HISTRATE

Advanced Composites under HIgh STRAin raTEs loading: a route to certification-by-analysis

Tips and tricks for the preparation of a COST action

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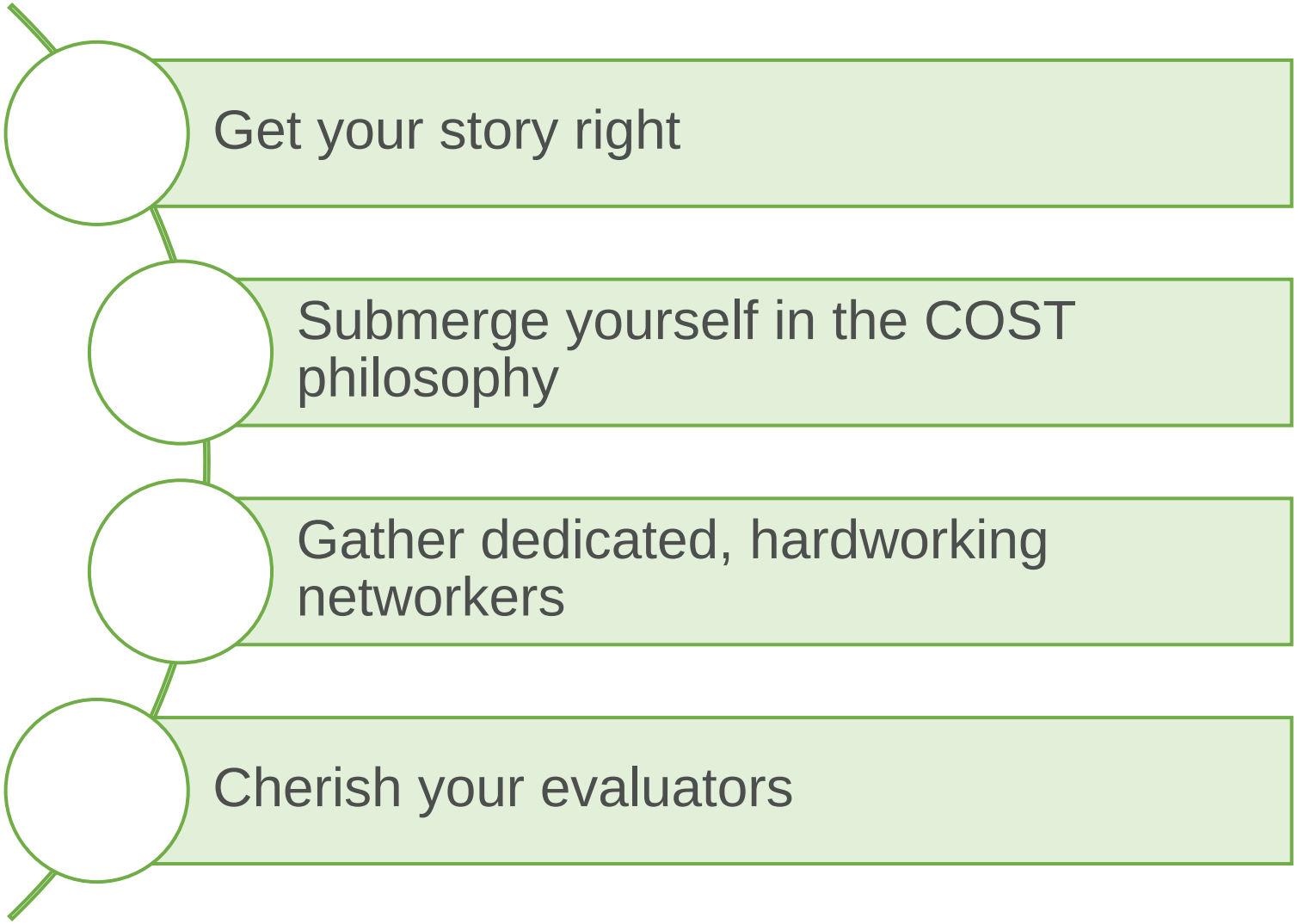
Funded by the European Union

Overview – Tips & tricks



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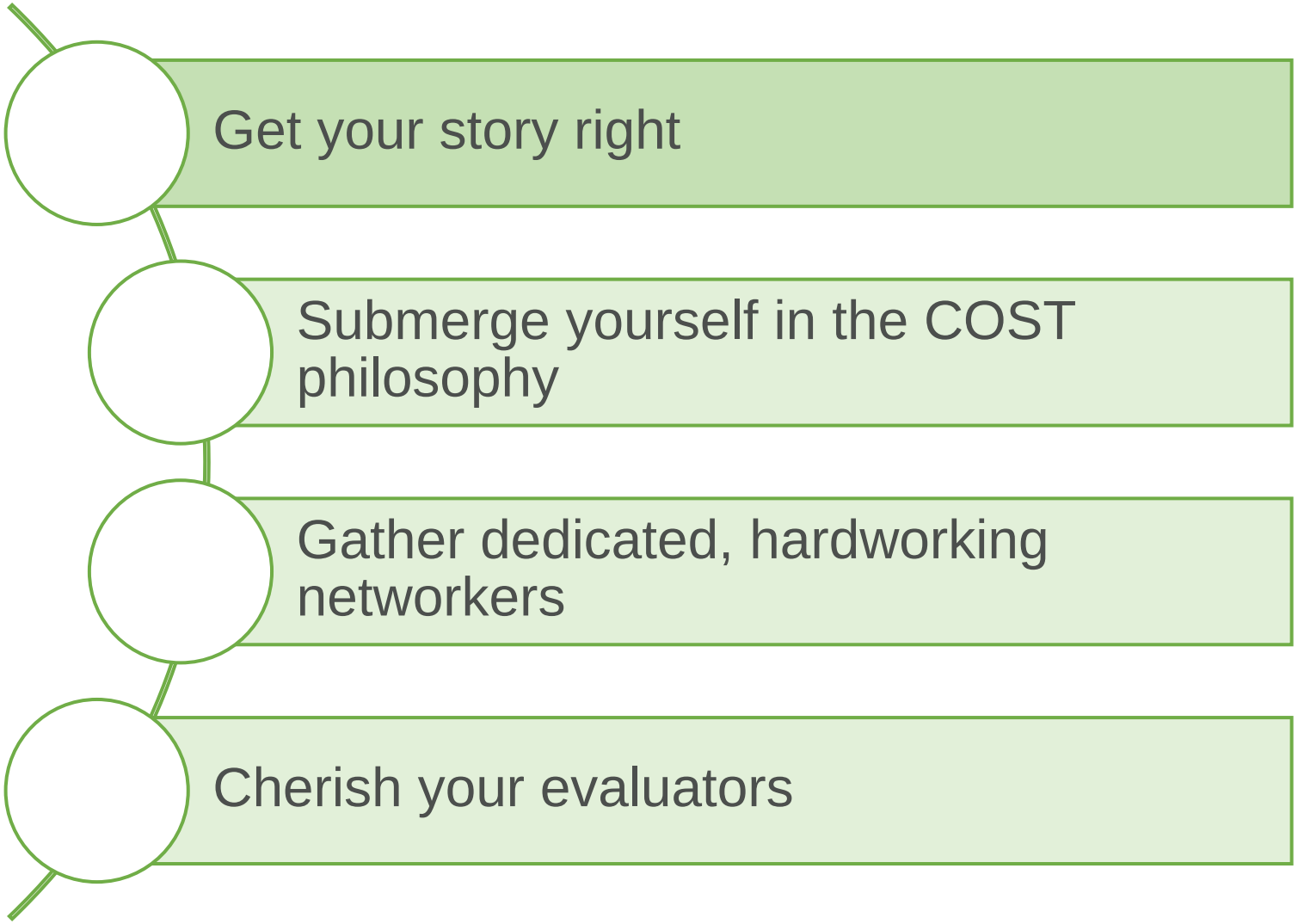
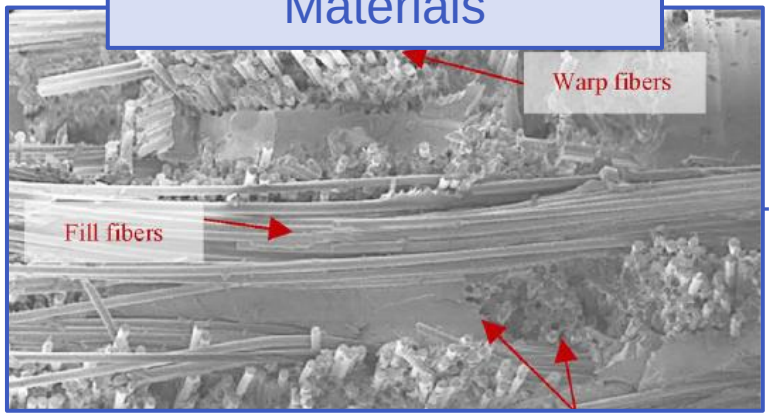


