

# **ADVANCED PROGRAM MANAGEMENT COURSE: MONITORING PROJECT PERFORMANCE**

Jeanne Bradford, John Carter, Scott Elliott

# AGENDA

- 1 **Schedule Prediction Accuracy**  
**Exercise** in creating diagram
- 2 **Metrics for estimating progress at the engineering task levels**  
**Exercise** in creating a Task Burn- Down Chart
- 3 **Monitoring Progress: Earned Value – Scope, Cost and Time**  
**Exercise** in managing Partner's delay
- 4 **Circle Dot Charts: What happens if there is a breakdown?**  
**Exercise**
- 5 **Management Systems**

# KEY LEARNING POINTS

Monitoring Project Performance for Internal and External Partners (TCGen's Innovate Products Faster, Greene's Head First PMP)

Participants will understand how to create and update Schedule Prediction Accuracy charts and how to demonstrate program status by showing scope, cost and time in one chart.

**They will also gain skill in creating and using:**

- 1 Metrics for estimating progress (at the engineering task levels)
- 2 Monitoring Progress (Earned Value – Scope, Cost and Time)
- 3 Risk Monitoring
- 4 Circle Dot Charts
- 5 Management Systems

# SCHEDULE PREDICTION ACCURACY

Hoping that teams recover through their own heroic efforts only creates more chaos, not better results

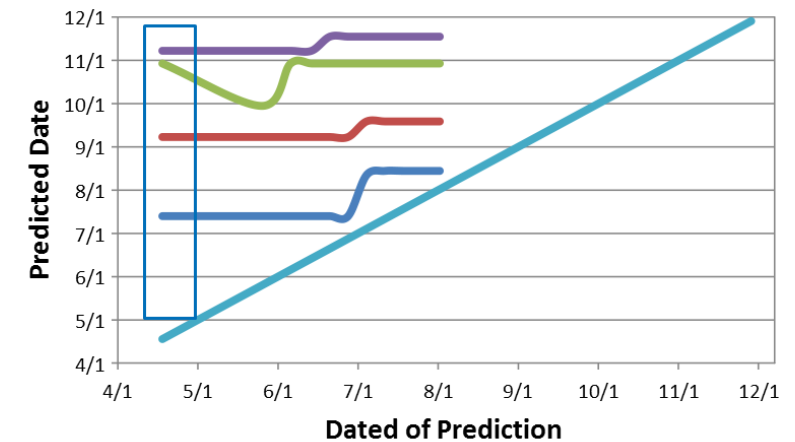
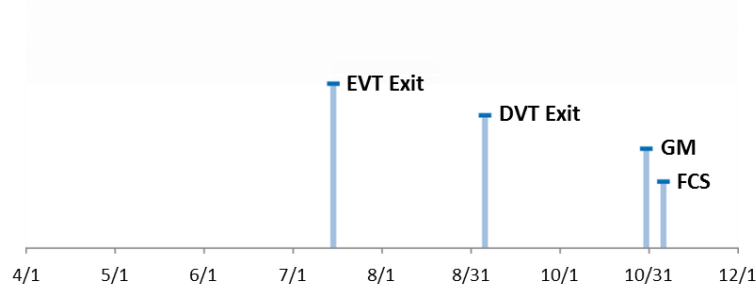
Avoidable delays in delivering products to market are fatal to companies, but we see them happen every day

The Schedule Prediction Accuracy Chart provides the best and earliest indication that a project is in jeopardy and gives the team the best chance of avoiding disasters

# SCHEDULE PREDICTION ACCURACY (SPA): WHAT IS IT?

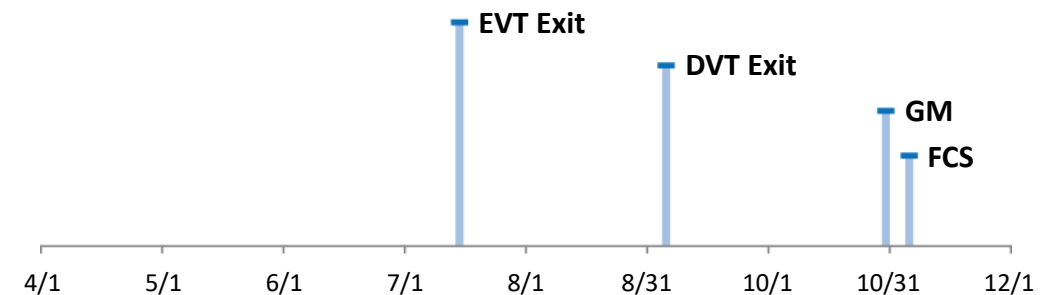
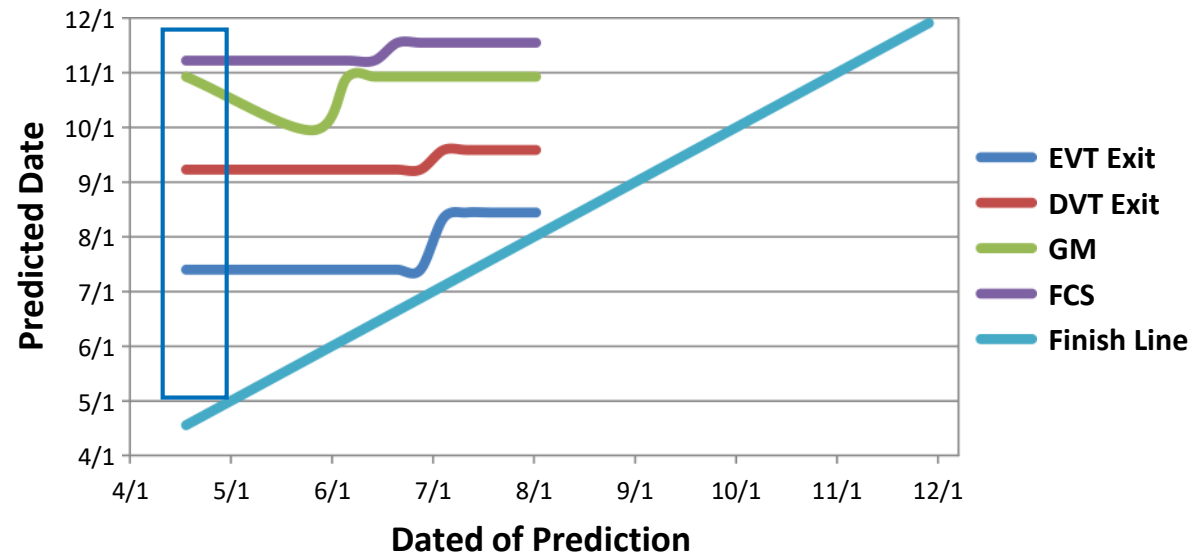
The Schedule Prediction Accuracy Chart provides an early warning when a project fails to hit its expected schedule

- Allows project teams to anticipate problems before they become more serious
- Shows how a project's major milestones are changing over time
- Can be created by hand or with an Excel XY Scatter Chart
- Y axis represents the predicted date
  - When the project will achieve a milestone
- X axis the actual date
  - The date the chart is updated
- Once set up, the Chart takes only a few minutes to update
- Update the Chart on a regular basis to reap the greatest benefits



# SCHEDULE PREDICTION ACCURACY (SPA) – WHAT IS IT?

- Initial project milestones are determined by the cross functional team
- The timeline creates the set of data points in the rectangular box in the figure below
- The diagram below shows the SPA after a series of updated schedules is plotted over time
- The 'Finish Line' is when the predicted date = the date of prediction, or when the milestone event is done



# SCHEDULE PREDICTION ACCURACY (SPA): WHY IS IT USED?

Serves as an early warning sign

Is a tactically straightforward, powerful tool

Provides a robust visualization of the entire project over time

Provides visual emphasis on significant changes in schedule

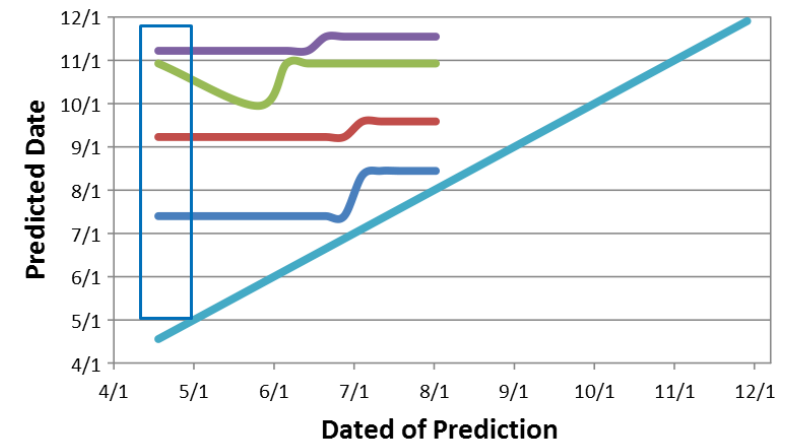
- It can also be used for Partners

Increases the accountability of the program manager

Reduces the practice of gaming the schedule since it includes the original plan of record

