

Future Defense Systems

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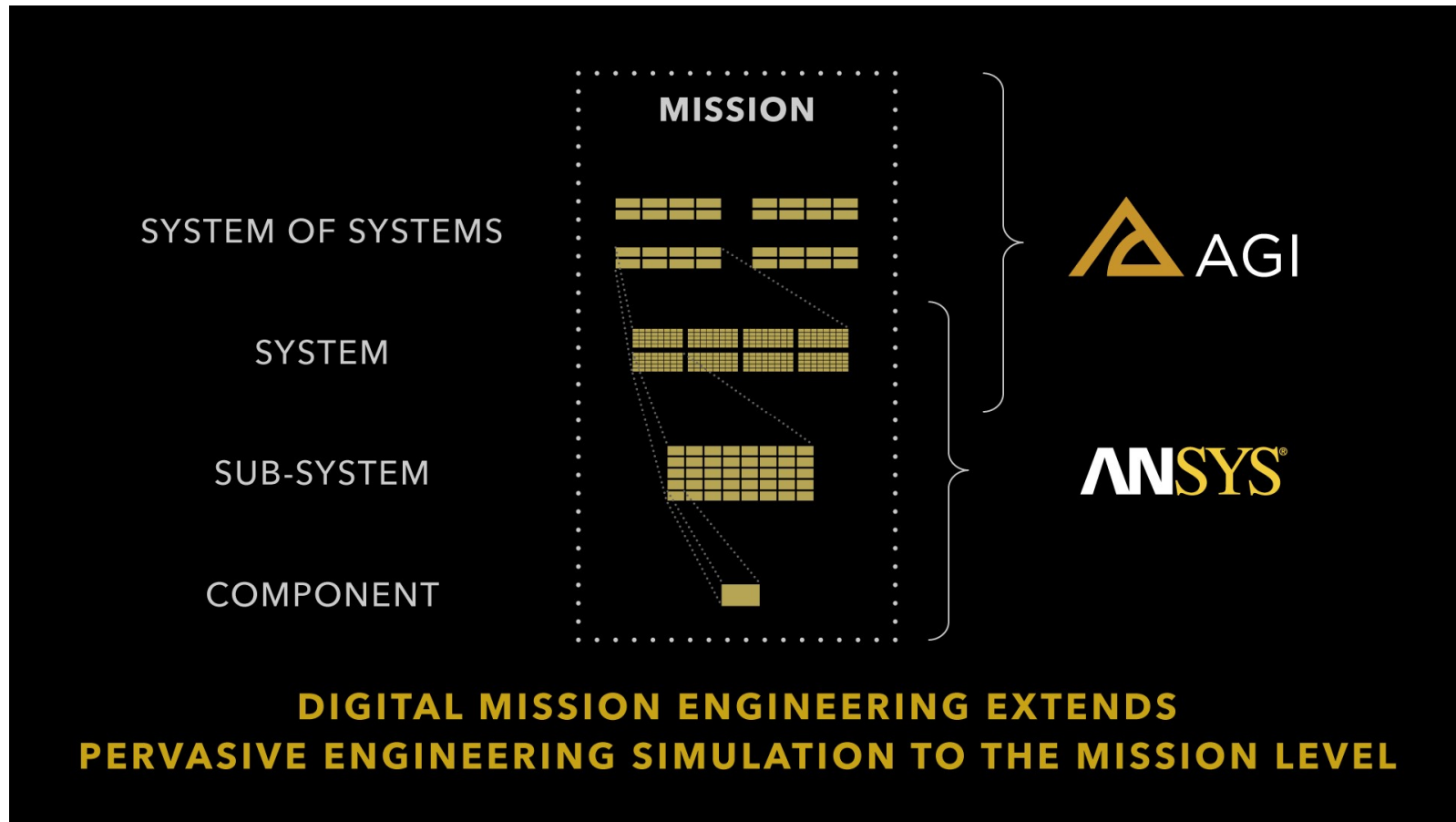




