

Web Interface for Systems Engineering Design Tools

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1 Background

The Department of Industrial and Materials Science (IMS) have developed several tools for improving product development, which are being used in aerospace, automotive products, and space products (e.g. satellite design). Clients have found these tools very useful and have asked the IMS to package them with a Web interface for use in the future. The IMS have created a first version of a Web environment for accessing these tools, the Systems Engineering Design Laboratory (SEDLab). However, this Web environment is currently very simple, and they would like some help from the Computer Science and Engineering department to create something better.

This is the problem that the IMS's tools are intended to solve. Engineering design and business development are traditionally conducted by different teams, which adopt different metrics to assess both a product's increased functionality and its business potential. While business development often evaluates new products in terms of the financial value generated over a number of business scenarios, engineering design teams base their activities on meeting technical requirements. The consequence is that engineering teams and business teams have difficulties sharing accurate and unbiased assessments of what the value of new technologies and solutions actually is.

2 Project description

You will create a Web interface to allow clients to use the IMS's software module more easily. The interface should allow clients to access to all the functionality that the tools provide - such as customising the relationships between the quantities in the model, or allowing clients to type in their own formulas - while being easy to use for a non-expert. This will involve deciding on the best way to accept data from the user and visualize the outputs for the user, and converting data between to and from the formats used by the software module.

The software module has these four major functions:

- Calculate the Surplus Value (SV) over the lifecycle of different design architecture alternatives, using a discrete-event simulation technique (simpy

package, <https://simpy.readthedocs.io/en/latest/>)

- Calculate the SV of the alternatives on different market and business scenarios (“Value Creation Strategies”)
- Visualize the impact on SV of critical attributes of the architecture (“Value Drivers”)
- Extract critical “Trade-off coefficients” from the SV, in order to support the generation of new architectural alternatives

3 Suggested reading material

Panarotto, M., Isaksson, O., Habbassi, I., & Cornu, N. (2020). Value-Based Development Connecting Engineering and Business: A Case on Electric Space Propulsion. IEEE Transactions on Engineering Management.

4 Target groups

DV, D, IT

5 Special prerequisites

Experience with Web development is an advantage but not essential.

6 Proposal author

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