

Sharing efforts for modelling plant systems: from publications to reusable software components

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Plant models become increasingly complex and their implementation often implies the use of advanced techniques in computer science. This evolution has been accompanied by the production of dedicated plant modelling tools, such as simulation platforms, that facilitate research in this field. However, much less sharing is observed for plant models themselves, that is for computer programs produced by scientists to address their specific questions. Yet, these programs could be highly valuable for other researchers, to avoid redundant development of similar code or to help non-specialists to simulate parts of a complex system. Model descriptions found in academic publications, even combined with code sources, are generally not sufficient for model reuse. Most difficulties come from the heterogeneity of language used, the structure of the programs, the download and installation procedures, the accessibility to the source code of the model, and the availability of documentation. The OpenAlea initiative (<http://openalea.gforge.inria.fr>) has been launched to address these problems by providing plant modellers with collaborative tools and guidelines to increase software quality, hence re-usability of their models. The Alinea pilot project further tested these concepts in a sample community of ecophysiologicalists and biophysicists. Based on this experience, we illustrate pros and cons of the approach and discuss future direction of progress. We foresee three steps towards a better re-usability of models: a better interoperability of existing tools and simulation platforms, the emergence of design patterns for plant modelling, and the definition of standardised data structures.