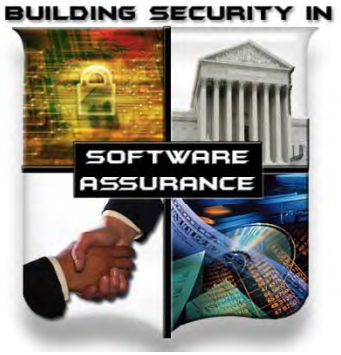
Homeland Security

Commerce

National Defense



Assurance Cases

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May 2011

MITRE

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Agenda

8:00-8:45am	Software Security Knowledge about Applications Weaknesses
9:00-9:45am	Software Security Knowledge about Attack Patterns Against Applications
	Training in Software Security
10:15-11:00am	Software Security Practice
11:15-12:00am	Supporting Capabilities
	Assurance Cases
	Secure Development & Secure Operations

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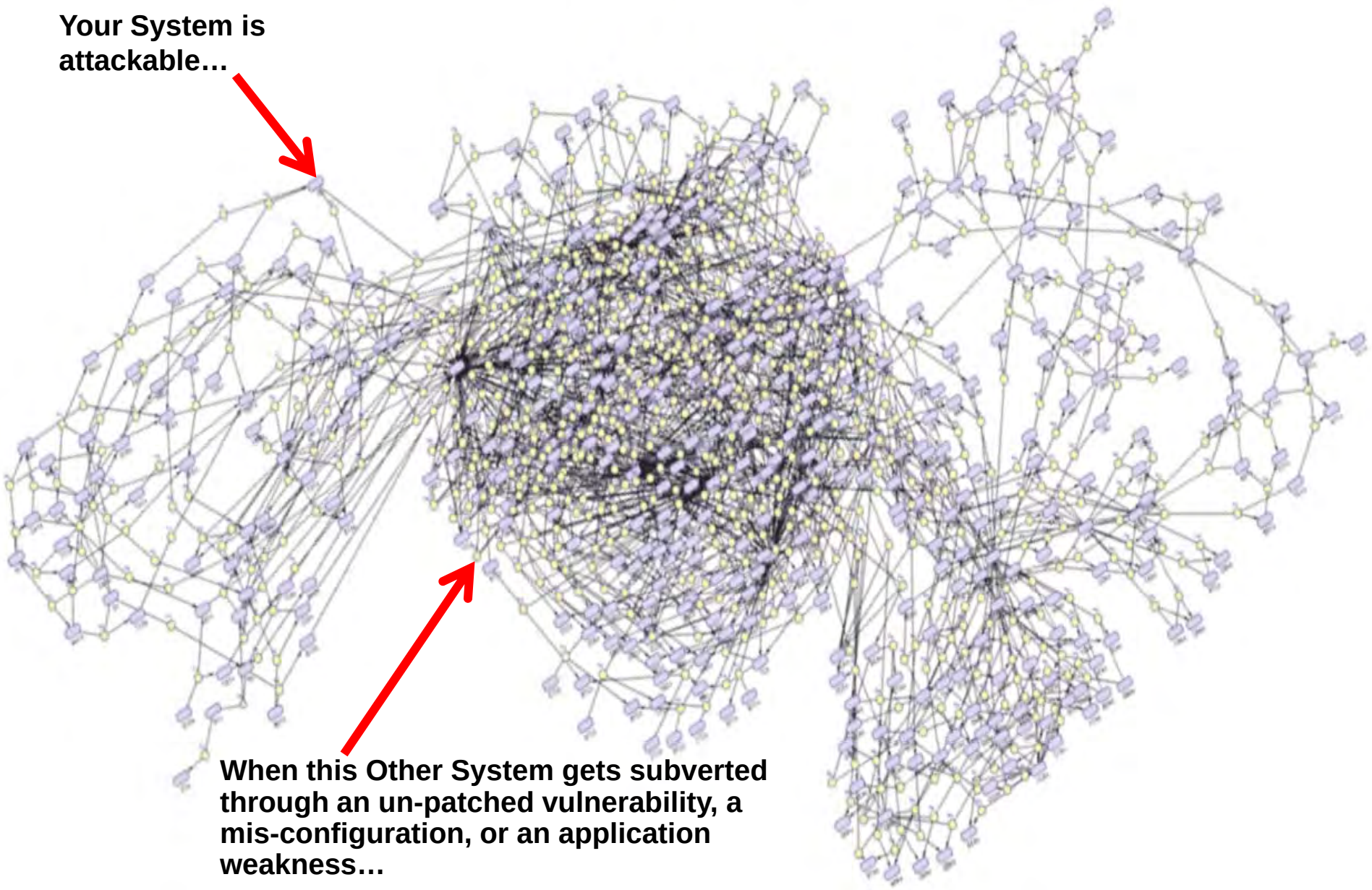
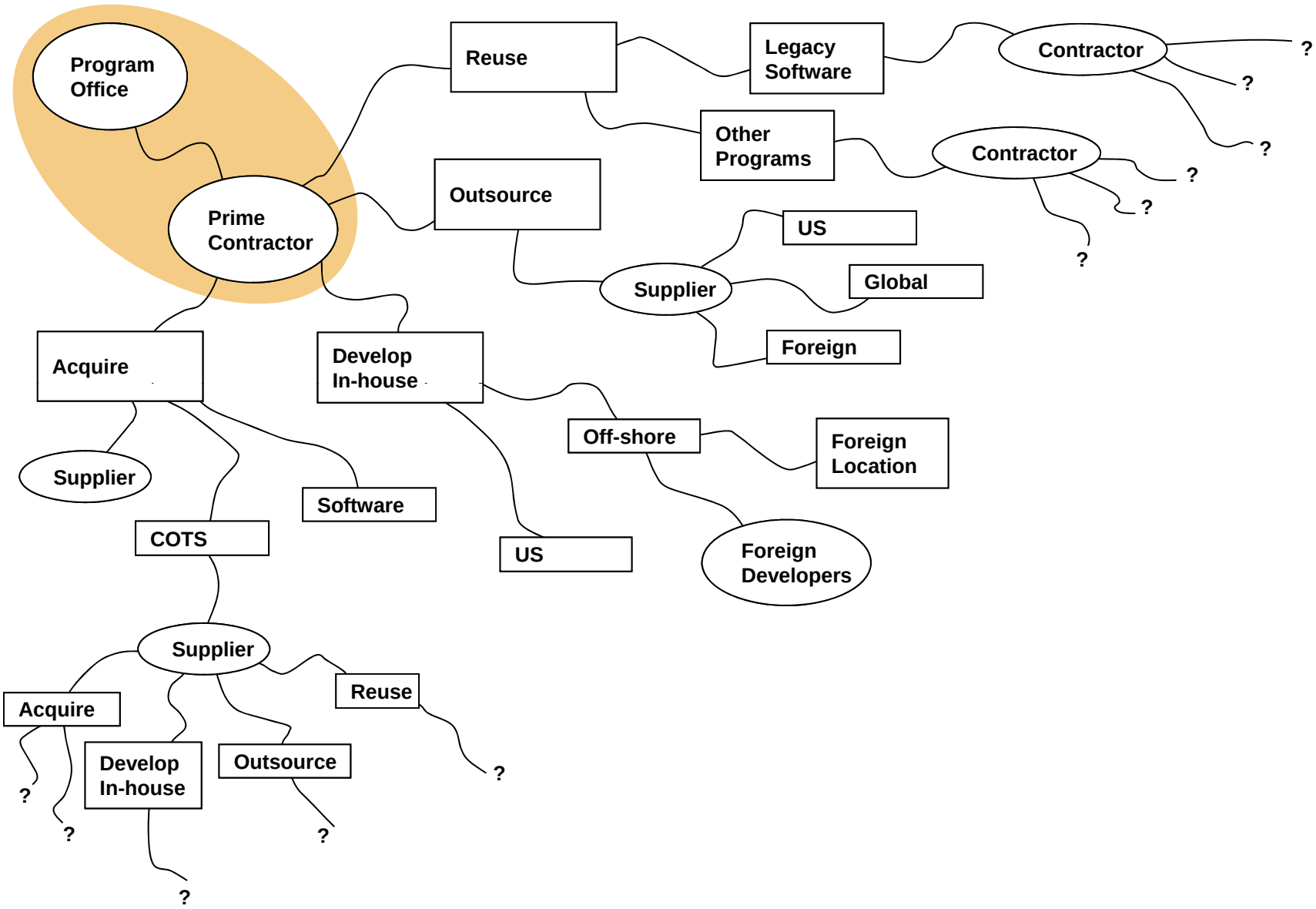
Today Everything's Connected



