Baselines and Models for Tailoring

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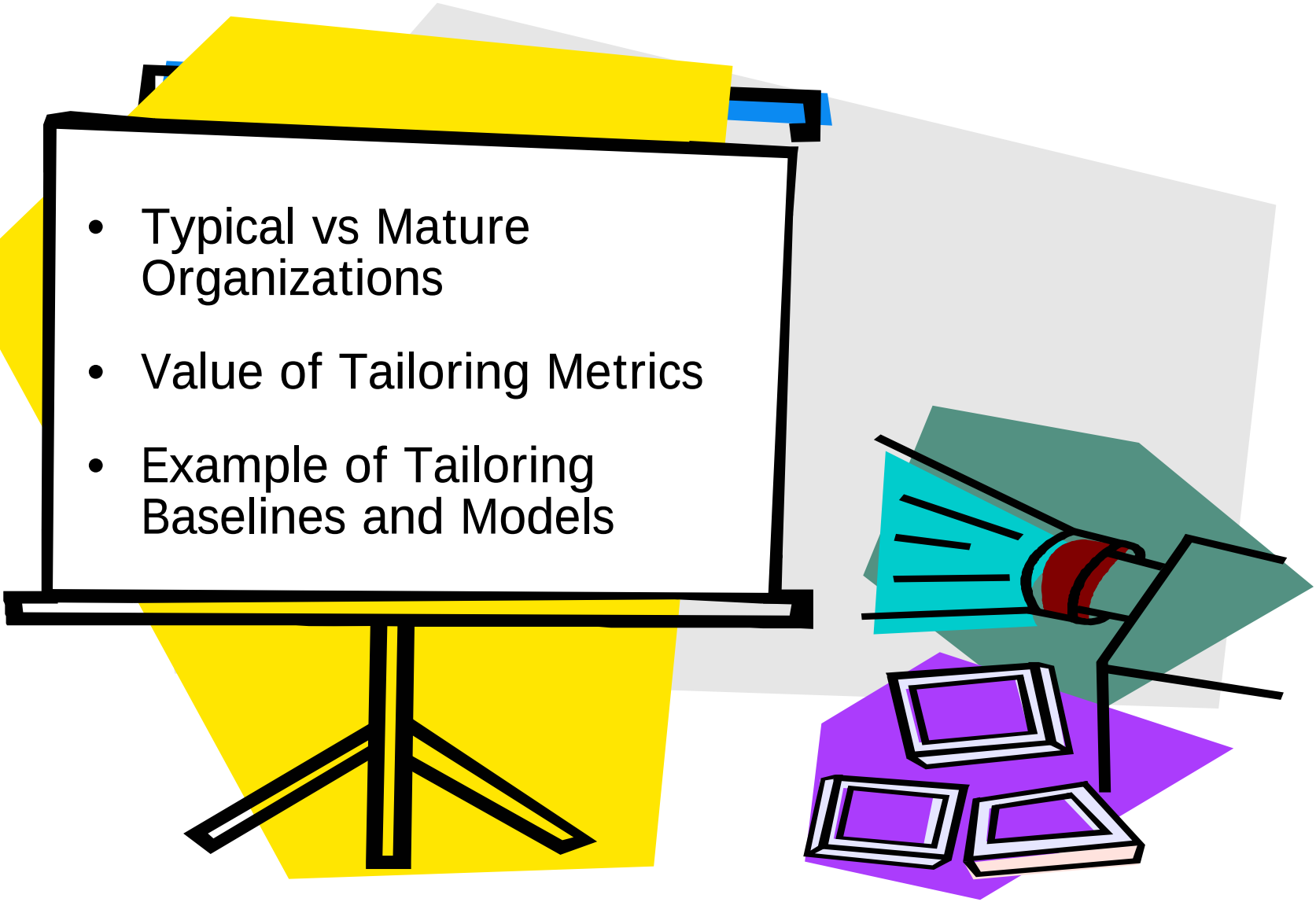
#7297

Agenda



Previous Presentation on Tailoring

- Baselines and models are only possible if your tailoring approach was designed for higher levels of maturity
- In other words,… you have tailoring **METRICS**

