Model-based Risk Analysis:
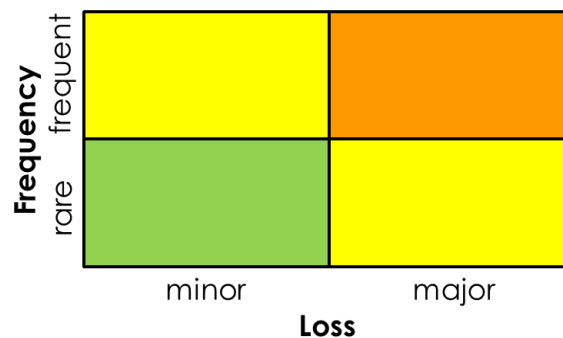# *Controlled Risk is Acceptable Risk*

Model-based Risk Analysis (MBRA)

Overview

Risk is the combination of the expected frequency/probability of an unwanted consequence and the expected degree of severity of that consequence. Many of today's systems introduce **safety and/or security risks** to their users or even to the public. However, not only products, but also development projects and entire organizations are exposed to various kinds of risks. It is therefore essential to identify, mitigate and manage the most threatening risks. A structured risk analysis involves the following main activities:

- **Identification** of the potential sources and causes of risks threatening the product/project/organization
- **Estimation** and quantification of the consequences of those risks on the product/project/organization and its environment
- **Elaboration** of suitable counter measures to reduce those risks to an acceptable level.

Carrying-out an explicit risk analysis for a product, project or organization in a model-based fashion yields the following benefits:

- **Communication among stakeholders is improved** by making risk-related argumentation visual – through various diagramming techniques and the capability to produce various documents for specific target-communities, all from the very same model.
- **"What if" analysis is supported** via automatic calculations and inferences of frequencies, probabilities, losses, tolerable failure rates and similar risk-related figures.
- **Reuse across multiple systems and projects becomes possible** by providing mechanisms to build-up libraries of causes, consequences, counter measures, system components and similar risk-related concepts.

KnowGravity Inc. offers model-based risk analysis as a turn-key service for products as well as for large projects.

Services related to Organizational and Project Risks

This service typically includes the following activities:

- Brief analysis and description of the risk-exposed organization or project, particularly its goals, structure, management approach, environment as well as its criticality
- Organization of a workshop with project/organization members and stakeholders to identify potential unwanted incidents as well initial causes and consequences
- Risk evaluation and identification of potential counter measures for risk mitigation
- Production of the risk analysis documentation for line managers or project managers

Services related to Product Risks

This service typically includes the following activities:

- Identification of the relevant standards and product-specific goals as well as definition of the risk acceptance level
- Brief analysis and description of the risk-exposed product, particularly its environment as well as its critical components and functions
- Organization of a HAZOP-workshop with product and domain experts to identify potential hazards (dangerous situations that could lead to unwanted consequences) as well initial causes and consequences
- Organization of a workshop for an in-depth analysis of the causes using Fault Tree Analysis (FTA) and/or Failure Mode and Effects Analysis (FMEA)
- Organization of a workshop for an in-depth analysis of the consequences using Event Tree Analysis (ETA)
- Risk evaluation and identification of potential counter measures to mitigate the identified risks and formalization of related safety and security requirements
- Allocation of failure rates and Safety Integrity Levels (SIL) to product components
- Production of the risk analysis documentation as needed by the product owners and certification authorities

Related Services

After carrying-out a model-based risk analysis, KnowGravity offers the following complementary services:

- Introduction of an adequate, yet comprehensive risk management system to permanently monitor and mitigate further potential risks
- Training, consulting and doing Model-Based Testing (MBT), particularly with focus on the identified risks (risk-based testing)
- In addition to the safety and security requirements, KnowGravity may further elaborate functional and non-functional requirements by applying Model-based Requirements Engineering (MBRE)

Why KnowGravity?

- KnowGravity has comprehensive engineering experience in a wide spectrum of domains and techniques, including mission- and safety-critical systems
- KnowGravity is an active OMG member in the testing and risk analysis domain as well as in several other modeling working groups and supports OMG's SEMAT/ESSENCE approach for agile project management
- All employees of KnowGravity are modeling experts for business systems as well as for technical systems and are proficient in many domain specific modeling languages
- KnowGravity has developed its own modeling tools (KnowEnterprise®, KnowDocs™, CASSANDRA) out of the need of its customer projects
- Employees of KnowGravity are co-authors of a book on operational risks
- KnowGravity is familiar with risk-related standards such as ISO or CENELEC

Contact

KnowGravity Inc.	Phone	+41 44 43 42 000
Hohlstrasse 534	Internet	www.knowgravity.com
CH-8048 Zürich	E-Mail	info@knowgravity.com