The Software Supply Chain



* "Scope of Supplier Expansion and Foreign Involvement" graphic in DACS www.softwaretechnews.com Secure Software Engineering, July 2005 article "Software Development Security: A Risk Management Perspective" synopsis of May 2004 GAO-04-678 report "Defense Acquisition: Knowledge of Software Suppliers Needed to Manage Risks"

What Is an Assurance Case?

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History of Assurance Cases

- Originally Only Safety Cases
  - **Aerospace**
  - **Railways, automated passenger**
  - **Nuclear power**
  - **Off-shore oil**
  - **Defense**
- Security Cases
  - **Use compliance rules more than an assurance case**
- Cases for Business Critical Systems

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Definition of Safety Case

- From Adelard's ASCE manual:

"A documented body of evidence that provides a convincing and valid argument that a system is adequately safe for a given application in a given environment."

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Definition of Assurance Case

- Generalizing that definition

  A documented body of evidence that provides a convincing and valid argument that a specified set of critical claims regarding a system's properties are adequately justified for a given application in a given environment.

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Structured Assurance Cases

- Structure is required to make the creation, sharing, analysis, maintenance and automation of such an assurance case practical

- Structured Assurance Cases are composed of structured sets of Claims, Arguments and Evidence
  - **A Claim is a proposition to be assured about the system of concern**
  - **An Argument is a reasoning of why a claim is true**
  - **Evidence is either a fact, a datum, an object, a claim or [recursively] an assurance case which supports an Argument against a Claim**

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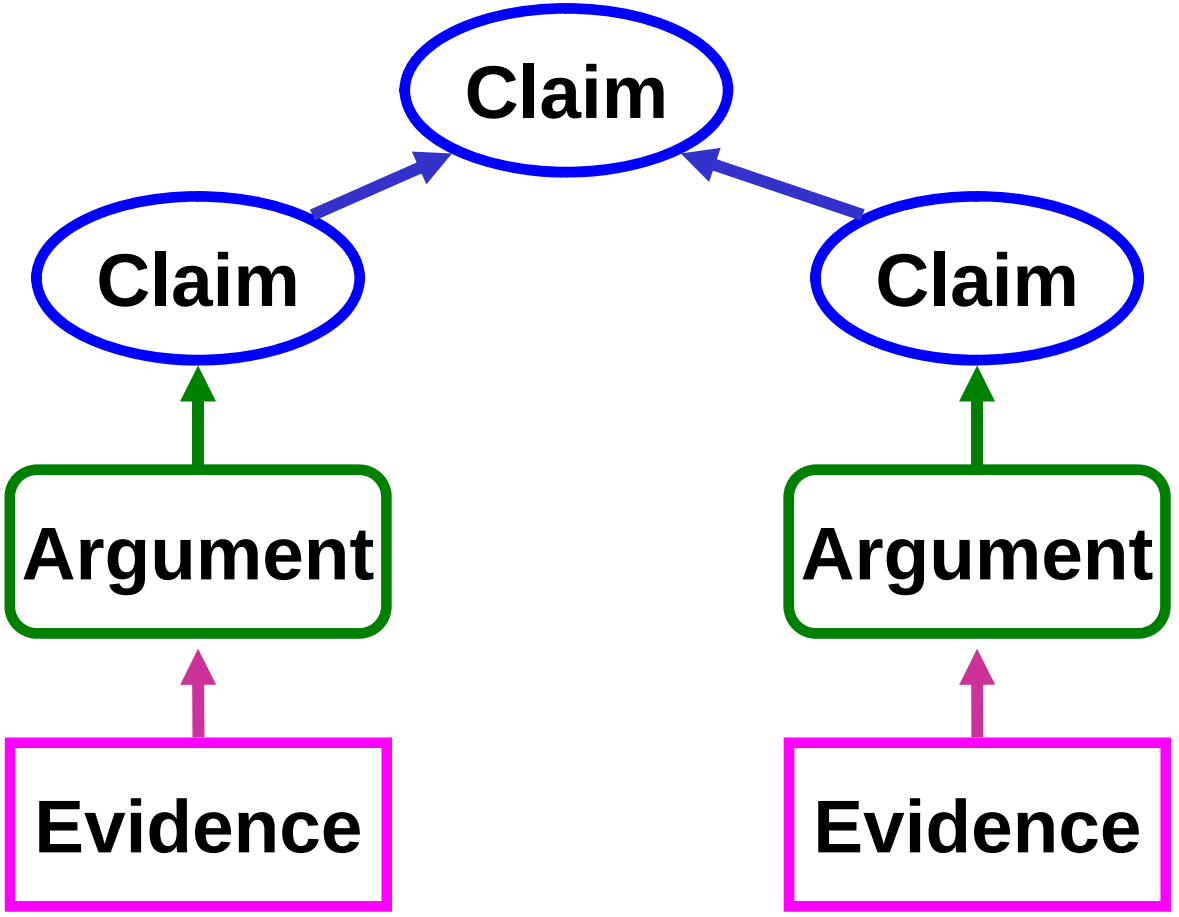
Extremely Simplified Overview of Structured Assurance Case Content

Claim =
assertion to be proven

Argument =
reasoning supporting a claim

Evidence =
data supporting an Argument



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Need for Standards

- While several different notations exist for safety cases and generalized assurance cases no widely accepted standard currently exists for specifying structured assurance cases within a systems & software assurance domain
- Standards are needed before structured assurance cases can be widely leveraged or made practical through automated tooling
- Coordinated efforts are currently underway in the International Standards Organization (ISO) and the Object Management Group (OMG) to develop these needed standards
  - **ISO 15026 Part 2 (currently published) is a very simple high-level standard outlining the context and basic requirements for structured assurance cases**
  - **The OMG SACM (under development) and supporting OMG standards are targeted at providing at automatable level of detail for structured assurance case specification**

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ISO/IEC 15026: A Four-Part Standard

