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SCHEDULE COMPLIANCE RISK ASSESSMENT METHODOLOGY

Knowledge Hub

An Overview of the Schedule Compliance Risk Assessment Methodology (SCRAM)

ProjectChat
17-18 September 2019

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RedBay

Topics

- SCRAM History
- SCRAM Overview
- Quantifying Schedule Slippage
- Case Studies

What does SCRAM mean?

- Go away!

- Secure Continuous Remote Alcohol Monitoring
  - As modelled here by Lindsay Lohan

- Safety Control Rods Activation Mechanism

- Schedule Compliance Risk Assessment Methodology

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SCHEDULE COMPLIANCE RISK
ASSESSMENT METHODOLOGY

Schedule Compliance Risk Assessment Methodology: SCRAM

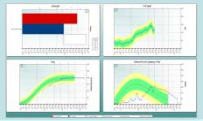
- According to Gartner
  - "The single most common reason that projects are considered a failure, is because they are substantially late".

Schedule is almost always the primary concern of project stakeholders

What is SCRAM?

An independent review to identify issues and risks to schedule

- Quantifies the schedule impact of issues and risks using scientific analysis techniques
  - Schedule Monte Carlo Simulation
  - Software Parametric Modelling



Embodies best practices

- Systems and software engineering
- Schedule development and project execution

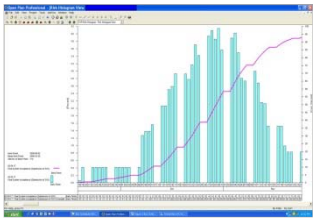
Facilitates improved business practices

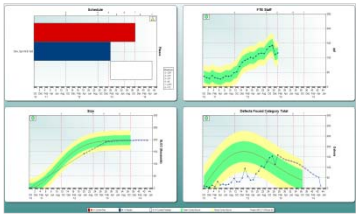
- Based on feedback from reviews
- Identification of systemic root causes / issues

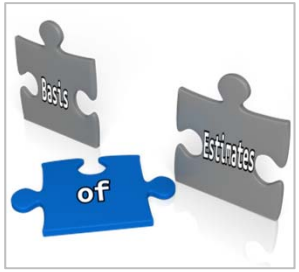
Typical SCRAM Outputs

Executive Out Brief and Review Report

- Executive level Bottom Line Up Front (BLUF) statement(s)
  - Identifying the most significant issues and risks and their impacts
- Detailed findings (issues, risks and impacts)
- Monte Carlo Analysis Results
- Parametric modelling forecast results
- Recommendations (issue remediation, risk mitigation)



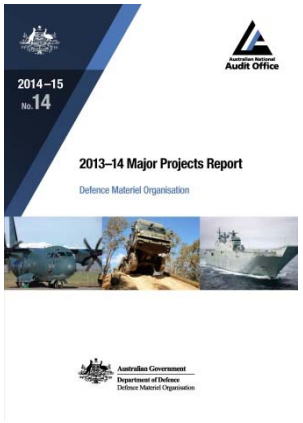




SCRAM Usage

Sponsored by the Australian Department of Defence

- To improve Project Schedule Performance in response to Government concern as identified by the Australian National Audit Office (ANAO)
- Successfully applied to the F-35 JSF Program in the USA and has been used to monitor software development performance on the program (web search “F-35 Australian SCRAM”)



Diversity of SCRAM Reviews

Aerospace

Satellite Ground Stations

Maritime

Enterprise Resource Planning

Telecommunications

Training Systems

SCRAM Testimonial

- SCRAM has been applied successfully to the F-35 Joint Strike Fighter Program in the USA (web search “F-35 Australian SCRAM”)
  - Six SCRAM reviews were conducted from 2011 to 2015 (on-board and ground software)

Testimonial from Lt. Gen. Chris Bogdan, Program Executive Officer, F-35 Program (24 March 2017)

- “The SCRAM reviews on the F-35 Program were extremely helpful to us. SCRAM gave us new techniques that allowed us to better understand the complexities of our software development. Within two weeks of coming in, the SCRAM reviews were able to point out areas where we were going to have problems. SCRAM also gave us new techniques for measuring the progress of software development and for predicting how long the software development was going to take. In 2014, I briefed the SCRAM results to the Defense Acquisition Board. Of all the organizations that were making estimates, the SCRAM estimates, in hindsight, were the most accurate.”

