Cover

Program Management Basics Simplified Tutorial

For Engineering and Business Management Majors

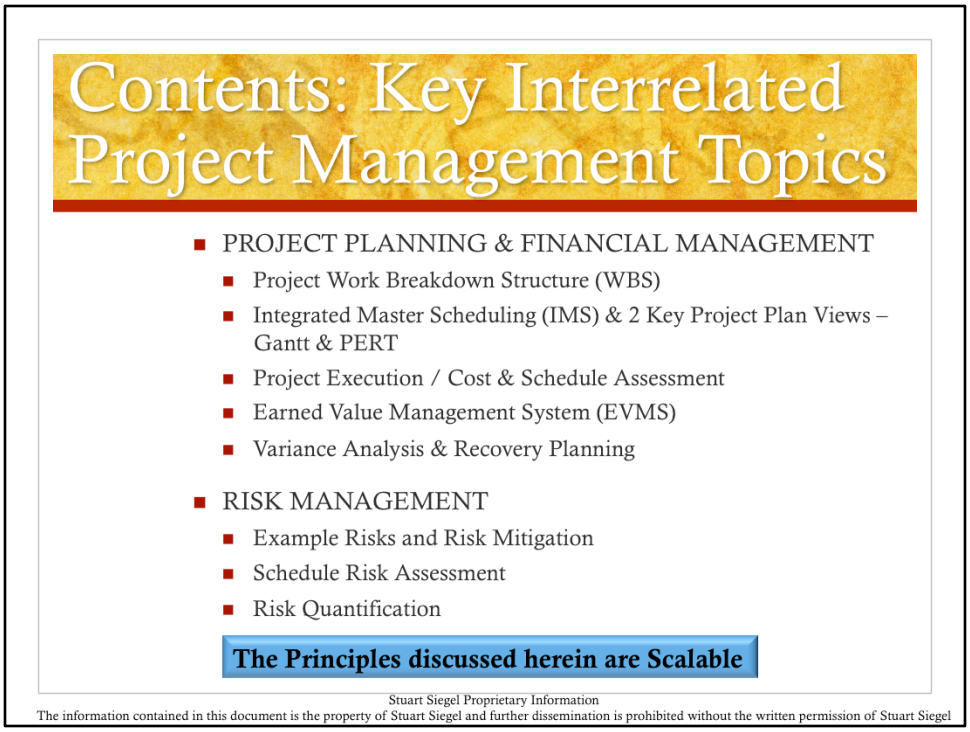
By S. A. Siegel

About the author Stuart A. Siegel:

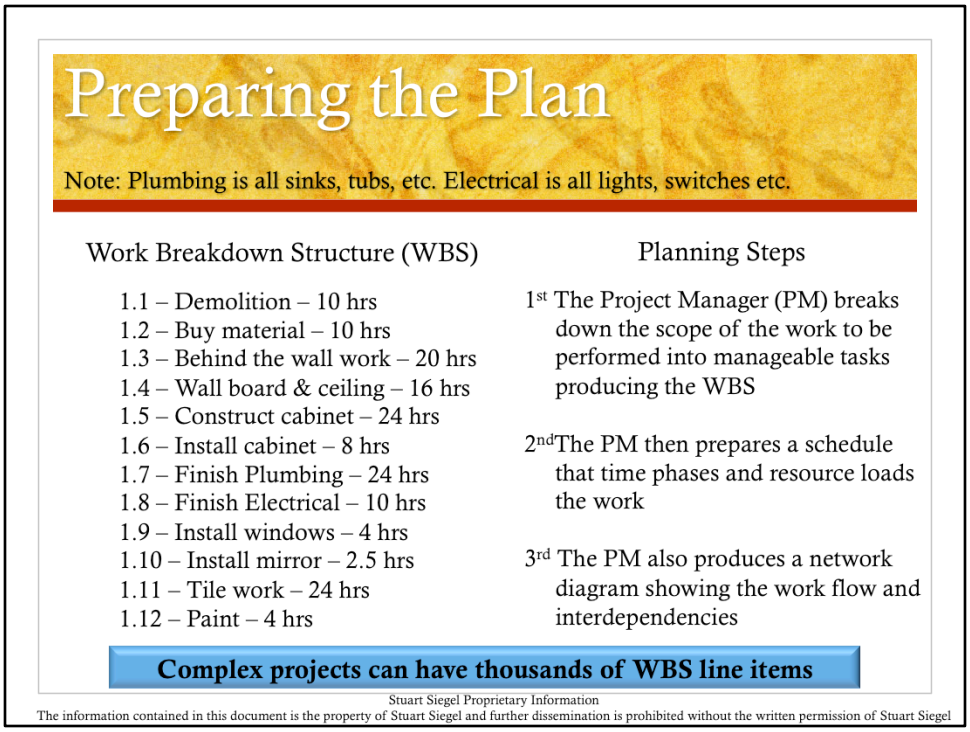
Stuart is a retired electrical engineer and former defense industry executive spanning a career of over thirty years helping to protect those who protect us. He has a Bachelors of Science Degree in Electrical Engineering (BSEE) from the Polytechnic Institute of New York and a Masters of Science Degree in Electrical Engineering (MSEE) from the University of Pennsylvania's Moore School of Engineering. He has written several non-fiction texts for engineers, engineering managers, and program managers providing in depth guides for managing high technology programs, for managing high technology proposals where businesses are in a competitive environment, and for learning program management basics applicable for engineering and business management majors alike.

