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Behavior Based Engineering Collaboration

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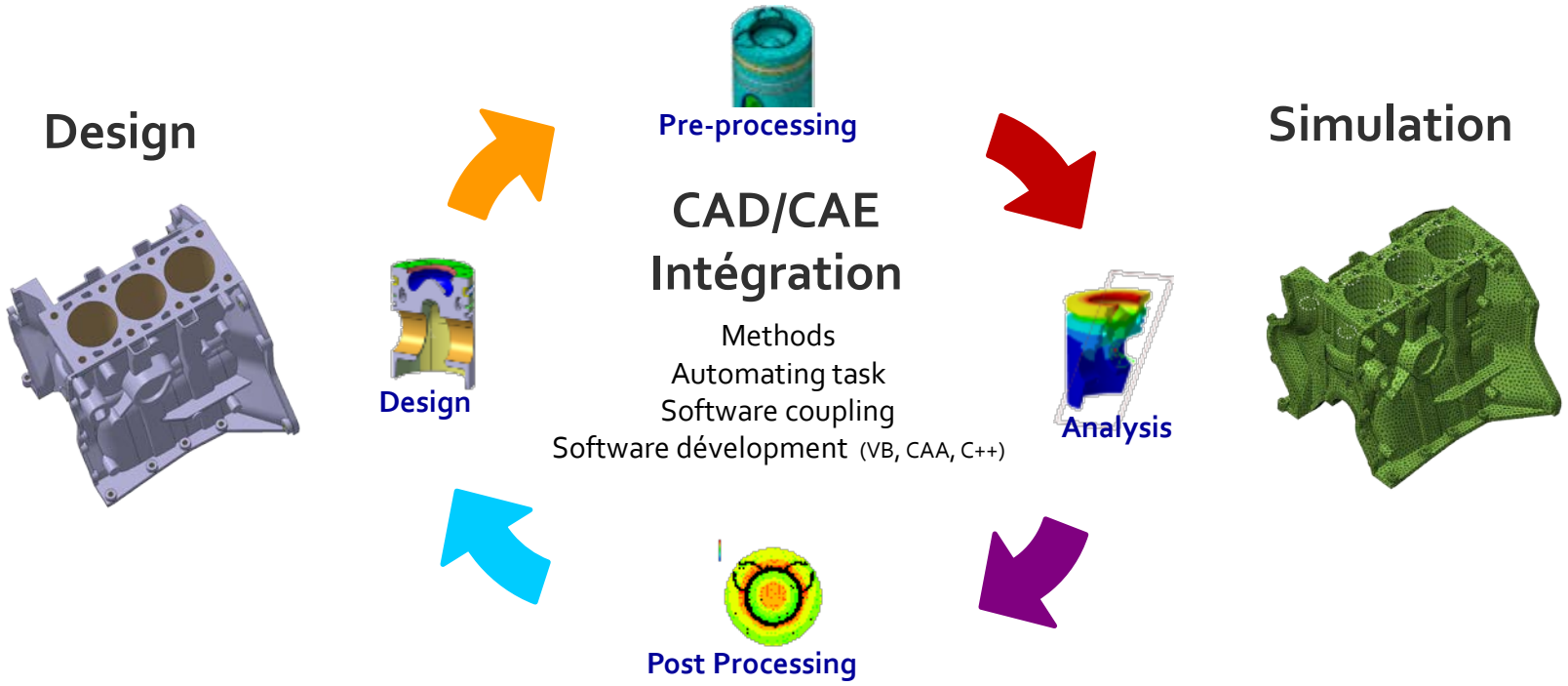
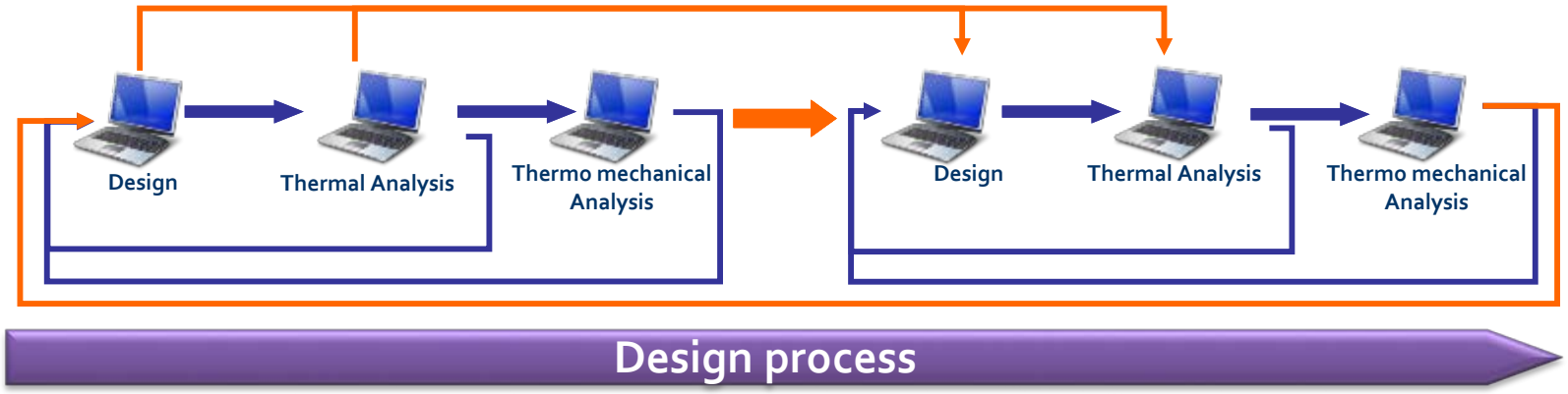
Simulation Processes Today

