

# **What is ISO/IEC 15288 and Why Should I Care?**

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17 September 2002

# Acknowledgements

- The basis of this presentation was derived from a presentation developed by delegates to ISO/IEC JTC 1/SC 7/WG 7 *Life cycle management* for the purposes of raising awareness about, and promoting the use of ISO/IEC 15288.
  - These charts are noted by a source statement and are used with the permission of the ISO/IEC JTC1/SC7/WG7
- Additional charts were provided by the following individuals with permission for use in this presentation.
  - Jerry Lake, Systems Management International
  - Alain Faisandier, Map Systeme

# Agenda

- Background and History
- ISO/IEC 15288 overview
- Benefits
- Comparison of Key SE Standards
- Future Directions

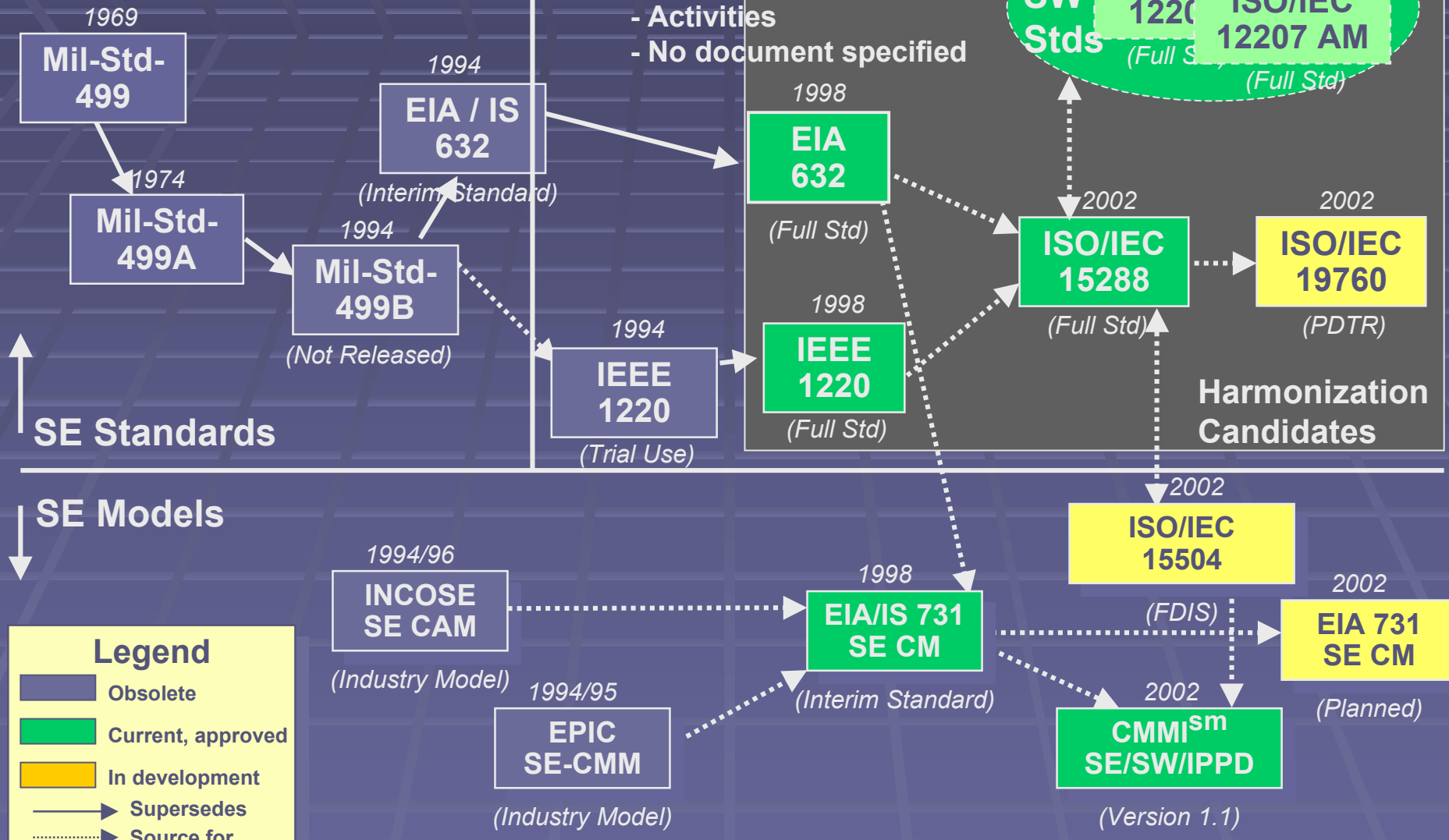
# Heritage of SE Standards & Models

## "Life cycle" approach

- Fixed phases / time
- Document contents

## Process approach

- Objectives / purpose
- Outcomes
- Activities
- No document specified



# Current Standards & Models For Systems Engineering (Back-up)

## STANDARDS

- EIA/ANSI 632 - 1998  
*Processes for Engineering systems*
- IEEE 1220 - 1998  
*Standard for Application and Management of the Systems Engineering Process*
- ISO/IEC 15288 - 2002  
*Standard for Information Technology - System Life Cycle Processes*
- ISO/IEC 19760 – PDTR - 2002  
*Guide for ISO/IEC 15288 - System Life Cycle Processes*
- ECCS-E-10A - 1996  
*Space Engineering - Systems Engineering*

