Agenda

- Process Improvement Fundamentals
- Capability Maturity Model Integrated (CMMI)
- Software Process Engineering Metamodel (SPEM)
- Defined Process SPEM, CMMI and ISO 12207
- Tool Support For Modelling Processes

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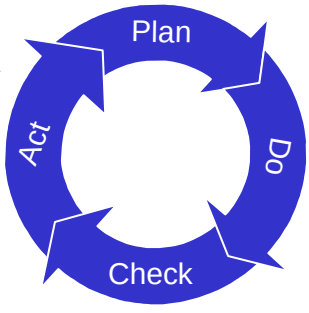
Process Improvement Fundamentals

 4

The Plan-Do-Check-Act (PDCA) Cycle

- Identify potential improvements
- Identify performance measures



- Experiment with changes
- Collect performance data

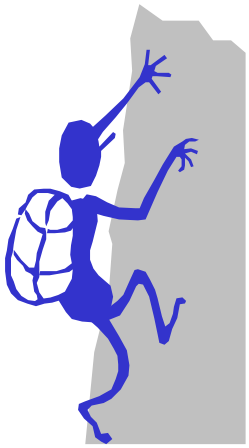
- Evaluate experiments

- Review lessons learnt
- Institutionalise improvements

…or

- Repeat cycle

 5



Capability Maturity Model Integrated (CMMI)

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Software Engineering Institute (SEI)

- US federal government funded research and development centre
- One area of the SEI's work is development of Capability Maturity Models (CMMs)

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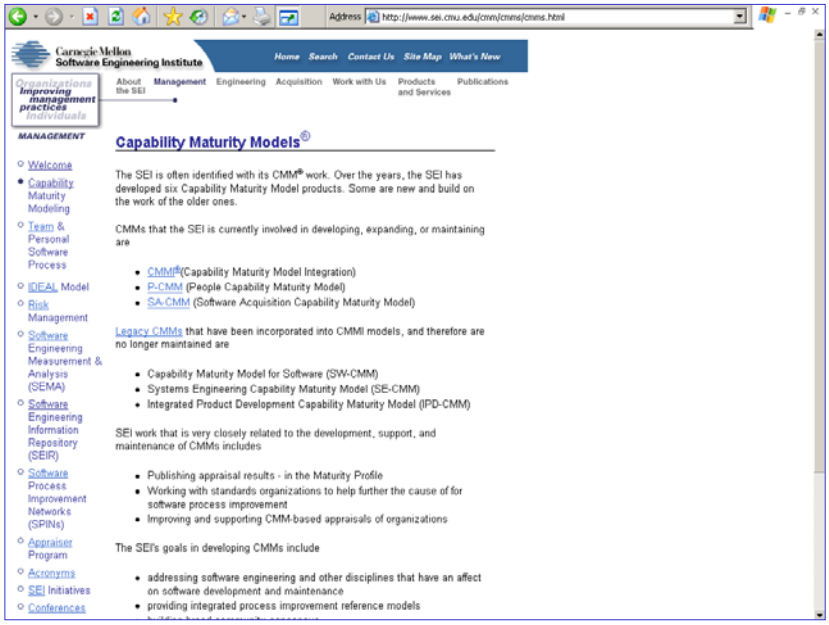
http://www.sei.cmu.edu



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The SEI's CMMs

Legacy CMMs	Current CMMs
• Capability Maturity Model for Software (SW-CMM)	• CMMI (Capability Maturity Model Integration)
• Systems Engineering Capability Maturity Model (SE-CMM)	• P-CMM (People Capability Maturity Model)
• Integrated Product Development Capability Maturity Model (IPD-CMM)	• SA-CMM (Software Acquisition Capability Maturity Model)

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CMMI

- Describes the essential elements of effective processes
- Offers guidance for developing processes
- Does not describe processes models

- Continuous representation
  - Customised sequence of improvements
  - Assessment of individual process areas
- Staged representation
  - Proven sequence of improvements
  - Assessment of organisation
  - Allows comparison of organisations

