Systems Engineering Training Curriculum
TRAINING AIM AND APPROACH

AIM

The aim of the learning experience is to present the learner with sufficient theory and practical examples to enable him/her to establish and/or provide a **practical** Systems Engineering (SE) capability in his own work environment.

The practical examples presented and standards referenced in this training course is applicable to the **Military Landward Environment**

APPROACH

Many publications and standards on SE exist. Current internationally accepted standards and benchmarks are used as a basis for course material.

The **uniqueness of the training courses** lies in the **practical application of the theory** as developed and successfully practiced by **Pronex** for the past 23 years on many multidisciplinary and complex military landward programs in South Africa and internationally.

The following references are utilised during training:

- Core references presenting the theoretical benchmark of the Systems Engineering discipline.
- Internationally related military standards applicable to the military landward environment
- Applicable handbooks and publications
TRAINING CONTEXT

MODULE 1: Program structuring

- System Breakdown Structure (SBS)
- Work Breakdown Structure (WBS)
- Contracting Breakdown Structure (CBS)
- Contract Deliverable Requirement List (CDRL)

MODULE 5: Technical management

MODULE 3: System Integration

System Acquisition

Specialty engineering activities

MODULE 2: System specification & synthesis

MODULE 4: System verification / testing
TRAINING COURSES

SE OVERVIEW - A PRACTICAL APPROACH

Course No: 01
Duration: 3 days

Target Audience:
- Managers of Research and Development/Acquisition companies/organisations
- Programme managers / Project officers
- Systems engineers seeking the bigger picture (perspective), practical advice or refreshing of all SE related topics.

Course Content
- Introduction to Systems Engineering
- An overview of each of the following “Module” courses:
  - Program Structuring - A Practical SE Approach
  - System Specification and Synthesis - A Practical Approach
  - System Integration - A Practical Approach
  - System Verification - A Practical Approach
  - Technical Management - A Practical Approach
TRAINING COURSES

MODULE 1: PROGRAM STRUCTURING - A PRACTICAL SE APPROACH

Course No: 02
Duration: 1 day

Target Audience:
- Managers of Research and Development/Acquisition companies/organisations
- Programme managers / Project officers
- Systems engineers

Course Content
- Introduction to Systems Engineering
- System Breakdown Structures (SBS)
- Acquisition strategies
- Work Breakdown Structure (WBS)
- Contract Deliverable Requirements List (CDRL)
- Organisational Breakdown Structure (OBS)
TRAINING COURSES

MODULE 2: SYSTEM SPECIFICATION & SYNTHESIS - A PRACTICAL APPROACH

Course No: 03
Duration: 3 days
Target Audience:
• Systems engineers (military landward environment)

Course Content
• System specification & synthesis process
• User studies & requirement statement
• System concept development and performance specification
• System requirements and architecture development
• Specification practices
• Modelling and analysis tools for (military landward)
  o Weapon system hit probability
  o System survivability
  o Vehicle mobility performance
  o Sight detection, recognition & identification ranges
  o System reaction time
  o Reliability, availability and maintainability
  o Electric power budget
  o Physical modelling (CAD)
  o System mass budget
  o System effectiveness
  o Life cycle cost
• Model Based Systems Engineering (MBSE)
TRAINING COURSES

MODULE 3: SYSTEM INTEGRATION - A PRACTICAL APPROACH

Course No: 04
Duration: 2 days
Target Audience:
- Managers of Research and Development/Acquisition companies/organisations
- Programme managers / Project officers
- Systems engineers

Course Content
- Introduction to Systems Engineering
- System functional integration overview (detail addressed in Module 2)
- Integration of Specialty Engineering activities
  - Reliability, availability and maintainability
  - Logistics engineering
  - System safety engineering
  - Human factors engineering (Ergonomics)
  - Electromagnetic compatibility (EMC)
  - Standardisation
- Physical integration
  - Integration context and process
  - Mechanical integration
  - Electrical integration
  - Electronic networks and software integration
  - Interface control
TRAINING COURSES

MODULE 4: SYSTEM VERIFICATION - A PRACTICAL APPROACH

Course No: 05
Duration: 1 day
Target Audience:
• Managers of Research and Development/Acquisition companies/organisations
• Programme managers / Project officers
• Systems engineers

Course Content
• Introduction to Systems Engineering
• Test and Evaluation Master Plan (TEMP)
• Acceptance of prototypes
  o Prototypes
  o Acceptance test procedures and -reports
• Testing of prototypes
  o Test readiness review (TRR)
  o Test specifications, -instructions and -reports
  o Verification techniques
  o Common approaches and tips
• Technical Performance Measure (TPM)
• Verification standards applicable to the military landward environment
TRAINING COURSES

MODULE 5: TECHNICAL MANAGEMENT - A PRACTICAL APPROACH

Course No: 06
Duration: 2 days
Target Audience:
• Managers of Research and Development/Acquisition companies/organisations
• Programme managers / Project officers
• Systems engineers

Course Content
• Introduction to Systems Engineering
• Systems Engineering Management Plan (SEMP)
• Test and Evaluation Master Plan (TEMP) overview (addressed in Module 4)
• Supporting technical management activities:
  o Configuration and Data Management
  o Risk Management
  o Integrated Logistic Support Management
  o Quality Assurance
• Technical reviews and audits:
  o Major program reviews
  o Design reviews
  o Audits
ABOUT THE COURSE PRESENTER

Louwrens Punt is the founder and Executive Manager of Pronex Engineering Management Management Consultants. He has been involved in many consulting engineering initiatives related to military acquisition programmes locally and internationally for the past 30 years, applying and tailoring systems engineering principles. As a Systems Engineer, Louwrens sees the bigger “systems” picture. His ability to take cognisance of the critical detail, but within the context of the bigger scheme of things, is what makes him a decisive and visionary leader. He has gained a wide range of knowledge, ranging from the front end of technology military systems, through to commercial operations. This includes various technology disciplines covering electronic, electrical and mechanical systems. As a Systems Engineer, his analysis skills, including simulation and modelling, are also highly developed. He holds a B.Eng (Electrical) (cum laude) from the University of Pretoria and a Masters Degree in Engineering (Control Systems) from the University of Witwatersrand.