Software And Systems Engineering Risk Management

John Walz
VP Technical and Conferences Activities, IEEE Computer Society
Vice-Chair Planning, Software & Systems Engineering Standards Committee, IEEE Computer Society
US TAG to ISO TMB Risk Management Working Group

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Agenda

- What is the change in Risk?
- What are the other Risk definitions?
- What is **R**i**sk M**anagement (RSKM)?
- What are the other RSKM standards?
- Where is RSKM in the enterprise and project?
- RSKM in **S**oftware and **S**ystem **T**echnology (SST) supply chain?
- What are the RSKM processes?
- What is the RSKM standards history?
- What changed in RSKM?
- What can you do?

"change the game"

- This year, the Systems and Software Technology Conference will explore various technologies which are expected to make abrupt changes to common thought. We will explore the tools, the **processes**, and the **ideas** which will "change the game" and make the way we have done things in the past - obsolete.

- The DOD supply chain has implements risk management processes to meet customer needs for the major objectives of timely delivery of functionality with quality. As software and systems complexity increased, these objectives have been difficult to achieve together. During system operations, unknown quality issues and events have placed missions at risk.

- What's changing the game are coordinated standards issued late in 2009:

  - **Risk management** — Principles and guidelines
  - Risk management — **Vocabulary**
  - Risk management — **Risk Assessment**

Changed Risk definition

Published	RSKM Vocabulary, ISO Guide 73
2002	combination of the probability of an event and its consequence
2009	effect of uncertainty on objectives

This is where ISO 31000 is clearly different from existing guidelines in that the emphasis is shifted from something happening – the event – to the effect on objectives.