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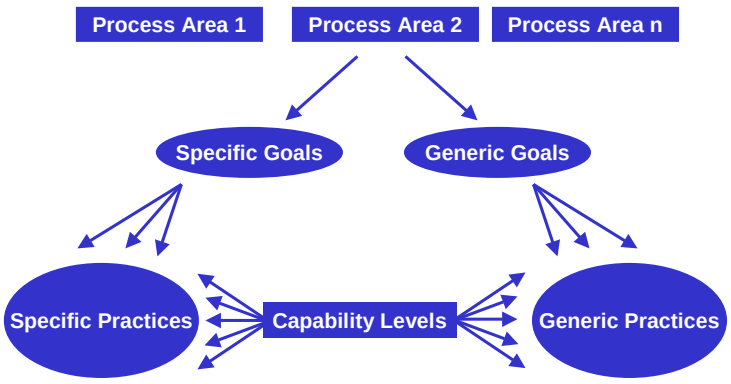
CMMI Continuous Representation



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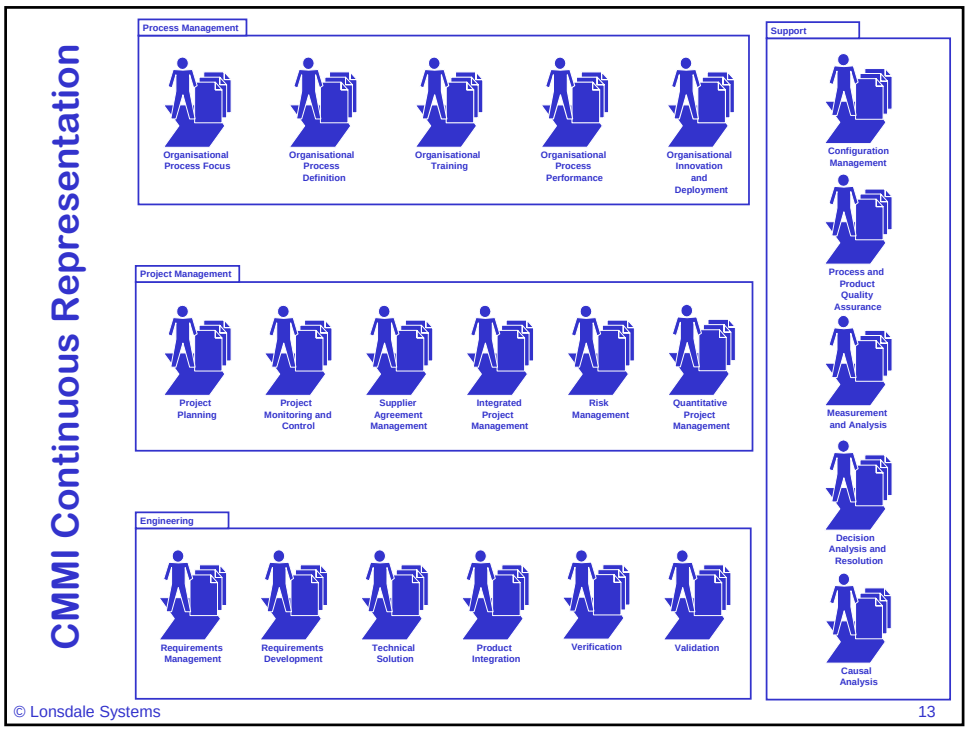

CMMI Continuous Representation

Capability Levels

- Level 0 – Incomplete
- Level 1 – Performed
- Level 2 – Managed
- Level 3 – Defined
- Level 4 – Quantitatively Managed
- Level 5 – Optimising

