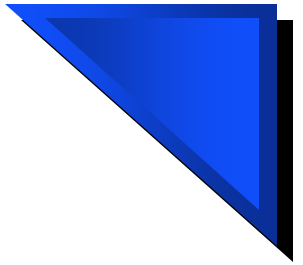

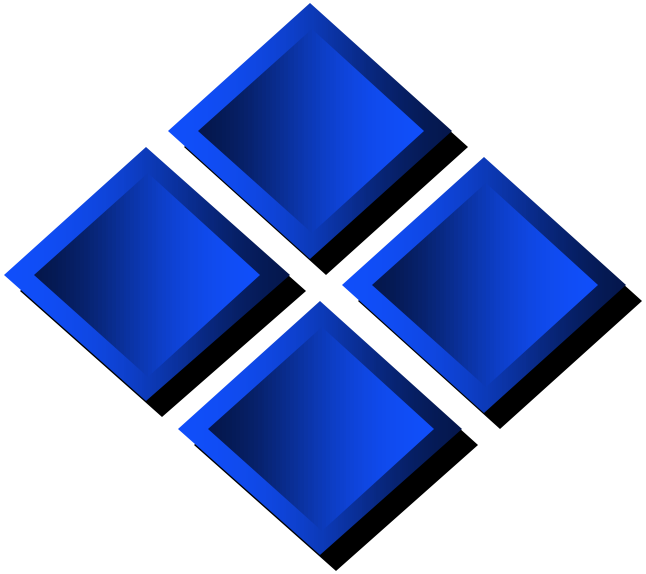

IEEE 1540 - Software Engineering Risk Management: *Measurement-Based Life Cycle Risk Management*

PSM 2001 Aspen, Colorado

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Chair, IEEE SESC
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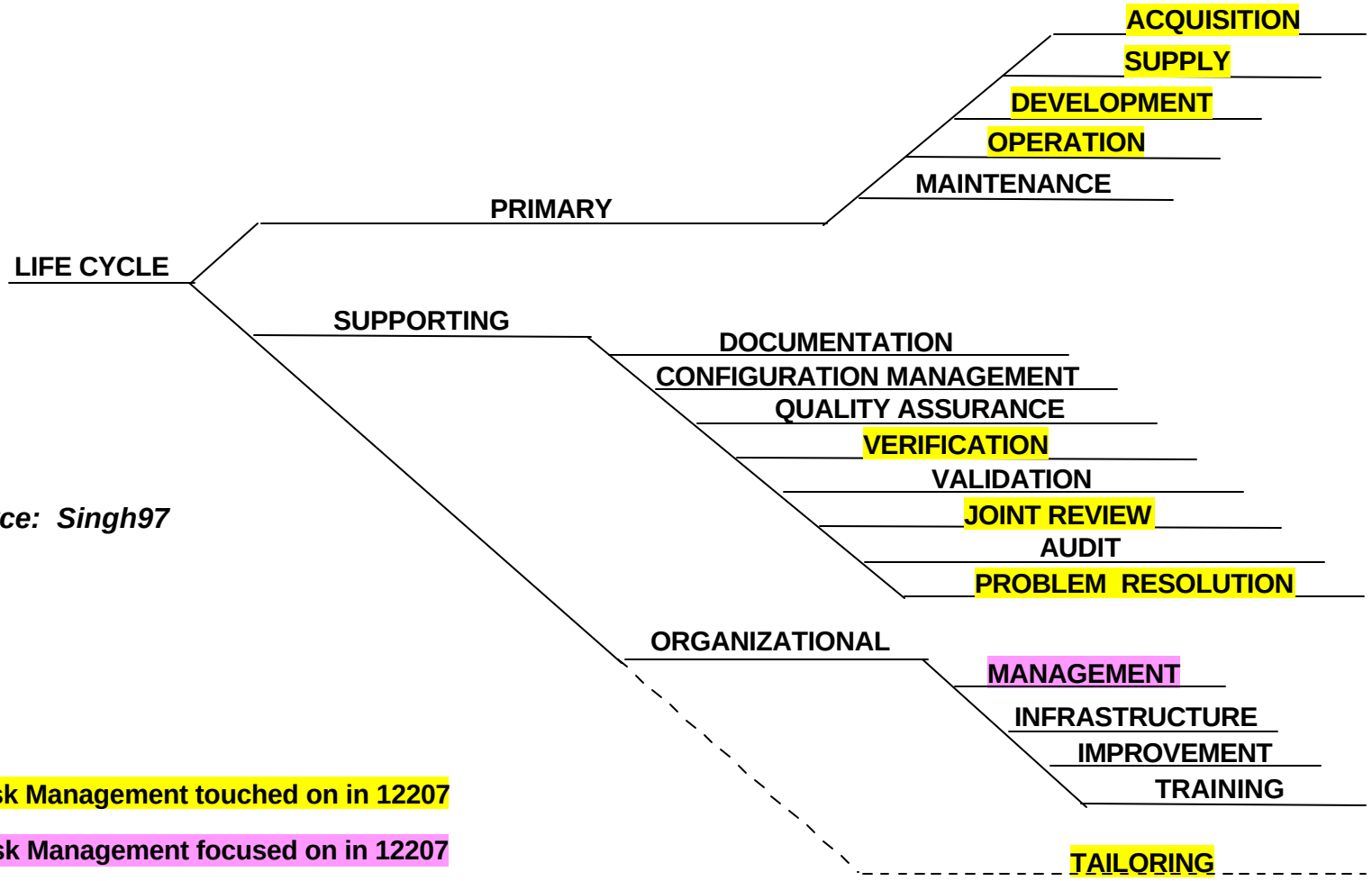
Objectives

- Describe Risk Management in the context of a life cycle process framework
- Describe IEEE 1540's Risk Management process model and process requirements
- Describe other Standards that complement IEEE 1540 in managing risk in the acquisition and engineering of software intensive systems

Risk Management (RM) in the Life Cycle Context

- An organizational life cycle process
  - responsibility of the organization using the process
  - the organization ensures that the process exists and functions
- IEEE Standard 1540 assumes that the other management and technical processes of IEEE/EIA 12207 perform the treatment of risk

