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Towards model-based Safety Cases in AutoFOCUS3

(http://af3.fortiss.org)

Seamless model-based systems engineering

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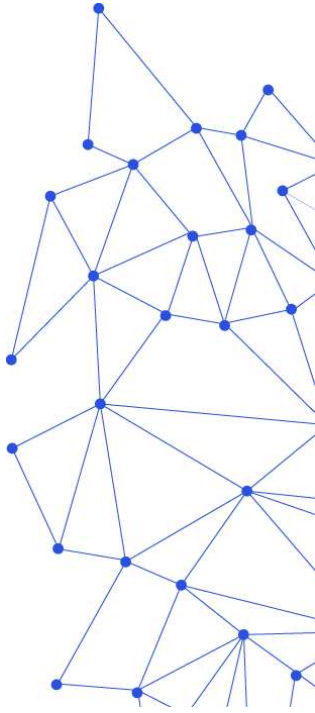
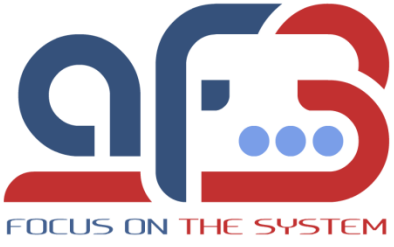


Background

- Increasing complexity in **domains**, **technologies**, **functionality** and **development** in the embedded systems domain

- Provision of methods and technologies for **seamless development of high quality embedded systems** through AutoFOCUS3 tool – chain



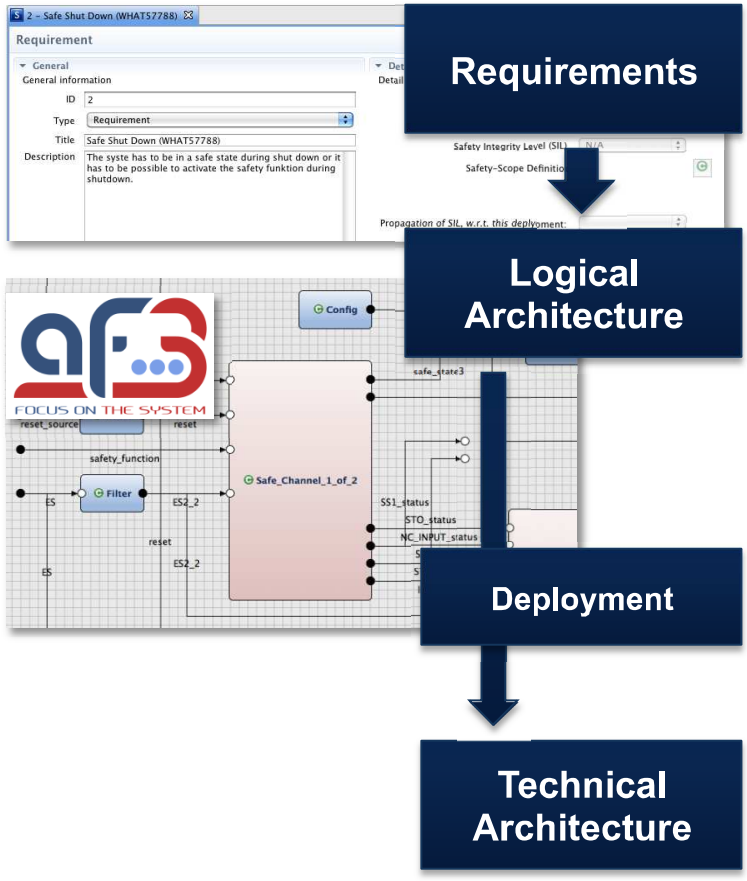
AutoFOCUS3 Basics

AF3 - Highlights

- **AF3 framework:**
  - Provides **modular construction** of the system
  - a **seamless model-based** System Development
  - (Standard-relevant) **Levels of abstraction** (e.g. logical, technical)
  - explicates **Allocations** and **Refinements** between different abstractions
  - Deeply integrated **Formal Verification** Techniques
  - **Open source** (http://af3.fortiss.org) and free of charge
  - **One-Click Code Generation**
  - Support of Standards (e.g. FIBEX, ReqIF)
  - Mechanisms to validate/verify **Functional Correctness**
  - Efficient **Test Case Generation**
  - **…**
- **AF3** supports **Modular Model-based Development** of Embedded Systems for various kinds of platforms