- Planned parts:
  - **15026-1: Concepts and vocabulary (initially a TR2 and then revised to be an IS)**
  - **15026-2: Assurance case (including planning for the assurance case itself)**
  - **15026-3: System integrity levels (a revision of the 1998 standard)**
  - **15026-4: Assurance in the life cycle (including project planning for assurance considerations)**
- Possible additional parts as demand requires and resources permit, e.g.
  - **Assurance analyses and techniques**
  - **Guidance documents**

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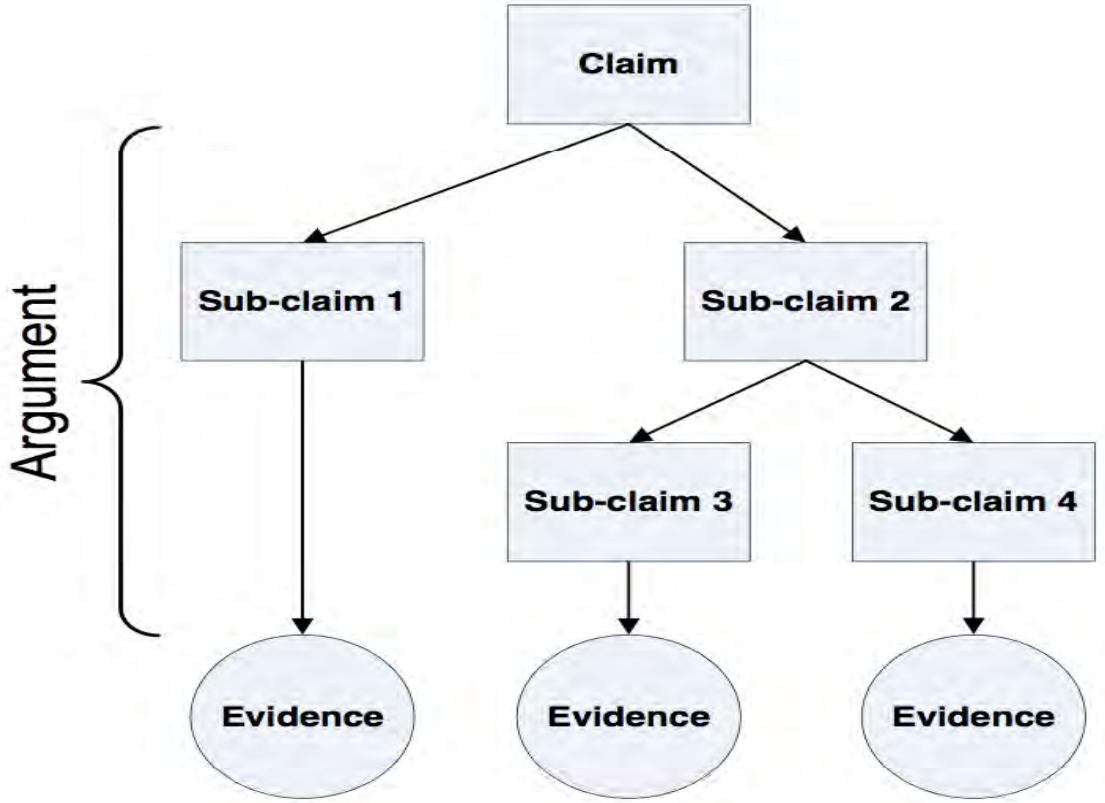
ISO/IEC 15026: Systems & Software Assurance