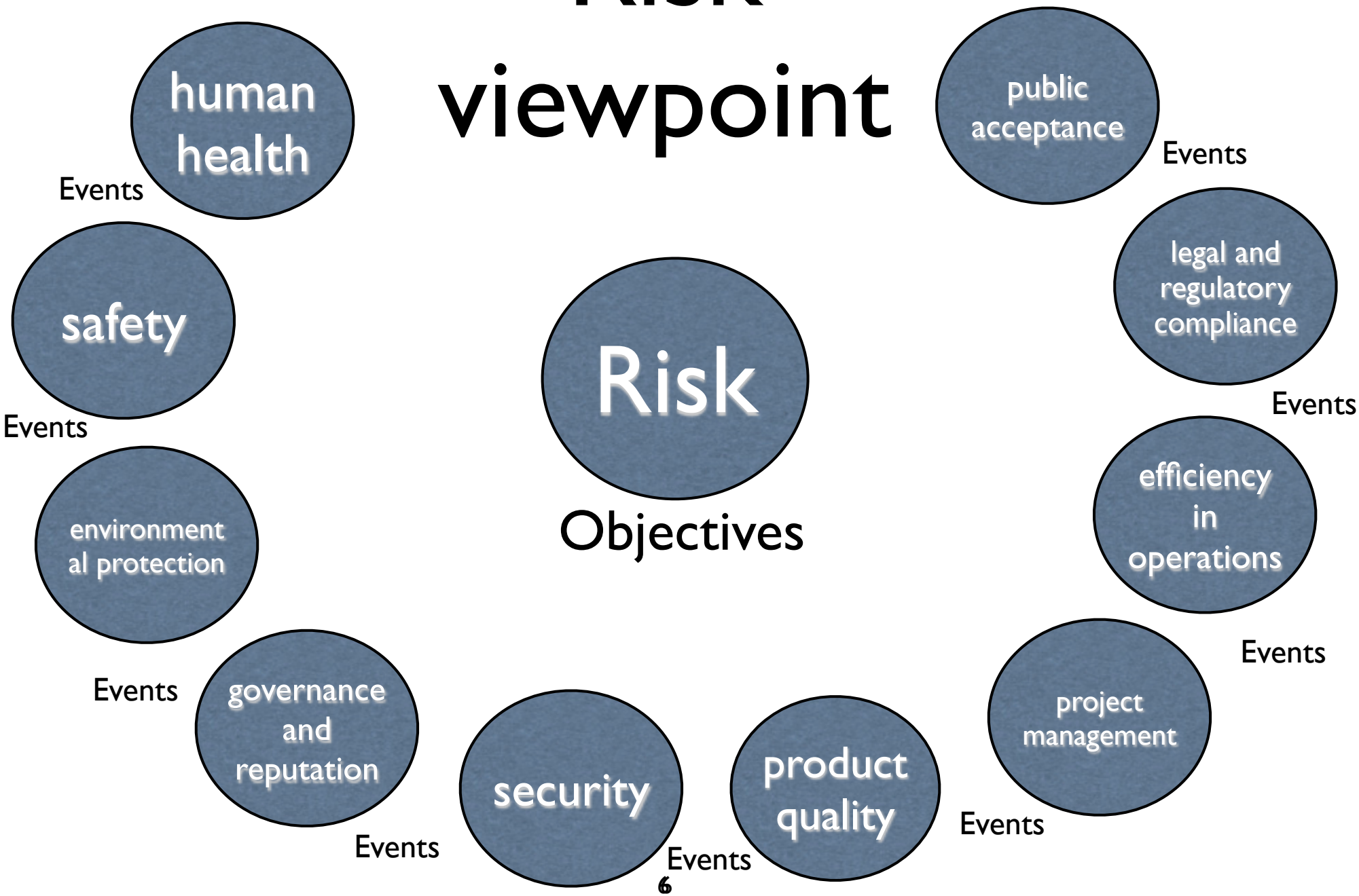
Kevin W. Knight

RSMK Concepts from New Zealand Society for Risk Management

- RSMK concepts which underpin both
  - AS/NZS4360:2004 and
  - ISO 31000:2009
- Risk defined as
  "the effect of uncertainty on objectives"
  - The change in definition shifts the emphasis
    from "the event" (something happens)
    to "the effect" which is the effect of the event on objectives.

    So, the "risk" isn't the chance of having a fire (for example) but the chance that value will be destroyed and or income flow disrupted (assuming preserving value and income flow was part of the objective).
- http://www.risksociety.org.nz/what_is_risk_management

Risk viewpoint



What are the other Risk definitions?

risk — effect of uncertainty on objectives, Guide 73-2009

- NOTE 1 An effect is a deviation from the expected — positive and/or negative.
- NOTE 2 Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).
- NOTE 3 Risk is often characterized by reference to potential events and consequences, or a combination of these.
- NOTE 4 Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.
- NOTE 5 Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.

risk management, risk management process, establishing the context, & risk assessment

Guide 73-2009

- risk management — coordinated activities to direct and control an organization with regard to risk
- risk management process — systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring and reviewing risk
- establishing the context — defining the external and internal parameters to be taken into account when managing risk, and setting the scope and risk criteria for the risk management policy
- risk assessment — overall process of risk identification, risk analysis and risk evaluation.

What is Risk Management (RSKM)?

