Discussion Questions/Topics for MOCRAF 2025

- **Advanced Motion Control - Synchronized Motion for Experiments (Performance & Scans)** -
  Achieving nm-level accuracy at high speed with cross-brand device synchronisation tightly coupled to detectors.

  - Fly-scans: triggers vs time-stamps; align motion & detector pipelines; handle detector dead-time.
  - Cross-brand synchronisation and multi-device sync : who is the time master? tactics when drives/PLCs differ; latency/jitter budgets.
  - Accuracy enablers: thermal management, vibration with steppers, calibration & error mapping.
  - Feedback loops using beam diagnostics to maintain position/energy—what works and what doesn't?
  - AI/ML for trajectory optimisation, feed-forward/feedback, anomaly detection during scans.
  - Organization of teams for Mechatronics

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- **Automation: Platforms, Standards & Real-Time Interoperability -**
  Converging on practical standards for controllers, networks, and software so systems interoperate deterministically.

  - Standardise or federate? One/two preferred controller families vs “best tool per task” with adapters.
  - Motors and controllers standardization (selection of controllers and motors to install)
  - EPICS: do we need a generic robot module? What should the PV schema look like (pose, JOB, status, safety)?
  - Programmable real-time machines (Speedgoat/dSPACE/OpalRT) vs embedded PLC/drive features—when to use which.
  - Piezo independence vs controller, radiation-hard absolute encoders, and interconnecting EC masters.
  - DevOps for motion: CI/CD, simulation/HIL, regression tests, configuration/versioning, cybersecurity baselines.

Discussion Questions/Topics for MOCRAF 2025

- **Maintenance strategies and Safety: Lifecycle, Reliability & Safety (Ops & Sustainment) -**
  Practical approaches to keep legacy and new motion systems safe, reliable, and available over long lifetimes.

  - What's our spares/obsolescence policy (last-time buy, interchangeability, form-fit-function, controller swap)?
  - Predictive vs preventive maintenance: what diagnostics/telemetry actually work?
  - How to extend life of >15-year mechanisms (bearings, encoders, cabling, lubrication, re-qualification)?
  - Safety: motion risk assessment, cobots vs classic cells, interlocks/E-Stops, zoning and procedures.
  - Incident management & RAMS ownership: MTTR reduction, knowledge capture, training and team roles.
  - Facility upgrades and controller obsolescence: planning without service disruption.