15026 Part 2: The Assurance Case (Claims-Evidence-Argument)



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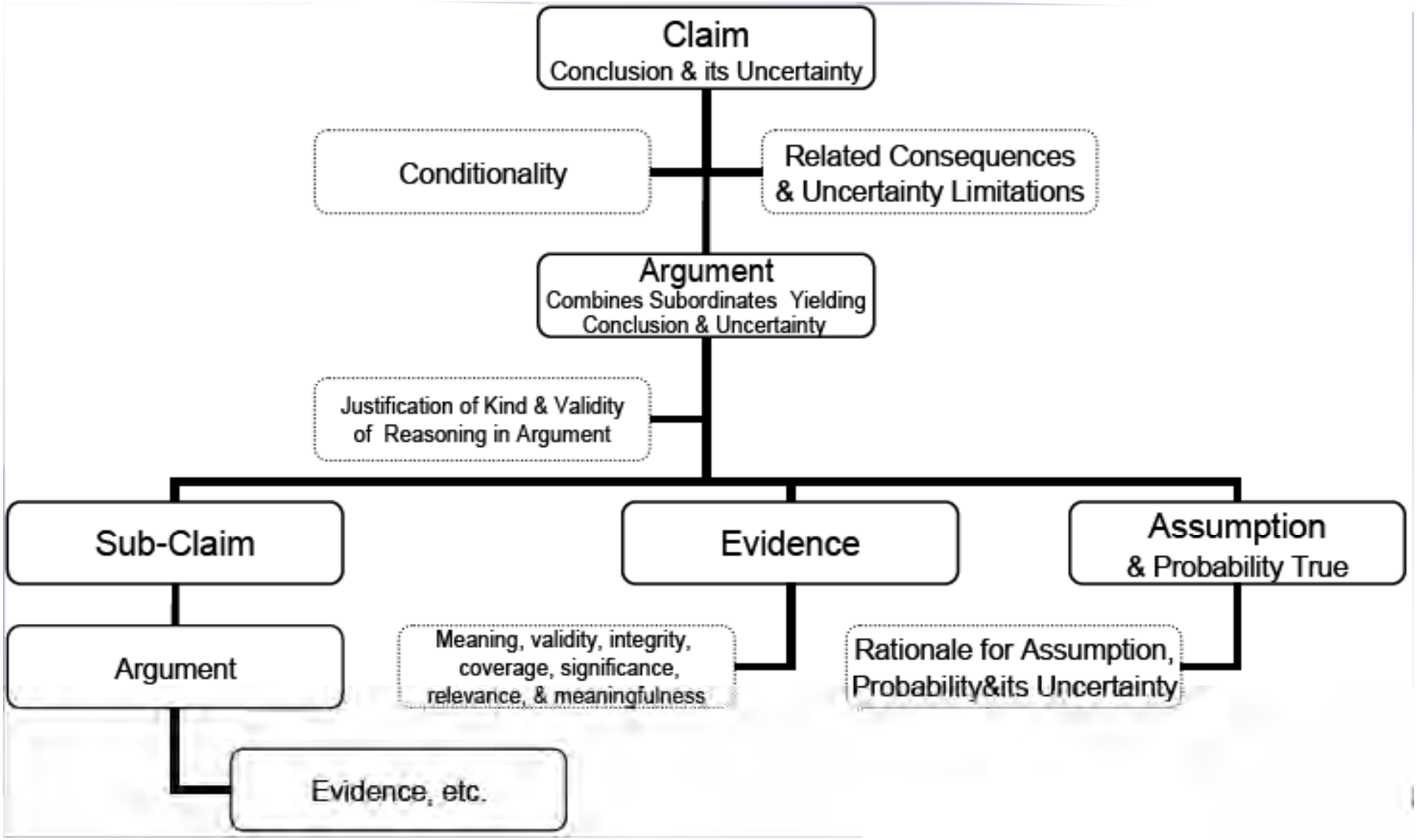
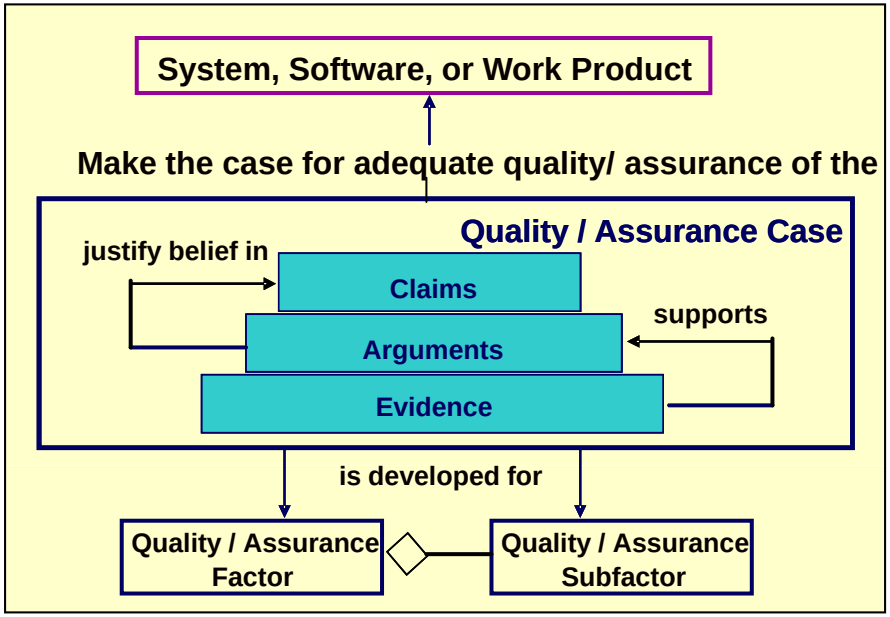
ISO/IEC 15026: Systems & Software Assurance

15026 Part 2: The Assurance Case (Claims-Evidence-Argument)



ISO/IEC/IEEE 15026 Assurance Case

- **Set of structured assurance claims, supported by evidence and reasoning (arguments), that demonstrates how assurance needs have been satisfied.**
  - Shows compliance with assurance objectives
  - Provides an argument for the safety and security of the product or service.
  - Built, collected, and maintained throughout the life cycle
  - Derived from multiple sources



- **Sub-parts**
  - A high level summary
  - Justification that product or service is acceptably safe, secure, or dependable
  - Rationale for claiming a specified level of safety and security
  - Conformance with relevant standards & regulatory requirements
  - The configuration baseline
  - Identified hazards and threats and residual risk of each hazard / threat
  - Operational & support assumptions