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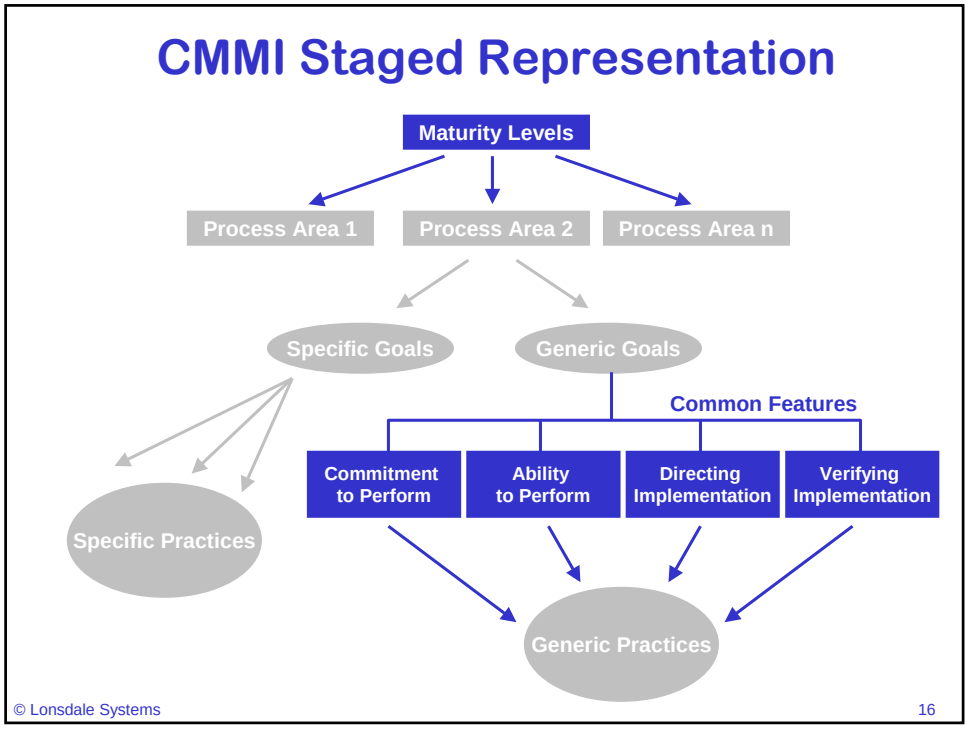
CMMI Staged Representation
Maturity Levels
Process Area 1
Process Area 2
Process Area n
Specific Goals
Generic Goals
Common Features
Commitment to Perform
Ability to Perform
Directing Implementation
Verifying Implementation
Specific Practices
Generic Practices
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CMMI Staged Representation
Level 2: Managed
Requirements Management
Project Planning
Project Monitoring and Control
Supplier Agreement Management
Measurement and Analysis
Process and Product Quality Assurance
Configuration Management
Level 3: Defined
Requirements Development
Technical Solution
Product Integration
Verification
Validation
Organisational Process Focus
Organisational Process Definition
Organisational Training
Integrated Project Management
Risk Management
Decsiosn Analysis and Resolution
Level 4: Quantitatively Managed
Organisational Process Performance
Quantitative Project Management
Level 5: Optimising
Organisational Innovation and Deployment
Causal Analysis and Resolution
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CMMI Staged Representation

Maturity Levels

- Level 1 – Initial
- Level 2 – Managed
- Level 3 – Defined
- Level 4 – Quantitatively Managed
- Level 5 – Optimising

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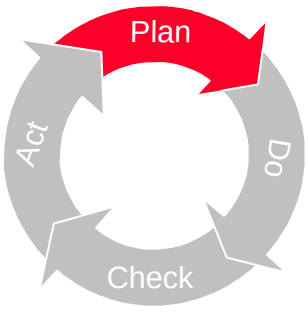
PDCA and the CMMI



- Defined (3) processes provide a framework for identifying problem areas and potential improvements
- Quantitatively Managed (4) processes provide a framework for evaluating the severity of problems and identifying performance measures for potential improvements

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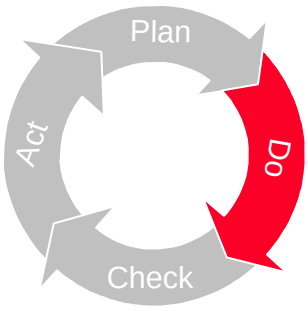
PDCA and the CMMI



