Practical Software and Systems Measurement

A foundation for objective project management

Safety & Security

17th July 2003
13:00 – 16:30
PSM 7th Annual Users' Group Conference
Keystone, Colorado

Paul Caseley, John Murdoch

Agenda

- 13:00 – 13:15 Introduction & Background
- 13:15 – 14:00 Current Status of work
  - TWG results
  - Proposed ICM tables
- 14:00 – 14:30 Structure and Content of White Paper
  - authors, review, timeframe
- 14:30 – 15:00 Implementation Strategy
  - 'Publication' of White Paper
  - Introduction to wider safety & security communities
  - Trials
  - Enhancement to PSM
- 15:00 – 15:30 Break
- 15:30 – 16:30 Optional!
  - Measurement Descriptions and Data Items
  - Process improvement

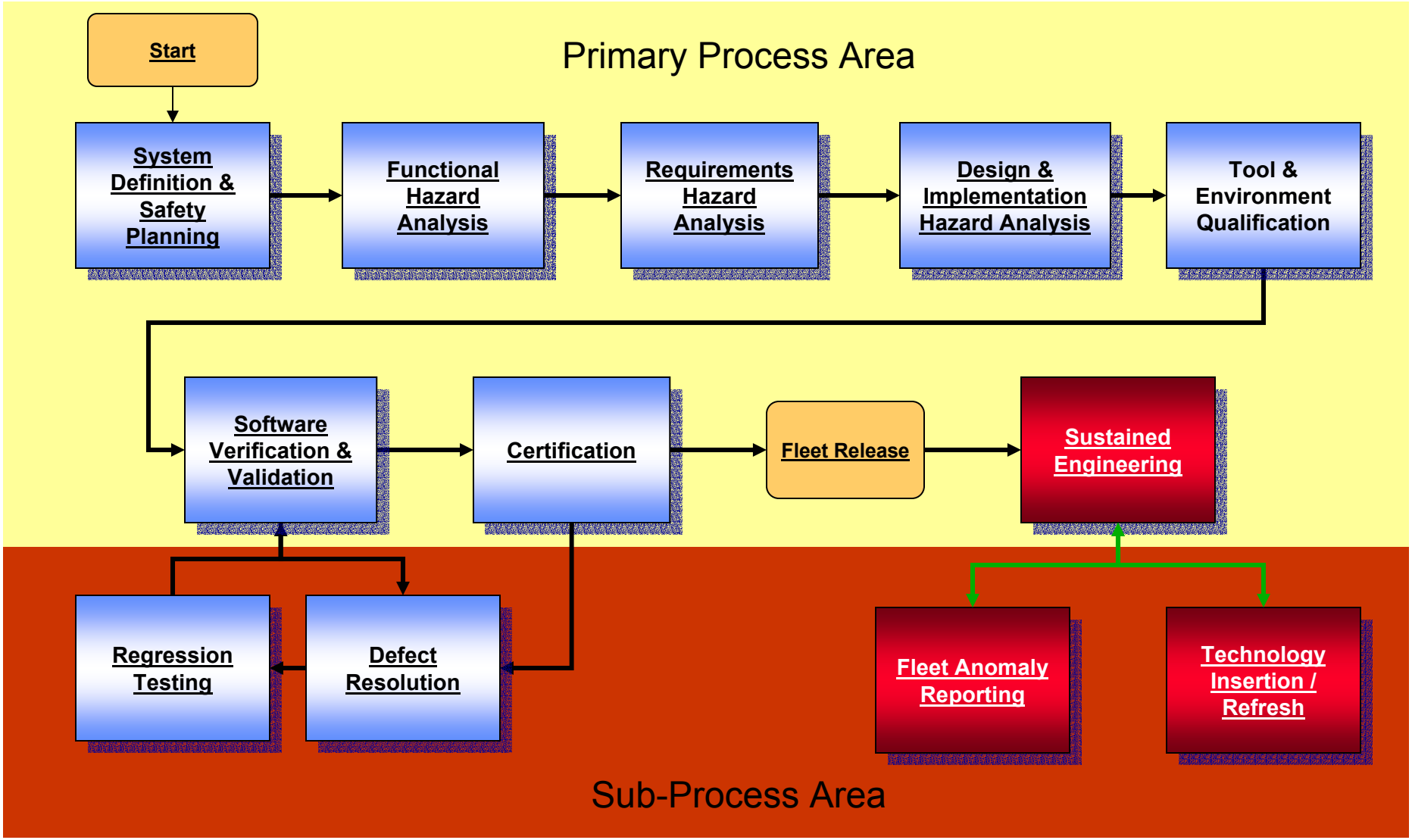
General Objectives

