Guidelines for EUROfusion standard software (ACH call; May 12, 2020)

Within E-TASC, we distinguish between two types of software. On the one hand, we have "research software" which is typically developed within TSVV Tasks or in the broader community. It tends to aim at addressing specific scientific questions and has a very limited user base (often more or less identical with the development team). The majority of our software in fusion research today falls in this category, and while it will continue to play an important role in the future, it is clear that several significant challenges ahead – like supporting or even guiding ITER operation and DEMO design – call for a more professional approach. Consequently, E-TASC will provide the platform and support to develop so-called *EUROfusion standard software*, taking the development, dissemination, and exploitation of fusion software to a new level.

EUROfusion standard software will be developed with a very rigorous, consistent quality assurance process that is common across the E-TASC initiative; it is designed to benefit a wide range of users across EUROfusion, well beyond the team of code developers, and will adhere to the following guidelines and criteria:

- Free availability (within EUROfusion) of an up-to-date release version of the source code used for production runs
- Good software engineering practices (version control, regression/unit testing, shared development rules etc.)
- High-quality code documentation via user manuals and reference publications (including, in particular, a detailed description of the underlying model)
- Excellent support of users, co-developers, and support staff within EUROfusion (via contact person, mailing list, issue tracker, and the like)
- Specific plans for code verification and validation (involving a third party), in particular within EUROfusion, including aspects of uncertainty quantification
- User-friendly, intuitive interfaces and visualisation/post-processing tools, including interfaces to the IMAS Data Dictionary (where applicable)
- Specific plans for code dissemination and user training within EUROfusion

The development of EUROfusion standard software – either based on existing research software or from scratch – is to be primarily driven by the ACHs, but in close partnership with the TSVV Tasks. Actually, in many cases, research software will be further developed by the ACHs (in liaison with or as vital part of TSVV Tasks) to become part of the EUROfusion standard software suite. The latter will carry significant Intellectual Property.