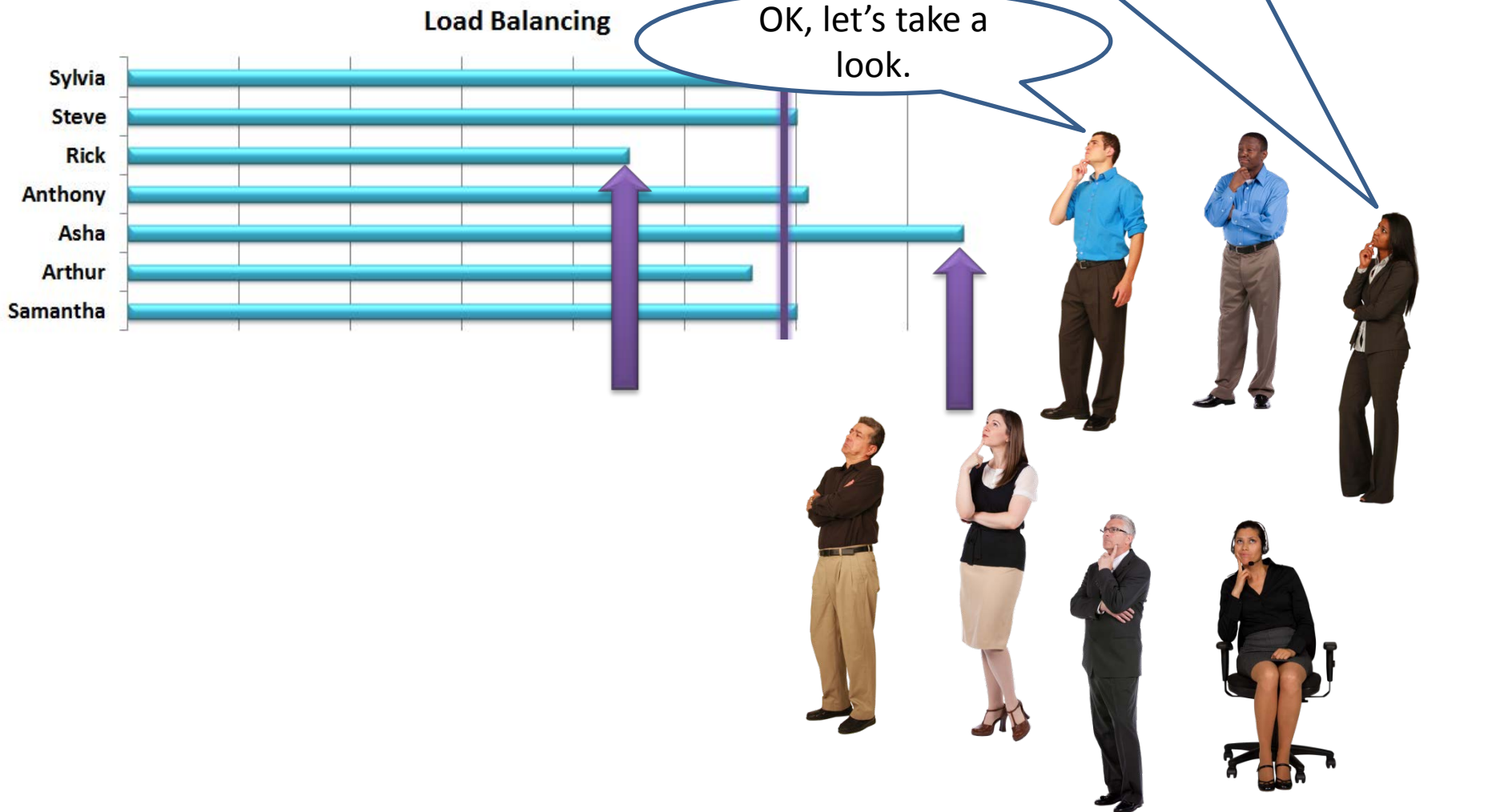
ACE

Accurate Confident Estimating



Step 10

Load Balancing



Step 9

Individual Adjustments

New 3

Asha

Measure	Actual	Estimated	Actual/Estimated
Size (LOC)		550	
Time (Task Hours)		98.08	
Rate (LOC/Hour)		5.61	

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity					✓	
Software Interactions						✓
Hardware Interactions					✓	
Number of Iterations						✓

Experience Factor						
Familiarity/Specific Experience In This Area					✓	
Development Environment Experience				✓		

Comments (Assumptions/Retrospective Thoughts)

Step 10

Load Balancing

New 3		Asha				
Measure	Actual	Estimated			Actual/Estimated	
Size (LOC)		550				
Time (Task Hours)		98.08				
Rate (LOC/Hour)		5.61				

Component Factor	Actual			Estimated		
	High	Medium	Low	High	Medium	Low
Complexity					✓	
Software Interactions						✓
Hardware Interactions					✓	
Number of Iterations						✓
Experience Factor						
Familiarity/Specific Experience In This Area					✓	
Development Environment Experience				✓		

Comments (Assumptions/Retrospective Thoughts)						
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Asha, I agree with the Size Estimate.