The HISTRATE Story

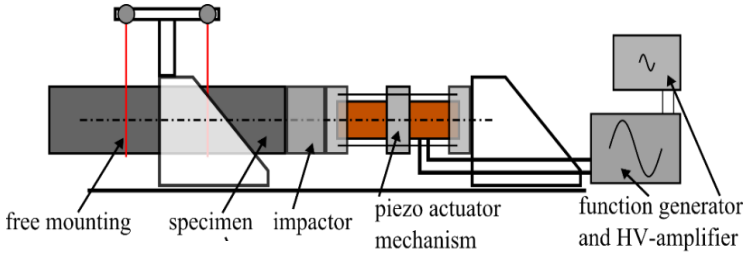
- Started in 2015 with H2020 project **EXTREME - Dynamic Loading Pushing the Boundaries of Aerospace Composite Material Structures**
- Gathered academic & industrial partners

EXTREME project - Overview

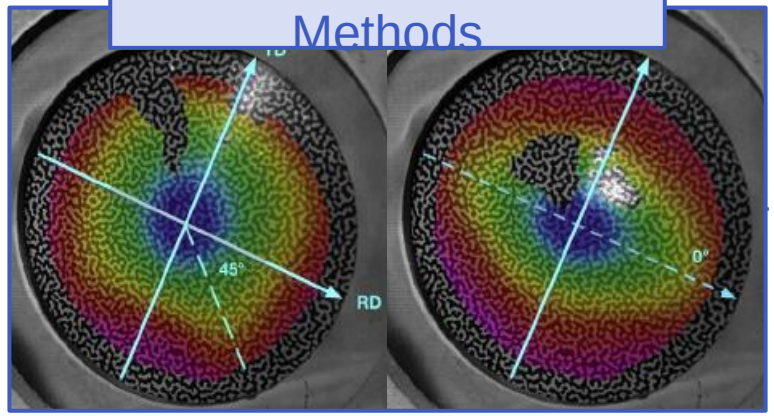
Materials

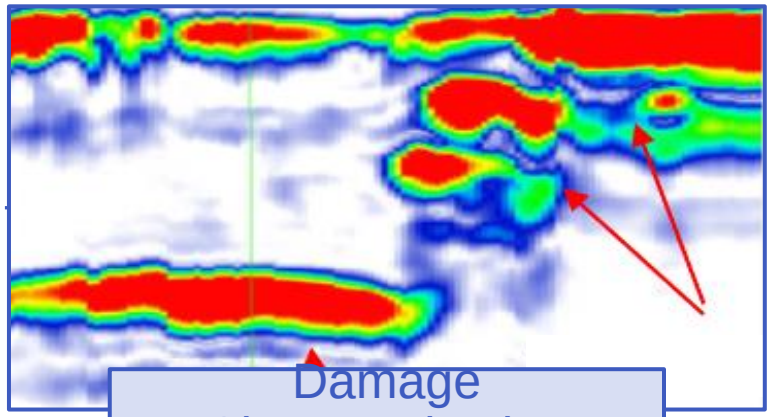


Material Testing



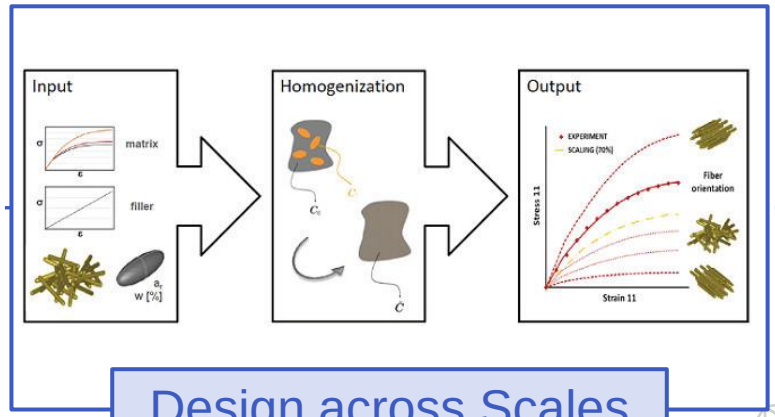
Measurement Methods





Damage Characterisation

Digital



Design across Scales

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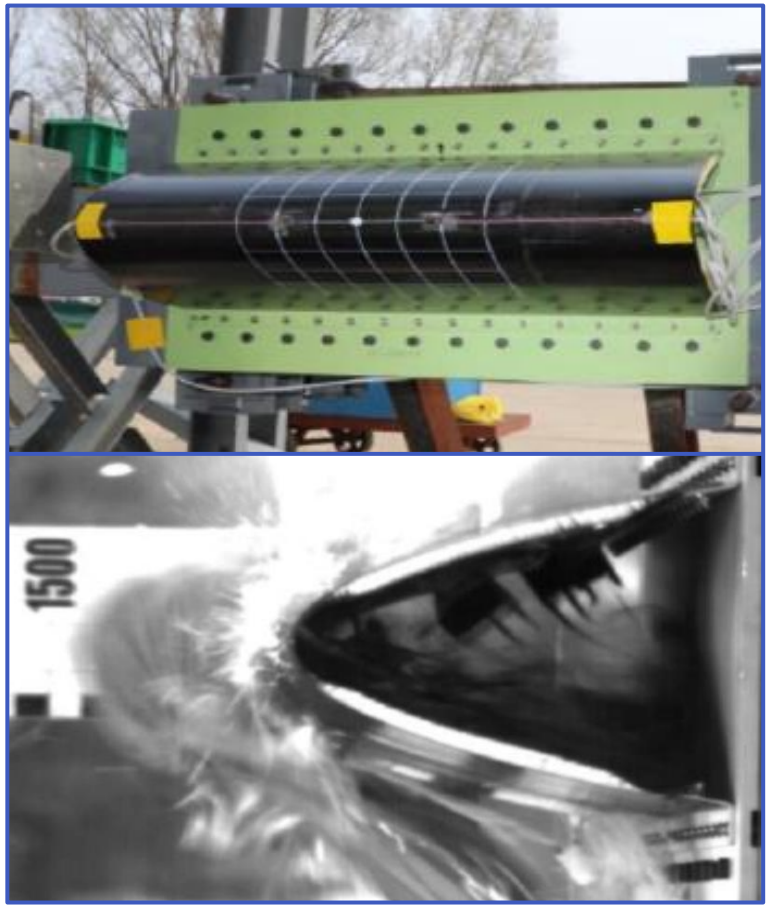
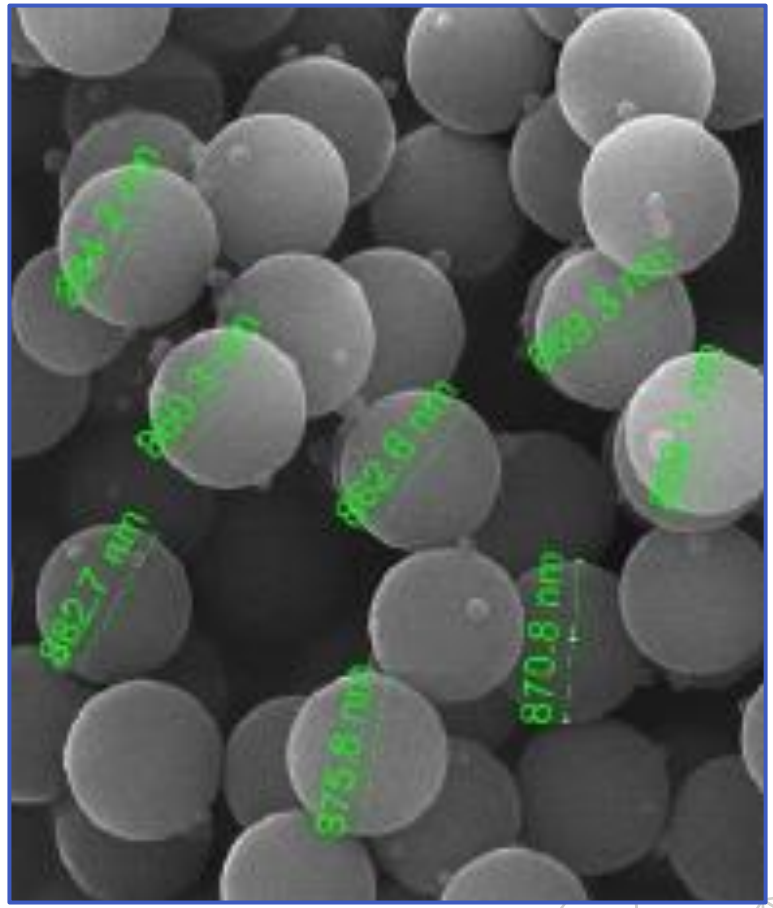
EXTREME project - Materials

