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May 2006 v1.0

Technical Management Using a SEMP

A 3-Day Course

Technical Management Provides the Path to Enhance Technical Quality

Without a well-considered, documented, articulated plan, a system development effort can easily founder on the complexity of the many technical issues. The plan provides the means to put each issue in context and ensure that each gets the attention it deserves. Roles and responsibilities must be clearly defined and widely understood, and this applies just as much within a project as at higher levels.

"No plan survives contact." (Gen. Helmuth Graf von Moltke 1800-1891) The purpose of technical management is to continually move the project along a valid technical path, updating the plans as necessary. It is a discipline that is often viewed as a combination of technical and management skills, spanning the gap between project management (with its focus on cost and schedule) and technical design (with its focus on the product). It is essential when dealing with the kinds of complex systems developed today, particularly in the face of far-reaching technologies.

This course introduces participants to the processes that support planning, development and execution of a technical management using a Systems Engineering Management Plan (SEMP). Participants learn how systems engineering deliverables are planned and managed. They experience systems engineering technical reviews and appreciate the value of these "gates."

***You should attend this course if you are*:**

- A technical team leader
- Responsible either for creating or for executing technical management plans
- Concerned about how to coordinate the efforts of a large technical team.
- Looking for proven methods

The course is aimed at

- Program managers,
- Systems engineers,
- Technical team leaders,
- Logistic support leaders, and
- Others who participate in defining and developing complex systems.

Participants walk through the planning and then execution of a SEMP for the development of a Space Habitat.

The course exercise is based on a future NASA program to develop a viable space habitat that can be home for thousands of people living in space, a small space city. The specific project is the water recycling facility that includes weather, agriculture, lakes, waste disposal, and treatment within a large closed environment.

Topics Covered in the Course

Technical Plan Development –The essentials of planning for technical work. Introduce the SEMP, but Place the emphasis on the planning itself.

- Technical Planning as a Discipline Importance of technical planning as a part of SE, with introduction to the SEMP document and to key issues

- SE Technical Management.
- Structure of a SEMP.
- Planning Successful Technical Work.

- Patterns for Planning. Basic theory of patterns as a tool to creativity, because planning is in essence a creative process. Choosing and applying particular management processes. Identifying potential problems in a program.
- Defining Technical Work – How to identify the work to be done.
  - Gather Information.
  - Define Technical Work.
  - Schedule, Organize and Cost the Technical Work.
- Types of Technical Work – Familiarization with the types of work that can be included in a technical plan.
  - Technology Insertion.
  - Requirements Definition.
  - Technical Solution Definition.
  - Design Realization.
  - Evaluation.
  - Product Transition.
- *Space Habitat Exercise* – Defining the Technical Work
- Tailoring Plans –Ttailoring processes to meet the needs or requirements for particular programs.
  - Concepts of Tailoring.
  - Sources for Planning Materials.
  - Verification/Validation Plans.
  - Patterns in Tailoring.
- *Space Habitat Exercise* – Tailoring the Plan
- Key Topics in Planning – Specific issues to monitor during technical planning
  - Relationships to other plans.
  - Responsibility & Authority
  - Negotiating Stakeholder Commitments
  - Technical Work Directives

Technical Plan Execution –Focus in this entire section is on the technical management during a project. How to use the plan. Technical control methods.

- Technical Management as a Discipline. Introduction to the execution issues. Define technical management by contrasting it to (a) project management and (b) technical design.
  - Discipline of Technical Management
  - Collaborative Environments
  - Leadership
- Scope Control. Keeping the technical scope within bounds during a project, across the barriers of space, time, and technical concepts.
  - Stakeholder Involvement
  - SEMP as a Contract among Stakeholders
  - Focusing Management Attention
  - Applying Expertise
  - Technical Contract Oversight
- *Space Habitat Exercise* – Collaborative Issues
- Technical Reviews – Using effective reviews as a control process to assess performance against the SEMP.
  - Management Reviews
  - Entrance/Exit Criteria.
  - Technical Reviews
  - Managing Reviews.
- Technical Control Processes –Common technical processes that are used in the execution stage to control technical progress.
  - Requirements Management.
  - Interface Management.
  - Risk Management.
  - Configuration Management.
  - Technical Data Management.
  - Safety and Mission Assurance.
- *Space Habitat Exercise* – Project Control
- Technical Assessment – This is about developing and maintaining a usable and accurate management view of how the technical part of the project is moving forward.
  - Productivity Assessment.
  - Technical Performance Measurement

- Metrics for SE.
- Leading Indicators.

- Decision Analysis – How to use the SE technical assessment data to make effective decisions.
- *Space Habitat Exercise* – Decision Analysis

Planning Documentation –Wrapping up the issues of technical planning and technical management into a document, the SEMP. Good plans and bad plans. Methods to create and approve the SEMP. Cycles of update.

- SEMP Structure –Basic description of what's in the SEMP and why.
- Characteristics of Good and Bad Plans – Examples of typical problems with SEMPs. Over-use of boilerplate, inadequate detail, emphasis on cost/schedule control to exclusion of technical control, inadequate consideration of technical risks or technical structure or trade-offs, etc.
- Preparing a SEMP –Overview of the process of preparing the SEMP
- Cycles of Control – How often should the SEMP be updated?

Summary - Review of the important points of the course. Interactive discussion of participant experiences that add to the material.

The Presenters:

Mr. Eric Honour has been in international leadership of the engineering of systems for over a dozen years. He is a former INCOSE President, was selected in 2000 for Who's Who in Science and Technology and in 2004 as an INCOSE Founder. He is on the editorial board for *Systems Engineering*. He has been a systems engineer, engineering manager, program manager and Naval pilot, and has led or contributed to the development of 17 major systems such as the Air Combat Maneuvering Instrumentation systems and the National Crime Information Center 2000. BSSE (Systems Engineering), US Naval Academy; MSEE, Naval Postgraduate School; doctoral candidate, University of South Australia.

Dr. Scott Workinger has led innovative technology development efforts in complex, risk-laden environments for 30 years in the fields of manufacturing (automotive, glass, optical fiber), engineering and construction (nuclear, pulp & paper), and information technology (expert systems, operations analysis, CAD, collaboration technology). He currently teaches courses on program management and engineering and consults on strategic management and technology issues. Scott has a B.S in Engineering Physics from Lehigh University, an M.S. in Systems Engineering from the University of Arizona, and a Ph.D. in Civil and Environment Engineering from Stanford University.