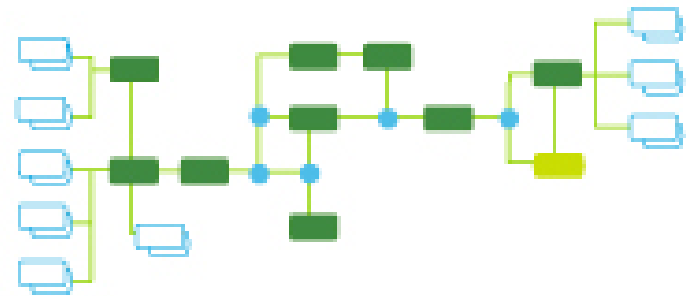




Managing Complex Programs Using Predictive Modeling and Simulation

Deloitte Consulting LLP

October 7, 2014



Agenda

Introductions

Predictive Modeling for Complex Program Management

Questions

Deloitte Presenters



Katrina Hauser
Specialist Master
Deloitte Consulting LLP
khauser@deloitte.com
(571) 236-0071



Laura Meier
Consultant
Deloitte Consulting LLP
lmeier@deloitte.com
(612) 206-7146

How do we address the challenges faced by test and evaluation (T&E) organizations in the current operating environment?

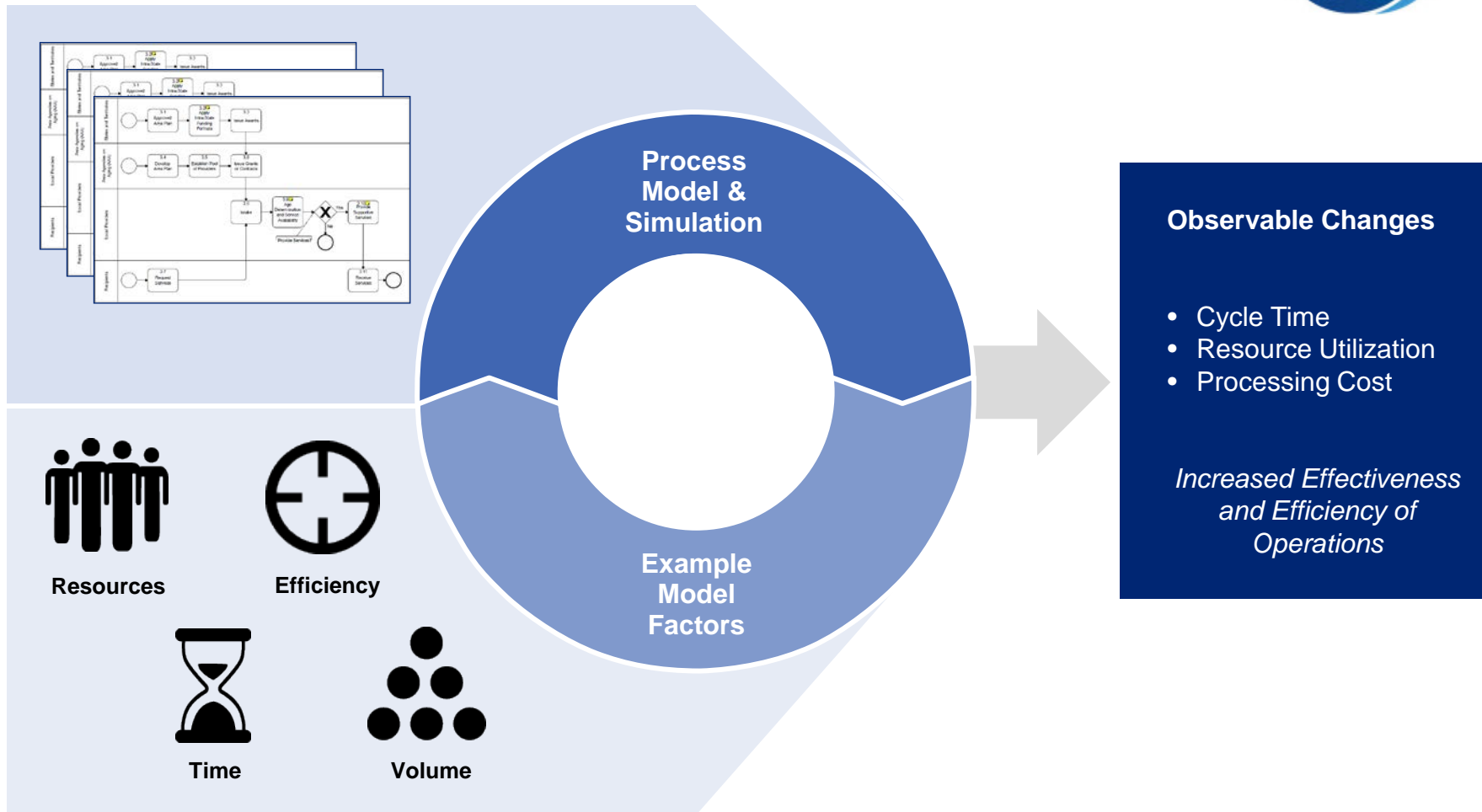


- Acquisition program decisions are complex
- Acquisition programs are expensive
- Uncertainty and delays are major issues
- Increasing pressure on T&E performance and metrics

Our Solution



What is predictive modeling and simulation (PM&S) and how is it used?

