Software Engineering (COMP2281)

Lecture 5:
Standards and risks

Craig Stewart

Standards …

SDLC: Standards

What is a Standard?

Why do we care?

Name one?

SDLC: Standards

- Why Standards?
  - Quality (systems, processes, frameworks, etc…)
  - Shared communication
  - Shared understanding (what does 'quality', 'completed', … mean?)
  - Influence, from understanding to creation/development
  - Profit
  - Collaboration
  - Reputation
  - Regulation (assurance)
  - Flexibility

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SDLC: Standards

- Importance
  - They encapsulate best practice (normally)
  - Framework for quality assurance
  - Provide continuity
    - Record of decision making processes
    - Organisational memory
    - New staff save time

SDLC: Standards

- Issues:
  - Standards are considered too large, unwieldy and difficult to adopt for SMEs or VSE/SOHOs
  - Focus is on large organisations
  - Concerns over cost and documentation
  - Difficult to justify

SDLC: Standards, ISO

- International Organization for Standardization (ISO) is the world's largest developer of International Standards

- The British member of the ISO is …?

- Roots in governmental, NGO, other public bodies and private sectors

- Gives ISO a broad reach, in terms of consideration and implementation

- ISO Standards are developed by technical experts who sit on technical committees, such as:

  – JTC: Joint technical Committee

  – SC: Sub-committee

  – WG: Working Groups

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SDLC: Standards ISO

Searched for **ISO/IEC JCT1, Information Technology**

- Interested in developing the Standards of the future?

https://www.iso.org/advanced-search/x/title/status/U/docNumber/docPartNo/docType/0/langCode/ics/currentStage/true/searchAbstract/true/stage/stageDateStart/stageDateEnd/committee/ISO%7CIEC%20JTC%201/sdg

- Standards that are being developed and are open for comment:

Scope
- ☑ Published
- ☑ Under development
- ☐ Withdrawn
- ☐ Deleted(last 12 months)

Document type
All by default

Language
All
(Official ISO translation)

ICS
All

Stage code
☑ Current only
All

Stage date
From
To

Committee
ISO/IEC JTC 1

26 standards found

⊙IEC/AWI TS 63526 [Under development]
Gap Analysis on Standards Related to City Information Modelling and Urban Digital Twins
Sustainable Development Goal(s): 6, 7, 11, 13   Edition: 1   Stage: Under development (10.99)   TC: ISO/IEC JTC 1

⊙ISO/IEC AWI 5087-3 [Under development]
Information technology — City data model — Part 3: Service level concepts -Transportation planning
Sustainable Development Goal(s): 11   Edition: 2   Stage: Under development (20.00)   TC: ISO/IEC JTC 1

⊙ISO/IEC DIS 19987 [Under development]
Information technology — EPC Information Services (EPCIS)
Sustainable Development Goal(s): 11, 9, 8   Edition: 3   Stage: Under development (40.60)   TC: ISO/IEC JTC 1   ICS: 35.200

⊙ISO/IEC DIS 19988 [Under development]
Information technology — Core Business Vocabulary (CBV)
Sustainable Development Goal(s): 11, 9, 8   Edition: 3   Stage: Under development (40.60)   TC: ISO/IEC JTC 1   ICS: 35.020

⊙ISO/IEC DIS 5087-2 [Under development]
Information technology — City data model — Part 2: City level concepts
Edition: 1   Stage: Under development (40.60)   TC: ISO/IEC JTC 1   ICS: 13.020.20, 35.240.99
Sustainable Development Goal(s): 11

⊙ISO/IEC PRF 20237 [Under development]
Information technology — Sparkplug® version 3.0
Edition: 1   Stage: Under development (50.20)   TC: ISO/IEC JTC 1   ICS: 35.020

