

# Engineering Systems Mid

## Slide 1

- **Definition of System**
- An integrated set of interoperable elements, each with explicitly specified and bounded capabilities, working synergistically to perform value-added processing to enable a User to satisfy mission-oriented operational needs in a prescribed operating environment with a specified outcome and probability of success.
- **Categories of System**
  - Hard : Involving simulation
  - Soft : Hard to quantify
  - Evolutionary : Open, Complex system.
- **Systems Thinking** : Process of predicating, how something influences other things.
- **Systems Engineering** : how complex engineering projects should be designed and managed.
- **Engineering Systems** : study dealing with diverse, complex design problems.
- **Characteristics of Engineering Systems**
  - Tech enabled
  - Large Scale
  - Socio-Technical Aspect
  - Nested Complexity
  - Dynamic
  - Emergent Properties

## Slide 2

- **Systems Approach**
  - Interdependence
  - Goal Seeking
  - Holism
  - Inputs and Outputs
  - Transformation
  - Entropy
  - Regulation

- Hierarchy
- Differentiation
- Equifinality
- Multi-finality
- **System vs Product vs Tools**
- Product has specific capability.
- Supporting product is tool.
- **Systems Attributes**
- The term *attributes* classifies *functional* or *physical* features of a system.
- **Properties** : Mass properties.
- **Characteristics** : Behavioural and Physical.
- **System Performance** : Objective and Subjective.
- **System Conditions**
  - Pre-requisites
  - Initial Operating Condition
  - Static vs Dynamic
  - Stabilisation
  - Balance of Power

### Slide 3

- **Stakeholders.**
- **Measures of a system**
  - Measure of Performance (Mo Effectiveness, Suitability)
  - Operational Effectiveness
  - Operational Suitability
  - Cost Effectiveness
- **Acceptability of a System**
  - Market
  - User perception
  - User mission- *System*
  - Return of Investment

### Slide 4

- **Stages in System's Life Cycle**
  - Definition (SWOT)
  - Procurement
  - Development
  - Production

- Operation and Support
- Disposal
- **System Interface — Objectives**
  - Link Systems
  - Adapt on incompatible systems
  - Buffer effects of incompatible systems
  - Leverage Human Capabilities
  - Restrain system element's usage.
- **Types of Interfaces**
  - Active
  - Passive
  - Combined
  - Logical
  - Physical
- **Interface Failures**
  - Disruption
  - Intrusion
  - Stress Loading
  - Physical Destruction

## Slide 5

- **Diagrams**
  - IDEFO
  - FFBD
  - $N^2$
  - Tree
  - ER
  - Context

## Slide 6

- Functional Specifications
- Non-Functional Specifications — ity
- **Physical Architecture** — Divides in Sub-systems
- **System Architecture**
- The System Architecture identifies all the products (including enabling products) that are necessary to support the system and, by implication, the processes necessary for development, production/construction, deployment, operations, support,

disposal, training, and verification.

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