He was born and raised in Queens New York and currently lives on Long Island New York with his wife. They have three grown children and six grand children. He enjoys skiing, sailing, and golf and in his spare time he writes. Having mostly written non-fiction educational material he is currently experimenting with writing fictional accounts of money, sex and power, within the defense industrial complex.

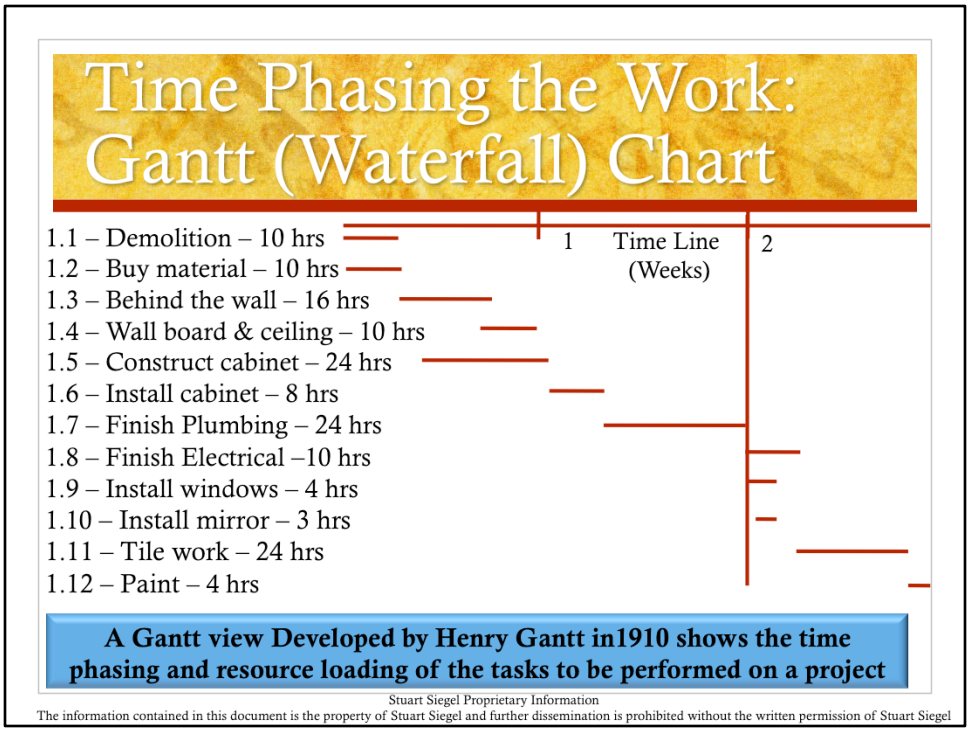
Hi All - This presentation is an introduction to program management for Engineers, MBA students, and anyone wanting to learn the processes key to managing a project. I'm making the following tutorial on Program Management Basics Made Simple available for all who have an interest in self-teaching on this topic. The impetus for my having produced this is based on what I experienced and believe is a short fall in pre-graduate engineering and business college education that is career essential. I've made the messaging simple in this tutorial by using a simple example of re-modeling a bathroom. So let's get started.



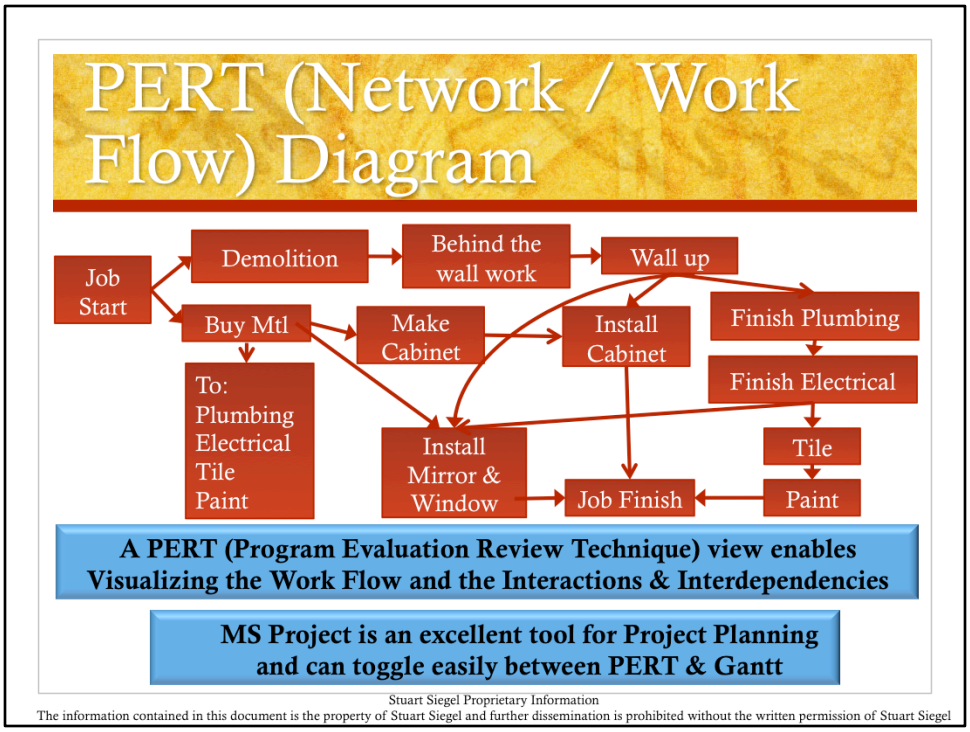
The contents of this discussion will address project planning, tracking, and control of a program and will also delve into the important process of risk management. The goal of what you'll take-away is a solid understanding of these practices and how to apply them. It discusses the following: How to break a project into manageable sub tasks using the Work Breakdown Structure (WBS), Integrated Master Scheduling (IMS) – how to schedule & resource load the tasks using Waterfall / Gantt view, and how to manage the interdependencies of a project using PERT / a NETWORK view of a project. A key aspect of the discussion will be your introduction to the widely used process that assesses the goodness of progress on a project called the Earned Value Management System (EVMS). Also as mentioned the importance of Risk Management and Risk Mitigation will be explained.