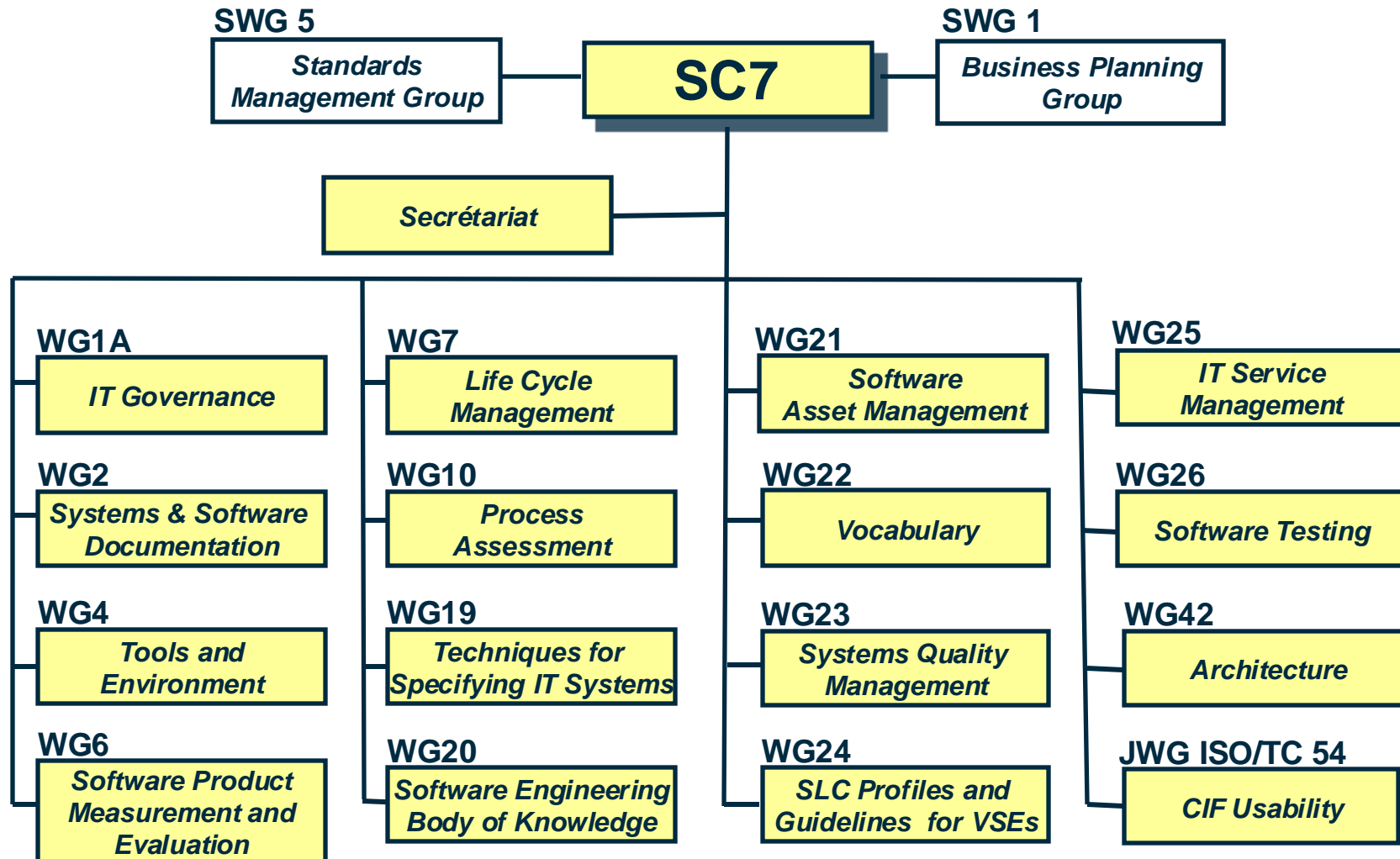⊙ISO/IEC DIS 20648 [Under development]
Information technology — TLS specification for storage systems
Edition: 2   Stage: Under development (40.60)   TC: ISO/IEC JTC 1   ICS: 35.030, 35.220.01
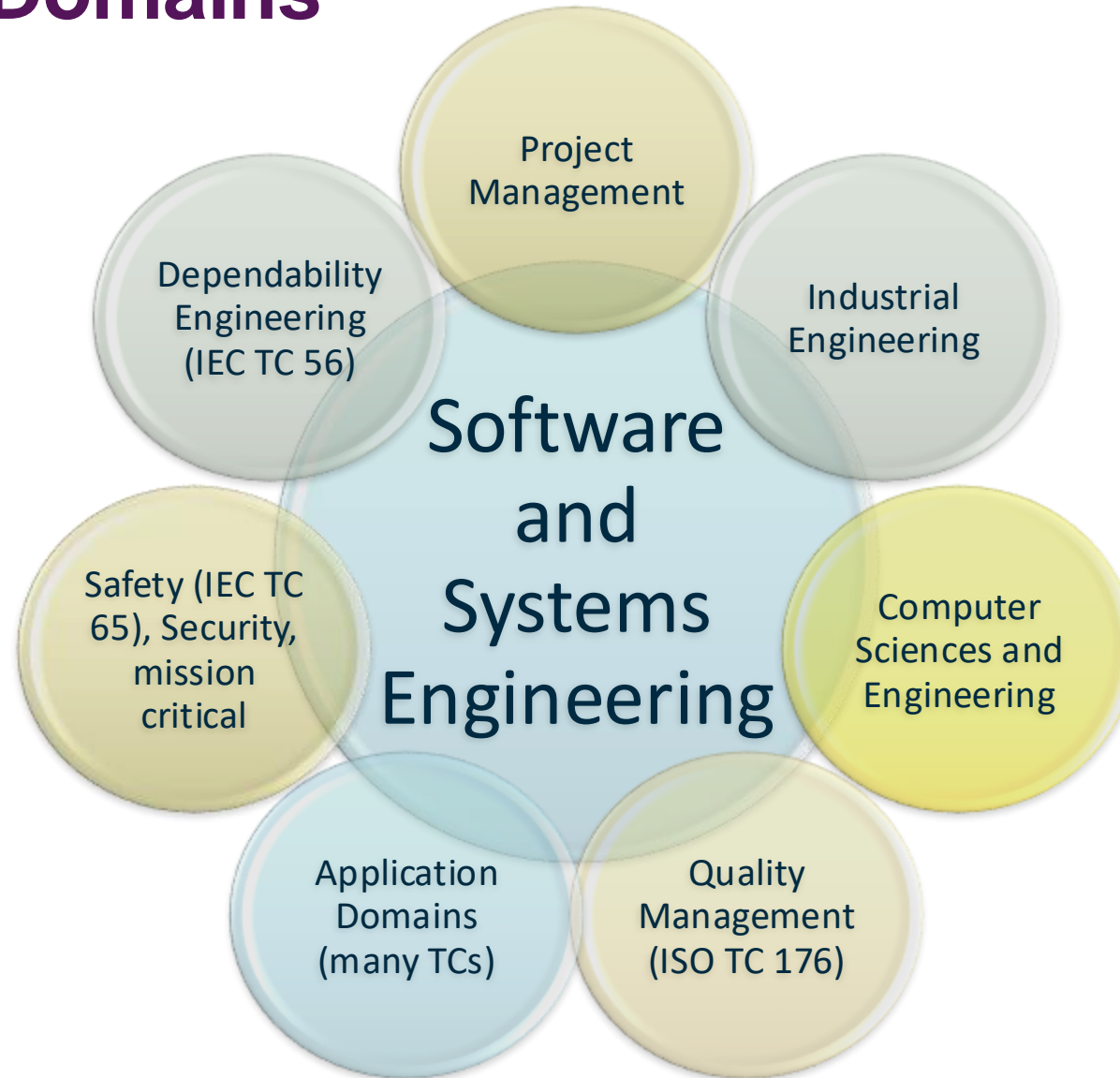Sustainable Development Goal(s): 11, 9, 8