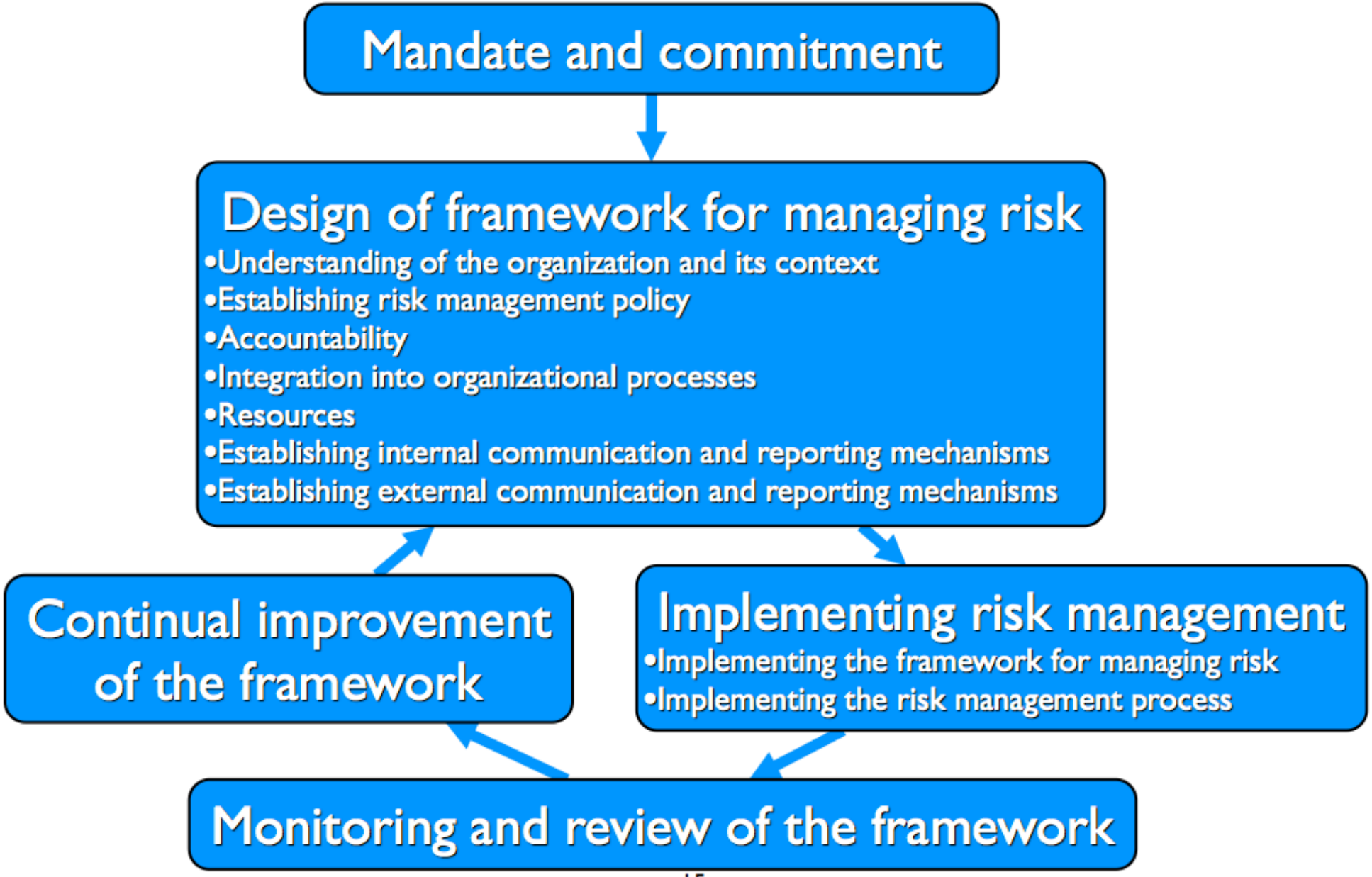
Risk management — Principles and Guidelines ISO 31000:2009

- Provides principles and generic guidelines on risk management
- Can be used by any public, private or community enterprise, association, group or individual. Therefore, ISO 31000 is not specific to any industry or sector
- Can be applied throughout the life of an organization, and to a wide range of activities, including strategies and decisions, operations, processes, functions, projects, products, services and asset
- Can be applied to any type of risk, whatever its nature, whether having positive or negative consequences
- Although provides generic guidelines, it is not intended to promote uniformity of risk management across organizations
    - Design and implementation of risk management plans and frameworks will need to take into account the varying needs of a specific organization, its particular objectives, context, structure, operations, processes, functions, projects, products, services, or assets and specific practices employed
- Utilized to harmonize risk management processes in existing and future standards. It provides a common approach in support of standards dealing with specific risks and/or sectors, and does not replace those standards
- Not intended for the purpose of certification