What SCRAM is NOT

An Audit

- It does not focus on identifying non-conformance

A Process Assessment

- Like Capability Maturity Model Integration (CMMI)
  - But SCRAM does identify and treat poor process performance as an issue if process is driving schedule slippage

Topics

- SCRAM History
- SCRAM Overview
- Quantifying Schedule Slippage
- Case Studies

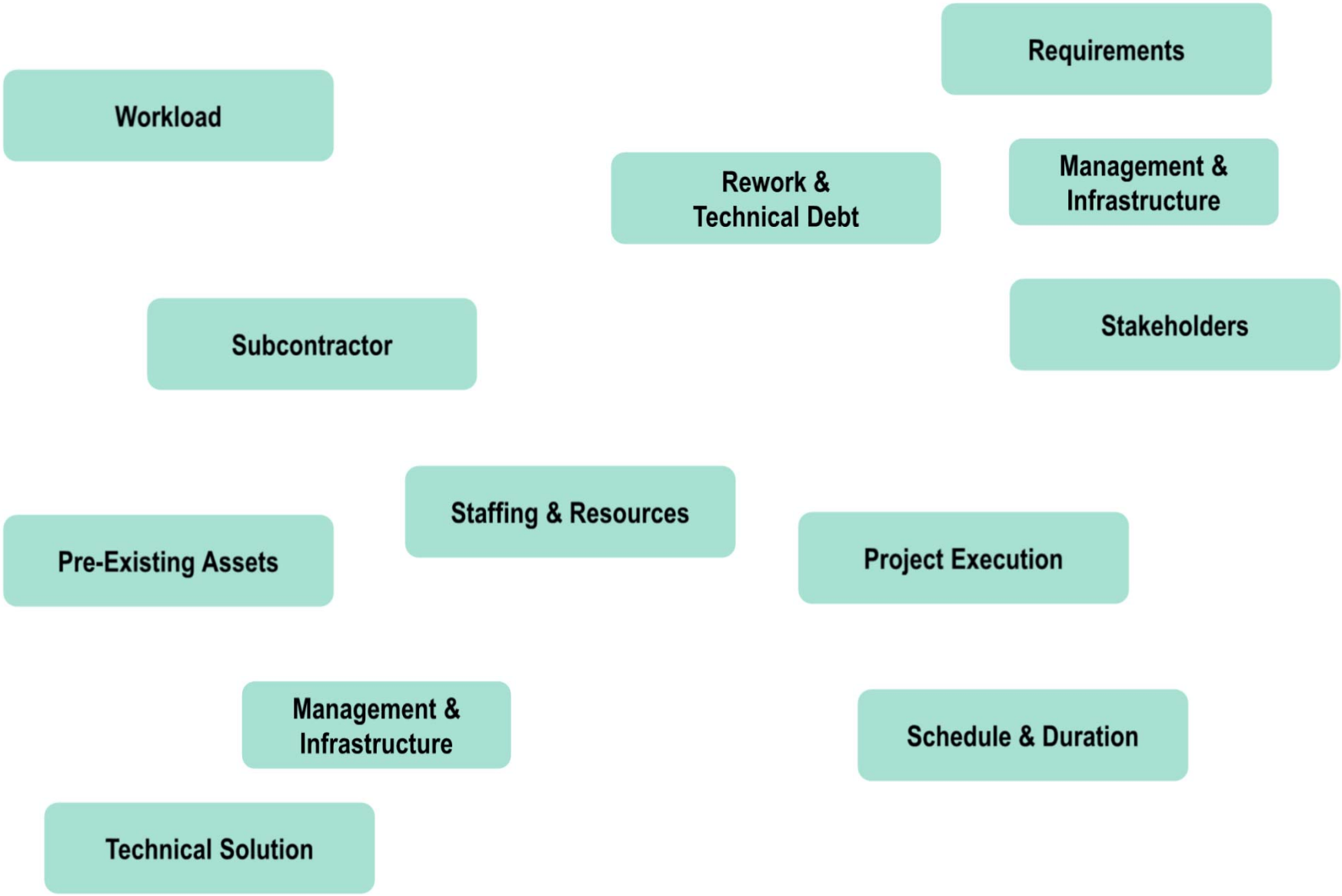
Organising Project Information

Program Managers are flooded with information, making it difficult to distinguish between symptoms and root causes of schedule slippage