IEEE/EIA 12207 Life Cycle Process Tree



Source: Singh97

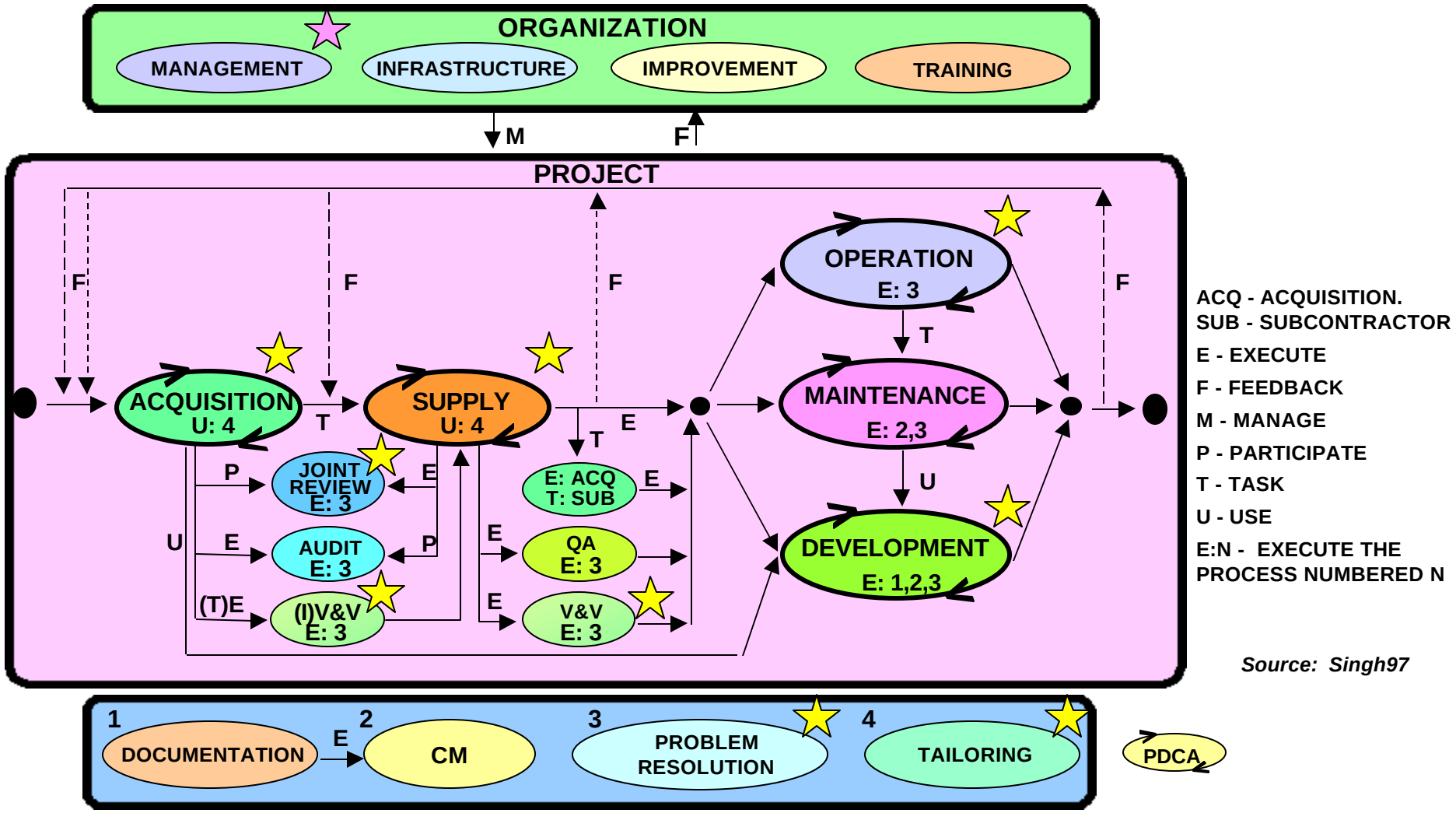
Risk Management touched on in 12207

Risk Management focused on in 12207

Risk Management Objectives in IEEE/EIA 12207

- Sprinkled throughout the Acquisition, Supply, Development, Operation, Verification, Joint Review, Problem Resolution, and Tailoring Processes
- Focused on in **Management Process** objectives
  - Determine scope of risk management to be performed
  - Identify risks to the project as they develop
  - Analyze risks
  - Determine mitigation priority
  - Define, implement and assess mitigation strategies
  - Define, apply and assess risk metrics

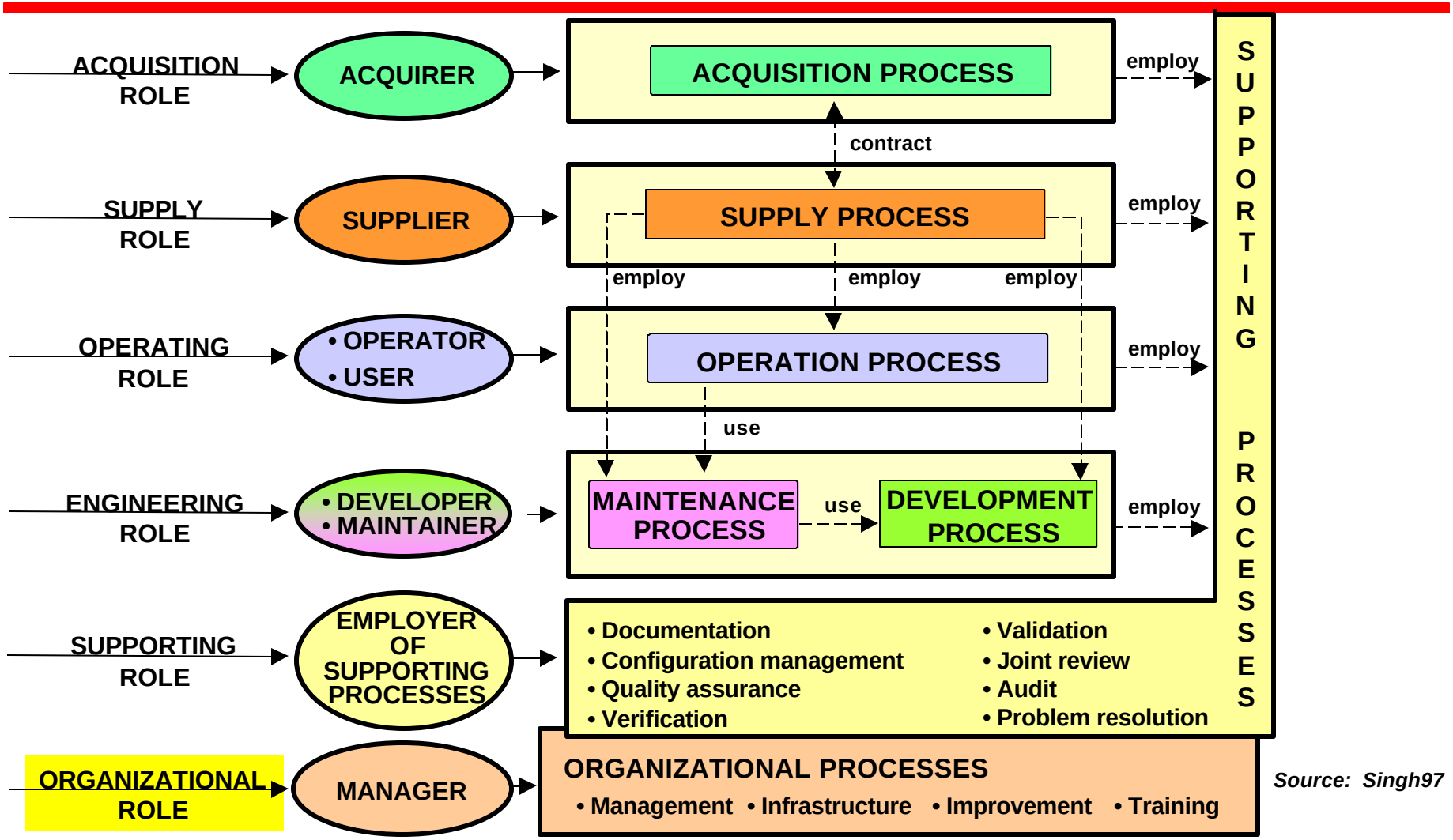
IEEE/EIA 12207 Process Interactions



ACQ - ACQUISITION.
SUB - SUBCONTRACTOR
E - EXECUTE
F - FEEDBACK
M - MANAGE
P - PARTICIPATE
T - TASK
U - USE
E:N - EXECUTE THE PROCESS NUMBERED N