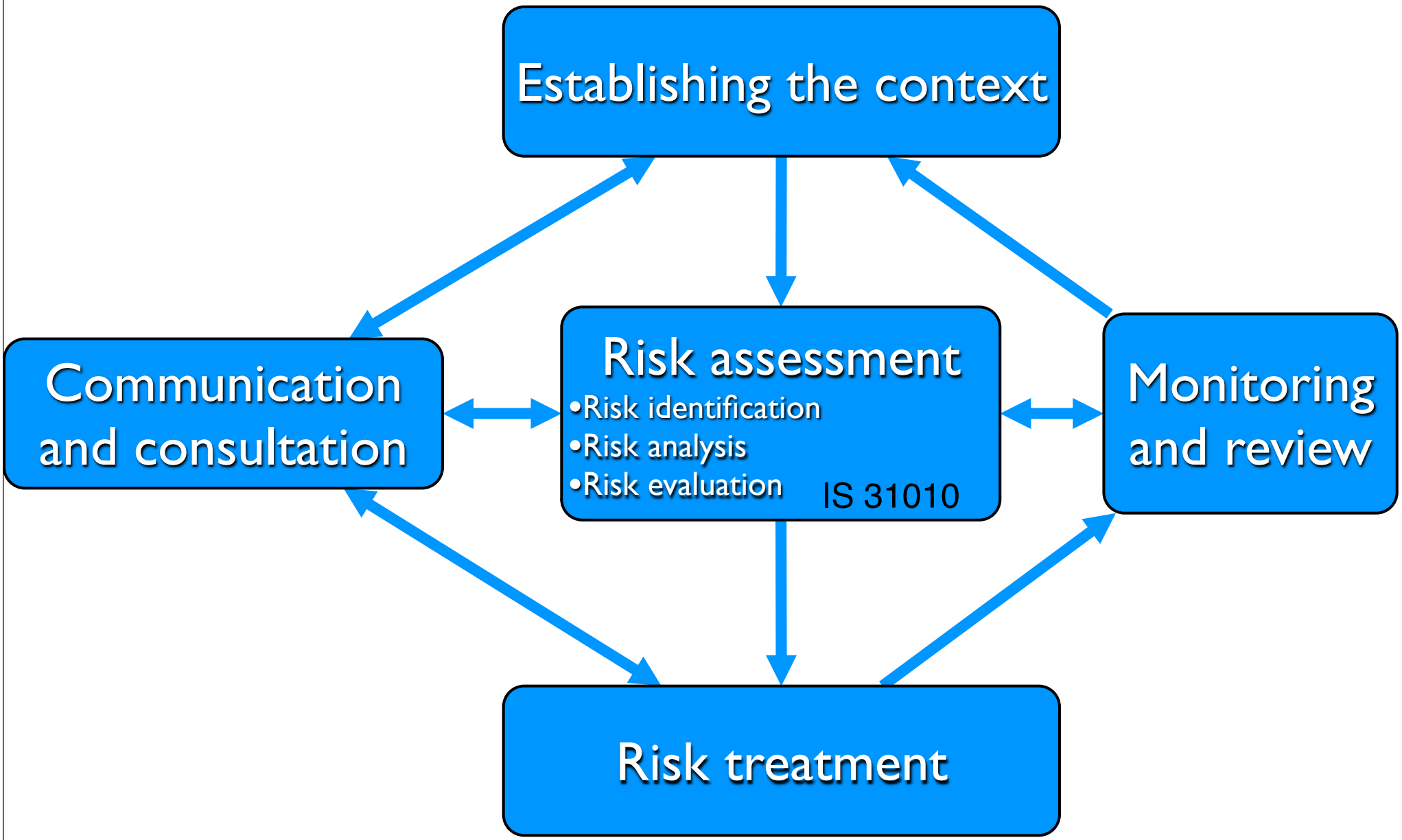
ISO 31000 Risk management Principles / Benefits

- For risk management to be effective, an organization should at all levels comply with the principles below.
  - creates and protects value
    - contributes to the demonstrable achievement of objectives and improvement of performance in, for example, human health and safety, security, legal and regulatory compliance, public acceptance, environmental protection, product quality, project management, efficiency in operations, governance and reputation
  - is an integral part of all organizational processes
  - is part of decision making
  - explicitly addresses uncertainty
  - is systematic, structured and timely
  - is based on the best available information
  - is tailored
  - takes human and cultural factors into account
  - is transparent and inclusive
  - is dynamic, iterative and responsive to change
  - facilitates continual improvement of the organization

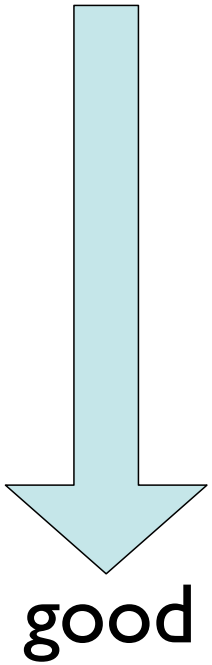
RSKM Framework



Risk management process



RSKM Maturity



level 0. **Pay out** for risk occurrences (insurance premiums & payouts)

level 1. **Test** in risk detection & mitigation (verification / validation)

level 2. **Design** in risk aversion (preventative action)