- Managed (2) processes facilitate controlled experimentation with potential improvements
- Quantitatively Managed (4) processes define what performance data to collect and how to collect it

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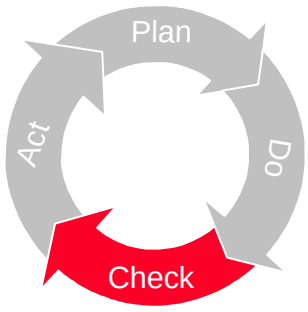
PDCA and the CMMI



- Quantitatively Managed (4) processes supply the performance data to evaluate potential improvements

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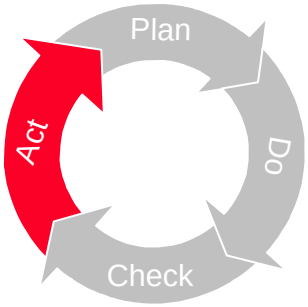
PDCA and the CMMI



- Defined (3) processes provide a framework for institutionalising improvements

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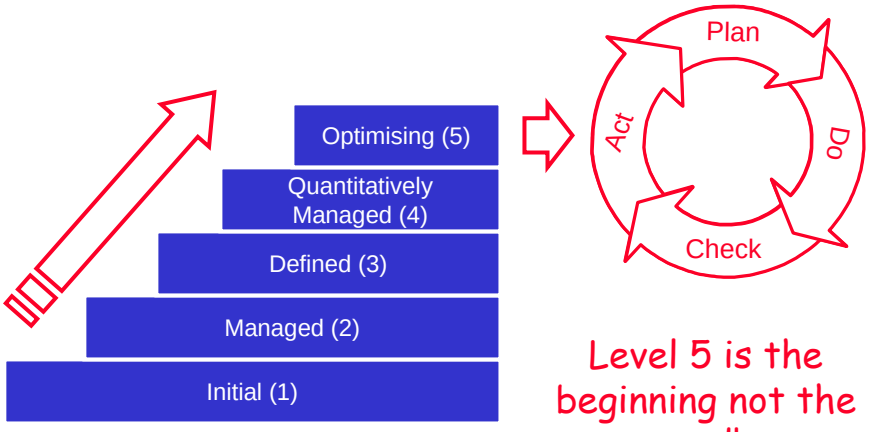
PDCA and the CMMI



Level 5 is the beginning not the end!

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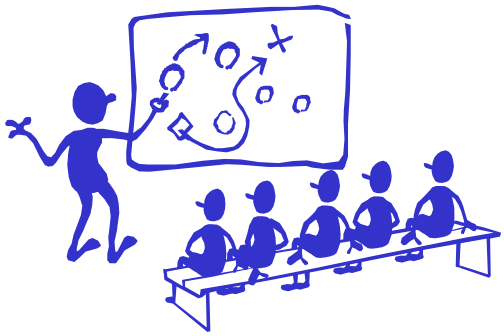

Software Process Engineering Metamodel (SPEM)

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Object Management Group (OMG)

- Founded 1989
- Promotes theory and practice of object-oriented technology
- Publishes industry guidelines and specifications
- Specifications of interest
  - Unified Modelling Language (UML)
  - Software Process Engineering Metamodel (SPEM)

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SPEM

- Metamodel
  - Modelling elements
  - Modelling rules
- Used to describe
  - New processes
  - Existing processes
- Role of UML
  - Notation for metamodel
  - SPEM profile
- Versions
  - Current 1.1
  - Under development 2.0

