



# Supporting Expert Assessment of Argument Structures in Trust Cases

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- What is 'trust case'?
- The Trust-IT framework
- Example argument
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# Trust vs Trustworthiness

#### • Trust

*trust* is the notion referring to a belief in some postulated property of a trusted object considered in a specific context

# Trustworthiness

- Trustworthiness is the notion referring to the justification explaining why we should trust that the object exhibits the posulated property in this context
- Trustworthiness can imply Trust



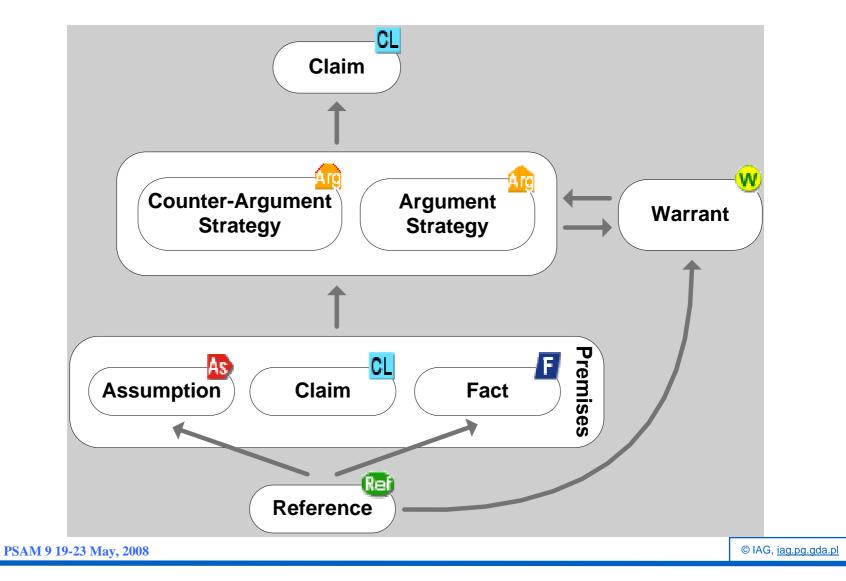
# **Trust Case**

Trust Case is an argument that provides a satisfactory (from a selected viewpoint) justification for a specified set of properties to make a judgement about the trustworthiness of the chosen object

> Trust Case integrates argumentation with the evidence that supports this argumentation

The notion of *Trust Case* is a generalization of the common notion of *Safety Case* 

# Language for representing trust cases



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# **Trust Case example**

- CL Safety of ANGEL user
  - 🖻 Argument by considering protection against safety hazards
    - W WARRANT: All unacceptable identified safety hazards are dealt with
    - CL Correctness of alarms
    - CL Exercise status information and exercise improving comments
    - CL Correctness of user's data
    - 🖻 🎰 Argument by describing system features
      - W WARRANT: Features are located in two layers platform and application
      - CL Support from ANGEL platform to correctness of data
        - 🗄 🎰 Argument by describing supporting functionalities and properties
          - WARRANT: Platform maintains reliablity of data
          - CH Reliability of ANGEL data
      - E CL Reliability of data storage and processing of ANGEL application
        - 🔚 🚼 Correct exercise support from ANGEL application
  - 🗄 🛄 ANGEL system instalation, configuration and maintanance
  - E CL Accidental damage of sensors e.g. due to Patient's physical activity
    - 📸 Argument by reference to platform component property
      - W WARRANT: Sensor design protects them sufficiently from accidental damage Sensor node resilience

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#### Language for **Scenarios for** representing using trust cases trust cases Trust case Trust Templates processes case Patterns system **Trust-IT framework**



# Problem

How to assess the 'strength' of the argument in a trust case and how to communicate it to the relevant stakeholders

# Solution

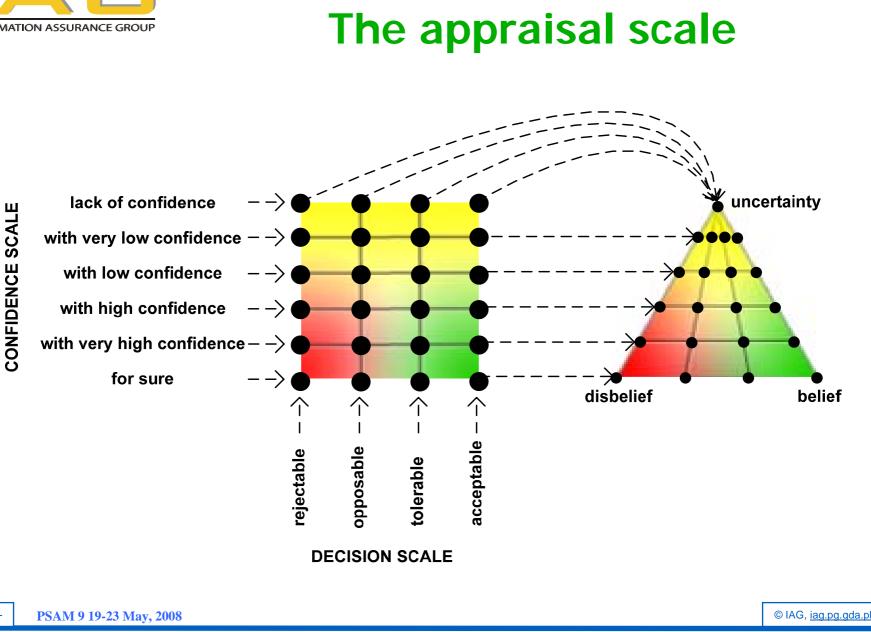
Provide an argumentation appraisal mechanism which starts from assessments of the facts and inferences in the argument and aggregates them to an assessment of the topmost claim



