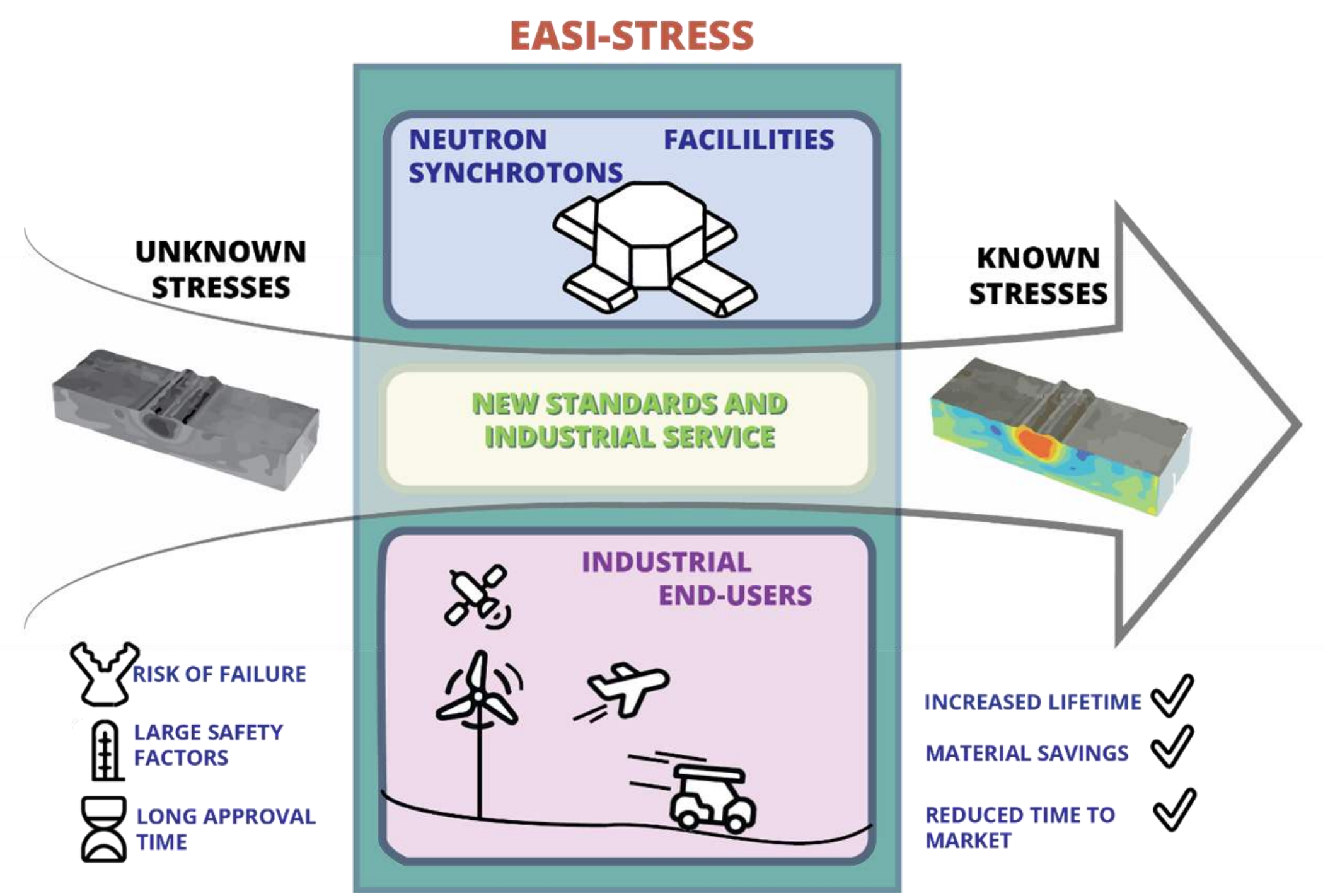


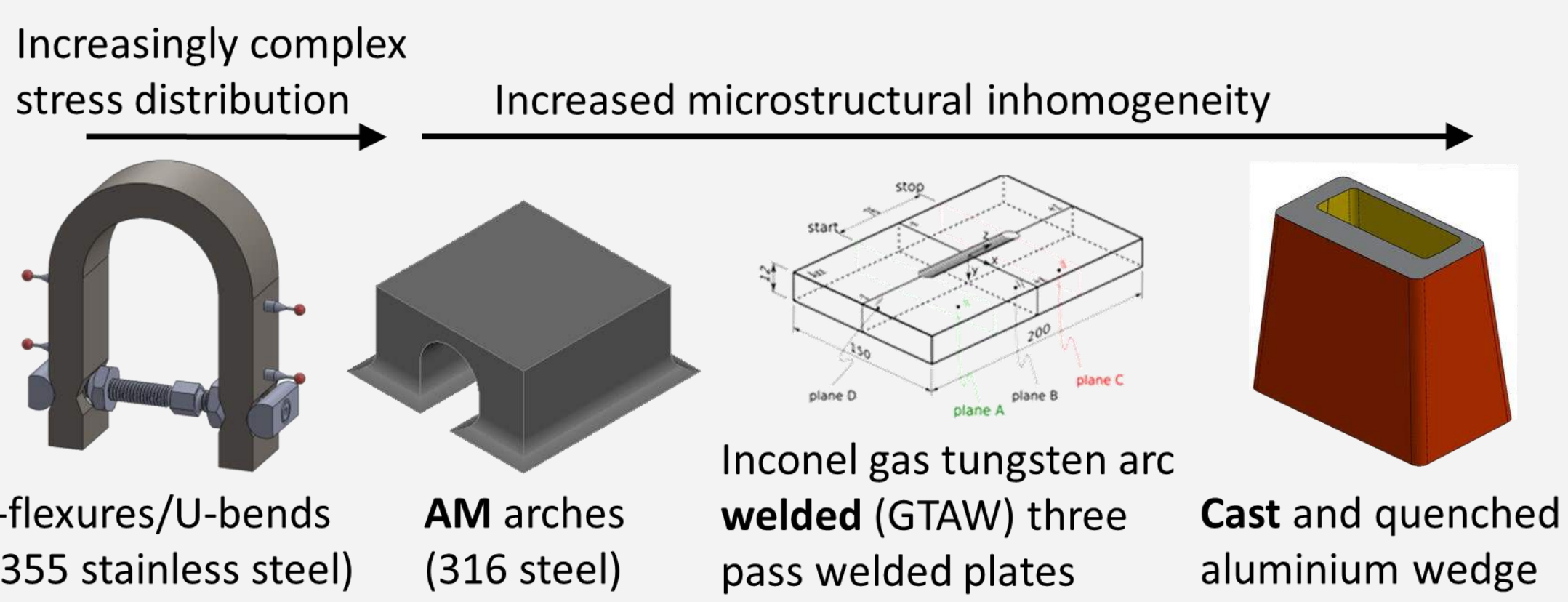
Reliable residual stress measurement for industry

Large scale neutron facilities provide powerful tools to look into the bulk of large industrial components and get insights into materials and processes that would otherwise not be possible. Despite these unique capabilities, their industrial use remains limited. In the EASI-STRESS project, we strengthen the industrial access and uptake of non-destructive neutron and synchrotron based residual stress analysis. Residual stresses inevitably arise and develop during manufacturing and usage of metallic components. They significantly influence the mechanical properties of the material, and uncontrolled residual stresses can reduce the strength and fatigue properties and ultimately cause premature failure of the component. Therefore, large safety factors are used when designing load-bearing metallic components, and EASI-STRESS will enable materials savings and reduce the time needed for testing. The EASI-STRESS project partners include large scale facilities and research institutes in addition to a companies from several different industrial sectors.