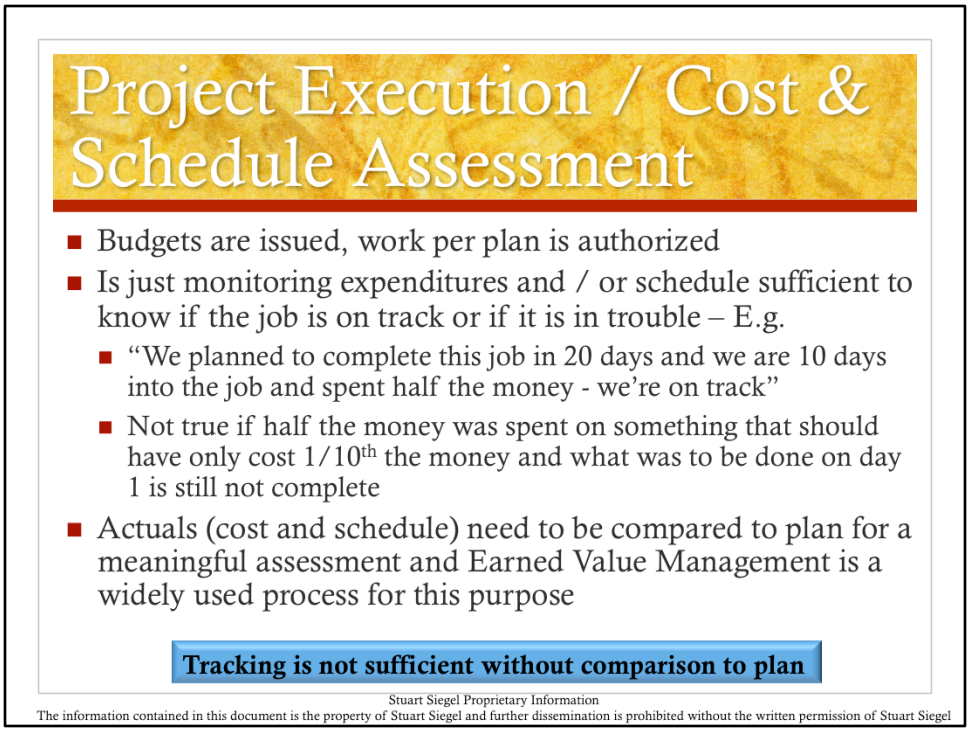
Every project (project & program are interchangeable terms in this discussion) has tasks to occur for completion and in a particular order if the outcome is to be correct. Every program has a labor force with varying skills to perform the tasks and typically every program needs material. So the project must be thought out – by the program manager who breaks down the tasks into a logical sequence (called the work breakdown structure or WBS and estimates the resources needed. So we can see that for this example there is a listing of what is needed to accomplish the re-modeling. We also see there are several labor categories – electrician, plumber, tile person and so on.



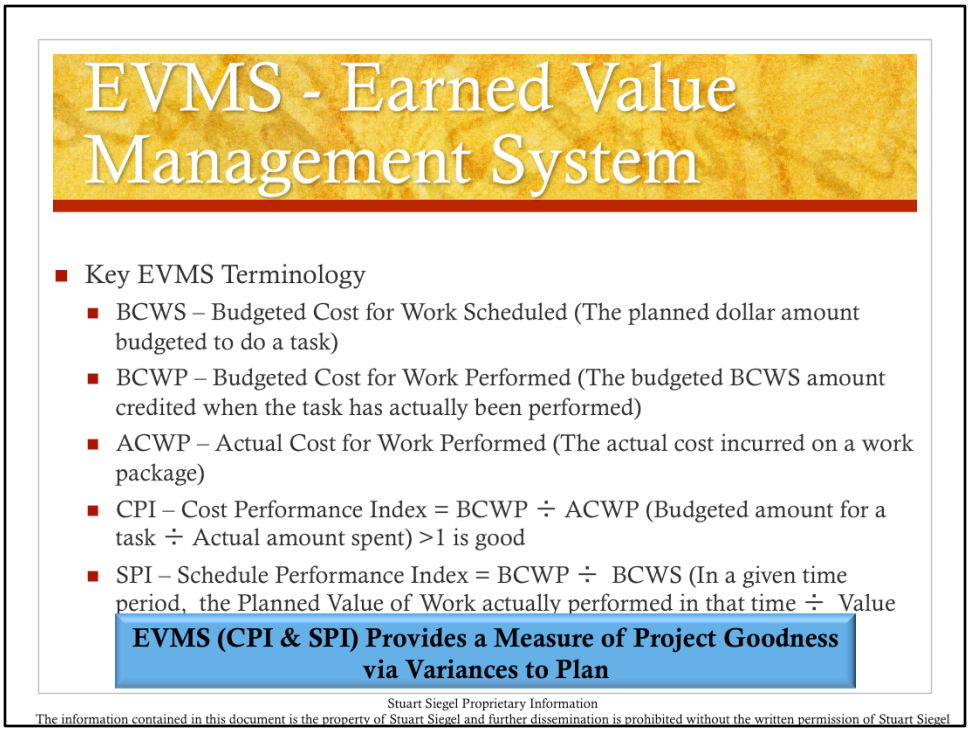
Having developed the WBS, the program manager proceeds to develop the Integrated Master Schedule or IMS for the program that time phases the activities into a waterfall or Gantt view of the project. There are clear interdependencies so some work is heel to toe and others can be done in parallel. Viewing and understanding the interdependencies is a key part of team communication and a supplemental view of the program called PERT or a Network view facilitates this as we will discuss next.