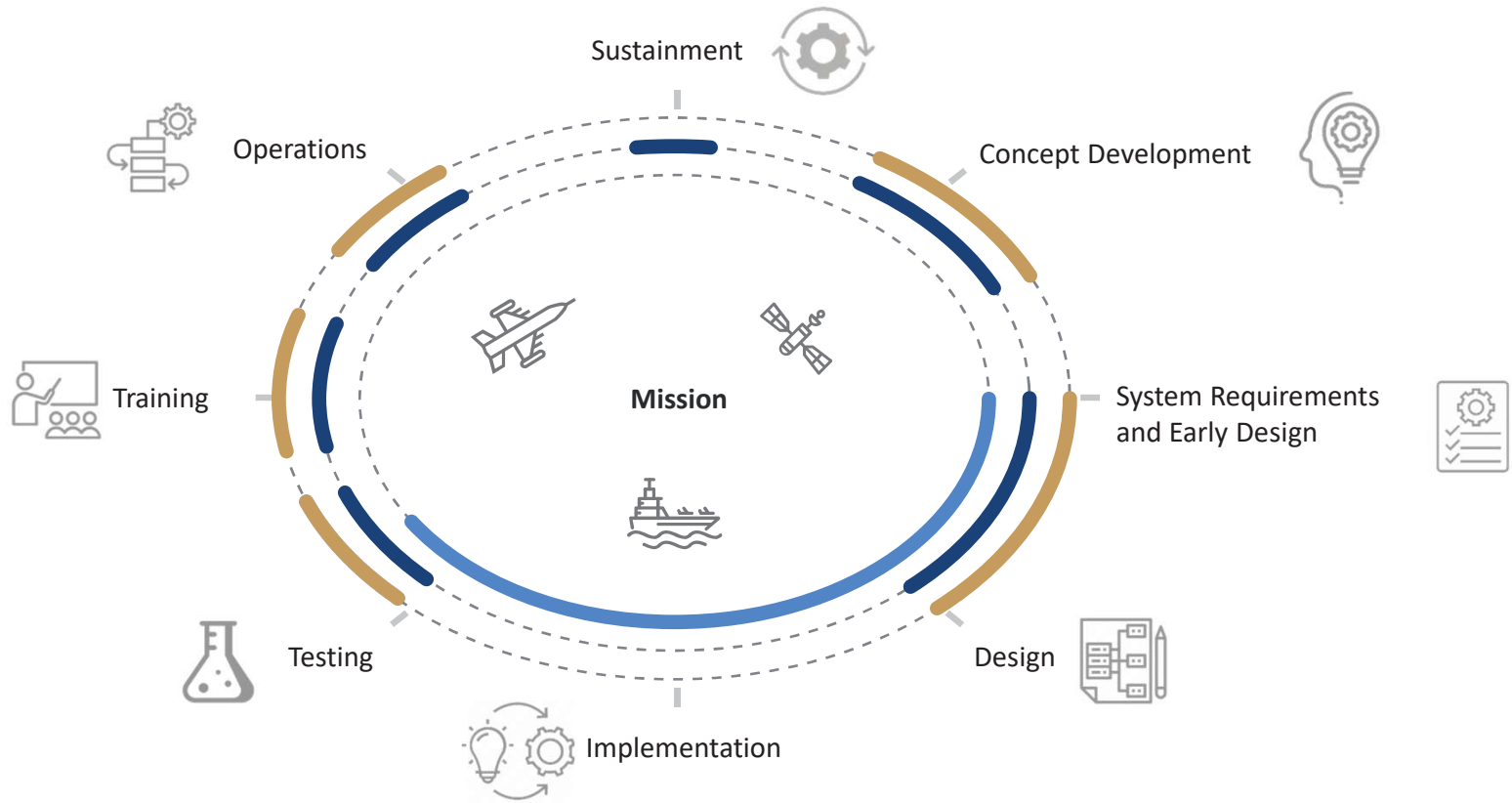
Digital Mission Engineering



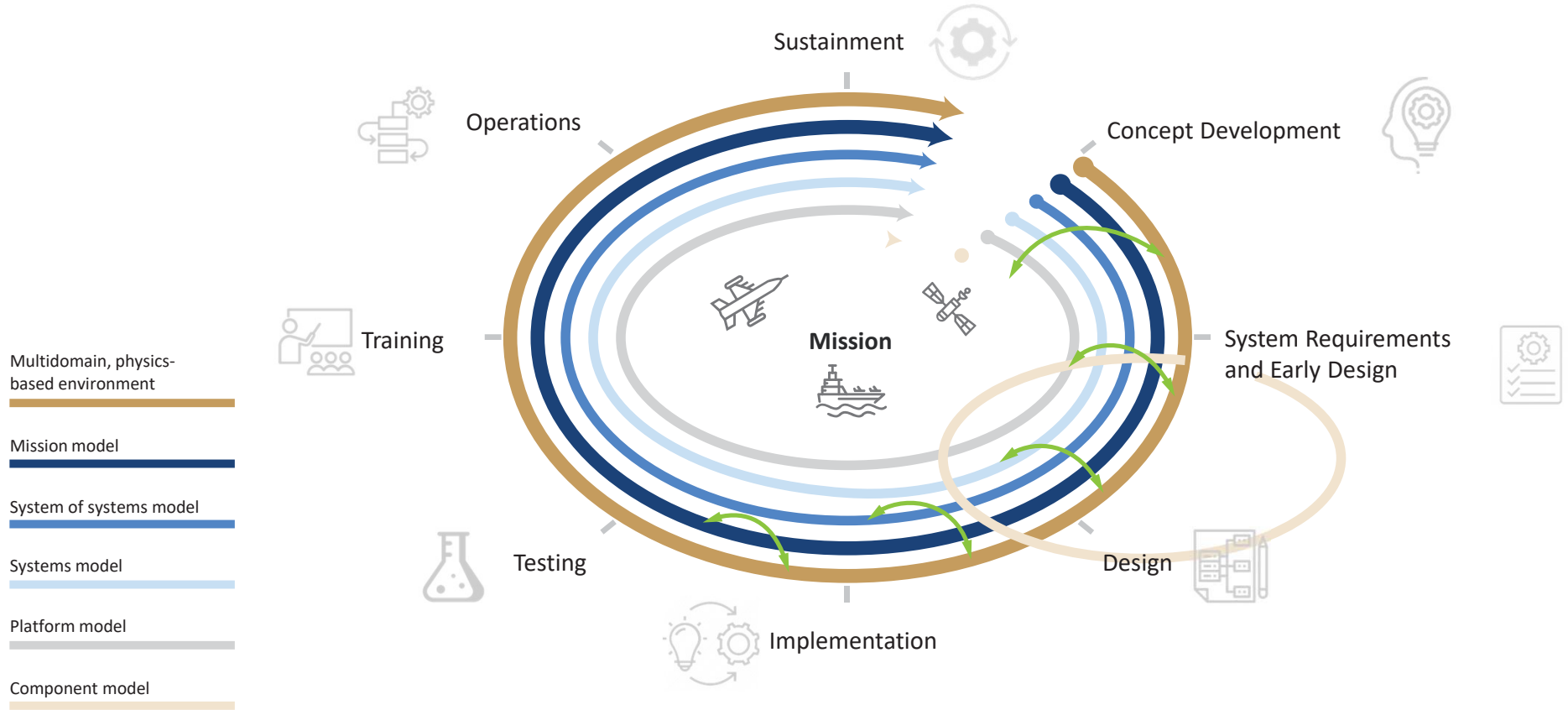