- Simulation is now a key area in the design process to optimize and streamline the design
- Innovation is becoming key to competetiveness
- Demand is increasing for use of digital simulation to drive the design decisions in all stages

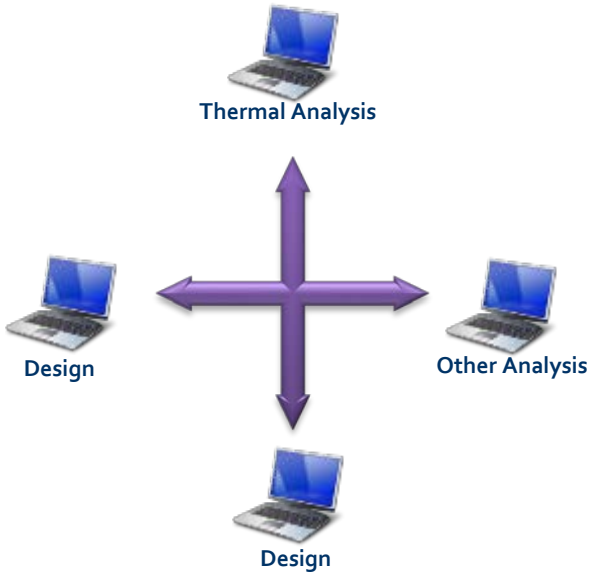


Simulation Processes Today

- There is a desire to move from Sequential engineering:

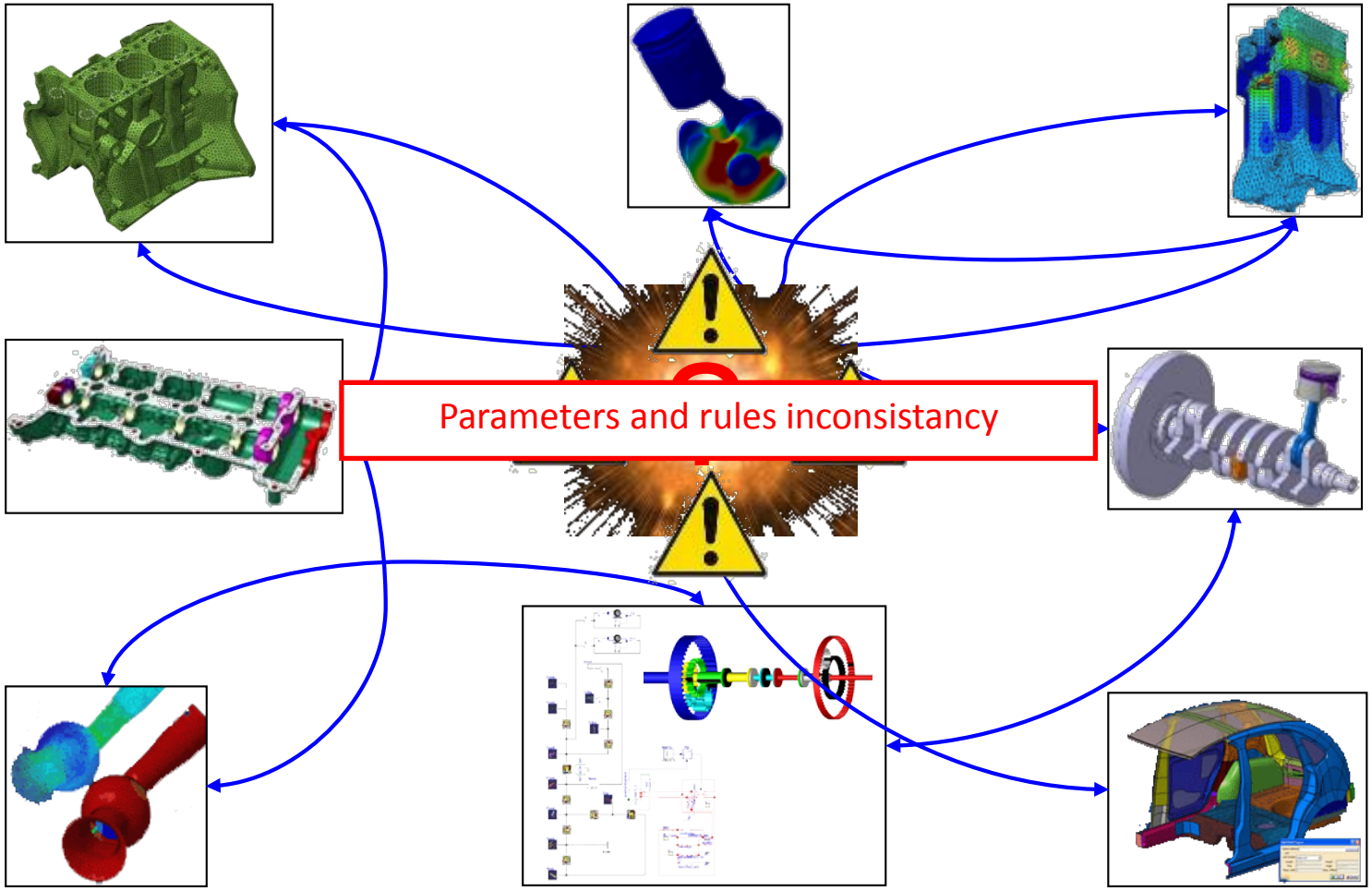


- to Collaborative engineering :
  - Concurrent design activities
  - Collaborative data sharing



Simulation Processes Today

- Lack of knowledge sharing and reuse is a significant problem between numerous CAD/CAE models used



CAE models use simulation related parameters and rules that are often recreated in other models

Smarter Simulation Collaboration Needed

- PDM/PLM systems are for product design process
  - Limited behavior knowledge
- Simulation tools exists for behavior studies
  - Various levels of integration with design and other simulation tools
  - Little to no reuse of behavior knowledge
- All knowledge is local and stored in each application
  - Inconsistent data
  - Not sharable
  - Inefficient
  - Limited to no collaboration
  - “what-if” investigations are difficult to manage and correlate