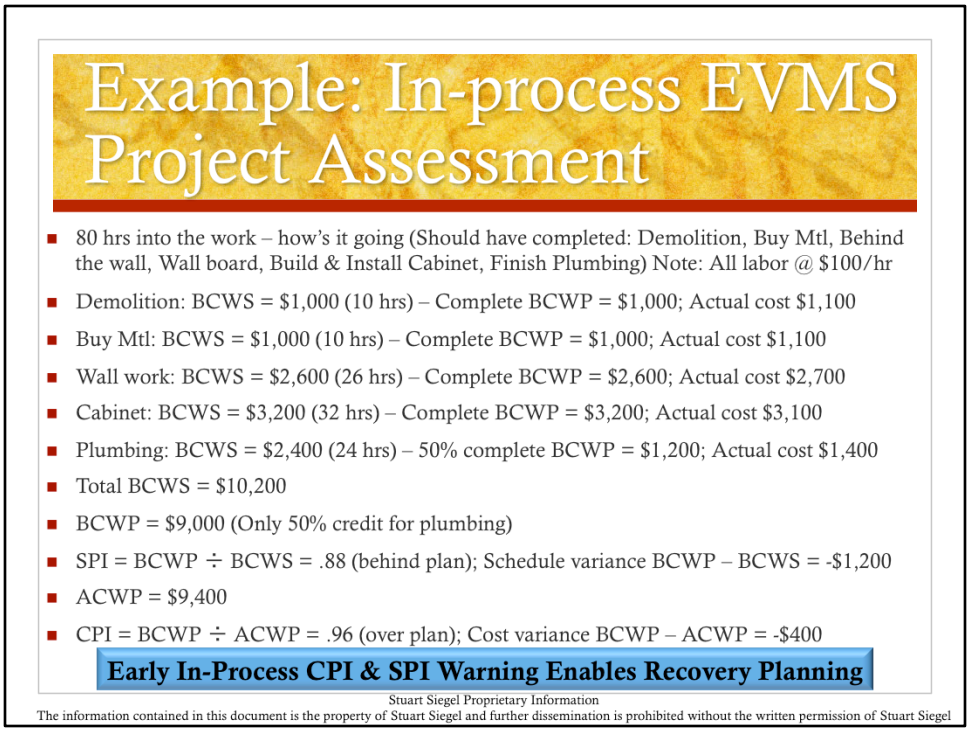
As said, a valuable tool for seeing the dependencies is a network diagram showing the work flow of the program from start to finish. Producing a diagram like this really forces the thought process of the steps to completion and is important for all the contributors to know the interdependencies between all the players. Imagine what this looked like for the going to the moon project. Remember these are the same practices used on major projects.



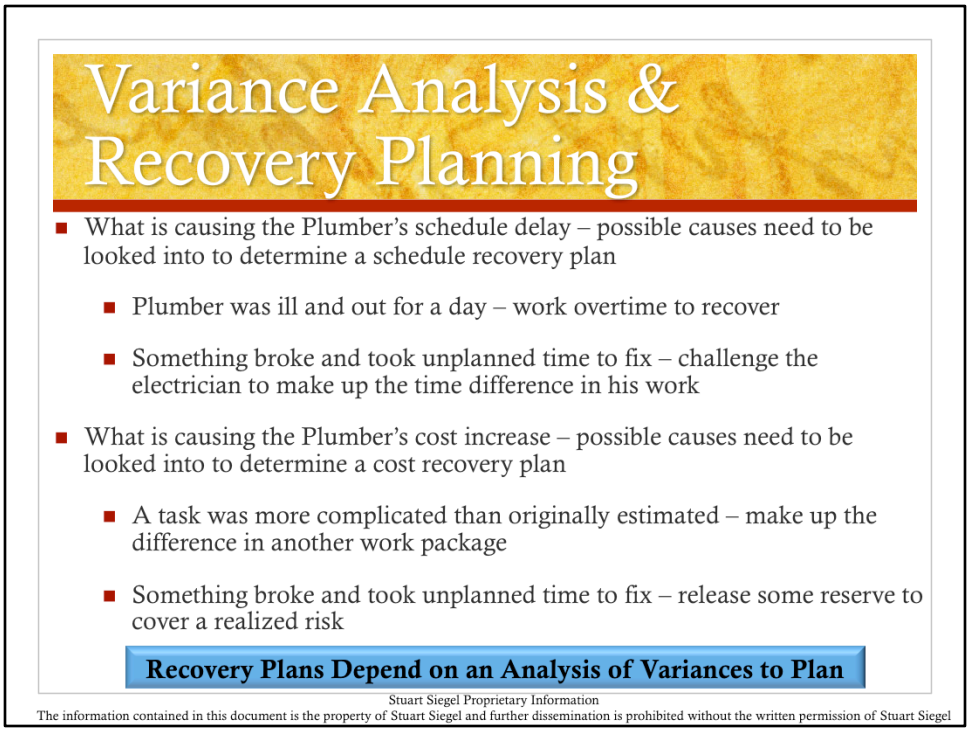
A key tool to apply for assessing project in-process 'goodness' is Earned Value Management and the Earned Value Management System. We'll go into this next but 1st let's establish the key role of a Program Manager. The program manager is the single point authority for the program and is responsible for its successful conduct. So, the PM authorizes the start of work in accordance with the plan. But, how does the PM know if the job is on track and will generate the profit expected. Let's look at the 2 inserted bullets on this chart. "We planned to complete this job in 20 days and we are 10 days into the job and spent half the money - we're on track" Not true if half the money was spent on something that should have only cost 1/10th the money and what was to be done on day 1 is still not complete. The key take-away is that **Tracking is not sufficient without comparison to plan** and that brings us to earned value management.