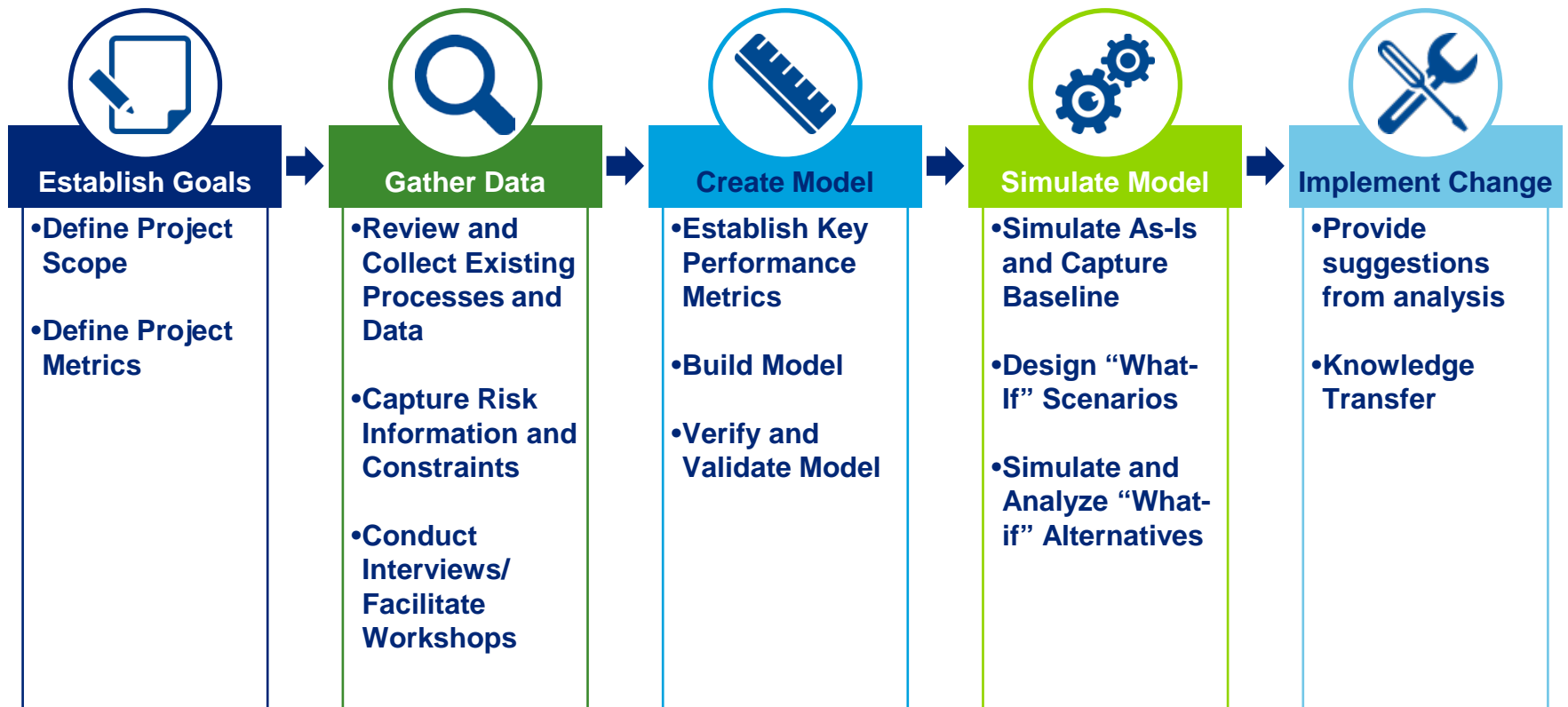


Predictive modeling and simulation can help organizations understand their complex processes and the impact of change to make informed decisions.

What is Deloitte's approach to PM&S?

PM&S is a structured approach that facilitates understanding and analysis across multiple dimensions to provide insight into the processes that support how an organization does business.

Deloitte takes a multi-step approach to model and simulate processes:



What modeling and simulation tools do we use?

PM&S Tools

Deloitte is vendor agnostic and utilizes a variety of business process management tools. These tools enable our process improvement teams to perform modeling and simulation beyond basic process mapping and design functionality.

The tool that we leveraged has the following capabilities:

- NMCI-approved COTS (commercial off-the-shelf) tool
- Offers process mapping and simulation functionality
- Supports Lean Six Sigma methods and the DMAIC lifecycle
- Combines swim-lane process mapping, Design of Experiments (DOE) and integration with statistical analysis software

The image displays three screenshots of a business process management tool, illustrating its capabilities in mapping, simulation, and analysis.

