SCRAM: A Method for Assessing Schedule Compliance Risk

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What does SCRAM mean?

- Go away!

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

- Schedule Compliance Risk Assessment Methodology
Collaborative effort:

- Australian Department of Defence - Defence Materiel Organisation
- Systems and Software Quality Institute, Brisbane, Australia
- Software Metrics Inc., Haymarket, VA
DMO SCRAM Usage

- SCRAM has been sponsored by the Australian Defence Materiel Organisation (DMO)
  - To improve our Project Schedule Performance in response to Government concern as identified by the Australian National Audit Office (ANAO)
    - ANAO is equivalent to the US Government Accountability Office (GAO)

- DMO equips and sustains the Australian Defence Force (ADF)
  - Manages 230+ Major Capital Equipment Projects & 100 Minor (<$20M) defence projects
DMO SCRAM Usage (cont.)

- SCRAM has evolved from our reviews of troubled programs
  - Schedule is almost always the primary concern of program stakeholders (delays to war fighter capability unacceptable)
  - SCRAM is a key component of our initiative to identify and remediate (and eliminate) root cause of schedule slippage
consolidate with 8
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SCRAM Components

- Assessment Process consists of
  - Root Cause Analysis of Schedule Slippage
  - Schedule Health Check
  - Monte Carlo Analysis
What SCRAM is Not

- Not an assessment of technical feasibility

- Not an assessment of process capability
  - However, may be identified and treated as an issue if process performance is identified as contributing to slippage
Topics

- SCRAM Components
  - Root Cause Analysis Model
  - Schedule Health Checks
  - Monte Carlo Analysis

- Benefits of Using SCRAM

- SCRAM Key Principles

- SCRAM Process Reference / Assessment Model

- Future plans for SCRAM
Angela takes over here
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PSM Analysis Model

- Technology Effectiveness
- Process Performance
- Product Size and Stability
- Resources and Cost
- Schedule and Progress
- Customer Satisfaction
- Product Quality
Root Cause Analysis of Schedule Slippage (RCASS) Model

- Model evolved with experience on SCRAM assessments
- Used as guidance for
  - Asking questions during assessments
  - Categorizing the wealth of data and details
  - Highlighting missing information
  - Assessing the causes of slippage
  - Recommending a going-forward plan
  - Recommending measures to serve as leading indicators
    - For visibility and tracking in those areas where there are risks and problems
    - Similar to the use of the Structured Analysis Model in PSM to guide categorization of issues and risks via issue identification workshops
SCRAM-RCASS

Adapted from Integrated Analysis Model in McGarry et al.,
Practical Software Measurement: Objective
Information for Decision Makers
Root Cause Analysis - Examples

- Stakeholders
  - “Our stakeholders are like a 100-headed hydra – everyone can say ‘no’ and no one can say ‘yes’.”

- Requirements
  - Misinterpretation of a communication standard led to an additional 3,000 requirements to implement the standard.
Root Cause Analysis - Examples

- **Subcontractor**
  - Subcontractor omitting processes in order to make delivery deadlines led to integration problems with other system components.

- **Functional Assets (COTS/Reused Code)**
  - Commercial-off-the-shelf (COTS) products that do not work as advertised, resulting in additional work or replacement with different products.
  - Underestimating amount of software code that must be written/modified in a legacy system.
Root Cause Analysis - Examples

- **Workload**
  - Optimistic estimates
    - Source lines of code underestimated
    - Contract data deliverables workload often underestimated by both contractor and customer

- **Staffing & Effort**
  - High turnover, especially among experienced staff

- **Schedule & Duration**
  - Area of primary interest
Root Cause Analysis - Examples

- **Schedule Execution**
  - Schedule replans are not communicated to program staff or stakeholders
  - Lack of, or poorly integrated, master schedule
  - Integrated schedule elements not statused consistently across program. Actual status unknown.
  - External dependencies not integrated or tracked

- **Rework**
  - Often underestimated or not planned for (e.g. defect correction)

- **Management & Infrastructure**
  - Lack of adequate test facilities (in terms of fidelity or capacity)
SCRAM Components

- Assessment Process consists of
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bc14  this doesn't match slide 19
betsy clark, 7/5/2011

bc15  17, 18, 20 & 22 could be reduced to one slide
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Schedule Health Checks

- To evaluate schedule construction and logic
  - Includes analyses of task dependencies, task constraints, and available schedule float
- Government, Prime, and Subcontractor schedule integration / alignment is reviewed
- Ensure external dependencies are included and linked in the schedule
  - Interfaces, resources, facilities, Government Furnished Equipment (GFE), test assets etc.
- Is there contingency in the schedule if risks are realized?
  - Or is the schedule so tight that nothing can go wrong?
Monte Carlo Analysis

- Allocate three point estimates to tasks on critical and near-critical path based on identified risks from RCASS
  - optimistic, pessimistic & most likely task duration
Monte Carlo Analysis Example
Topics

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- Benefits of Using SCRAM

- SCRAM Key Principles

- SCRAM Process Reference / Assessment Model

- Future plans for SCRAM
Angela takes over here
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SCRAM Benefits

- SCRAM root-cause analysis model (RCASS) useful in communicating the status of programs to all key stakeholders
  - Particularly executive management

- Identifies Root Causes of schedule slippage and permits early remediation action