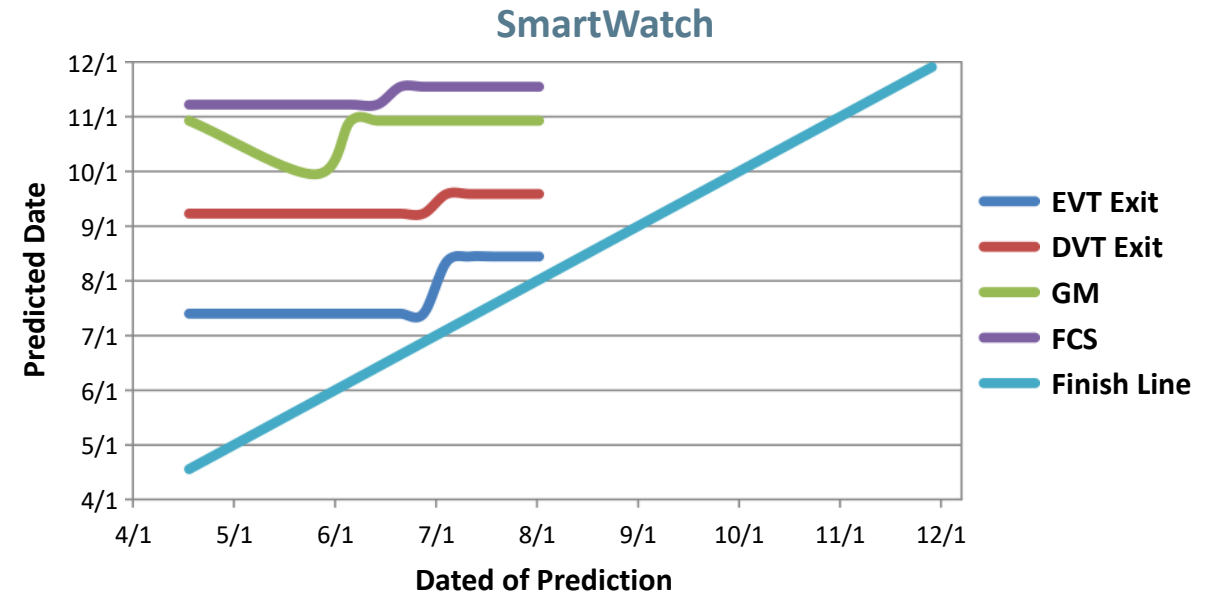
The SPA is *better than a GANTT*

- Because it maintains the initial plan of record
- Shows how a delay ripples through the schedule
- Tracks the series of schedule estimates over time
- Visually displays compression of future milestones



# EXAMPLE: SCHEDULE PREDICTION ACCURACY

- 1 What may pulled-in GM for June?
- 2 What might have caused the EVT slip?
- 3 Why did the DVT Exit slip 10 days while GM did not slip a day?
- 4 What mitigation might be implemented so that the project predictably hits the FCS?



*Schedule slips in early milestones, but end date remains relatively constant!*



# SCHEDULE PREDICTION ACCURACY: WORK INSTRUCTIONS

## Process Description

- 1 Identify the initial project milestones
- 2 Using graph paper, define the schedule duration (time) on the x-and y-axes – x axis should be tracked on a weekly periodicity
- 3 X-axis is labeled “Date of Prediction”; y-axis is labeled “Milestone Prediction”
- 4 Draw the diagonal “Finish Line”, where the Date of Prediction is equal to the Predicted Date
- 5 On the left side of the graph, record initial project milestone dates along the y-axis; record today’s date on the x-axis
- 6 For subsequent weeks, repeat Step 5
- 7 Apply this information to Dashboard or Boundary Conditions

# Schedule Prediction Exercise

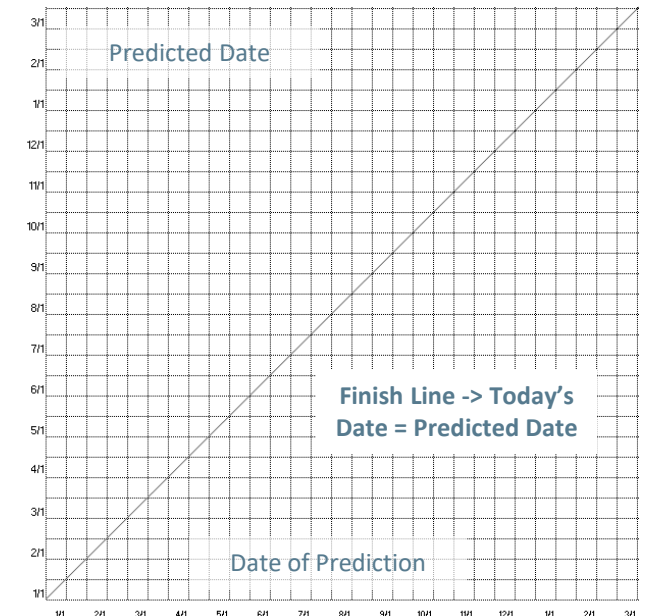
# SCHEDULE PREDICTION ACCURACY: EXERCISE

Using the program schedule data above:

- Construct a Schedule Prediction Accuracy Chart
- Connect line segment for each milestone in the same color
- Extend the line segment to intersect the diagonal for each milestone, and stop there

*Note that the dates are updated every two months (March, May, July, and September)*

Date of schedule	Finish Line	Kick off	EVT	DVT	PVT	FCS
1/1/14	1/1/14	2/28/14	4/15/14	7/15/14	9/30/14	10/20/14
3/1/14	3/1/14	3/15/14	5/1/14	7/15/14	9/30/14	10/20/14
5/1/14	5/1/14		6/15/14	9/15/14	10/31/14	11/15/14
7/1/14	7/1/14			9/15/14	10/31/14	11/15/14
9/1/14	9/1/14			9/15/14	1/15/15	1/31/15



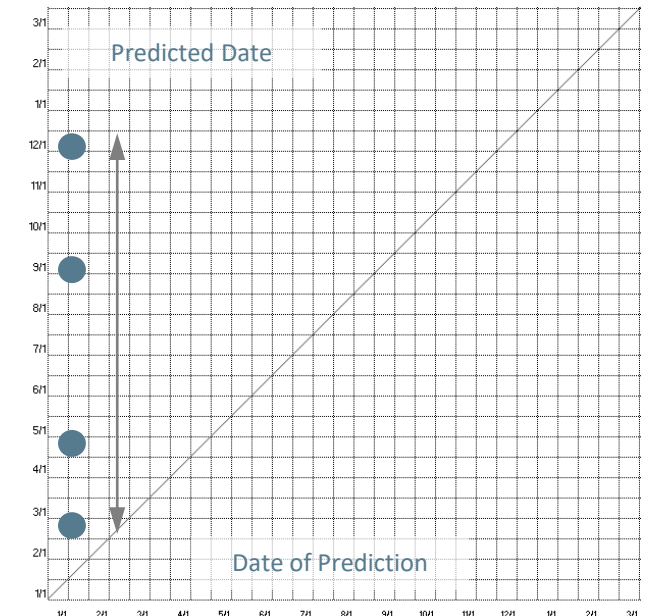
# SCHEDULE PREDICTION ACCURACY/SLIP RATE: EXERCISE

This is how to plot the first set of points – think of a tabular schedule that is created on January 1<sup>st</sup>

Then, going vertically, plot individual points that represent the future milestones. It is a bit confusing, but try to plot them vertically.

Once plotted for the first schedule, then get prepared to plot the dates for the next schedule, which was published on March 1st

Date of schedule	Finish Line	Kick off	EVT	DVT	PVT	FCS
1/1/14	1/1/14	2/28/14	4/15/14	7/15/14	9/30/14	10/20/14
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5/1/14	5/1/14		6/15/14	9/15/14	10/31/14	11/15/14
7/1/14	7/1/14			9/15/14	10/31/14	11/15/14
9/1/14	9/1/14			9/15/14	1/15/15	1/31/15



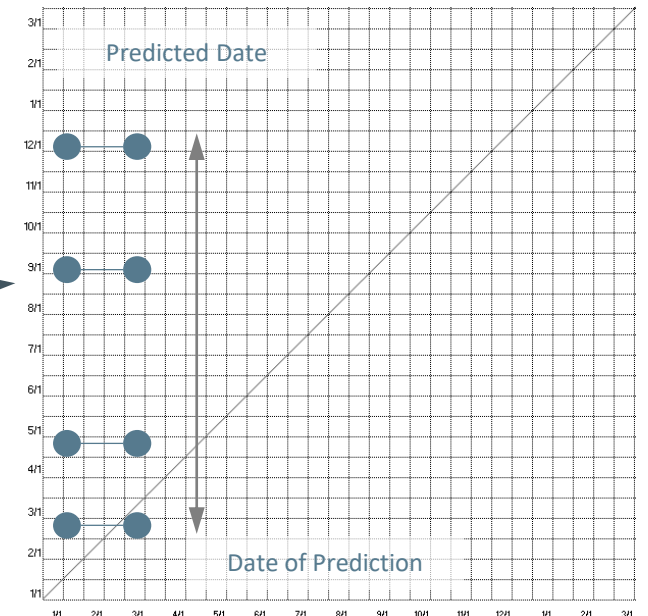
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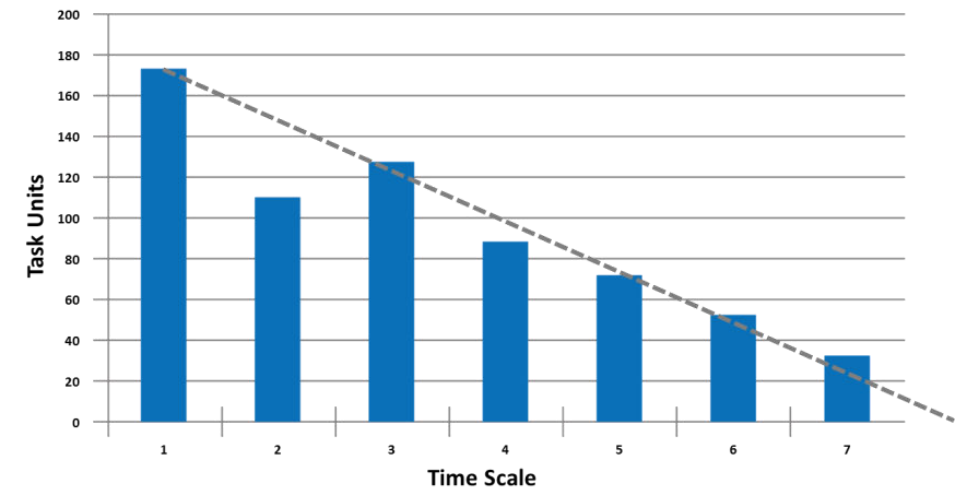
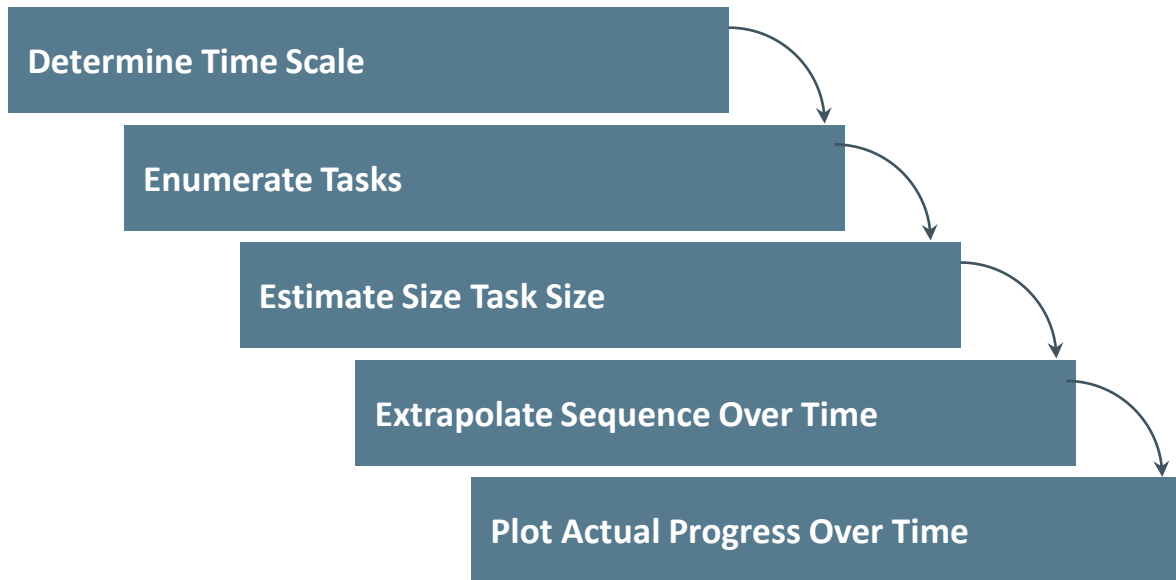
# TASK BURN-DOWN CHARTS