Mapping: The top screenshot shows a swim-lane process map for the "ACME Order Fulfillment Process". The process is divided into lanes for "Order Entry", "Credit Check", and "Order Fulfillment". Key steps include "Generate Order", "Complete Order", "Review Order", "Check Credit", "Process Will Order", "Process Invoice", "Other Product", "Ship Order", "Schedule Production", "Mass Product", and "Append Package".

Simulation: The middle screenshot shows the same process map with a "Simulation Progress" dialog box open. The dialog indicates that the simulation is 1.90% complete, with 4 activities completed, 0 discarded, and 0 activities remaining.

Analysis: The bottom screenshot shows a "Report" window with several data tables. The "Total Transaction Waited Count" table shows 888 total transactions, with 660 in Parallel Production and 737 in Live Production. The "Resource Statistics (Hours)" table shows that 6 workers are utilized, with a total wait time of 737 hours and a total work time of 1338 hours. The "Activity Statistics" table shows that the "Shipping - 15 - Ship Order" activity has the highest total wait time of 131 hours.

As-Is	Parallel Production	Less Credit Check	Live Production	Sim #5
Worker	888	660	737	737

Count	Tot # Wait	Tavg # Wait	Max # Wait	Avg Wait	Avg H2 Wait	Avg Res Wait	Acq Count	
Worker	6	737	16.64	32	20.65	37.49	0.00	1338

Count	Tot # Wait	Tavg # Wait	Max # Wait	Avg Wait	Avg H2 Wait	Avg Res Wait	Acq Count	
Credit & Invoicing	2	192	1.14	13	5.91	12.66	0.00	411
Production	2	210	1.31	4	5.27	13.32	0.00	531
Sales	1	72	8.37	3	5.36	11.25	0.00	151
Shipping	1	263	13.91	27	88.15	92.12	0.00	245

