



Modelling crisis management for improved action and preparedness

## **CRISMA Framework**

**CRISMA Business Day**

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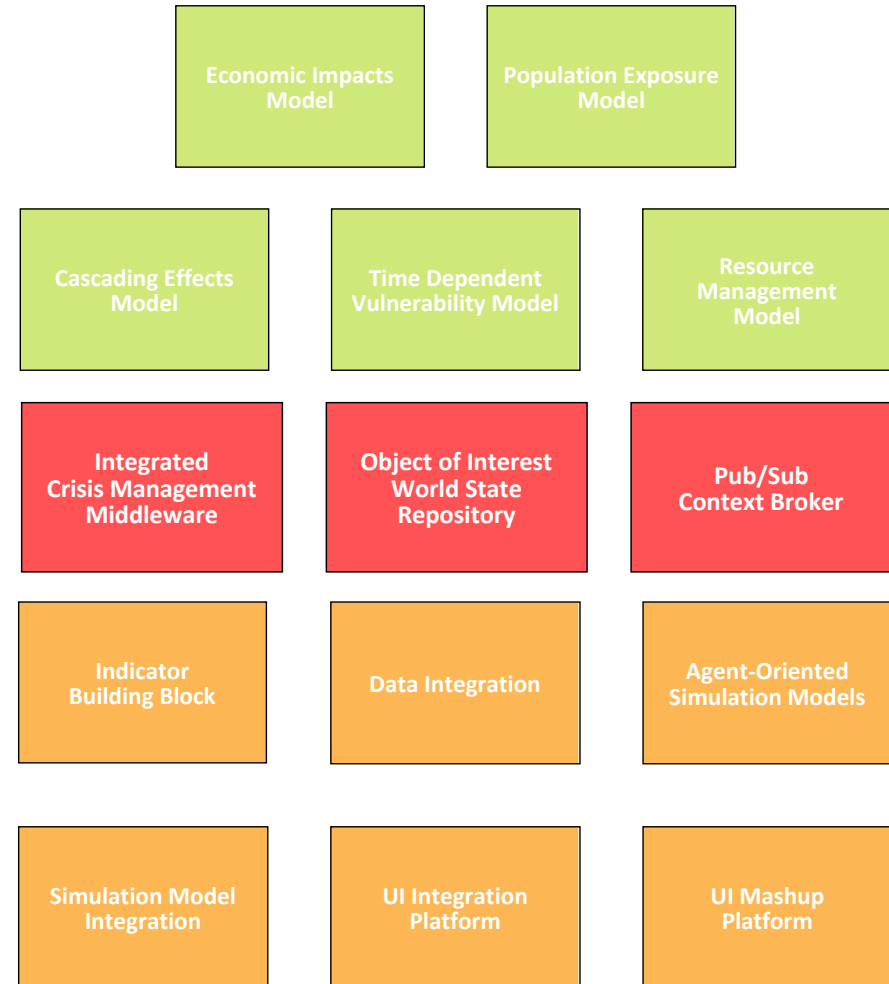


## What is CRISMA for?

- Create scenarios for simulating crisis in a given area, for a given hazard
- Play with possible events, actions during the evolution of the (simulated) crisis
- Explore alternatives (scenarios) during the evolution of the (simulated) crisis
- Analyze the scenarios, compare and evaluate wrt defined “performance” criteria to:
- Support planning, decision making and training

## What does CRISMA offer?

- A Simulation and Decision Support **Concept** and **Architecture** implemented by a:
- Software **Framework** consisting of:
- **Building Blocks** (Software components) supporting certain aspects of the concept that can be integrated to build specific Crisis Management Applications:
- **Solutions** for specific market segments (hazard domains)

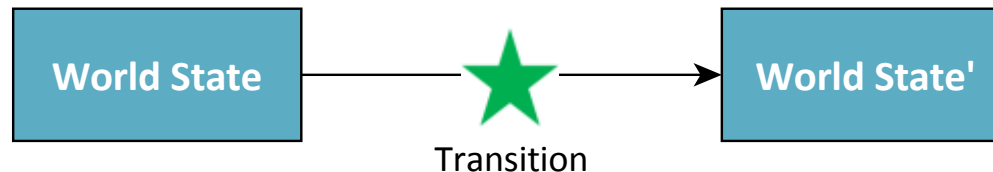


## The CRISMA Core Concept (1)

- The evolution of a crisis can be represented by a **succession of “World States”**
- Each “**World State**” represents the **status of pre-selected variables** (*describing the crisis context with a reasonable degree of accuracy*) like:
  - Geographical settings (*e.g. DEM, roads, buildings, etc.*)
  - Elements at risks (*people, properties, goods, etc.*)
  - Environmental parameters (*e.g. Wind speed, temperature, etc.*)
  - Resources (*first responders, busses, ambulances, trucks, ...*)
  - Parameters driving the physical phenomena of the hazard (*wave height, water level, flow speed, strength of shakes, toxicity of a pollutant, ...*)