- It is often difficult to tell how much progress has been made on a project
- What are ways to make the intangible, tangible? How can this be done in a sufficiently detailed manner so that you can detect slips early?
- Granular progress monitoring methods include
  - Monthly reports
  - Deliverable hit rate
  - Weekly meetings
  - Gantt charts
  - Tabular schedule
  - Burn Down Charts are one of the most precise schedule monitoring tools:  
it pinpoints exactly where we are
  - And what we have yet to do...

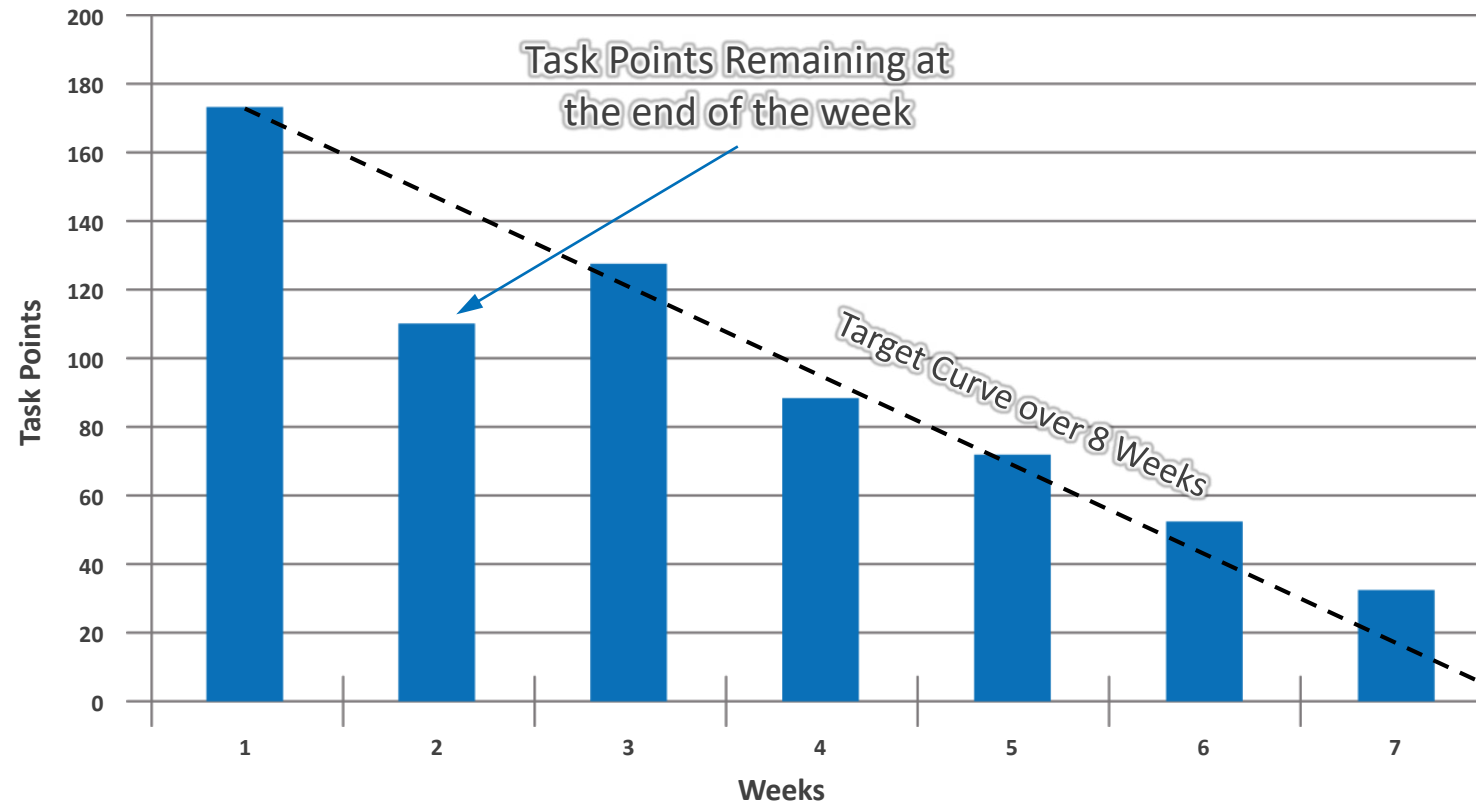


# TASK BURN-DOWN CHARTS

- Application of the Agile methodology
- Shows the team's and partner's actual progress
- More meaningful than a Gantt chart
- Shows actual work accomplished versus planned



# TASK BURN-DOWN CHARTS



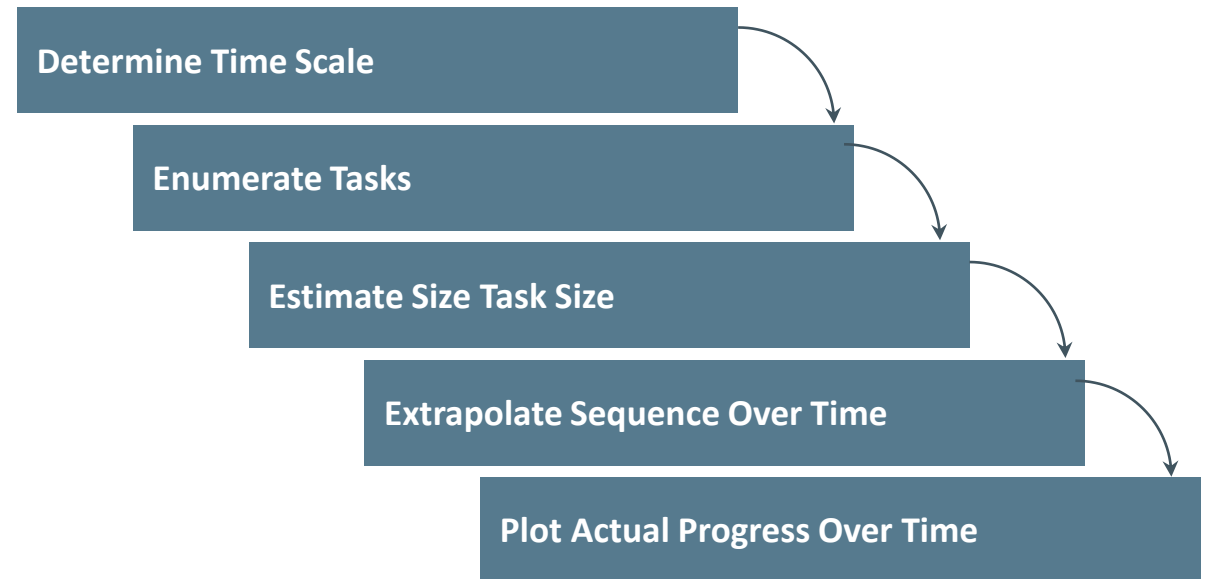
- Vertical axis indicates the number of Task Points over time
- Horizontal axis indicates the number of weeks contained within a sprint

*Note: Task Points could be person-hours, story points, or an internally created measure of effort*



# CREATING BURN-DOWN CHARTS

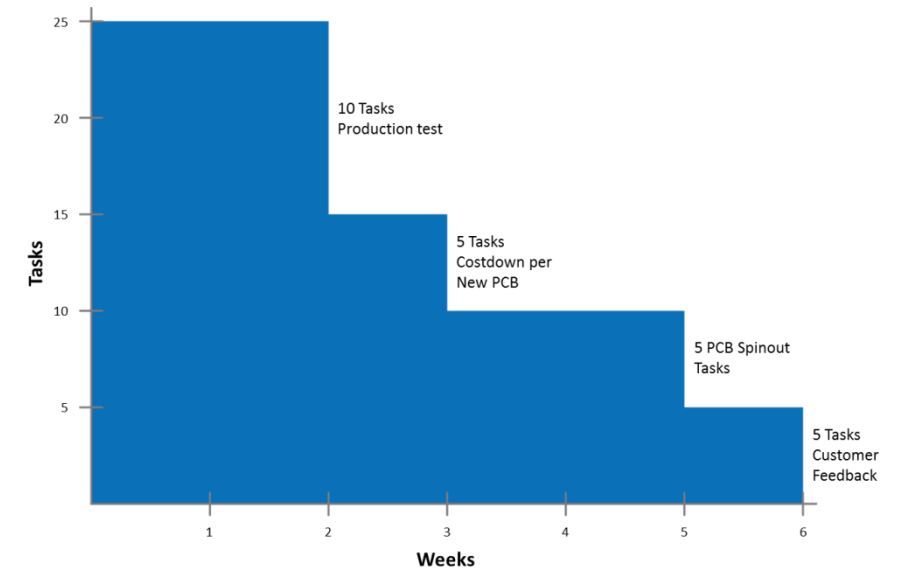
- For the most granular view, choose a scale equal to or less than that of a major milestone (8 weeks)
- From Team PERT or WBS create a list of tasks that should be completed during that time period
- For each task, size them using very coarse sizing (Tee shirt or Fibonacci is commonly used)
- Assign a numerical value to each task and total them up
- Create the target line by extrapolating that total down to zero over the interval time period
- Plot points remaining after each week – points can increase!