## Capability Models

- EIA-IS 731 – Interim Standard – 1998  
*Systems Engineering Capability Model*
- ISO/IEC 15504 FDIS - 2002  
*Systems Engineering – Process Assessment*
- CMMI<sup>sm</sup> SE/SW/IPPD V1.1 – 2002  
*Capability Maturity Model Integration – SE/SW/IPPD*

# Background and History

## Why and How ISO/IEC 15288 was developed

- Initial planning started in 1994
- Large international market for systems engineering (SE) services and related products
- Need for a common process framework
- Need for a SE standard that addressed hardware and software in a concurrent and integrated fashion
  - Establish common terminology
  - Integrate all necessary disciplines and technical processes
  - Integrate project management across full life cycle
  - Interactions with the organization/enterprise
- Standard was approved for release in July 2002
- Resulting standard achieved through participation of:
  - 18+ countries
  - Several liaison organizations (e.g., IEEE, INCOSE, and EIA)
  - Over 40 technical experts

Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# ISO/IEC 15288 scope

- Provides a common, comprehensive & integrated framework for describing and managing the full life cycle of systems for:
  - Small, medium and large organizations
  - Internal self-imposed use, as well as providing a basis for contractual arrangements (i.e., any agreement)
- Defines a set of processes and associated terminology
  - Can be applied at any level in the hierarchy of a system's development
- Applies to man-made systems configured with one or more of the following:
  - Hardware, software, humans, or processes

Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

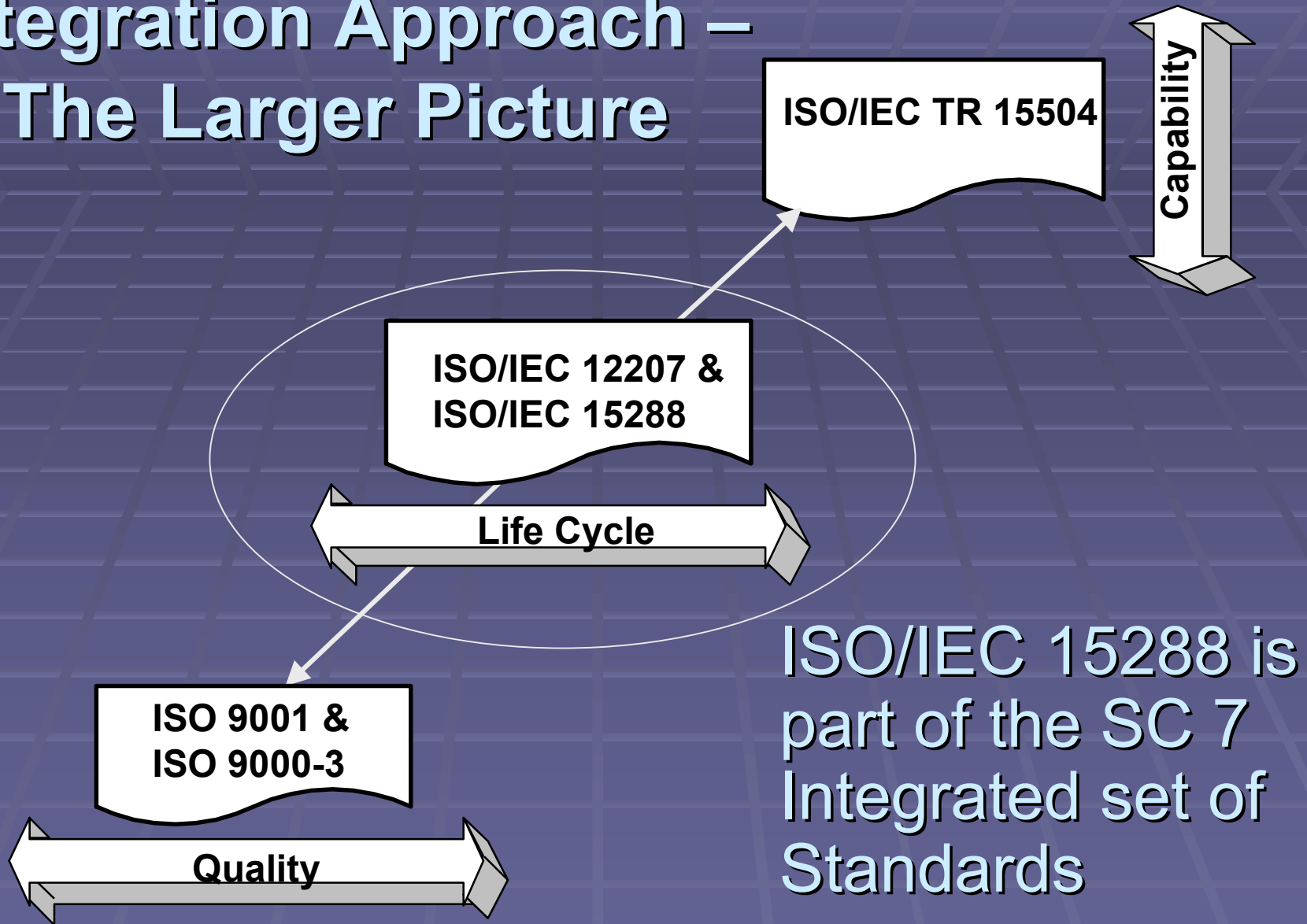
# Applicability of ISO/IEC 15288

- Key business domains
  - Aerospace
  - Telecommunications
  - Transportation systems
  - Military systems
  - Ship building
  - Finance and Administrative systems
  - Information Technology systems

***Applicable to most domains in industry today***

Source: ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

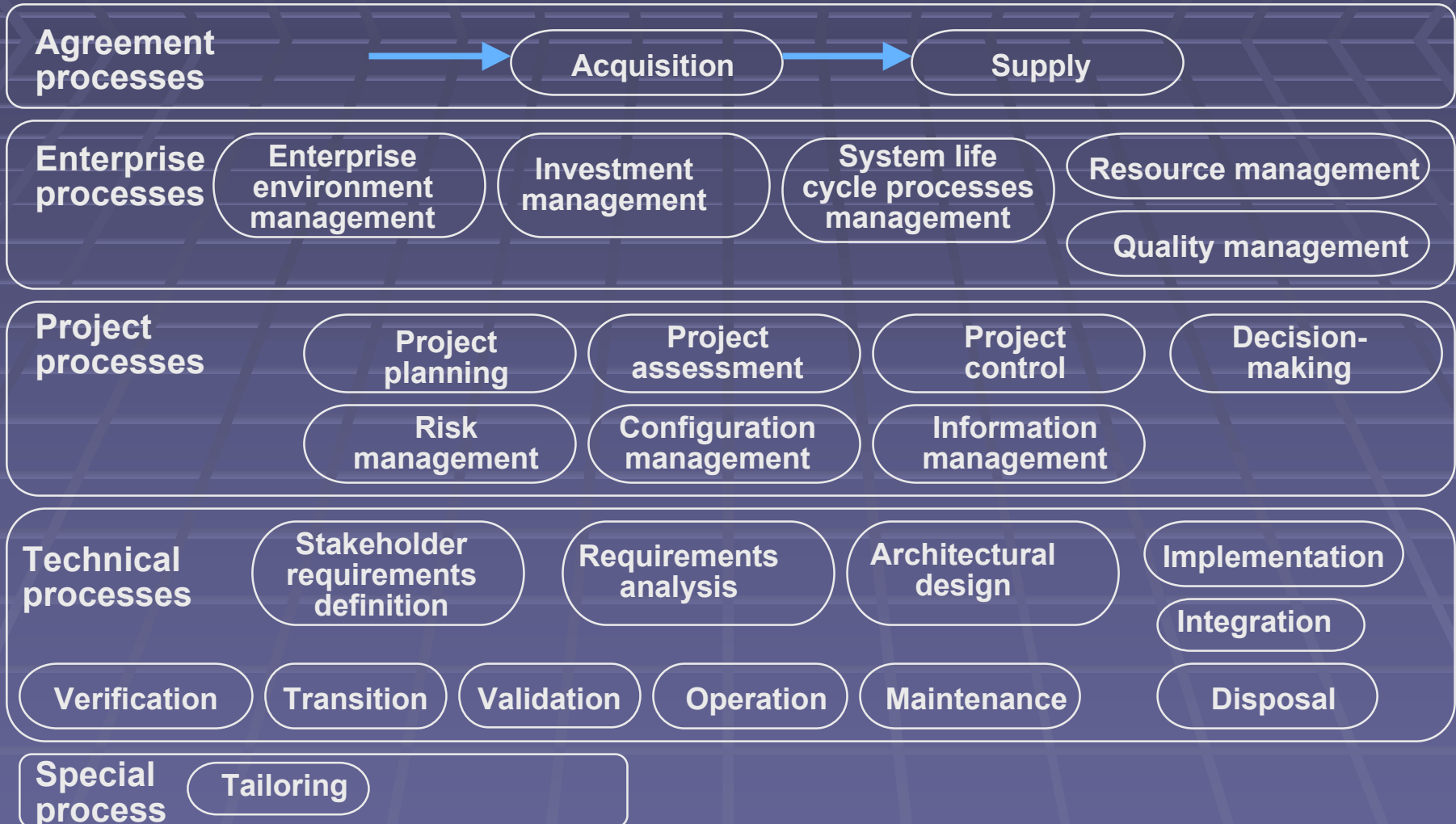
# Integration Approach – The Larger Picture



Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# System life cycle processes