AF3 Product - Development

- AF3 **framework:**
  - supports Concept Phase and Product Development at **System**, **Hardware** and **Software** Level
  - explicates **Allocations** and **Refinements** between different abstractions
  - provides modular, hierarchic concept for **Networks of Components**
  - can be **simulated, verified, synthezied**
  - Supports **Automated Verification** (e.g., contracts)
  - Supports **Automated Generation** (e.g., test cases, code, schedules)



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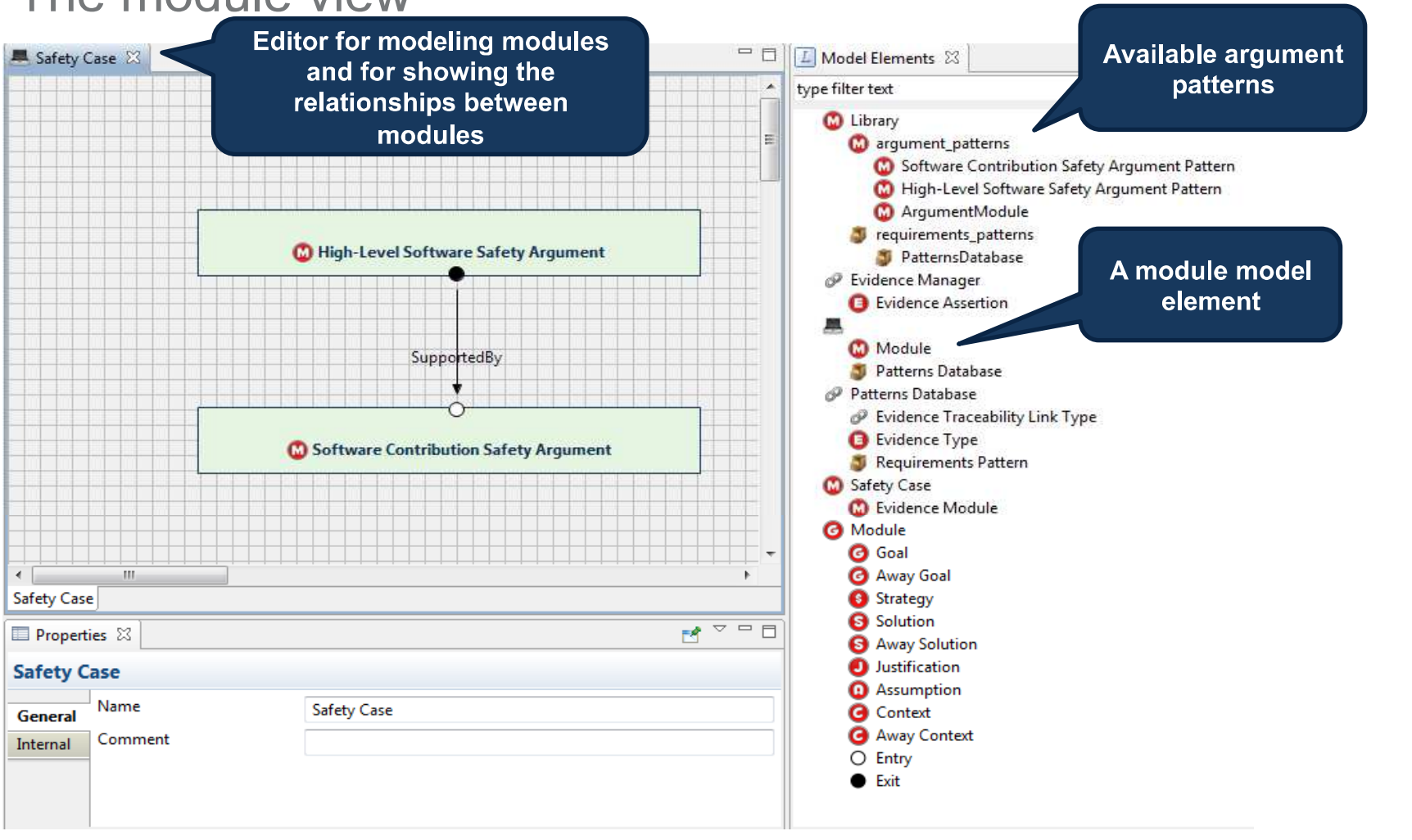
Safety Cases in AutoFOCUS3

