FABER Project

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What It Offers to Fatigue Solver Developers

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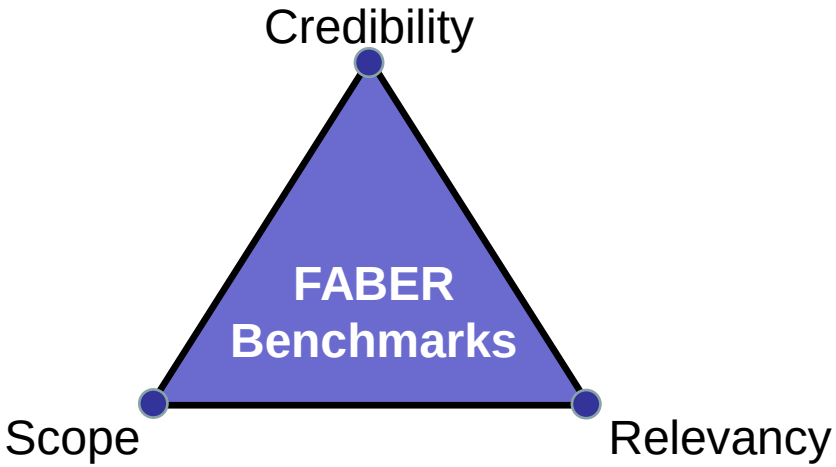
FAtigue BEnchmark Repository

Benchmark

Benchmarking is used to **measure performance of evaluated fatigue prediction methods** using a specific indicator (relative error between predicted and experimental fatigue lives) resulting in a **metric of performance that is then compared to others**.

What FABER offers to SW Developers

1. Benchmarks to evaluate and improve fatigue procedures either implemented in own products or assessed for implementing in future



- **Scope:** Assembled in a scope the company would never be able to reach
- **Credibility:** Agreed on by an international community of fatigue researchers
- **Relevancy:** Free of ballast or harmful items, which could damage the output quality

What FABER offers to SW Developers

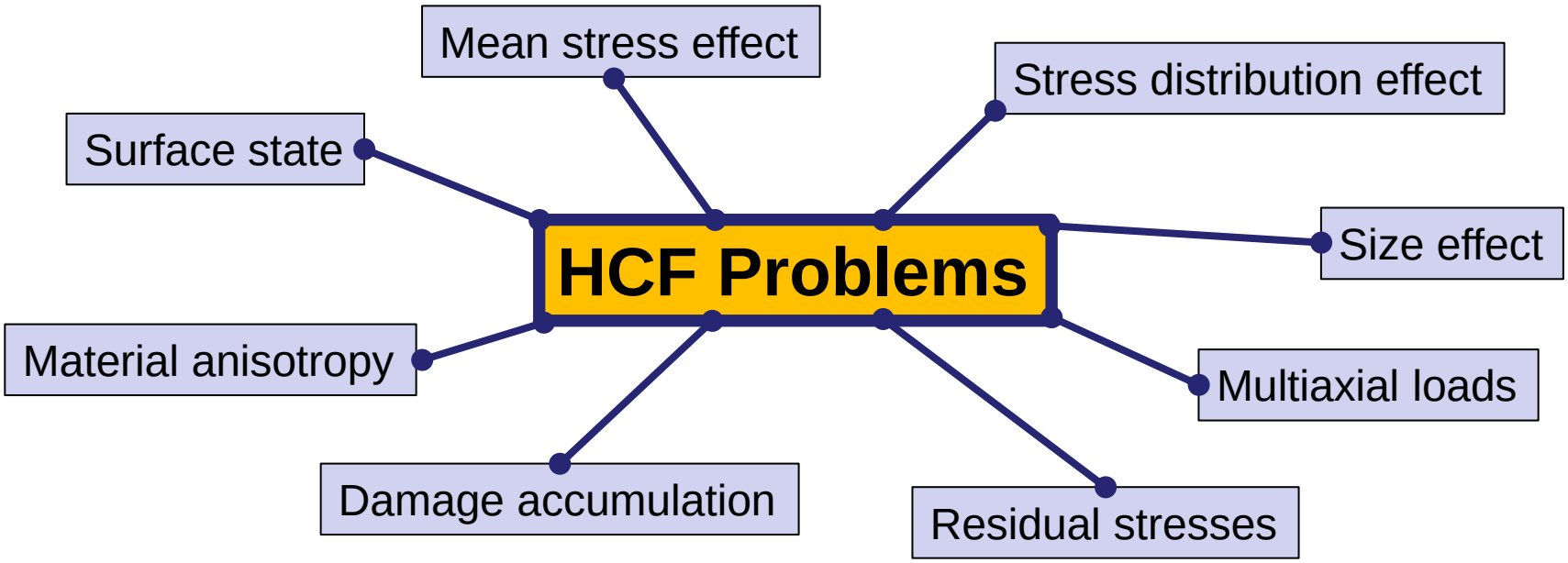
2. Possibility to provide access or to show benchmark results summary as an **additional service to customers**
3. **Cleaner and more honest attitude** to customers
   - The warranty denial clause can remain in EULA
   - The prospective customer can see the output results by himself / herself
   - The user can even test it by himself / herself
   - The responsibility for an adequate use of the product stays by the user, but (s)he is apparently supported by widely-accepted benchmark results