Risk assessment techniques
IEC/ISO 31010:2009

- **Answer the following fundamental questions:**
  - **what can happen and why (by risk identification)?**
  - **what are the consequences?**
  - **what is the probability of their future occurrence?**
  - **are there any factors that mitigate the consequence of the risk or that reduce the probability of the risk?**
  - **is the level of risk tolerable or acceptable and does it require further treatment?**
- **Provides input to decisions about:**
  - **whether an activity should be undertaken;**
  - **how to maximize opportunities;**
  - **whether risks need to be treated;**
  - **choosing between options with different risks;**
  - **prioritizing risk treatment options;**
  - **the most appropriate selection of risk treatment strategies that will bring adverse risks to a tolerable level.**

Benefits of performing risk assessment, IEC/ISO 31010

- understanding the risk and its potential impact upon objectives;
- providing information for decision makers;
- contributing to the understanding of risks, in order to assist in selection of treatment options;
- identifying the important contributors to risks and weak links in systems and organizations;
- comparing of risks in alternative systems, technologies or approaches;
- communicating risks and uncertainties;
- assisting with establishing priorities;
- contributing towards incident prevention based upon post-incident investigation;
- selecting different forms of risk treatment;
- meeting regulatory requirements;
- providing information that will help evaluate whether the risk should be accepted when compared with pre-defined criteria;
- assessing risks for end-of-life disposal.

Risk Assessment, IEC/ISO 31010

Risk assessment
- Risk identification
- Risk analysis
- Risk evaluation

- Expands Risk analysis:
  - Controls assessment
  - Consequence analysis
  - Likelihood analysis and probability estimation
  - Preliminary analysis
  - Uncertainties and sensitivities

* from ISO 31000

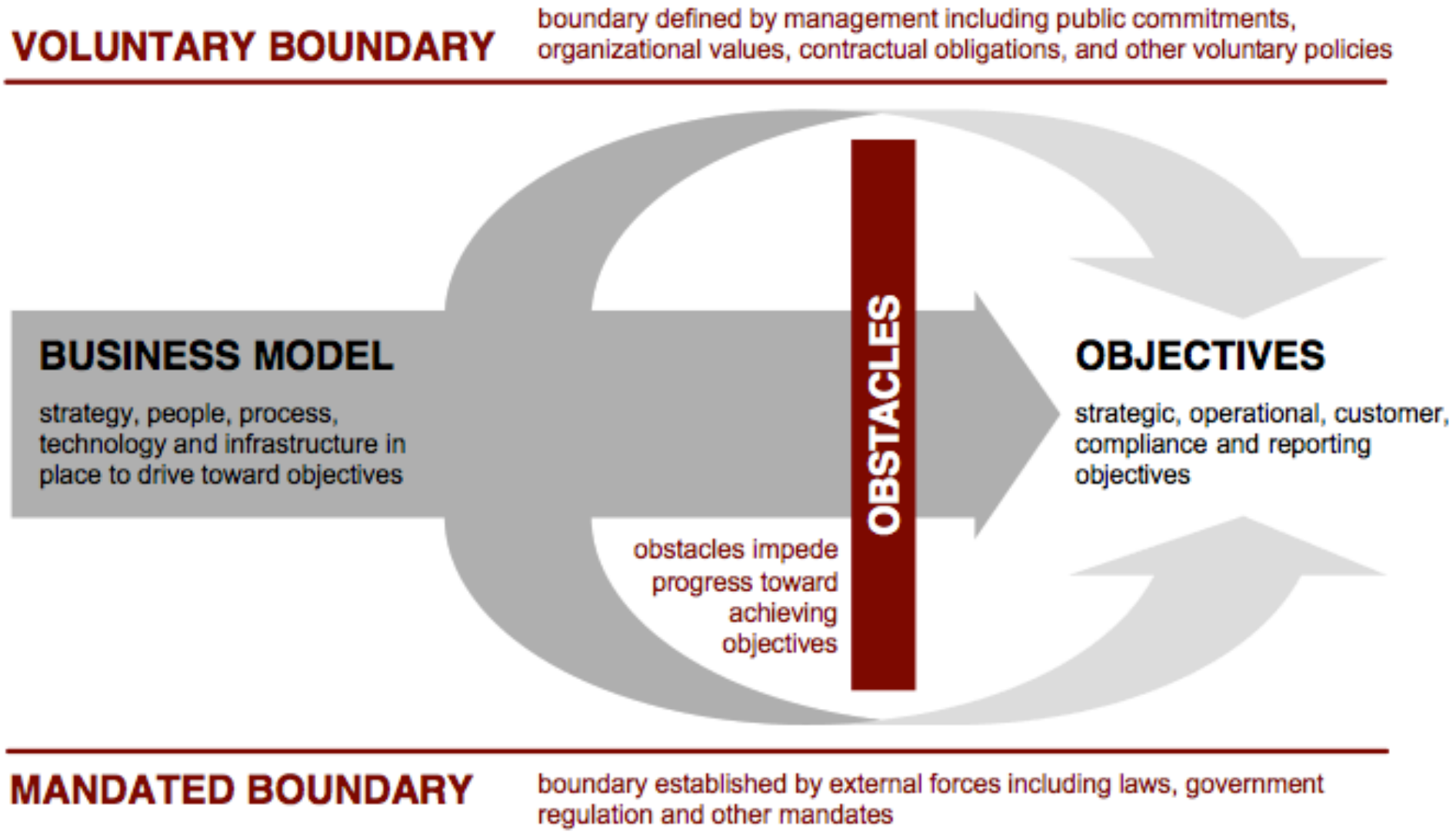
What are the other RSKM standards?