The module view



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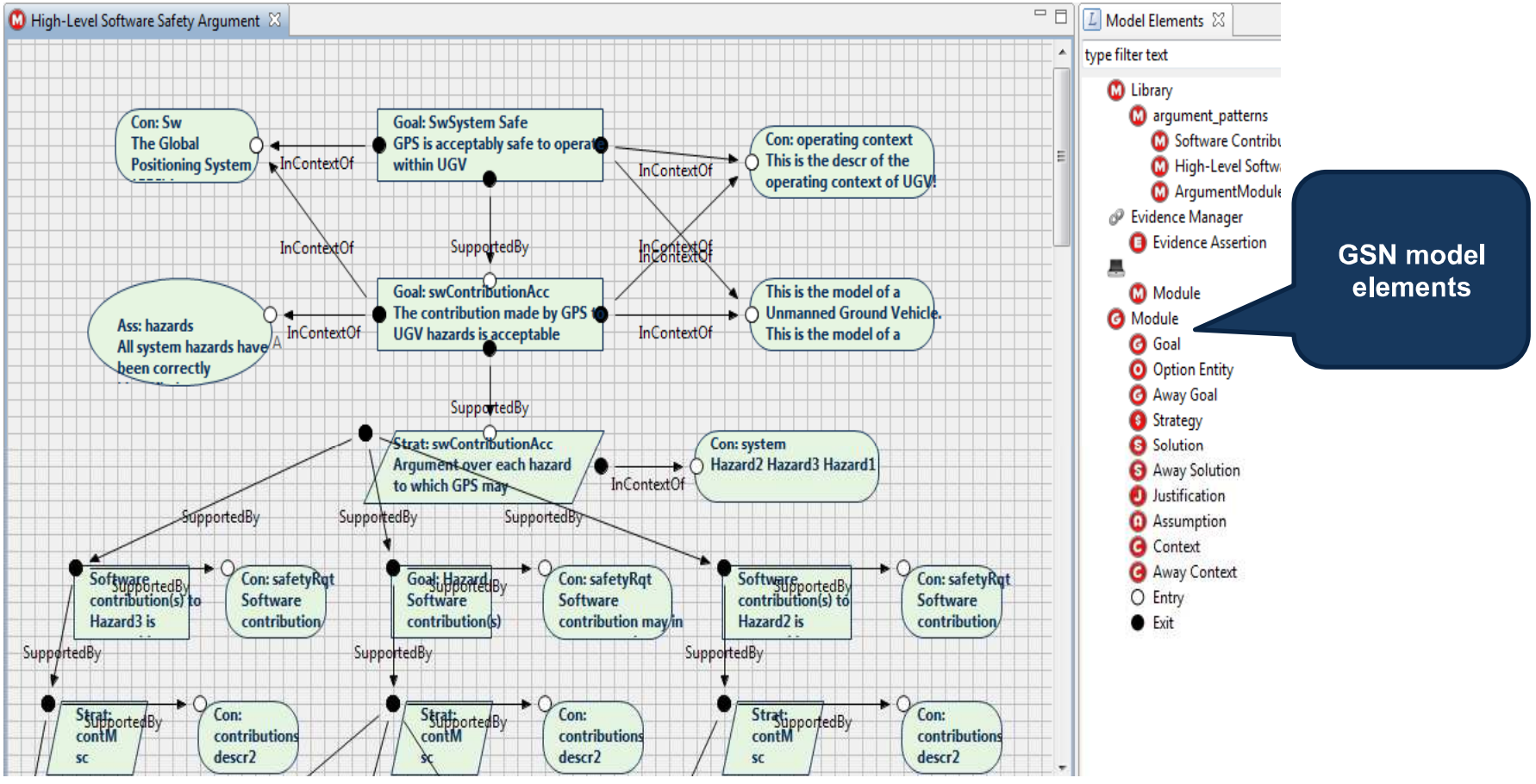
Safety Cases in AutoFOCUS3

The argument structure view



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Safety Cases in AutoFOCUS3

Linking GSN elements with AF3 elements

- ✓ Goals <-> Safety Requirements
- ✓ Solutions <-> AF3 elements
- ✓ Parts of a claim <-> Safety Requirements
- ✓ Parts of a claim <-> Hazards
- ✓ Parts of a claim <-> Logical Components
- ✓ Parts of a claim <-> Platform Components