Storyboard of a Typical Organization

1 Create Standard Processes

Develop policies and standard processes in Word

2 Post Standard Processes

Provide Word files to projects

3 Go Into Hibernation

Wait for the next process initiative

4 Update Years Later

Update policies and standard processes years later

Storyboard of a Mature Organization

1 Create Standard Processes

Develop policies and standard processes in a tool

2 Post Standard Processes

Provide the tool to projects

3 Let the Tool Gather Metrics

Walk away knowing the tool will automatically gather metrics

4 Improve Standard Processes

5

CMMI Level

Use the metrics, to improve the policies and standard processes regularly

Storyboard of a Typical Organization Trying to Become More Mature

NORTHROP GRUMMAN
DEFINING THE FUTURE

1 Collect Defined Processes

Collect Word files from projects

2 Figure Out What Was Tailored

Analyze red revision bars in every Word file

3 Waste Resources

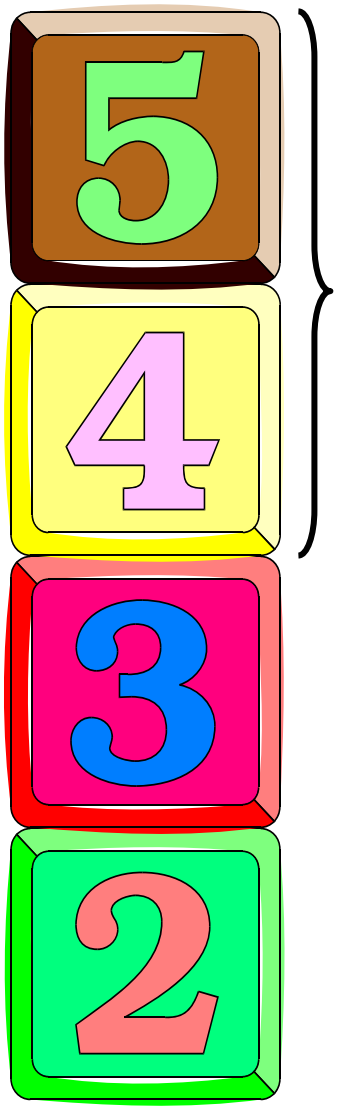
Waste an enormous amount of money and time

4 Improve Standard Processes

CMMI Level 5

Use the **error-prone** method to improve the policies and standard processes regularly

The 3 "P"s and CMMI Maturity Levels



Process

Metrics to monitor the process, e.g., process effectiveness

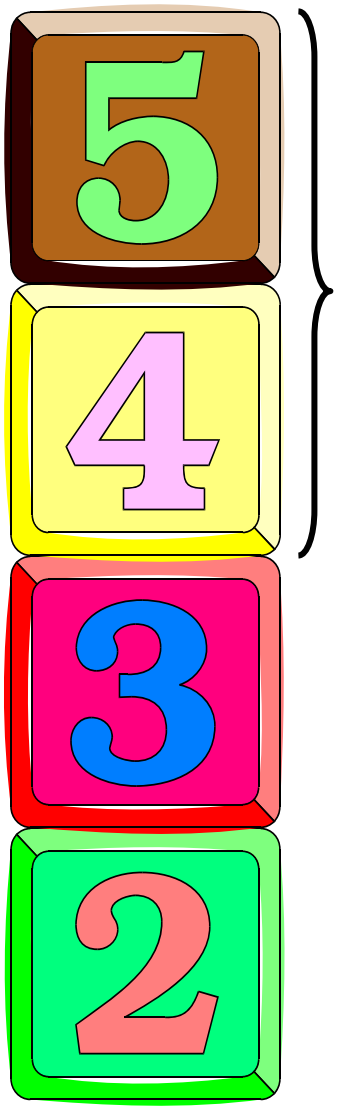
Product

Metrics to monitor the product, e.g., peer reviews and test

Project

Metrics to monitor the project, e.g., cost and schedule

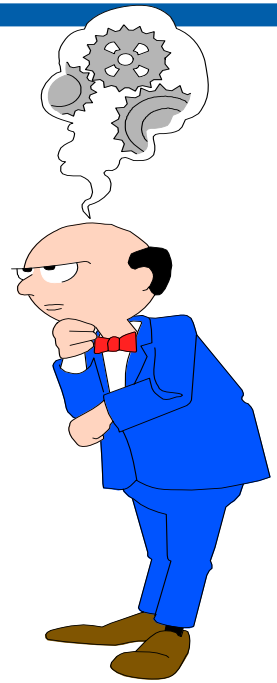
Baselines and Models for Typical Organizations



Process

Let's just beef up the baselines and models from Levels 2-3 and add more variables. Just make it fancier with more bells and whistles.

What happened to "Process"?



Product

Baselines and models to predict defects from peer reviews and test

Project

Baselines and models to predict cost and schedule

Baselines and Models for Mature Organizations

Don't give up on "Process".

Think about baselines and models for OPD, OPF, OT, etc.

