Model-Based Systems Engineering (MBSE) is gradually becoming an acceptable good practice, especially for large-scale complex systems. The variety of modeling languages allows detailed representation of domain-specific knowledge of different components and aspects of a system. Semantic Web concepts offer opportunities for easier and more efficient collaboration between design and verification teams using different modeling tools. We propose integrating Object-Process Methodology (OPM), a formal simple powerful framework, which provides a holistic view of the system’s function, structure, and behavior, into the Semantic Web. The research deals with the first integration stages – exporting OPM models built in OPM CASE Tool (OPCAT) to Resource Description Framework (RDF) format, which is used for representing data in the Semantic Web, and importing RDF files to OPCAT. This involves defining the OPM ontology in a way that conforms with Semantic Web specifications. Different approaches of element representation are discussed as the ontology is validated by round-trip transformation of OPM models from their visual representation to RDF and back.