# Task Burn-Down Chart Exercises

# BURN-DOWN CHART: EXERCISE

- 1 Create a Burn-Down chart for a Wireless Partner
- 2 Assume an approximately 12-week interval, use a Fibonacci series for sizing
- 3 This scales to a task having 1, 2, 3 and 5 points
- 4 Create the total and then draw the target Burn-Down line on a flip chart
- 5 Draw a few hypothetical weeks and label what was accomplished



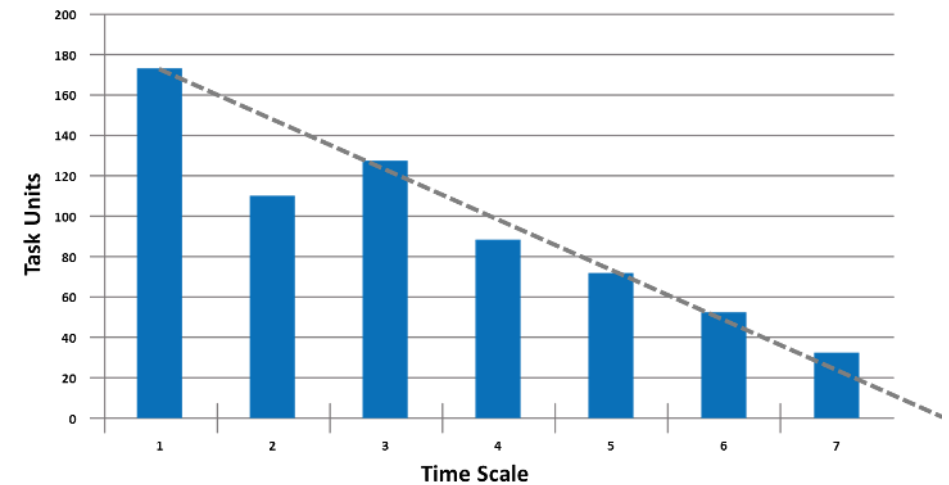
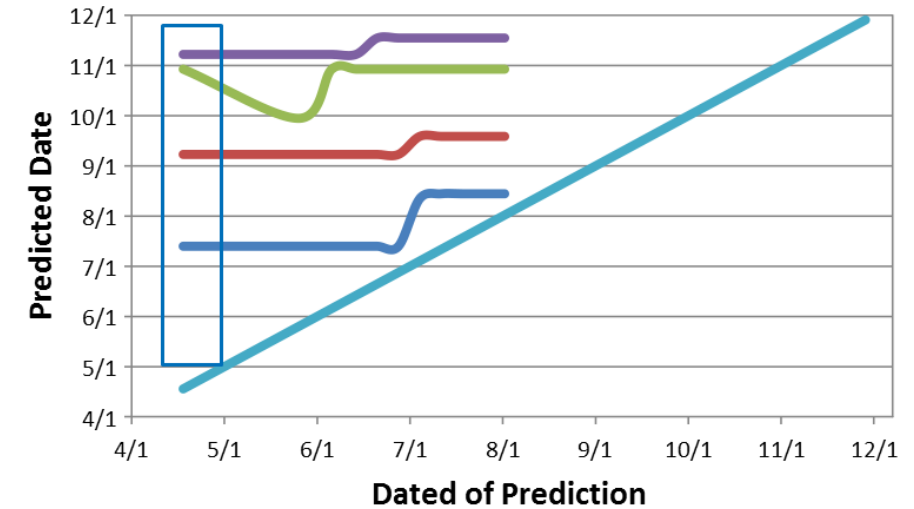
\* A Fibonacci series, often found in nature, is created by adding recursively the two preceding numbers in the series together and continuing that (1, 2, 3, 5, 8, 13, etc.). There are many methods for assigning story points to size tasks in software quickly (Fruit, Tee Shirts, Fibonacci, and others)

# WELL, WHAT IS IT? WHAT ARE YOU TELLING ME?

We have just learned two new skills:

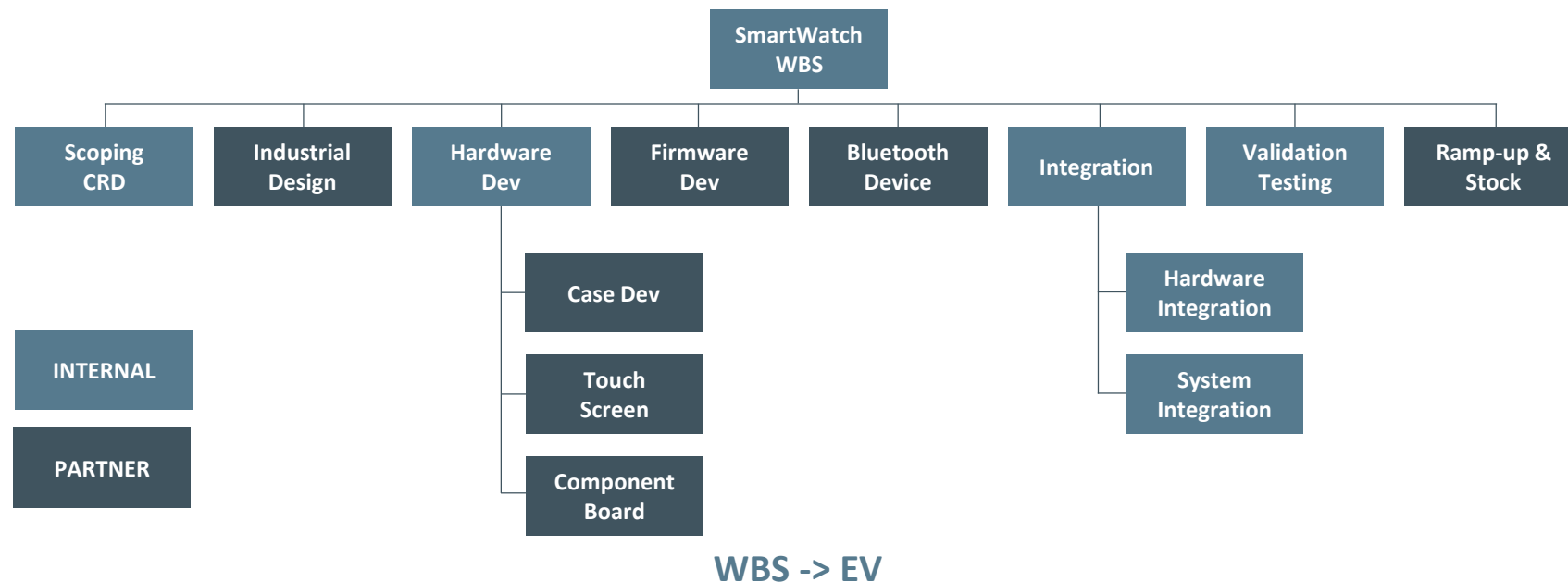
Task Burn-Down Charts and Schedule Prediction Accuracy Charts

Why? Which one is best for what?



# WBS: MANAGING EXECUTION THROUGH EARNED VALUE

- WBS is one of the most effective ways to manage AND monitor execution
- You first plan the work, and then you work the plan
- Results in a very well managed program HOWEVER
  - It requires more work to plan, and more work to monitor
- Earned Value allows you to understand both cost and schedule at the same time



# CONTEXT: WHY EARNED VALUE?

## Many ways of monitoring budgets

- Invoices
- Deliverables
- Tracking project time
- Resource tracking
- Spreadsheets
- Earned Value (EV)
- EV is most precise/robust tool for pinpointing exactly where the project stands – relative not just to progress but to completion in terms of both budget and schedule!
- You can learn so much from an EV chart
  - Where you are re: schedule
  - Where you are re: budget
  - Where you are with *cost to complete* and *time to complete*!

# PROJECT TRACKING: FIVE KEY ELEMENTS

BCWS	Budgeted Cost of Work Scheduled
BCWP	Budgeted Cost of Work Performed
ACWP	Actual Cost of Work Performed
BAC	Budget at Completion
EAC	Estimate at Completion

# PROJECT TRACKING: SCHEDULE VARIANCE

BUDGET BASED

BC WS  
BC WP

of the work I scheduled to have done,  
how much did I budget for it to cost?

of the work I actually performed, how  
much did I budget for it to cost?