Attributes

- ❑ Clear
- ❑ Consistent
- ❑ Complete
- ❑ Comprehensible
- ❑ Defensible
- ❑ Bounded
- ❑ Addresses all life cycle stages

Structured Assurance Case Efforts at the OMG

- There are efforts underway within the Object Management Group (OMG) to leverage existing standards and develop new standards for specifying ISO 15026 structured assurance cases in such a way that they will fully support automation
  - **Currently working to integrate two draft standards (the Argumentation Metamodel (ARM) and the Software Assurance Evidence Metamodel (SAEM)) into a single standard (Structured Assurance Case Metamodel (SACM)) for structured assurance case specification**
  - **SACM will also likely leverage the existing OMG Knowledge Discovery Metamodel (KDM) and Semantic Business Vocabulary & Rules (SBVR) standards**

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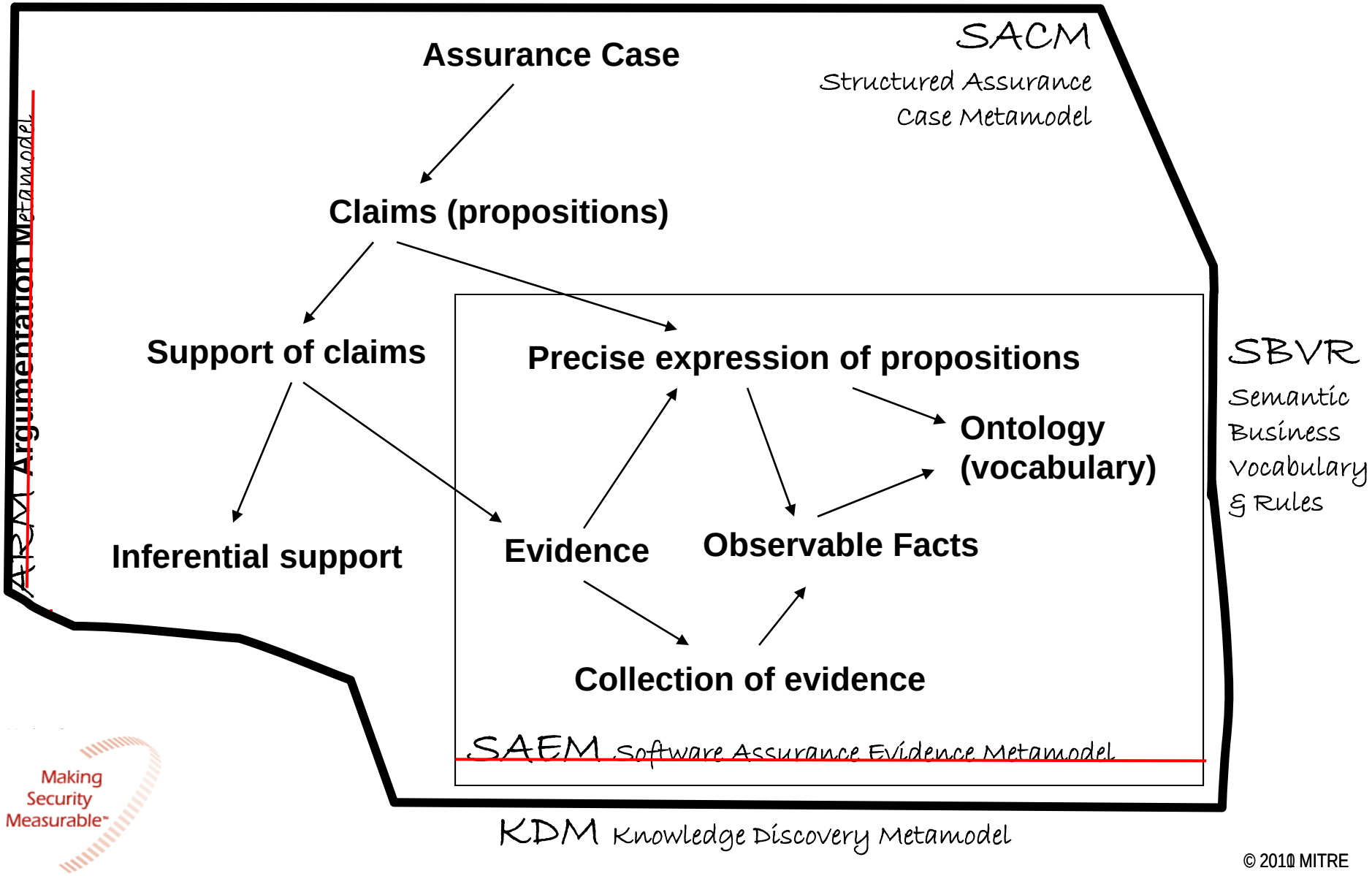
Object Management Group (OMG)
Systems Assurance Task Force
Claims-Evidence-Arguments Overview



