Outline

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- Outline

        - Systems Engineering Heuristics
    - The Nature of Systems
        - Types of Systems
        - Cycles and the Cyclic Nature of Systems
    - Systems Science
        - History of Systems Science
        - Systems Approaches
        - Complexity
        - Emergence
    - Systems Thinking
        - What is Systems Thinking?
        - Concepts of Systems Thinking
        - Principles of Systems Thinking
        - Patterns of Systems Thinking
    - Representing Systems with Models
        - What is a Model?
        - Why Model?
        - Types of Models
        - System Modeling Concepts
        - Integrating Supporting Aspects into System Models
        - Modeling Standards
    - Systems Approach Applied to Engineered Systems
        - Overview of the Systems Approach
        - Engineered System Context
        - Identifying and Understanding Problems and Opportunities
        - Synthesizing Possible Solutions
        - Analysis and Selection between Alternative Solutions
        - Implementing and Proving a Solution
        - Deploying, Using, and Sustaining Systems to Solve Problems
        - Applying the Systems Approach
- Part 3: SE and Management
    - Systems Engineering STEM Overview
    - Model-Based Systems Engineering (MBSE)
    - System Life Cycle Approaches - Renamed article

    - Generic Life Cycle Model
    - Applying Life Cycle Processes
- System Life Cycle Models - Renamed article
    - System Life Cycle Process Drivers and Choices - Renamed article
    - Vee Life Cycle Model - Renamed article
    - Incremental Life Cycle Model - Renamed article
    - Agile Systems Engineering - Renamed article
    - Process Integration
    - Lean Engineering
- Systems Engineering Management
    - Technical Planning
    - Assessment and Control
    - Decision Management
    - Requirements Management - New article
    - Risk Management
    - Configuration Management
    - Information Management
    - Quality Management
    - Measurement
- System Concept Definition - Renamed article
    - Business or Mission Analysis
    - Stakeholder Needs Definition - Renamed article
- System Requirements Definition - Renamed article
- System Architecture Design Definition - New article
    - Functional Architecture
    - Logical Architecture
    - Physical Architecture
- System Detailed Design Definition
- System Analysis
- System Realization
- System Implementation
- System Integration
- System Verification
- System Transition

- System Validation
- System Operation
- System Maintenance - Updated Knowledge Area
  - Logistics
  - Service Life Management
  - Service Life Extension
  - Capability Updates, Upgrades, and Modernization
  - System Disposal and Retirement
- Systems Engineering Standards
  - Relevant Standards
  - Alignment and Comparison of Systems Engineering Standards
  - Application of Systems Engineering Standards

- Part 4: Applications of Systems Engineering
  - Product Systems Engineering
    - Product SE Background
    - Product as a System Fundamentals
    - Relate Business Activities
    - Product SE Key Aspects
    - Product SE Special Activities
  - Service Systems Engineering
    - Service Systems Background
    - Fundamentals of Services
    - Properties of Services
    - Scope of Service Systems Engineering
    - Value of Service Systems Engineering
    - Service Systems Engineering Stages
  - Enterprise Systems Engineering
    - Enterprise SE Background
    - The Enterprise as a System
    - Related Business Activities
    - Enterprise SE Key Concepts
    - Enterprise SE Process Activities
    - Enterprise Capability Management
  - Systems of Systems (SoS)
    - Architecting Approaches for Systems of Systems

        - Socio-Technical Features of Systems of Systems
        - Capability Engineering
        - Mission Engineering
    - Healthcare Systems Engineering
        - Overview of the Healthcare Sector
        - Systems Engineering in Healthcare Delivery
        - Systems Biology
        - Lean in Healthcare
- Part 5: Enabling Systems Engineering
    - Enabling Businesses and Enterprises
        - SE Organizational Strategy
        - Determining Needed Capabilities
        - Organizing Business to Perform SE
        - Assessing SE Performance
        - Developing SE Capabilities
        - Culture
    - Enabling Teams
        - Team Capability
        - Team Dynamics
        - Diversity, Equity, and Inclusion
        - Technical Leadership in SE
    - Enabling Individuals
        - Roles and Competencies
        - Assessing Individuals
        - Developing Individuals
        - Ethical Behavior
- Part 6: Related Disciplines
    - Systems Engineering and Environmental Engineering
    - Systems Engineering and Geospatial/Geodetic Engineering
        - Overview of Geospatial/Geodetic Engineering
        - Relationship between Systems Engineering and Geospatial/Geodetic Engineering
        - Further Insights into Geospatial/Geodetic Engineering
    - Systems Engineering and Industrial Engineering

- Systems Engineering and Project Management
  - The Nature of Project Management
  - An Overview of the PMBOK® Guide
  - Relationships between Systems Engineering and Project Management
  - The Influence of Project Structure and Governance on Systems Engineering and Project Management Relationships
  - Procurement and Acquisition
  - Portfolio Management
- Systems Engineering and Software Engineering
  - Software Engineering in the Systems Engineering Life Cycle
  - The Nature of Software
  - An Overview of the SWEBOK Guide
  - Key Points a Systems Engineer Needs to Know about Software Engineering
  - Software Engineering Features - Models, Methods, Tools, Standards, and Metrics
- Systems Engineering and Mechanical Engineering
- Systems Engineering and Enterprise IT
- Systems Engineering and Quality Attributes
  - A Framework for Viewing Quality Attributes from the Lens of Loss
  - Human Systems Integration
  - Manufacturability and Producibility
  - System Adaptability
  - System Affordability
  - System Hardware Assurance
  - System Reliability, Availability, and Maintainability
  - System Resilience
  - System Resistance to Electromagnetic Interference
  - System Safety
  - System Security

- Part 7: SE Implementation Examples
  - Matrix of Implementation Examples
  - Implementation Examples
  - Defense System Examples

        - Submarine Warfare Federated Tactical Systems
        - Virginia Class Submarine
    - Information System Examples
        - Complex Adaptive Taxi Service Scheduler
        - Successful Business Transformation
        - FBI Virtual Case File System
    - Management System Examples
        - Project Management for a Complex Adaptive Operating System
    - Medical System Examples
        - Next Generation Medical Infusion Pump
        - Medical Radiation
        - Design for Maintainability
    - Space System Examples
        - Global Positioning System
        - Global Positioning System II
        - Russian Space Agency Project Management Systems
        - Cassini/Huygens
        - Hubble Space Telescope
        - Applying MB Approach for 30 Meter Telescope
        - MSTI Spacecraft
        - Apollo 1 Disaster
    - Transportation System Examples
        - Denver Baggage Handling
        - FAA Advanced Automation System
        - FAA NextGen
        - UAV Prototype - Agile
        - UK Route Modernisation
        - Korean Light Transit System
    - Utilities Examples
        - Northwest Hydro System
        - Singapore Water Management
- Part 8: Emerging Knowledge
    - Emerging Topics
        - Introduction to SE Transformation
        - Socio-technical Systems
        - Artificial Intelligence

        - Verification and Validation of Systems in Which AI is a Key Element
        - Transitioning Systems Engineering to a Model-based Discipline
        - Model-Based Systems Engineering Adoption Trends 2009-2018
        - Digital Engineering
        - Set-Based Design
        - System of Systems and Complexity
    - Emerging Research
