Action items for December 15th and 22nd

- Think about schedule choices
  - March 1st for ISO 23247 FDIS
  - May 1st for ISO virtual meeting
  - November 1st for ISO Hamamatsu (Japan) meeting
- Business goals of your project
- Benefits of your project for standards community
- Resource requirements

Round 2 Use Cases under discussion

- Extended Use Case 1 – robot teams for drill and fill
- Extended Use Case 2 – stack-up measurement for fasteners
- Extended Use Case 3 – machining feature quality
- New Use Case 4 – digital twin for additive manufacturing
- *New Use Case 5 – design for manufacturing analysis**
- *New Use Case 6 – predictive performance**

* TBD

UC1 – Drill and Fill using Robot teams

- Dynamic Scheduling for Condition of Assembly (Round 1)
- Dynamic Scheduling for Condition of Equipment (Round 2)
- Round 2 goals
  - “Kill Kenny” in the robot cell at UW lab
  - Add the assembly loader into the cell (PLC integration)
  - Learn how to manage the digital twins
  - Parallel programming and robot cooperation / interference checking
  - Standardized state machines, different types of robots, loaders, etc

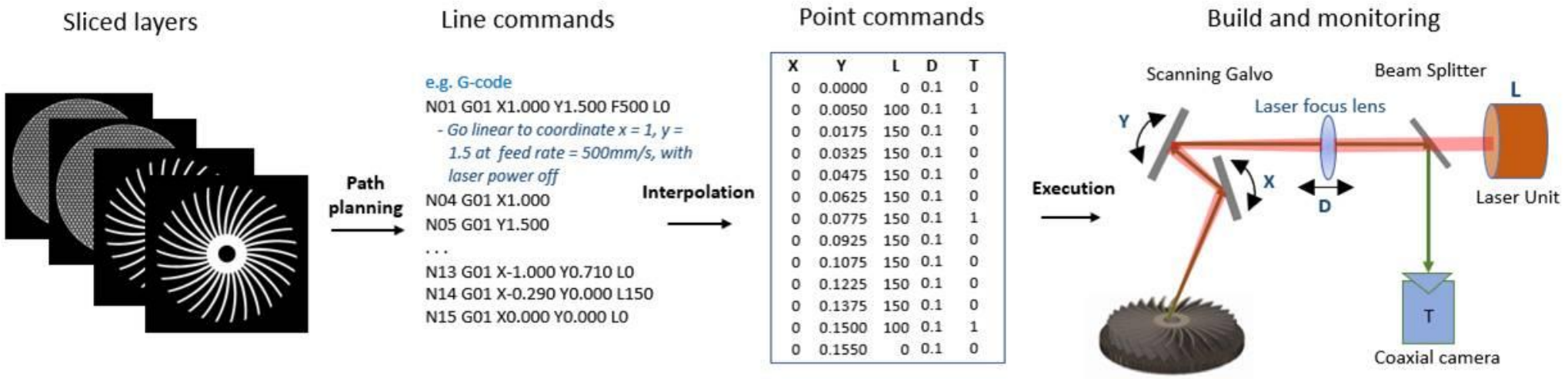
UC2 – Fastener Weight Reduction new focus – more tolerance types

- Round 1 Weight reduction
  - Measure stack-up of Al, Ti and Cf layers
  - Reduce weight by selecting best/exact fit fasteners
- Round 2 Goals
  - Demonstrate for more types of tolerances
  - Adjust geometry to match each type of tolerance
  - Learn about how to apply Round 1 results to more types of features an d tolerances

UC3 Machining Feature Quality

- Machining feature quality
  - Machine monitoring
  - Exception detection
  - Feature identification
- Round 2
  - Feature measurement
  - Life cycle management
  - Learn how to manage the digital twins
  - One plan – many runs (as per AP238 Edition 2)
  - All runs of a part, all runs for a cutter