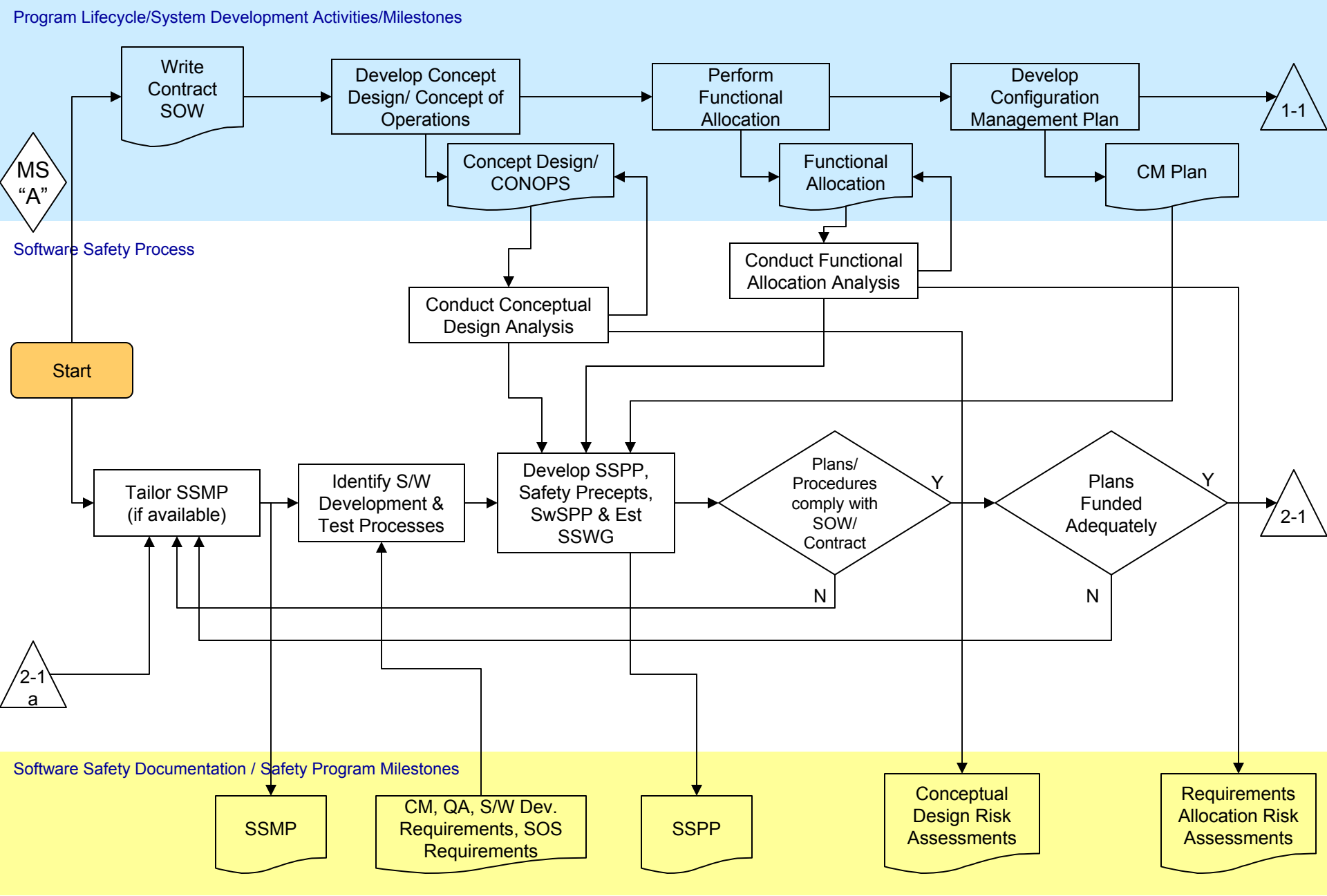
- To identify measures appropriate for the safety and security disciplines, in the spirit of the measurement approach of PSM
- To draw up augmentations to the PSM materials, in particular the Issue-Category-Measure, Measurement Category and Measure Description Tables, with the objective of guiding users in developing measurement systems for these disciplines
- To provide measurement support to the CMMI and +SAFE integration initiative

Objectives of Workshop

- To review progress in the measurement of safety; approach being taken, preliminary results, PSM augmentations proposed
- To seek comments, suggestions etc for further work
- To plan the next phase of the work

Software Safety/Certification
MACRO PROCESS
Weaver Group Integration, Weaving Team, 23 May 2003





