A Software Safety Risk Taxonomy for Use in Retrospective Safety Cases

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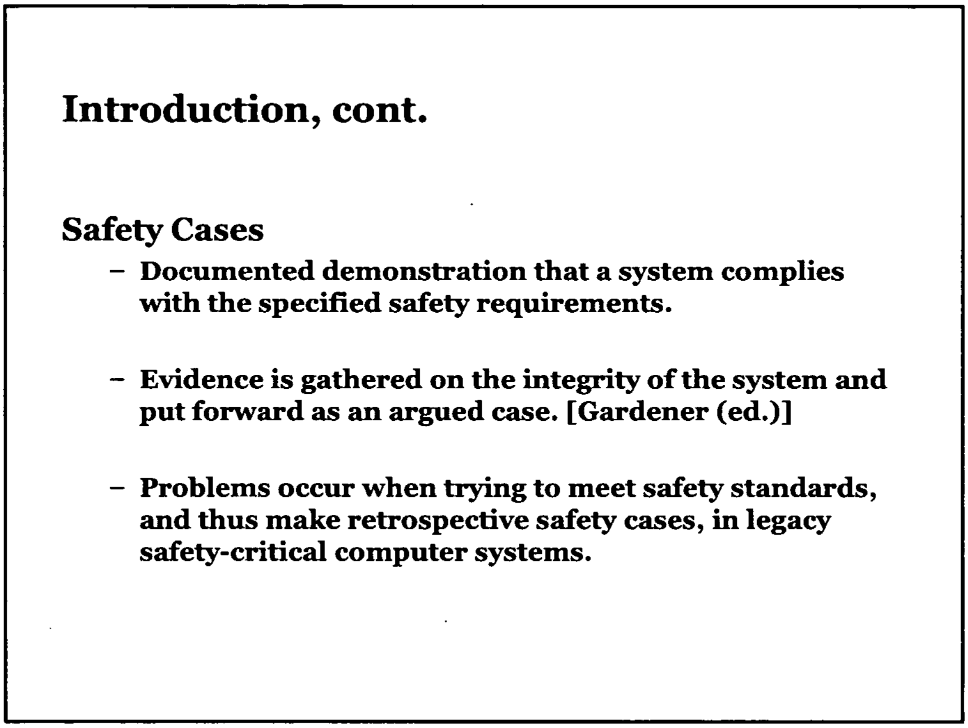
Introduction

Safety Standards

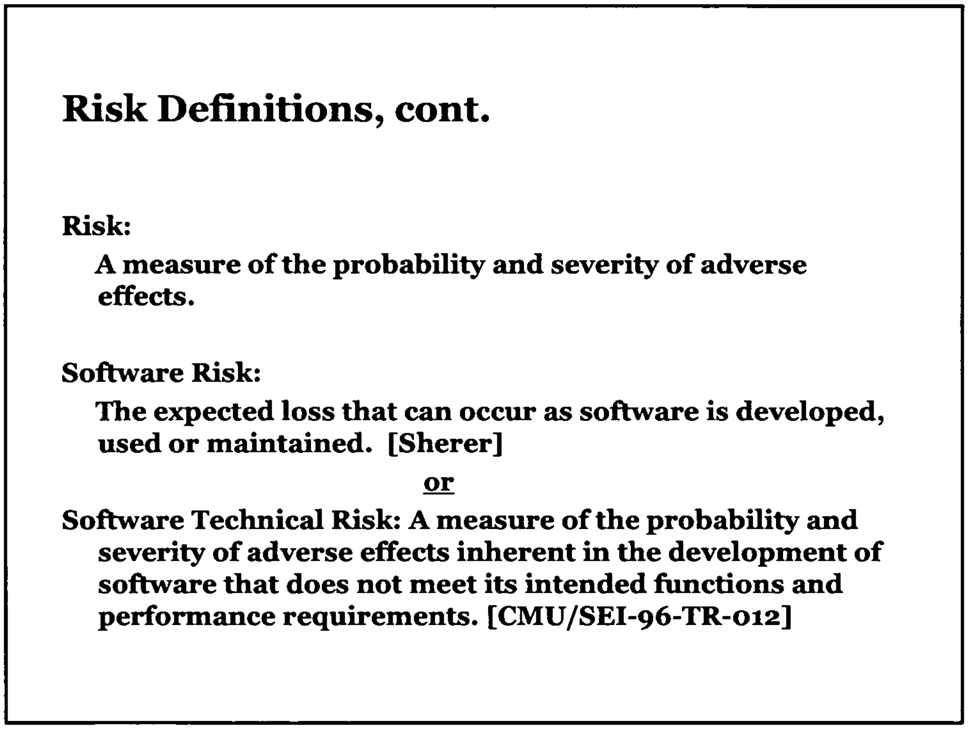
- **Contain Technical and Process oriented safety requirements**
- **Many varieties of Safety Standards, some addressing the system perspective, some just for software**
- **NASA programs/project will have their own set of safety requirements**
- **Industry operates similarly**