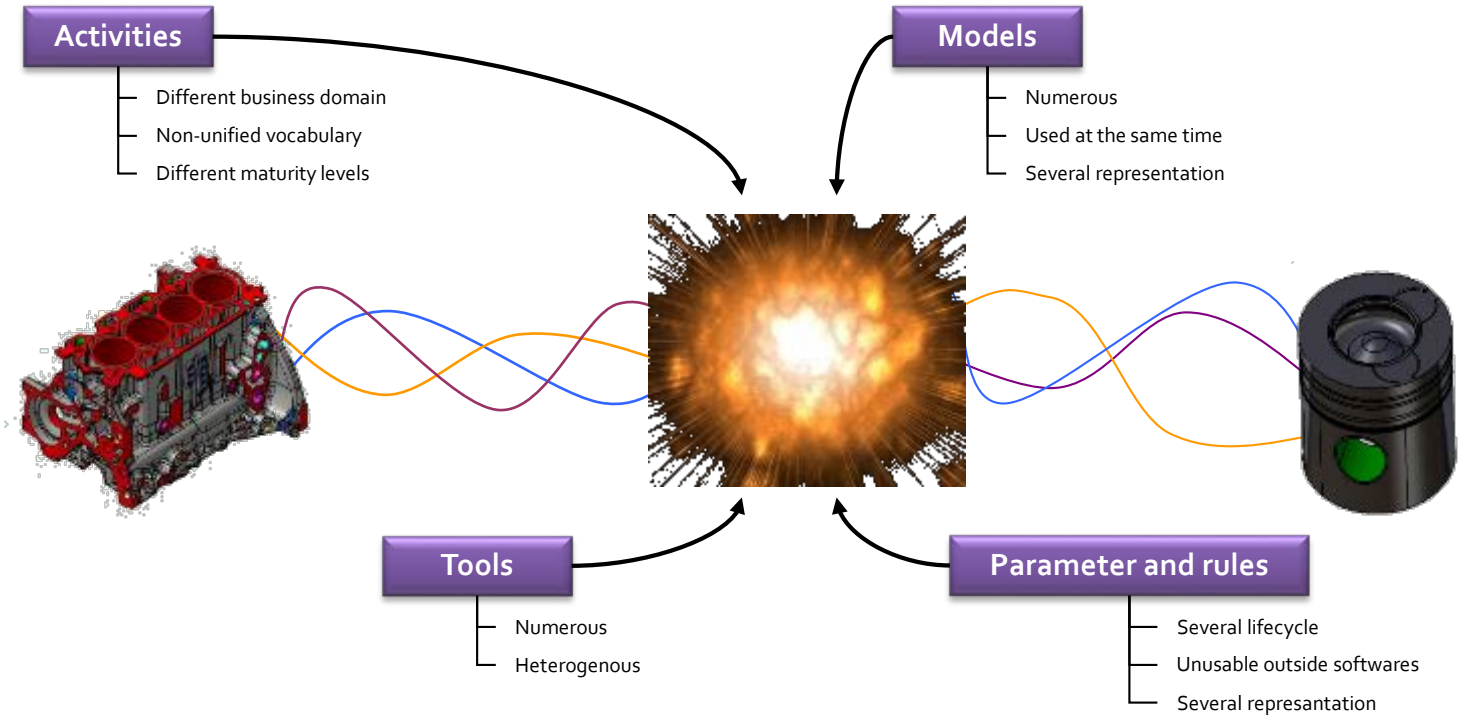
Smarter Simulation Collaboration Needed

- We need something more
  - **Behavior Based Engineering Collaboration**
    - Smarter designs through understanding behavior
    - Better decisions earlier in the design process
    - Consistent sharing and reuse of simulation data
      - Across applications
      - Throughout the design process
      - Across the Systems Modeling process
    - While enabling independent “what if” investigations and resolution of differences

The KARREN Approach

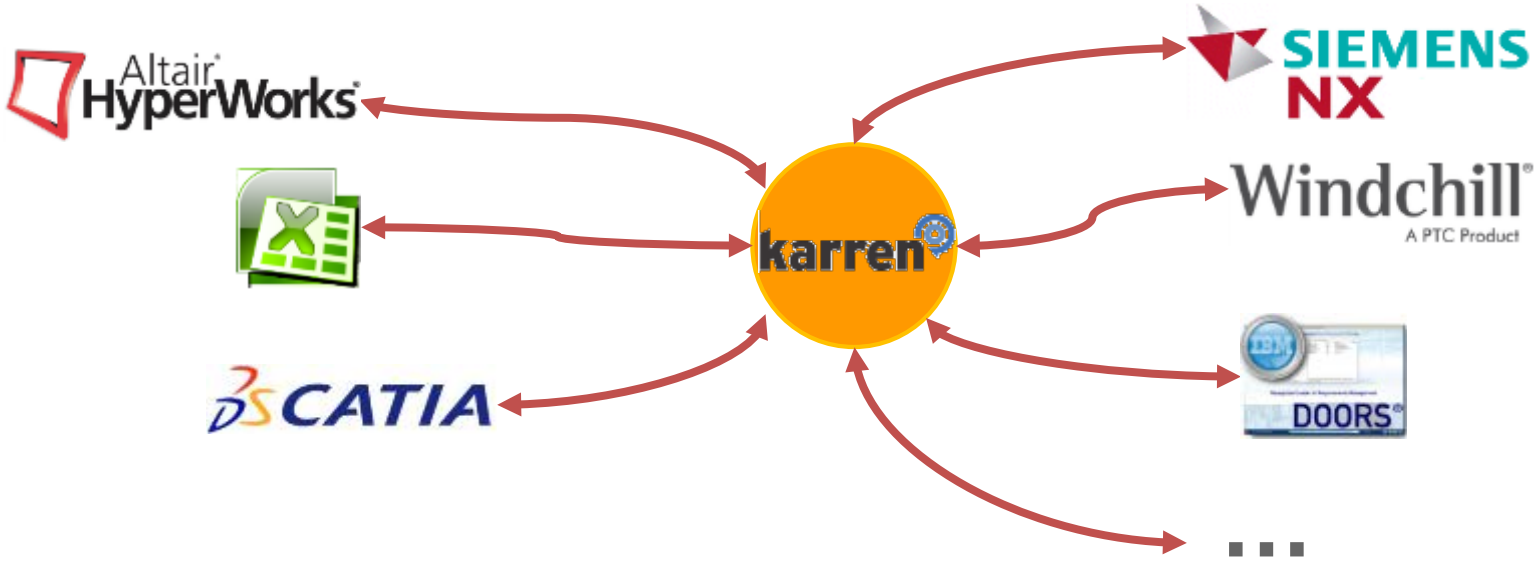
- **K**nowledge **A**cquisition and **R**euse for **R**obust **EN**gineering

- Each CAD/CAE models uses parameters and rules that are shared by other disciplines from various business domains.