## ISO/IEC 15288



Source: ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# Development implemented by processes – ISO/IEC 15288 structure

**Processes** → **Outcomes** → **Activities**

**Processes (25)  
(with stated Purposes)**

**Outcomes (123)**

**Activities (208)**

- The purpose of the process is stated in a paragraph that describes at a high level the overall goal for performing the process
- An outcome is an observable result of the successful achievement of the purpose of the process
- The activities provide a structural decomposition of a process

# Example of ISO/IEC 15288 outcomes

- Risk Management Process:
  - As a result of the successful implementation of the Risk Management Process:
    - Risks are identified and categorized
    - The probabilities and consequence of risks are quantified
    - A strategy to treat each risk is specified
    - Risk status is available and communicated
    - Risks that have become unacceptable are acted upon

Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# Some Key Terms

## ■ **System**

- a combination of interacting elements organized to achieve one or more stated purposes

## ■ **System-of-Interest**

- the system whose life cycle is under consideration in the context of this International Standard

## ■ **System Element**

- a member of a set of elements that constitutes a system

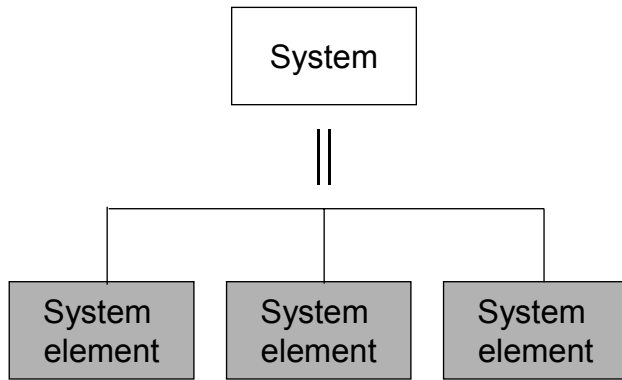
NOTE: A system element is a discrete part of a system that can be implemented to fulfill specified requirements

## ■ **Enabling System**

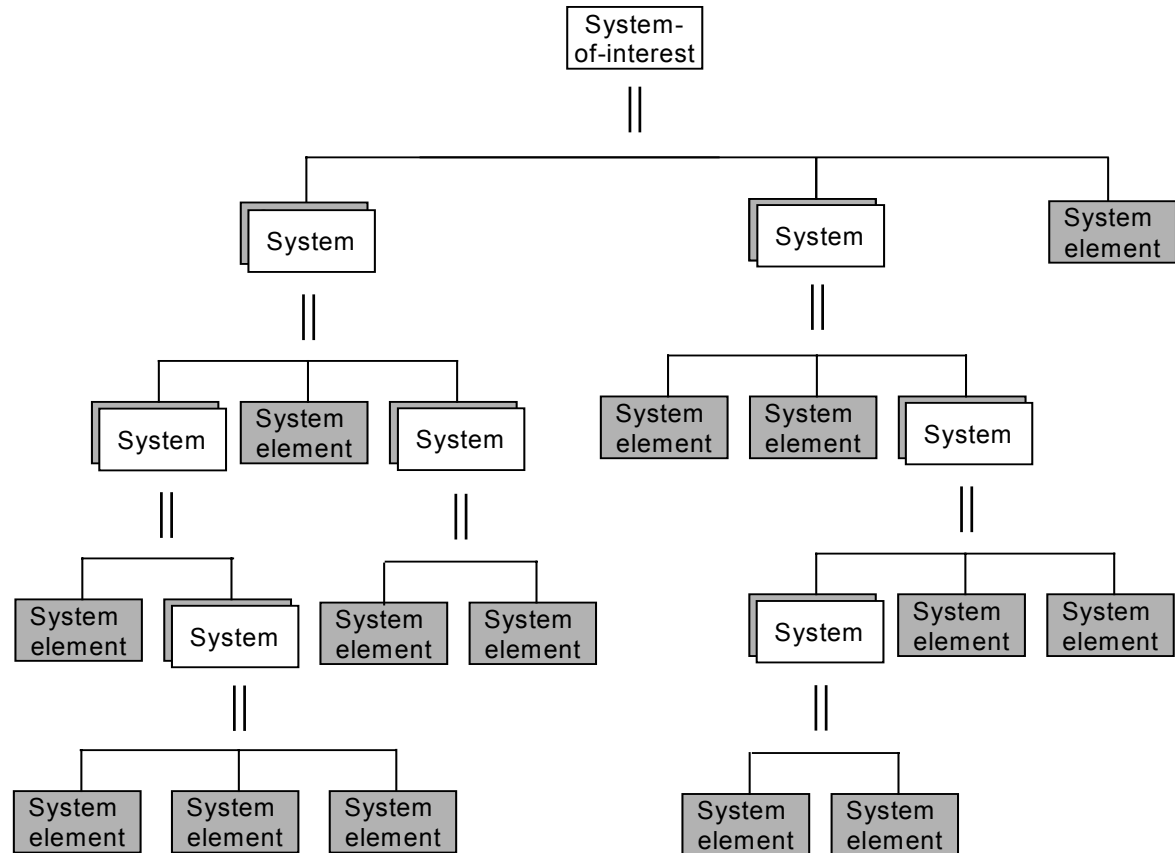
- a system that complements a system-of-interest during its life cycle stages but does not necessarily contribute directly to its function during operation

NOTE: For example, when a system-of-interest enters the production stage, an enabling production system is required.