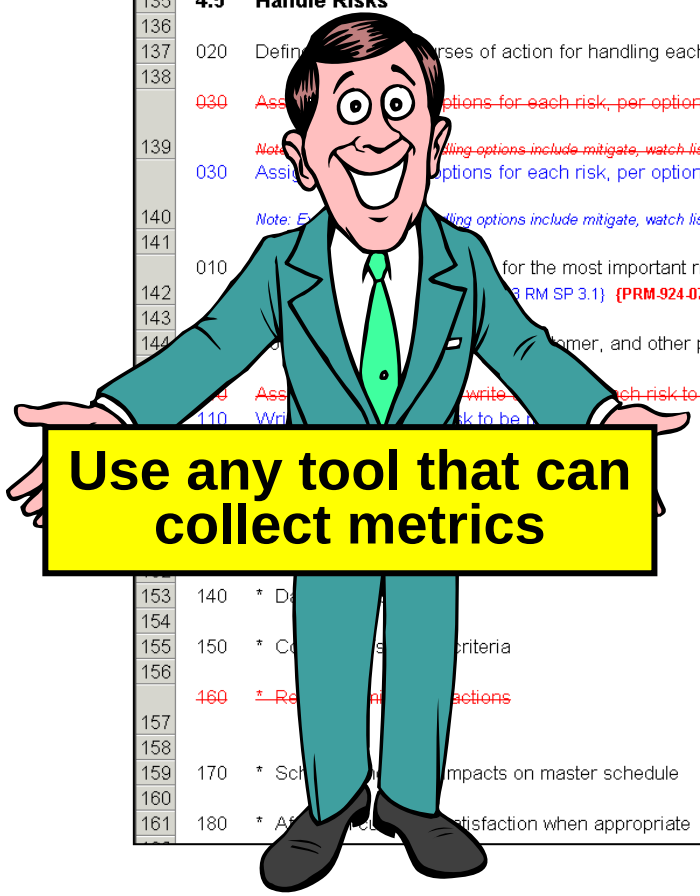
Expand your thinking.

Create a Tailoring Tool that Collects Metrics

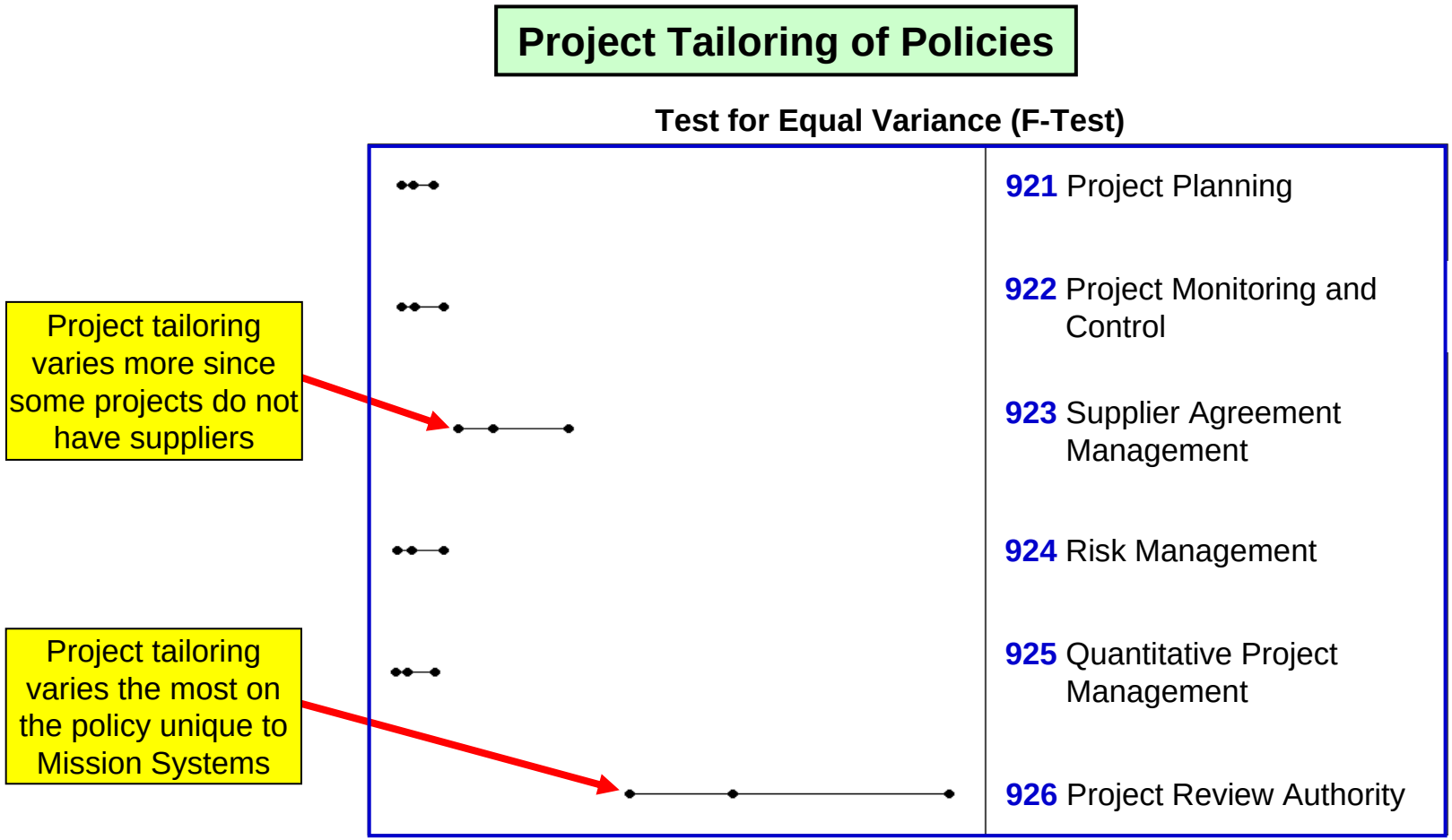
Microsoft Excel - dm-135 Rev 08 10-01-04.xls