Digital Mission Engineering Video

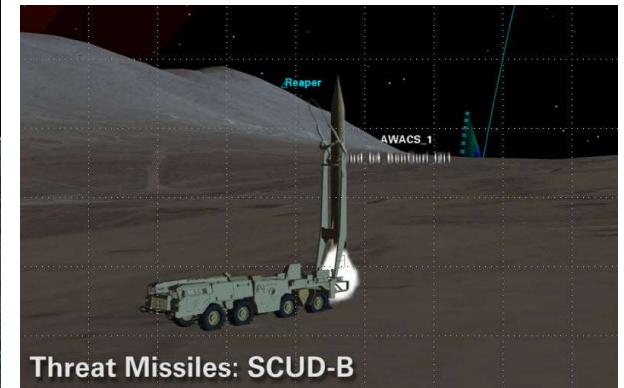
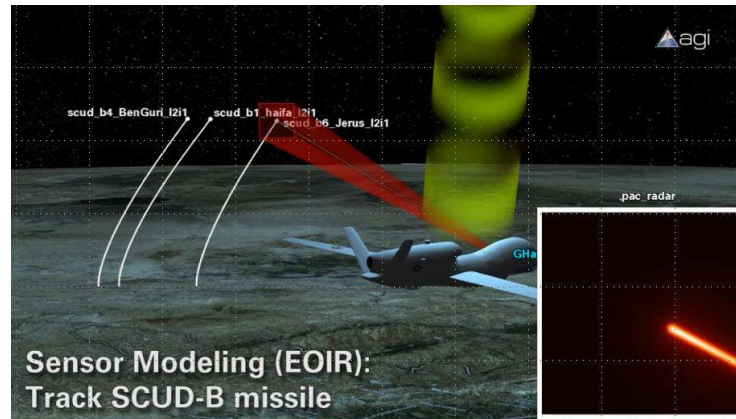
