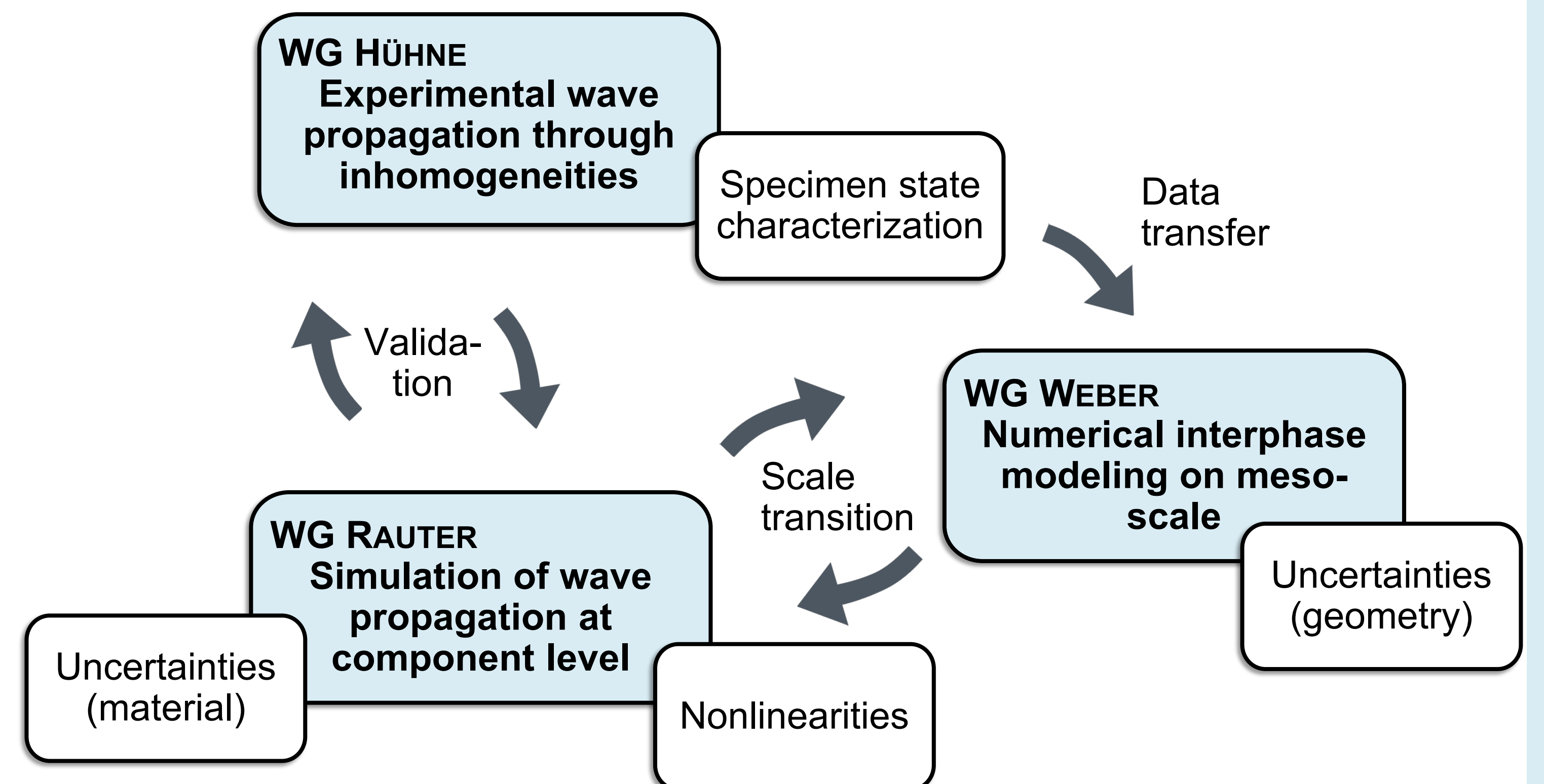


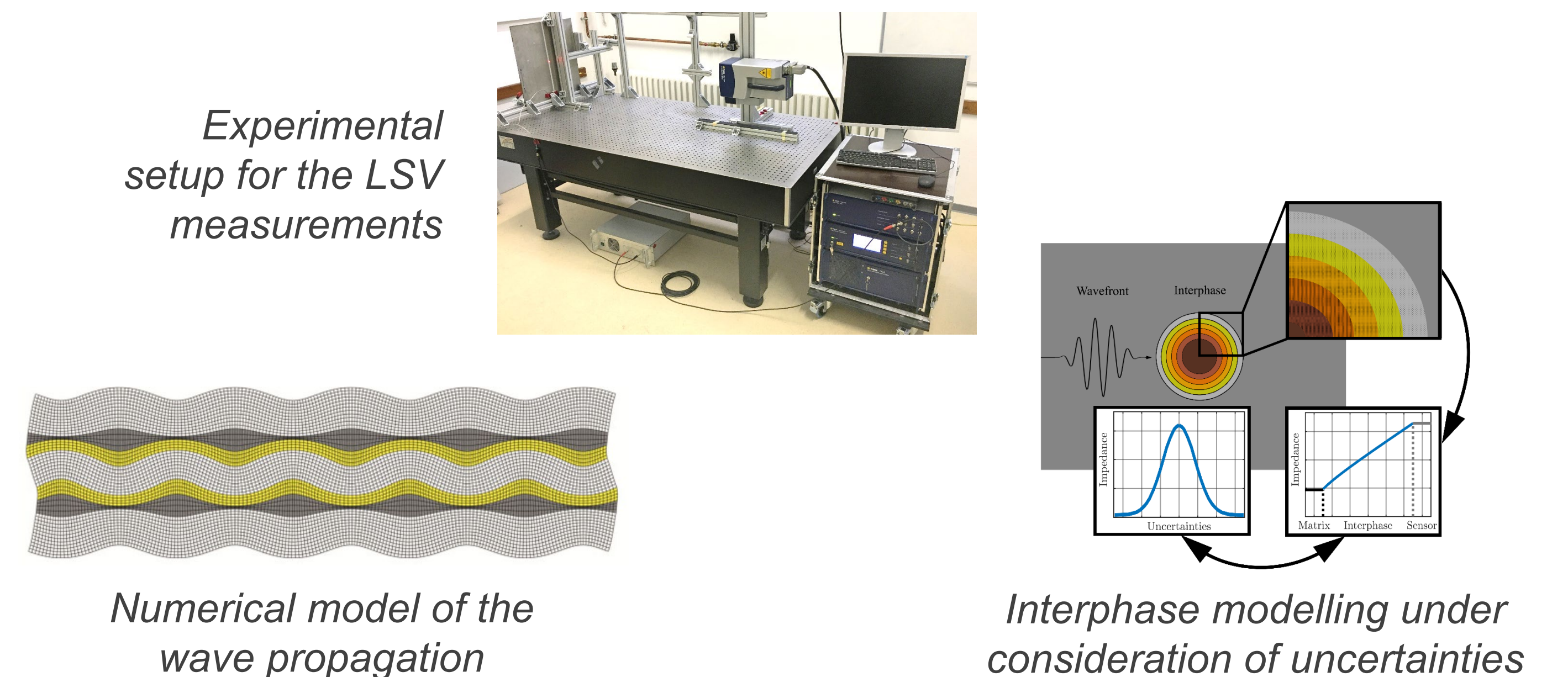
Objectives of the second funding period

- Manufacturing and design inhomogeneities in large FML constrain the design of an SHM system
- Proper and robust 2D and 3D numerical models reflect the physical phenomena when propagating waves interact with inhomogeneities
- A detailed analysis at the meso-scale allows for an efficient modelling at the component level
- Probabilistic modelling including multi-scale information is necessary to predict the wave propagation and interaction with inhomogeneities correctly
- Structural inhomogeneities influence wave propagation
- Functional conformity is achieved through the design of the inhomogeneity