File Edit View Insert Format Tools Data Window Help

		924 Risk Management	Selection	Rationale
135		**4.5 Handle Risks**	Applicable	
137	020	Defin…rses of action for handling each risk.	Applicable	
139	030	~~Ass…ptions for each risk, per options defined in project plans.~~	Original	
		~~Note: …dling options include mitigate, watch list, etc.~~		
140	030	Assig…ptions for each risk, per options defined in the Risk Management Plan.	Modified	Risk handling options are defined in the Risk Management Plan.
		Note: E…dling options include mitigate, watch list, etc.		
142	010	…for the most important risks to the project as defined by risk …3 RM SP 3.1} {PRM-924-070}	Compliant	
144		…mer, and other potentially affected teams, as appropriate.	Applicable	
		~~Ass… write… ch risk to be mitigated.~~	Original	
	110	Wri… k to be …	Modified	Plans must be written. Action items are not allowed.
			Applicable	
			Applicable	
153	140	* D…	Applicable	
155	150	* C… …criteria	Applicable	
157	160	~~* Re… …actions~~	Deleted	Results of mitigation actions are not known when the plan is being written.
159	170	* Sch… …mpacts on master schedule	Applicable	
161	180	* A… …tisfaction when appropriate	Applicable	



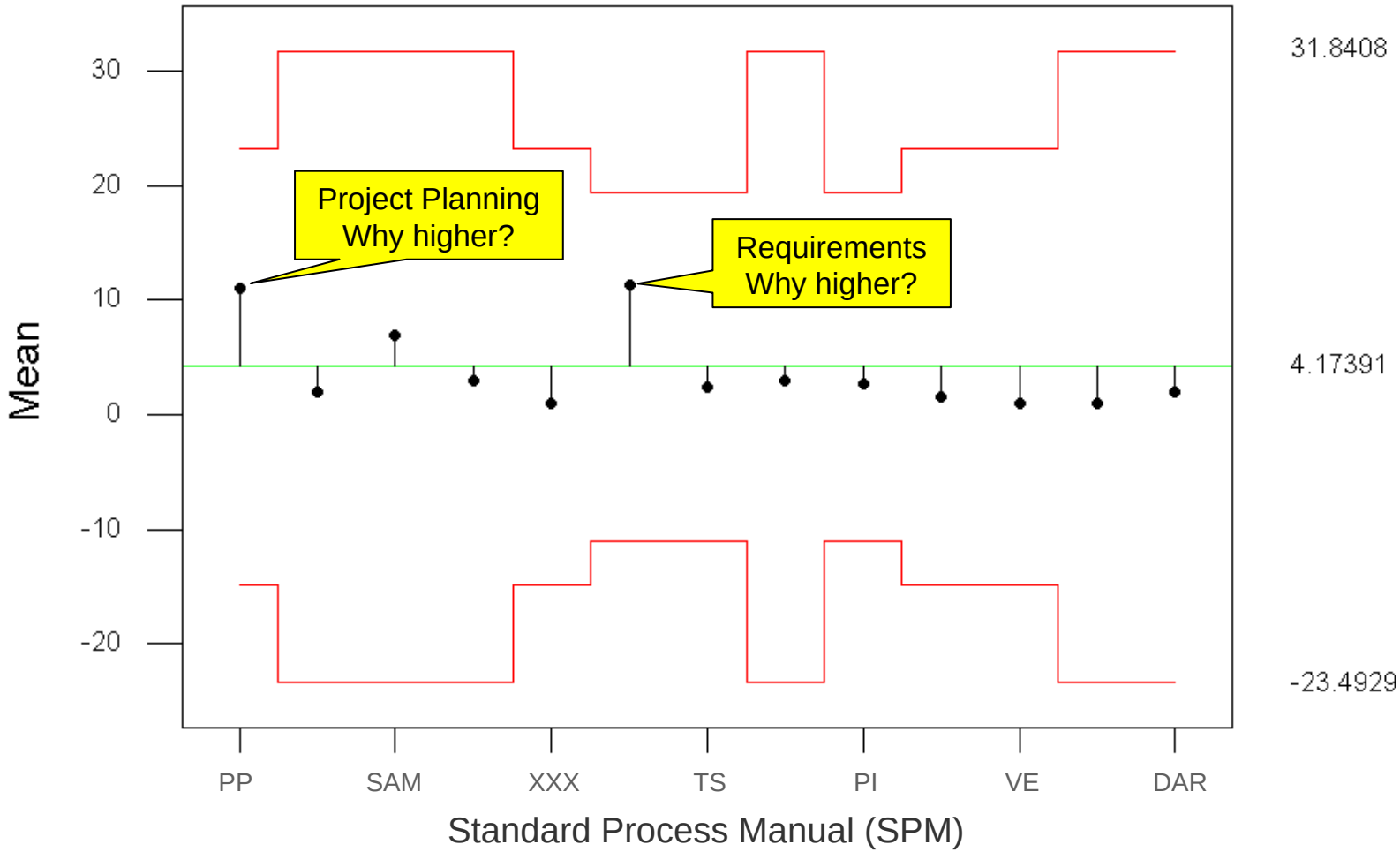
Example 1 of Tailoring Metrics' Value
Analyze Policy Tailoring