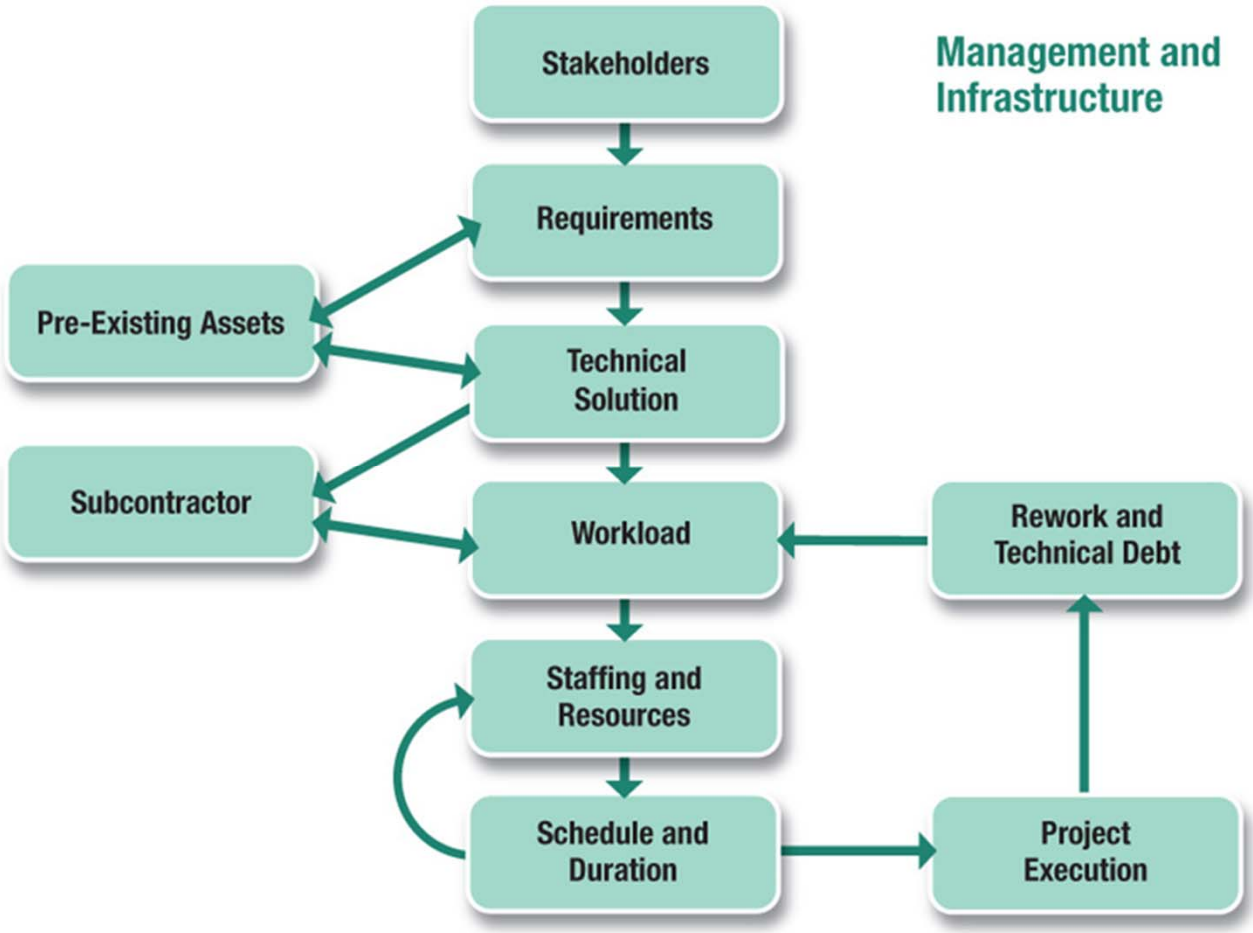
To de-clutter and organise the massive amounts of information, SCRAM Assessors utilise a thought model

Root Cause Analysis of Schedule Slippage (RCASS)

Categories of Information

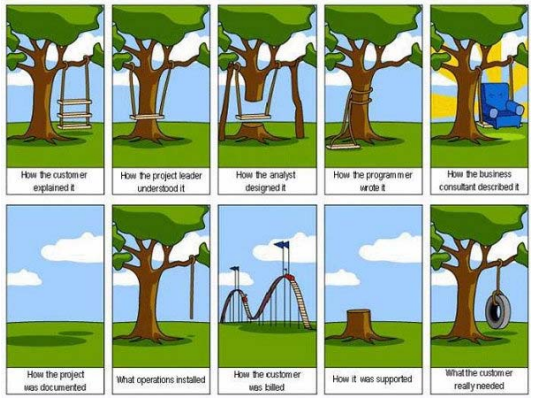


Root Cause Analysis of Schedule Slippage (RCASS) Model



RCASS Categories

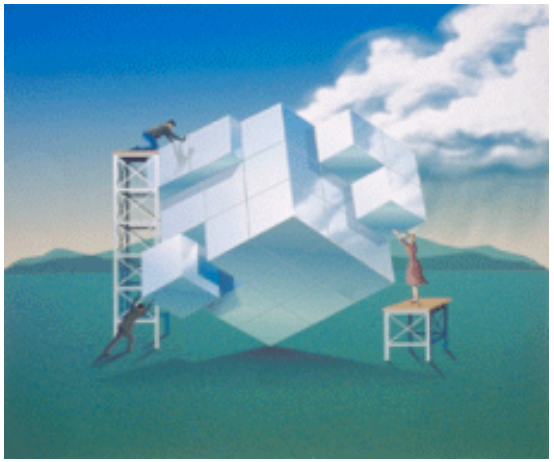
- Stakeholders
  - "Our stakeholders are like a 100-headed hydra – everyone can say 'no' and no one can say 'yes'."



- Requirements
  - Requirements Churn drives schedule slippage, increases costs and can sacrifice quality

RCASS Categories

- Technical Solution
  - The design considerations and approaches needed to ensure that the chosen solution is appropriate.



- Pre-Existing Assets (Off The Shelf)
  - "It doesn't do what we thought…"
    "There is a lot of functionality we don't need."