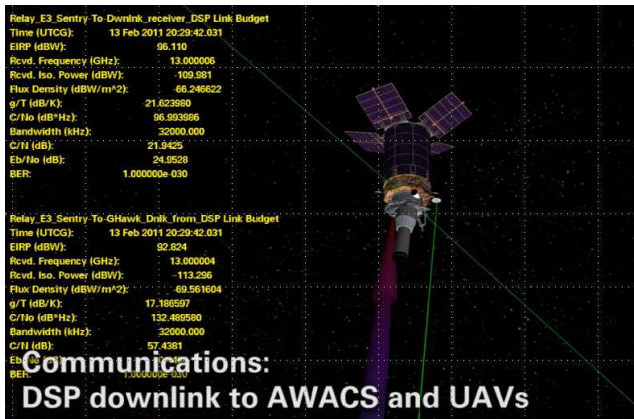
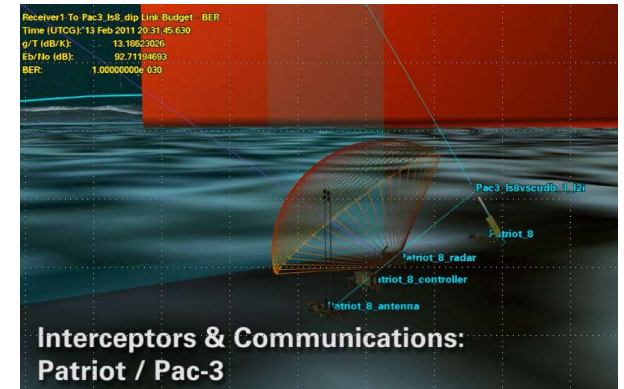
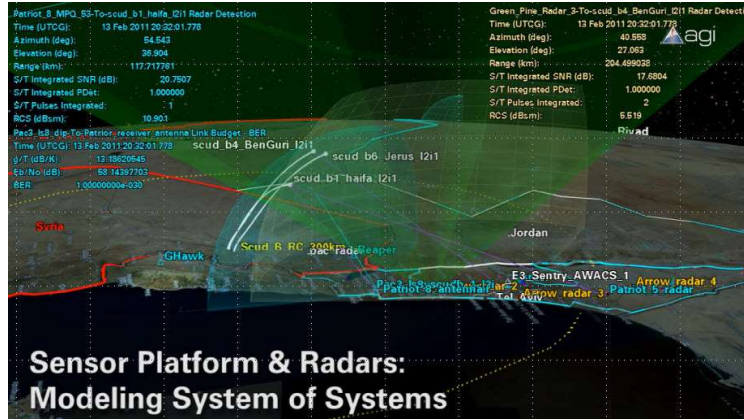