These new features open the door to small-sized and middle-sized customers

4. The option to use the **black box mode** (for that input I get that output of that quality) still possible to preserve own know-how from competitors

FABER Project - Goals I

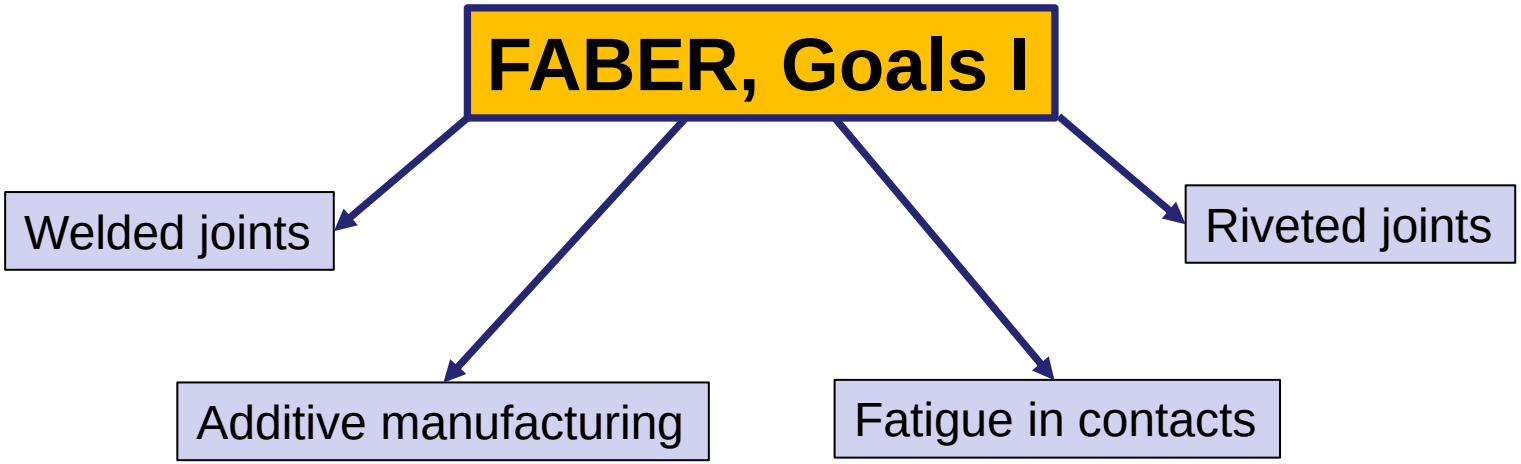
- To establish benchmark sets for testing quality of **High-Cycle Fatigue prediction methods** in these categories:



- These categories
  - **affect the basic prediction quality**
  - conditions of dedicated experiments are **still simple enough to monitor**

FABER Project - Goals II

- **Prepare basis for future benchmarks** on compound problems:



- Fatigue processes in these domains are more complicated than those in Goals I, various issues interact
- Within FABER, only these activities targeted:
  - Monitoring of optimum data sources
  - Applicable experiments to be defined
  - Definition of experimental data record

How to reach those goals

- To disperse the demanding task to more cooperating people/institutions
- To create a broad network
- Some momentum to start with it sought:
  - COST Projects
  - First project from September 2019 call
    - 4-years project planned
    - Failed while attaining 40 points from 50
    - No fatigue solver developer was invited in the first round
  - Also second project (October 2020) failed to reach funding
  - Third version of the project currently under preparation to meet the deadline on October 29, 2021.

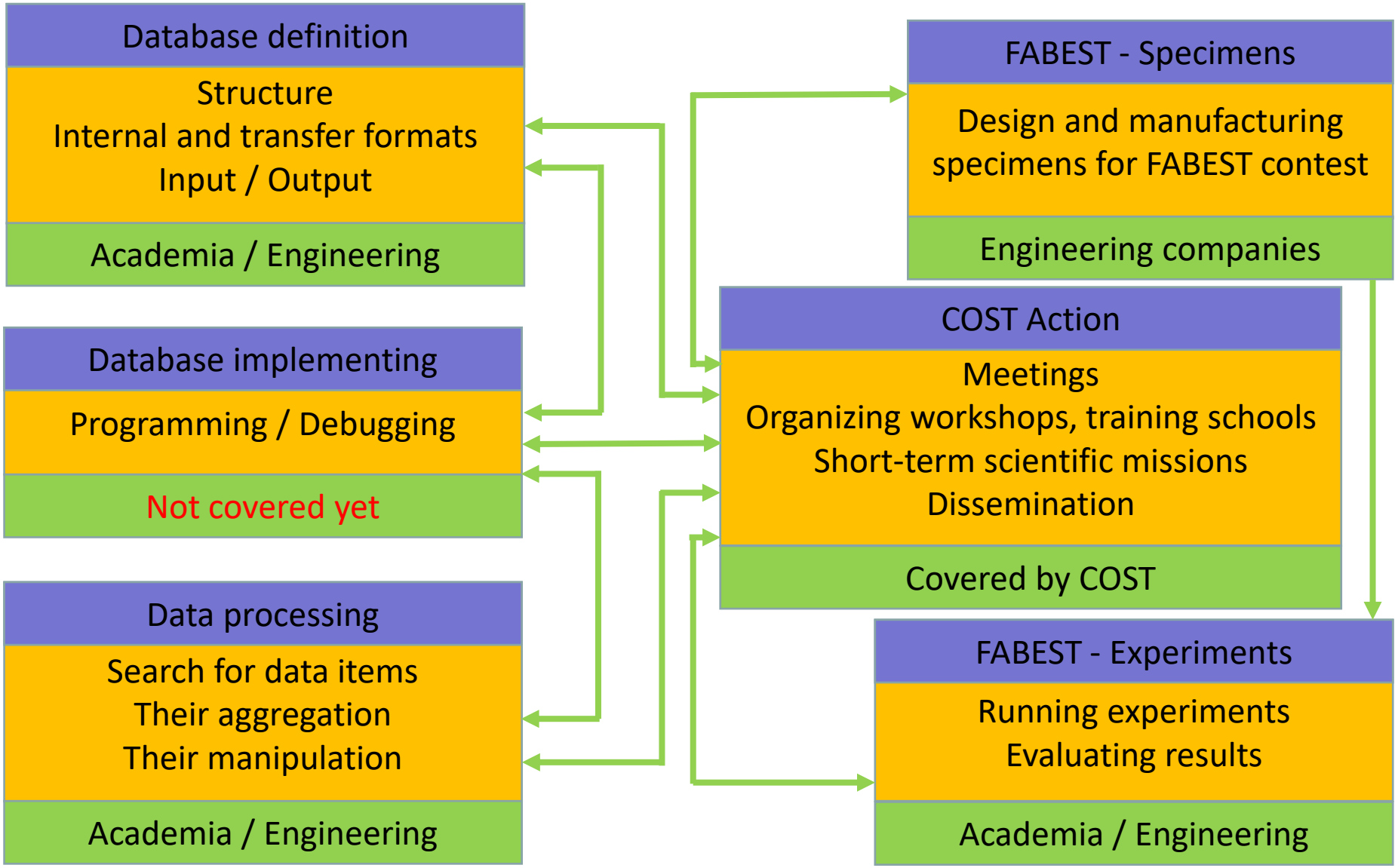
COST Actions

- Focused on European countries and immediate neighbors, but no problem with getting worldwide
- If funded, the funds can be used **only for costs of**:
  - Meetings
  - Organizing workshops, training schools
  - Short-term scientific missions
  - Dissemination
- There are **no funds at all for research or experimenting** itself

Concept of implementation

- The current consortium partners dispose of three different database systems to preserve experimental fatigue data – they should be compared, and **either new solution proposed and built, or some of those solutions adopted**
- Format of an experimental setup record should be checked and redefined, if necessary, for all focused domains in Goals I section
- Participants select their focused areas, look for potential data sources and aggregate data from them. Systems for evaluating data quality and for data inputs checking is developed
- Individual workgroups discuss those rules and decide on selecting of evaluated data sets or their removing
- Benchmark established in Goal I categories and they are tested on available prediction methods, results published
- FABEST – Worldwide contest on best fatigue prediction in selected categories: **experiments to feed the predictions to be run** before the contest, those to show results after the call is closed, contest is monitored and its results are published

