10 July 2020
Lenord/CR/AEE3

ITEA3 Call2 15016 EMPHYSIS

2 July 2020	Memo in responds to the mandatory action from PPR 2019-H2

Action:
URGENT : As also requested in the previous 2 PPRs, by 4 May provide a memo explaining the avoidance and mitigation actions of the described risks.

Risks (PPR2019-H1)

	Severity	Probability
1. Critical requirements cannot be met by the eFMI standard	High	Rare

Avoidance action:
Involve the technical experts of the tool vendors in the requirements elicitation phase.

Back-up / mitigation plan:
Narrow the scope of eFMI.

Explanation:
The discussion with the technical experts has revealed that in particular the support of call-back functions is very challenging. This is due to the fact that MISRA rules discourage or even forbid the usage of pointers, while the most common design of call-back functions is relying on function pointers. Furthermore it was apparent that the definition of a new Equation Code language is a very involved effort beyond the capacity of the project.

The support of function pointers is relevant for the realization of observers (virtual sensors) e.g. in form of a Kalman-Filter, required for the demonstrator D7.12. The support of Equation Code is a crucial feature of the eFMI standard for the realization a the model-based diagnosis demonstrator as part of D7.4.

Even though these two requirements are considered crucial for some of the intended usage scenarios it was still decided to strictly prioritize the requirements to ensure that the main project goal to deliver a first version of the eFMI standard is achieved. The minimal viable product (MVP) of the eFMI standard has been agreed to cover the end-to-end tool chain for physical models with a simple block semantics (causal input/output relations) of a clocked system (no call backs). This covers 80% of the identified eFMI use cases and will already bring significant value to the market.

According to the current status of work the standardization work and prototype development has reached the level of the above described MVP.

A solution for the Kalman-Filter use case has been proposed, but has not yet been implemented. The definition of the Flat Modelica language is an on-going effort. A first prototype generating Flat Modelica code that can be used for the EMPHSIS demonstrators has been implemented and will be refined as the language specification progresses. This ensures that the demonstrators can be realized on a prototypical basis even though the formal specification of these extension may lack behind.

	Severity	Probability
2. FMI Change Proposal is rejected by the FMI standardization group	High	Rare

Avoidance action:
Alignment of the proposed eFMI standard with the up-coming FMI 3.0 standard. Presence of EMPHYSIS partners in the FMI 3.0 discussion groups.

Back-up / mitigation plan:
Delay the submission of the eFMI change proposal until controversial aspects have been cleared.

Explanation:
Members of the eFMI project, e.g. Bosch, are heavily involved in the release process of the FMI3.0. Changes related to type declarations and interface definitions in FMI3.0 have been considered in eFMI so that no conflicts are expected.

The procedure of accepting the eFMI standard goes through filing a Change Proposal to the project leader of the FMI group. The plan is to engage with the project leader before the change proposal is filed to ensure that the proposed eFMI standard has the full support by the FMI project leader. Potential blockers shall be resolved up-front so that the submitted change proposal will make its way as fast as possible, even though a final approval before the end of the project is unlikely.

	Severity	Probability
3. Lack of tool chain support	Critical	Rare

Avoidance action:

Remain in continuous exchange about technical feasibility and strategic relevance of eFMI for M&S tool vendors as well as ECU software development tool vendors.

Back-up / mitigation plan:

Keep a broad base of tool vendors within the project.

Explanation:

Tool vendors could become discourage to keep the eFMI support on their strategic release roadmap if:

- the implementation effort exceeds the available development capacity,
- or, the business value of this functionality becomes questionable.

Therefore it is a good practice within the EMPHYSIS project to give the developers a strong voice when it comes to design decisions of the eFMI standard. The effort to develop and maintain a proposed design is always an important aspect.

The feedback from the OEM Advisory Board is key to confirm the market relevance as the tool prototypes evolve.

	Severity	Probability
4. Lack of user acceptance	High	Possible

Avoidance action:

Develop realistic usage scenarios in close collaboration with the end-user. Define an additional scenario together with the OEM Advisory Board.

Back-up / mitigation plan:

Interview the users and analyse the deficits. Revise the eFMI standard and/or encourage the tool vendors to consider tool improvements.

Explanation:

As expressed by BMW does user acceptance often hinge on tiny things that can discourage the end-user to take advantage of a very advanced technology. Therefore it was very valuable to discuss the usage scenarios and even define an additional OEM Advisory Board scenario (D2.8) to get the full picture of how eFMI and the developed tools fit into the development processes.