Activity	Tot # Wait	Tavg # Wait	Max # Wait	Tot # Act	Tavg # Act	Max # Act	Max Cap	Count
Shipping - 15 - Ship Order	131	7.84	20	131	7.25	21	1	87
Credit & Invoicing - 13 - Order Picked?	84	7.57	21	84	7.57	21	1	65
Shipping - 11 - Pick and Pack Order	84	7.97	21	87	7.97	21	1	65
Disinvoicing - 9 - Make Divvot	74	0.61	2	88	0.78	2	2	87

Simulation

Mapping

Analysis

How do we develop models for our complex T&E clients?

Deloitte created a dynamic process model that simulates the test execution process to provide insight into the impact of multiple variables on test schedules.

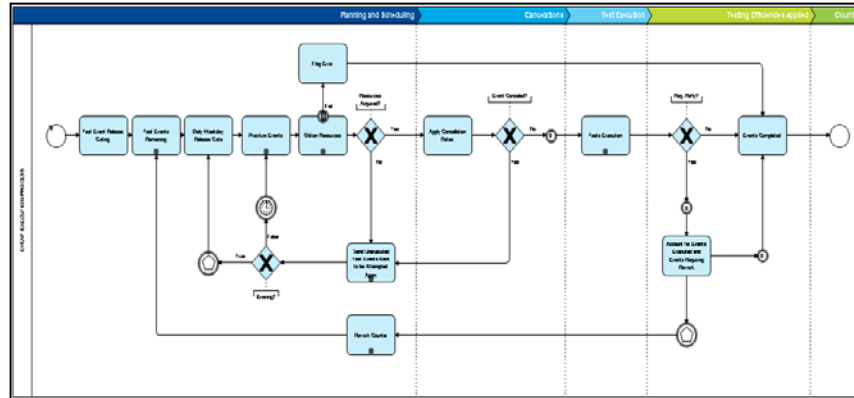


Predictive Modeling & Simulation Model

Inputs

Program Characteristics:

- Planned projects
- Planned / baseline schedule
- Schedule constraints
- Resource availability



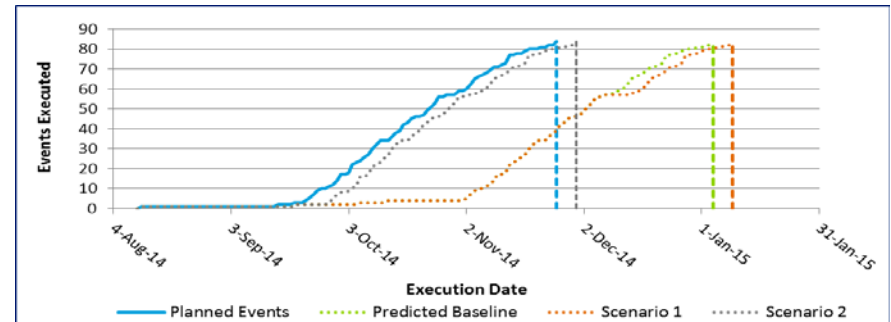
Outputs

Analysis and prediction:

- Impacts to schedule
 - Resource capacity
 - Schedule sensitivity analysis
- #### Management Tools:
- Decision support
 - What-if scenarios
 - Resource allocation