The KARREN Approach

- Designed to work with existing tools
  - PLM, Systems Engineering, Simulation & Design tools



KARREN Architecture

Information Core Entity

- Composed of a collection of information molecules known as **Information Core Entities** (ICE)
- **ICE** = Definition of groups of parameters and generic rules, grouped as makes sense for intended usage

ICE1

- Param 1
- Param 2
- Param 3
- Règle 1
- Règle 2

ICE2

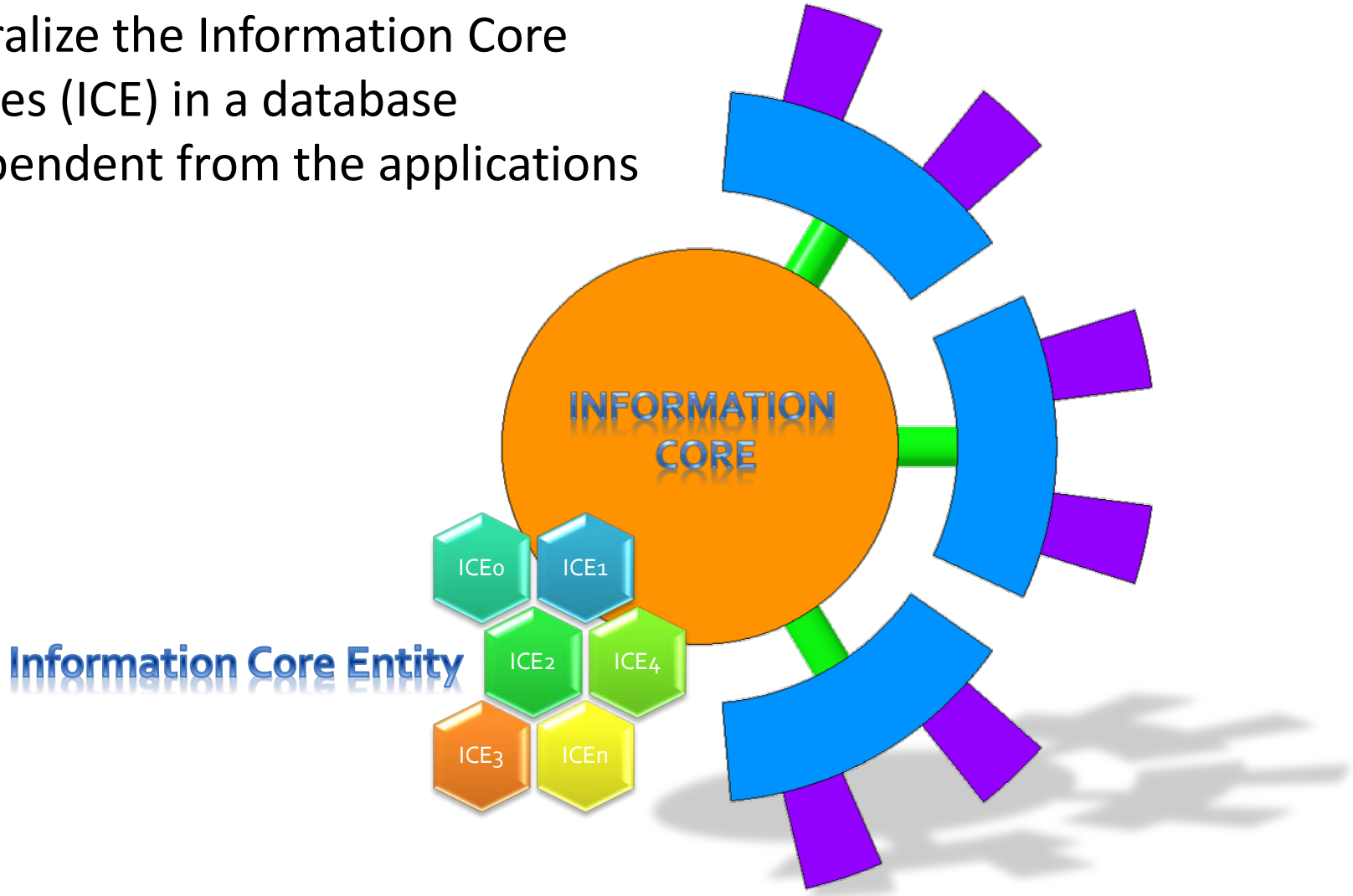
- Param 4

ICE3

- Param 5
- Param 6

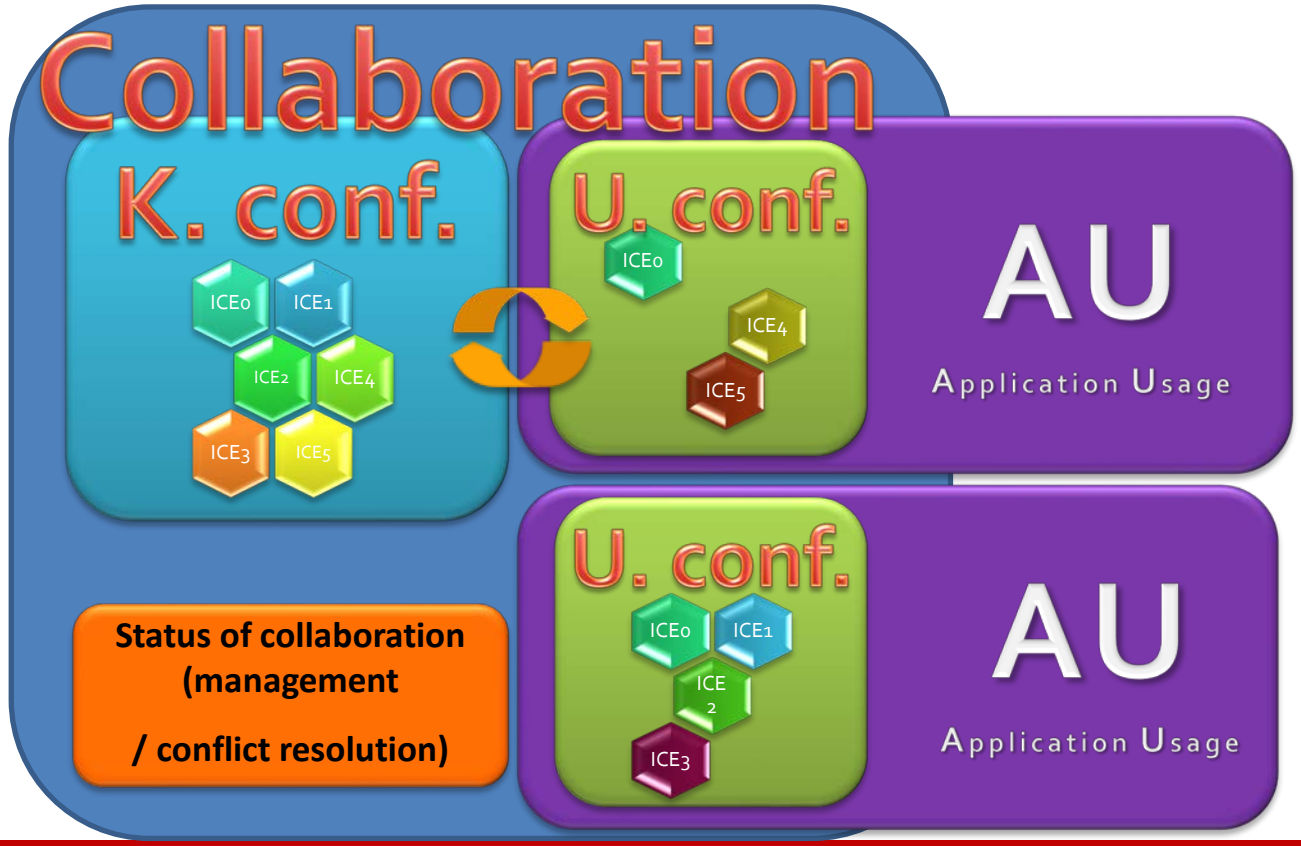
KARREN Architecture

- Centralize the Information Core Entities (ICE) in a database independent from the applications