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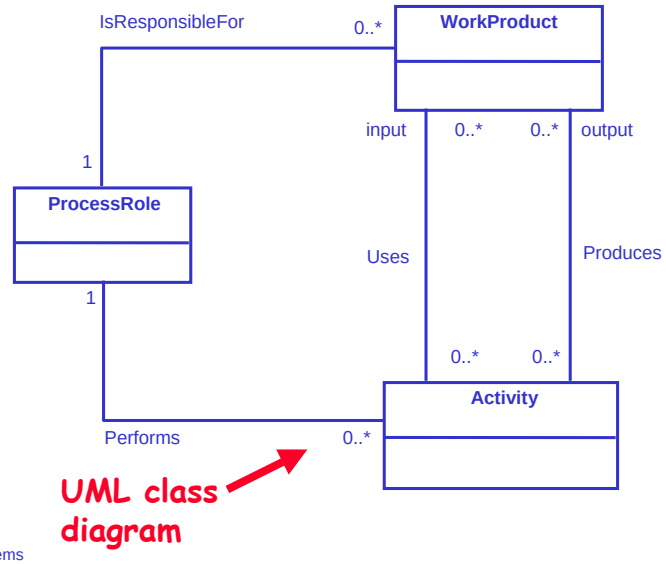
SPEM Conceptual Model



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Process Elements

Work Product
Process Role
Activity and Step
Guidance

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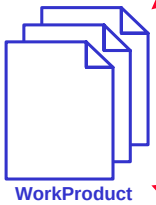
Work Product

SPEM icon



- Anything produced, consumed or modified by a process

UML class or object

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Process Role

- Performs and assists with specific activities
- Can be responsible for specific Work Products
- Not an individual person
  - A person may act in many Process Roles
  - A Process Role may be performed by many people

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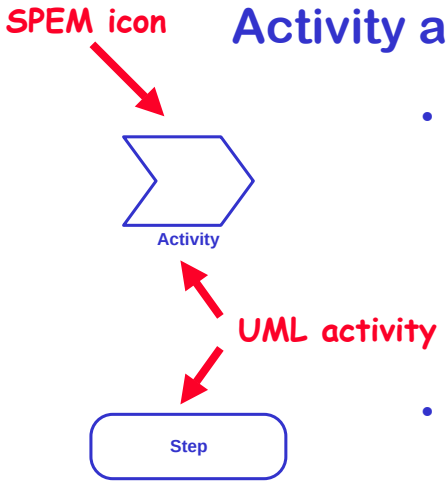
Activity and Step



- Activities
  - Work performed by a single Process Role
  - Work Products
    - Inputs
    - Outputs
  - Decomposed into steps
- Steps
  - Lowest level of activity decomposition
  - Dependencies defines sequence

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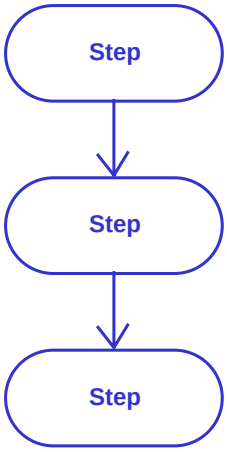
Activity and Step
Control Flows



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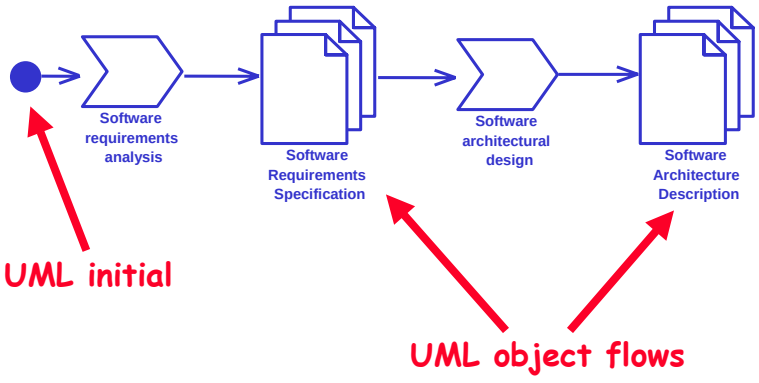
Activity and Step
Object Flows



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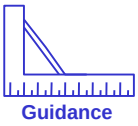
Guidance



- Additional detail about model elements
- Examples
  - Checklists
  - Estimates
  - Guidelines
  - Standards
  - Techniques
  - Templates
  - Tool Mentors
  - UML Profiles

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Process Components

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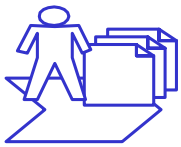
Process Component