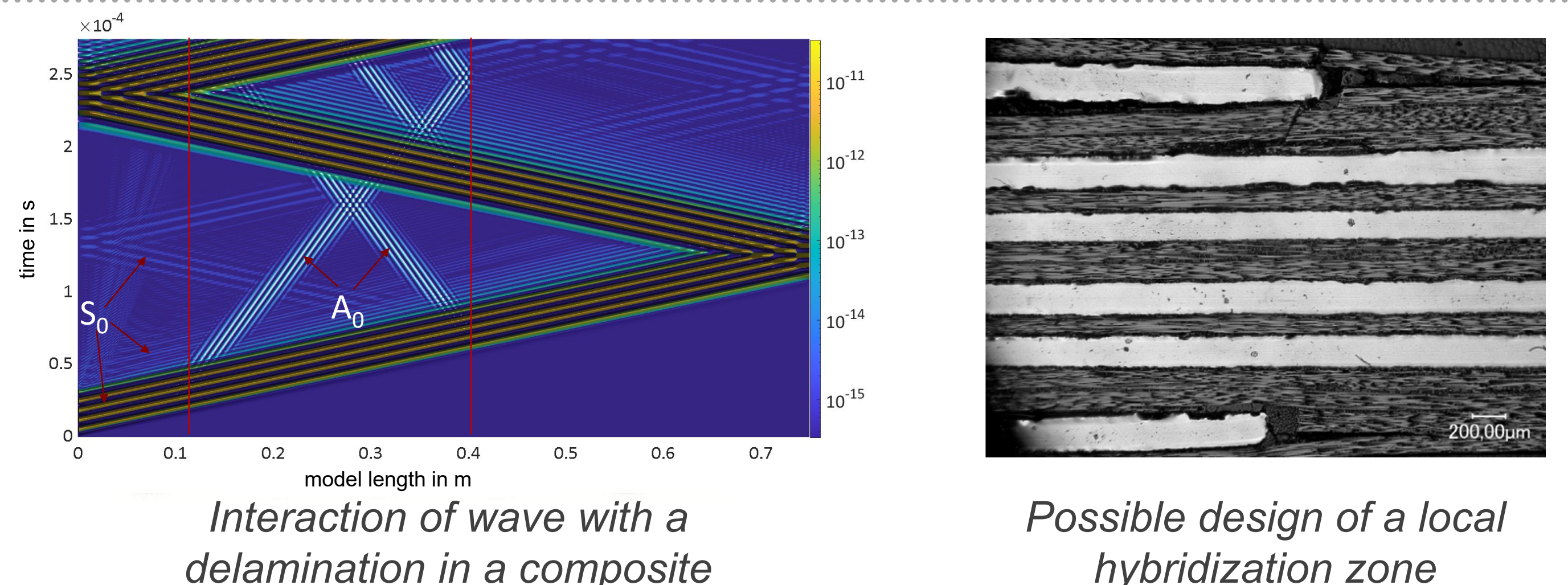
Methods

- FEM (2D/3D) with regard to nonlinearities, uncertainties and layered inhomogeneous materials
- Random fields for spatial distributed material properties
- Multiscale approach (from interphase modelling to component level and vice versa)
- Experimental wave propagation measurements using Laser Scanning Vibrometry (LSV)
- State characterization with strain gages and FBGs
- Microsection analysis and ultrasonic scans