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SDLC: Subcommittees (SC) of ISO/IEC JCT1

Technical Directions	JTC1 Subcommittees and Working Groups
Application Technologies	SC 36 - Learning Technology
Cultural and Linguistic Adaptability & User Interfaces	SC 02 - Coded Character Sets SC 22/WG 20 – Internationalization SC 35 - User Interfaces
Data Capture land Identification Systems	SC 17 - Cards and Personal Identification SC 31 - Automatic Identification and Data Capture Techniques
Data Management Services	SC 32 - Data Management and Interchange
Document Description Languages	SC 34 - Document Description and Processing Languages
Information Interchange Media	SC 11 - Flexible Magnetic Media for Digital Data Interchange SC 23 - Optical Disk Cartridges for Information Interchange
Multimedia and Representation	SC 24 - Computer Graphics and Image Processing SC 29 - Coding of Audio, Picture, Multimedia, Hypermedia Information
Networking and Interconnects	SC 06 - Telecommunications and Information Exchange Between Systems SC 25 - Interconnection of Information Technology Equipment
Office Equipment	SC 28 - Office Equipment
Programming Languages & Software Interfaces	SC 22 - Programming Languages, their Environments & Systems Software Interfaces
Security	SC 27 - IT Security Techniques
Software Engineering	**SC 07 - Software and System Engineering**
Biometrics	SC 37 - Biometrics

