Participant Questionnaires: Initial Analysis

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The Questionnaire

• Consisted of 36 questions
• General themes addressed:
  • Tooling; Process Overview; Problems Encountered; Resource & Expertise Required
  • Intended to focus on those aspects that would not necessarily be identified via direct analysis of the meshes themselves
• Participants who generated meshes in both GMGW-1 and HLPW-3 were required to submit one completed questionnaire with each family of meshes
• In the event, 24 completed PQs were received
Questionnaires Received

• 19 Participants completed PQs
  (Some Participants submitted multiple PQs, others combined multiple responses onto a single PQ)
  • 18 for HL-CRM:
    3 Industrial Organisations; 4 Research Agencies;
    4 COTS vendors; 3 Universities
  • 3 for JSM:
    2 Industrial Organisations; 1 Research Agency
Responses: Geometry (1/3)

• Models Used

![Bar chart showing models used]

• NB:
  • No use of “native” NX model
    -> variety of inherited and mysterious problems
Responses: Geometry (2/3)

• Although diverse problems were encountered with the supplied models, none appeared to be “substantial”
  • All problems were resolved in <1hr
• Largest efforts were anticipated
  • … and may not be representative of “real-world” scenarios (i.e. may be accommodated by suitably tailored end-to-end local process)
• All Participants required some manual interaction to import the supplied models
  • Some required (or chose to make) further modifications subsequently
Responses: Geometry (3/3)

- Expertise Required:
Responses: Initial Meshing (1/3)

Surface Meshing

- Simplified surface meshing groupings (based on elapsed time):
  - “Quick” (<1hr or N/A)
    - N/A: Meshing tools that project volume mesh onto the surface
    - Processes incorporating extensive automation
  - <= ~1 day
    - Processes that require a reasonable amount of user input and/or iteration and incorporate varying degrees of automation to achieve an acceptable mesh
  - Longer (->2mwks)
    - (Remaining) Structured meshes and “slower” 1-day-ers
Responses: Initial Meshing (2/3)

**Volume Meshing**

- Simplified volume meshing groupings (based on elapsed time):
  - “Quick” (<1/2day)
    - Processes incorporating extensive automation or are reliant on extant information (e.g. Octree-based approaches)
  - <= 2-3 days
    - Processes that require a reasonable amount of user input and/or iteration and incorporate varying degrees of automation to achieve an acceptable mesh
  - Longer (>1wk)
    - Structured meshes
Responses: Initial Meshing (3/3)

Expertise Required:
Responses: Post Solution Modifications

• Not all Participants reported undertaking post-solution modifications
• Those reported included:
  • Structured meshes:
    • Modification of wake-sheet location and wake surface meshes [Multi-block]
    • Close proximity of hole boundary in far-field box mesh to OML discovered – and fixed [Overset]
  • High-order meshes:
    • Flow solver run to identify “hot-spots” in the solution; these were used to guide local mesh refinements
  • Adapted meshes:
    • Mesh adapted automatically (using Mach Hessian)
    • After 8th refinement, gap between trim curves on flap end > local mesh size
      • Repaired using “hybrid mesh/geometry” technique
        -> Only requirement for >Novice expertise
      • Adaptation process re-started two levels earlier
        (Cost: 30min Labour; 6Hrs CPU)
Responses: I/O

- Meshes were uploaded in the following formats:

- The following problems were noted in transferring meshes between tools and Workshop Participants:
  - CGNS: no single format-variant seemed to work with all tools
  - UGRID: boundary condition information could be lost (if downstream process loaded it via a separate text file)
Closing Remarks

• The submitted PQs include a wealth of information
  • Many Thanks to all of you who completed one!

• A diverse range of approaches was adopted by the Participants
• End-to-end (Receive Geometry -> Supply Mesh) process typically required:
  • Between a day-or-two and a couple of weeks
  • At least an Intermediate level of Expertise (at some stage)

• Analysis of the data continues – next report at SciTech
• When analysis is complete, it is intended that these data will be used as a benchmark by which to measure progress towards realising the 2030 Vision
Thank you for your attention