- Novel composites for high strain rate loading applications
- Conflicting requirements posed by safety, lightweight and manufacturing cost
- Nano-particle reinforced matrix materials
- Alternative fibre materials
- New out-of-autoclave manufacturing procedures





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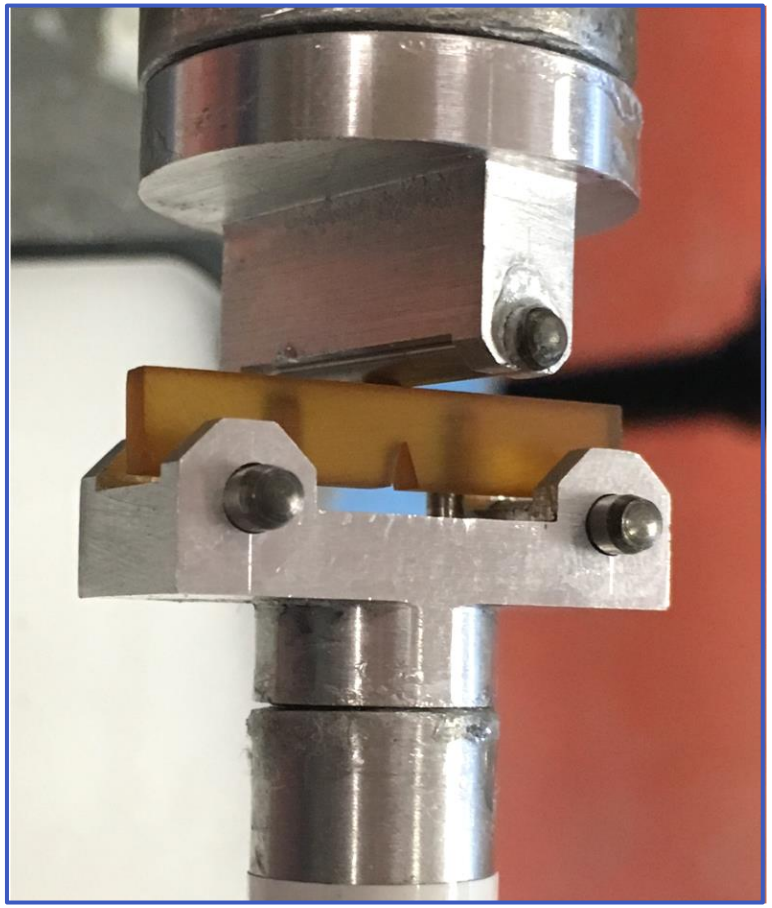
EXTREME project – Material Testing



- Optimised and new testing protocols
- Strain rate levels relevant for structural applications
- Deformation conditions approaching real applications
- Tests revealing critical damage and failure phenomena
- Rich measurement datasets allowing efficient model calibration and validation