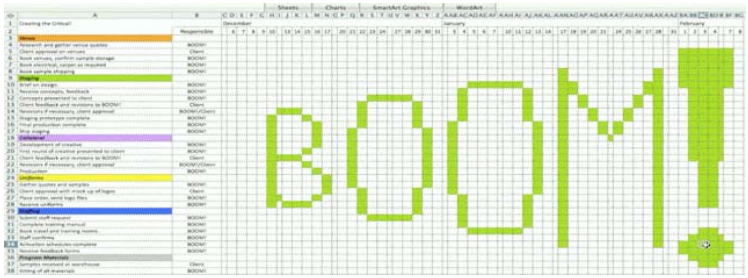
RCASS Categories

- Subcontractor
  - If the subcontractor doesn't perform, additional work required by the Prime

- Workload
  - "Unrealistic expectations based on inaccurate estimates are the single largest cause of software failure."
    - » Futrell, Schafer

RCASS Categories

- Staffing & Resources
  - Bringing on people to solve a slippage problem may make it worse (especially late in the project)



- Schedule & Duration
  - Area of primary interest. Area of primary interest. Without a well constructed schedule, you can't control the project

RCASS Categories

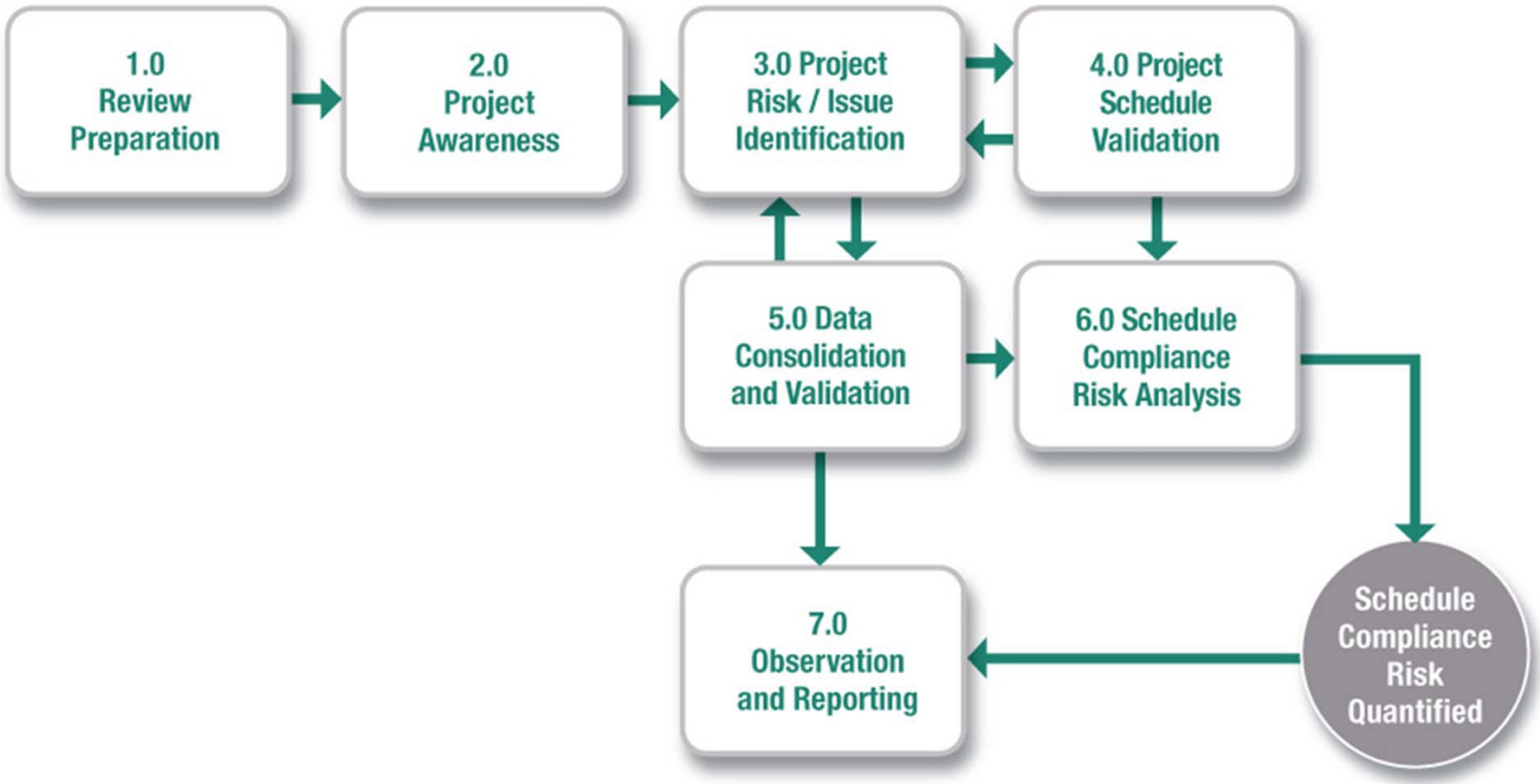
- Project Execution
  - No “red” risks on a program undergoing a major contract overrun breach

- Rework & Technical Debt
  - Technical Debt includes suspension of peer reviews, short-cuts in unit test, postponing functionality until later.
  - Rework is often underestimated or not planned for.

