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Data Curation and Visualization for MuSIASEM Analysis of the Nexus

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A novel software-based approach to relational analysis applying recent theoretical advancements of the Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM) accounting framework is presented. This research explores and explains underutilized ways software can assist complex system analysis across the stages of data collection, exploration, analysis and dissemination and in a transparent and collaborative manner. This work is being conducted as part of, and in support of, the four-year European Commission H2020 project: Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC). In MAGIC, theoretical advancements to MuSIASEM propose a powerful new approach to spatial-temporal WEFC relational analysis in accordance with a structural-functional scaling mechanism appropriate for biophysically relevant complex system analyses. Software is designed primarily with JavaScript using the Angular2 model-view-controller framework and the Data-Driven Documents (D3) library. These design choices clarify and modularize data flow, simplify research practitioner's work, allow for and assist stakeholder involvement and advance collaboration at all stages. Data requirements and scalable, robust yet light-weight structuring will first be explained. Following, algorithms to process this data will be explored. Data interfaces and data visualization approaches will lastly be presented and described.