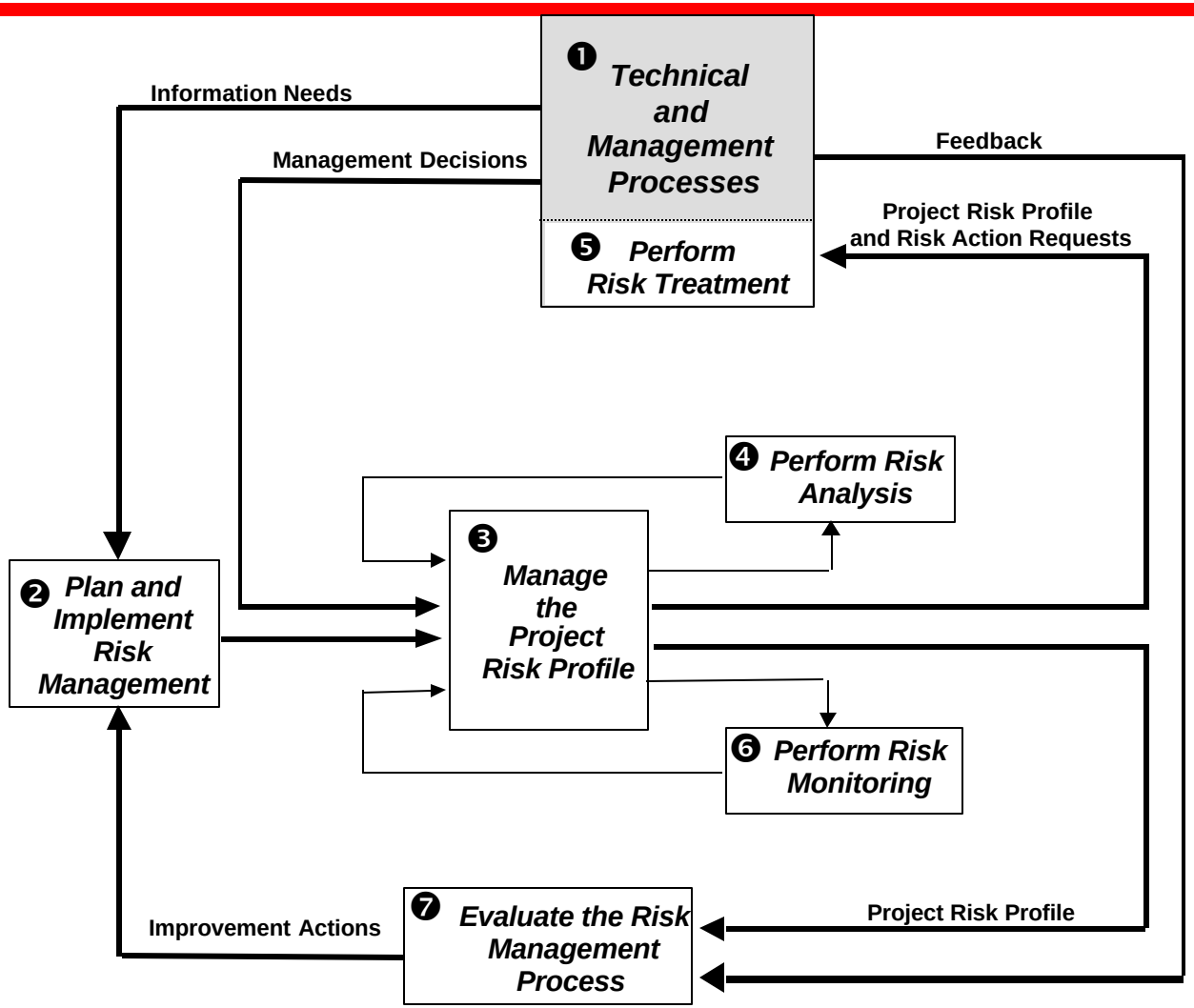
Source: Singh97

IEEE/EIA 12207 Process Roles



Source: Singh97

Risk Management Process Overview



Source:
IEEE Standard 1540:2001
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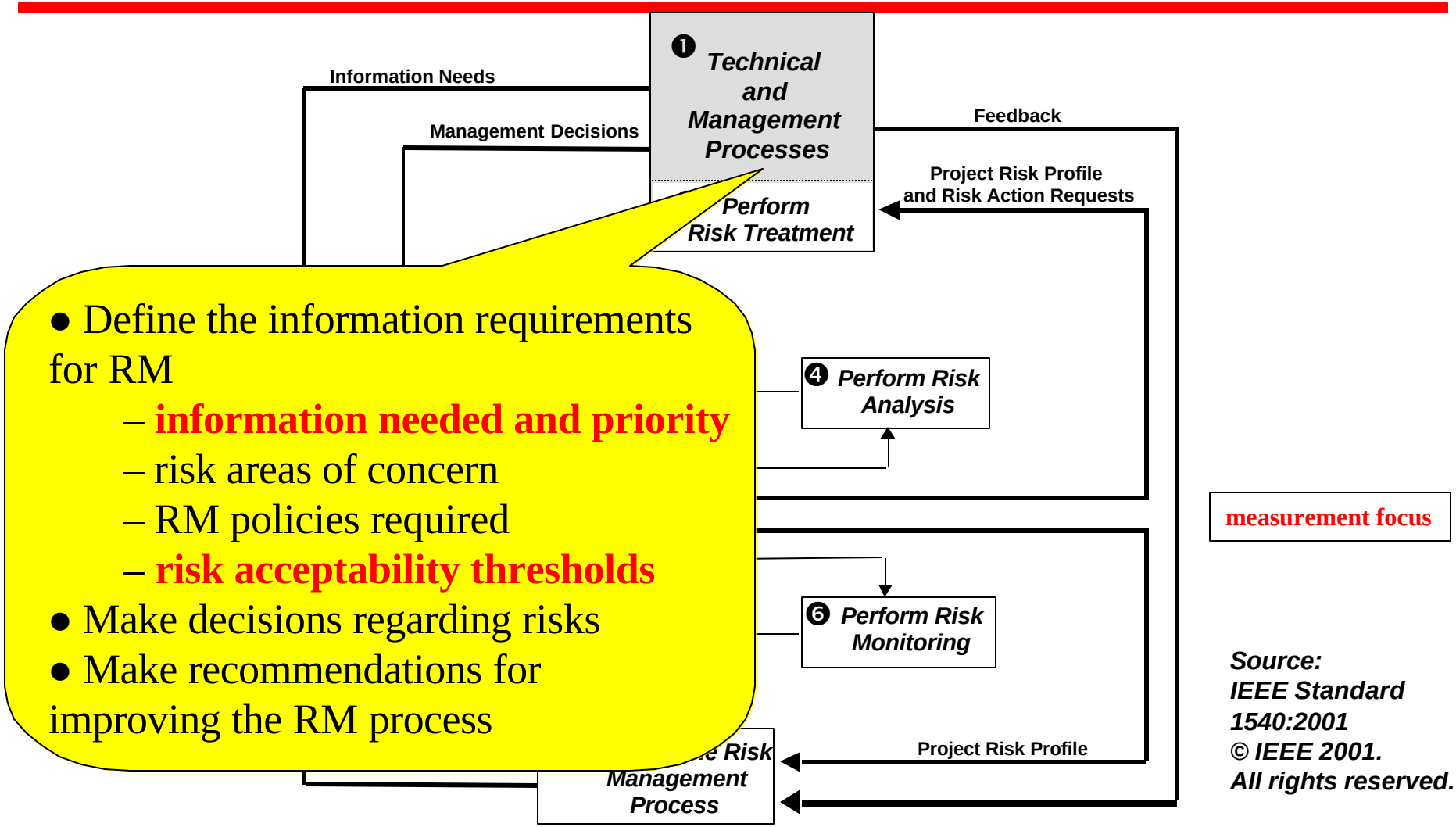
Risk Management Process Overview