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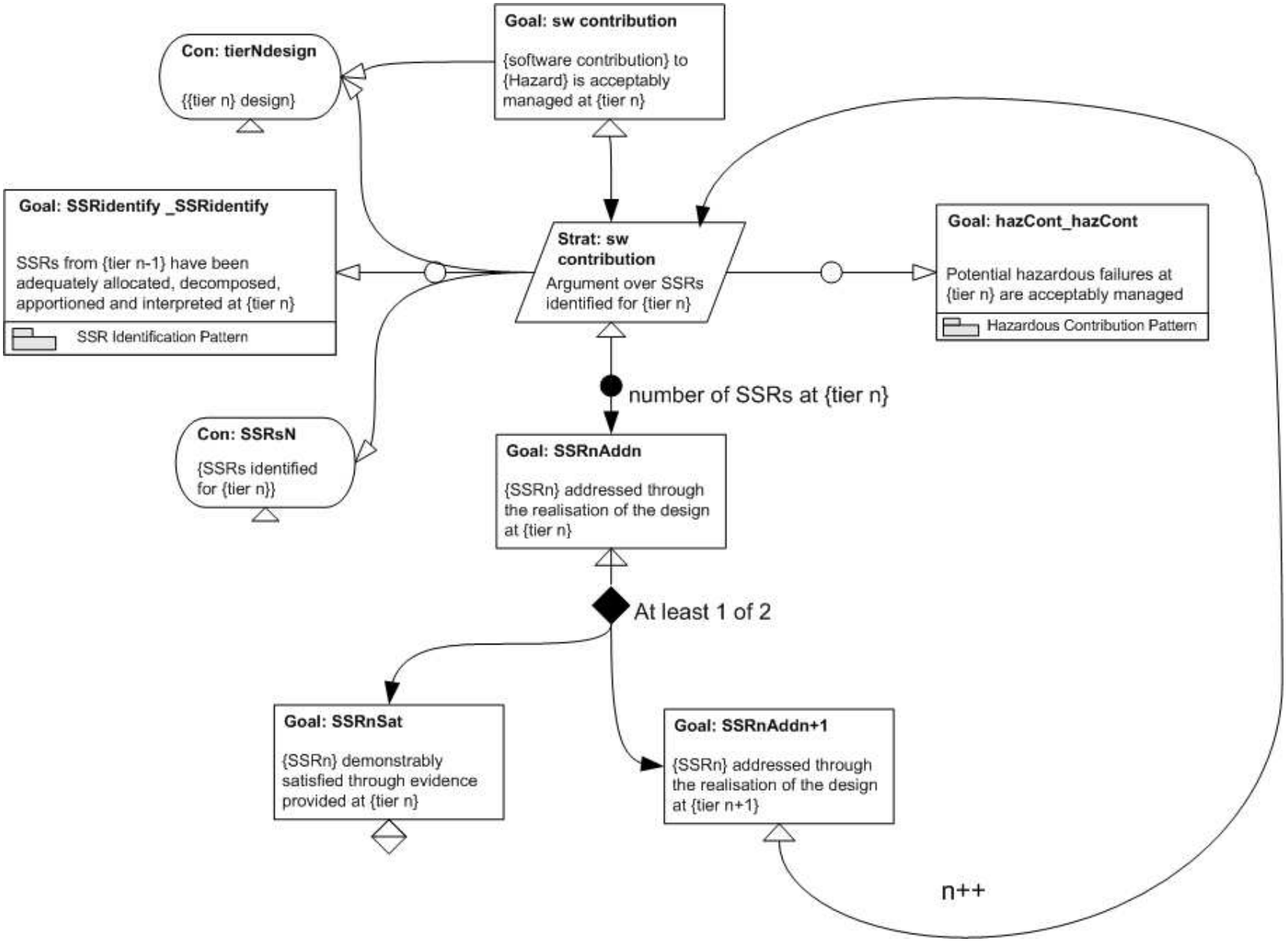
Software Safety Case Pattern



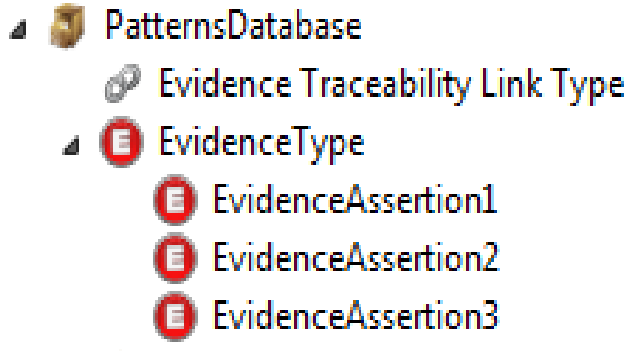
Evidence Manger in AF3

A prototypic implementation

The AF3 Evidence Manager contains **EvidenceItems**, **Assertions** made about the contained EvidenceItems and the **relationships between EvidenceItems**.