# **Trust Case example**

Safety of ANGEL user Argument by considering protection against safety hazards WARRANT: All unacceptable identified safety hazards are dealt with **Correctness of alarms** Exercise status information and exercise improving comments + Correctness of user's data Argument by describing system features WARRANT: Features are located in two layers - platform and application Support from ANGEL platform to correctness of data Argument by describing supporting functionalities and properties E. WARRANT: Platform maintains reliablity of data Reliability of ANGEL data Reliability of data storage and processing of ANGEL application **I** Gorrect exercise support from ANGEL application ANGEL system instalation, configuration and maintanance Accidental damage of sensors e.g. due to Patient's physical activity Argument by reference to platform component property WARRANT: Sensor design protects them sufficiently from accidental damage Sensor node resilience







# Appraisal example

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# The aggregation mechanism



# Different argument types depending on how the premises contribute to the conclusion

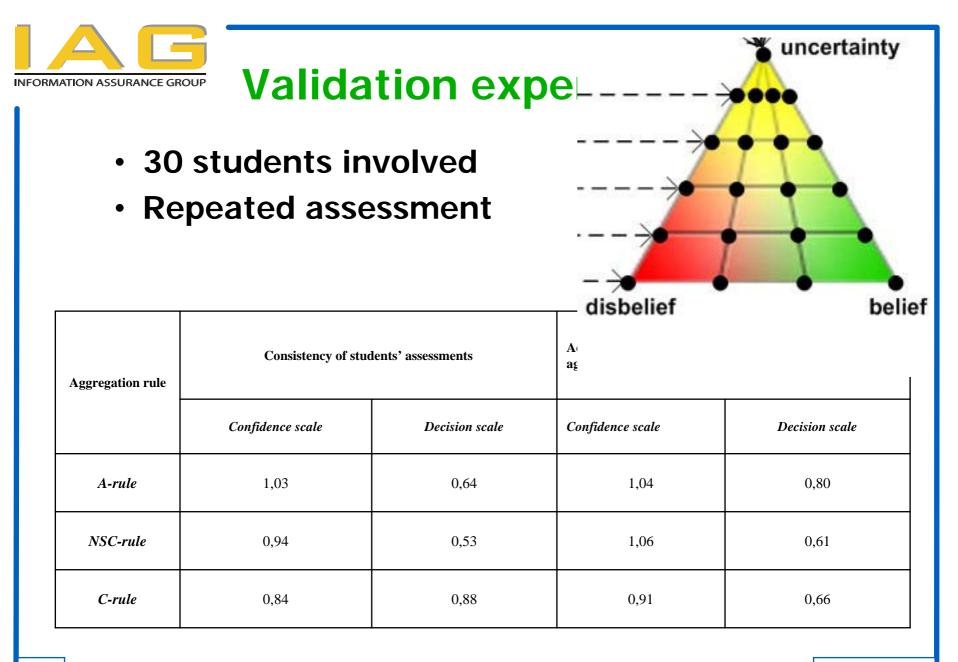
- Different aggregation rule for each argument type
- Mapping of the linguistic values on Dempster-Shaffer belief and plausability functions

#### A-argument rule

Yager's modification of Dempster's rule of combination

 $Bel(c) = Bel(a_1) \cdot Bel(a_2) + Bel(a_1) \cdot (Pl(a_2) - Bel(a_2)) + Bel(a_2) \cdot (Pl(a_1) - Bel(a_1))$ 

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# Conclusion

- Trust-IT provides for development, maintenance and sharing of trust cases for real life objects
  - A Personalized Information Platform for health and life Services
    - (6th EU FR Integrated Project PIPS)
  - A platform supporting WSN based health related applications
    - (6th EU FR STREP Project ANGEL)
  - TTA based dependable embedded systems
    - (6th EU FR Integrated Project DECOS)
  - Support for standards conformance (e.g. ISO 27001, ISO 14971:2000)
  - Trustworthiness of HON (Helth On the Ne) criteria
- Argument appraisal mechanism provides for third party assessment of trust cases
- Linguistic scales support communication of trust case contents between stakeholders
- More experiments are needed to calibrate and validate the appraisal mechanism