# System-of-Interest Structure

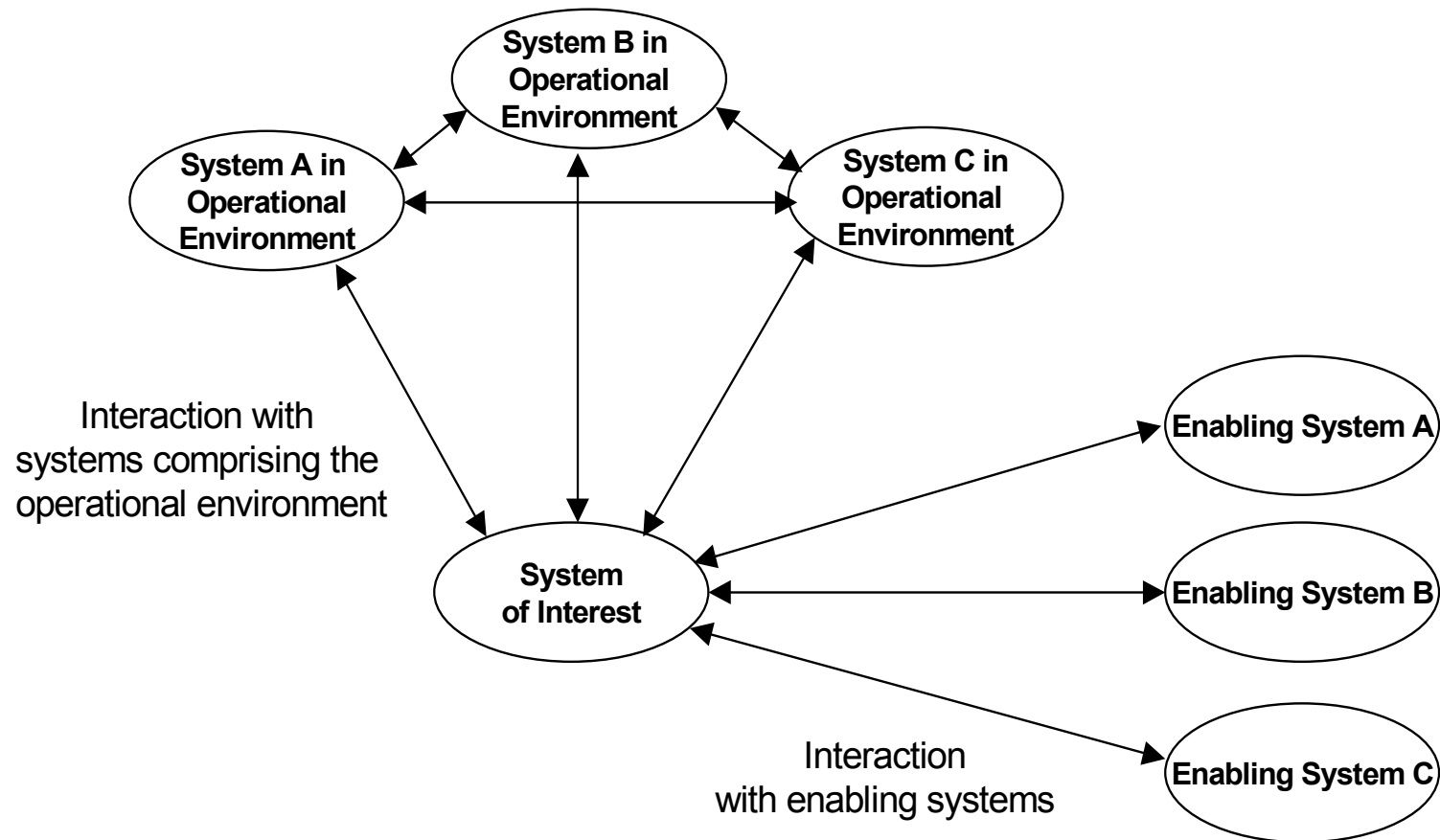


- ← A system
- ← is completely composed of
- ← a set of interacting
- ← system elements



Source: ISO/IEC 15288.