Funding


Database definition
Structure
Internal and transfer formats
Input / Output
Academia / Engineering
Database implementing
Programming / Debugging
Not covered yet
Data processing
Search for data items
Their aggregation
Their manipulation
Academia / Engineering
FABEST - Specimens
Design and manufacturing specimens for FABEST contest
Engineering companies
COST Action
Meetings
Organizing workshops, training schools
Short-term scientific missions
Dissemination
Covered by COST
FABEST - Experiments
Running experiments
Evaluating results
Academia / Engineering

What FABER needs from SW developers

- **Financial involvement to support implementation of the database** of experimental results used for data aggregation and for benchmark(s) assembly
  - 1000 EUR entry fee to be paid yearly
  - This sum covers only internal use of the output within the company itself. If the benchmark sets or their results should be provided to customers, the entry fee will be higher
- Proposals on either commercial or academic institution(s), which could test the SW product & inviting them to FABER
- Reporting about FABER goals and activities in journals, on conferences
- Acceptance of benchmarking effort within controlled FABER activities
  - results can be monitored and delivered to the company in real time before their publishing
- Proposals on FABEST contest topics, its announcement in users' network
- Any ideas and help on FABEST prizes, on samples manufacturing for it is welcomed

FABEST

- **Original concept:**
  - Worldwide challenge organized by FABER on best fatigue prediction in selected categories
  - Experiments to feed the predictions to be run before the contest
  - The experiments results of which are to be predicted will be run after the call is closed
  - Contest is monitored and results published
- **FABEST#0:**
  - In January 2021, I proposed wide cooperation of research teams on testing 1.4 ton of 42CrMo4+QT from a single heat I purchased
  - Members finance the manufacturing and testing by themselves
  - Results are shared and published by the originators
  - Within 2021, these domains are focused – size effect, frequency effect, mean stress effect, roughness effect and semi-product homogeneity/anisotropy evaluated
  - 15 institutions joined the project
  - **We are jointly building the base, on which FABEST challenge could be run in 2022!!!**