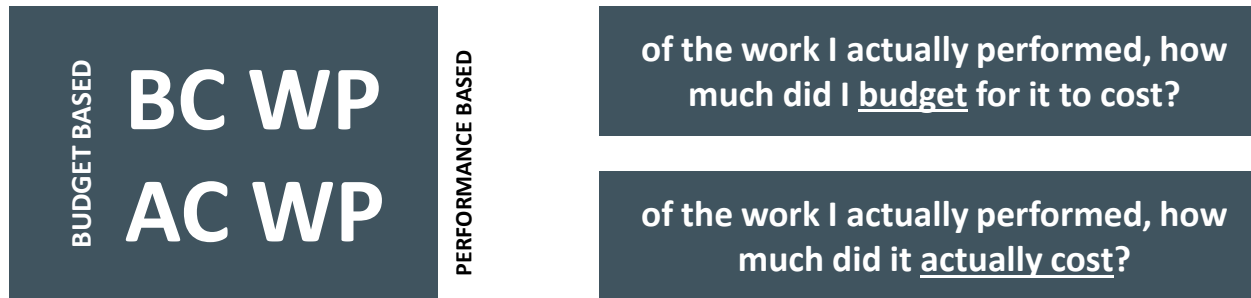
SCHEDULE VARIANCE is the difference between work scheduled and work performed (expressed in terms of budget dollars)

Formula:  $SV \$ = BCWP - BCWS$

Example:  $SV = BCWP - BCWS = \$1,000 - \$2,000$   
 $SV = -\$1,000$  (negative = behind schedule)



# PROJECT TRACKING: SCHEDULE VARIANCE



COST VARIANCE is the difference between budgeted cost and actual cost

Formula:  $CV \$ = BCWP - ACWP$

Example:  $CV = \$5,000 - \$7,500$   
 $CV = -\$2,500$  (negative = overrun)

# PROJECT TRACKING: SCHEDULE VARIANCE

BUDGET BASED  
BAC  
EAC

what the total job is supposed to cost

what the total job is expected to cost

VARIANCE AT COMPLETION is the difference between what the total job is supposed to cost and what the total job is now expected to cost.

Formula:  $VAC = BAC - EAC$

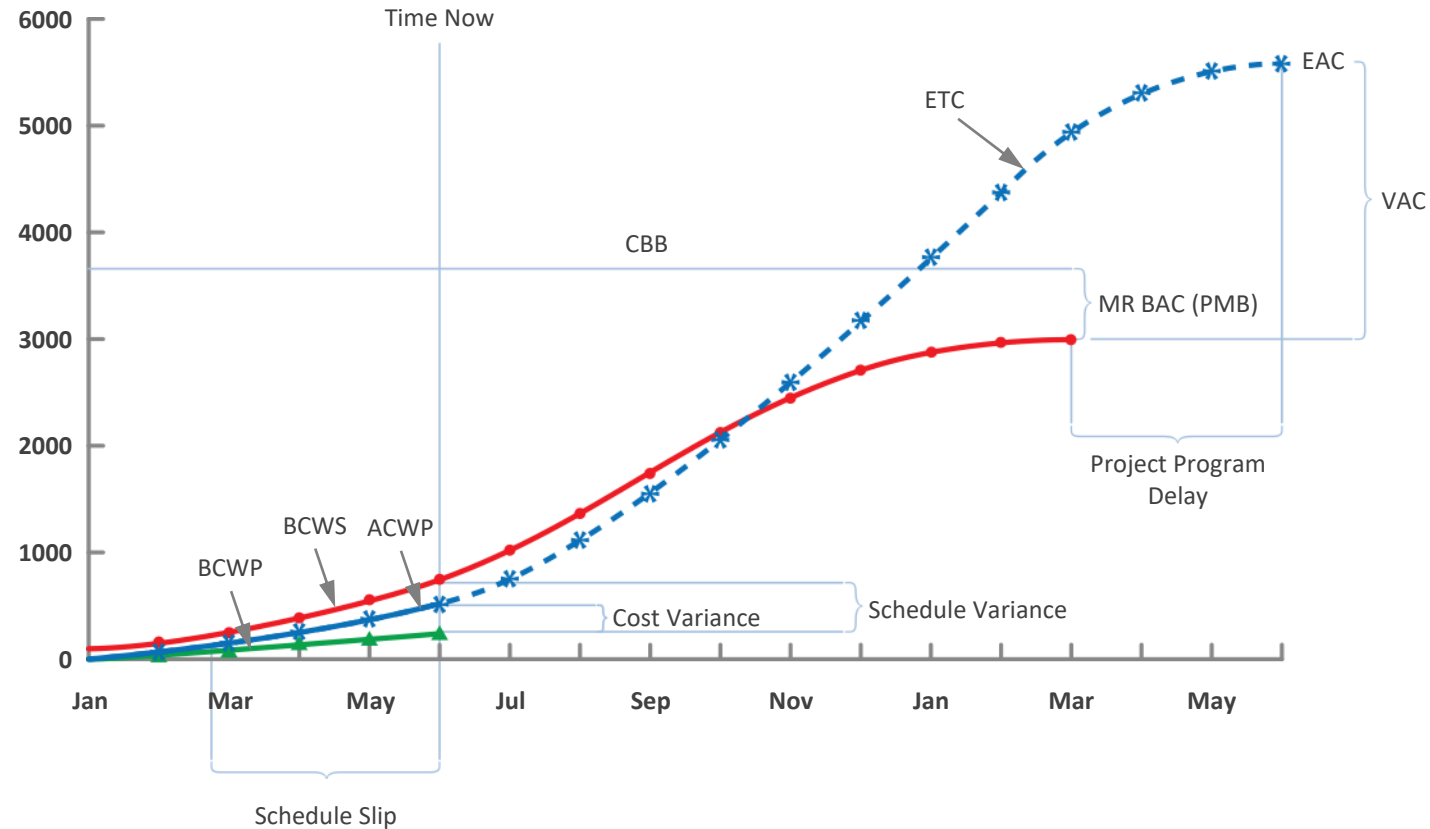
Example:  
 $VAC = BCWP - ACWP = \$1,000 - \$2,400$   
 $VAC = -\$1,400$  (negative = cost overrun)

# PROJECT TRACKING: FIVE BASIC QUESTION/PARAMETERS

QUESTION	ANSWER	ACRONYM
How much work <u>should</u> be done?	Budgeted Cost for Work Scheduled	BCWS
How much work <u>is</u> done?	Budgeted Cost for Work Performed	BCWP
How much did the <u>is done</u> work cost?	Actual Cost of Work Performed	ACWP
What was the total job <u>supposed</u> to cost?	Budget at Completion	BAC
What do we <u>now expect</u> the total job to cost?	Estimate at Completion	EAC

Source: *Resource Consumption and Project Tracking – Metrics* , Hale, MIT, 2003, p 24

# PROJECT TRACKING: EARNED VALUE DATA ELEMENTS – PROJECTIONS



Source: *Resource Consumption and Project Tracking – Metrics*, Hale, MIT, 2003, p 27

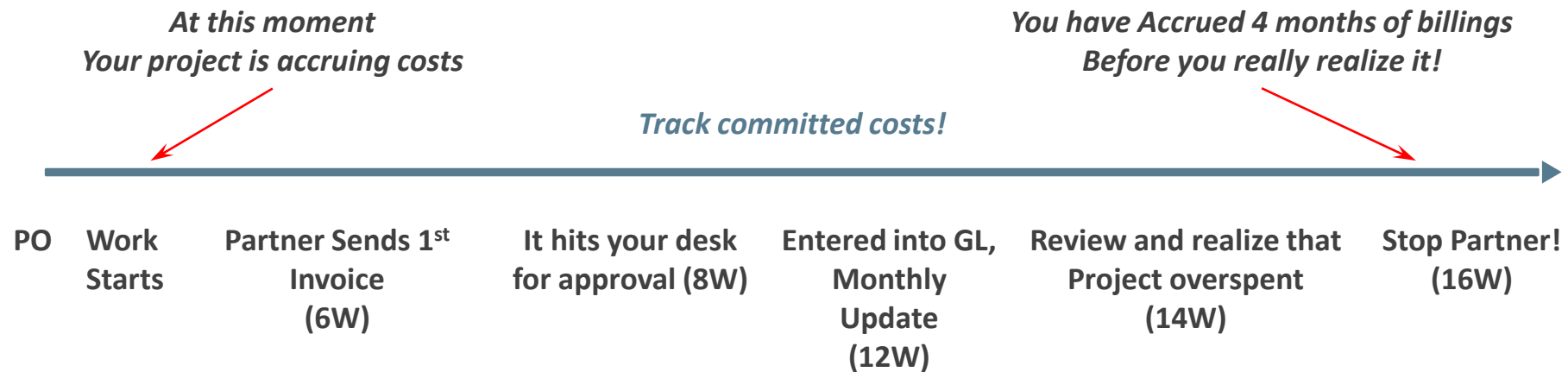
# ACCOUNTING AND BUDGETS

The **accrual method** records income items when they are earned and records deductions when expenses are incurred

Invoicing for work done, the corresponding amount will appear in the books even though no payment has yet been received

***Much trouble can be caused*** because of the many delays in the accounting cycles

The **cash method** records income items when the cash comes in the door, and records deductions when checks are written



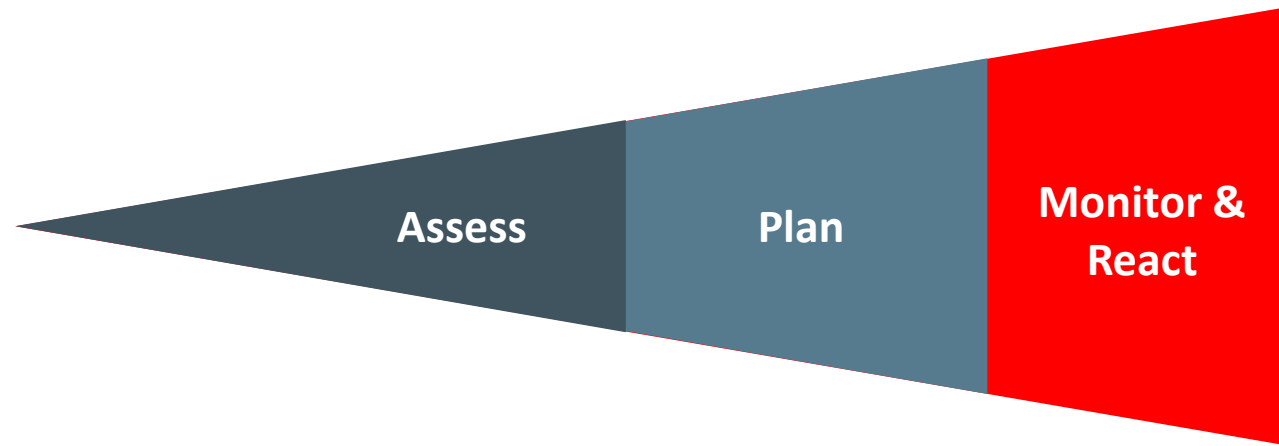
# EARNED VALUE AND DELINQUENT PARTNERS: EXERCISE

## Exercise

- Linear spending trend from Partners
- But you find that partner is not doing the work
- They are continuing to bill us, but we are behind
- What should we do with Partner?
  - To stop the overage
  - To correct things going forward
- So where is the budget to date?
- How much to finish?