Problems with Legacy Engineering Processes



Digital Mission Engineering Vision





STK for Defense Systems

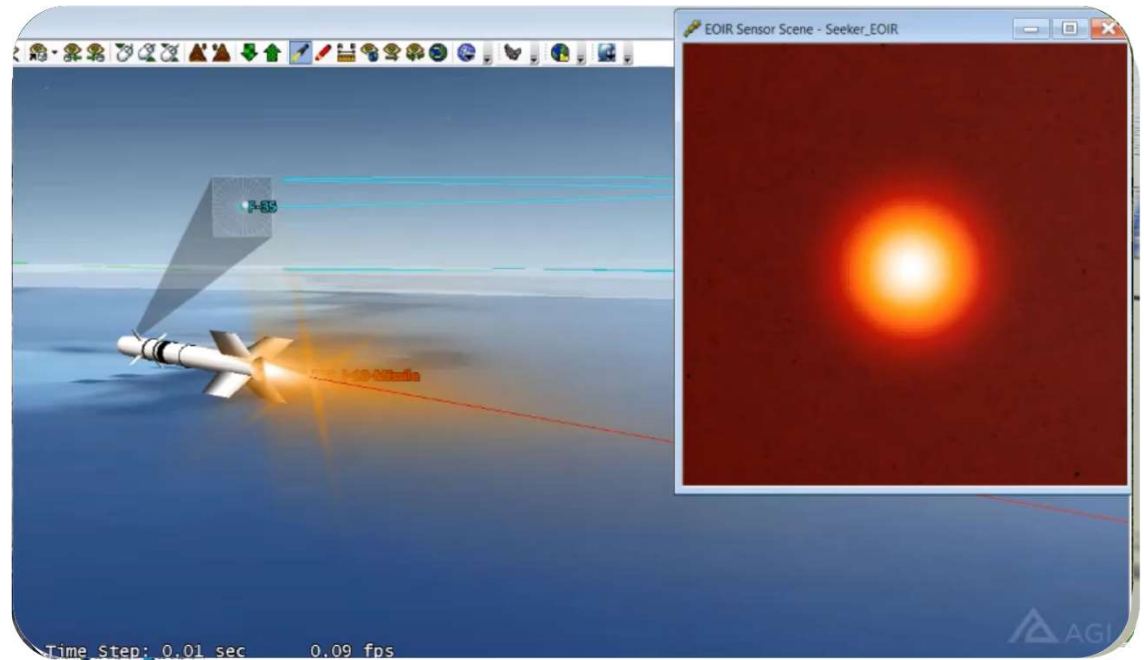
Aircraft Flight
Dynamics

Communication /
Coverage Analysis

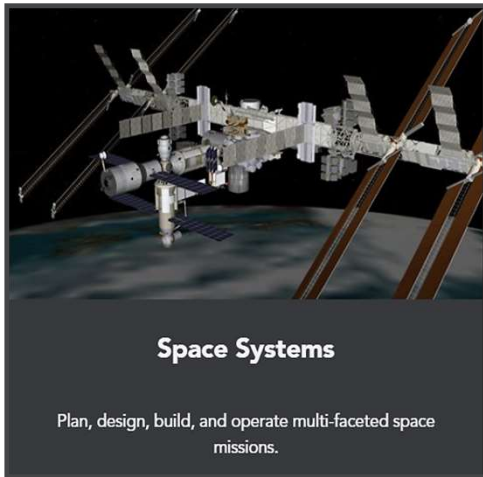
Radar Analysis

Jamming Analysis

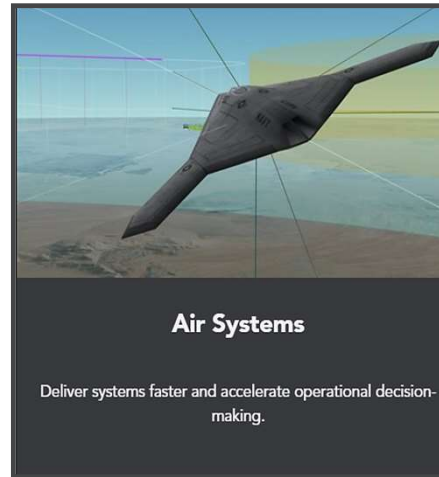
EO/IR Sensor Design



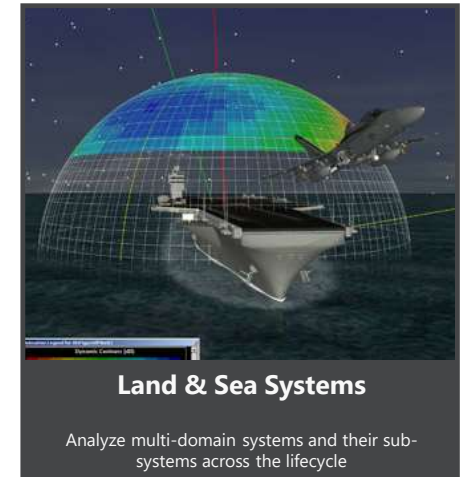
Platforms



- Satellites in any orbital regime for any mission application
 - Space environment
 - Propulsion
 - Safety of flight
 - Attitude/actuators
 - Solar power generation
 - GPS performances