Measurement and modelling technique benchmark and validation

Industrially relevant benchmark samples are designed, manufactured and measured in order to document reproducibility and repeatability of the measurement methods and develop guidelines for comparison of data from different analysis techniques and modelling.

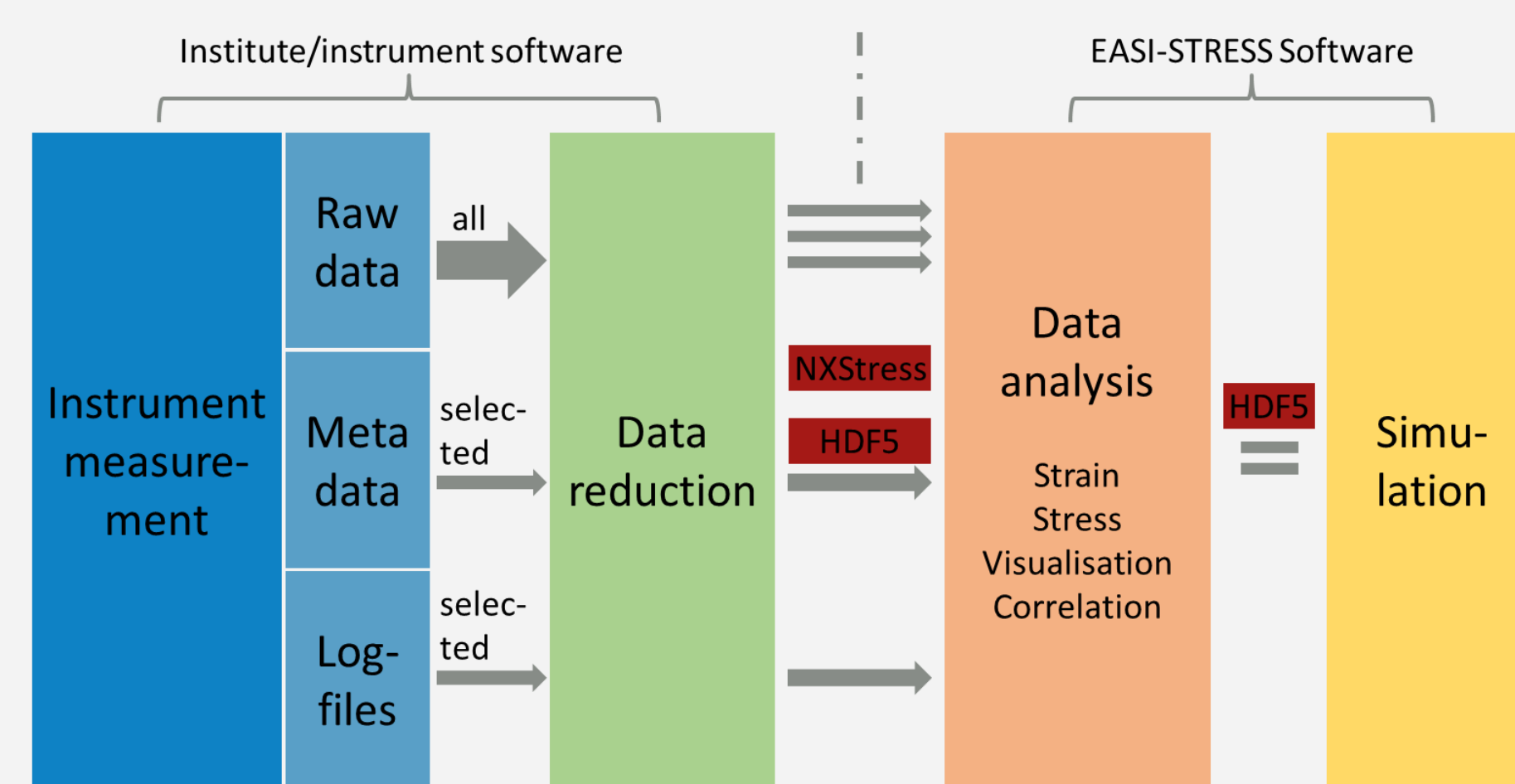
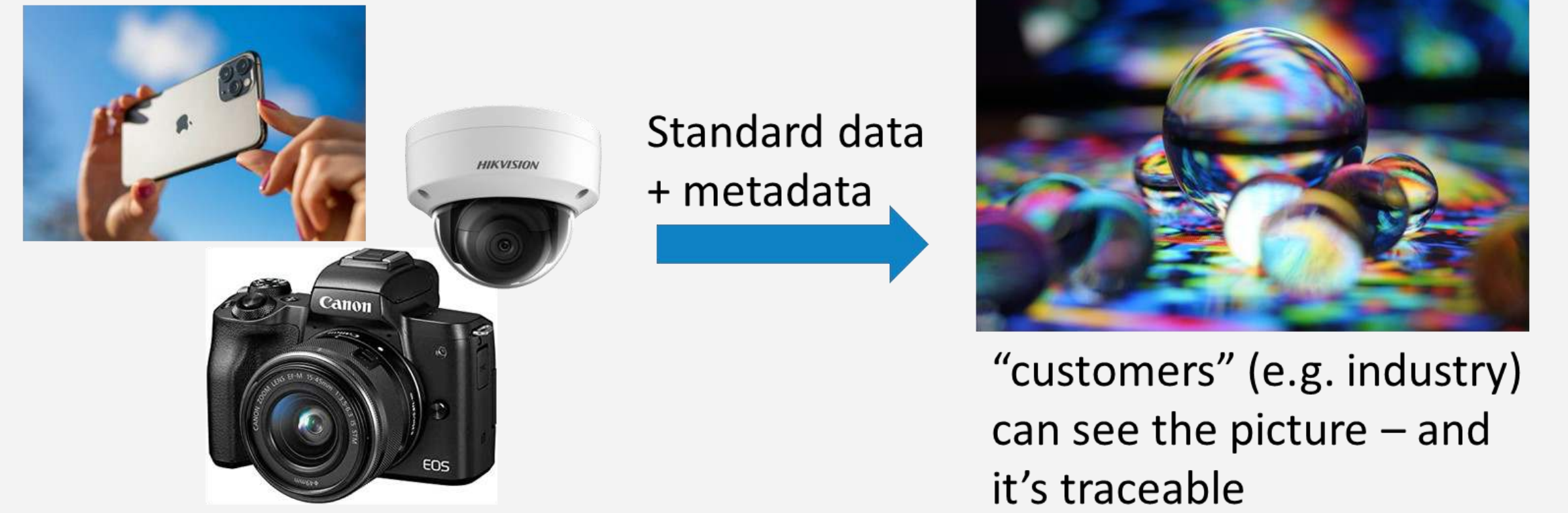