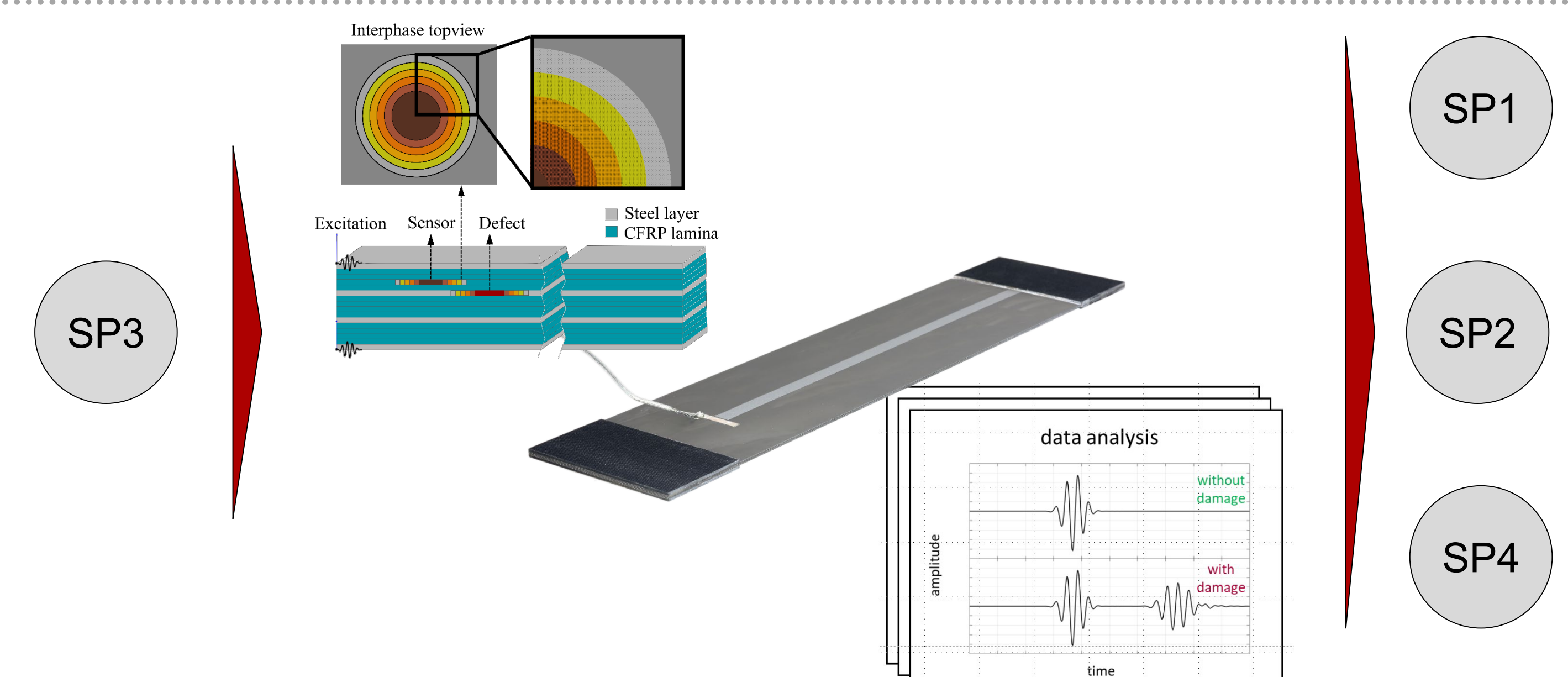
Expected results

- Correlation between the wave propagation and the design of inhomogeneities
- Validated numerical modelling approach that is capable of predicting the wave propagation in components with varying complexity
- Numerical and experimental wave propagation data for various inhomogeneities as input for model free methods



Added value for the research unit

- Physical CFRP-steel specimens with different state characteristics and inhomogeneities (SP1, SP2)
- Design guidelines for embedded sensor interphases (SP2)
- Numerical and experimental wave propagation data (SP1, SP2, SP4)
- With the gained knowledge over the entire duration of the research unit design guidelines for SHM systems are developed



Ultrasonic Monitoring of Fibre Metal Laminates Using Integrated Sensors

Research Unit FOR3022