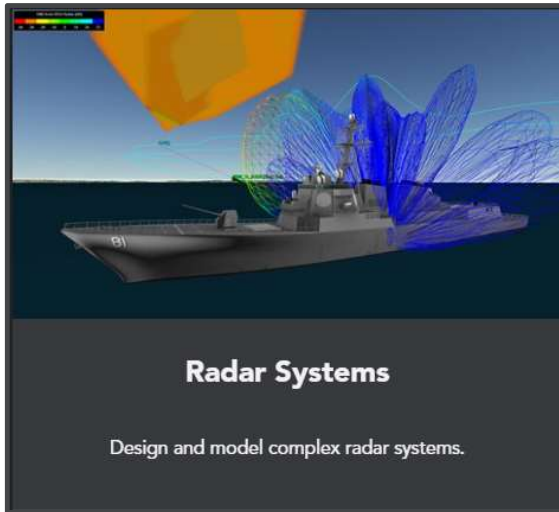


- Fixed wing
- VTOL (Vertical lift)
- Cruise missiles
- Performance models
 - Electric Motors
 - Turbofan/jet
- Flight procedures
- Attitude
- Fuel use
- Human factor G limits

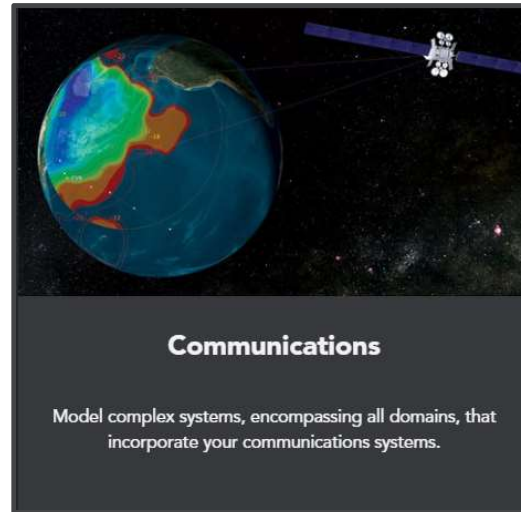


- Ground vehicles
- Ground systems (Antenna's)
- Surface ships
- Terrain following
- Terrain obstruction
- Great arc propagation
- FOM Grid (Heat map)

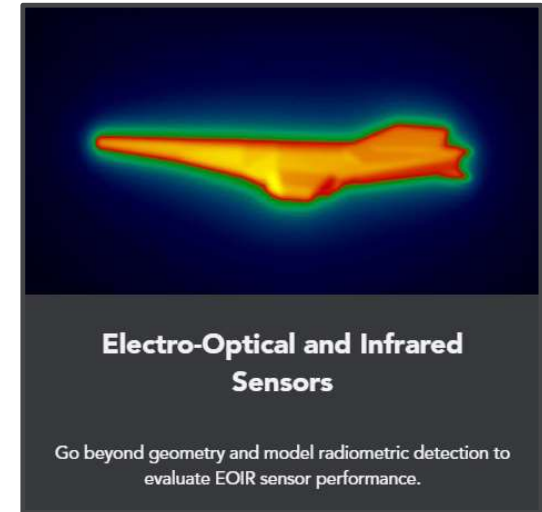
Payloads (sub-systems)



- Place on any platform to detect/jam any platform
 - Phased Array, SAR, mono/bi-static, etc..
 - Rain, refraction and atmospheric absorption and ionospheric fading models
 - Aspect Dependent RCS
 - Interference/Jamming
 - Terrain/clutter and sea affects

