Abstract

Systems Architecture and Engineering Applied to Technology Development

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"For a successful technology, reality must take precedence over public relations, for nature cannot be fooled." - Richard Feynman
Technology development has reached a level of sophistication and expense that requires more than a good idea and perspiration to make it happen. Fortunately, many of the same analyses and techniques that have allowed development of systems of ever increasing complexity can be usefully applied to development of similarly sophisticated new technology. Some level of engineering analyses must be performed to see if the proposed technology would be cost-effective in its intended application in some larger system. This means understanding the target system architecture well enough to quantify the technology benefit. Application of systems engineering analyses (spreadsheet engineering) can be used to find the "knee" in the technology benefit curve, insuring that the technology is developed to meet the real need, without undershooting and making the technology worthless, or spending excessive amounts of money on what amounts to "polishing the cannonball." Both the Mars Exploration Program and the Solar System Exploration Program at JPL have been working these issues, to insure that NASA's technology investments are appropriate and adequate to support challenging future missions in these areas. This has included establishing Mission and System Architectures, identifying and categorizing needed technologies, performing analyses of technology design trade spaces, and determining the potential benefit to one or more missions. Brief examples of these analyses and some of the tools developed to support them are to be presented.