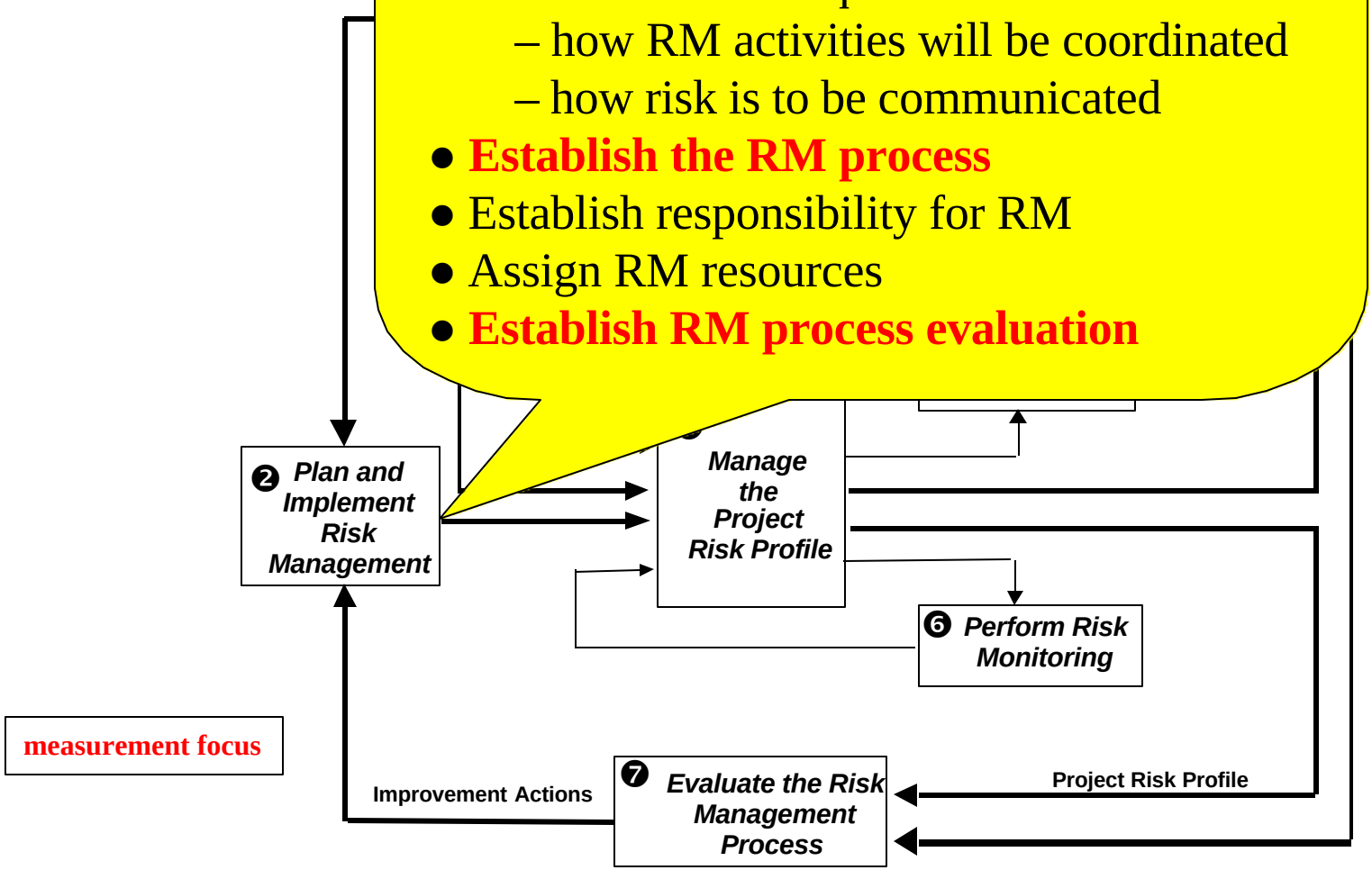
- Define the information requirements for RM
  - **information needed and priority**
  - risk areas of concern
  - RM policies required
  - **risk acceptability thresholds**
- Make decisions regarding risks
- Make recommendations for improving the RM process

measurement focus

Source: IEEE Standard 1540:2001

Risk M... Ov...

