TAMS-MESH PROJECT

WORKPLAN

Creation Date : 11.02.2025
Last Update : 12.02.2025

PROPOSAL

- Motivation: A proper preprocessing tool is required for our computational platform (TAMS-Aero) to meet the projects demand in the Turkish Aerospace.

- Objectives:
  - To develop surface mesh generator within the agreed time schedule (for TAMS-Mesh) – End of 2026
  - The subject tool shall be able to generate valid high-quality surface meshes for complex geometries from the aerospace industry in acceptable time frame (using parallelization)

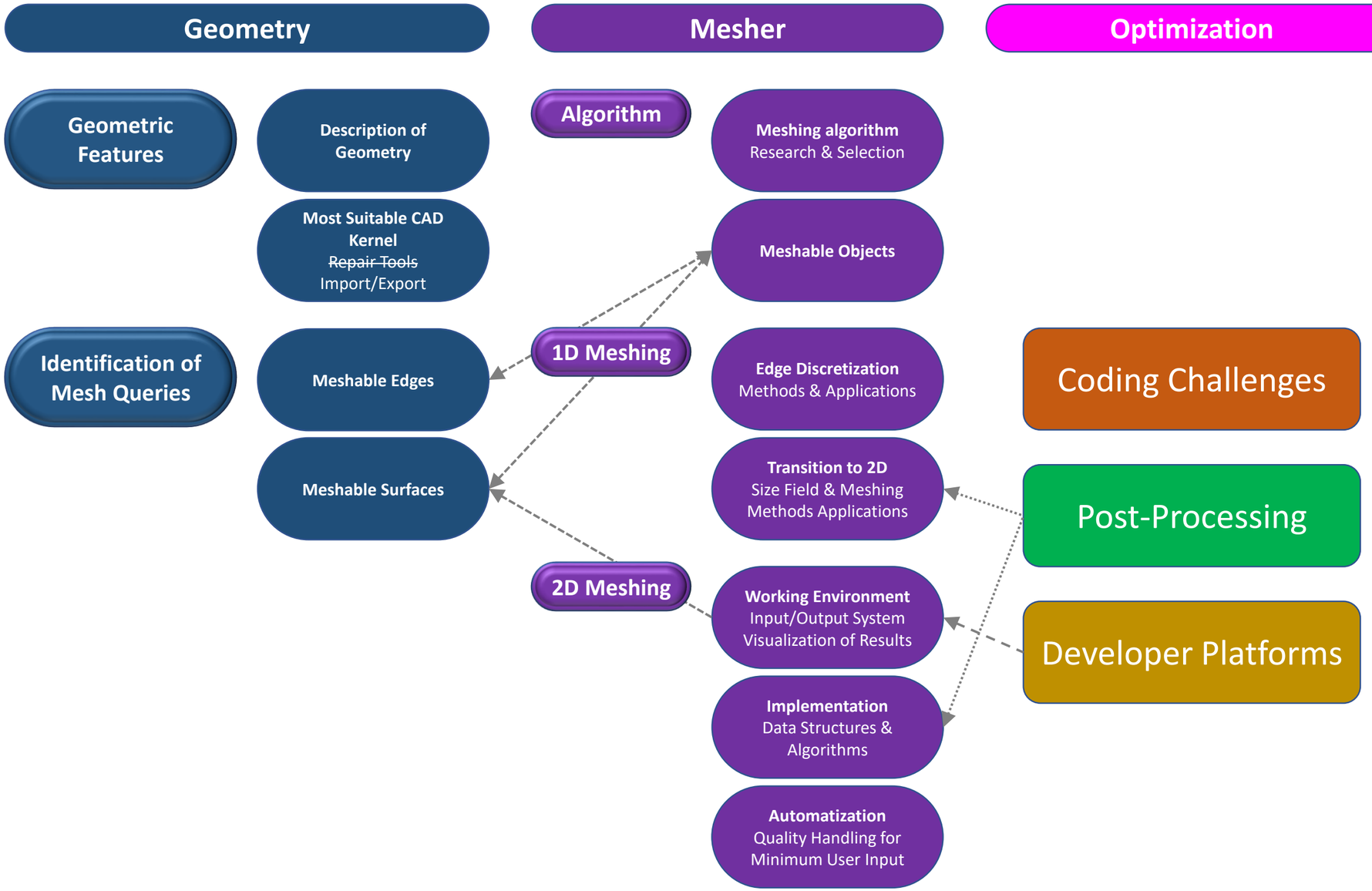
- Scope:
  - Input: Watertight CAD geometry (STEP/IGES format)
  - Output: High quality triangulated surface mesh
  - The surface mesh generator plan composes of 4 steps:
    1. CAD functionalities (Import/Export – Closed Checking – Geometrical Queries)
    2. Surface Meshing Algorithms Implementation
    3. Optimization / Post-processing
    4. Export