Understanding the EVMS terminology is important. So READ THE CHART. BCWS is the time estimate in the plan for each task. When we complete a task we take the planned amount that was estimated as credit for the work performed - BCWP. So if it is planned to do 30 hrs of planned work in 2 weeks and we only do 10 hrs of planned work it shows a schedule problem. This is a key point to get. To make a schedule assessment, we are not looking at actual hrs spent for a task – only the planned hrs to make a schedule assessment. We're saying if we planned on buying 2 apples and 4 oranges in a week and only bought 2 apples and 1 orange, we're behind schedule. No mention of the issues causing the delay or costs of the tasks is needed for a schedule assessment. We may be OK on cost. Cost issues do compare cost of what you did accomplish that is the actual cost for work performed - ACWP vs. the planned cost for what it was supposed to cost namely the budgeted cost for work performed - BCWP. So if the 2 apples and 1 orange cost what we thought they should cost then we still have money for the other 3 oranges. The 2 key indices CPI & SPI tell the story. If the actual cost was less than the budgeted cost then the CPI will be greater than 1 which is good; if the Budgeted Cost for Work Performed is greater than what was scheduled (BCWS) then the SPI is greater than 1 & is good also. Let's apply this to our example.



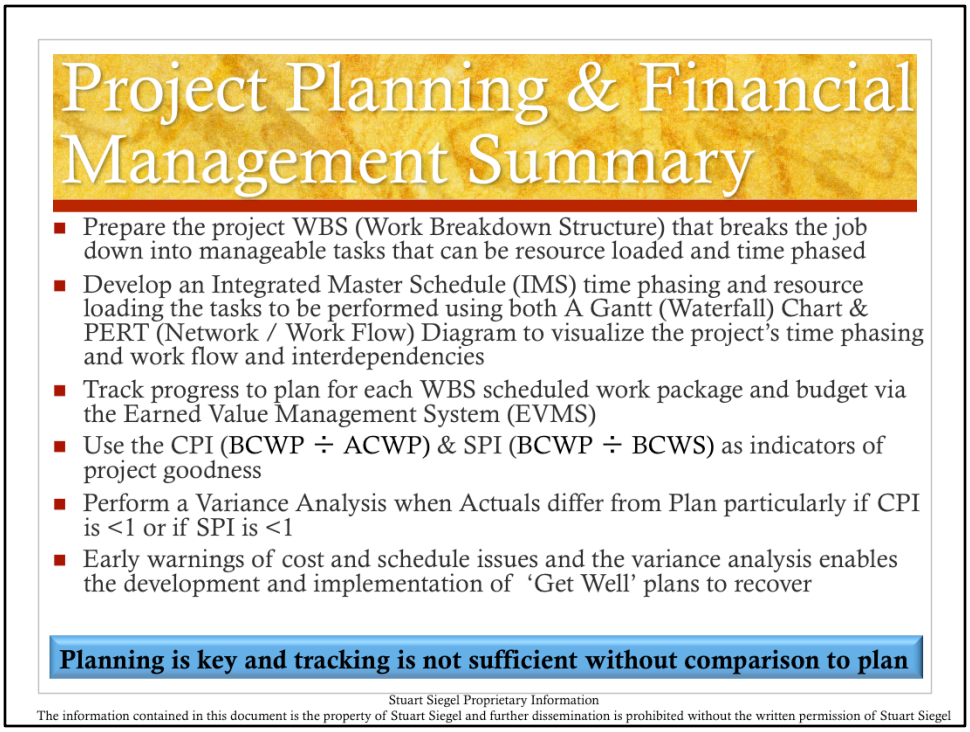
To ease the process, let's make some assumptions on Actual Costs using $100 per hour for each labor category; and some assumptions on budgeted cost BCWS and actual work accomplished BCWP) to see how to apply EVMS as discussed. – Again DO A WALK-DOWN ON THIS CHART.



OK – we see there are issues with both schedule and cost. What can we do about it to get back on plan? The 1st step is to perform a variance analysis – to see what the causes are. The reason is to develop plans to recover and still get the job done on time and for the cost estimated to make the expected profit.