Weaving Team, 23 May 2003 **SYSTEM DEFINITION & SAFETY PLANNING (1 of 1)**

+SAFE Extensions to CMMI

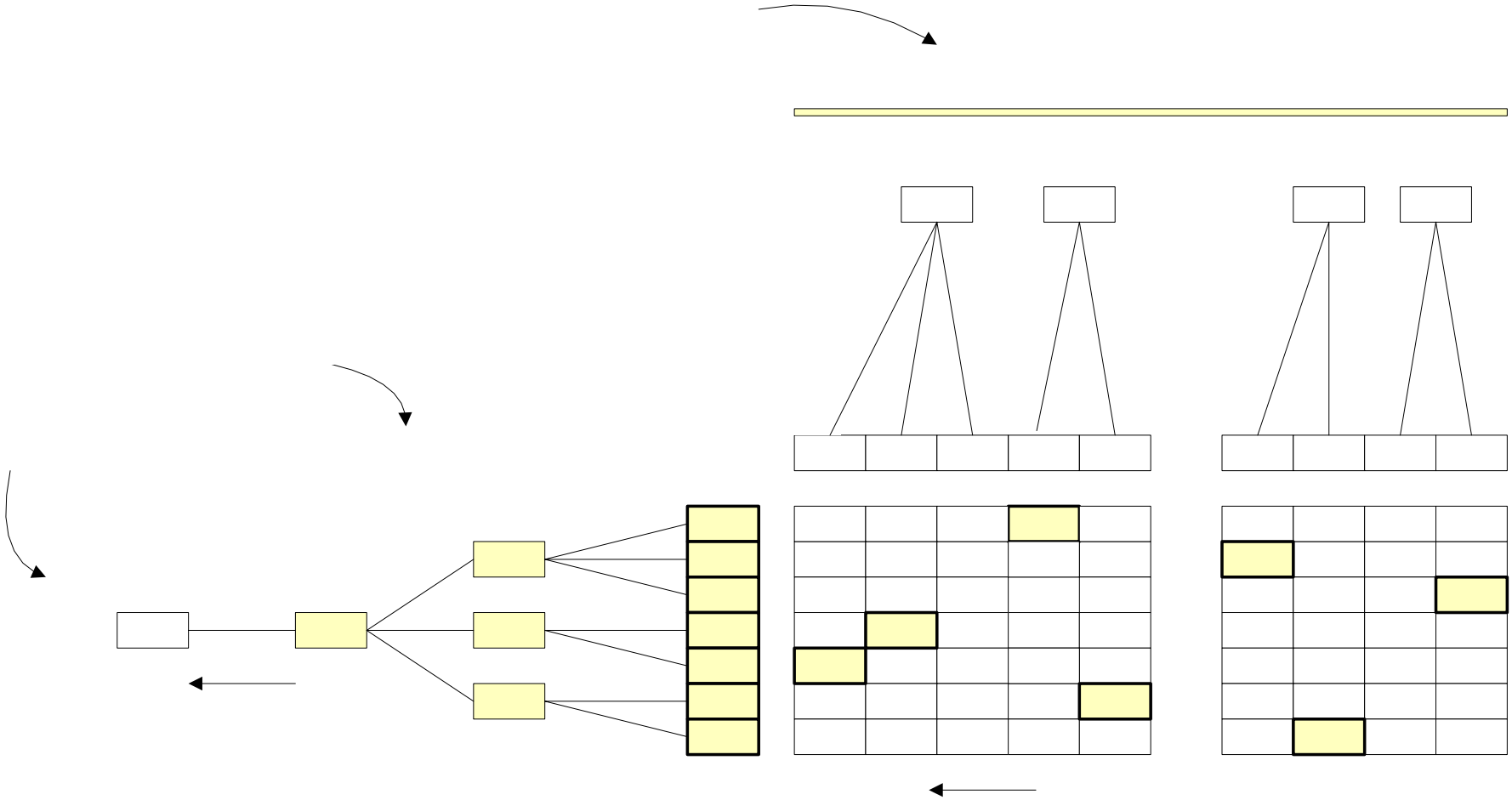
+SAFE Extension to CMMI[SM], Aus Dept of Defence

CMMI[SM] Categories	Safety Process Areas	Goals
Project Management	Safety Management	Develop Safety Plans
		Monitor Safety Incidents
		Manage Safety-related Suppliers
Engineering	Safety Engineering	Identify Hazards, Accidents and Sources of Hazards
		Analyze Hazards and Perform Risk Assessment
		Develop Safety Requirements
		Apply Safety Principles and Requirements
		Support Safety Acceptance