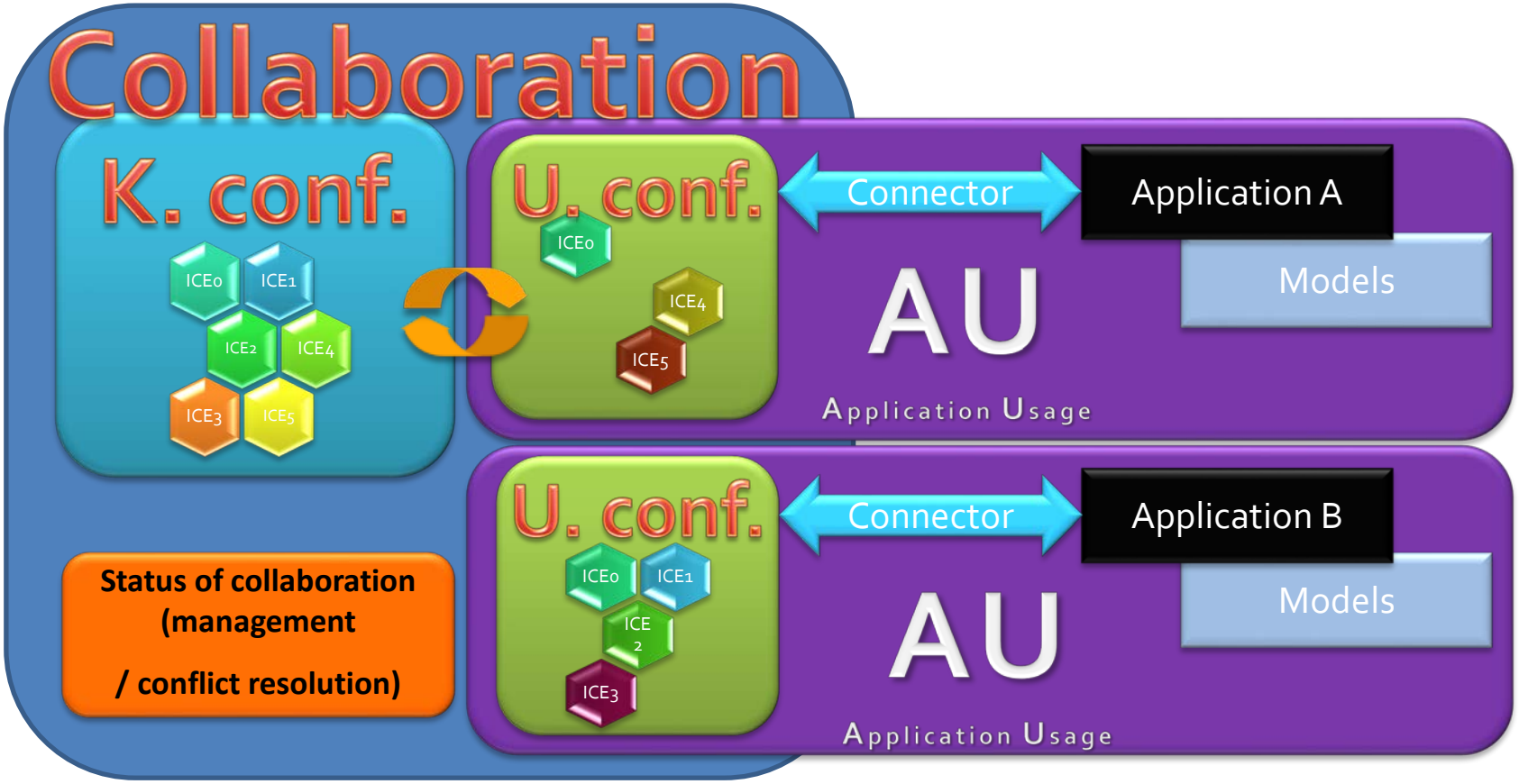
KARREN Architecture

- Collaboration Manager defines “Collaborations”
  - Knowledge Configurations (k.conf.)
  - Usage Configurations (u.conf.) for each Application Usage (AU)
  - User rights for each user with access to each Application Usage



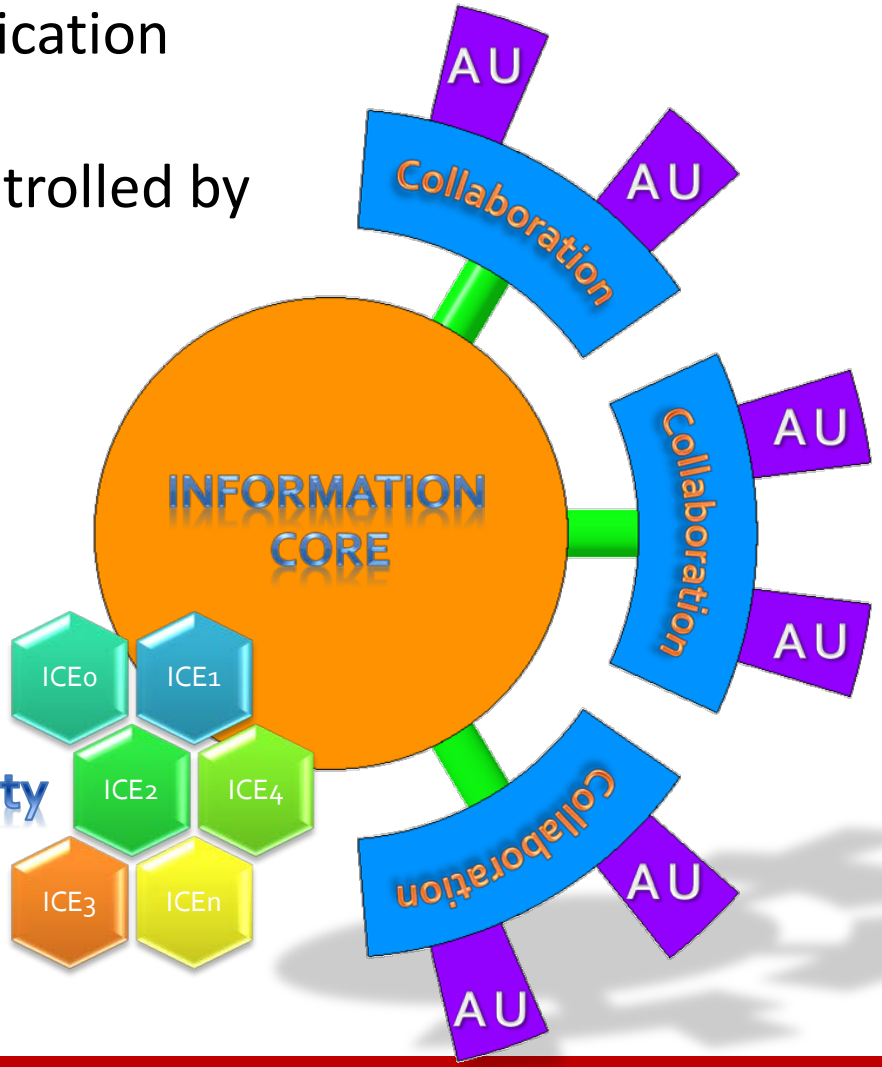
KARREN Architecture

- Usage Configurations leverage KARREN Connectors to communicate to/from applications & models for each Application Usage (AU)



