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The LabCEED project – current research in quality control

PROMETIA Scientific Seminar 2025

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Fact sheet

www.eda.europa.eu

Incubation Forum for Circular Economy in European Defence (IF CEED)

Project idea:

Circular Deployable Additive Manufacturing

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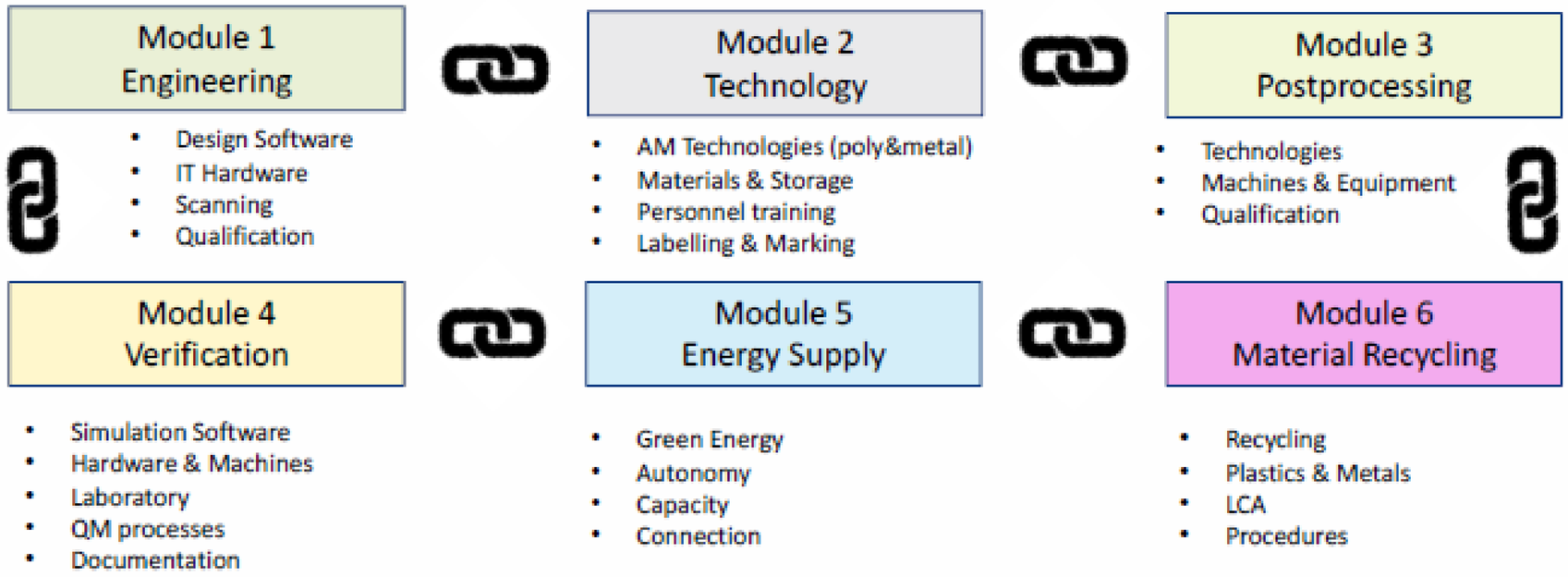
Methodology – Capability modules



Source: Fact-sheet Incubation Forum for Circular Economy in European Defence (IF CEED)
Project idea: Circular Deployable Additive Manufacturing

Why quality control is important?

- **Ensuring Material Integrity:** Raw material analysis (e.g., powders, resins, filaments) verifies chemical composition, purity, particle size distribution, morphology, and flowability. Inconsistencies can directly impact the printing process and the final part's properties.
- **Guaranteeing Mechanical Performance:** QC checks on final products (like tensile strength, hardness, fatigue resistance) ensure they meet the required specifications for their intended application, crucial for functional parts in aerospace, medical, or automotive sectors.
- **Achieving Dimensional Accuracy and Tolerances:** AM parts must often meet strict geometric dimensioning and tolerancing (GD&T) requirements. QC confirms that the printed part matches the CAD design within acceptable limits.
- **Detecting Internal Defects:** Techniques like CT scanning or ultrasonic testing are vital for identifying internal voids, porosity, or cracks that are not visible externally but can compromise the structural integrity and lead to premature failure.

Why quality control is important?

- **Ensuring Process Repeatability and Reliability:** Consistent QC allows manufacturers to validate and monitor the AM process, ensuring that parts produced in different batches or on different machines maintain the same quality standards.
- **Meeting Regulatory and Industry Standards:** Many industries using AM have stringent regulations (e.g., FDA for medical devices, FAA for aerospace). QC provides the necessary documentation and proof of compliance.
- **Preventing Costly Failures:** Identifying issues early in the raw material stage or during post-processing checks prevents the deployment of faulty parts, which could lead to catastrophic failures, warranty claims, and damage to reputation.
- **Optimizing Process Parameters:** Data gathered during QC and analysis can be fed back into the system to optimize printing parameters (e.g., laser power, scan speed, layer thickness) for improved quality and efficiency.
- **Validating Post-Processing Steps:** Many AM parts require post-processing (e.g., heat treatment, surface finishing). QC verifies that these steps have been performed correctly and achieved the desired effect without negatively impacting the part.