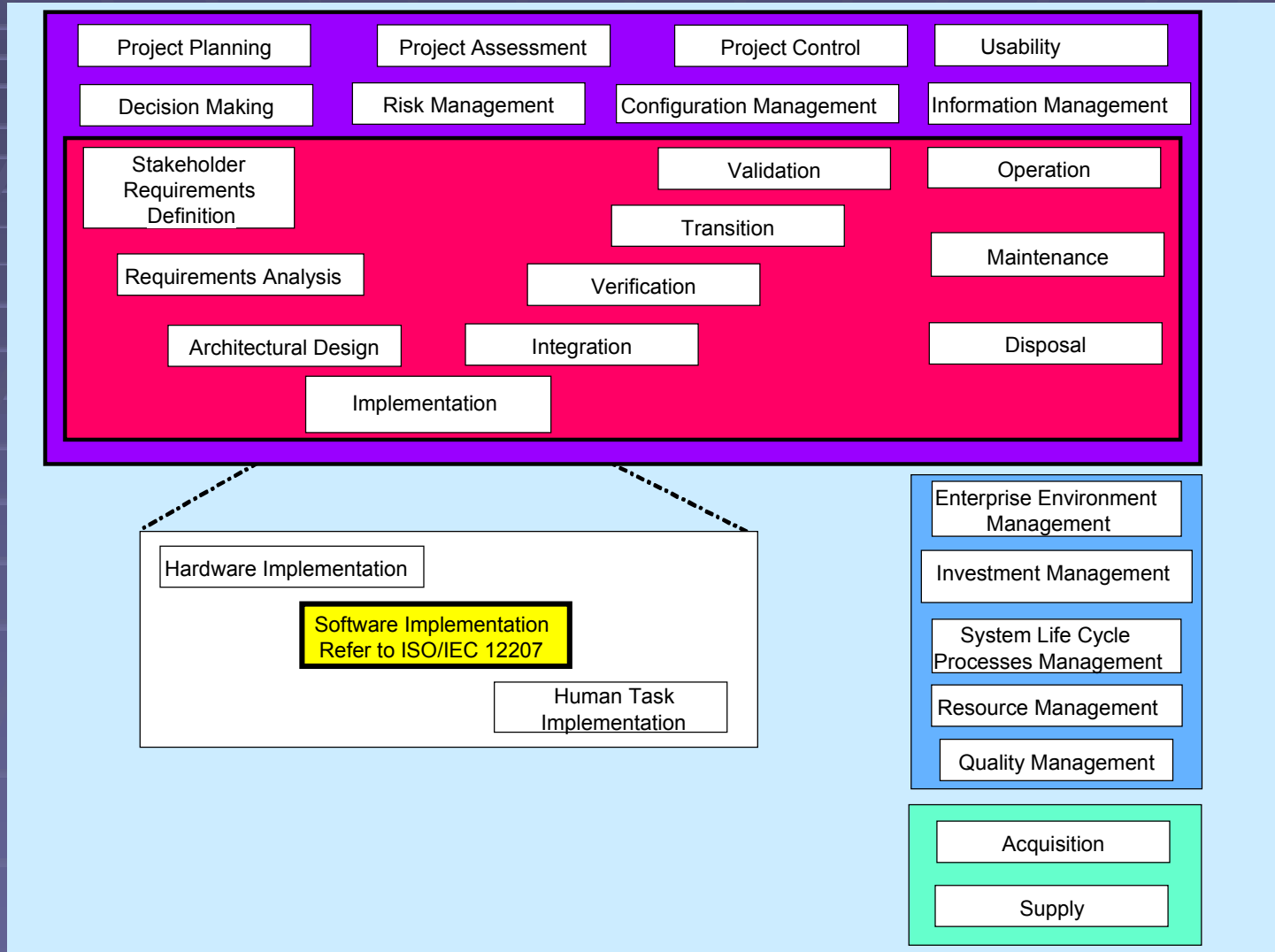
# System-of-Interest, Operational Environment, and Enabling Systems



# System Life Cycle processes – Example stages

Stage	Description
Concept	Analyze needs, identify concepts and develop solutions
Development	Engineer a product that is a producible item
Production	Manufacture, inspect and test the item(s)
Utilization	Operate and use the item(s)
Support	Maintain and support the item(s)
Retirement	Retire, dispose and archive

# Relationship between ISO/IEC 15288 and ISO/IEC 12207



# Benefits of Using ISO/IEC 15288

- Full life cycle approach to systems engineering and systems management
  - Built on proven experience and lessons learned
  - Life cycle modeling of systems
- Provides the basis for improving:
  - Quality of the product
  - Productivity
  - Integration among all stakeholders
  - Customer satisfaction
- Better foundation for growth and product enhancements

Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# Benefits of Using ISO/IEC 15288

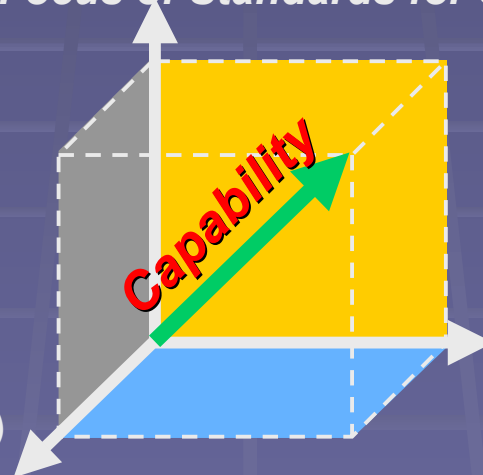
- Helps focus system management across the life cycle by providing:
  - Insight into what should be assessed
  - A holistic view of engineering the system (software, hardware, humans, and processes)
  - A process framework that:
    - Is easy to tailor to meet project/organization needs
    - Reduces development risk
  - A basis for:
    - Stage-based life cycle models
    - Communicating with all stakeholders
    - Coordinating work
    - Managing agreements

Source: Adapted from ISO/IEC JTC1/SC7/WG7 presentation on ISO/IEC 15288.