TAMS MESH

GENERAL WORKFLOW

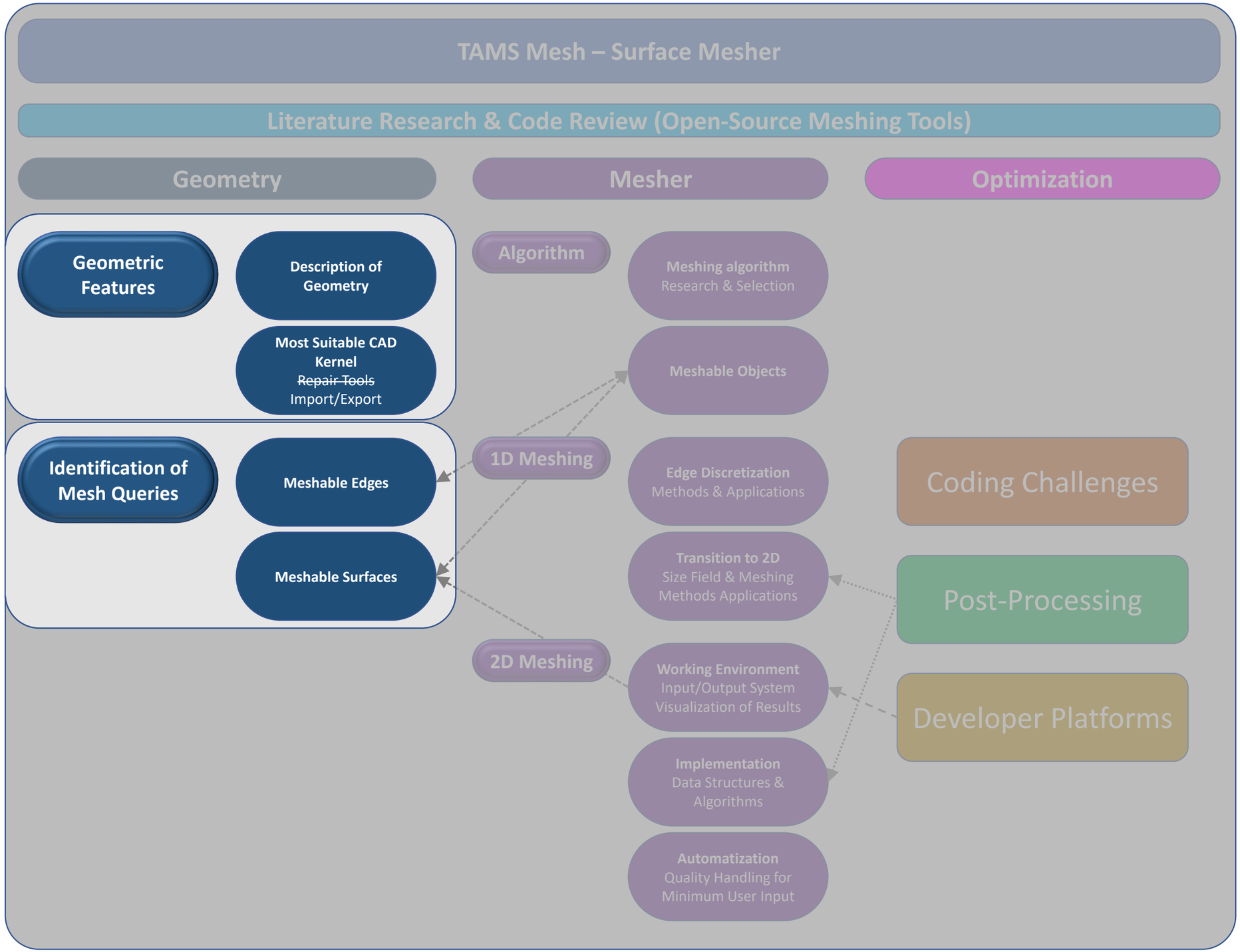
TAMS Mesh – Surface Mesher

Literature Research & Code Review (Open-Source Meshing Tools)



TAMS MESH

GENERAL WORKFLOW



TAMS MESH

DIFFRACTION OF WORK

Literature Research & Code Review

Building Up Understanding → CAD SYSTEMS

Starting Point

→ OCCT
→ CGAL

TASKS	OUTPUT OF THE TASK
Import cad exchange format files (step)	Framework to Import a CAD file
Geometric data storage (meaning of benchmarked code, non uniform rational b-spline)	Data collection structure and use classes. Documentation by code demonstration.
Used functions, methods to mathematically modeling geometry	Functions and mathematical models. Documentation by code demonstration.

→ MESHABLE OBJECTS

TAMS MESH

DIFFRACTION OF WORK

Literature Research & Code Review

Building Up Understanding → MESHER

Starting Point

→ GMSH
→ NETGEN

TASKS	OUTPUT OF THE TASK
Benchmarking low level libraries meaning of required inputs	Required information's to create mesh. Geometrical data containers and interpreters. (Additionally shared elements, neighboring relations etc.) Documentation
Comparison	Differences, similarities and difficulties discussion

→ MESHABLE OBJECTS

Expectations

Literature Research & Code Review

Building Up Understanding

CAD SYSTEMS

MESHER

1. Import CAD file and store variables, create the framework.
2. Document code data collection to explain how and what kind of geometric information stored.
3. Document functions and methods which used for represent geometric data.
4. Document if there is a format for data representation (like wires, surface loops etc.)

1. Benchmark input requirements of open-source low level tools.
2. Document code data collection to explain how and what kind of geometric information stored.
3. Define difficulties by comparison output of the work and show differences and similarities.

Will continue…