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Sent: Monday, December 04, 2000 1:34 PM
To: Graham Allyn (E-mail); Rita R. Garcia (E-mail)
Cc: Mule, Joseph N; Ault, David A; Shapiro, Elisa G.
Subject: Scenario Planner Action Item

Scenario Planner Action Item: Supply Solipsys with a list of desired inputs/outputs and capabilities.

General Inputs/Outputs:

- Single nominal and multiple off-nominal (~100) trajectories for a given launch vehicle. Trajectory coordinate frame should be standard (WGS-84 ECI w/epoch at t=0, ECEF or geodetic) and include time, position, velocity, acceleration and 3-dimensional body orientation (Euler angles or direction cosine matrix.)
- Participant locations as paths or fixed points. Should have capability to load/write aircraft flight paths (and orientation, if available) to/from a text file. Should be able to input all locations by hand, as well.
- Emitters table for all participants/vehicles.
- Footprints for hazard areas (gdlat, long, and alt), by text file and by hand.
- Single file or folder from which the entire scenario can be loaded/written to.
- Basic tracking parameter report (output only).
- Should be able to copy plots (including maps and tracking parameter plots) and paste them into PowerPoint presentations. Should be able to compare parameters from various participants.

General Capabilities:

- Tag vehicles and participants (some or all) and translate their positions a given distance and direction.
- Tag vehicles and participants (some or all) and rotate the scenario about a given point.
- Tag vehicles and participants (some or all) and flip the scenario about a vertical plane.
- Attach IR, visual and RF sensors to participants/vehicles, define azimuth and elevation limits or boresight and half-angle. User should be able to define emissions for each participant and/or sensor.
- Be able to calculate, plot and export a table to a file basic tracking parameters for given participants and targets (slant range, horizon angle, elevation angle, azimuth angle, aspect angle and roll angle as a function of time.

Optional Capability:

- Calculate estimated target RF and IR signatures as a function of time for a given sensor.

Signature Inputs/Outputs:

- Radar cross section tables (as a function of target aspect and roll angle, and polarization) for a given target at a given RF band (i.e., S-Band) and a given percentile. There would be many of these tables for each target; e.g., VV, HH, VH and HV polarizations and 75th percentile, median and 25th percentile x S-Band and L-Band = 24 2-dimensional tables (RCS as a function of aspect and roll) for one target.
- IR signature tables (as a function of altitude and aspect angle) for different wavebands. There would be a few tables for each target.
- Signature vs. time report for a given participant (output only).
- Should be able to copy plots (signature vs. time) and paste them into PowerPoint presentations.

Signature Capabilities:

- Be able to calculate polarization angle and interpolate RCS tables to plot RCS vs. time for various sensors, given percentile and RF band.
- Be able to interpolate IR table and plot IR vs. time for various sensors, given the waveband.

Optional Capability:

- Conduct launch window planning.

Launch Window I/O:

- Input basic launch window closure table from a text file (e.g., satellite collision avoidance (COLA) launch window closure table)
- Output overall launch window closure table for given time span on given day.
- Input solar and lunar (and satellite?) orbital element sets (better if part of the code, at least for sun and moon).
- Input (by hand) window closure criteria for various sensors (e.g., sun or moon exclusion angles, no radiation into geosynchronous belt, etc.)

Launch Window Capabilities:

- Calculate window closures based on sensor closure criteria (solar exclusion angles, lunar exclusion angles, don't radiate into eosins belt.) Must have knowledge of the geosynchronous belt.
 - Plot all window closures (horizontal bar chart works well) for various criteria and overall launch window for a given time span on a given day (primary or backup launch day).
- Joe Mulé mentioned using Scenario Planner to conduct rudimentary link margin analyses. Dave Friedens knows more about what inputs/outputs and calculations are necessary. Joe Mulé and Mike Martorano also mentioned using Scenario Planner for countdown scheduling.

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