Making a Medial Object Useful in an Engineering Simulation Context

Medial Object is the Gateway

- MO is not the end goal for engineering simulation but a means to get to other capabilities or functions
  - Mid-surfacing
  - Dimensional reduction
  - Mesh sizing
  - Proximity information
  - Simulation related property extraction
  - Feature recognition
  - Feature based actions

intrin**SIM**
CONNECTING WORLDWIDE
BUSINESS & TECHNOLOGY

Medial Object is the Gateway

- MO is a reduced dimensionality representation

- So if we get an MO we are good to go !!!

- Not so much - the MO is just the beginning of the journey

intrinSIM

CONNECTING WORLDWIDE
BUSINESS & TECHNOLOGY

Medial Objects have artifacts

- MO is a reduced dimensionality representation
  - A "proper" MO has "artifacts" that are mathematically correct but confusing and possibly disruptive to the function we are building it for
    - Flaps
    - Medial Surface flipping (& associated transitions)
    - Junction smoothing
    - Too much dimensional reduction
    - More…
  - What is an artifact for one function is a requirement for another

Medial Objects need to be "transformed"

- MO needs to be transformed to fit the function it was created for
    - Extensions to remove flaps
    - Constant surface orientation through Medial Surface flipping & associated transitions
    - Squaring up junctions
    - What to do when the medial object has no surface
  - May require more info
    - MO topology and not just geometry
    - callbacks to original geometry
    - an MO of the MO

intrinSIM
CONNECTING WORLDWIDE
BUSINESS & TECHNOLOGY

Medial Objects need to be "transformed"

- MO transformation to fit the function needs to be fully automatic or trivial
    - Conceivable with a few rules for simple objects
    - Unclear on complex "real-world" objects where there are multiple interacting artifacts

Medial Objects need to be "transformed"

- We then have four choices for using MO in an Engineering Simulation context
  - Limit MO to use as reference information only
    - Useful in some functions
    - Not enough for most use cases
  - Function based MO transformation tools
    - As we approach robust MO creation we need to shift effort into researching function based transformations
    - An MO is not a mid-surface usable for meshing or costing or CAM
  - Function based tools that "think" MO but never build one
    - There are some available and more coming
  - A combination

intrinSIM
CONNECTING WORLDWIDE
BUSINESS & TECHNOLOGY