RCASS Categories

- Management & Infrastructure
  - Processes for Verification and Validation, Infrastructure, Quality Assurance, Process Improvement and Configuration Management

SCRAM Review Process



The SCRAM Review Team

Engineers

- Validate engineering related work load estimates, identify project issues and risks, and provide inputs for schedule risk assessment
  - Supplemented by domain specific subject matter experts as necessary
  - For software intensive development projects, at least one team member should be proficient in software parametric modelling

Schedule Controller

- Experienced in the Project schedule tool
- Validates schedule – conducts schedule health checks
- Performs Monte Carlo risk modelling with inputs from engineering team members

SCRAM Review Key Principles

Minimal Disruption

- Artefact Review (plans, procedures, model evidence) conducted offline
- Information is collected one person at a time
- Interviews typically last an hour

Independent

- SCRAM Team members are organisationally independent of the program under review
  - Some SCRAM reviews have been joint contractor/customer team – facilitates joint commitment to resolve review outcomes

Non-advocate

- All significant issues and concerns are considered and reported regardless of origin or source (Customer and/or Contractor).

SCRAM Review Key Principles

Non-attribution

- Information obtained is not attributed to any individual
- Focus is on identifying and mitigating the issues/risk

Corroboration of Evidence

- Significant Findings and Observations based on at least two independent sources of corroboration

Rapid turn-around

- One to two weeks spent on-site
- Executive out-briefing presented at end of second week
- Written report two weeks later

SCRAM Review Key Principles

Sharing Results

- Openness and Transparency
- For the parametric modelling component of a SCRAM Review, the organisation may witness data analysis and challenge results
- Preliminary out brief of findings is delivered prior to departure from review site
- Builds cooperation and trust
- Builds confidence in the schedule forecast
- However, the SCRAM Team is the final arbiter

SCRAM Assessor Qualification Framework

Pre-requisites

- Qualifications:
  - Tertiary qualifications or equivalent gained through work experience
- Experience:
  - Minimum 10 years engineering or scheduling experience
- Skills:
  - Communication skills
  - Interview skills
  - Ability to analyse large volumes of information

Provisional SCRAM Assessor

- Completed training
  - SCRAM Introduction Course
  - SCRAM Assessor Course
- Passed exam

Certified SCRAM Assessor

- Qualified as a Provisional SCRAM Assessor
- \+ Satisfactory participation in two SCRAM Reviews

SCRAM Assessor Qualification Framework

SCRAM Lead Assessor

- Qualified as a Certified SCRAM Assessor
- \+ Satisfactory participation in at least one additional SCRAM Review
- \+ Lead a SCRAM Review with a SCRAM Principal as mentor

SCRAM Introduction Course Instructor

- Qualified as a Certified SCRAM Assessor
- \+ Satisfactory participation in at least one additional SCRAM Review
- \+ Instruct a SCRAM Introduction Course with a SCRAM Principal as Mentor

SCRAM Principal

- Qualified as a SCRAM Lead Assessor / Instructor
- Responsibilities
  - Evolve and improve SCRAM Assets
  - Lead SCRAM Reviews
  - Deliver SCRAM Training Courses

