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On the necessity of a Joint Open Environment for operational hydrology across Europe

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The Flemish Environment Agency (or VMM) contributes as an agency of the Flemish government for a better environment in Flanders. Its Division Operational Water Management is competent for the maintenance, investment and renovation works of the non-navigable watercourses in catchments larger than 50 km². In support of these tasks, a performant set of operational instruments over the last 10 years for monitoring and predicting the status of the rivers has been developed, including a wide range of monitoring networks (> 400 sites), off-line and real-time hydraulic models (> 1000 km) and a comprehensive real-time flood warning system. Next to these instruments, the VMM has commissioned research on model predictive control to better manage the flows under extreme conditions in the Demer basin (2334 km²), which has suffered serious floods during the last decennia (1998, 2002, 2010).

Today, new challenges are appearing for water authorities related to new European policies like climate change adaption, land use planning, urban wastewater, etc. The need to understand the highly complex interactions of the hydrological cycle and to predict and project its changes has never been greater. This demand for detailed water information and the new issues to deal with, request advanced tools merged with the latest technologies and research in hydrology. In response to these evolutions, the Flemish Environment Agency started in June 2013 research on the development of the next generation operational tools for the catchments of the Dijle and the Maarkebeek. For example such next generation tools are open and integrate all major components of the water cycles; they apply high spatial and temporal resolution for data and process representation and have links to models of other disciplines. The development of these next generation tools must allow an accelerated pathway towards significant advances in operational hydrologic capabilities to deal with the current and future challenges.

The Flemish Environment Agency is, however, also aware that it will be difficult to continue the progress, and to keep pace with the need to adapt and evolve water management strategies without enhancing the accessibility of these next generation operational tools across European Member States. Traditionally, tools had been independently and locally developed for specific, narrowly-focused tasks, using a range of computer languages and tested on different data sets.
The result of this was the existence of a large number of codes that were difficult to compare and access. This has impeded and is still impeding the advancement in operational hydrology relative to other disciplines, like meteorology, where both code development and large operational systems are shared in international collaborations.

To fill this gap in operational hydrology across Europe, the Flemish Environmental Agency is exploring through some business analysis whether there are possibilities to set up long term, sustainable collaborations and structures that would allow for the development and maintenance of what could be ultimately seen a next generation Joint Open Environment for operational hydrology (platform, toolbox of modeling instruments and monitoring networks, research-operations links, etc.) allowing the European community of hydrologists to develop an equal play of field as the meteorological community has established in the last decennia in Europe. This might not only be beneficial for scientific and technical development, knowledge and data exchange, but it will also be economically efficient to share the costs of both development and maintenance of systems.