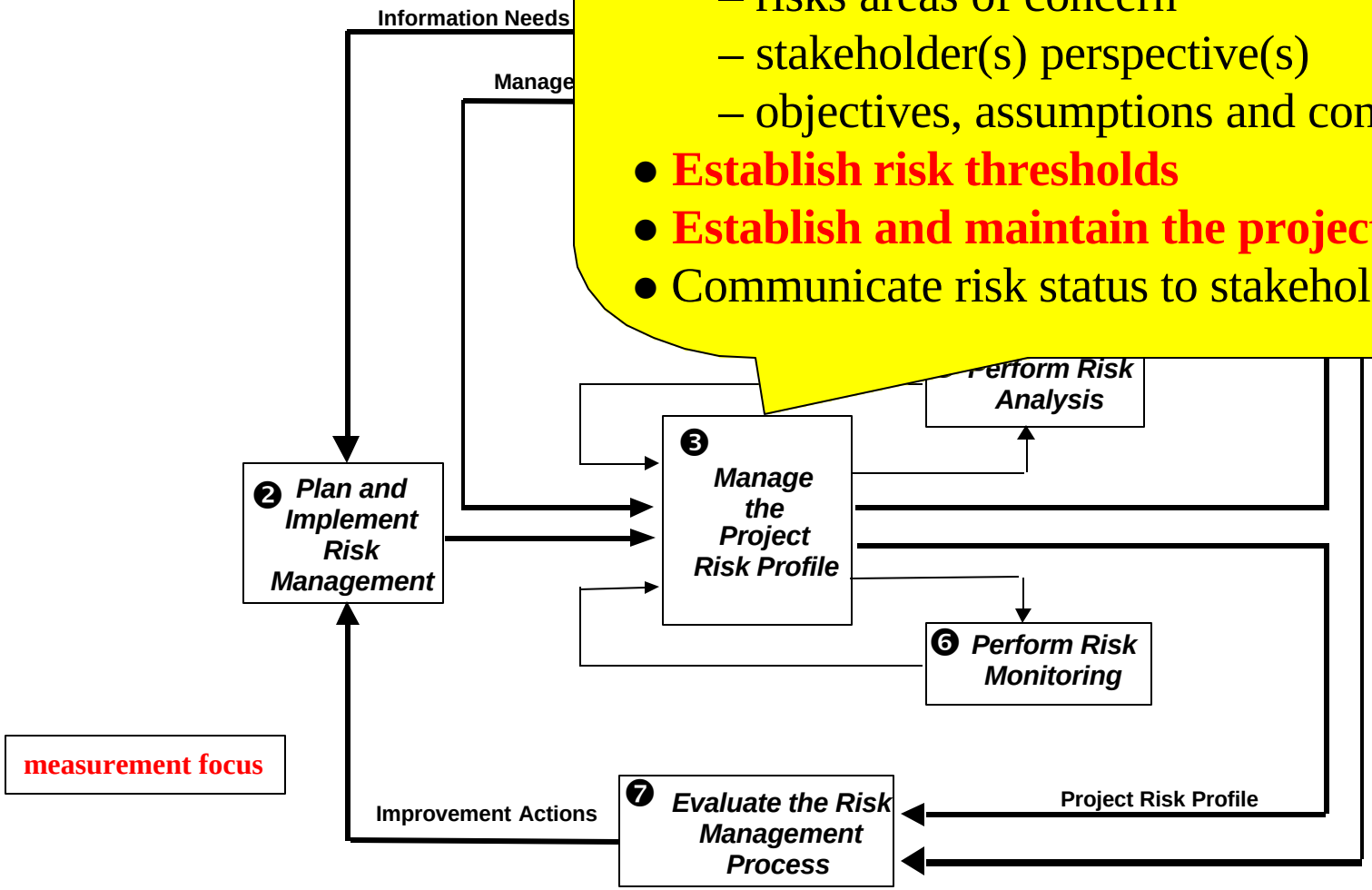
- Establish RM policies to support information required by decision makers
  - how RM is to be performed
  - tools or techniques to be used
  - how RM activities will be coordinated
  - how risk is to be communicated
- **Establish the RM process**
- Establish responsibility for RM
- Assign RM resources
- **Establish RM process evaluation**



Source: IEEE Standard 1540:2001

Risk Ma
Overvie

- Create a consistent current and historical view of the risks present and their treatment
- Define the technical and managerial risk management context
  - risks areas of concern
  - stakeholder(s) perspective(s)
  - objectives, assumptions and constraints
- **Establish risk thresholds**
- **Establish and maintain the project risk profile**
- Communicate risk status to stakeholders