Topics

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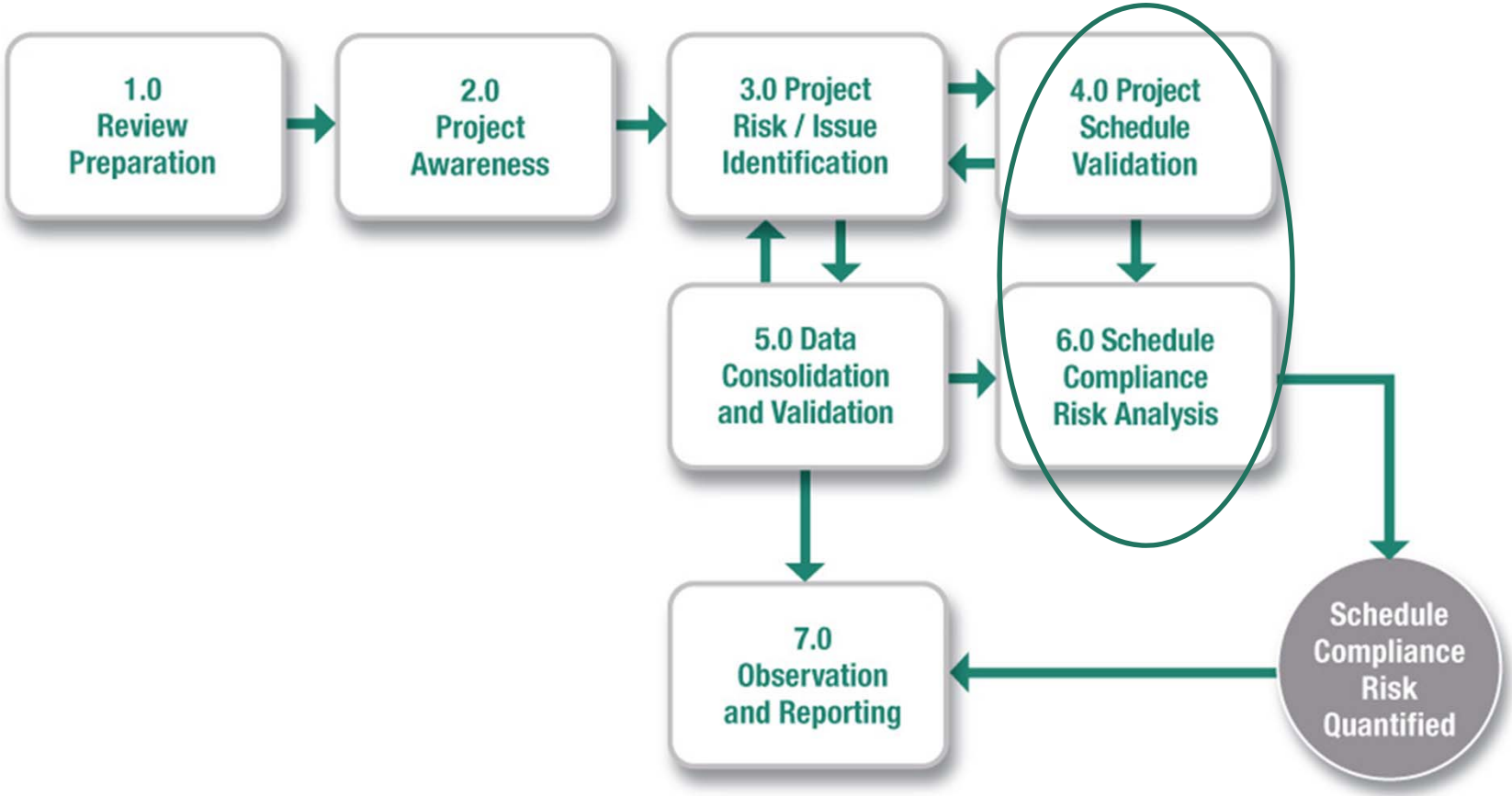
SCRAM Review Process



Two Methods of Quantifying Schedule Risk

Schedule Risk Analysis (SRA)

- Provides a detailed view
- Risks to schedule compliance are performed at the level of specific risks and specific tasks in the Project Schedule using a Monte Carlo simulation

Parametric Software Modelling

- Provides a high-level view
- Forecast completion date can be determined based on product size (SLOC), historical data and achieved productivity

The two techniques provide independent estimates of schedule compliance probability

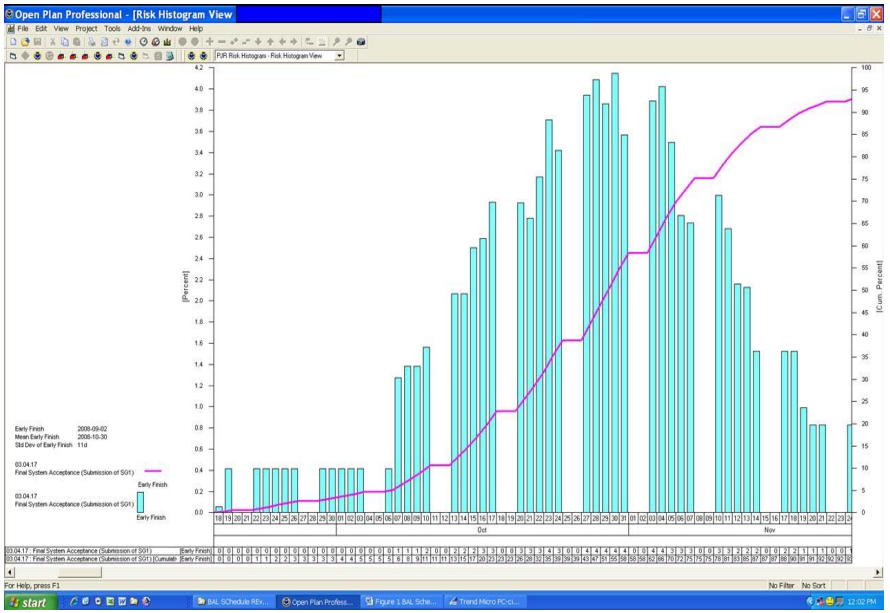
Schedule Risk Analysis/Monte Carlo

Rate Tasks that are on the Critical or Near Critical Path

- Assign three point estimates
  - Most Likely, Optimistic and Pessimistic
- Based on identified risks, issues, technical debt and any other sources of delays

Perform Monte Carlo Simulation

- Provides a picture of the potential impact of risk on schedule



Projects should use the results of the SRA to develop plans to remediate issues and mitigate risks