- Specialised process package
- Grouping of process elements
  - Self-contained
  - Internally consistent
- Used to partition and structure large processes

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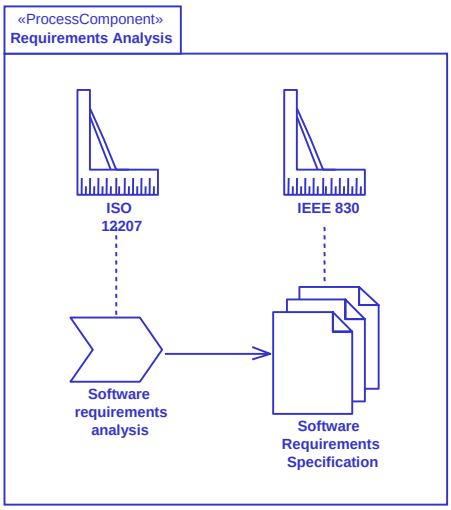
Process Component

IEEE 12207 Work Products

UML package



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Defined Process
SPEM, CMMI and ISO 12207

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ISO/IEC 12207
Information Technology
Software Life Cycle Processes

- Framework of software life cycle processes
- Definitions of activities and tasks
- Intended to be tailored
- No guidance on how to implement or perform

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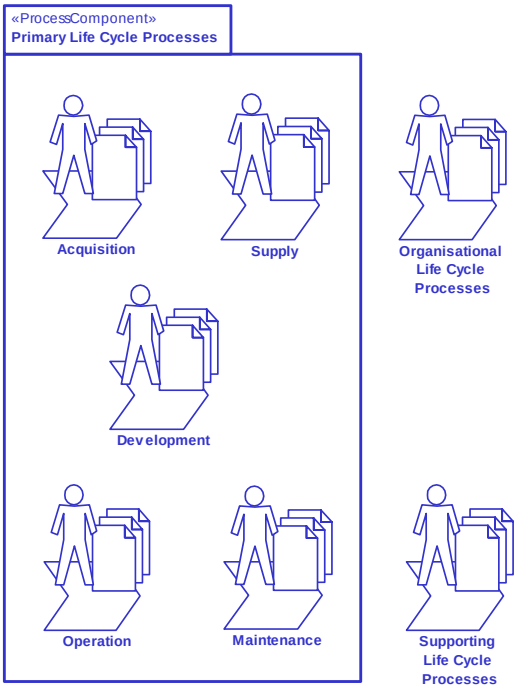
ISO 12207



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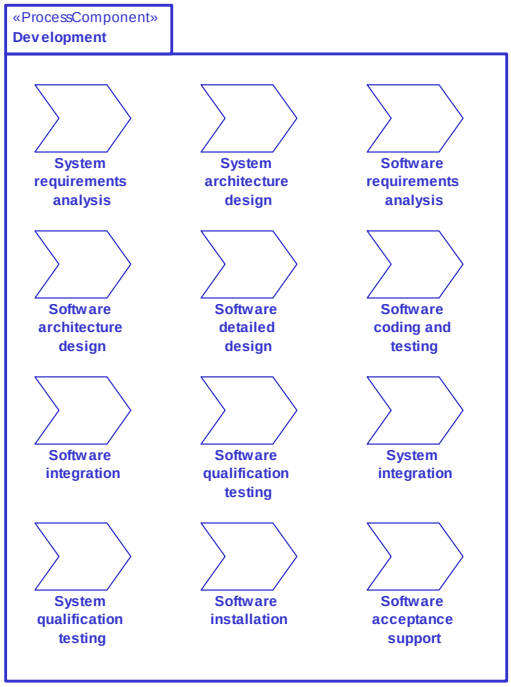
ISO 12207 Development Process

