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Hydra Platform: A web-based data management system to facilitate integration in network resource modelling.

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Abstract: The planning and management of engineered resource systems often involves applying multiple modelling approaches to the same system. These models can broaden the scope of decision making, giving owners/investors a better picture of the costs and effects of future assets or policy changes. Combining multiple different modelling paradigms is a challenge as many models operate on different time scales and have different input data requirements. One approach to combining models is to create a central data structure, to which each model connects via a specialised interface, transforming the centrally stored data into the appropriate input structure for the model and storing obtained model results. This approach can streamline modelling, minimize errors and simplify data sharing, but requires a common representation of the modelled domain. We focus on systems which can be represented by a node-link network structure, such as water resource systems, transport, and energy. We present Hydra Platform, an open-source data management system which stores network topologies and scenario data and allows access, editing and sharing of these through a web API (www.hydraplatform.org). Using Hydra Platform's API, multiple modellers can connect to network data, stored in a central location. These connections are made using 'Apps', which transfer data to and from Hydra Platform. Apps can generate input files for modelling platforms or custom models, export and import data to and from common data formats or visualise data in a user interface. Apps can be made available and shared through an App Store (www.hydraappstore.com) which freely hosts open-source and proprietary Apps, as well as models and data. Several Apps, models and datasets are currently available on the App Store. Development of new Apps is encouraged and supported by online tutorials, examples and documentation.

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