Actions: Improved the list of metrics in 926 Project Review Authority.

Example 2 of Tailoring Metrics' Value

Analyze Standard Process Additions



Actions: Identified potential improvements to the standard processes.

Example 3 of Tailoring Metrics' Value

Improve the Standard Processes

	B	D	L	M	N
1		SPM	Modified	Deleted	Not Applicable
2					
43	924	4.4.080	1	4	
44	924	4.4.110		4	3
45	924	4.5.120		4	
46	924	4.5.130		5	
47	924	4.5.140		5	
48	924	4.5.150		5	1
49	924	4.5.160		7	2
50	924	4.5.170		5	
51	924	4.5.180		6	2
52	924	4.5.190		6	
53	924	4.5.200		6	2
54	924	4.6.050		4	
55	924	4.6.070		4	2
56	924	4.7.040		4	

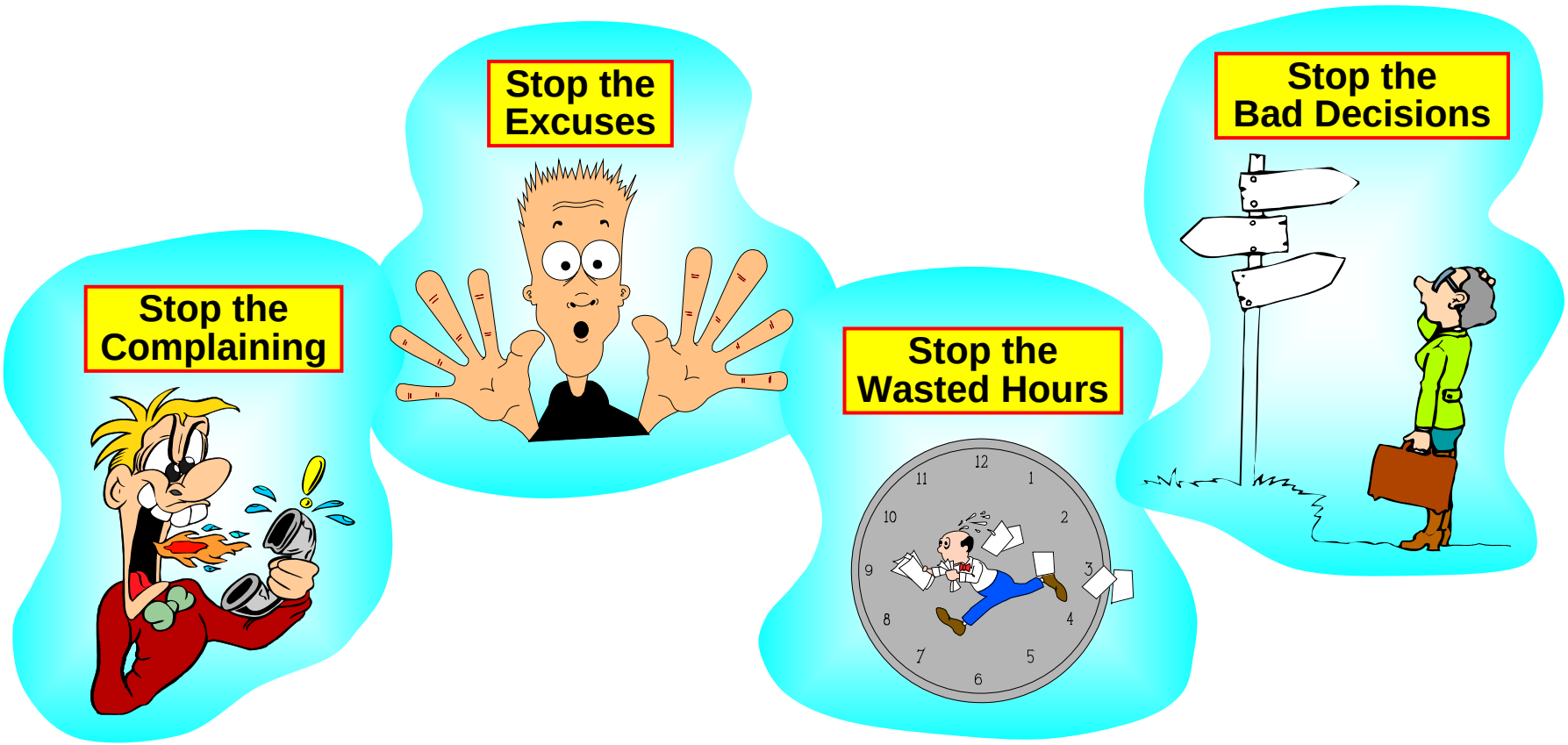
A stretch of process steps in the Risk Management (924) standard process was being tailored frequently. After investigating, it was discovered the process steps were way too detailed and not really "standard" practice. As a result, the standard process was changed to have projects define the details in their project plans.

