

Participant Questionnaires: Initial Analysis

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**1st AIAA Geometry & Mesh Generation &
3rd AIAA High Lift Prediction Workshops
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The Questionnaire

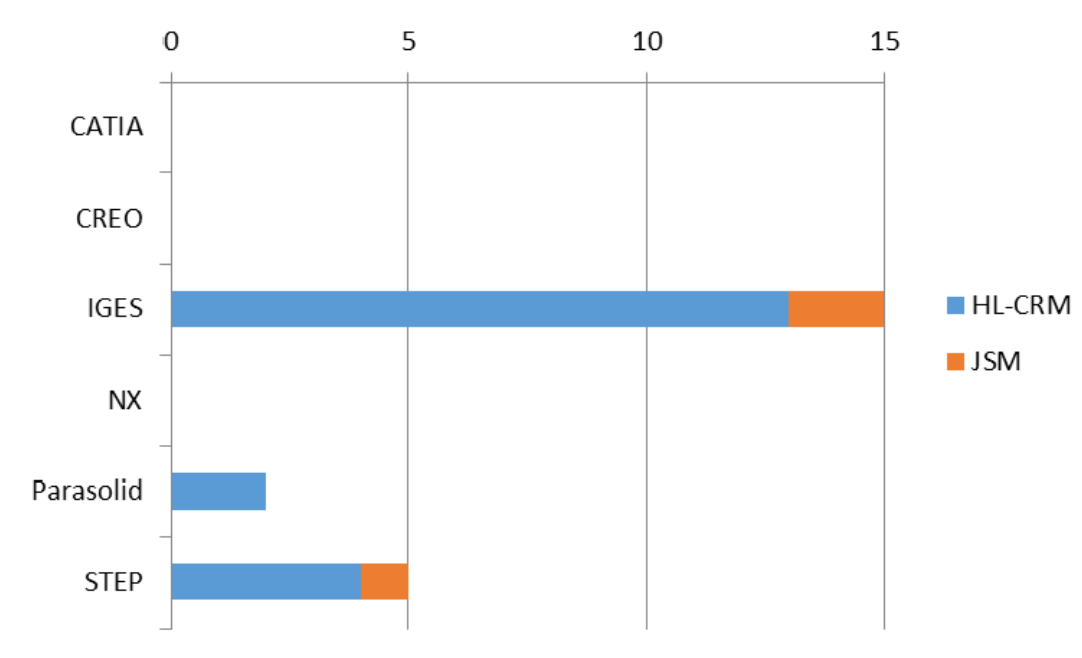
- Consisted of 36 questions
- General themes addressed:
 - Tooling; Process Overview; Problems Encountered; Resource & Expertise Required
 - Intended to focus on those aspects that would not necessarily be identified via direct analysis of the meshes themselves
- Participants who generated meshes in 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

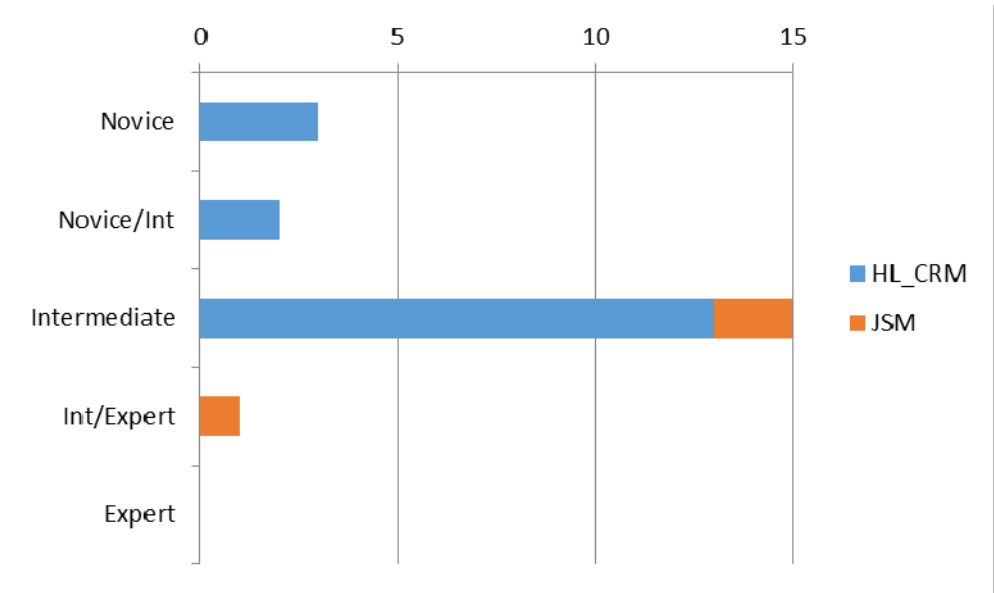


- NB:
 - No use of “native” NX model
-> variety of inherited and mysterious problems

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

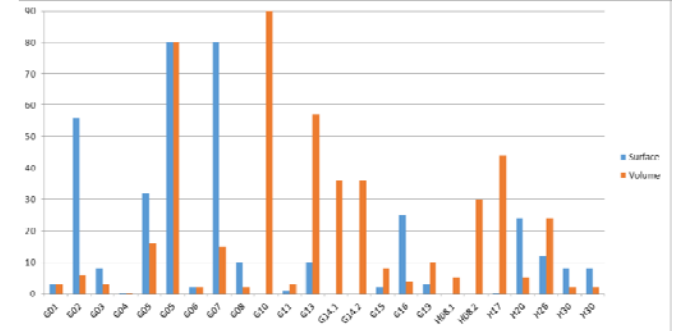
- Expertise Required:



Responses: Initial Meshing (1/3)

Surface Meshing

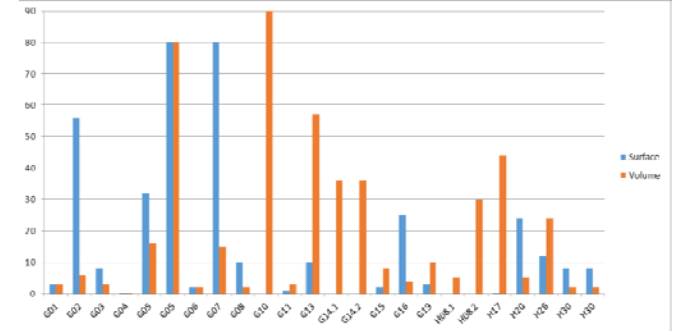
- Simplified surface meshing groupings (based on elapsed time):
 - “Quick” (<1hr or N/A)
 - N/A: Meshing tools that project volume mesh onto the surface
 - Processes incorporating extensive automation
 - <= ~1 day
 - Processes that require a reasonable amount of user input and/or iteration and incorporate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



Responses: Initial Meshing (2/3)

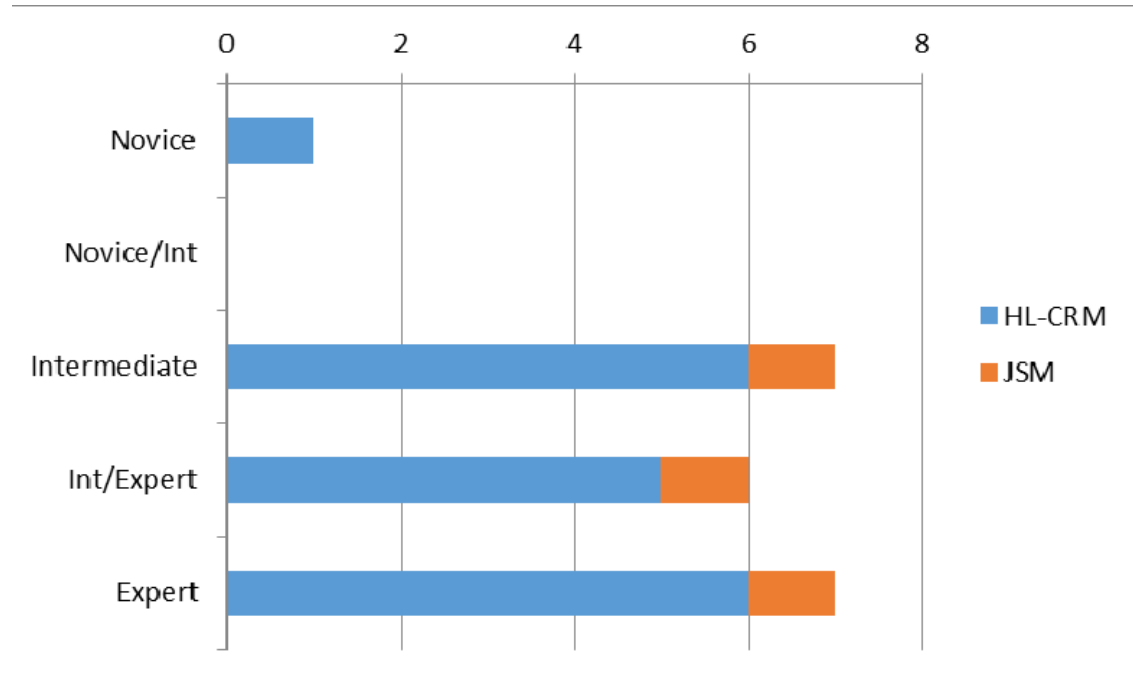
Volume Meshing

- 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:

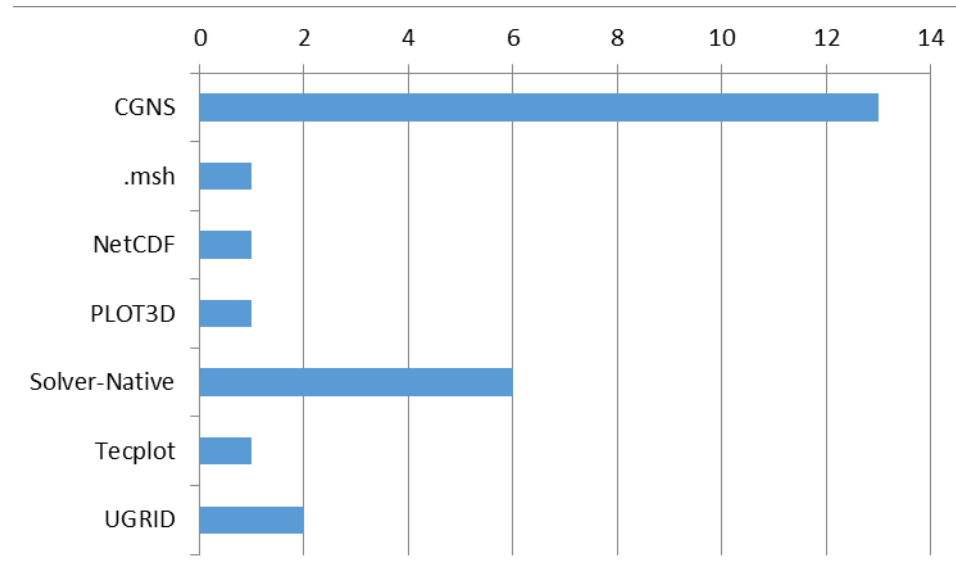


Responses: Post Solution Modifications

- 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