# Risk Monitoring

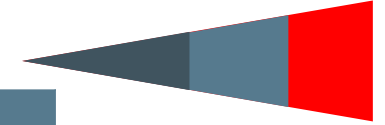
# ESSENTIAL PROCESSES FOR MANAGING RISKS



- **Assess** – Learn from the past, create checklist, review prior audits, go outside, generate list of potential risks
- **Plan** – Perform impact and probability analysis, prioritize, and make plans
- **Monitor** – Keep an active watch for trouble by monitoring predictive metrics
- **React** – Re-mediate if and when there is trouble



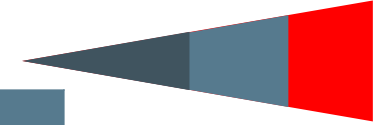
# RISK RESPONSE OPTIONS



Risk Response	Description	Examples/Notes
Avoidance	Avoiding the risk. Changing the project plan to eliminate the risk. Changing the project plan to protect a project objective from the impact.	Reducing the scope remove high-risk tasks. Adding resources or time. Adopting a proven approach rather than new one. Removing a “problem” resource.
Acceptance	Accepting the consequences of the risk. The project plan is not changed to deal with the risk. A better response strategy cannot be identified.	Active acceptance. Passive acceptance. No action. Contingency allowance (reserves). Communication plan around possible major cost increases if this risk occurs.
Monitor and prepare	Accepting the risk for now. Closely monitor the risk and develop alternate action plans proactively if the event occurs.	Contingency plan. Fallback plan. Establish criteria that will trigger the implementation of the response plans.

Source: Project Management, Absolute Beginner's Guide, Gregory Horine Que Publishing, Indianapolis 2013

# RISK RESPONSE OPTIONS



Risk Response	Description	Examples/Notes
Mitigation	<p>Taking action to reduce the likelihood that the risk will occur.</p> <p>Taking action to reduce the impact of the risk.</p> <p>Reducing the probability is always more effective than minimizing the consequences.</p>	<p>Adopting less complex approaches.</p> <p>Planning on more testing.</p> <p>Adding resources or time to the schedule.</p> <p>Assigning a team member to visit the seller's facilities frequently to learn about potential delivery problems as early as possible.</p> <p>Providing a less-experienced team member with additional training.</p> <p>Deciding to prototype a high-risk solution element.</p>
Transference	<p>Transferring ownership of the risk factor.</p> <p>Shifting the consequence of a risk and the ownership of the response to a third party.</p>	<p>Outsourcing difficult work to a more experienced company.</p> <p>Fixed price contract.</p> <p>Contract, insurance, warranties, guarantees, and so on.</p> <p>Used most often for financial risk exposure.</p> <p>Does not eliminate the risk.</p>

Source: Project Management, Absolute Beginner's Guide, Gregory Horine Que Publishing, Indianapolis 2013

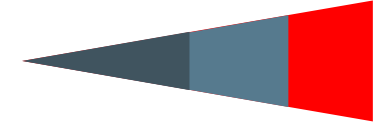
# ESSENTIAL PROCESSES FOR MANAGING RISKS

## Which Business Problems Does the Tool Solve?

- Innovation brings with it additional risks which can still be managed by the team on its own
- Helps improve project execution because it can help the team anticipate, prevent, and mitigate risks

## Benefits:

- You can identify risks before they occur
- There is a reduction of risk impact due to early detection
- Quantitative metrics that help clarify when to act on a risk item
- Action accelerates because of the clear thresholds and the agreement to follow a process



# RISK MANAGEMENT MATRIX

Status	Risk	Impact	Likelihood	Metric	Threshold	Current Value	Date	Action Plan
	Global team does not communicate frequently enough. Want to keep weekly communication high.	4	7	Meetings per week	2	2.5	Current	Invoke team's elevation plan, purchase videoconferencing systems, change incentives.
	Data captured on long forms from online interaction sessions must not be lost if user gets error message or returns to screen.	6	6	% Data Lost	10%	25%	Q3 FY 13	Design review current forms layout, bring in Expert Co. consulting firm, change staff balance.
	Server must respond to users rapidly under fairly high loads – expect page to be updated way under a second.	7	7	Ms at 1000 Users	259	1000	Q2 FY 13	Add architect and create tiger team with system optimization experience.
	Financial partner cooperation is critical to this household finance program, and we need to have a sufficient number at launch	4	6	Institutions	1000	247	Q3 FY 13	Increases business development staff, change incentive compensation, add external business development firm.
	Mobile operating system support must be in place at the same time as launching the desktop version.	5	6	On Time	Q4 FY 14	Q4 FY 14	Current	Track schedule prediction accuracy. If slip then recruit internal team from Vietnam (permission already granted).

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	Server must respond to users rapidly under fairly high load. Must be updated with new data.	7	7	Ms at 1000 Users	259	1000	Q2 FY 13	What to do if Threshold reached Add staff and create tier team experience.
	Financial partner cooperation is critical to this household finance program, and we need to have a sufficient number at launch	4	6	Institutions	1000	247	Q3 FY 13	Increases business development staff, change incentive compensation, add external business development firm.
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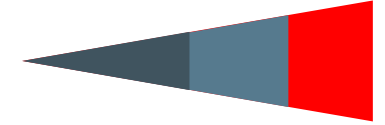
**Impact of Risk**  
1 = Low, 10 = High

**Likelihood**  
1 = Low, 10 = High

**Metric Value**  
triggering action

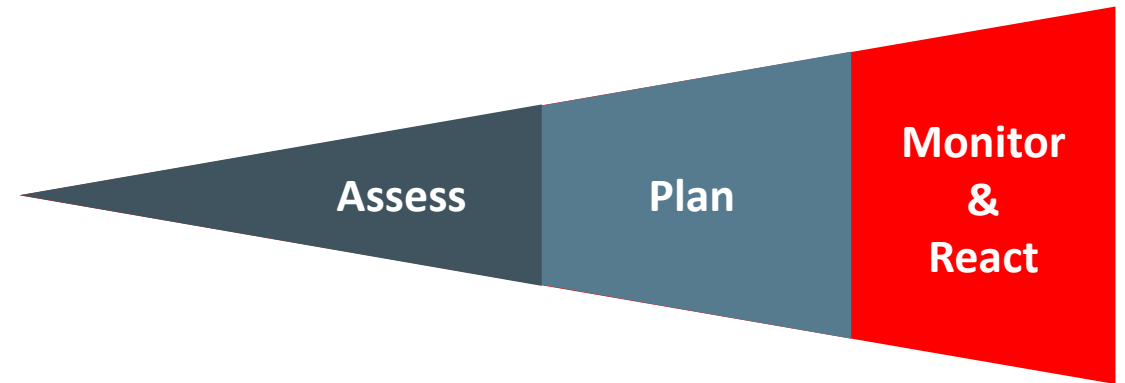
# CONTROLLING RISKS

- **Tackle high risk tasks first**
  - Maximize resources on high-risk tasks
  - Postpone low-risk tasks
- **Use iterative, phased approaches**
  - Frequent, smaller deliverables reduce overall risk
- **Change the way you design**
  - Create a better balance between theory and experimentation; lean more on experimentation to get fast answers
  - Get to “no” more quickly on parallel paths
- **QA the planning process**
- **Leverage independent QA audits**



# MITIGATING RISKS: ALTERNATIVES

- ① Soft Skills
- ② Meetings
- ③ Dot Voting
- ④ Out of Bounds
- ⑤ Communication Paths
- ⑥ Fast Tracking and Crashing



These Tools are for the “Monitor and React” phase

# SOFT SKILLS: EXECUTING

A successful Program Manager has these critical soft skills

Is the leader of communications:  
sets the tone and protocols for them

When there are breakdowns, emphasizes  
*the outcome* the team is trying to produce  
not who is to blame