	B	D	L	M	N
1		SPM	Modified	Deleted	Not Applicable
2					
187	934	4.3.130		6	7
188	934	4.3.150		6	12
189	934	4.3.180		4	6
190	934	4.3.190		4	6
191	934	4.3.230		4	7

A process step in the Integration (934) standard process was being tailored frequently. After investigating, it was discovered the process step was not what is normally done on projects, i.e., it wasn't "standard" practice. The process step was deleted.

Baselines and Models Always Need a Goal

My goal,...



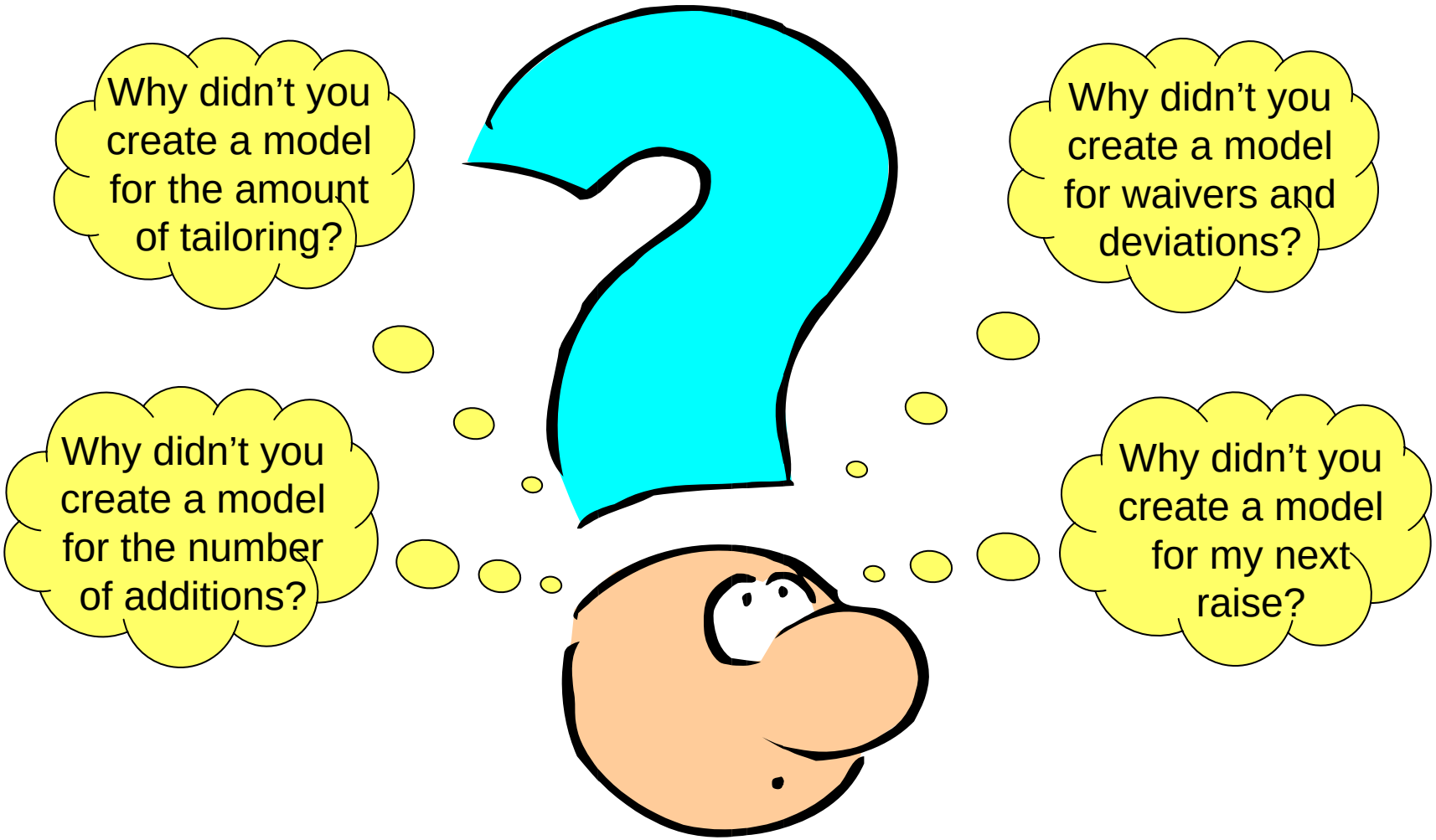
Goals should be related to your pain and what you care about.