SDLC: SC7 Structure

SWG 5
Standards Management Group

SC7

SWG 1
Business Planning Group

Secrétariat

WG1A
IT Governance

WG2
Systems & Software Documentation

WG4
Tools and Environment

WG6
Software Product Measurement and Evaluation

WG7
Life Cycle Management

WG10
Process Assessment

WG19
Techniques for Specifying IT Systems

WG20
Software Engineering Body of Knowledge

WG21
Software Asset Management

WG22
Vocabulary

WG23
Systems Quality Management

WG24
SLC Profiles and Guidelines for VSEs

WG25
IT Service Management

WG26
Software Testing

WG42
Architecture

JWG ISO/TC 54
CIF Usability

‡ Adapted from Prof. M. Azuma

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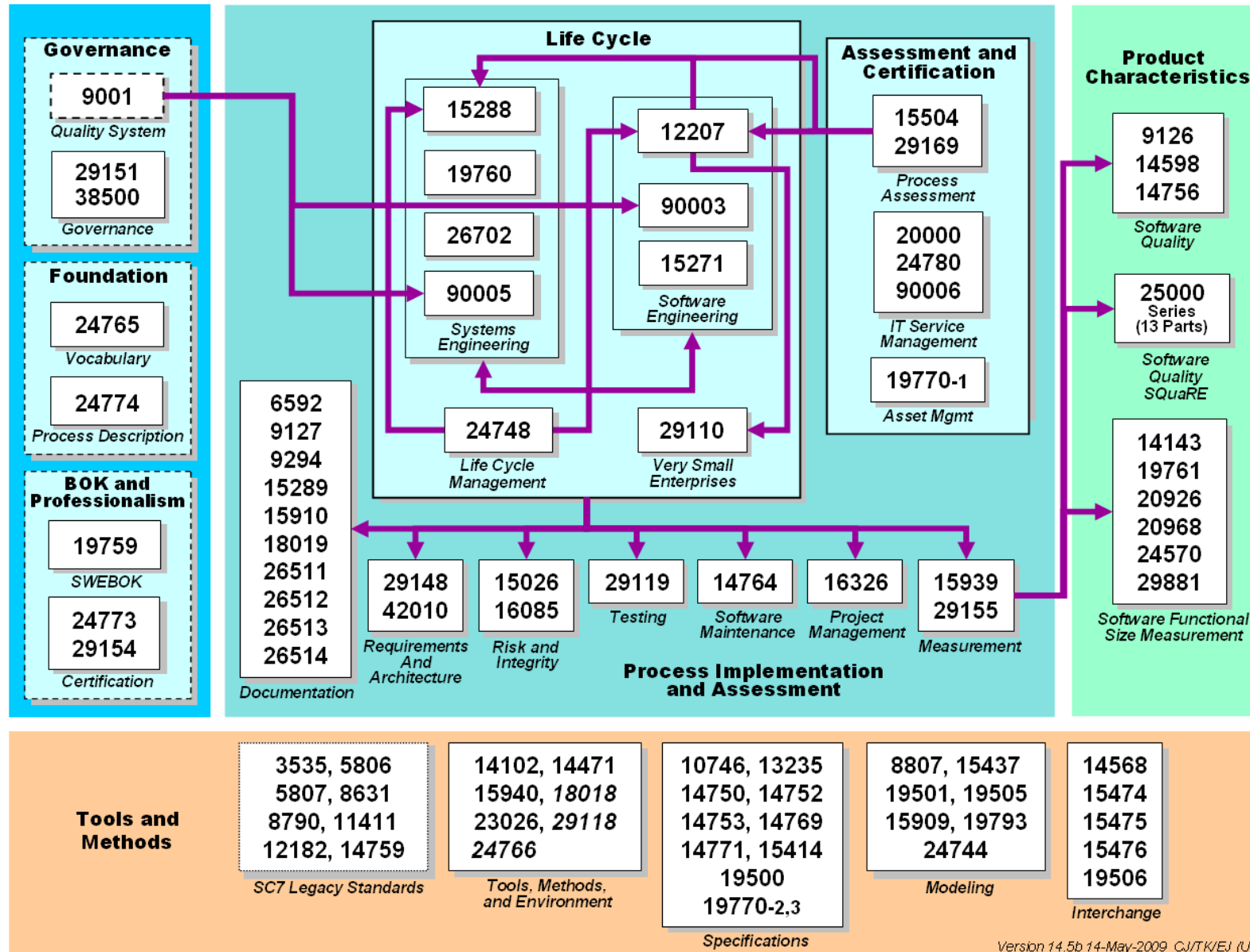
SDLC: SC7 Domains

