**Integrated Mission Design using satsearch**

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For space systems engineers to make design choices, they have to know what products are available on the market and their specifications. The effort required to find products that satisfy mission requirements and constraints can necessitate an inordinate level of manual effort, including spending hours “Googling”, wading through long PDF datasheets, emailing and calling suppliers, and relying on a network of “space friends”.

Over the last decade, NewSpace companies have popped up all around the world. The global supply chain is becoming increasingly fragmented; hence the search problem is only worsening. Finding the right products has turned into a colossal problem, costing precious engineering man-hours. Fixing industry-wide search is vital to ensuring continued and sustainable growth of the space industry over the coming decade.

To fix the search problem, we are building satsearch: the first global marketplace for space. By consolidating, harmonizing, and structuring global supply chain data, we are making the search for space products simple. This helps to increase engineering efficiency, reduce lifecycle costs and increase transparency across the industry.

In this paper, we present a new design methodology called *Integrated Mission Design* (IMD). IMD is built around the premise that deep integration of supply chain data in the mission design process will lead to strong gains in terms of optimality and robustness. The IMD approach belongs to a broader class of *Data-Driven Design* (D3) methods for complex systems engineering. IMD enables direct analysis of the sensitivity and robustness of the overall system to specific design choices. We review how IMD fits within the scope of Model-Based Systems Engineering (MBSE). IMD enables complex algorithms to be deployed to assist engineers in the process of rapidly testing design concepts and pinpointing feasible solutions in the design space.

We detail our efforts to develop satsearch for IMD, by generating a knowledgebase that enables direct integration of global supply chain data into the design process. Our approach rests on converting unstructured product datasheets into electronic, human-readable, machine-readable datasheets (EDS) to populate the satsearch knowledgebase. The satsearch knowledgebase has been integrated into a number of advanced design tools and platforms. We provide an overview of integrations with RHEA Group’s CDP4TM platform for concurrent design and Valispace’s browser-based platform for collaborative development of hardware projects. In both cases, we present short scenarios to elucidate how engineers can utilize the integrations for IMD.

Efforts to develop EDS are underway across the industry; our unique proposition is to leverage EDS to integrate supply chain data directly into systems engineering software. We summarize the research that we have conducted to develop a space systems ontology that underpins the generation of EDS. We also provide an overview of the architecture of our data pipeline that ingests source datasheets and generates EDS that is served to our integrations through our knowledgebase API. We discuss future developments to deploy structured supply chain data through our API integrations, enabling engineers to develop complete missions using the IMD approach.