“Stop the Wasted Hours” Actual Example

8,000

One project spent 8,000 hours (4 years) to tailor the standard process. Each process area was assigned to a team of people who had several meetings to discuss each process step.

Decided to Create a Model for Hours to Tailor

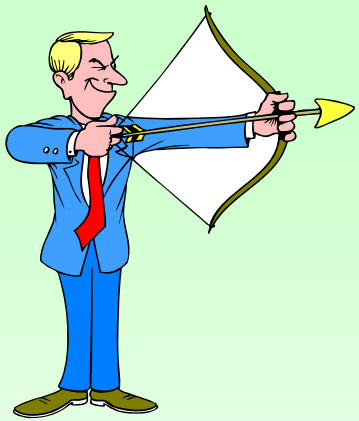


Questions People Ask

Baselines and Models are Like Metrics

You create more and more and don't know why, except that you want to pass CMMI Level 5. The only model needed was the one to heal my pain (goal-driven).

Controllable vs Non-Controllable Factors



Controllable Factors

- **Method**
  (Blank, Pre-Tailor, Reused, Pre-Populated)
- **Effort for Tailoring**
  (Heads Assigned to Tailoring)

A model is not a model unless there are controllable factors ("what-if")

Non-Controllable Factors

- **Development Type**
  (Development, Maintenance, Services, Other)
- **Project Type**
  (Software, Hardware, Systems)
- **Project Size**
  (Heads)

Tailoring Baselines

	N	Min	Max	Med	Mean	Q1	Q3	StDev
	184.0	0.3	8000.0	78.5	223.6	38.3	179.0	700.2
Non-Controllable Factors								
Project Type Baselines								
Development	109.0	0.3	8000.0	97.0	273.2	46.5	230.0	831.2
Maintenance	69.0	7.0	2654.0	100.0	231.8	55.0	242.5	432.2
Services	61.0	4.0	8000.0	60.0	320.0	32.0	121.0	1147.0
Other	27.0	11.0	640.0	56.0	91.3	24.0	100.0	127.6
Development Type Baselines								
Software	128.0	0.3	8000.0	98.5	256.7	45.1	227.5	770.1
Hardware	37.0	0.3	2654.0	140.0	239.1	60.0	270.5	434.5
Systems	75.0	0.0	8000.0	8.5	296.0	36.0	208.0	1038.0
Project Size Baselines								
Micro Project (< 10 FTEs)	20.0	10.0	200.0	73.0	79.9	24.0	102.0	60.3
Small Project (< 20 FTEs)	38.0	3.0	542.0	49.0	78.7	24.5	104.6	101.9
Medium Project (< 100 FTEs)	89.0	0.3	1120.0	97.0	170.1	53.3	239.5	197.5
Large Project (>= 100 FTEs)	37.0	7.0	8000.0	100.0	579.0	46.0	315.0	1488.0
Controllable Factors								
Method Baselines								
a. Blank	92.0	0.3	8000.0	86.0	290.7	51.3	220.0	900.0
b. Pre-tailor	14.0	12.0	400.0	120.5	137.7	39.5	218.5	113.0
c. Reused	25.0	7.0	430.0	69.0	99.2	22.0	153.5	104.5
d. Pre-populated	19.0	11.0	1053.0	90.0	175.7	31.0	280.0	239.2
Heads for Tailoring Baselines								
a. 1	41.0	0.3	230.0	63.0	76.7	25.5	98.5	67.5
b. 1 to 2	35.0	8.0	315.0	60.0	84.4	24.0	130.0	83.0
c. 2	25.0	17.0	2654.0	84.0	219.0	45.0	161.0	519.0
d. 3 or more	23.0	20.0	8000.0	252.0	669.0	92.0	300.0	1670.0

- Collected metrics from 184 projects
- These baselines are provided to projects
- Per the CMMI, baselines have distribution (StDev) and range (Min Max)

Hours for Tailoring are WILD

Lesson learned,... you better have a very specific operational definition (directions for the metrics you want) or you get this! We had to redo the definition.