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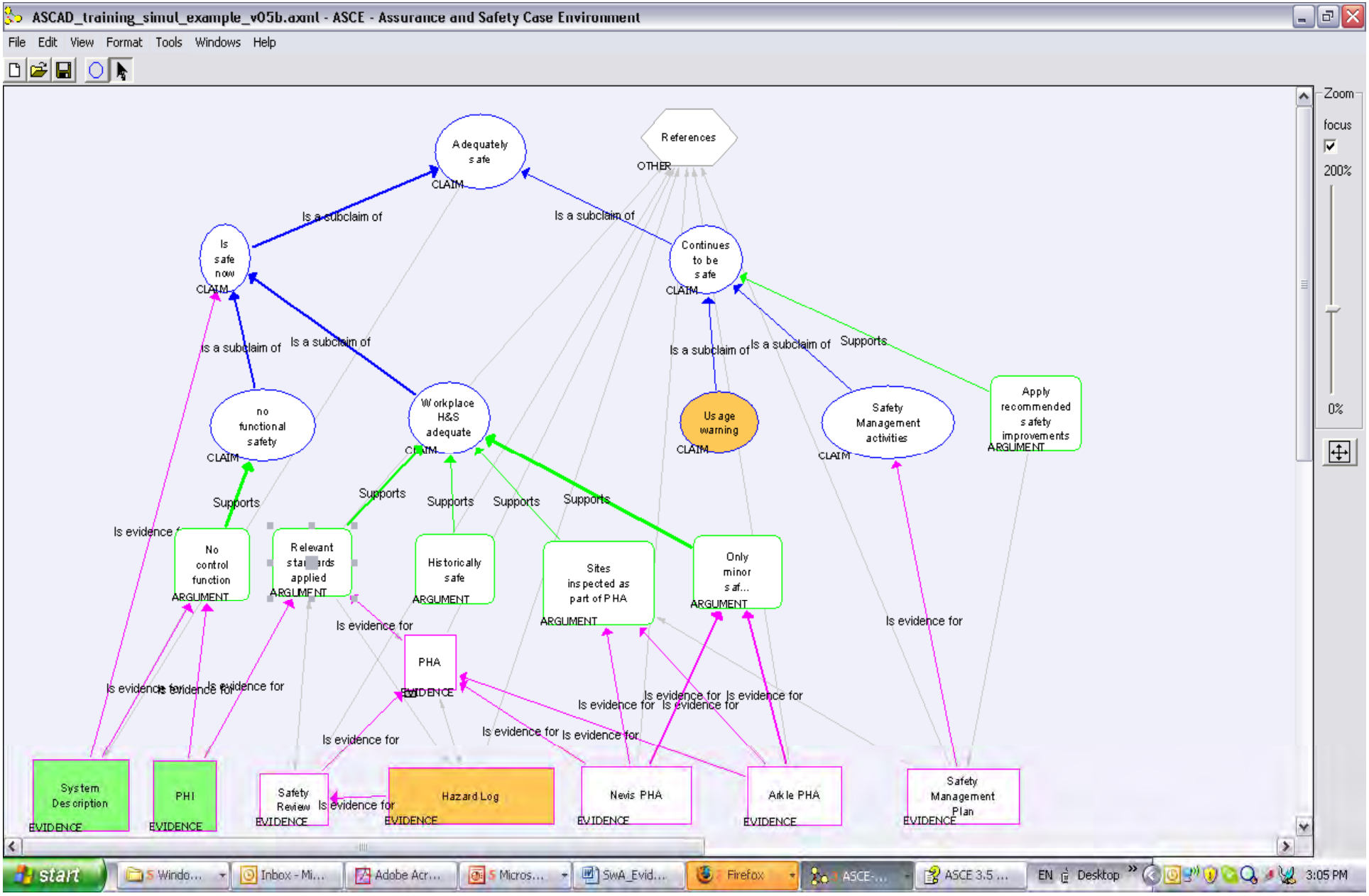
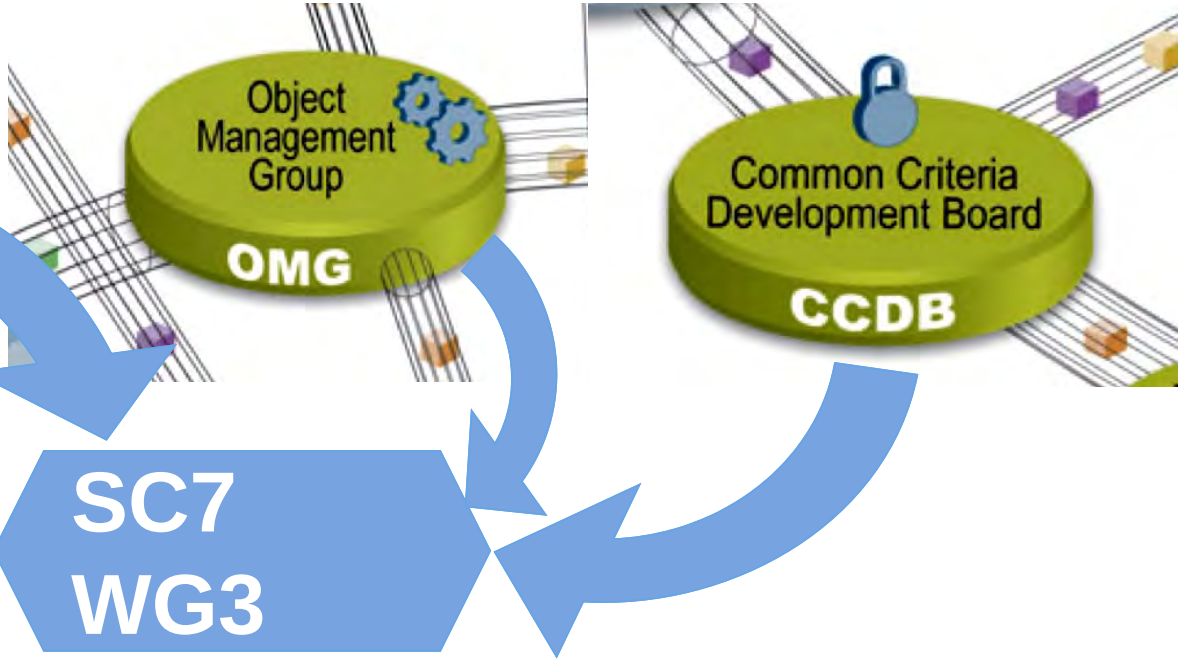
Structured Safety Assurance tools are commercially available