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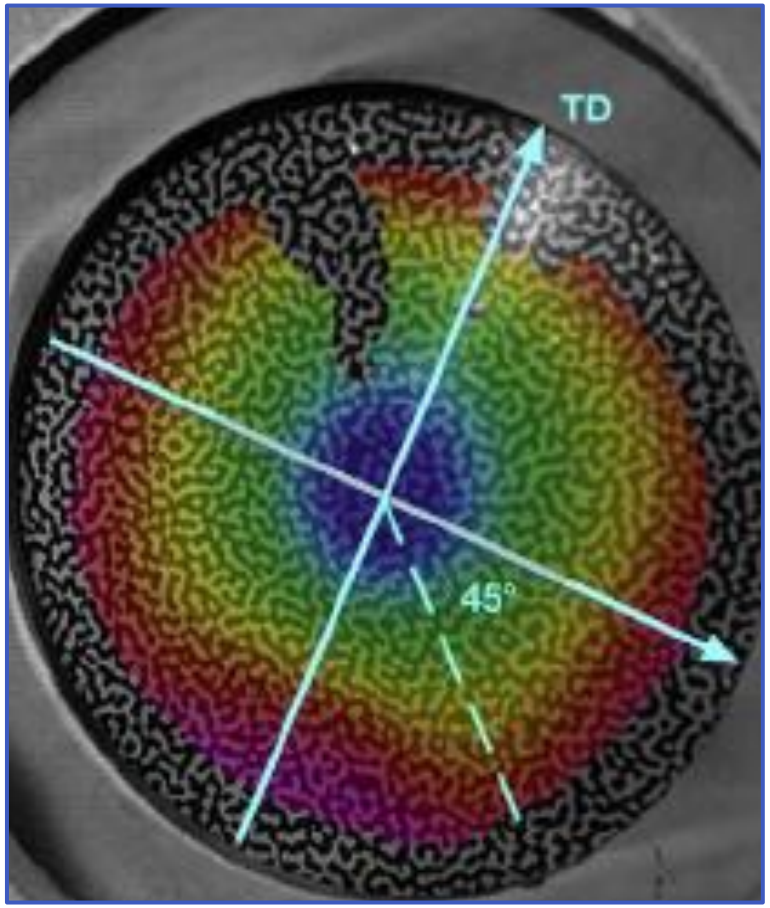
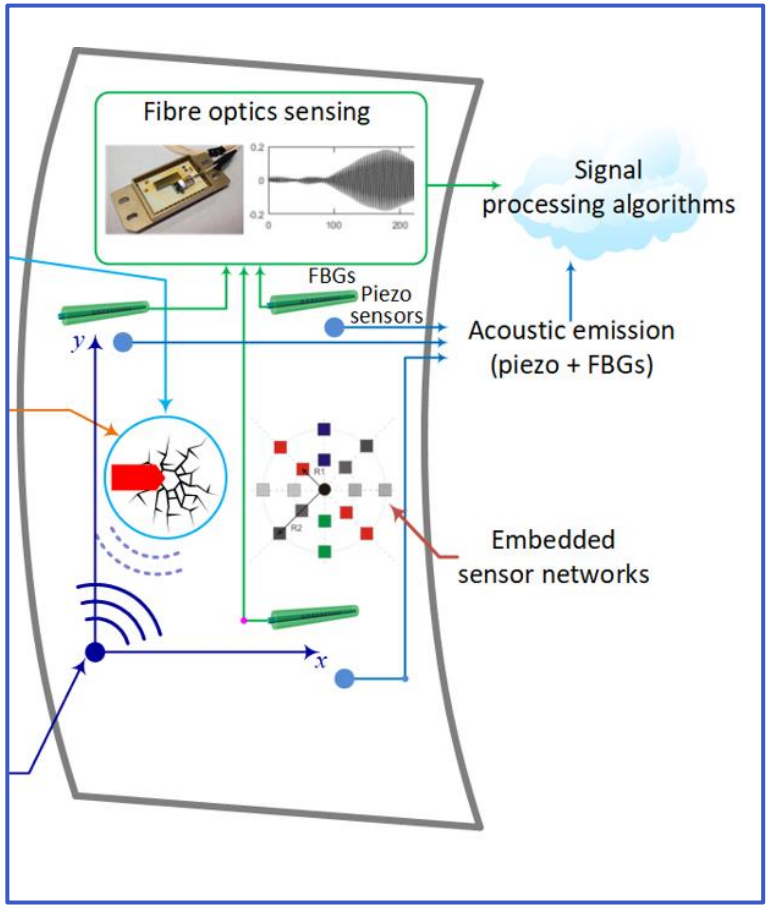
EXTREME project – Measurement Methods





- Novel techniques to measure wave propagation, shock loading, and damage initiation and fracture
- Full-field versus discrete, non-contact surface versus embedded sensors measurements
- Integration in model parameter calibration and validation schemes
- Materials testing 2.0