# Obtaining the Benefits

- The following are necessary to obtain the expected benefit from this standard:
  - Correct implementation of the standard via organization/project processes
  - Methods and tools consistent with the processes
  - Personnel trained in processes, methods, and tools
  - Project implementation that ensures compliance and integration
  - Emphasis on correct system definition and application

***Processes and Concepts***  
***(What has to be done – Focus of Standards for Systems Engineering)***

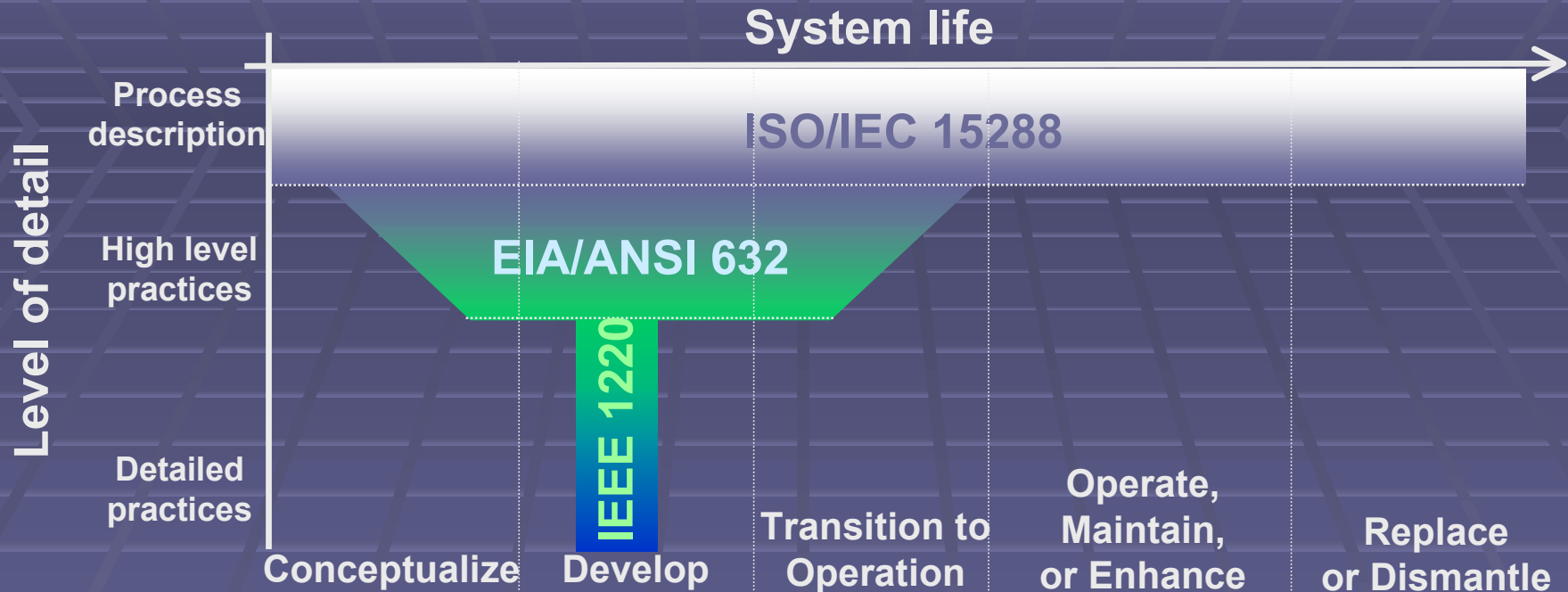


Source: Adapted from chart by Jerry Lake,  
Systems Management International.

***People***  
***(Knowledge, Skill & Teamwork)***

***Methods & Tools***  
***(Collaborative/Automated)***

# Breadth and Depth of Key SE Standards



## Purpose of the Standards:

**ISO/IEC 15288** - Establish a common framework for describing the life cycle of systems

**EIA/ANSI 632** - Provide an integrated set of fundamental processes to aid a developer in the engineering or re-engineering of a system

**IEEE 1220** - Provide a standard for managing a system

# Generic Process Approach and Structure

## External environment

Laws, standards, natural & deduced constraints, technologies, competition

## Enterprise Environment

Policies & procedures, standards et guides, resources, technologies, culture

### Program & project environment

plans, procedures, tools, reviews, measurement

Project Management Processes

Agreement Processes

Technical Processes

Support processes

(technical mgt of inputs & outputs)

### Entreprise Processes

- Enterprise strategy
- Resources Management (humans, infrastructure, finance ...)
- Quality Management
- Information Management
- Process Management
- Knowledge management