## The CRISMA Core Concept (2)

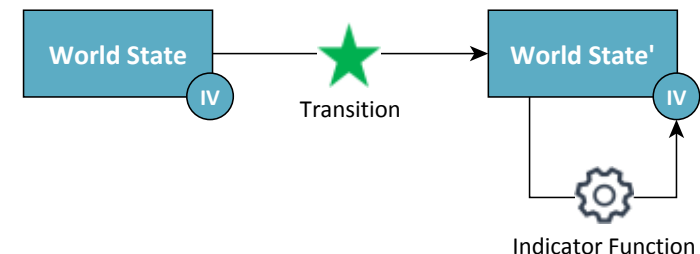
- The succession of the “World States” in a given scenario is driven by **Transitions**.
- The Transitions are created
  - by the results of a **Simulation** model representing the evolution of the phenomena or
  - by an **Action** introduced by a user
- The Transitions can be synchronized with the crisis evolution or can be completely asynchronous, with the pace set by an operator



## The CRISMA Core Concept (3)

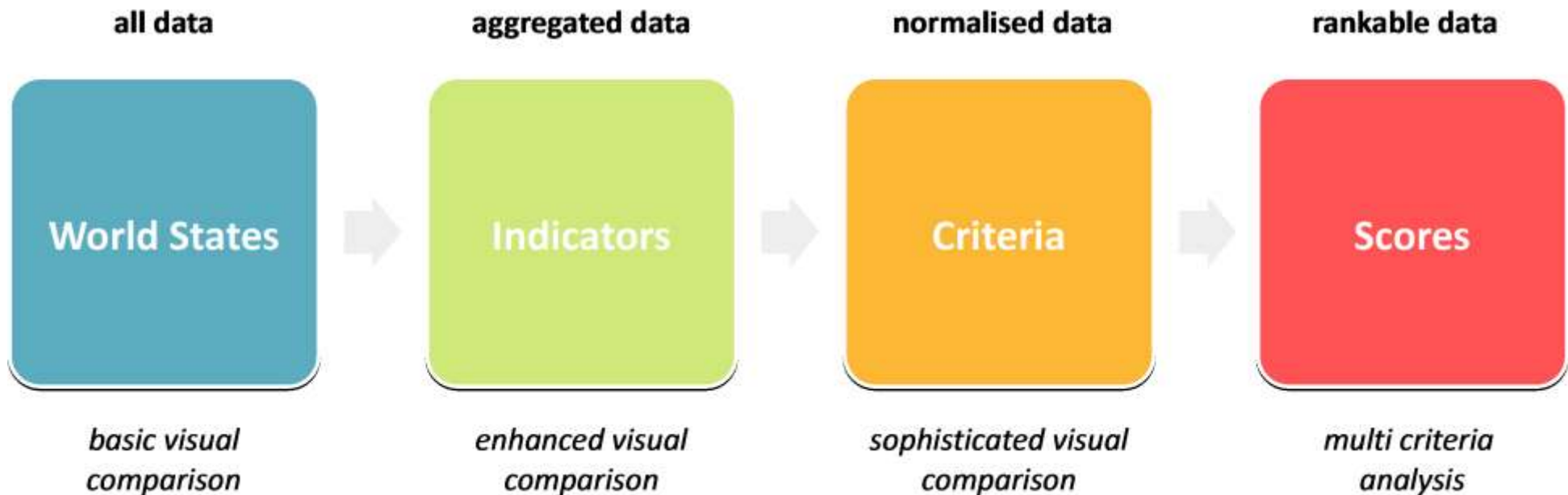
- Word States always come with a set of **Indicators** (simplified/aggregated representations)
- They provide an Overview of the status of a “Worldstate”
- They can be used to algebraically compare “Worldstates”
- They are “automatically” produced after a Transition