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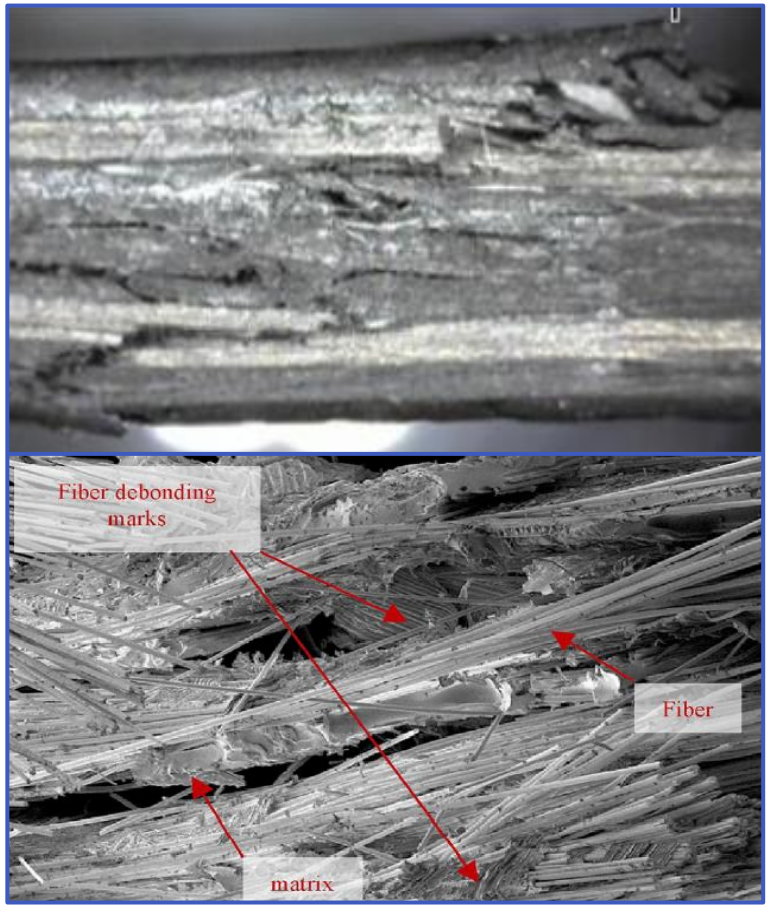
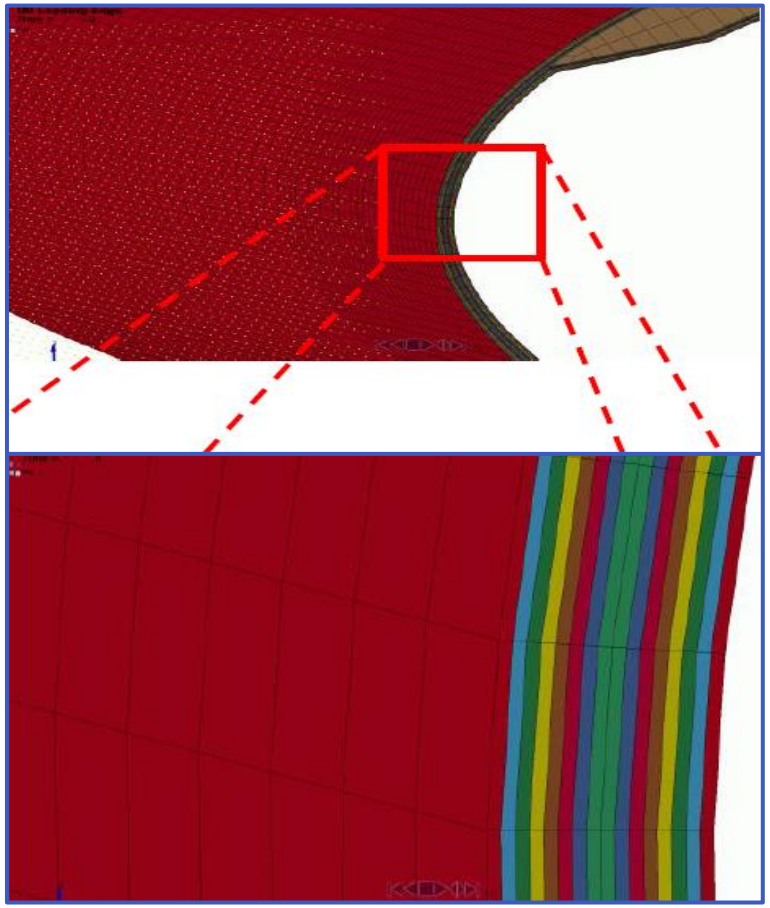
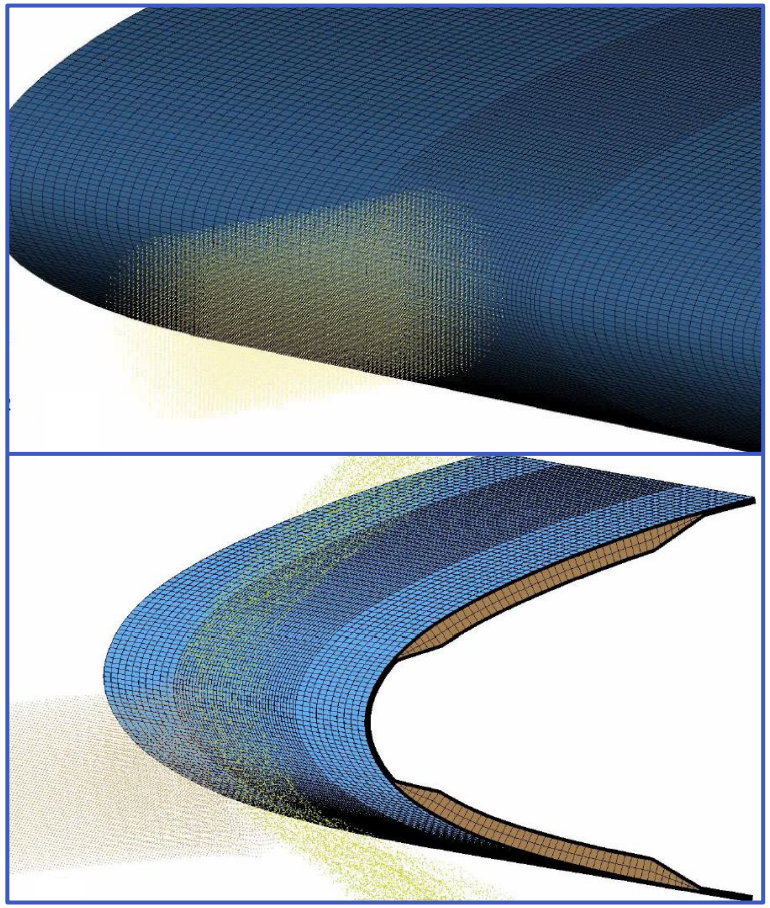
EXTREME project – Damage Characterisation

- Wide variety in-situ and post-impact damage characterisation methodologies
- Data often difficult to use for model validation
- Need for common approach for multi-modal inspection based on different physical principles
- Reliable data on post-impact damage needed for inspection and modeling



EXTREME project – Design across scales





- Tools and methodologies for designing structures with different scale features
- Multiscale composite material models for dynamic loading
- Computational methods able to overcome mesh distortion and interpenetration
- Multiscale model-based simulation procedures allowing verification with test data

EXTREME project – Conclusion

- ✓High level consortium, all partners driven and dedicated to get results
- ✓Generous budget
- ✓Excellent collaborations
- ✓Valuable project results, high level publications
- ✓Solutions with high innovation potential

X Though… outcome not adopted by industrial partners

The EXTREME project – Conclusion

X Though… outcome not adopted by industrial partners because of certification issues

- X Limited transfer of innovations to certification procedures
- X Standardisation & certification bodies not involved
- X Poor geographical coverage of Europe
- X Increasing knowledge gap
- X Lack of training & wide distribution of required knowledge

✓ Ideal starting point for a COST ACTION !!

How does HISTRATE fit in CA framework ?

COST Actions

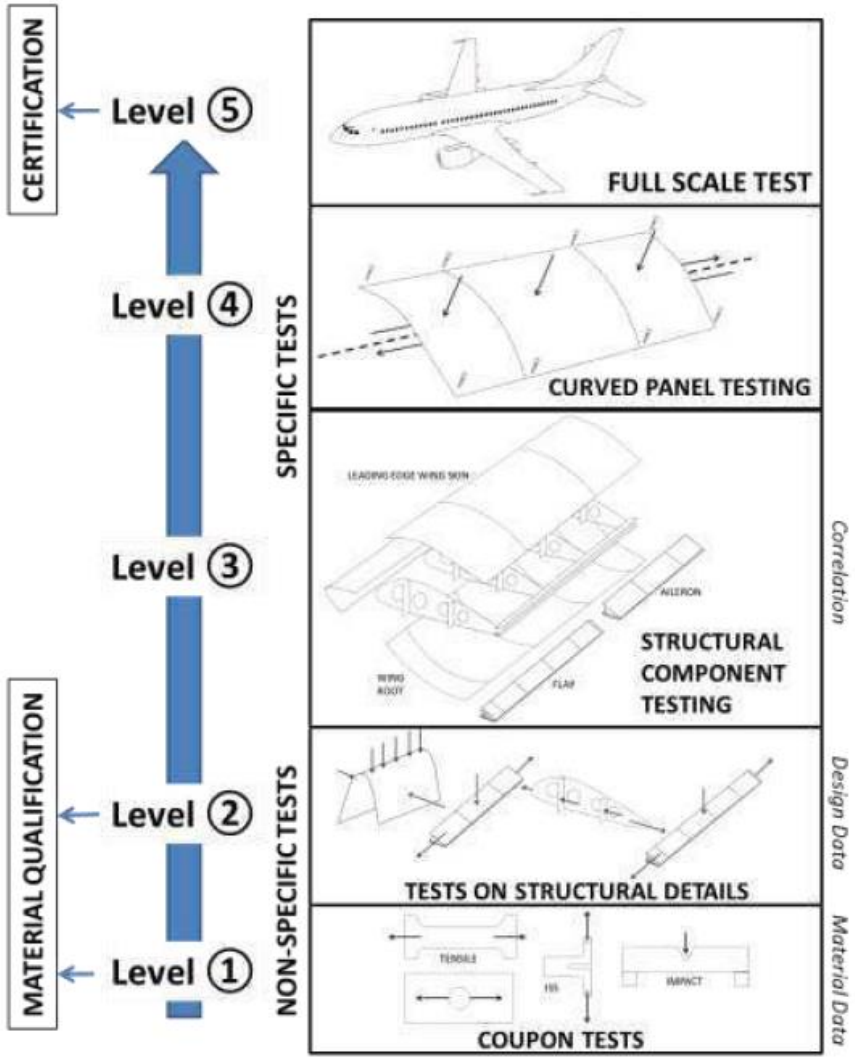
AN EFFICIENT NETWORKING TOOL

COST provides funding
for research coordination
and capacity building
activities

COST is not funding research
itself,
but pooling resources
and research results
by networking