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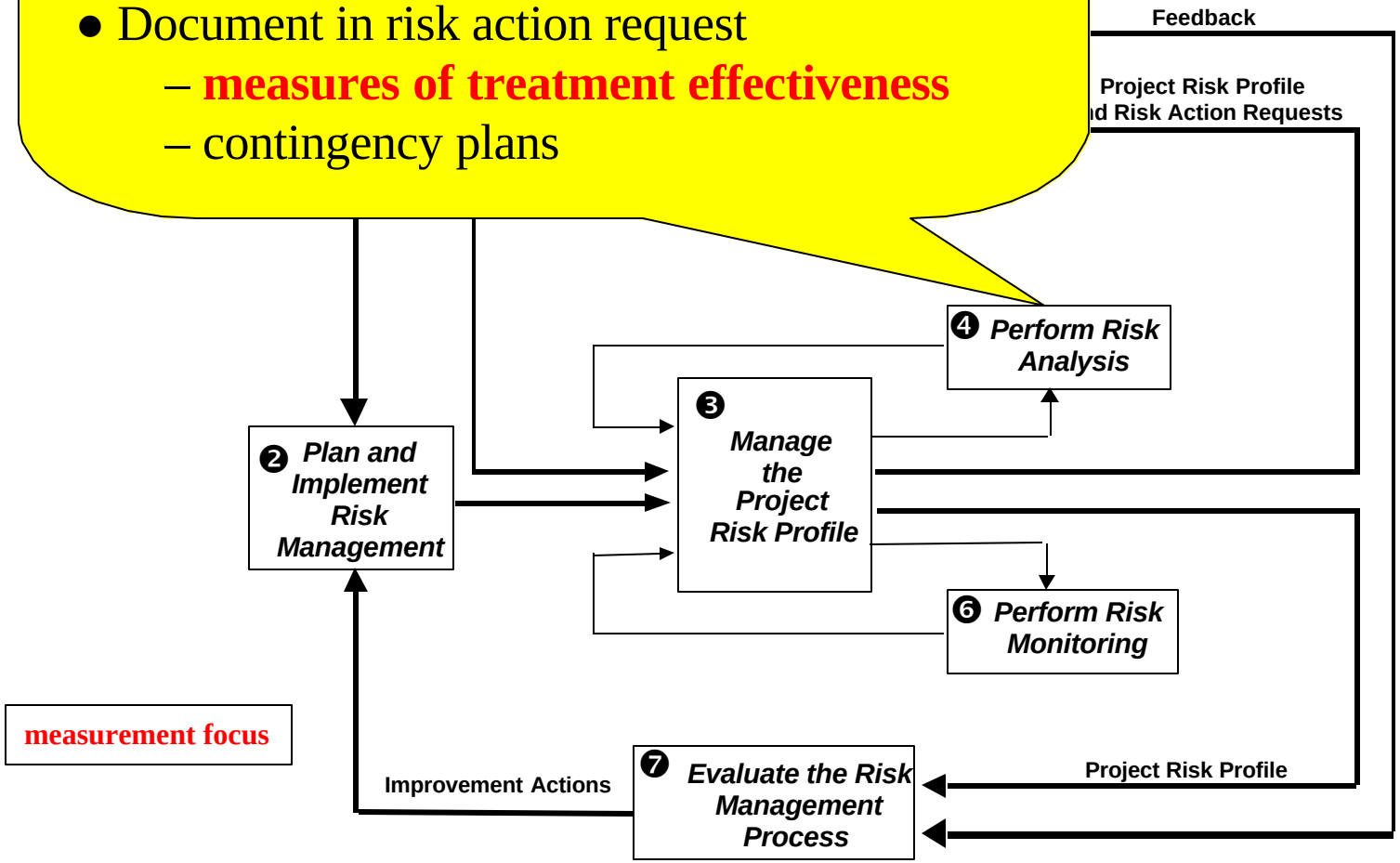
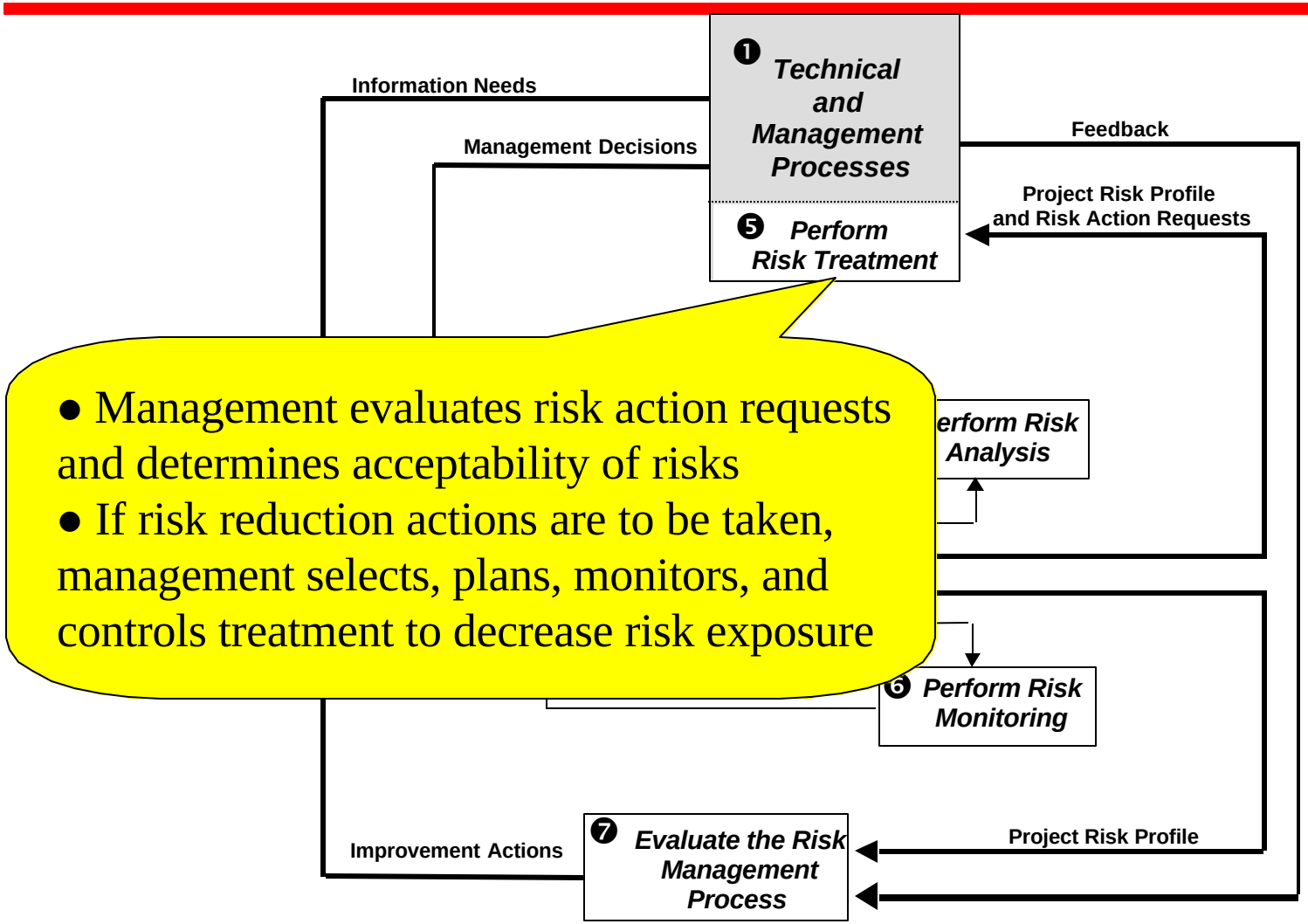
rocess

- **Identify risks defined by RM context**
- **Estimate risk likelihood and consequences**
- Evaluate and prioritize the risks and their interactions against thresholds
- Recommend risk treatment where applicable
- Document in risk action request
  - **measures of treatment effectiveness**
  - contingency plans