Standards addressing RSKM from Technical Committees

Technical Area	Committee	Std #	Standards title
Risk Management	ISO TMB	Guide 73	Risk Management Vocabulary
		ISO 31000	Risk Management Principles & Guidance
Dependability	IEC TC 56	IEC/ISO 31010	Risk Assessment
Software & System Engineering	JTC1/SC7	IS 12207	Software Engineering Life Cycle Processes
		IS 15288	Systems Engineering Life Cycle Processes
		IS 16085	Risk Management Process
Quality	ISO TC 176	ISO 9001	Quality Management System
		ISO 9000	Quality Management Vocabulary
Environment	ISO TC 207	ISO 14001	Environmental Management System
IT Security	JTC1/SC22	IS 27005	Information Security RSKM
Supply Chain Security	ISO TC 8	ISO/PAS 28001	Security management systems for the supply chain
Societal security	ISO TC 223	ISO/PAS 22399	Guideline for incident preparedness and operational continuity management
Medical Devices	ISO TC 210	ISO 14971	Application of risk management to medical devices

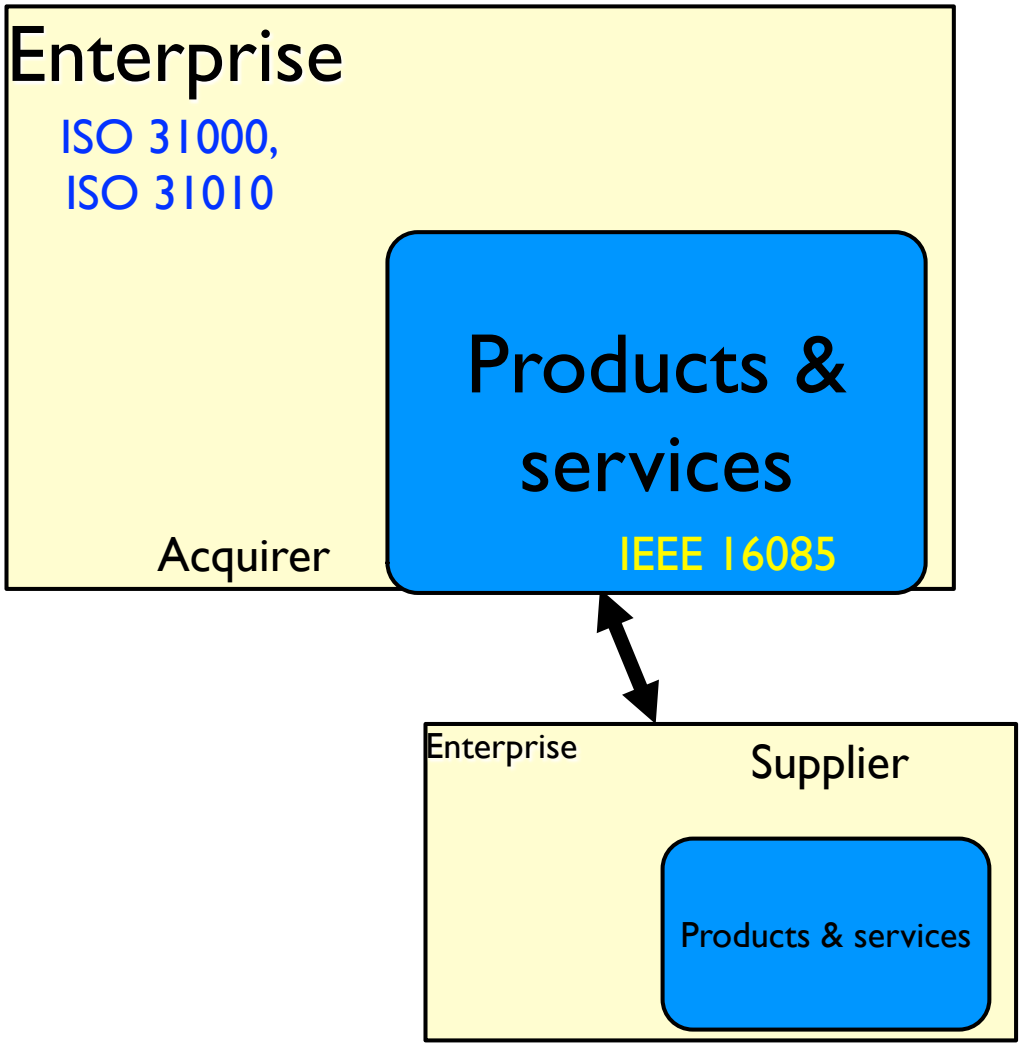
Where is RSKM in the enterprise and project?

Governance Risk Compliance (GRC)



Open Compliance & Ethics Group (OCEG)

Risk Management in SST organization



- Enterprise
  - GRC
  - 31000
  - 31010
- Products & services
  - 15288/12207
  - 16085
- Supply chain management

Enterprise vs. Project

- The management of risk extends from devices to enterprise systems, from quality management, to project management, to product development, and to system operations.
- The collection of software and systems engineering standards based on IEEE/ISO/IEC 12207/15288 frameworks covers risk management with specific details in IEEE 16085 Risk Management Processes.
- Alternate framework of CMMI-DEV covers the Risk Management Process Area.