- ✓ Networking clearly brings added value to tackle the Challenge
- ✓ Impact for EU competitiveness, science and society clear
- ✓ Relevant stakeholders identified, win-win sufficiently clear to get them involved
- ✓ Important for EU
- ✓ Not a research project

COST ACTION HISTRATE - CHALLENGE



Establish the scientific and technological (S&T) foundations for the creation and implementation of a reliable and robust framework for certification by analysis of advanced composite load-bearing structures subject to high strain rate loading

AUTOMOTIVE

ENERGY

AERONAUTICS

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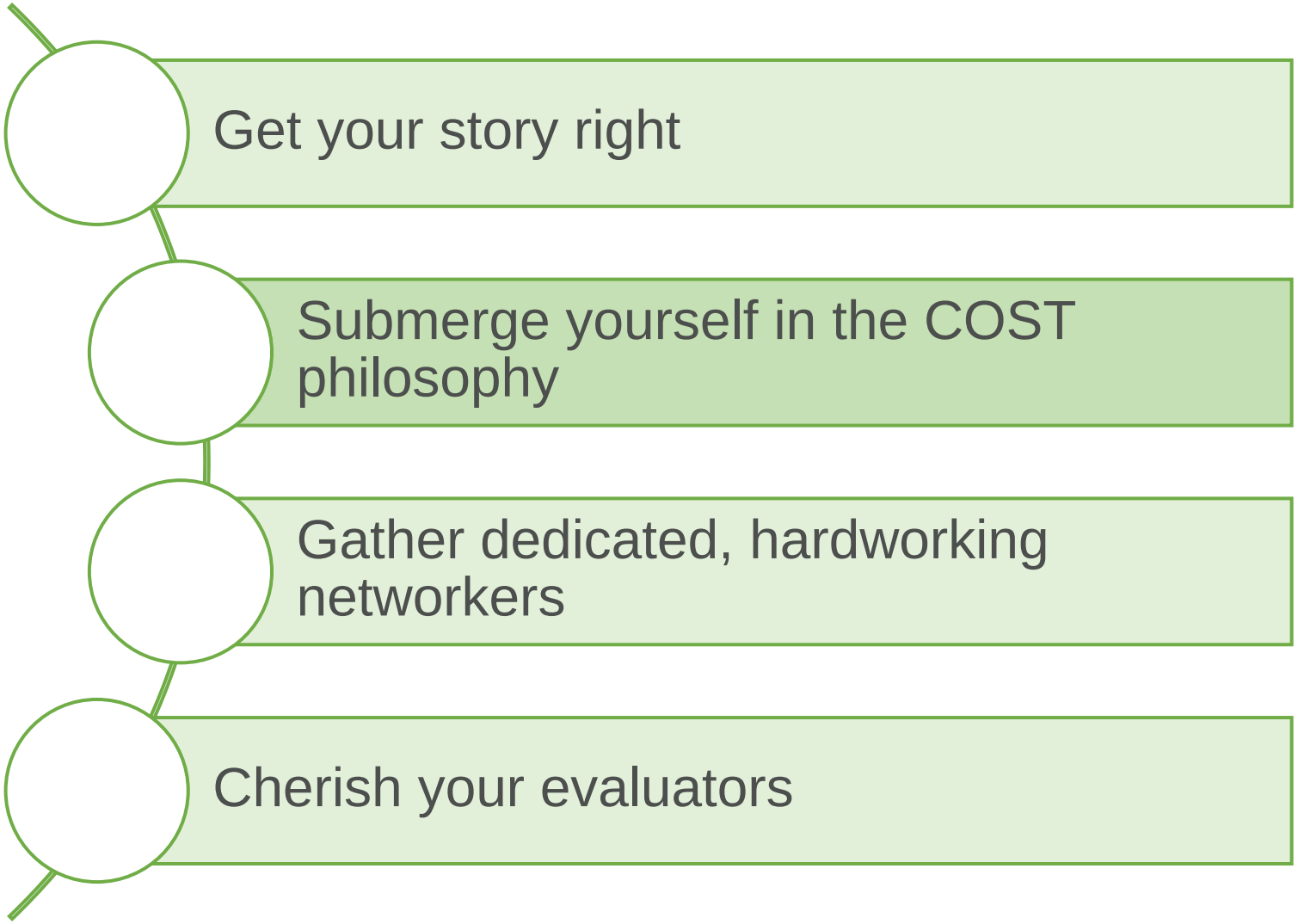
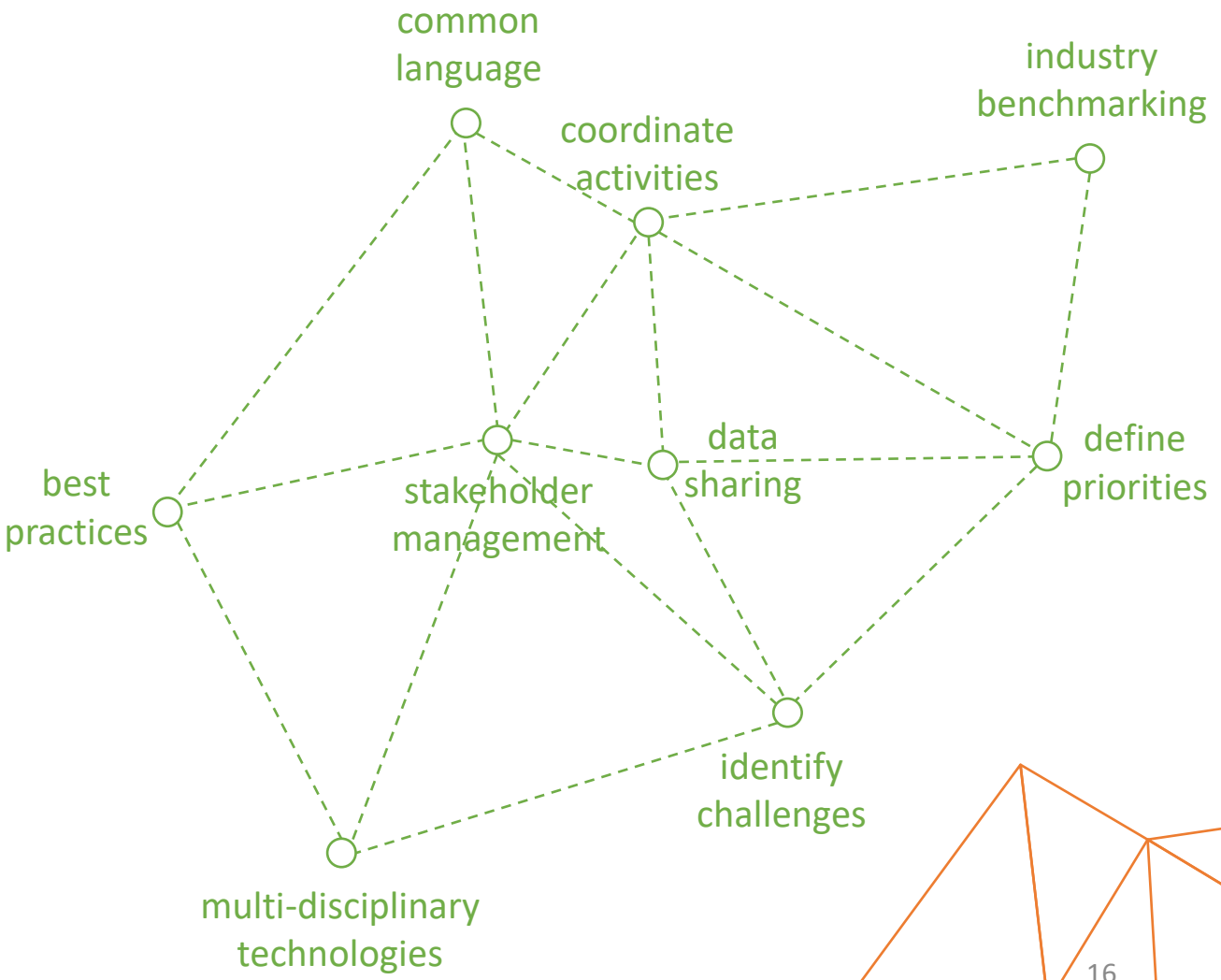


