

# **Some Additional Constructs in the Hitachi-UCI SDO PIM/PSM**

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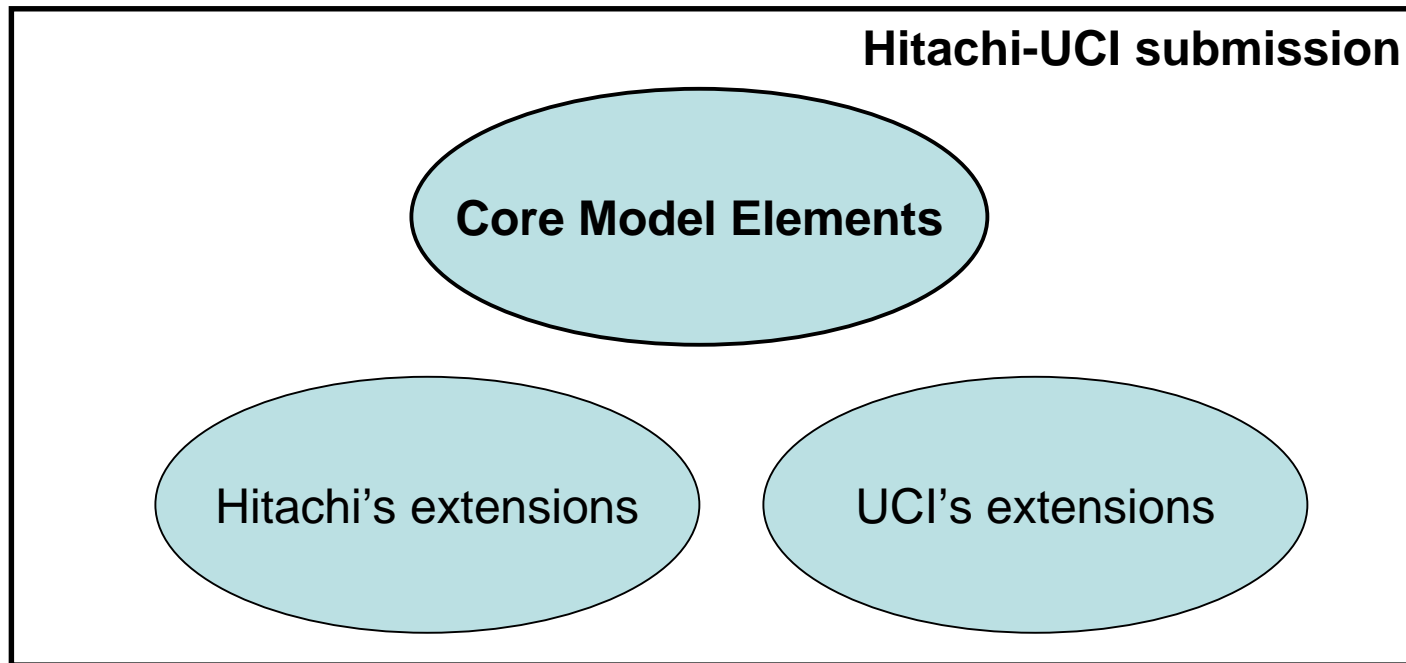
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# UCI's Role in the SDO PIM/PSM Submission

- UCI is a *supporter* for the Hitachi's submission to the SDO PIM/PSM RFP.

# Status of Hitachi-UCI Initial Submission

- Hitachi and UCI built and agreed core model elements in SDO PIM at the Orlando TC meeting.
- Hitachi presented the agreed core model elements and some additional elements.
  - Mr. Yamamoto gave a talk about this.
- UCI presents some other additional elements to the agreed core model elements.



- These 3 components are combined and described in a single submission document.

# UCI's Extensions

- UCI added 2 model elements to the core SDO model.
  - *RelationshipStrength*
  - *WeightStatus*

# ***RelationshipStrength***

- *RelationshipStrength*
  - is a class specializing *OrganizationProperty*.
  - is used to add the concept of *strength* into organizational relationships between SDOs.
    - i.e. used to represent a weighted relationship.
  - defines an instance variable *strength*, which indicates a relationship strength.
  - Each instance of *RelationshipStrength* is associated with an organizational relationship.

- The semantics and usage of organizational relationship strength varies across applications and application domains.
  - It may indicate the usefulness of another SDO (or other SDOs), in order to select useful interaction partners and prioritize different organizational relationships for the interactions.
- It also depends on implementations how to calculate and update strength values.
  - It may be calculated and updated based on
    - the average response time between SDOs,
    - the availability ratio of an SDO,
    - the number of interactions between particular SDOs, or
    - the degree of dependency to an SDO.

# *WeightStatus*

- *WeightStatus*
  - is a class specializing *Status*.
  - is used to add the concept of *weight* to SDOs.
  - defines an instance variable *weight*, which indicates an SDO's current weight.
- SDO's weight is supposed to be used for controlling availability, behavior and lifecycle of SDOs.
  - Each SDO increases and decreases its weight.

- It depends on applications (implementations) how to increase and decrease the weight value.
  - An SDO may gain weight in exchange for providing its own service, and lose weight for
    - invoking another SDO's service and
    - utilizing resources (e.g. CPU cycles, network bandwidth and memory space).
- The level of weight affects SDO's behaviors.
  - An abundance of weight may be considered as an indication of higher demand for the SDO; thus the SDO may be designed to favor replication in response to higher level of weight value.
  - A scarcity of weight (an indication of lack of demand) may eventually cause the SDO's removal.

# Why Weighting SDOs?

- SDOs are supposed to be
  - autonomous entities, and
  - organized in a decentralized (or less centralized) manner.
- SDOs need to adjust/control their availability, behaviors and lifecycle by themselves (i.e. autonomously).
  - Weight is a means to do that.

- The concept of weight can prevent
  - SDOs from overusing resources and other SDOs' services
  - the SDOs that have not been used by anyone from continuing to stay in network and use resources.

# Proof of Concept

- The SDO Core model elements and UCI's extensions have been implemented and confirmed to work well
  - in the Bio-Networking Architecture project
    - [netresearch.ics.uci.edu/bionet](http://netresearch.ics.uci.edu/bionet)
    - funded by
      - DARPA
      - NSF
      - AFSOR
      - State of California
      - Hitachi
      - Hitachi America
      - NTT
      - NTT Docomo