Model Delivers

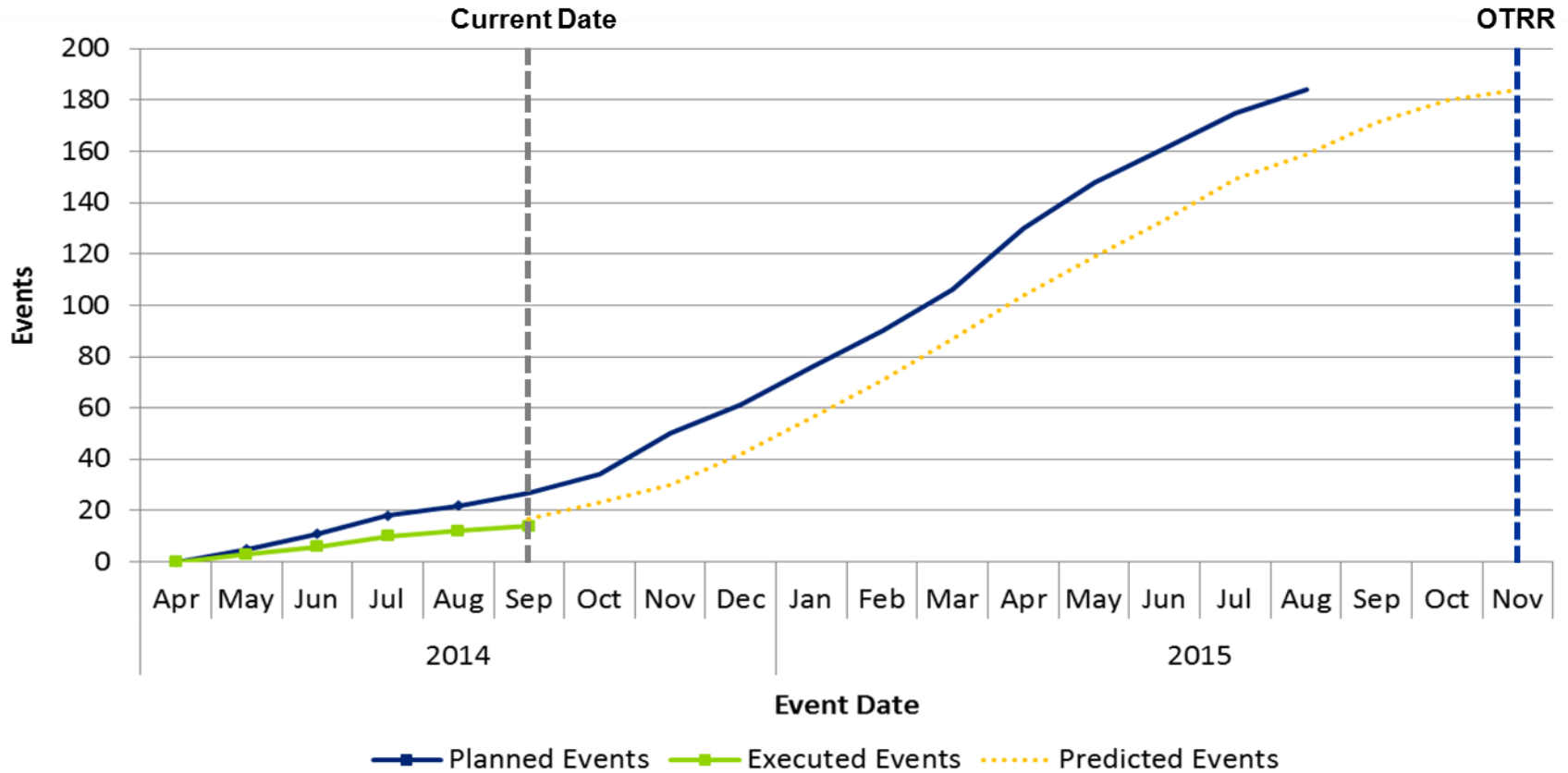
- Analyses based on customized, demonstrated workflows and process models
- Actionable execution metrics
- Data-driven predictive analysis of program schedules
- Decision support for improved test program management



Representative Data

How can we use PM&S to better understand performance-to-plan?

