Nanospace, an open source tool to help concurrent engineering teaming in cubesat preliminary design

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Designing a cubesat requires close interrelation between different fields, with respectively strong level of expertise, all the more so as development progresses.

Nanospace is a tool designed to ease interaction between expert tools and a graph database. It is not a heavy client application, but a web oriented one. The front-end, Nanospace-UI, an Angular GUI, is accessible through a browser. Data management is handled by a graph Neo4j database deployed on the back-end server side. This database is able to centralize all the project preliminary design required data, taking into account concurrent access of all experts.

Key contribution of Nanospace to the community of Concurrent Design Engineering tool is a way to ease inter-connection of experts (and their tools) around project data. In a pragmatic way and from each subsystem engineer point of view, it allows to link in a simple and automated way their own expert tool to a common, unified and updated database at the system engineering level. Let say that if mission analysis changes orbit altitude, effects should be propagated to all sub-systems, should be taken into account for the mission requirement, and should lead to iterating and converging over new sets of output data. Three way of connecting the expert tools to Nanospace database are provided:

- Manual interaction with NSS Web User Interface - the "shared spreadsheets style";
- Embedded code to ease interface - an Angular component and a python API are provided to ease code integration;
- Full compliance with the Nanospace REST API - allowing you to develop your own independent service application directly interacting with the database.

Nanospace is the backbone of a larger project, NSS (Nanostar Software Suite). NSS aims at helping to get a strong data consistency between expert software during a mission analysis preliminary design. Goal is to provide a set of open-source tool that can be used for designing each subsystem of a cubesat, interconnected through a centralized database. That should let the choice for the user, depending on its skills and tools, the best way to fit his project needed.

Nanospace is currently under development. Nanospace is Open source (AGPLv3 Licence), a prototype is available [1]. A test server is also deployed [2]. Part of this work is supported by SUDOE Nanostar project [3].

[1] https://gitlab.isae-supaero.fr/nanostar/nanospace

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