Use Cases

- Unambiguous specification of security requirements along with clear identification of what evidence will be acceptable to prove them
  - **Unambiguously bound scope of effort**
  - **Focus training and resource management on skills that are actually needed for a given context**
  - **Acquire the appropriate tools and services that are actually needed for a given context**
  - **Enable Acquisition to clearly communicate required assurance and what evidence will be required along with the delivered product**
  - **Guide Security Engineering**
  - **Guide Assurance Analysis**
  - **Guide Testing**
  - **Guide Independent Assessment & Evaluation**
  - **Empower accountability and liability**
- Structured Assurance Cases are composable and reusable



ISO IEC

ISO/IEC JTC 1/SC 27 NXXXX

ISO/IEC JTC 1/SC 27/WG x NXXXXX

REPLACES: N

ISO/IEC JTC 1/SC 27

Information technology - Security techniques

Secretariat: DIN, Germany

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TITLE:	National Body New Work Item Proposal on "Secure software development and evaluation under ISO/IEC 15408 and ISO/IEC 18045"
SOURCE:	INCITS/CS1, National Body of (JS)
DATE:	2010-09-10
PROJECT:	15408 and 18045
STATUS:	This document is circulated for consideration at the forthcoming meeting of SC 2 WG 3 to be held in Redmond (WA, USA) on 2nd – 6th November 2010.
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DUE DATE:	
DISTRIBUTION:	P-, O- and L-Members W. Fumy, SC 27 Chairman M. De Soete, SC 27 Vice-Chair E. J. Humphreys, K. Naemura, M. Bañón, M.-C. Kang, K. Rannenberg, WG-Convenors
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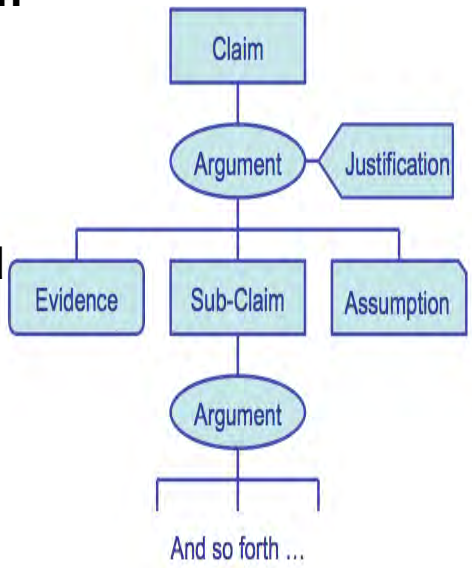
HTTP://www.jtc1-sc27.din.de/en

Common Criteria v4 CCDB

- **TOE to leverage CAPEC & CWE**
- **ISO/IEC JTC 1/SC 7/WG 3, TR 20004: "Refining Software Vulnerability Analysis Under ISO/IEC 15408 and ISO/IEC 18045"**
- **Also investigating how to leverage ISO/IEC 15026 and OMG's Structured Assurance Case Metamodel (SACM)**



NIAP (U.S.) Evaluation Scheme

- **Above plus**
- **Also investigating how to leverage SCAP**

Questions?

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