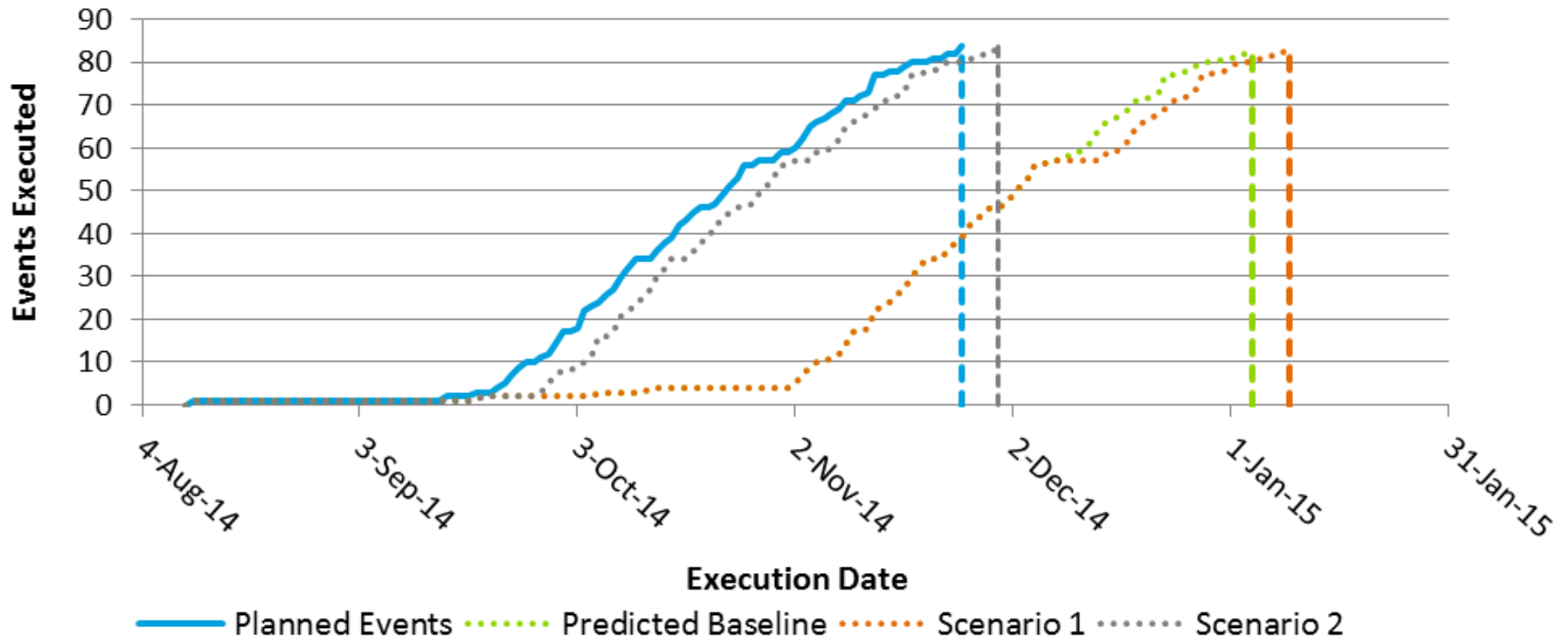
Model results are combined with metrics data to better understand actual and projected performance to plan.



Representative Data

How do we use “what if” scenarios to simulate impacts to schedule?

Once the baseline prediction is established, several “what-if” scenarios are developed and simulated to understand how changes in workload and resources will impact the schedule.



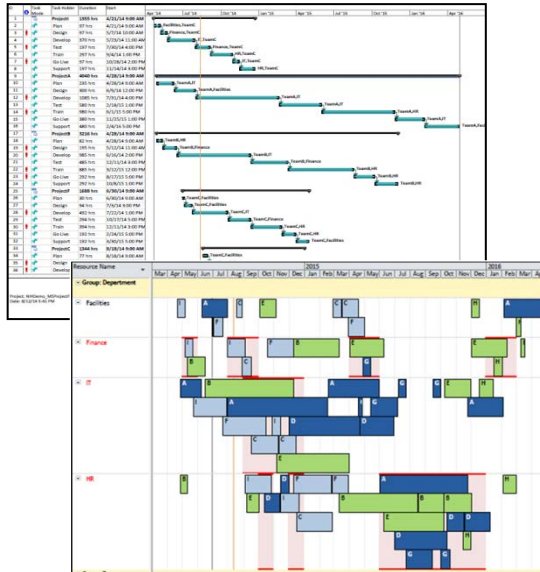
Scenarios can include additional or reduced resources, workload fluctuations, or event prioritization.