Defined Process



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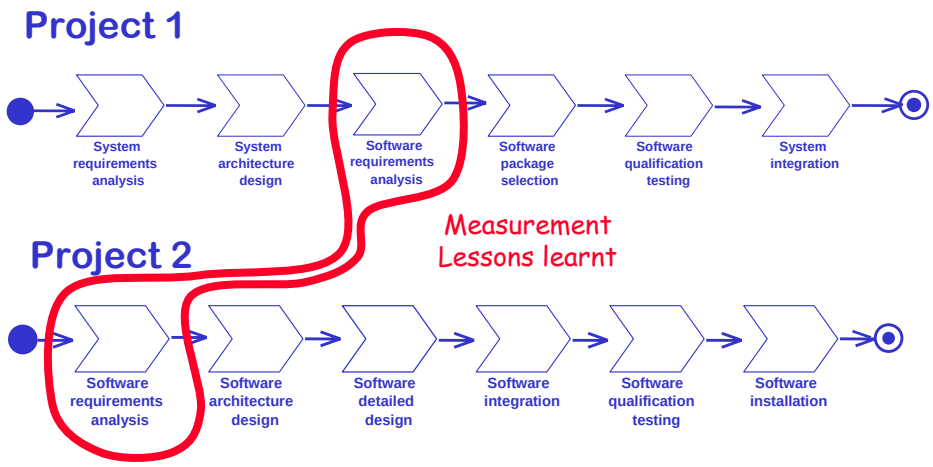
Tailored Process



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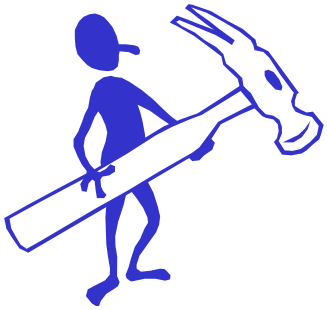
Software Process Modelling Tools



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Sparx Systems Enterprise Architect

http://sparxsystems.com.au

- General purpose UML modelling tool
- SPEM profile available
- Limited drag and drop process tailoring
- Can generate HTML documentation

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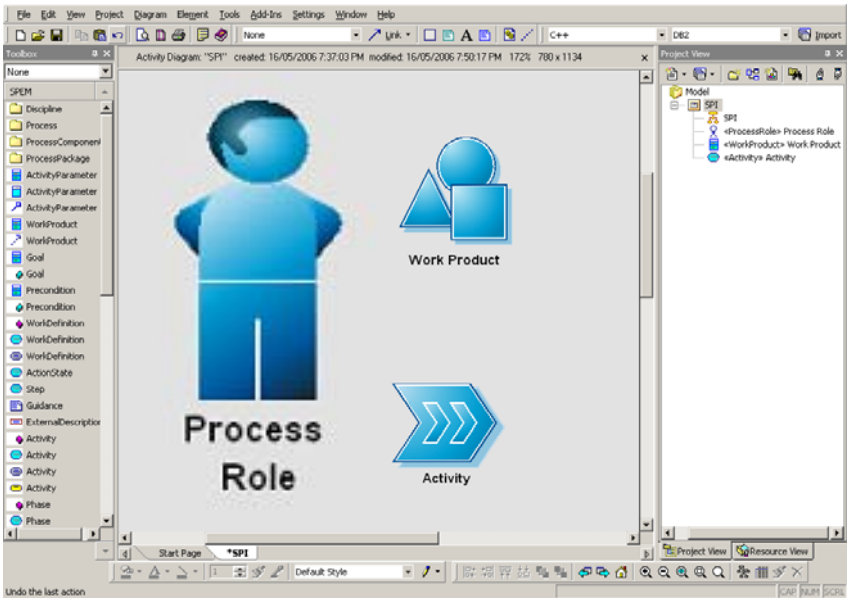
http://sparxsystems.com.au



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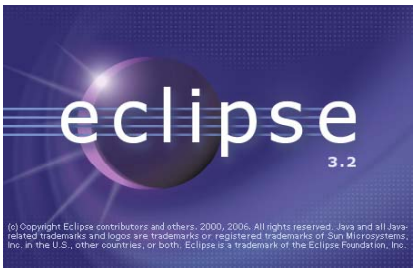
Eclipse Process Framework Composer

http://www.eclipse.org/epf/

- Process engineering tool
- Based on Unified Method Architecture (UMA)
- UMA is proposal for SPEM 2
- Generates HTML process guides
- Exports to MS Project
- Full drag and drop process tailoring