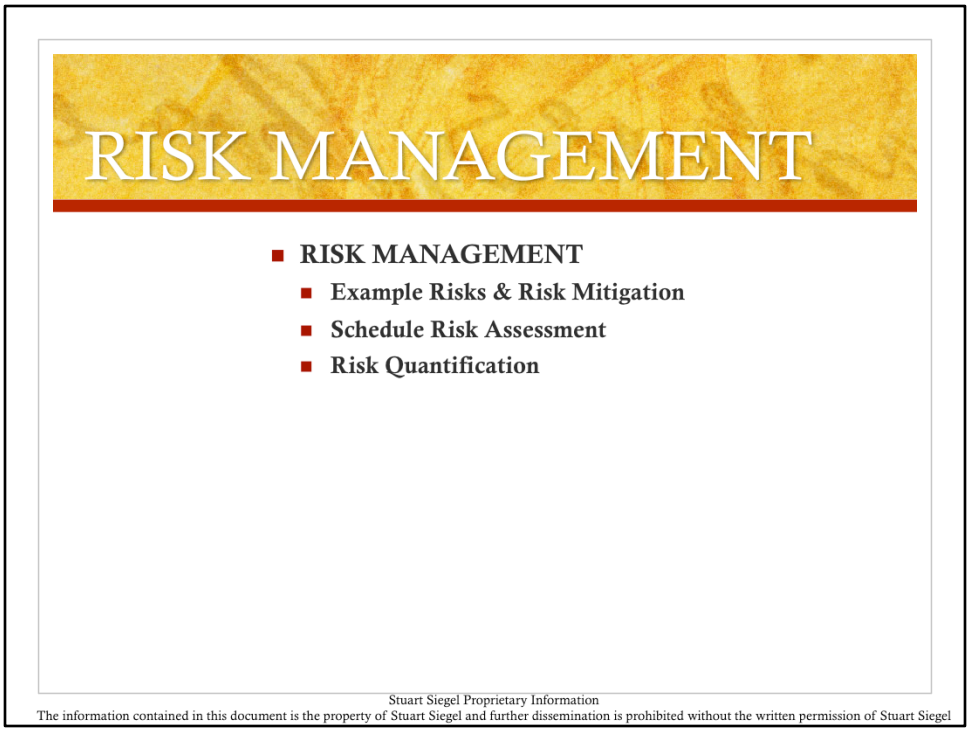
So let's look a the schedule issues and possible plans to recover. Let's read the chart

Now let's do the same for the cost issues – and read the chart



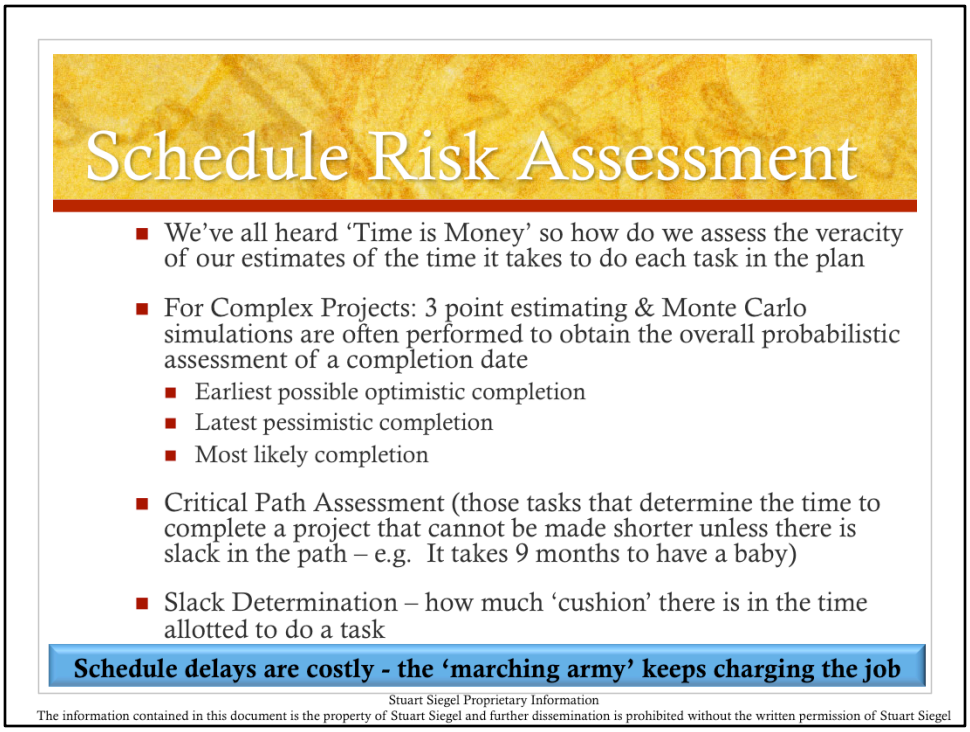
Let's summarize the steps-in-the-process about program management basics so far
We know the 1st step is to develop the WBS followed by developing the IMS
We know developing a PERT is key to understanding the interdependencies on a project and we've learned how to apply Earned Value Management to assess project goodness regarding cost and schedule to date
Finally using the key CPI and SPI indices we understand the importance of performing a variance analysis which is key to developing recovery plans to get a project back on track

So now let's look at the impact of risks on a project and delve into risk management.

