

# Computational Challenges for a Sentient World Simulation

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Sentient World Simulation (SWS) will be a continuously running, continually updated mirror model of the real world that can be used to predict and evaluate future events and courses of action. SWS will react to actual events that occur anywhere in the world and incorporate newly sensed data from the real world. SWS will provide the ability to examine the likely progression of the status-quo as well as explore any "what if" scenarios.

SWS will consist of a synthetic environment that mirrors the real world in all its key aspects—Political, Military, Economic, Social, Information, and Infrastructure. Within the synthetic world are models of individuals, organizations, institutions, infrastructure, and geographies that represent the traits and mimic the behaviors of their corresponding real world counterparts. As the models influence each other and the shared synthetic environment, behaviors and trends emerge in the synthetic world as they do in the real world. Analysis can be performed on the trends in the synthetic world to validate alternate worldviews. The key computational components of SWS are: Virtual Execution Environment (VEE), SWS Virtual Model Repository (SVMR), and Dynamic Resolution Manager (DRM). Virtual Execution Environment (VEE) will enable users to configure a unique execution environment for their own requirements. Many such environments can run simultaneously. SWS Virtual Model Repository (SVMR) is a warehouse consisting of validated simulations, models, and model-components - at varying levels of resolution, data, and inter-model coupling relationships. These essential elements can be selected, sustained, and appropriately combined to build any desired simulation through conformance to model standards. Each component is validated before committing it to SVMR to ensure an accurate representation of the behavior of its real-world counterparts, and for a specific level of simulation detail.

SWS will have a software zoom capability, called Dynamic Resolution Manager (DRM). Simulations can be presented at varying levels of fidelity. With a user-friendly graphics interface, different data sets can also be selected and the information presented enhanced via DRM. Supported by the ability to accept live inputs, such as real-time transaction data from an Enterprise Resource Planning (ERP) or other databases, allows simulated environments to be organized hierarchically for various levels of access. Information can be easily displayed and readily transitioned from one focus to another using detailed modeling, such as engineering level modeling, to aggregated strategic, theater, or campaign-level modeling.