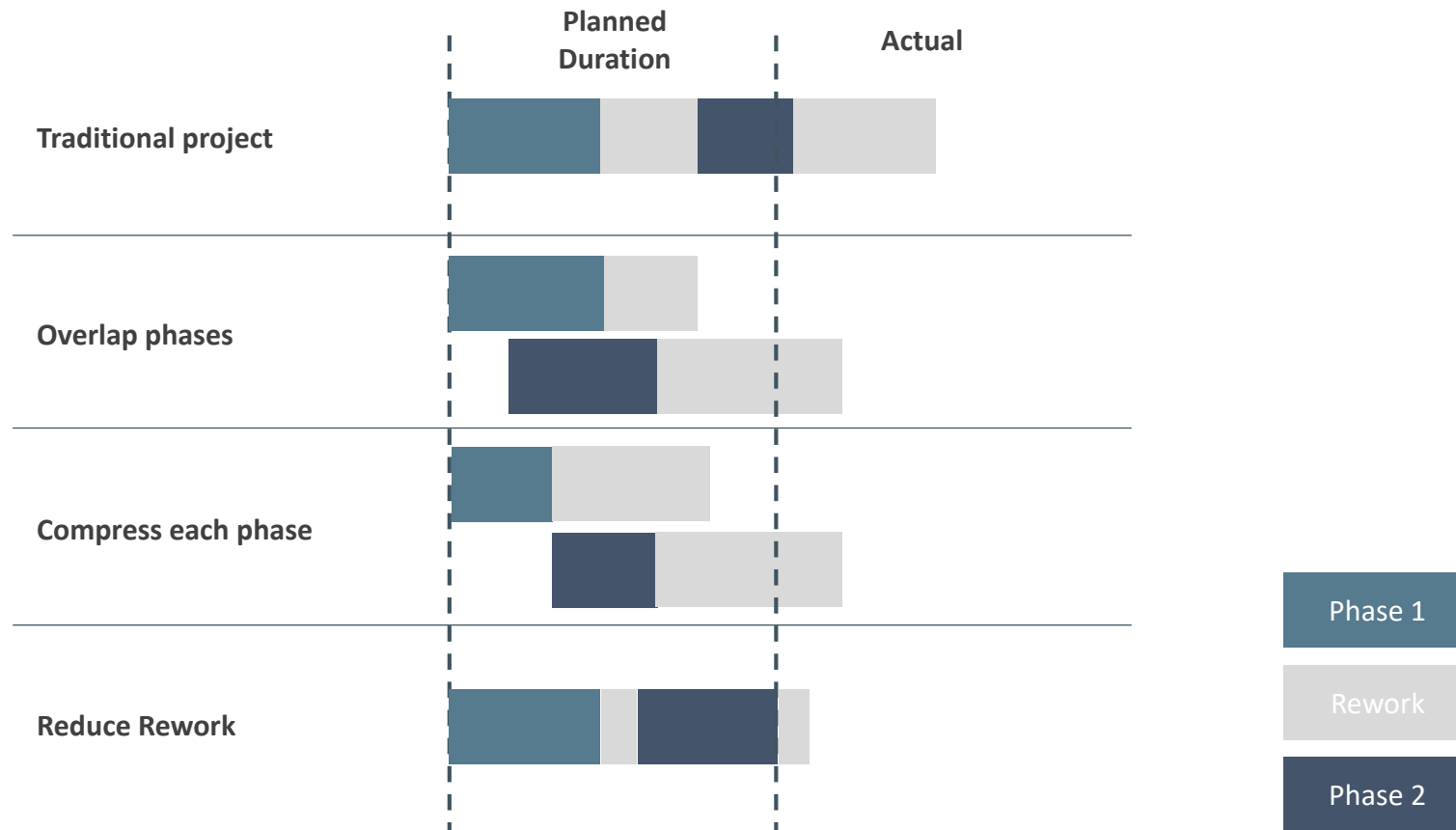
# MANAGING YOUR TEAM & MEETINGS

- “Smooth” program management starts by running effective meetings
- Communicating effectively outside of team meetings is where the real work gets done however
- Focusing on the outcome rather than on blaming people
- Establishing clear priorities and sticking with them
- Tracking the status of each activity (sub-project) within the project
- Using metrics to see the big picture and to drive improvement



- DOCUMENTS: Communication protocols, Metrics dashboard, Priority lists (These are suggested, not in place yet at D+M)

# FAST TRACKING & CRASHING TASKS

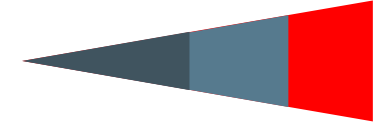


Worry about taking shortcuts that only cause delay because of more rework

Source: *Dynamics of Project Performance: System Dynamics and Project Management*, Lyneis, MIT, 2003, p 16

# EXERCISE: MONITORING RISK

Possibilities:



Build a Risk Management Matrix from a project

Have a role-playing scenario where a risk has crossed the threshold and Partner is not responding well

# COMMUNICATION PATH TOOL

## Ensuring Teams Communicate

### 1 What is the Tool?

- A diagram describing key communication paths and information flow
- Describes various “issue paths” useful for getting the teams aligned initially
- Contains key standing meetings, executive reviews, and external partner meetings

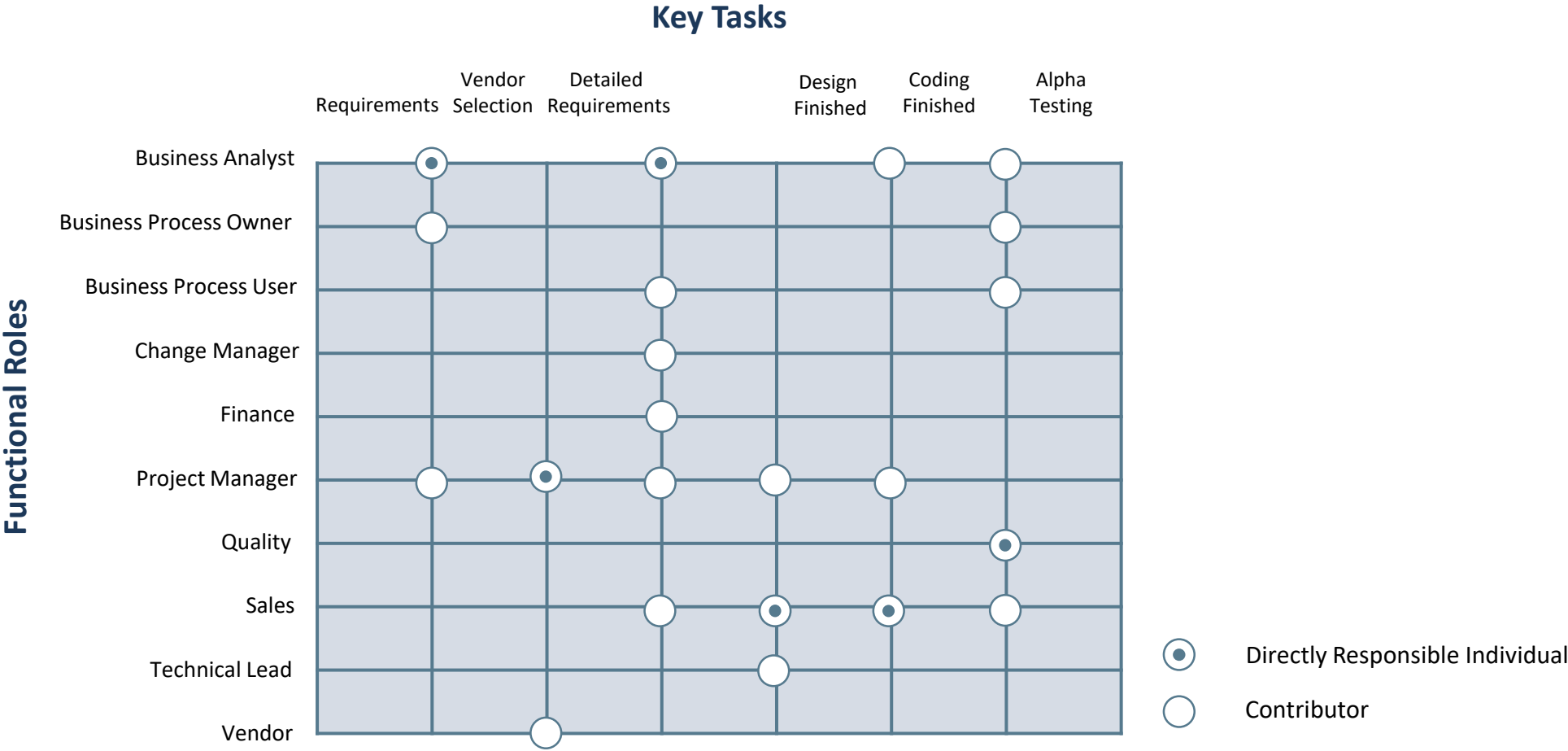
### 2 Which Business Problems Does the Tool Solve?

- Clarifies who should be notified in given situations
- Clarifies to management how the team will communicate outside itself
- Ensures that groups outside the Core Team have an opportunity to interact

### 3 Benefits

- Creates blame free paths to communicate bad news, and come to quick resolution
- Ensures that decisions are made quickly since the stakeholders have been identified per decision type/meeting type/issue type

# CIRCLE DOT CHART



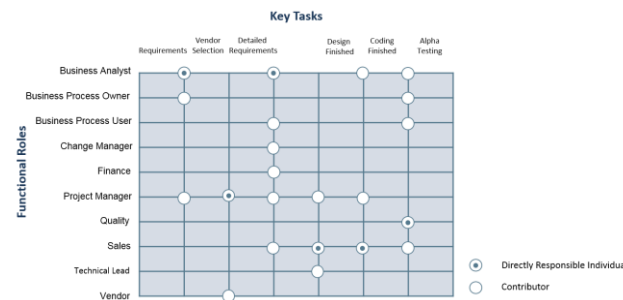
# CIRCLE DOT CHART

## What is the Tool?

- The Circle Dot Chart illustrates the directly responsible individual and contributors for each key project deliverable
- The vertical axis identifies the key functional team members, and the horizontal axis identifies the key project deliverables
- With this tool, the team shares a common understanding of who contributes to, and who owns, the delivery of these key milestones

## Which Business Problems Does the Tool Solve?

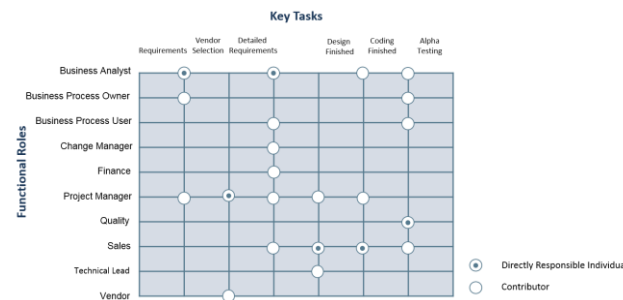
- Besides unclear requirements, unclear responsibilities are one of the leading causes of program delays
- Providing the team with a crisp picture of key deliverables tied to key functions reduces this problem



