For cost effective management of multiple complex low-cost small spacecraft projects using distributed teams, management tools are required that integrate the various elements of management, systems engineering, and risk and mission assurance data. This subtopic is seeking tools where members of a spacecraft team are able exchange technical information and capture the salient decisions, trades, dependencies, etc. For a tool to be effective, it must make the job for each team member easier. There should be customizable views for each member so they are able to see the data that affects their job. This subtopic is seeking tools that:

- Simplify data integration resulting in top level roll-up or "dashboard" views as well as provide manager-friendly deep-drilling capability when depth of technical insight is required.

- Directly reflect the management and reporting requirements for NASA projects as defined in NPR7120.5D, NPR 7123.1A, NPR 8000.4, and related standards and directives.

- Facilitate or automate data entry for the Project Manager, Systems Engineer, and Risk and Mission Assurance Manager through secure web-based interfaces.

- Perform data integrity checks at the time of entry and upon request. Include automated e-mail notification of data integrity problems to responsible parties.

- Provide common-interface input portals and data library structures for data uploading from each project WBS element.

- Provide manager-controlled cross-linking of access to data resources from WBS to WBS.

- Provide the ability to specify and automatically generate and update metric and trend reporting on key performance measures, quantities and changes in requirements, documents, configuration items, risk databases, and cost tracking including Earned Value Management metrics and schedule critical path and resource loading metrics.

- Make it possible for reasonably experienced managers to train themselves on tool use.

- Provide data entry and presentation interfaces that are reliable, accepting and presenting data without lengthy uploads or downloads.
• Provide simple, user-modifiable linking to related, keyword searchable archives.

• Provide data translation and capture tools for integration of any data that can be provided in spreadsheet formats or common text documents.

• Aid in building re-usable reporting formats linked to data resources including metric analysis data, snapshots of discipline-specific report sheets, standard subsystem progress reports, and other manager specified data.

• Provide integrated management and team support tools such as Action Item tracking including automatic e-mail alerts to individual and groups, and customizable tracking status schemes.

Data resources to be linked include cost tracking spreadsheets, task plans, risk management databases, requirements databases, technical performance metrics and margins sheets, top level and WBS element schedules, and standard monthly status reports from WBS elements. The tool should be easily scalable for large or small projects and the number of WBS elements and features included or excluded for a given project should be user-selectable. User and group permission and access controls are required.

Phase 1 - Research should provide examples of proven cost benefits and project successes based on the use of integrated management tools for management of multiple simultaneous distributed projects. Architectures should be proposed for implementation of an integrated multi-project management tool.

Phase 2 - A management tool set will be implemented and demonstrated as part of an actual small satellite management project. The tool will be evaluated for ease of use, effectiveness as a NASA project set-up tool, management information tool, and reporting tool. Feasibility for a single manager to effectively manage and report on multiple simultaneous projects will be assessed. Project users from the WBS elements of the satellite project will evaluate ease of use of uploading data.