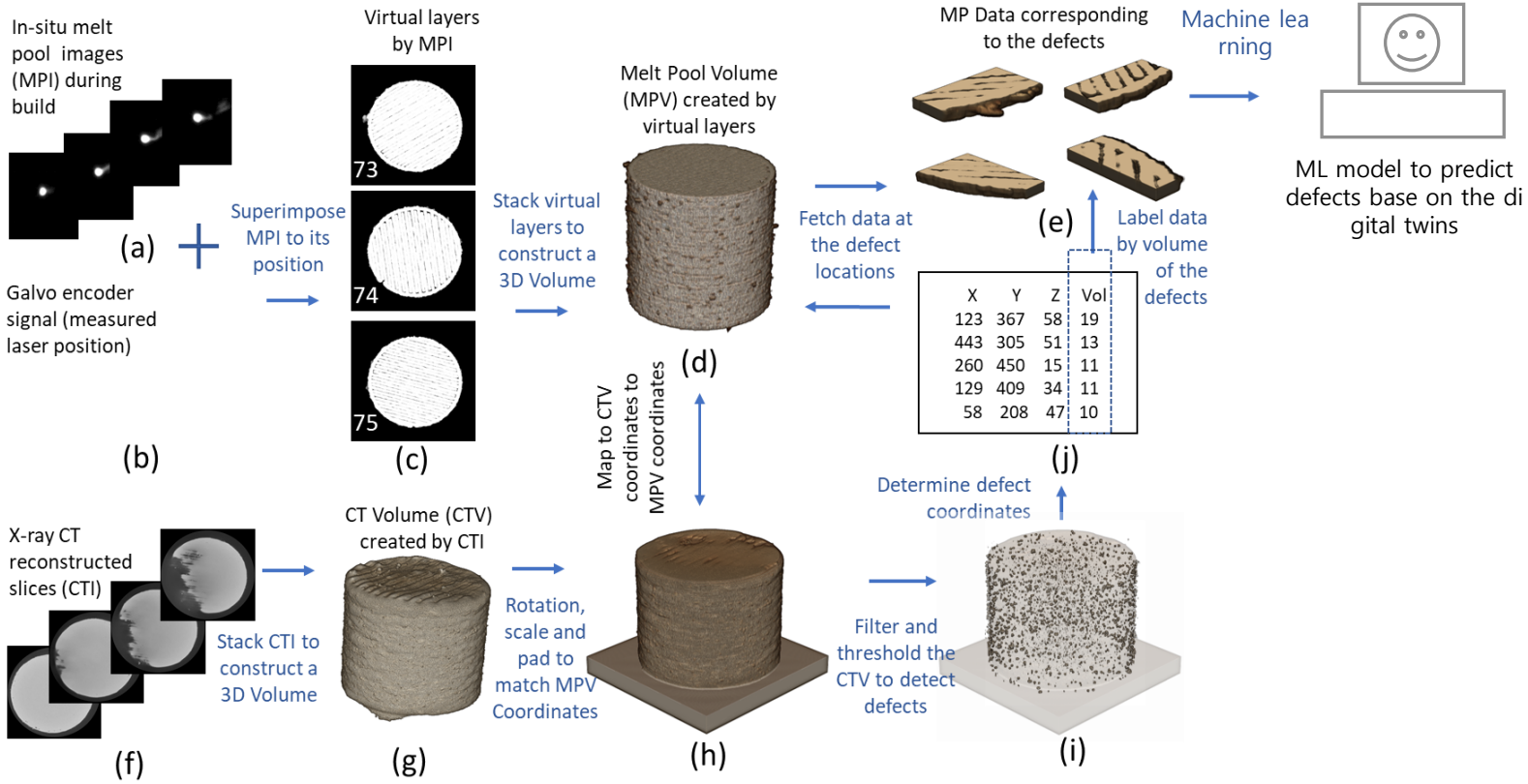
Additive Manufacturing Interoperability

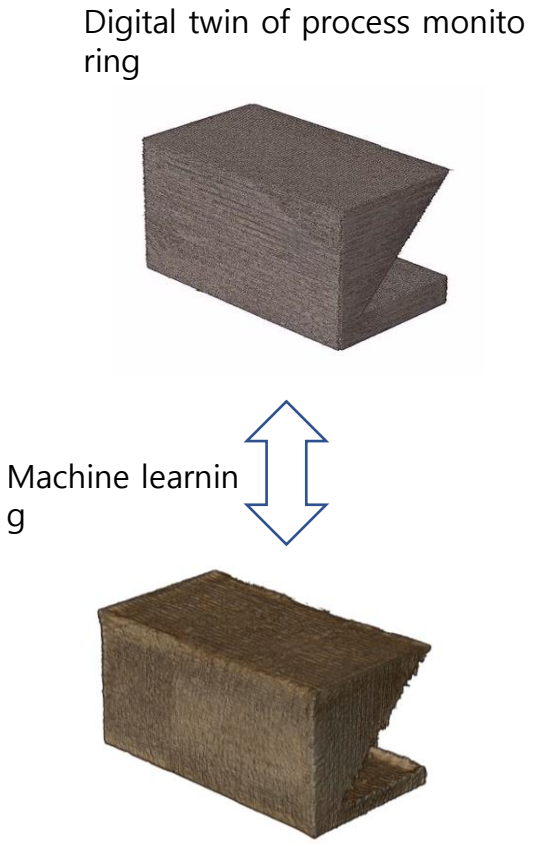


- Make STEP-NC Process Model
  - Technology model for additive processes
  - Validate using NIST digital twin
  - Learn how to match images against geometry

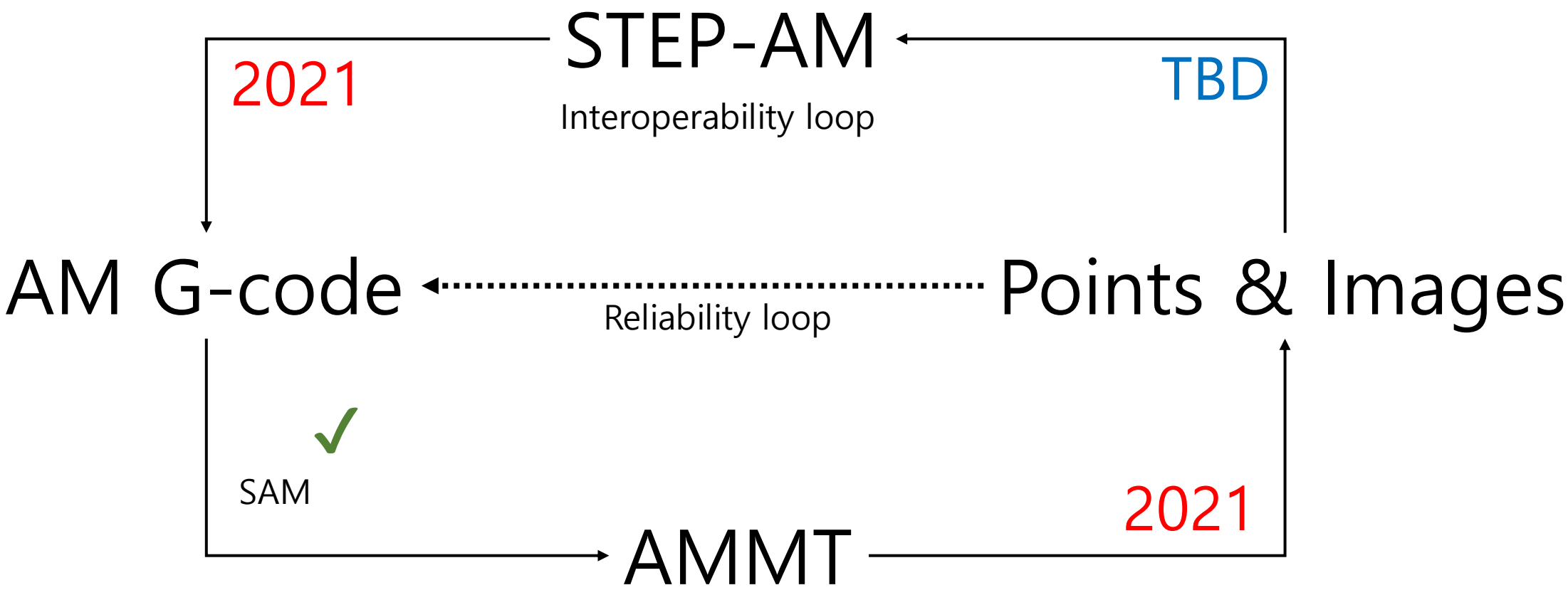
Qualify as build – defect prediction model

- Porosity is an important measurement for scan strategies.
- Correlate the process monitoring digital twin and XCT detected defects.
- Train machine learning model to predict pores from the digital twin.





AM Feedforward and Feedback



Predictive Machining

- MTConnect simulation
  - Multi-core programming
  - Exception detection
  - Feature identification
- QIF Results
  - From simulation points, touch probe, CMM
  - Geometry re-generation
  - Volume re-computation
  - Closed loop prediction