Outcomes of March TWG Meeting

- **Safety & Security TWG Meeting held on 27th March 2003**
- **Inputs: a ‘strawman’ ICM Table**
- **Outputs: proposed augmentations to ICM Table, proposals about measurements at different CMMI levels, actions.**

Reference Measures



ICM Table: Augmentations v2

Issue - Category - Measure Mapping		
Common Issue Area	**Measurement Category**	**Measures**
Schedule and Progress	Milestone Performance	Milestone Dates
		Critical Path Performance
	Work Unit Progress	Requirements Status
		Problem Report Status
		Review Status
		Change Request Status
		Component Status
		Test Status
		Action Item Status
	Incremental Capability	Increment Content - Components
		Increment Content - Functions
Resources and Cost	Personnel	Effort
		Staff Experience
		Staff Turnover
	Financial Performance	Earned Value
		Cost
	Environment and Support Resources	Resource Availability
		Resource Utilization

ICM Table: Augmentations v2

Product Size, Stability and Scope	Physical Size and Stability	Database Size
		Components
		Interfaces
		Lines of Code
		Physical Dimensions
	Functional Size and Stability	Functional Requirements
		Functional Change Workload
		Function Points
	Scope - Safety	Safety Requirements
		Safety-Critical Functions
		Safety-Critical Components
		Safety-Critical Interfaces
		Safety-Critical Modes
		Safety Zones
		Safety Change Workload

ICM Table: Augmentations v2

Product Quality	Functional Correctness	Defects
		Technical Performance
	Supportability	Time to Restore
	Maintainability	Cyclomatic Complexity
		Maintenance Actions
	Efficiency	Utilization
		Throughput
		Timing
	Portability	Standards Compliance
	Usability	Operator Errors
	Dependability - Reliability	Failures
		Fault Tolerance
	Dependability - Safety	Hazards
		Hazard Scenarios
		Failure Modes
		Safety Assessments & Assumptions
		Mitigations
		Safety Incidents & Accidents
	Assurance - Safety	Safety Argument

ICM Table: Augmentations v2

Process Performance	Process Compliance	Reference Model Rating
		Process Audit Findings
	Process Efficiency	Productivity
		Cycle Time
	Process Effectiveness	Defect Containment
		Rework
Technology Effectiveness	Technology Suitability	Requirements Coverage
	Impact	Technology Impact
	Technology Volatility	Baseline Changes
Customer Satisfaction	Customer Feedback	Survey Results
		Performance Rating
	Customer Support	Requests for Support
		Support Time

White Paper: Content

- Introduction, Objectives
  - Background and desired outcomes of TWG work
- Safety & Security Measurement Principles
  - Fundamental theoretical approach to safety & security measurement
  - Phased approach – 'simple' measures first, then more 'advanced' measures
- Augmentations to ICM Table
  - Proposed augmentations
- Preliminary Measurement Specifications
  - Proposed measurement specifications special to safety and security
  - Proposed modifications to existing measurement specifications
- Example Implemented Measures & Data Items
  - Examples from current practices (hazard logs, tracing to mitigations, reqmts etc)
- Further Work
- Feedback & Review
  - What we need from the reader for the next iteration

White Paper: Preparation

- Timescale
- Authorship
- Reviewers
- Distribution

- Proposed timeframe:
  - Draft White Paper for TWG internal review, end October 2004
  - Paper at Australian Safety Workshop, October 2003; preliminary results
  - White Paper for wider review, end December 2003
  - Trials thru 2004
  - TWG Meeting Feb/Mar 2004; progress review
  - Trial report and assessment: PSM Conf July 2004

Implementation Strategy

- White Paper preparation and internal TWG review, October 2003
- Publish White Paper for wider review in safety & security communities, December 2003
- Paper at the Australian Safety Workshop, October 2003
- Buy-in from US Navy
- Buy-in from DoD/ OSD/ MoD

- Trials
  - UK project – identified
  - US project – tbd, via OSD
  - Aus project – tbd, seek interest at Aus Workshop

- Formal augmentation to PSM materials, second half 2004

Deliverables/Dates Available

- Draft White Paper, end October 2003
- White Paper, end December 2003
- Paper to Aus conference, end August 2003
- UK project trial,

Action Items

- John Murdoch/ Paul Caseley to draft White Paper, end October 2003
- Distributed inside TWG
- TWG members to review and comment by end November 2003
- Updated and ‘published’ end December 2003

Points of Contact

Paul Caseley
011 44 1684 77 1476
PRCaseley@dstl.gov.uk

Tony Powell
011 44 1904 43 4649
alp2@york.ac.uk

John Murdoch
011 44 1904 43 4893
jm48@york.ac.uk