Number of Dead	12
Total Cost in M€	500
Recovery in months	33



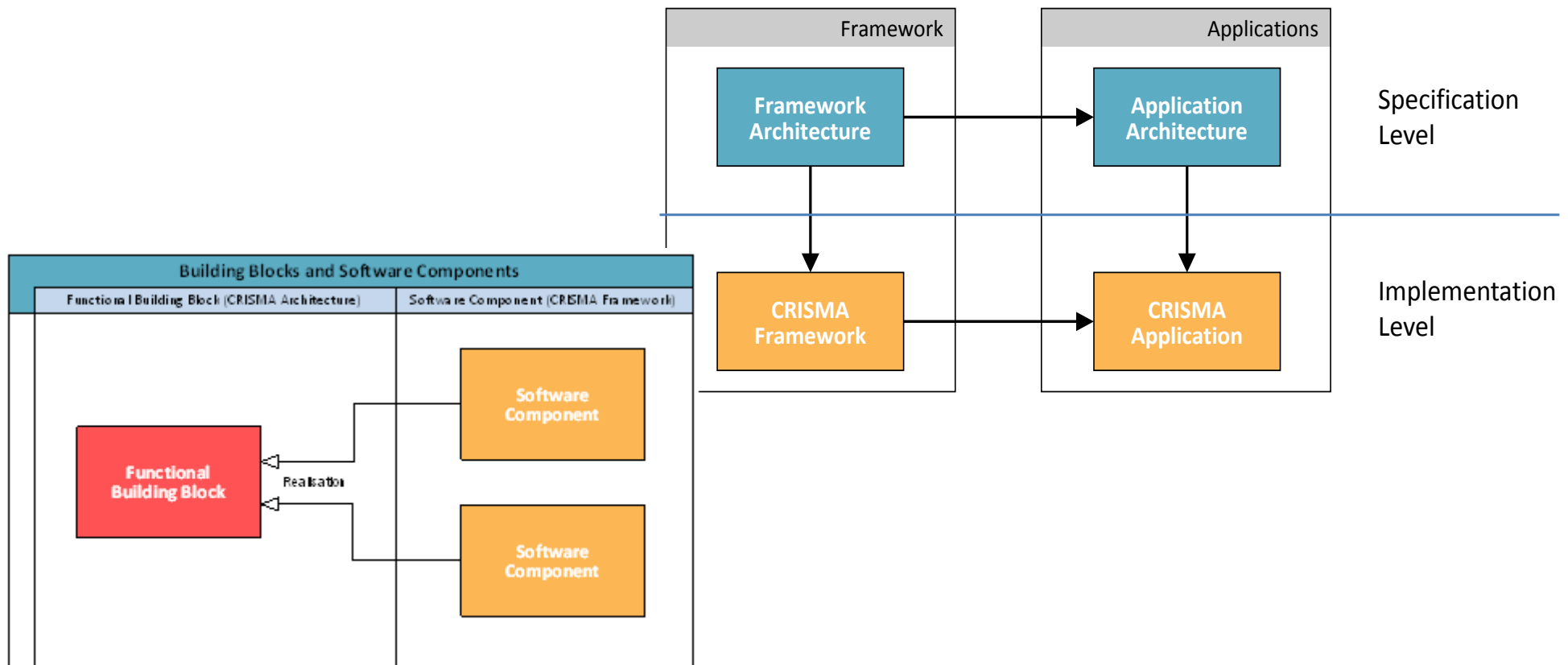
## The CRISMA Core Concept (4)