But this is the first time I have ever worked on something in this area – my Familiarity is Low.

So, I'm going to change the rate to 4.5 Lines of code/hour.

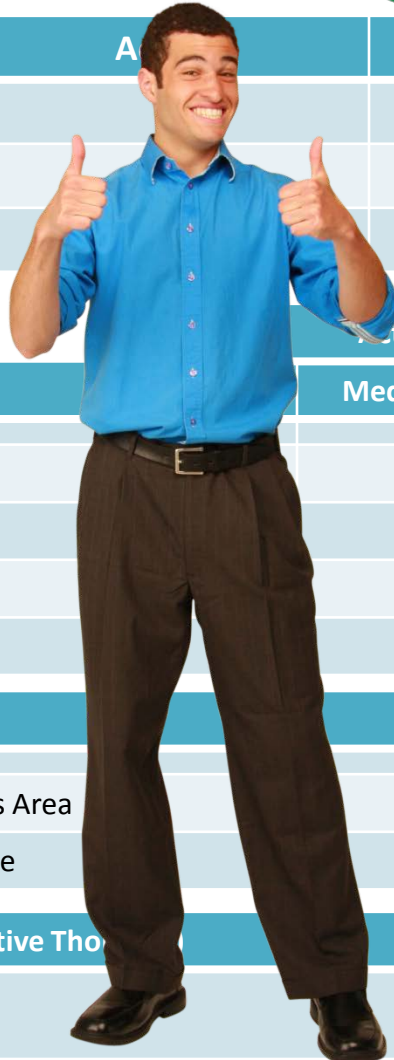


Step 9

Individual Adjustments

New 3

Rick



Measure	A	Estimated	Actual/Estimated
Size (LOC)		550	
Time (Task Hours)		122.22	
Rate (LOC/Hour)		4.5	

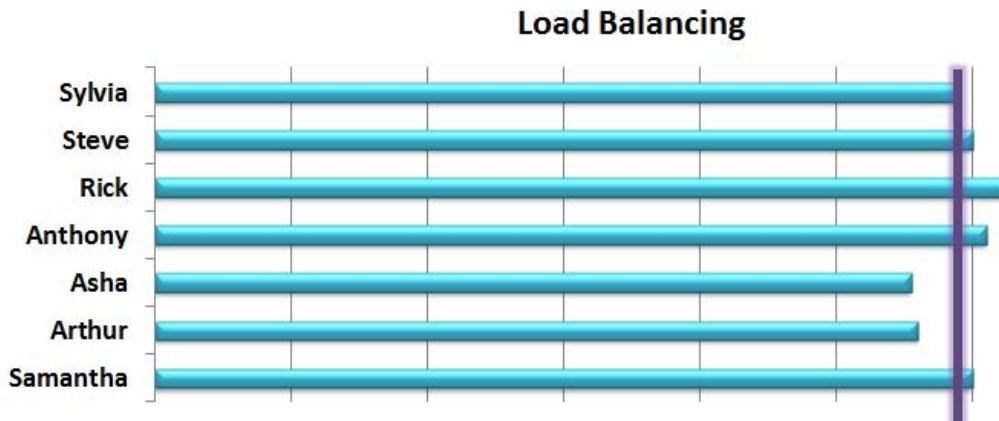
Component Factor	Actual			Estimated		
	Medium	Low	High	Medium	Low	
Complexity				✓		
Software Interactions						✓
Hardware Interactions				✓		
Number of Iterations						✓

Experience Factor					
Familiarity/Specific Experience In This Area					✓
Development Environment Experience			✓		

Comments (Assumptions/Retrospective Thoughts)

Step 10

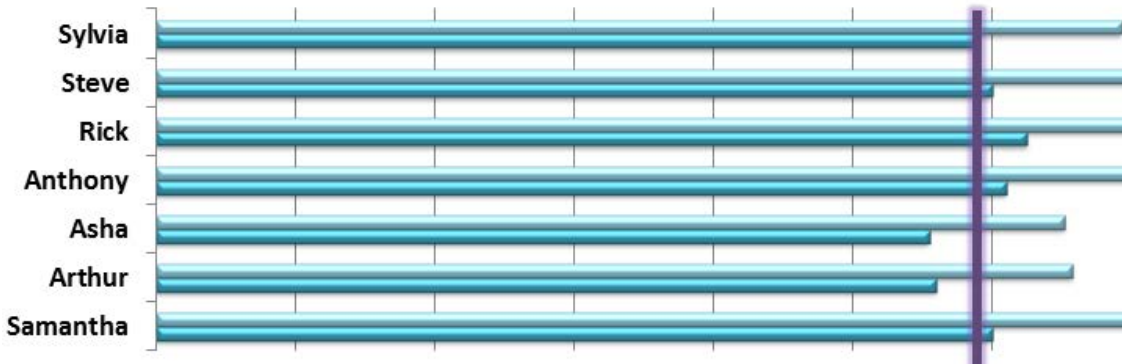
Load Balancing



Step 10

Load Balancing + Plan Growth

Load Balancing + Plan Growth



But we always see that the plan has some growth

Yes, about 15% - 20%. We better factor that in.