Implementing the knowledge framework

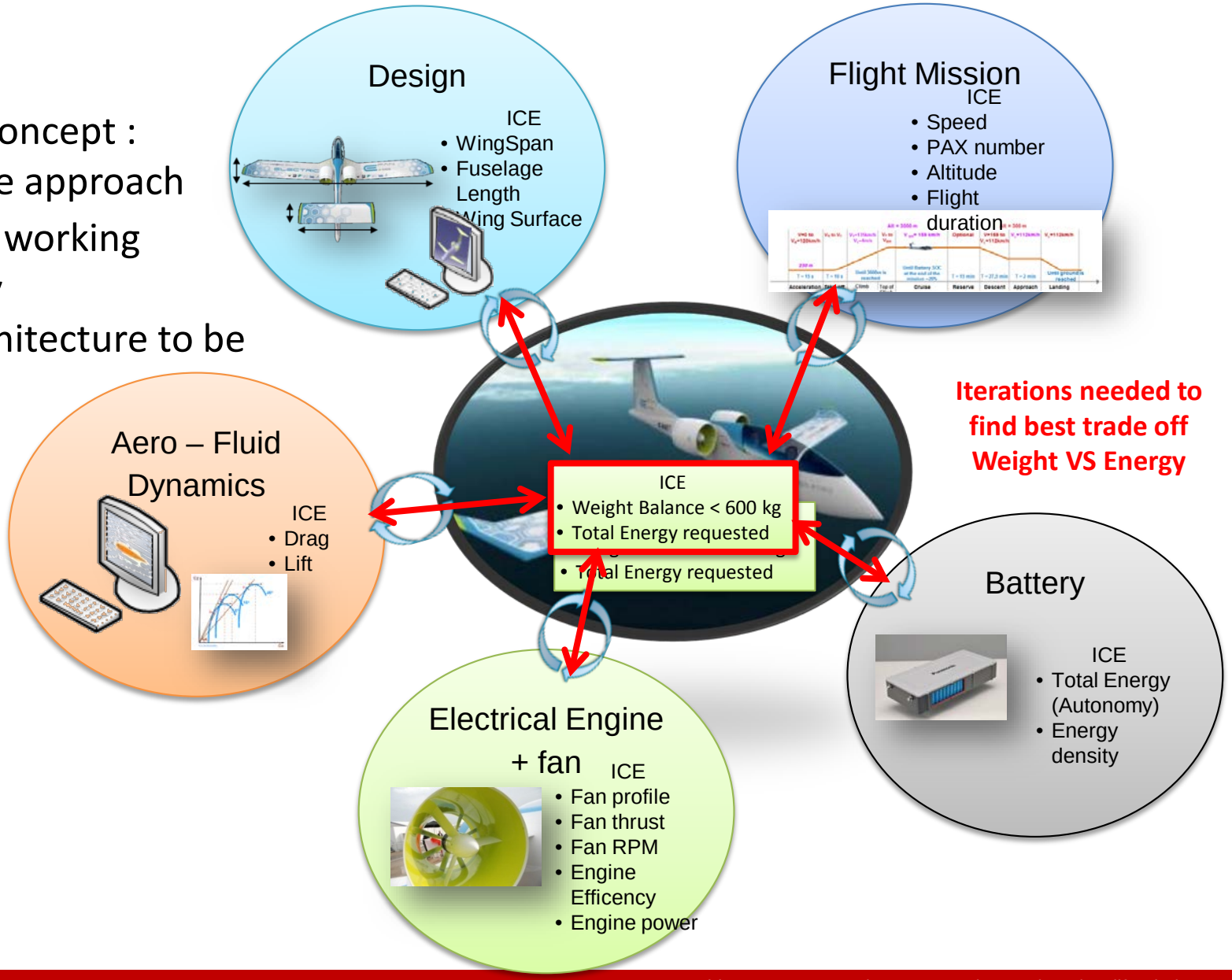
- Build & deploy a library of ICE, Collaborations, and Application Usages
- Establish user access controlled by defined rights
  - Administrator
  - Collaboration Manager
  - User
- Define Collaborations
- Run Application Usage
- Parameters updated
- Evaluate “Trade-offs”



Information Core Entity

Sample Use Case

- Pre-design concept : Collaborative approach
- 5 disciplines working concurrently
- Mutliple architecture to be evaluate



Summary

Behavior Based Engineering Collaboration needed

- Consistent sharing and reuse of simulation data
- Independent “what if” investigations and resolution of differences