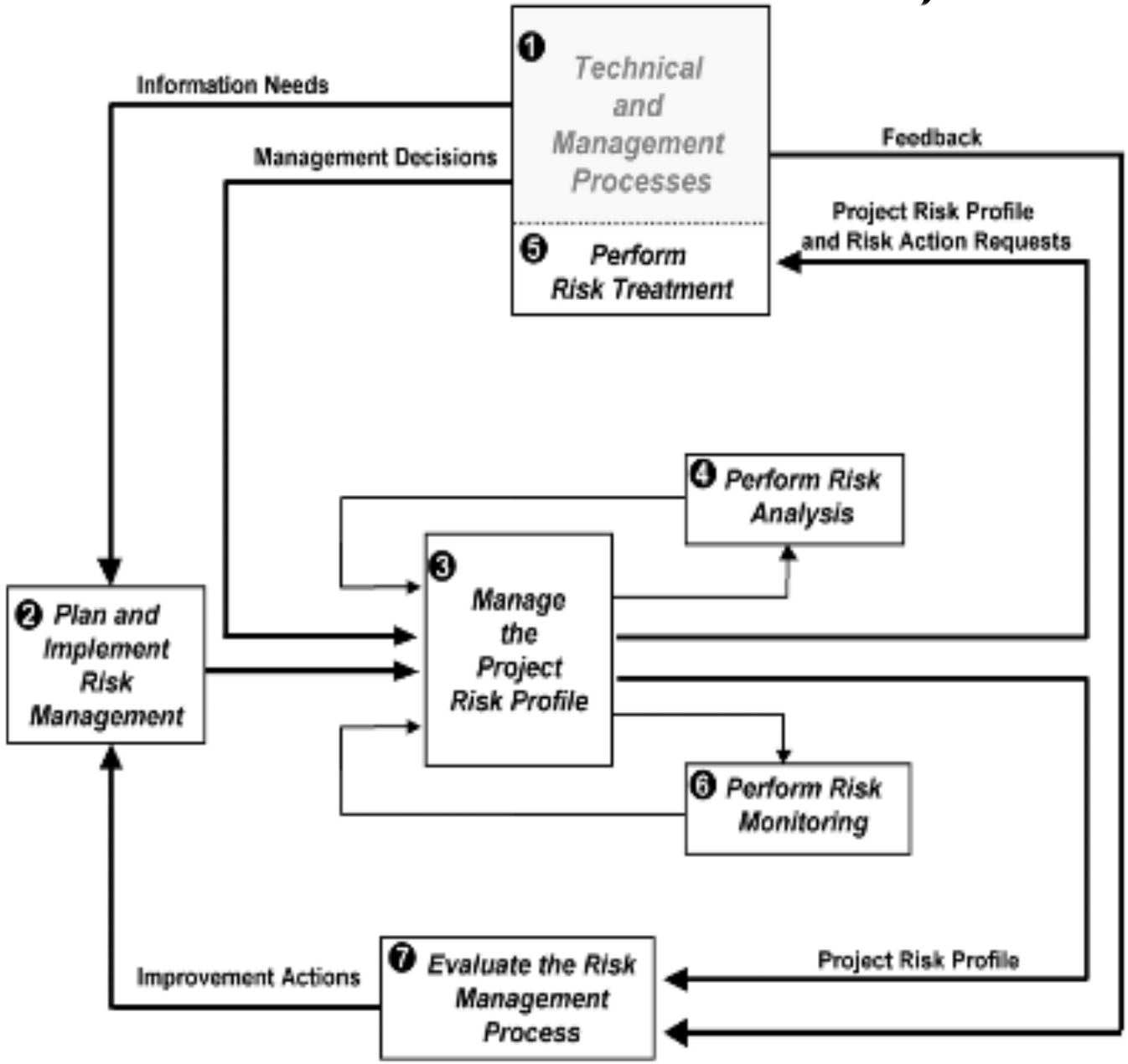
RSKM in Software and System Technology (SST) supply chain?

Standards affecting SST supply chain

- S2E Life Cycle Processes
  IEEE/ISO/IEC 12207/15288
- Risk Management Processes
  IEEE/ISO/IEC 16085:2006
- Risk management — Principles and Guidelines
  ISO 31000:2009
- Risk management -- Risk assessment techniques
  IEC/ISO 31010:2009
- Risk management — Vocabulary
  Guide 73:2009

What are the RSKM processes?

RSKM Process Model, IS16085



What is the RSKM standards history?

Risk Management (RSKM) Standards – Selected History

Year	Std #	Std Title
1995	AS/NZS 4360	RSKM
1999	AS/NZS 4360	RSKM
2001	JIS Q 2001	Guidelines for Development and Implementation of RSKM System
2001	IEEE 1540	Software Life Cycle Processes – RSKM
2001	IEC 62198	Project RSKM – Application Guidelines
2002	ISO/IEC Guide 73	RSKM – Vocabulary Guidelines for Use in Standards
2004	AS/NZS 4360	RSKM
2004	COSO	Enterprise RSKM Framework
2006	ISO/IEC 16085	Risk Management Process
2008	ISO/IEC 12207	Software Lifecycle Processes
2009	ISO/IEC Guide 73	Risk management – Vocabulary
2009	ISO 31000	Risk management – Principles and guidelines
2009	IEC/ISO 31010	Risk management – Risk Assessment

Where can you do?

ISO 31000 Implementation

- The SST supply chain's practice of risk management must be reexamined to
  - include the positive "opportunity" with the negative view of risk
  - expand application of risk to any organizational objective
  - expand risk management to the enterprise
  - carefully define their "Context" as there is little guidance
  - integrate RSKM into their ISO 9001 clause 8.5.3 Preventive action
  - avoid offers for conformity assessments
  - use 16085 for product & service development and deploymnet