# CIRCLE DOT CHART

## How to Apply the Tool

- The project manager fills out a rough draft of the chart and then holds a review with the team
- They identify key tasks (approximately 5-15) from the project plan and put them in time sequence across the top of the chart
- Next, they list the key functions responsible for delivering the program
- Differentiate between *participating in* and being *ultimately responsible* for delivering the task
- Any functional group involved in a particular task is indicated by an open circle; the one function that is ultimately responsible for fulfilling the task is represented by a filled-in circle
- All tasks must have one, and only one, directly responsible individual (DRI)



# Circle Dot Chart Exercise



# EXERCISE: CIRCLE DOT CHART

Circle dot chart exercise

Product development with partner

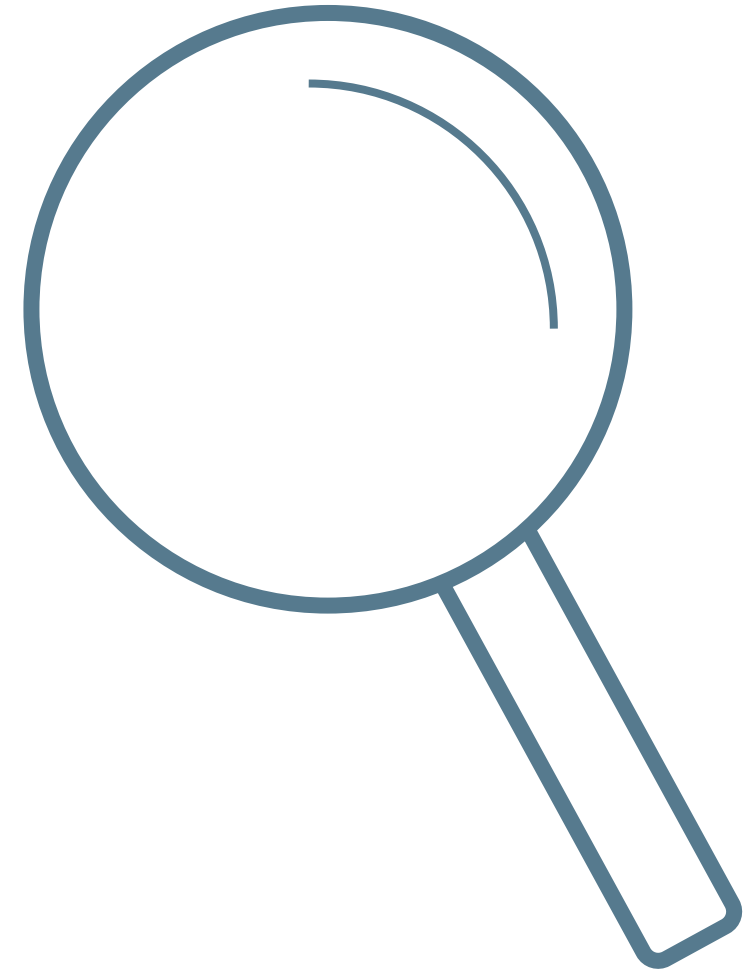
Give them deliverables and they  
determine the  
team and who does what

# PUTTING IT ALL TOGETHER: PROJECT MONITORING DASHBOARD

- In this module we have discussed a large variety of techniques for monitoring projects
- Project Managers and Project Leaders have many of these at their disposal
- What should you have if managing an internal project team or external partner?

## What gets measured, gets managed... so what is important?

- Scope, Cost and Time!
- With the increasing sophistication of tools, comes increased overhead, so let's look at two solutions...



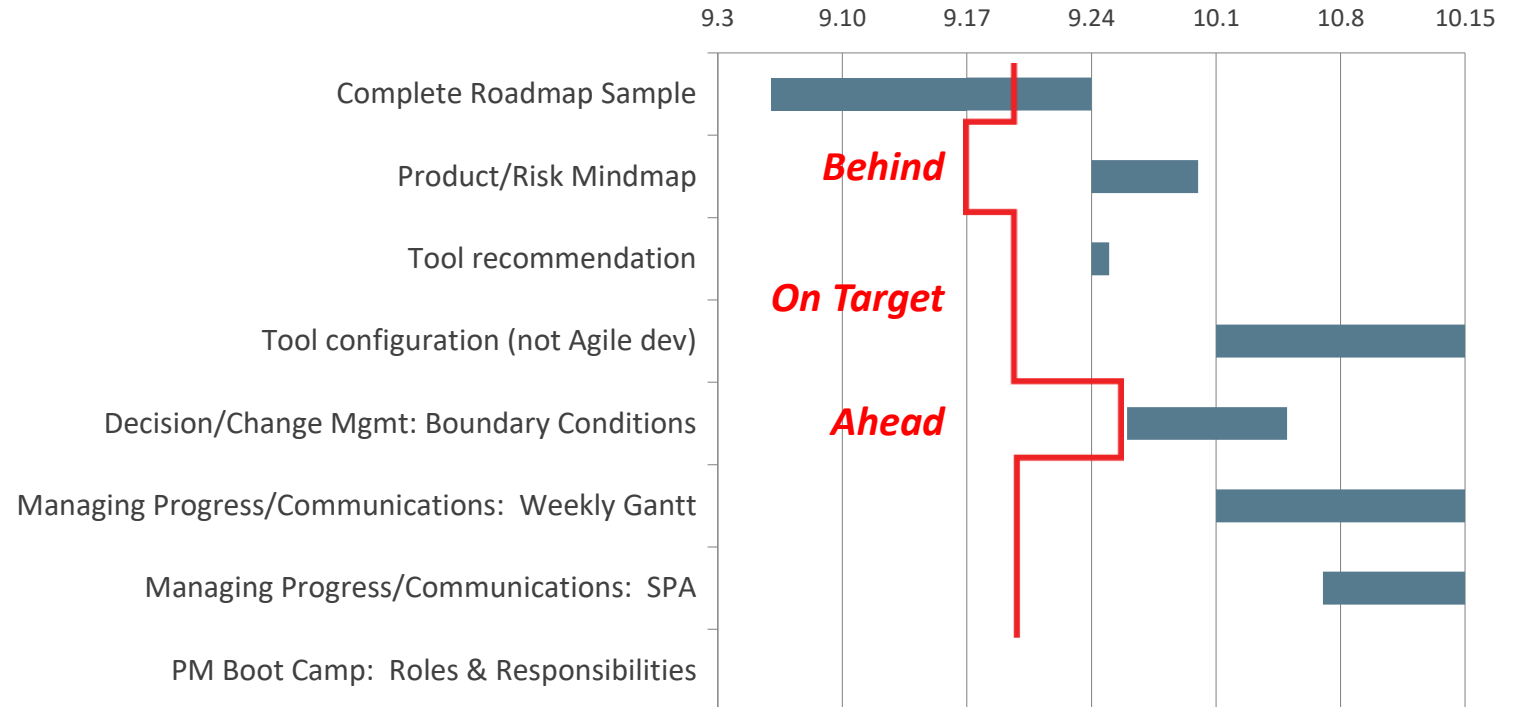
# SIMPLIFIED PROJECT MONITORING DASHBOARD

## Issues:

1. Critical Path Firmware X
2. UI decision C
3. Tooling Release

## Committed Budget:

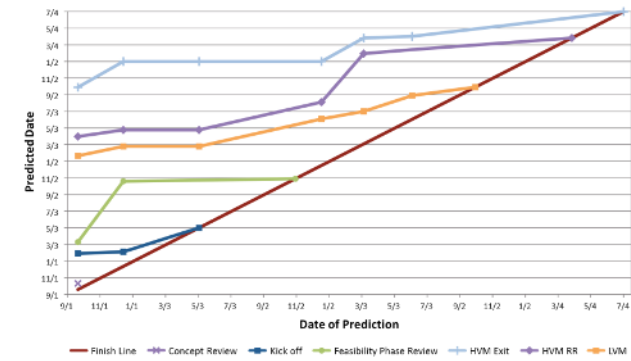
1. Budget to date 156 MM, \$7.6M
2. Actual MM to day 146MM (OK)
3. Partner \$ to date \$7.9M (OB!)



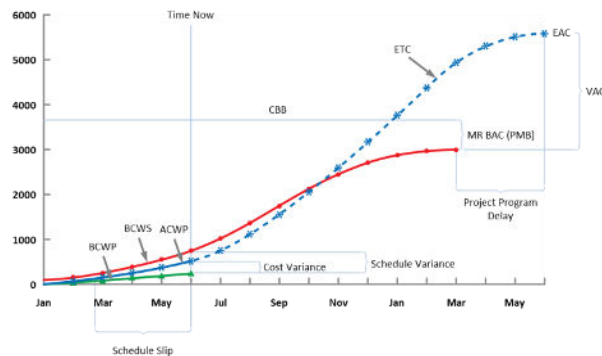
# COMPREHENSIVE PROJECT MONITORING DASHBOARD



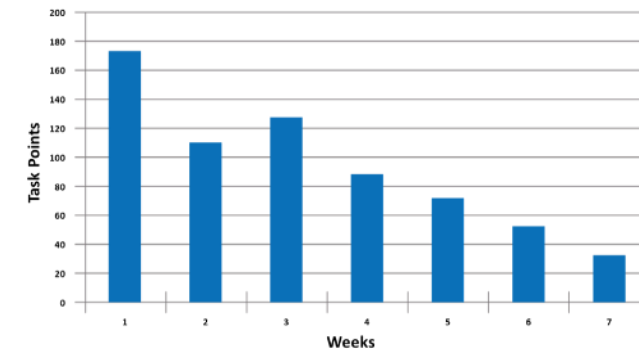
Boundary Condition



Schedule Prediction Accuracy



Earned Value



Task Burn Down



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