ACE

Accurate Confident Estimating



Step 11

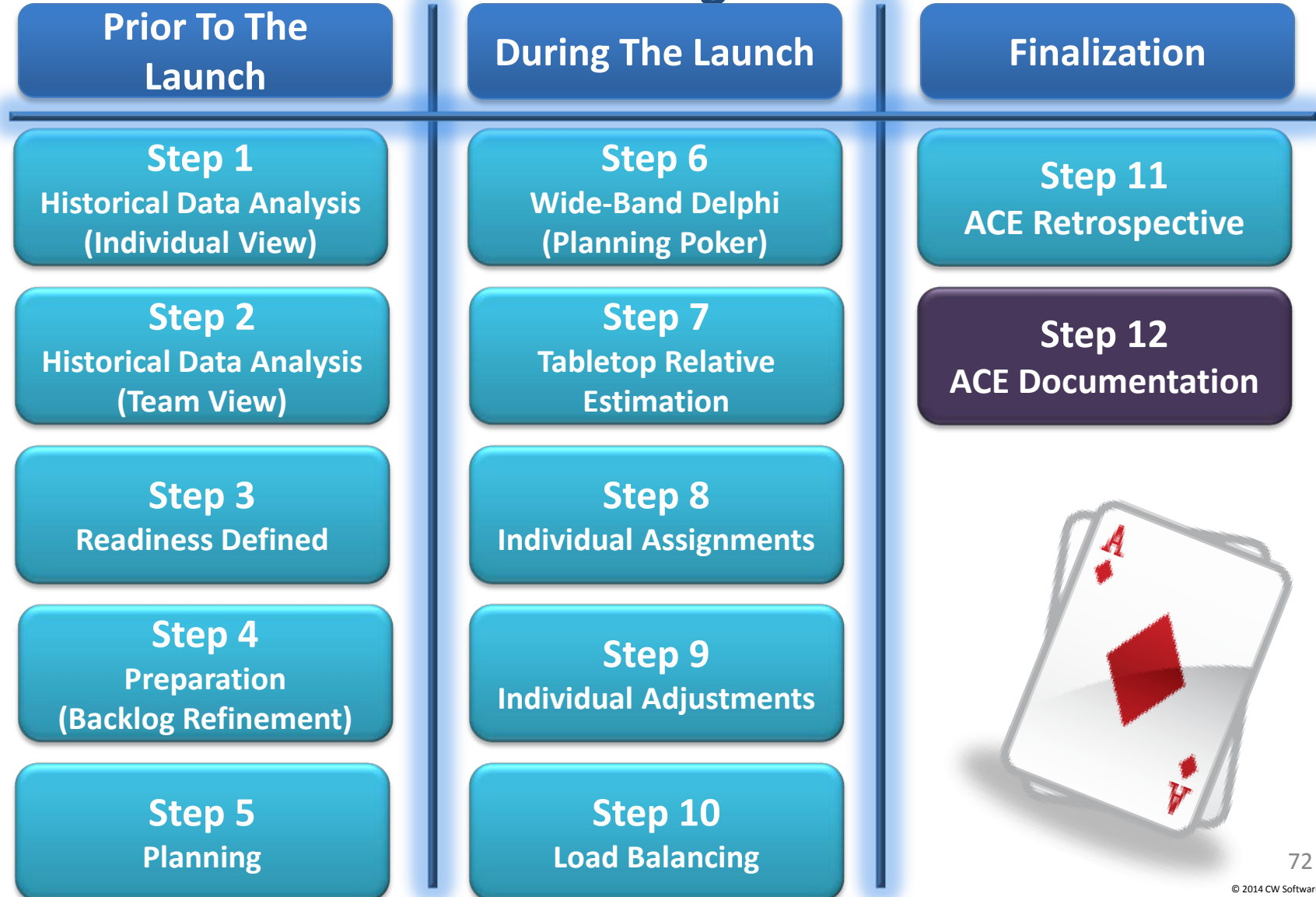
ACE Retrospective

What Worked Well?	What Did Not?	Changes For Next Time
		



ACE

Accurate Confident Estimating



ACE Documentation

[illegible]

CONFIDENT



Samantha

Arthur

Asha

Steve

Anthony

Sylvia

Rick



Thanks!!!



Carl Wyrwa

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