Introduction, cont.

Safety Cases

- Documented demonstration that a system complies with the specified safety requirements.
- Evidence is gathered on the integrity of the system and put forward as an argued case. [Gardener (ed.)]
- Problems occur when trying to meet safety standards, and thus make retrospective safety cases, in legacy safety-critical computer systems.



Risk Definitions, cont.

Risk:

A measure of the probability and severity of adverse effects.

Software Risk:

The expected loss that can occur as software is developed, used or maintained. [Sherer]

<u>or</u>

Software Technical Risk: A measure of the probability and severity of adverse effects inherent in the development of software that does not meet its intended functions and performance requirements. [CMU/SEI-96-TR-012]

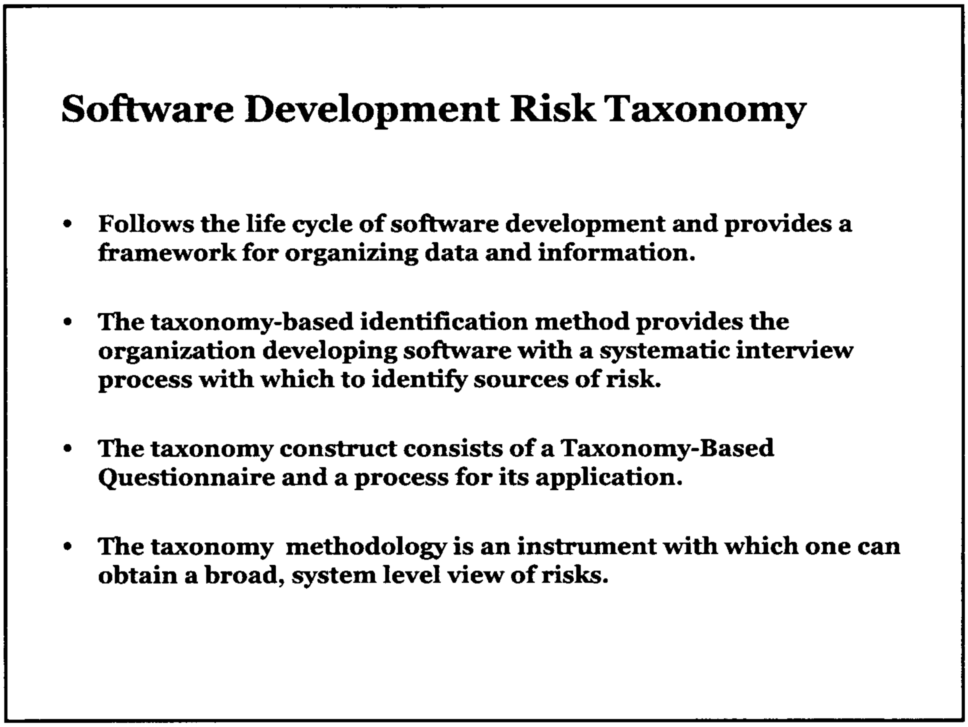
Risk Definitions, cont.