How is PM&S used in conjunction with traditional project management methods?

To complement the model output and analysis, Deloitte provides project management support developing reports to better facilitate performance tracking and short and long-range planning and execution.

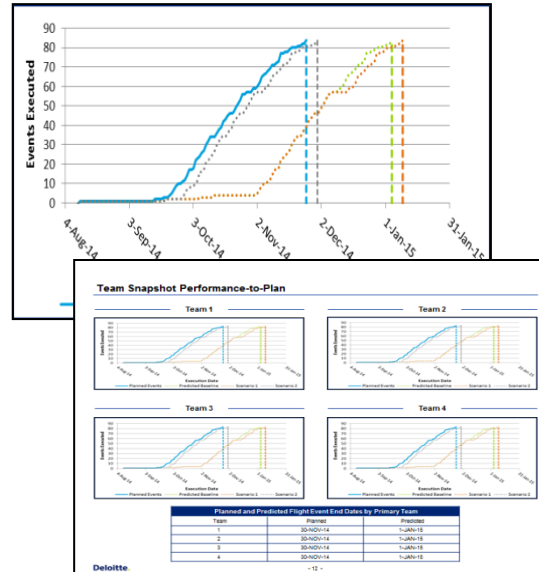
Planning

- Planning and Predicting Gantt
- Resource Loads
- iTest-compatible Inputs



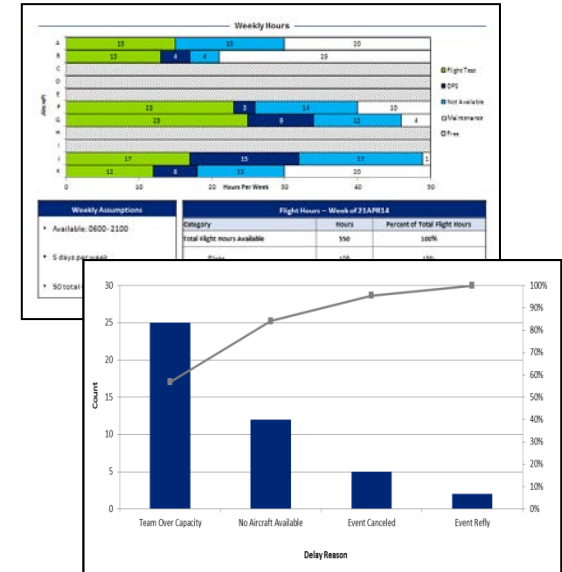
Forecasting

- Short-Range Burn-Up Charts
- Long-Range Burn-Up Charts
- Team and Project-Specific Burn-Up Charts



Issue & Metric Tracking

- Flight hour allocation
- Flight hour trends
- Prediction Driver Report



Representative Data

How do our clients benefit from PM&S?

PM&S helps prepare clients for environmental changes, so they may continue to meet mission demands and maintain sustainable operations.

Modeling, simulation and resulting analysis can help clients realize the following benefits:



Provide data to support process and program improvement decisions, rather than “gut feel” decision-making



Predict the impact of potential approaches to solving organizational problems before the costly expenditure of implementation



Provide insight into effective use of resources; helping identify root causes of delays and inefficiencies

With PM&S, organizations can identify drivers of schedule delays and production inefficiencies and develop informed, data driven insights that increase the likelihood that high-value T&E programs execute on-plan.

Questions?



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