Objectives on Research Coordination

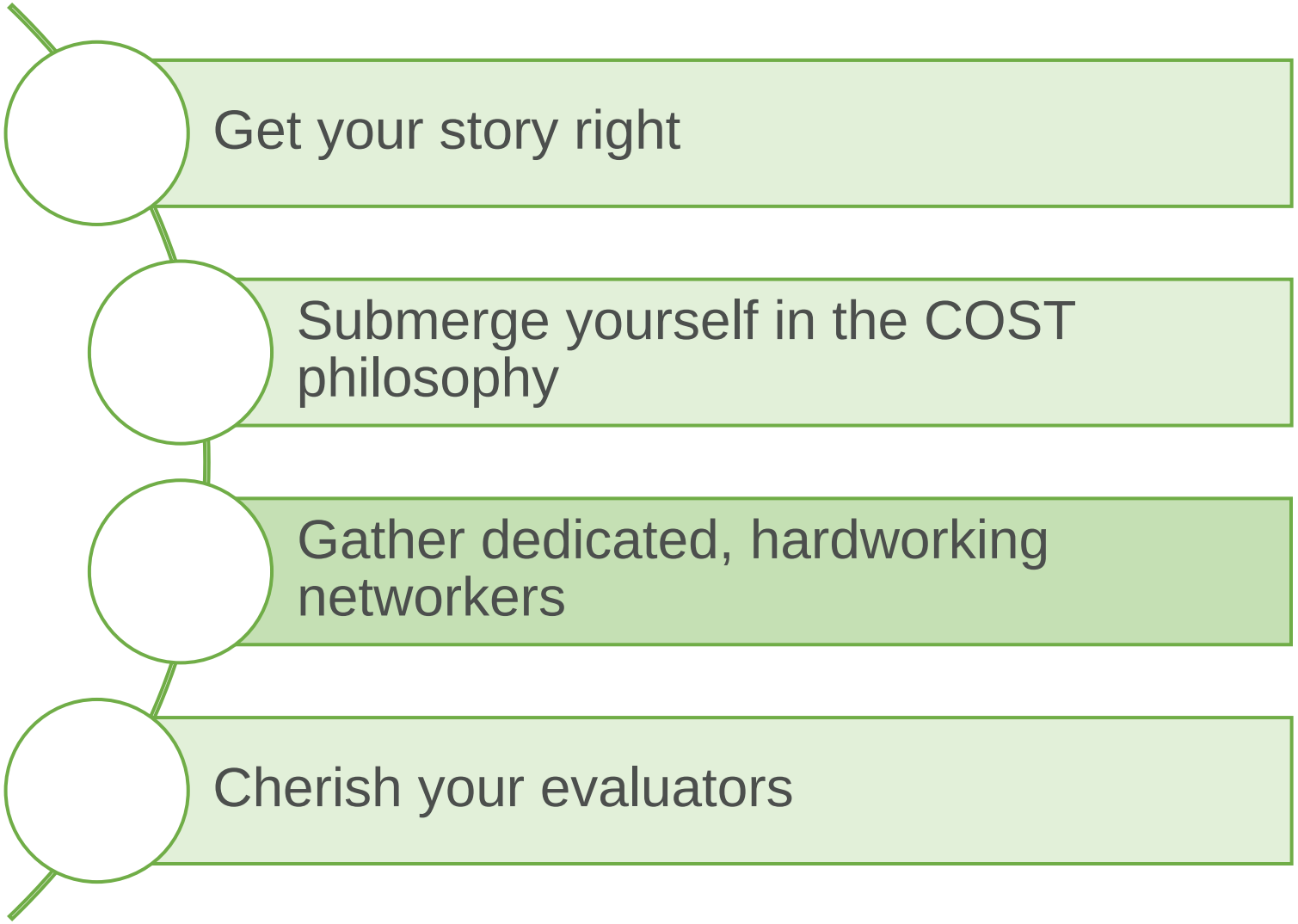
1. Establish and improve semantic interoperability to develop a common “language” between various technologies/tools/methods adopted in the different industrial fields involved in HISTRATE.
2. Gather the state-of-the-art in the following science and technology fields for the design of safety-critical structures under high dynamic loading and composite/hybrid structures: dynamic testing, full-field and discrete measurements, in-Situ NDT, data extrapolation, advanced simulation tools, certification and standardisation.
3. Identify challenges, limitations and issues currently faced in designing lightweight composites, including safety structures undergoing extreme loading conditions. Establish the best practice for design which also includes environmental impact.
4. Analyse representative cases across the various industrial fields to address the needs of the stakeholders and the requirements of certification agencies, in terms of materials, inspection, testing, modelling and regulations. Start activities towards the development of new guidelines for certification.
5. Identify short term and long-term challenges of



Objectives on Capacity Building

1. Create and coordinate activities in a collaborative network of experts and facilities from broad backgrounds.
2. Promote geographical, age and gender balance throughout the network activities.
3. Generate and promote new opportunities, and create new networks especially for Early Career Investigators.
4. Train graduate students and ECIs on relevant crucial topics such as advanced modelling, multiaxial testing, certification issues, full-field capturing devices.
5. Establish strong links between scientists, stakeholders, certification bodies, policymakers.
6. Actively disseminate knowledge and experience from the network by publications, workshops, seminars, periodic conferences, awareness days,…
7. Incorporate the Action's outcomes in the syllabus of the PhD programmes across the network.