Source:
IEEE Standard 1540:2001

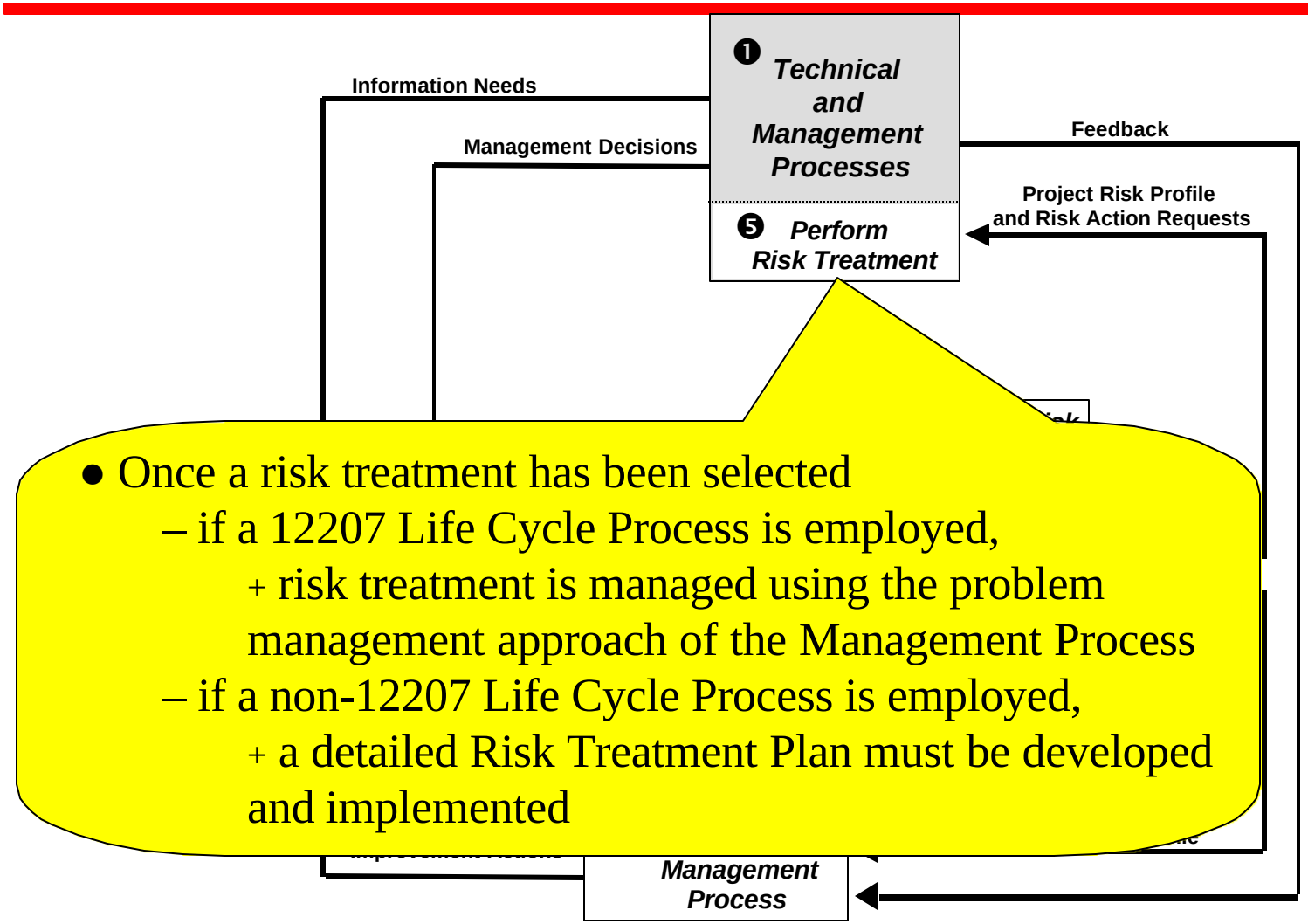
Risk Management Process Overview



- Management evaluates risk action requests and determines acceptability of risks
- If risk reduction actions are to be taken, management selects, plans, monitors, and controls treatment to decrease risk exposure