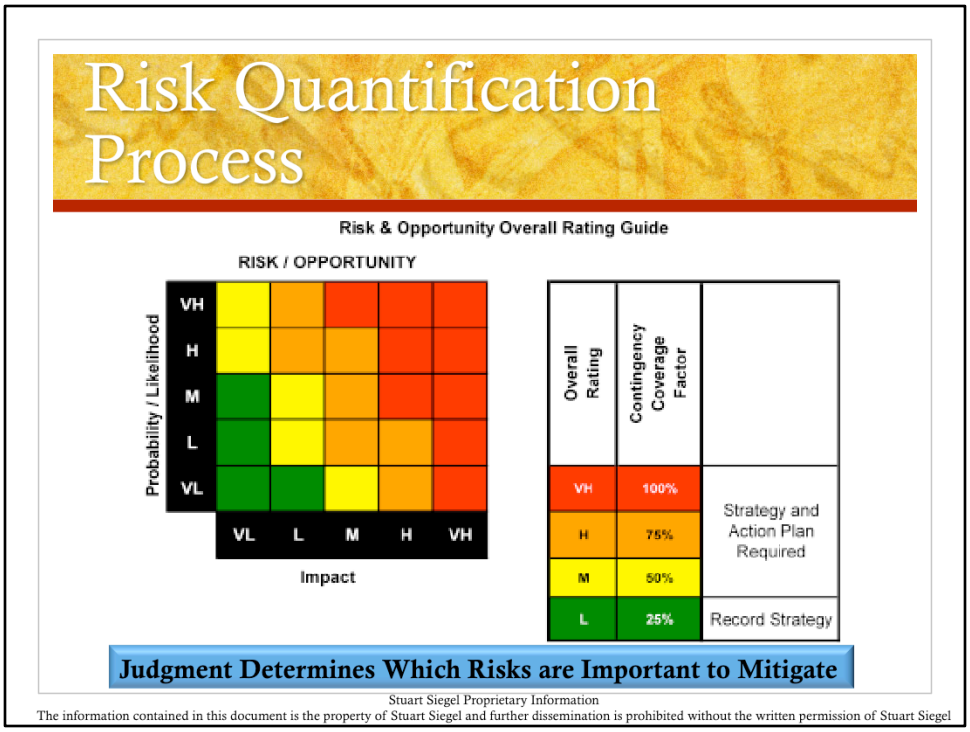


A key practice that enhances the probability of successful program management is applying Risk Management to the project. Early identification of potential risks and planned mitigation actions to burn-down risks and reduce the impact of risks is an essential part of program management. The reality is that any project will have issues that can arise that impact cost, schedule and performance. So in our example, could we have anticipated the 'risks' that seemed to have materialized and taken steps to mitigate them - Let's discuss the process

So for our example let's think about possible risks and how to mitigate them. READ THE CHART

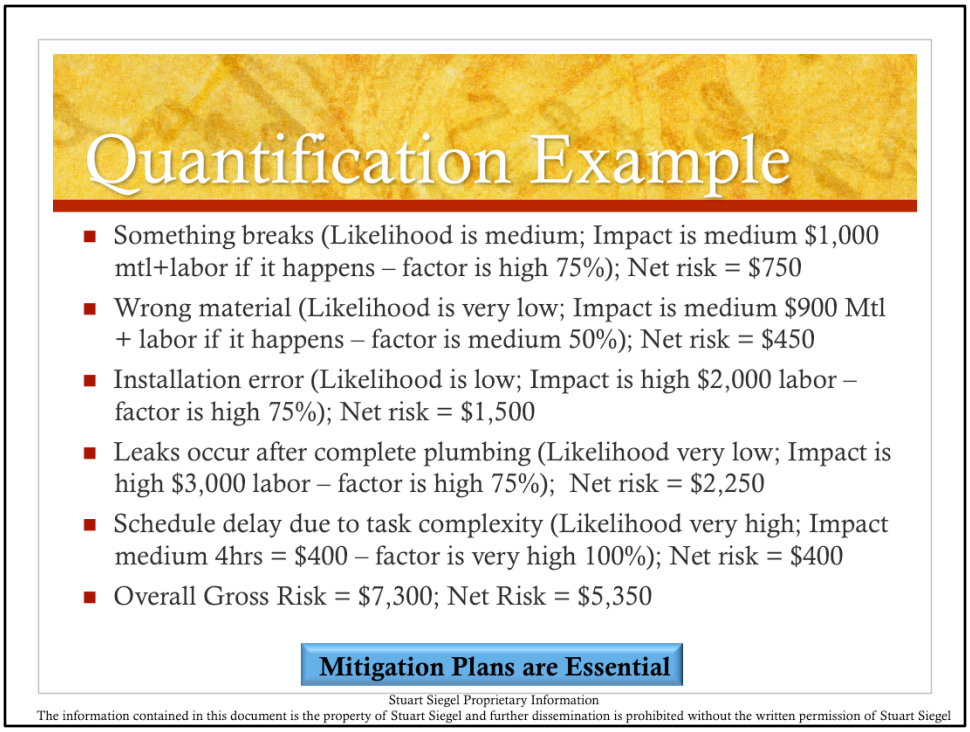


Let's divert a bit and talk schedule risk. (READ THE CHART) Why is this done – schedule delays are costly – the 'marching army' keeps charging the job