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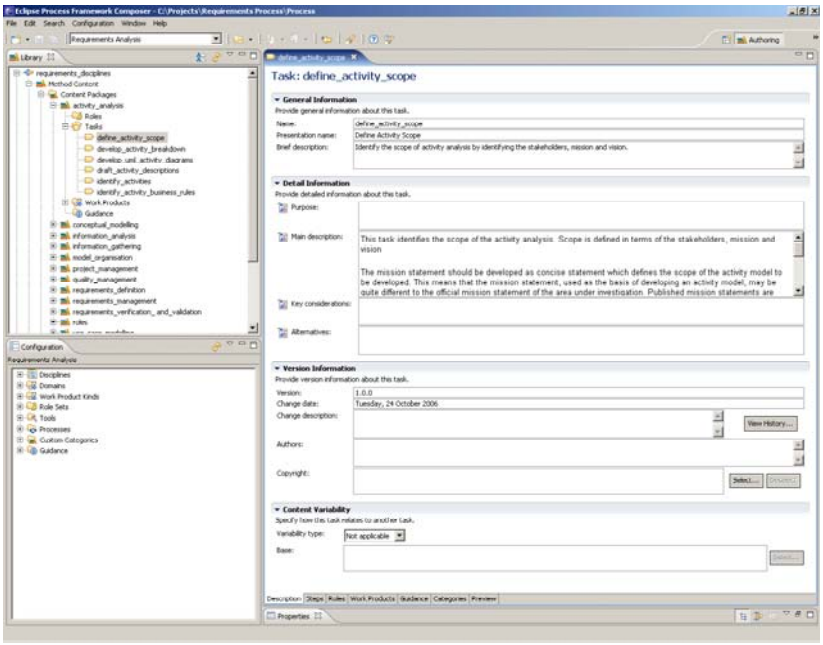
http://www.eclipse.org/epf/



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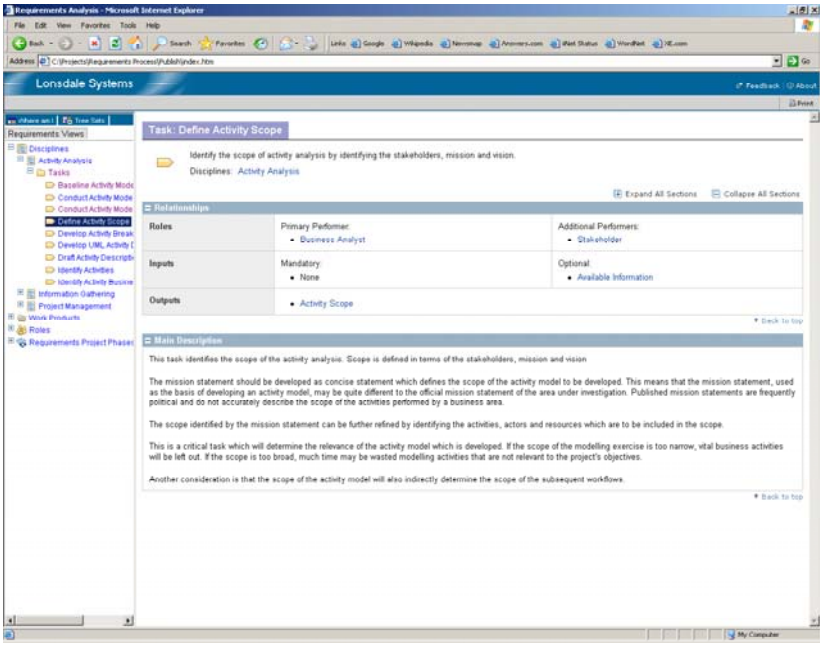
http://www.eclipse.org/epf/



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Conclusion and Questions

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www.lonsdalesystems.com

Presenter: Phil Robinson

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