The samples are measured using neutron and synchrotron diffraction based techniques in addition to laboratory x-ray diffraction, (semi)destructive techniques and modelling.

Software development and harmonized data and metadata formats compatible with modelling

Standardized data formats and software is developed to ensure traceability and streamline data analysis. The output data formats should be compatible with FE modelling to ensure integration of measurement and modelling and stimulate industrial utilization.

“The JPEG solution”
No matter the source



The EASI-STRESS software, SOFT-AIS, reads in a standardized data format, NXstress, that contains the necessary metadata. Strain and stresses can be calculated and visualized in a format that is compatible with modelling software.

The data reduction and peak fitting is conducted locally at the facilities as optimized routines for the given setup are required.

Standardization and harmonization of procedures

Harmonized procedures and protocols are developed across all large-scale facilities to ensure reproducibility / repeatability.

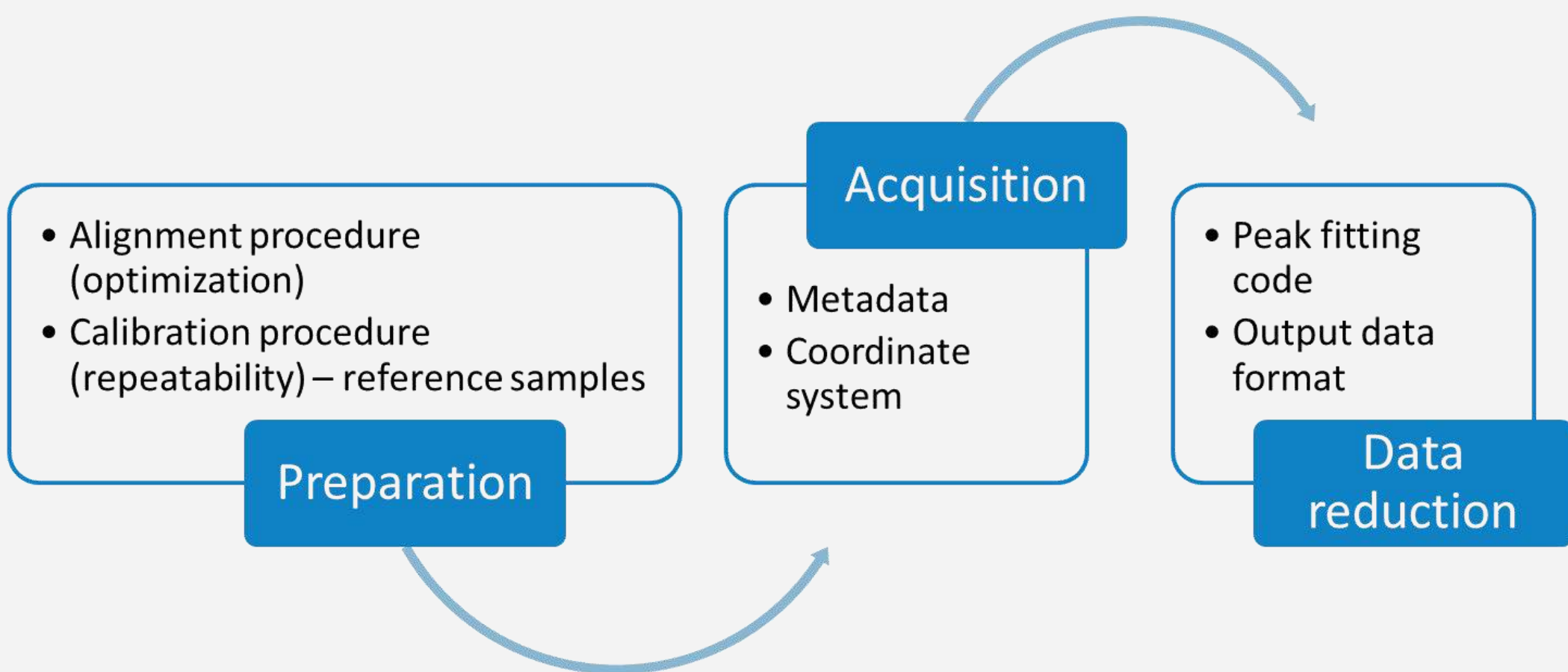
EASI-STRESS has initiated the work to establish a CEN Technical Specification (pre-standard) in Technical Committee 138 (non-destructive testing) that will be sent for approval 2023.



- Different:
- Instruments
 - Techniques
 - probes

The TS will include sections on:

- terms and ontologies,
- measurement procedures,
- calibration/reference samples,
- calculation principles, and
- uncertainty budgets.



Industrial service and testbed service

The software and measurement protocols are tested via 5 case studies defined by the industrial partners.

These will also form the basis of establishing a sustainable industrial residual stress service that will be hosted by CETIM and DTI and continue after the project period. The service will ensure reliable and efficient access to residual stress measurements to be included with modelling tools.

This will secure a competitive advantage across European industrial sectors through optimised component design, reduced material use through reduced safety factors (material savings of around 15%) and an estimated cost-reduction of 5% in a EUR 350 billion market through shortened time-to-market and increased lifetime.