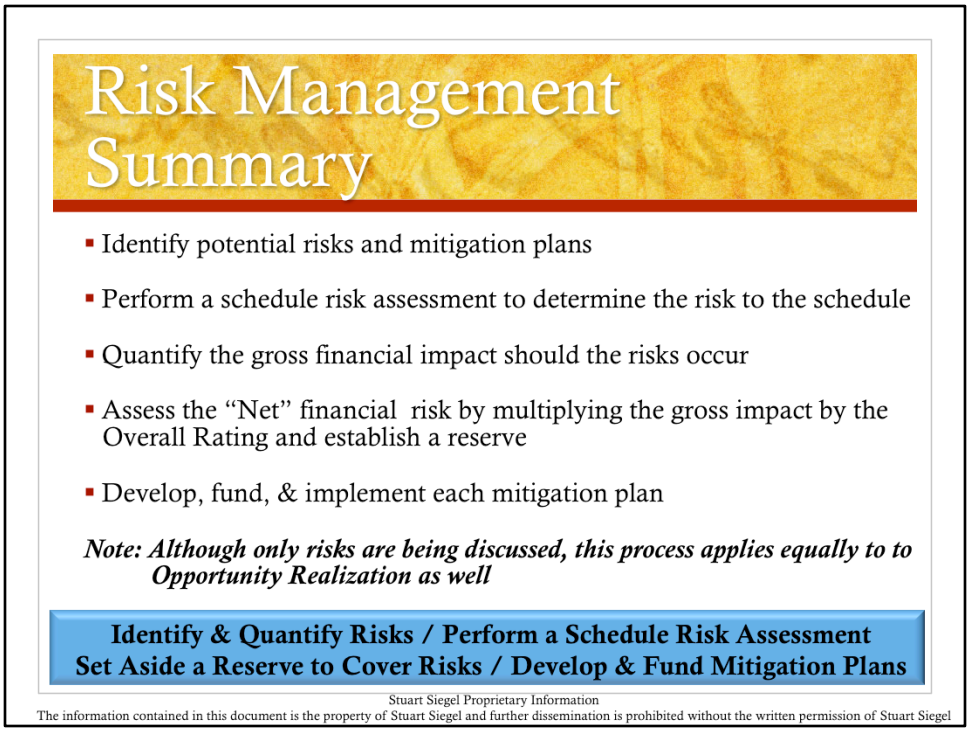


There is a process for identifying, quantifying, & mitigating risk on a program – But before we delve into this chart – let's talk every day risk management. Hypothetically consider if one might speed on the highway. Maybe - If the traffic is doing 10 mph above the limit – 'doing the traffic' not too risky; but weaving in and out much more risky. Is not making a full stop at a red light before making a right on red risky? Not if there is a sign that says red light camera but could be risky if no sign and there is a camera. Maybe we should budget our finances and set aside a reserve for 1 ticket per year. The same thinking is applied to program risks and this chart helps determine the reserve to set aside for risk. Let's discuss it. Note – I am not encouraging failing to adhere to all traffic laws – quite the opposite! This discussion is for example purposes only.

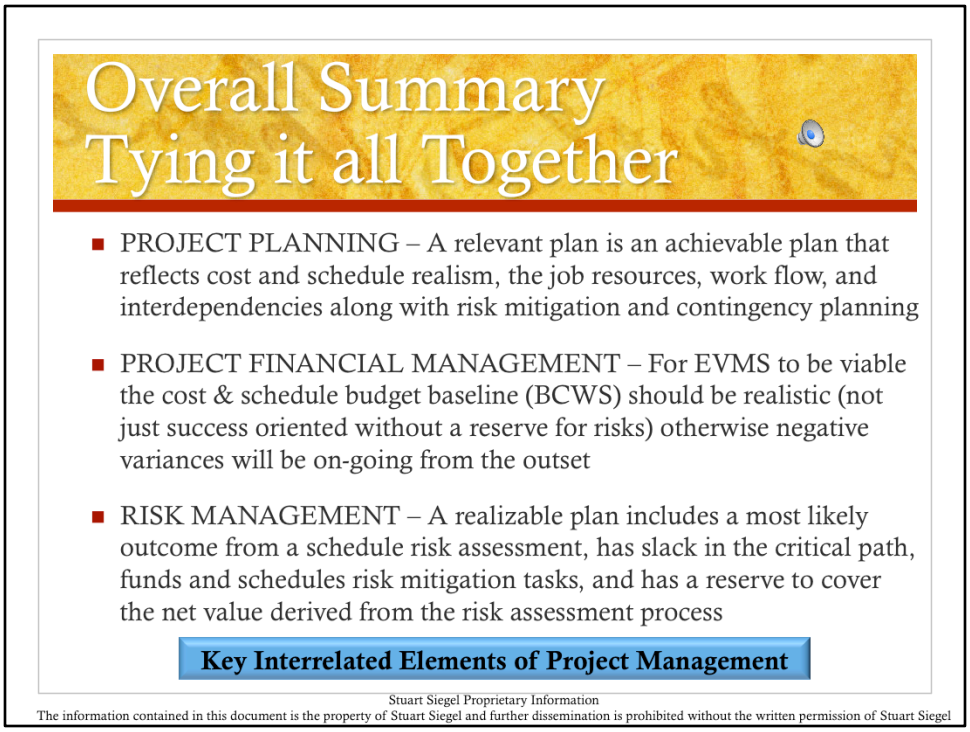
Risk management considers each risk as to its likelihood of occurrence and the magnitude of the impact should it occur. So if a risk is likely to occur and it would be impactful some reserve / set-aside should be included in the budget in case it actually happens. The amount of reserve is typically as shown in this chart. So reading this chart we see that risks falling into the green area are low overall but still should have some reserve or 25% of their cost impact included in the budget; for risks falling into the yellow area set aside 50% of the cost impact should be included and so on. Let's see how to apply this to our example.



Let's make some assumptions about the likelihood and impactfulness of the risks we discussed earlier regarding our example project. READ THE CHART - These are the risks we can think about and should have a reserve in our budget to do the job to cover some of the risks if they materialize. Remember when a risk happens it happens for the full value. We just can't be competitive if we include the full value in our estimate for all the risks that may happen – so this process establishes a reasonable reserve. Remember – the best way to address risk is to identify them, quantify them and then take action to fund plans to mitigate them. Remember earlier we did discuss plans to mitigate these risks.



Let's summarize what has been discussed regarding Risk Management:
Each risk is identified along with its financial impact should it occur
Schedule risk is determined as well
Using the likelihood of occurrence and impactfulness of each risk, a factored value for each risk is set-aside as a reserve in the overall budget
Importantly, a mitigation plan is identified and implemented for each risk. Note: The cost to mitigate each risk is to be included in the estimate to complete the project.



Tying it all together

Key to successful planning is the notion that a plan must be realistic and achievable. Plans that have no slack in the critical path or that are totally success oriented are destined to fail and all the processes discussed become moot since negative variances will start at day one and recovery by definition will not be feasible.

Again, my name is Stuart and if you want a copy of these charts see managementkeyskills.com. Good luck to you all.