The user can:

- ✓ Define EvidenceItem types
- ✓ Define Evidence Assertion patterns for a certain EvidenceItem type
- ✓ Define types of links that can exist between two EvidenceItems



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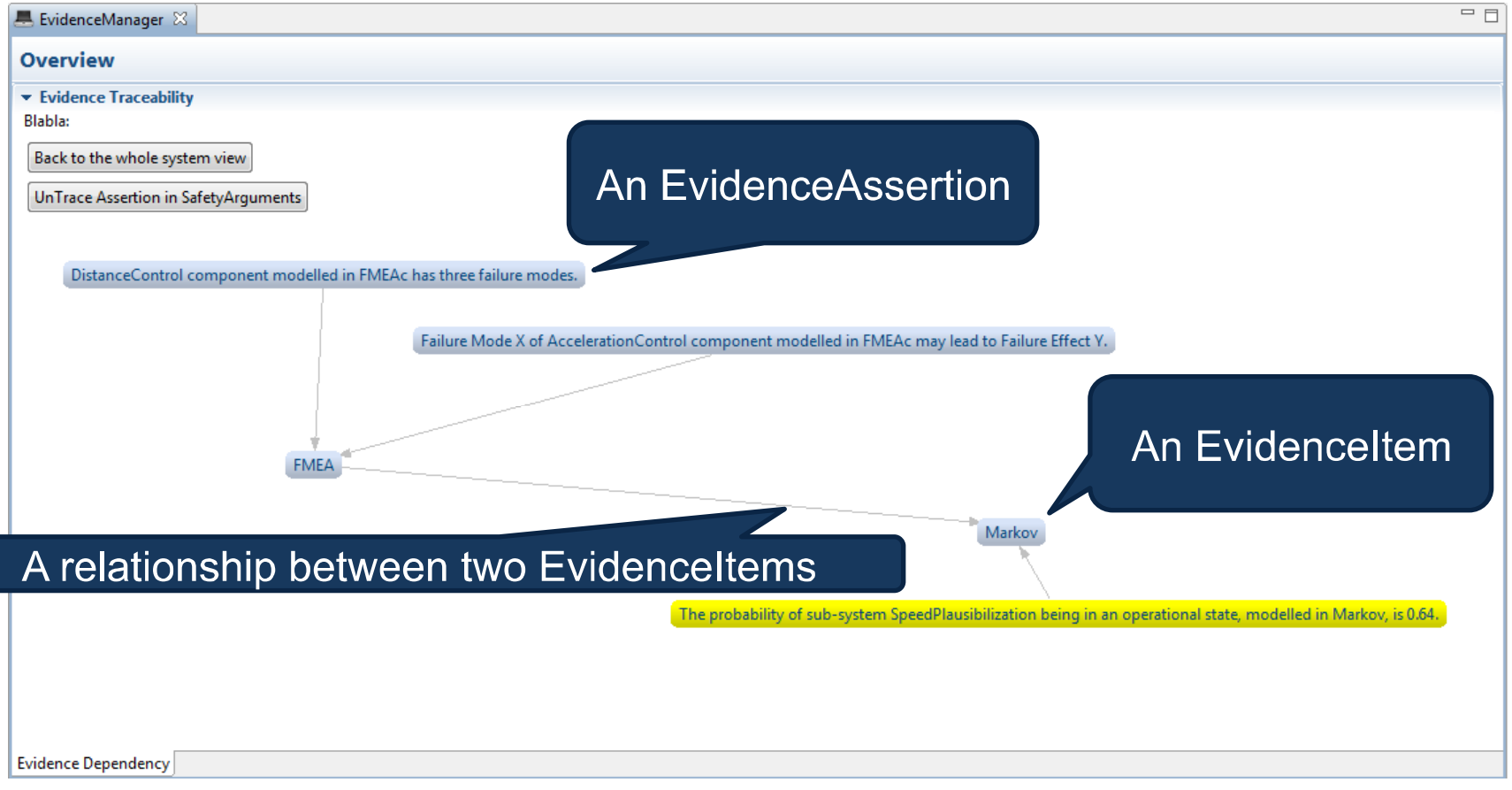
Evidence Manger in AF3

A prototypic implementation



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Thank you

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Please try yourself:

FOCUS ON THE SYSTEM

http://af3.fortiss.org

Open Source

Requirements Engineering

Modeling of Systems

Verification and Testing

Scheduling Synthesis

Code Generation and Deployment