Software Safety Risk:

A measure of the probability and severity of adverse effects inherent in the development of software that does not meet *some set of software safety requirements.* [Hill]

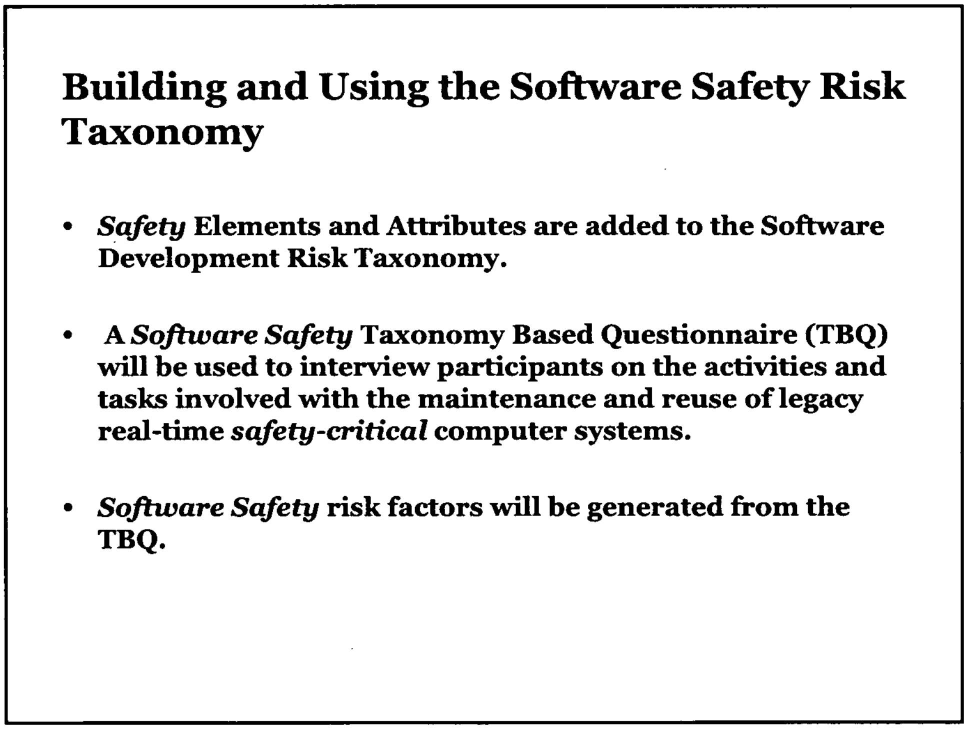
Software Risk Evaluation (SRE)

- **Practice developed by the Software Engineering Institute (SEI)**
- **Formal method for identifying, analyzing, communicating, and mitigating software technical risk.**
- **The Software Development Risk Taxonomy is a construct of risk management that contributes to the SRE practice.**



Software Development Risk Taxonomy

- Follows the life cycle of software development and provides a framework for organizing data and information.
- The taxonomy-based identification method provides the organization developing software with a systematic interview process with which to identify sources of risk.
- The taxonomy construct consists of a Taxonomy-Based Questionnaire and a process for its application.
- The taxonomy methodology is an instrument with which one can obtain a broad, system level view of risks.



Building and Using the Software Safety Risk Taxonomy

- *Safety* Elements and Attributes are added to the Software Development Risk Taxonomy.
- A *Software Safety* Taxonomy Based Questionnaire (TBQ) will be used to interview participants on the activities and tasks involved with the maintenance and reuse of legacy real-time *safety-critical* computer systems.
- *Software Safety* risk factors will be generated from the TBQ.

The Software Safety Risk Taxonomy

- **The Software Safety Risk Taxonomy maps the characteristics of *safety-critical* software development and *safety-critical* software, or *software safety* risks.**
- **Additionally, the Elements and Attributes of the new taxonomy maps closely to the requirements of the NASA Software Safety Standard.**

Questions?