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**ISO 15288**

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# The Future: 15288 & 12207 Harmonization Project

## ■ Current Situation

- Many people don't see many differences between system and software development
- The level of detail in the two documents differs, which is an obstacle to their joint usage
- There are places where the two documents overlap and have incompatibilities

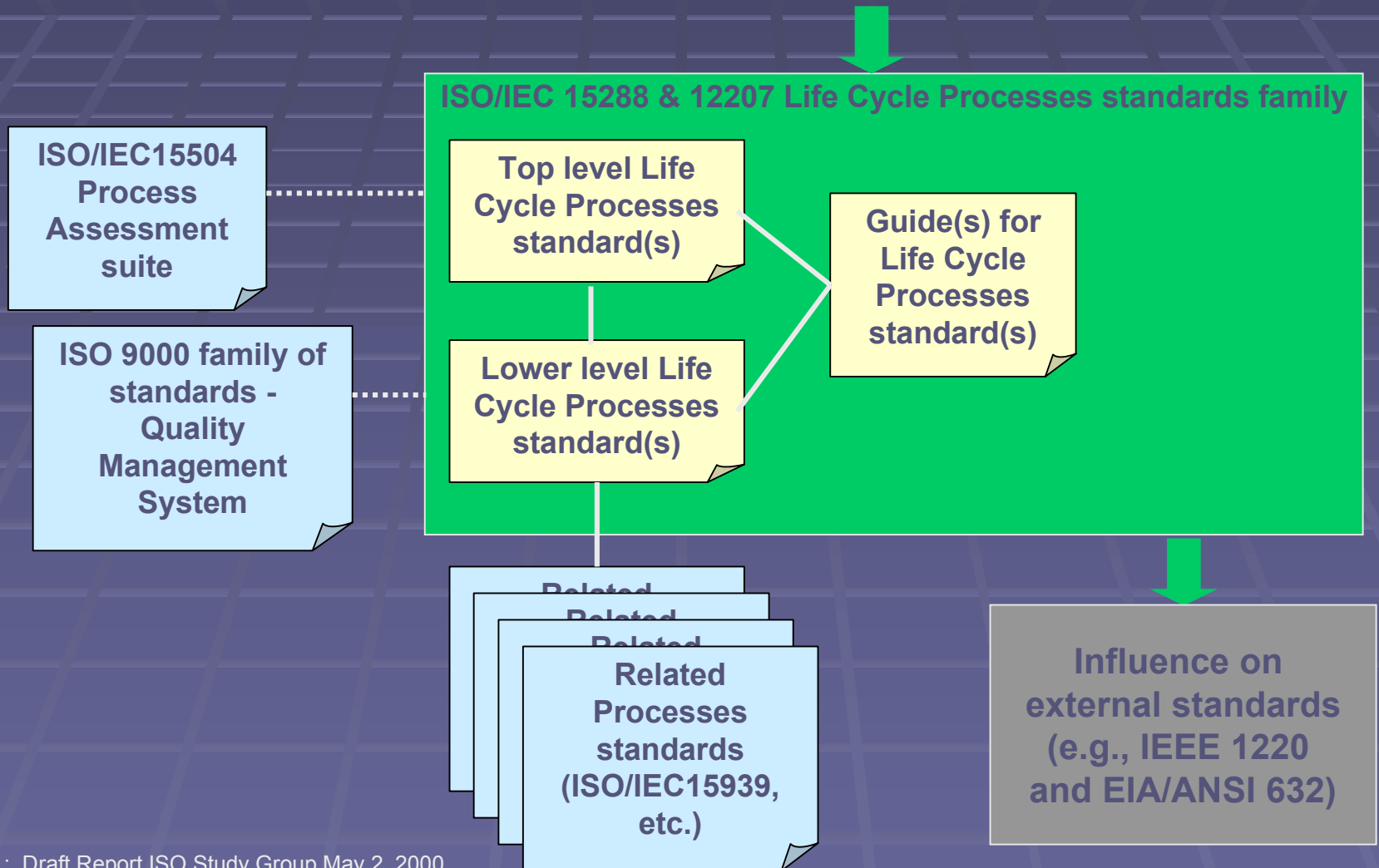
## ■ Harmonization will achieve consistency in :

- Concepts – Terminology - Readability - Level of detail
- Processes - Document structure – Normative references
- Interfacing mechanism with ISO 9000 family of standards
- Conformance with requirements of ISO/IEC 15504 as applicable

## ■ Extend to include to other related ISO/SC7 documents

# The Future: 15288 & 12207 Harmonization Project

Possible or expected structure



# Conclusion

- ISO/IEC 15288 is a key reference for any situation where systems are concerned
- Life cycle models are a key concept for successful systems

# Further reading

- [www.jtc1-sc7.org](http://www.jtc1-sc7.org)
- ISO/IEC 15288:2002
- ISO/IEC 19760 *Guide for ISO/IEC 15288*  
(to be published in 2003)