- Indicators are the basis for Multi-Criteria Analysis and Ranking of Scenarios



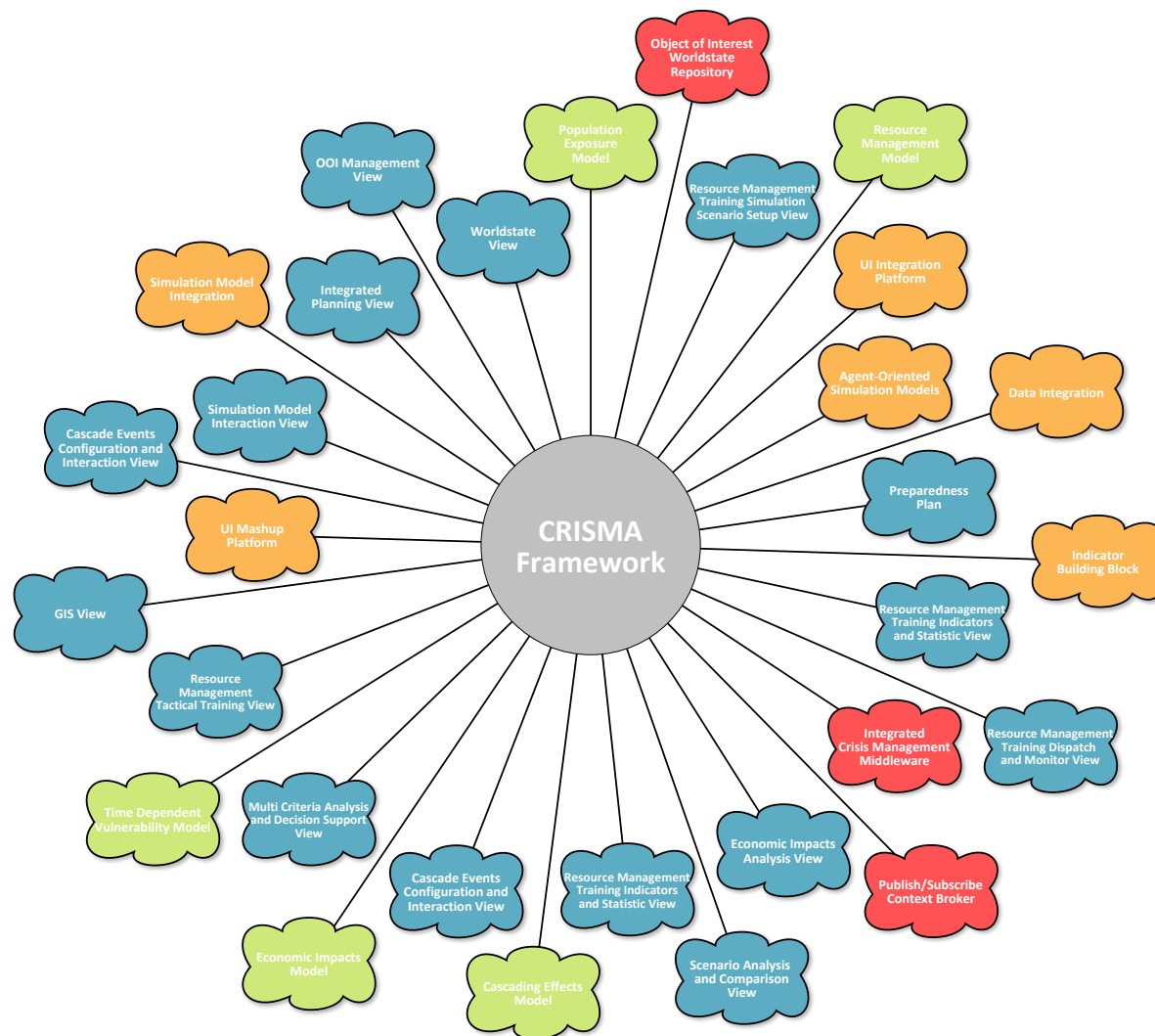
## The CRISMA Core Concept (5)

- System **Architecture** for Applications that follow the **CRISMA concept**





# The CRISMA Software Framework



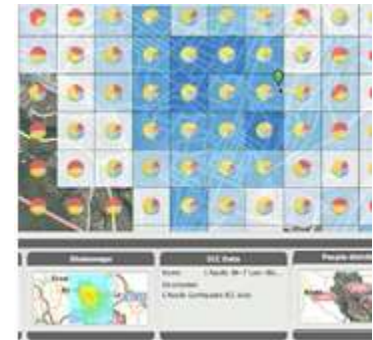
## The CRISMA Software Framework

- Implements the core concepts
- Provides support building blocks (integration, infrastructure)
- Provides pre-integrated systems (Reference Applications)

→ The Framework is used to build CRISMA Systems (Solutions)