- Provides guidance for collection of measures
  - Provides visibility and tracking for those areas where there is risk

- Provides confidence in the schedule
SCRAM - Benefit

- Validate schedule before execution

- Widely applicable
  - SCRAM can be applied at any point in the program life cycle
  - SCRAM can be applied to any major system engineering activity or phase

- Examples
  - Software-Hardware Integration
  - Aircraft Flight Testing
  - Installation/integration of systems on ship
  - Logistics Enterprise Resource Planning (ERP) application roll out readiness
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SCRAM Key Principles

- Minimal Disruption
  - Information is collected one person at a time
  - Interviews typically last an hour

- Independent
  - Review team members are organizationally independent of the program under review

- Non-advocate
  - All significant issues and concerns are considered and reported regardless of origin or source (Customer and/or Contractor).
  - Some SCRAM reviews have been joint contractor/customer team – facilitates joint commitment to resolve outcomes
SCRAM Key Principles (cont.)

- Non-attribution
  - Information obtained is not attributed to any individual
  - Focus is on identifying and mitigating the 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 briefing presented at end of second week
Topics

- Three Common Questions Addressed by SCRAM
- Benefits of Using SCRAM
- SCRAM Key Principles
- SCRAM Process
- Future plans for SCRAM
SCRAM Process

1.0 Assessment Preparation

2.0 Project Awareness

3.0 Project Risk / Issue Identification

4.0 Project Schedule Validation

5.0 Data Consolidation & Validation

6.0 Schedule Compliance Risk Analysis

7.0 Observation & Reporting

Schedule Compliance Risk Quantified
SCRAM Team Composition

- Assessment conducted by a small team including:

  - Engineering Assessors
    - Validate WBS, engineering-related basis of estimates (BoEs), workload estimates, technical risk assessment

  - Scheduler experienced in the project schedule tool
    - Validates schedule – conducts schedule health checks
    - Performs Monte Carlo risk modelling

  - Other project domain specialists as needed
    - E.g. Aeronautical Flight Test Engineers
SCRAM Key Steps

- SCRAM Team briefs the Project on the principles, purpose and approach of the SCRAM

- The Project provides the SCRAM team with an initial overview of the current status and project issues

- Project Issues and Risks are confirmed by the SCRAM Team through interviews, reviewing documentation and other project assets

- Schedule health checks and Monte Carlo analysis are performed
SCRAM Key Steps (cont.)

- Executive out brief is prepared and presented
  - Observations, findings and recommendations
  - Presentation structured using the RCASS model
    - Shows cause and effect linkage
  - Findings allocated a risk code rating
  - Presented at the end of the second week

- The final report is prepared and delivered (an additional two weeks)
SCRAM Findings - Examples

Sample Findings with Risk Code Rating

- POSITIVE:
  - Functional requirements based-lined and agreed; no evidence was identified of requirements churn or creep

- POTENTIAL RISK:
  - Limited schedule contingency exists for further rework

- HIGH RISK:
  - Lack of an integrated high-level schedule precludes the ability to accurately forecast project milestone achievements
    - 13 major schedules not integrated at the program level
Process Reference / Assessment Model

- Developed as an ISO/IEC 15504 conformant Process Reference Model and Process Assessment Model
  - Funded by the Australian Defence Materiel Organisation (DMO)
  - Developed by
    - Systems and Software Quality Institute and Software Metrics Inc.
  - Delivered June 2010
  - The models are publicly available to download from:

http://www.scramsite.org
Topics

- Three Common Questions Addressed by SCRAM
- Benefits of Using SCRAM
- SCRAM Key Principles
- SCRAM Process
- Future plans for SCRAM
Future Plans

- Currently developed Diagnostic SCRAM (D-SCRAM)
  - Full scale application of the method to evaluate challenged projects or Projects of Concern.
  - Used to assess likelihood of schedule compliance, root cause of schedule slippage and to recommend remediation of project issues.

- Further evolve the SCRAM process for:
  - Pro-active SCRAM (P-SCRAM)
    - To be conducted prior to Contract or at Integrated Baseline Review (IBR) to ensure common systemic issues are avoided before the Program Schedule is contracted or baselined.
  - Monitor SCRAM (M-SCRAM)
    - Reduced version of D-SCRAM that maybe used to monitor project status – project health check performed ad hoc or conducted to support appropriate Gate Reviews.
Future Plans (cont.)

- SCRAM Training & Assessor Qualifications

- SCRAM Process Reference and Assessment Model
  - Further revisions
    - Based on feedback from use during SCRAM assessments and
    - Change Requests (Appendix D in the model)

- SCRAM Assessment Tool
  - Prototype has been used
  - Under development
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Acronyms

- ANAO – Australian National Audit Office
- BoE – Basis of Estimate
- COTS/MOTS – Commercial off the Shelf/Modified off the Shelf
- DMO – Defence Materiel Organisation (Australia)
- GAO – Government Accounting Office
- GFE – Government Furnished Equipment
- ISO/IEC 15504 – Information Technology – Process Assessment
- RCASS – Root Cause Analysis of Schedule Slippage
- SCRAM – Schedule Compliance Risk Assessment Methodology
- SMI – Software Metrics Inc. (United States)
- SSQi – Systems & Software Quality Institute (Australia)