

Flexible re-use of system modules for whole-farm and landscape analysis and design with Model Explorer

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There seems to be consensus in the scientific community on the need to overcome past problems of case-specific agro-system models, as these impede operational flexibility, scientific quality control and cost-effectiveness. Integrated modelling environments are seen as a way out and institutions have invested in their development to arrive at standardized approaches for broad problem domains. At the same time, it has been acknowledged that as researchers we may prefer well-known and highly accessible locally developed tools over institution-wide generic applications even when the latter offer superior features. As yet no conclusions are possible on the critical success factors of a modelling environment, as experience is still limited. In this paper we present the Model Explorer environment for flexible model assembly, built on the principles of prototyping.

Model Explorer was developed to meet the needs of our work at the farm and landscape levels where we are interested in analysis of current and future land use and landscape configurations. Re-use of existing knowledge is essential to arrive at integrated assessment. At the same time, continuous knowledge development requires short turn around cycles between agro-ecologists and software engineers, which led to a continuous software prototyping approach.

Model Explorer allows building new models from existing software components, to access input and output files, and to generate graphs and/or GIS maps. Models are constructed around 'kernels' which are software components that determine the flow of the calculations and that can be coupled with other model components using a number of 'slots', each of which can accommodate linking a (number of) component(s) of a specific type. In the paper we will demonstrate how working in this way, Model Explorer was used to generate two different models: a model at the field scale called ROTAT+ which is used to generate and evaluate crop rotations, and a model for assessment of agronomic, economic, environmental indicators integrated with biodiversity and landscape quality indicators (Landscape IMAGES).