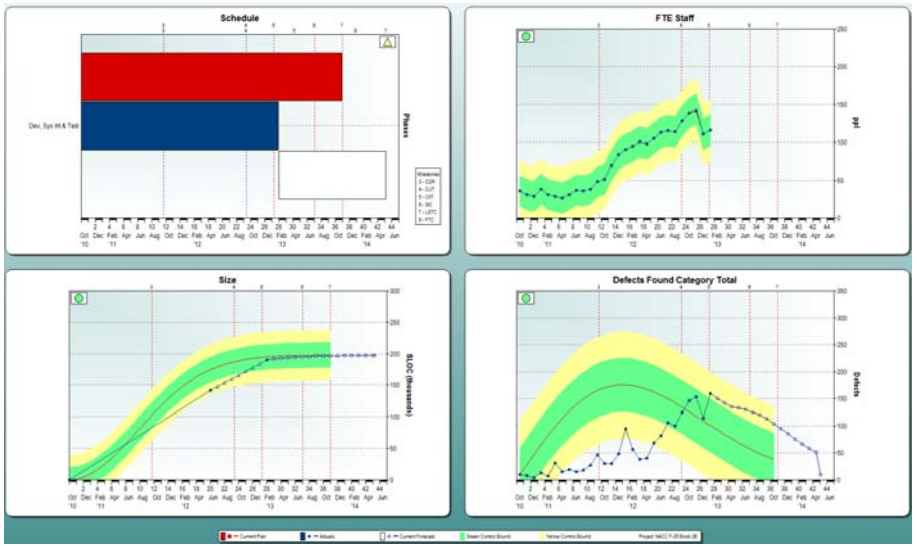
Parametric Software Modelling Forecast

Estimates software development characteristics

- Duration/Schedule
- Effort/Staffing
- Defects

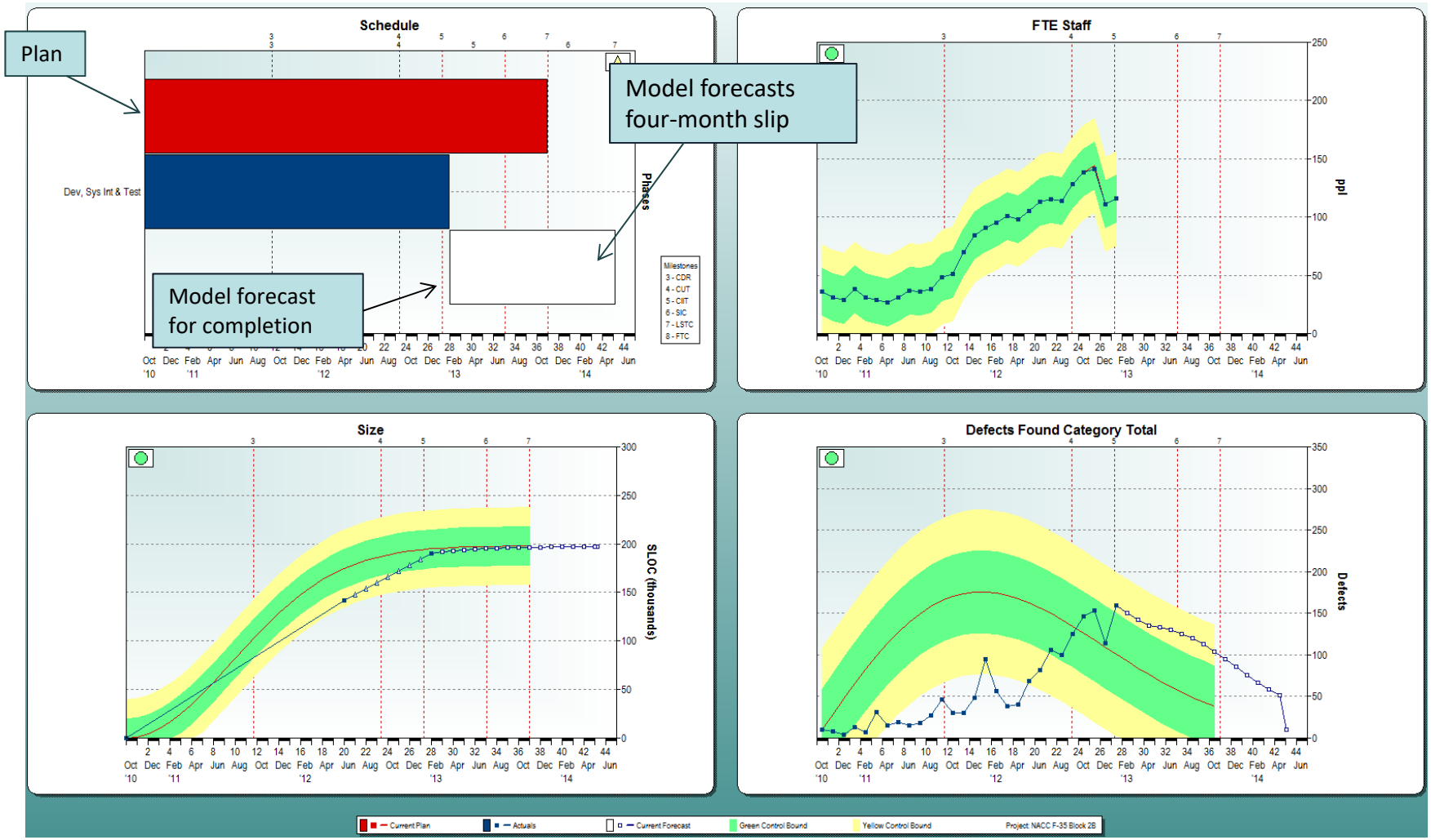
Inputs include

- Total size
- Complexity
- Defects discovered
- Major milestones completed
- Staffing
- Experience



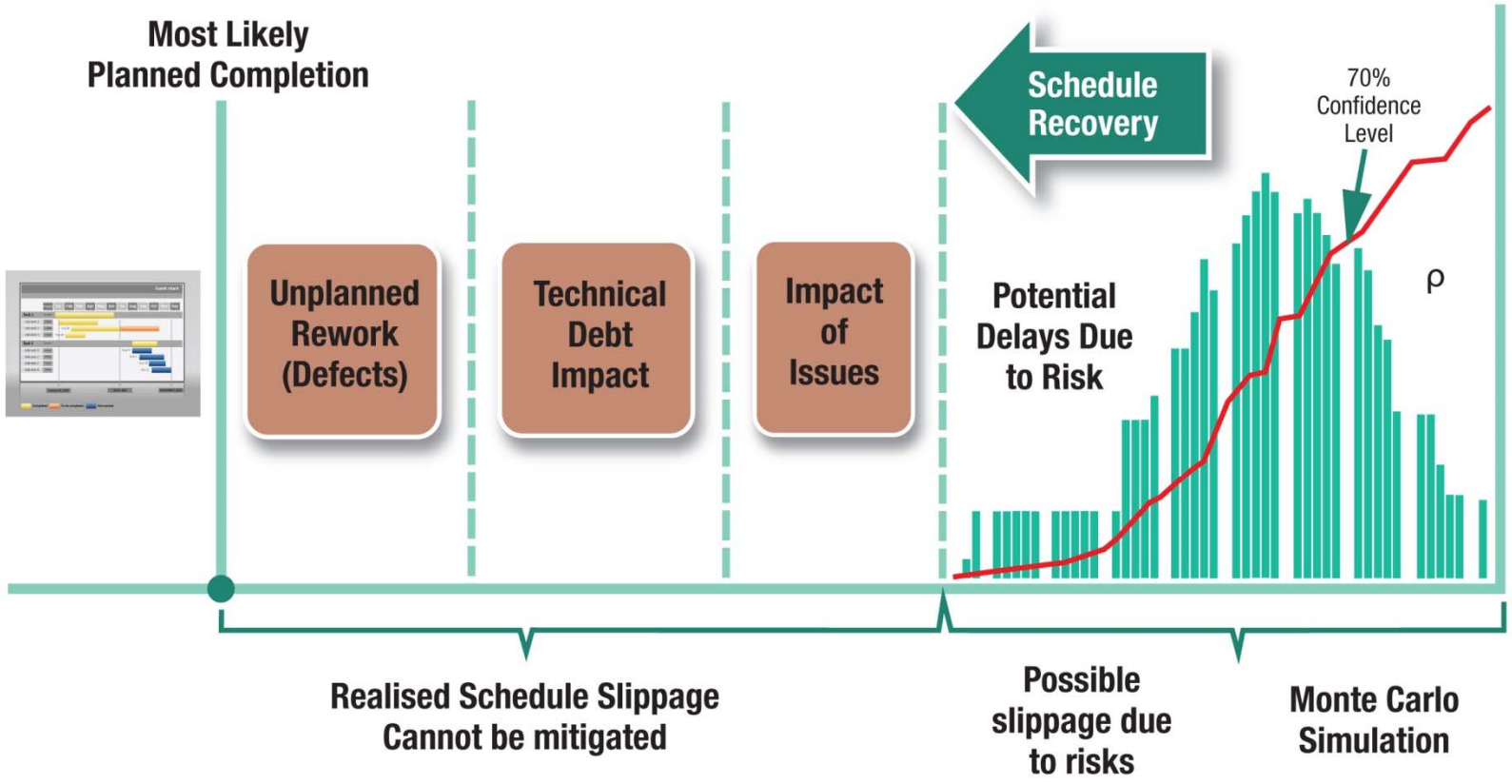
For software intensive SCRAM Reviews, actual performance to date is used to forecast software completion

Example Parametric Forecast



Putting All Together

Causes of Project Slippage and Potential Risk Delays



More information

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- SCRAM website pages
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  - http://scramsite.org