SDLC: SC7 Standards

SDLC: Standards

- Standards of particular interest:

    - ISO 9000, family of standards for quality management systems

    - ISO 12207, defines the software engineering process, activity, and tasks that are associated with a software life cycle process from conception through retirement

    - ISO 15504, also known as SPICE (Software Process Improvement and Capability Determination), is a framework for the assessment of processes

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SDLC: ISO9000

SDLC: ISO9000

ISO9000 (QSM: Quality System Model)

- ISO9001 – QSM for Quality Assurance in design, development, production, installation and service

- ISO9002 – QSM for Quality Assurance in production, installation, and servicing

- ISO9003 – QSM for Quality Assurance in final inspection and test

Quality: refers to all features of a product (such as software) which are required by a customer

Quality management: covers the organisations approach to ensuring that it produces quality products and complies with the appropriate regulations

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SDLC: ISO 12207

- Created to supply a common structure so that the buyers, suppliers, developers, maintainers, operators, managers and technicians involved with the software development use a common language

- It is the standard that defines all the tasks required for developing and maintaining software

- Created in '95, last updated in '17 (ISO 12207:2017)

- Covers the processes in the life cycle of software:

  - High level process architecture

  - Activities and tasks

  - Tailored for any organization or project (inc. SME et al)

  - An 'inventory' of processes from which to choose

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SDLC: ISO 12207

- This standard does not create a standardised way to create a product

- It is not prescriptive

- Nor does it advocate or enforce a standardised methodology

  - No framework, lifecycle, tool set …

SDLC: Process implementation

- Define or select software life cycle model appropriate to the scope, magnitude, and complexity of the project;

- Select, tailor, and use standards, methods, tools, and programming languages (if not stipulated in contract);

- Develop plans for conducting the activities of the Development process.

SDLC: ISO 15504

Process assessment: What is it?

- A disciplined examination of the processes by an organisation against a set of criteria to determine capability of those processes to perform within quality, cost and schedule goals

- Focus here is on continual, self-improvement

Why bother?