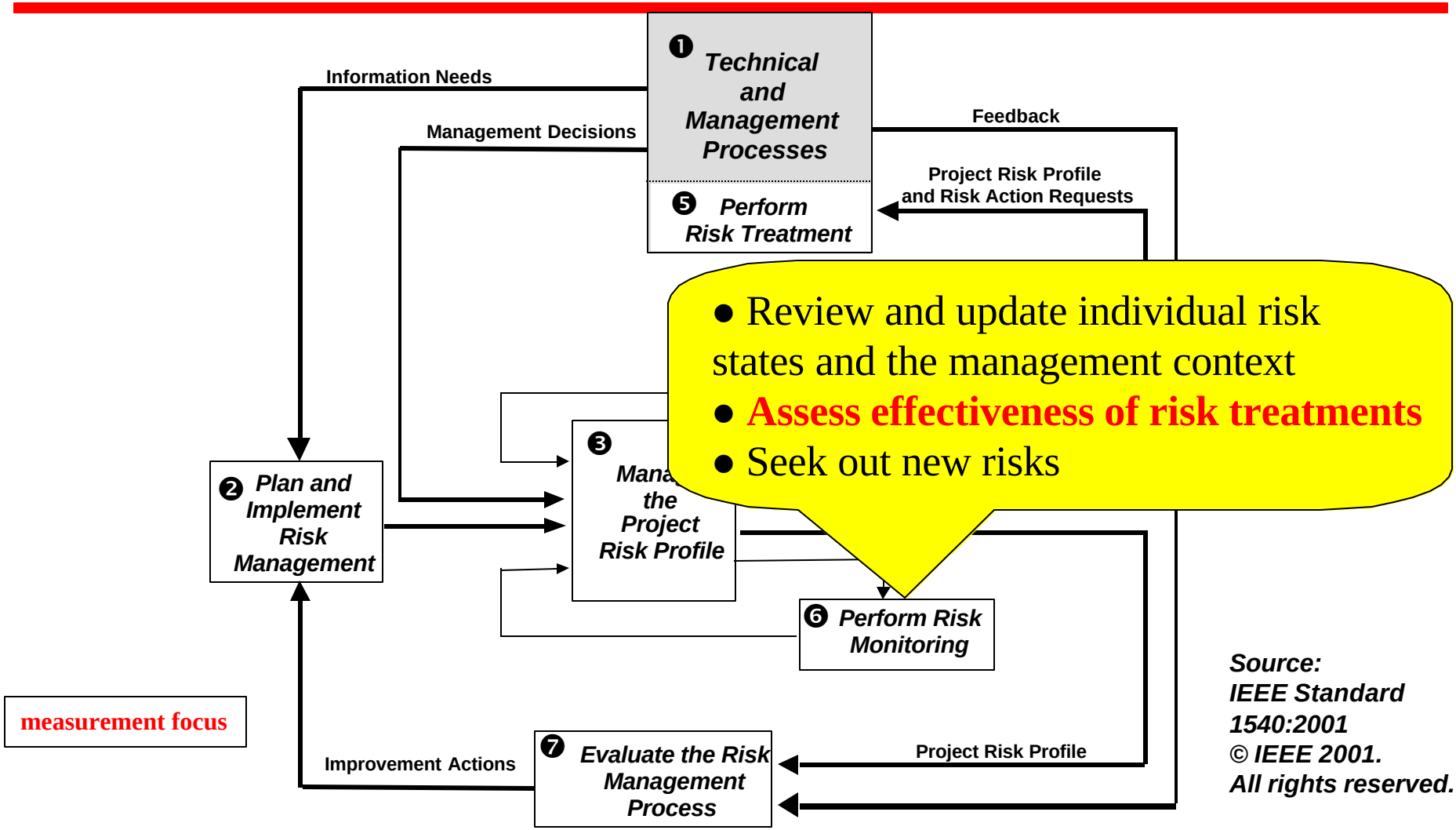
Source: IEEE Standard 1540:2001

Risk Management Process Overview



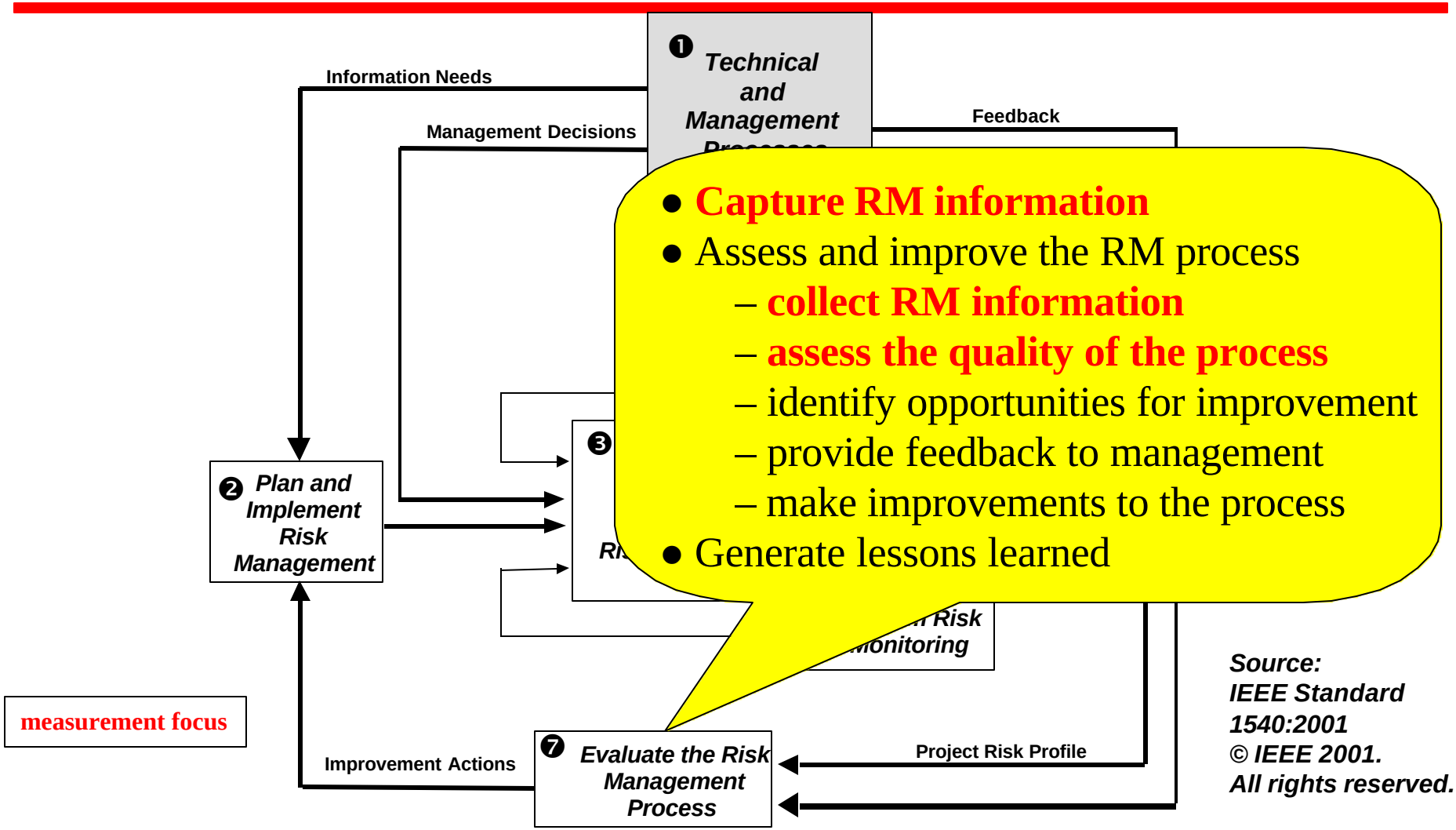
- Once a risk treatment has been selected
  - if a 12207 Life Cycle Process is employed,
    - risk treatment is managed using the problem management approach of the Management Process
  - if a non-12207 Life Cycle Process is employed,
    - a detailed Risk Treatment Plan must be developed and implemented

Risk Management Process Overview



Source: IEEE Standard 1540:2001

Risk Management Process Overview



Source: IEEE Standard 1540:2001

IEEE 1540 and ISO/IEC 15026

- ISO/IEC 15026:1998, Information Technology —System and Software Integrity Levels
  - Defines a process for establishing integrity levels that are used to contain risk within acceptable values
    - the system integrity level reflects the worst case risk that is associated with the as-designed system
    - all appropriate risk dimensions are addressed
  - Requires employment of a risk management process

IEEE 1540 and ISO/IEC 15939

- ISO/IEC 15939:FDIS, Information Technology —Software Measurement Process
  - Identifies the activities and tasks that are necessary to successfully identify, define, implement, and improve a software measurement process
    - Two core activities
      - Plan the Measurement Process
      - Perform the Measurement Process
    - Two supporting activities
      - Establish and Sustain Measurement Commitment
      - Evaluate Measurement

IEEE 1540 and ISO/IEC 15939 - 2

- References to risk in ISO/IEC 15939
  - Plan the Measurement Process
    - Identify Information Needs
  - Annex A: The measurement information model
    - Measurable Concept

IEEE 1540 and IEEE 1012

- IEEE Std 1012 -1998, IEEE Standard for Software Verification and Validation
  - Uses integrity levels to determine appropriate V&V activities
  - These integrity levels could be determined in the baseline risk profile

IEEE 1540 and IEEE 1228

- IEEE Std 1228 - 1994, IEEE Standard for Software Safety Plans
  - Addresses planning for a software safety program that provide a systematic approach to reducing software risks
    - Requires that a risk assessment be performed to identify potential safety risks
    - Requires that risk treatment alternatives be addressed for uncontrolled risks

IEEE 1540 and IEEE 1058

- IEEE Std 1058 -1998, IEEE Standard for Software Project Management Plans
  - requires the specification of a risk management plan
    - identification, analysis and prioritization of project risk factors
    - procedures for contingency planning, risk monitoring, and changes in risk status

IEEE 1540 and IEEE 982.1 and 982.2

- IEEE Std 982.1 -1988, IEEE Standard Dictionary of Measures to Produce Reliable Software
  - measures appropriate for use in risk management
- IEEE Std 982.2 -1988, IEEE Guide for the Use of IEEE Standard Dictionary of Measures to Produce Reliable Software
  - guidance regarding measures appropriate for use in risk management

For more information . . .

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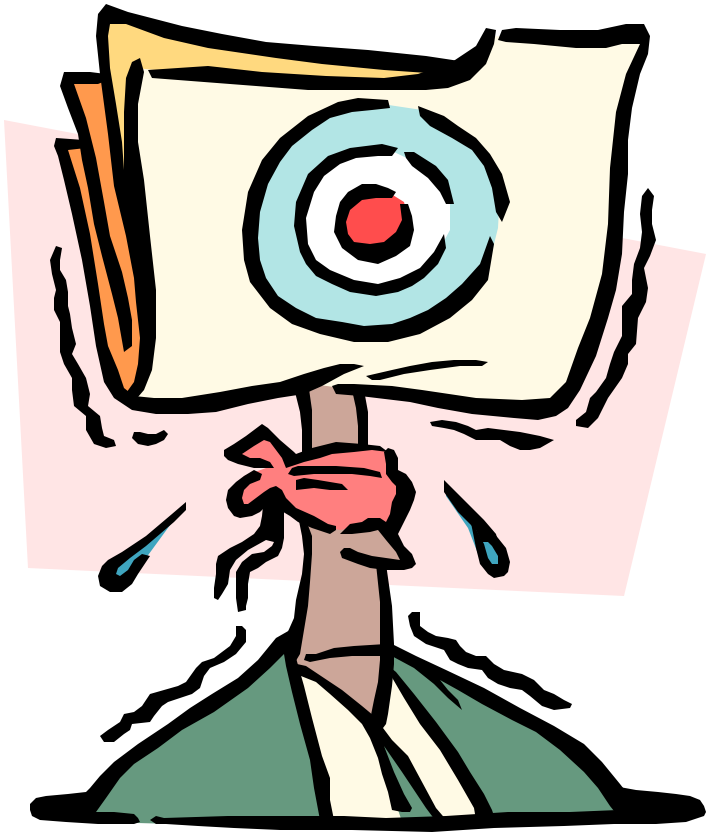
For IEEE Standards:

http://standards.ieee.org/catalog/

For the IEEE Software Engineering Standards Committee:

http://computer.org/standard/sesc/

Questions?



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