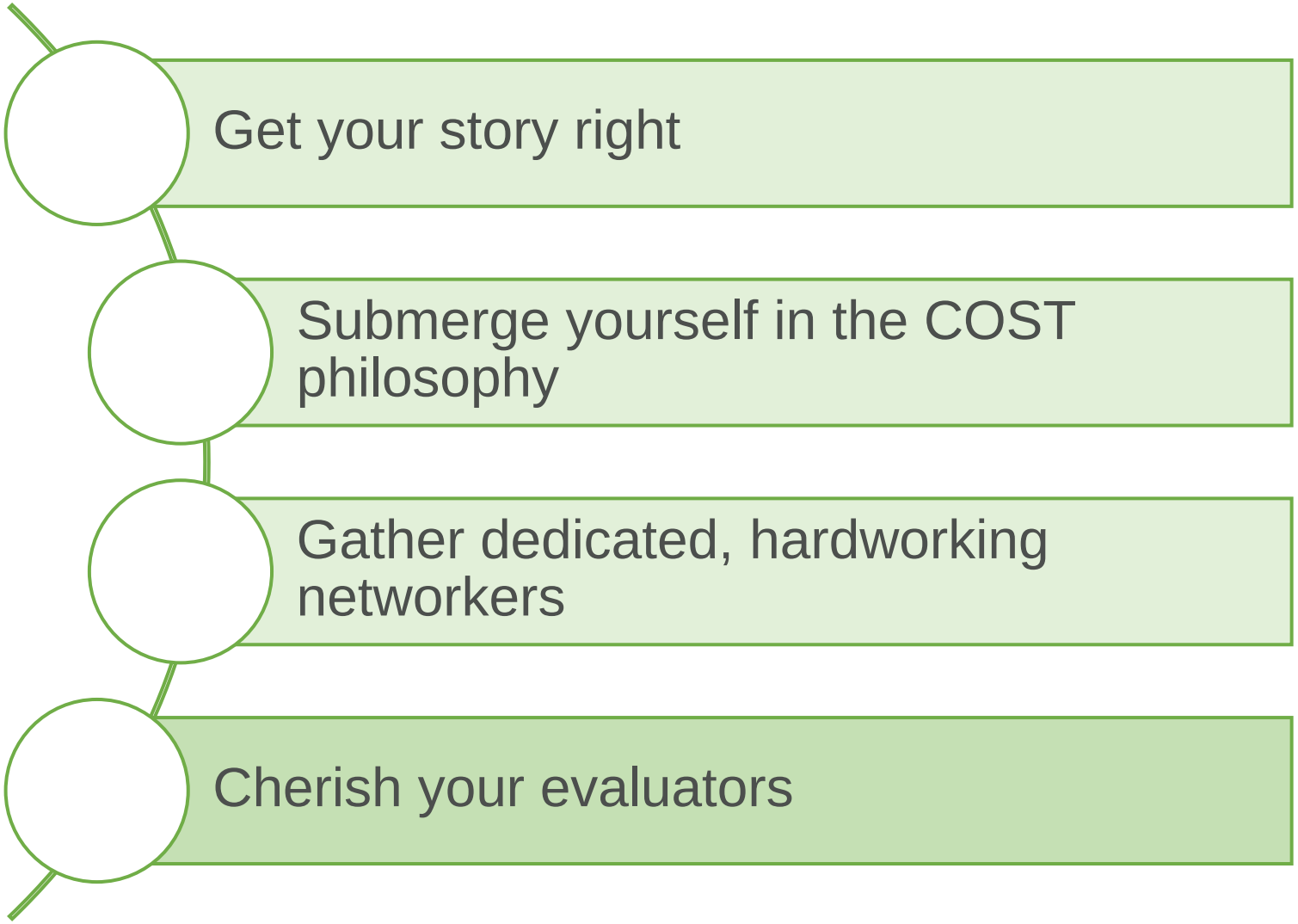
Overview – Tips & tricks



The Team

- The team of proposers
  - Well-balanced: geographically, age and gender
  - Academic and non-academic research institutes
  - Well-established and high-potentials
  - SME and large companies
  - Including relevant stakeholders (standardisation and certification partners)
- The writers
  - COST inclined
  - Hardworking, dedicated people with track-record in field of project
  - Networkers

Overview – Tips & tricks



Evaluation - Background

- Evaluation process
  - 3 independent external experts, write individual evaluation report following strict, imposed structure addressing clearly defined evaluation criteria
  - Consensus evaluation report
  - Quality check of consensus evaluation report

Evaluators

Keep in mind

- Evaluators generally busy people
- On average 8 proposals to review - Some fully aligned with research area, others less
- Time limited, strict deadlines

Therefore,

- Cherish your evaluators
- Study the evaluation criteria thoroughly
- Address criteria in a proper way

Evaluation criteria

S&T EXCELLENCE	NETWORKING EXCELLENCE	IMPACT	IMPLEMENTATION
Total marks for the section = 15 points	Total marks for the section = 15 points	Total marks for the section = 15 points	Total marks for the section = 5 points

- Do not ignore anything
- Make it easy to evaluate

Evaluation questions

- Questions are known
- Linked to specific sections
- Example: S&T EXCELLENCE
  - Question 1: Does the proposal demonstrate a comprehensive command of the state of the art in the field and present a relevant and timely challenge ?


TECHNICAL ANNEX

1 S&T EXCELLENCE

1.1 SOUNDNESS OF THE CHALLENGE

1.1.1 DESCRIPTION OF THE STATE-OF-THE-ART

1.1.2 DESCRIPTION OF THE CHALLENGE (MAIN AIM)

Evaluation questions

- Question 2: Does the proposal describe an innovative approach to the challenge that advances the state of the art in the field ?

1.2 PROGRESS BEYOND THE STATE-OF-THE-ART

1.2.1 APPROACH TO THE CHALLENGE AND PROGRESS BEYOND THE STATE-OF-THE-ART

- Question 3: Are the objectives presented relevant to the challenge clear and ambitious ?

1.2.2 OBJECTIVES

1.2.2.1 Research Coordination Objectives.

1.2.2.2 Capacity-building Objectives

Evaluation scores

MARK	ABBREVIATION DISPLAYED IN e-COST	LABEL	DESCRIPTION
5	E	Excellent	The proposal fully addresses all relevant aspects of the question. Any shortcomings are minor.
4	VG	Very Good	The proposal addresses the question very well, although certain improvements are still possible.
3	G	Good	The proposal addresses the question well, although improvements would be necessary.
2	F	Fair	While the proposal broadly addresses the question, there are significant weaknesses.
1	P	Poor	The question is addressed in an inadequate manner, or there are serious inherent weaknesses.
0	Fail	Fail	The proposal fails to address the question under examination or cannot be judged due to missing or incomplete information.

- Make it easy for evaluators to assess and score the questions

Cherish your evaluators

- Tell a convincing, engaging and clear story
- Make life easy for your evaluators
  - Feed your evaluators with what they need
  - Address the evaluation criteria in the proper way, in the right sections
  - Don’t waste the time of your evaluators – Be to-the-point
  - Make it easy to score/evaluate
  - Write in a clear, unambiguous way
  - Be sufficiently concrete
  - Make it easy to evaluate and re-evaluate
  - Give favourable evaluators the munition they need to defend you.

Questions ? Remarks ?

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Once a CA gets approved: your role as chair ….