## Concrete Solutions

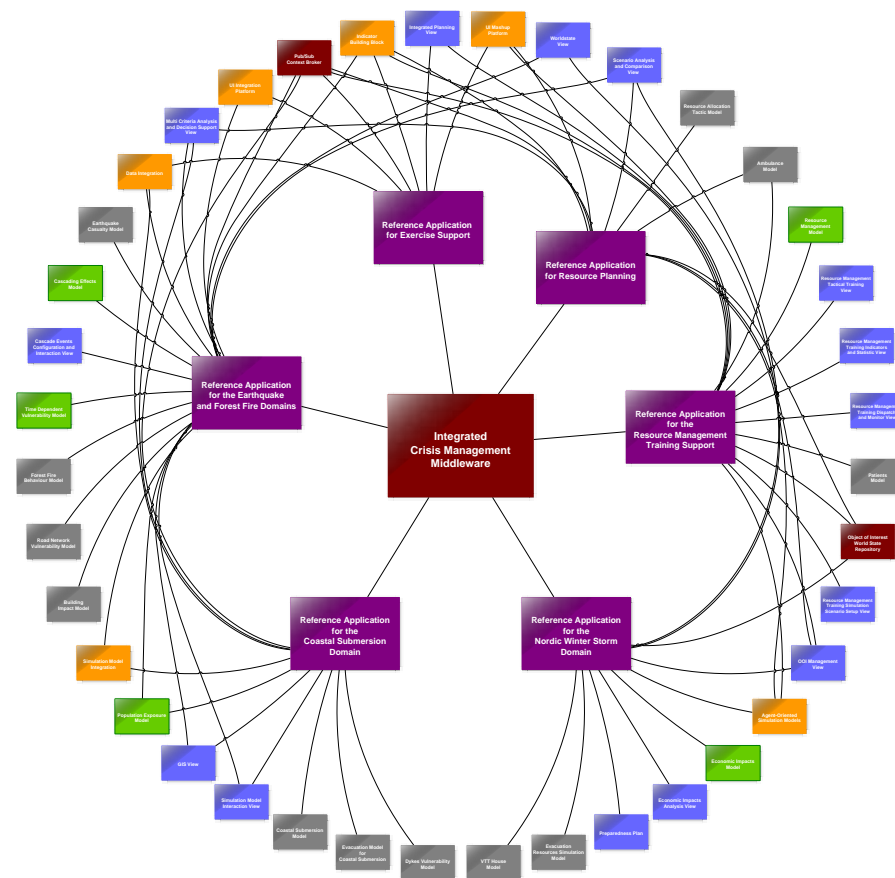
- Contingency Planning
  - Offer supported by INSTA+VTT+TTU+FMI+ESC
  
- Multi-sectors impact assessment and mitigation
  - Offer supported by AMRA + CISMET
  
- Preparedness and mitigation planning for coastal submersion
  - Offer supported by ARTELIA + SPACEBEL + CISMET
  
- Emergency resource management
  - Offer supported by NICE + AIT



## How to use CRISMA (software perspective)?

1. Use the Framework to build a CM Application
  - ✓ Get familiar with the concepts and learn how to use the tools
  - ✓ Define World State structure and map/integrate data
  - ✓ Integrate simulation models
  - ✓ Populate ICMM
  - ✓ Integrate software (BBs + Legacy) to create your solution
2. Use a Specific Building Block in your own context (e.g. Multi-Criteria-Analysis)
  - ✓ Get familiar with the concepts
  - ✓ Get the software
  - ✓ Learn how to use the tools
3. ...

# Make use of the CRISMA based Business Offers



## How to use CRISMA to solve a problem?

You need to answer:

- **Hazard(s)** → volcanic eruption → ashfall
- **Elements at risk** (e@r) → population
- **Vulnerability(s)** of e@r to the hazard v:(mater/qm air) → health index
- **Mitigation actions** → evacuation (short term) or constructional measures (long term)
- **Physical Impact Model(s)** → expose e@r to the hazard  
→ applying vulnerability function to area of study
- **Economic Impact Model**

## Data and Model requirements

- Backed by data and models?
- **Data**
- **Distribution of the e@r** in discrete units (e.g. grid cells)
- **Vulnerability functions** e.g. vulnerability classes as property of the e@r
- **Hazard data** → distribution of total amount of ashfall per grid cell
- **Cost variables**
- **Simulation Models**
- **Impact Model** (e.g. ashfall health impact model)
- **Mitigation Measure Model** (e.g. affecting the vulnerability functions)
- ...

## Make it CRISMA (Integrated System)

1. Define Worldstate (incl. indicators)
2. Map Data to Worldstate (and define indicator function)
3. Connect models and indicator function producing data to ICMM
4. Connect model control (to run parametrised model from CRISMA application)
5. Select visualisation options