Tailoring "Rough" Estimation Model

Tailoring Hours : Rough Estimation Model

		Q1	Q3	Median
1	**Project type is primarily:** Development	46.5	230.0	97.0
2	**Development type is primarily:** Software	45.1	227.5	98.5
3	**Project size:** Small Project (< 20 FTEs)	24.5	104.6	49.0
4	**Method to complete the tailoring:** c. Reused	22.0	153.5	69.0
5	**Heads to complete the tailoring:** c. 2	45.0	161.0	84.0
	Estimated Hours: 37 to 80	**36.62**	**175.32**	**79.5**

- The "rough" model uses the baselines to provide a range of estimated hours
- Users select from the blue pulldown menus
- The model is "rough" because the factors are not correlated with one another, i.e., some factors have a greater influence on the estimated hours
- An accurate model correlates the factors and uses a regression equation

Tailoring Regression Estimation Model

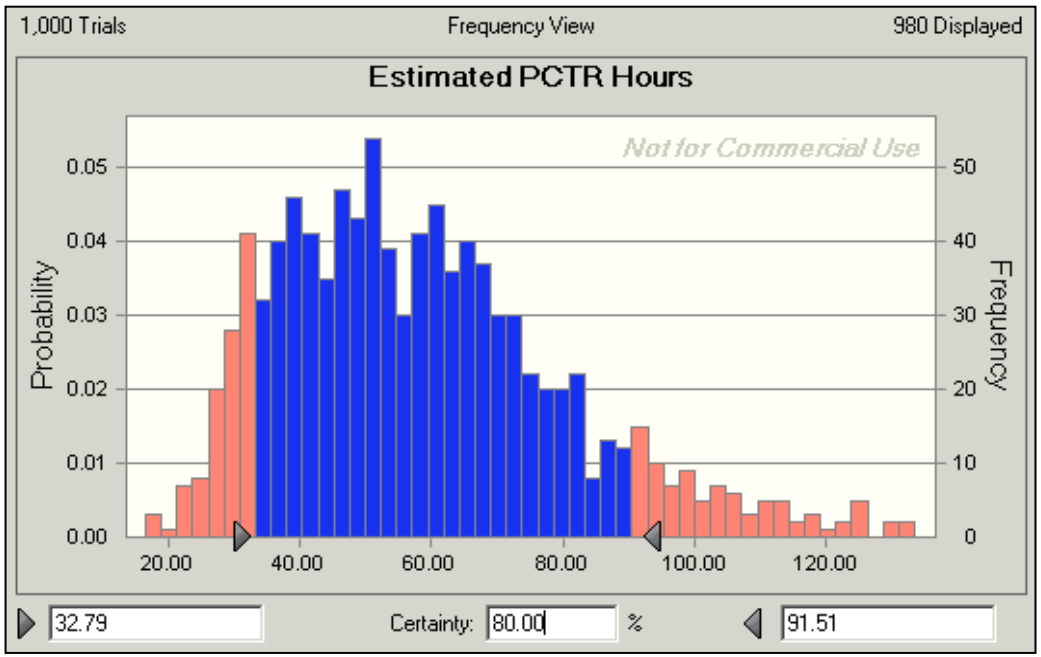
Tailoring Hours : Regression Model

1	**Project Type:**	
	Development	Yes
	Maintenance	Yes
	Services	No
	Other	No
2	**Development Type:**	
	Software	Yes
	Hardware	Yes
	Systems	Yes
3	**Project Size (Number of FTE Heads):**	20
4	**Number of heads to complete the tailoring:**	1
5	**Method to complete the tailoring:**	Reused
	Estimated Hours:	**38**

- The regression equation was developed using Minitab
- Unlike the previous model, which used pulldown menus (discrete data), this model uses continuous data for Project Size and Heads for Tailoring, which is more accurate
- This model accounts for multiple Project Types and Development Types
- This model accounts for normal vs. lognormal data, which is also more accurate

Monte Carlos Can Also Be Used

Monte Carlo Simulation Output



- The Monte Carlo was done using Crystal Ball
- The Monte Carlo range is more accurate than the “rough” model presented earlier
- Monte Carlo provides fields where the user can enter percentages. In the example to the left, there is 80% certainty that tailoring will take between 32.79 and 91.51 hours

Did it Help My Pain to Achieve My Goal?

Projects Can See the Effect of Their Decisions

1 Person Completes the Tailoring

Tailoring Hours : Regression Model

1	**Project Type:**	
	Development	Yes
	Maintenance	No
	Services	No
	Other	No
2	**Development Type:**	
	Software	Yes
	Hardware	No
	Systems	No
3	**Project Size (Number of FTE Heads):**	50
4	**Number of heads to complete the tailoring:**	1
5	**Method to complete the tailoring:**	Blank
	Estimated Hours:	65

8 People Complete the Tailoring

Tailoring Hours : Regression Model

1	**Project Type:**	
	Development	Yes
	Maintenance	No
	Services	No
	Other	No
2	**Development Type:**	
	Software	Yes
	Hardware	No
	Systems	No
3	**Project Size (Number of FTE Heads):**	50
4	**Number of heads to complete the tailoring:**	8
5	**Method to complete the tailoring:**	Blank
	Estimated Hours:	6348

65 vs. 6,348 hours

Summary

- Mature organizations create baselines and models for “Process”, not just “Project” and “Product”
- Have goals before creating any baselines and models or you end up with non value-added baselines and models
- Models are powerful tools that allow users to make better choices, i.e., “what-if” analysis

Stop the Guessing

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