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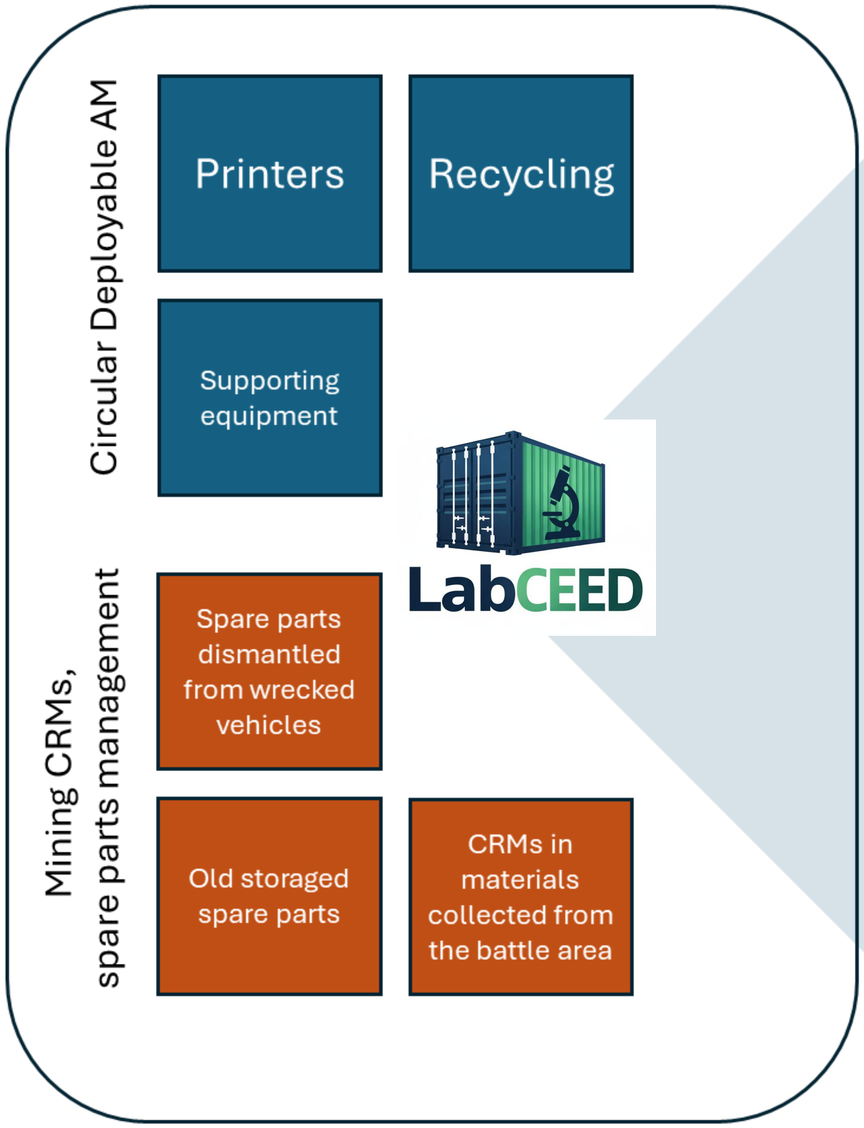

2 Stage fast quality control

- Digital quantification for fast & basic assesment
- Uncertainity decreasing using fast instrumental analytical methods

Full compatibility

- Compatibility with military standards in deployable AM

Flexibility

- For deployable AM as well as quality control of spare parts of various origins
- For recycling processes control for plastics and metals
- Allow for determination of CRMs in materialls collected from the area

Full mobility

- Small and mobile analytical instruments
- Complete container form
- Air transportation size

Easy control

- Simplified analytical procedures and aplications
- Only short training required
- On-line suport system

Digital quantification system

Selection of the instrumental methods and calibration standards (plastic/metals) + verification

Validation using defected/non-defected printed samples

Time optimization

Complete design of the mobile AM/CRM lab

The idea

Characteristic

Proof of concept

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The **Lab**oratory for **C**ircular **E**conomy in **E**uropean **D**efense Industry (**Lab CEED**) project

The project is co-funded by EDA: 24.ISE.CP.140 call under the grant agreement no. 04-24.ISE.CP.140

The final product is a design of a deployable advanced analytical laboratory for AM and identification of CRMs in battlefield waste.

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Thank you for your attention

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