- Identify strengths and weaknesses in current utilisation of processes

- Ongoing development of systems, maturity and growth

- Feeds into the future

SDLC: ISO 15504
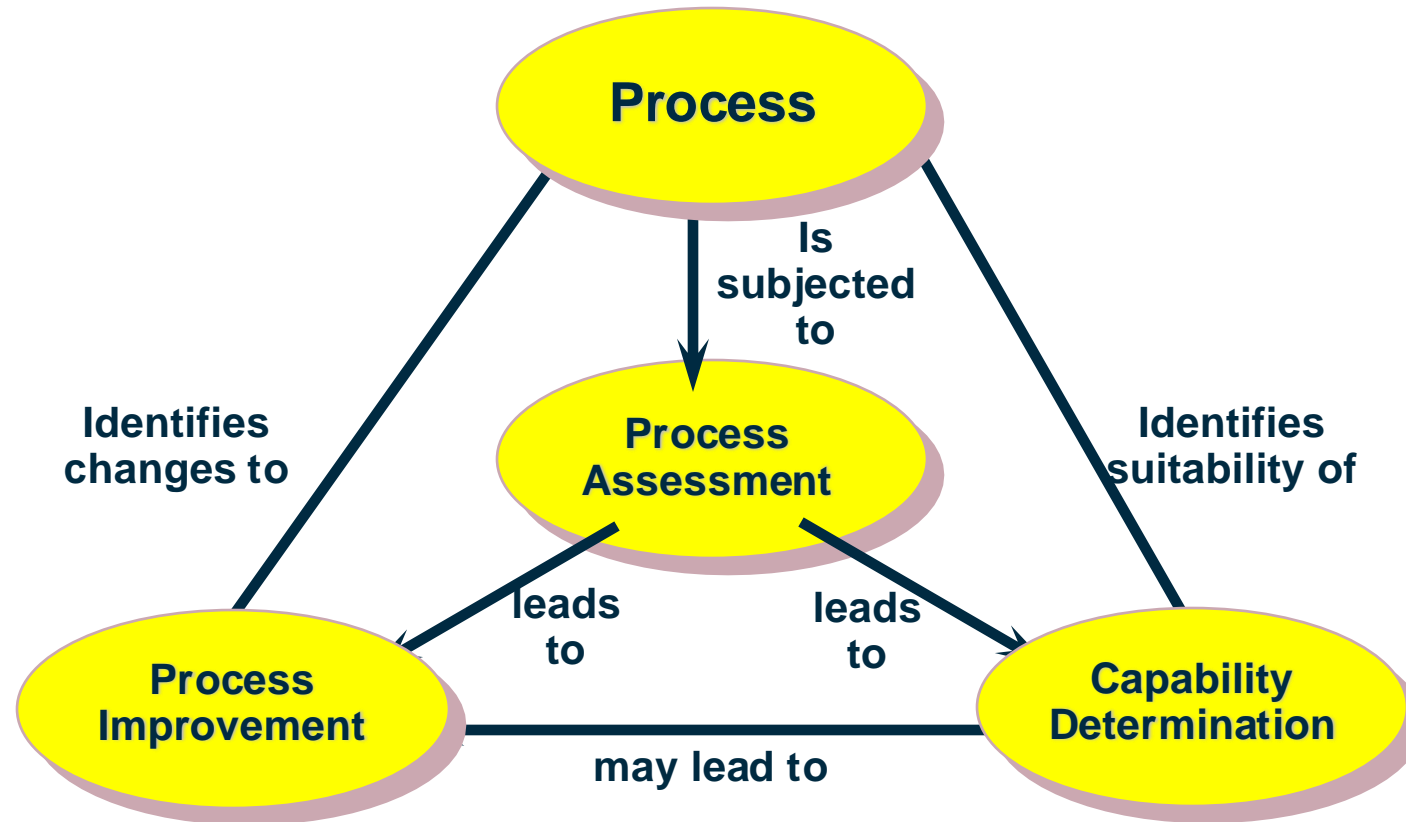
Risks

SE: Risks

What is risk?

- Involves choice and uncertainty

- Based on incomplete information

"While it is futile to try to eliminate risk, and questionable to try and minimise it, it is essential that the risks taken be the right risks." [Drucker, 75]

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SE: Risks

What kind of risks exist within a software development project?

Reactive vs Proactive approaches – describe them …

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Reactive strategies

The 'Indiana Jones' school of risk management

- Fire fighting

- Crisis

- Cheap?

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Proactive strategies

The 'cautious planner' school of risk management

- Identify risks in advance

- Assess probability and impact

- Prioritise

- Risk management plan

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Software risks

Uncertainty: the chance of a risk occurring, 0 < P <1

Loss: the impact of the risk if it comes about

Use these two factors
to assess each risk

5x5 RISK MATRIX

PROBABILITY	Very Low	Low	Medium	High	Very High
Highly Probable	5 Moderate	10 Major	15 Major	20 Severe	25 Severe
Probable	4 Moderate	8 Moderate	12 Major	16 Major	20 Severe
Possible	3 Minor	6 Moderate	9 Moderate	12 Major	15 Major
Unlikely	2 Minor	4 Moderate	6 Moderate	8 Moderate	10 Major
Rare	1 Minor	2 Minor	3 Minor	4 Moderate	5 Moderate

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Types of Risk

- Project risks

- Technical risks

- Business risks

- Known risks

- Predictable risks

- Unknown risks

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Questions … ?

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