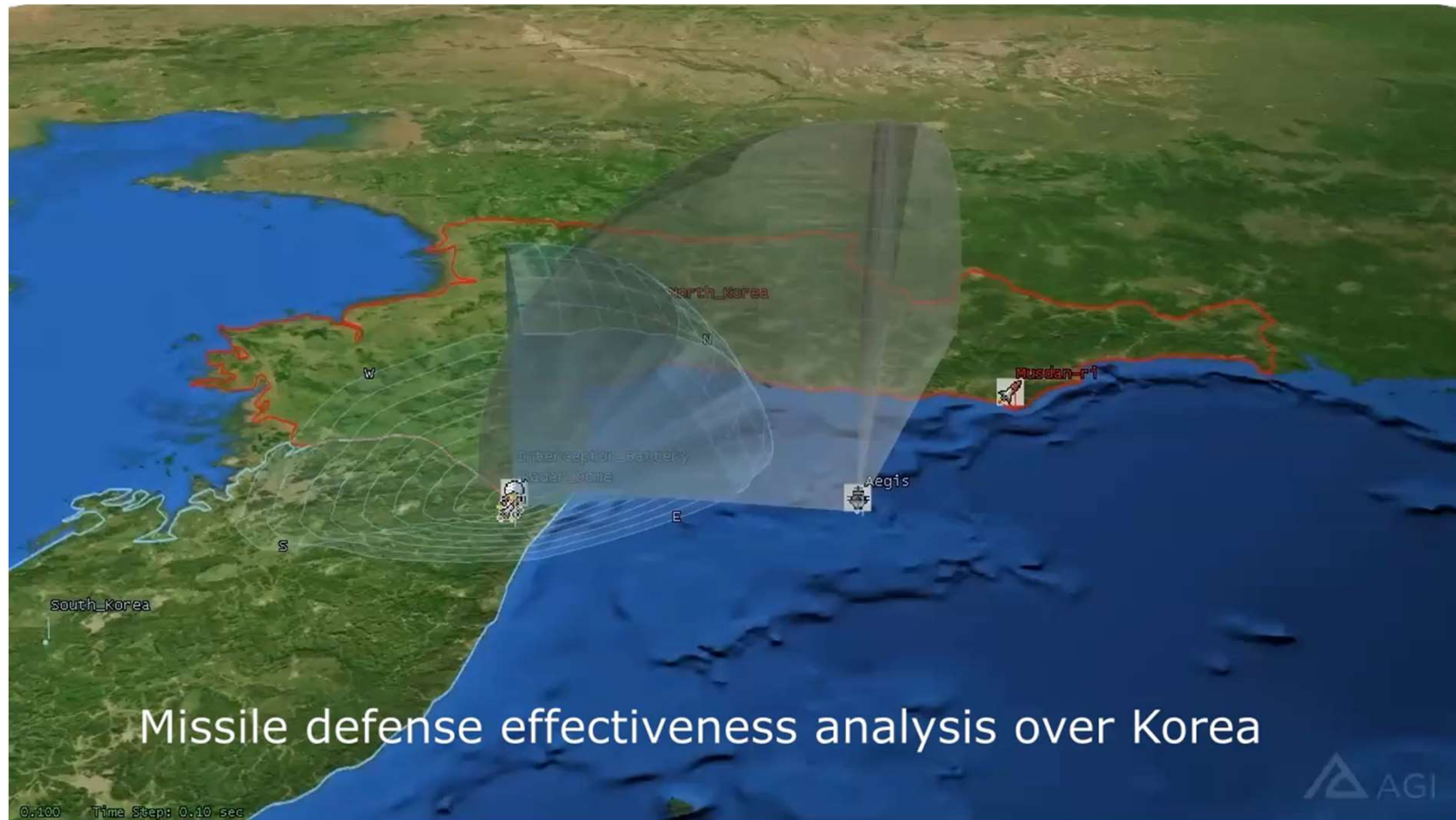


- Place on any platform to communicate/jam any platform
 - Phased Array, multi-beam, etc..
 - Rain, refraction and atmospheric absorption and ionospheric fading models
 - Interference/Jamming
 - Terrain and sea affects on signals
 - Urban propagation
 - Interface to network modeling tools



- Place on any platform to detect any platform
 - Metrics supported
 - Target radiance/irradiance
 - Background radiance/irradiance
 - Scene photon signal to noise ratio
 - Noise equivalent irradiance/radiance
 - Atmospheric and cloud effects
 - Material properties
 - Detector pitch
 - Focal plane definitions
 - Jitter

Ballistic Missile Detection & Inhibition



Systems Tool Kit STK

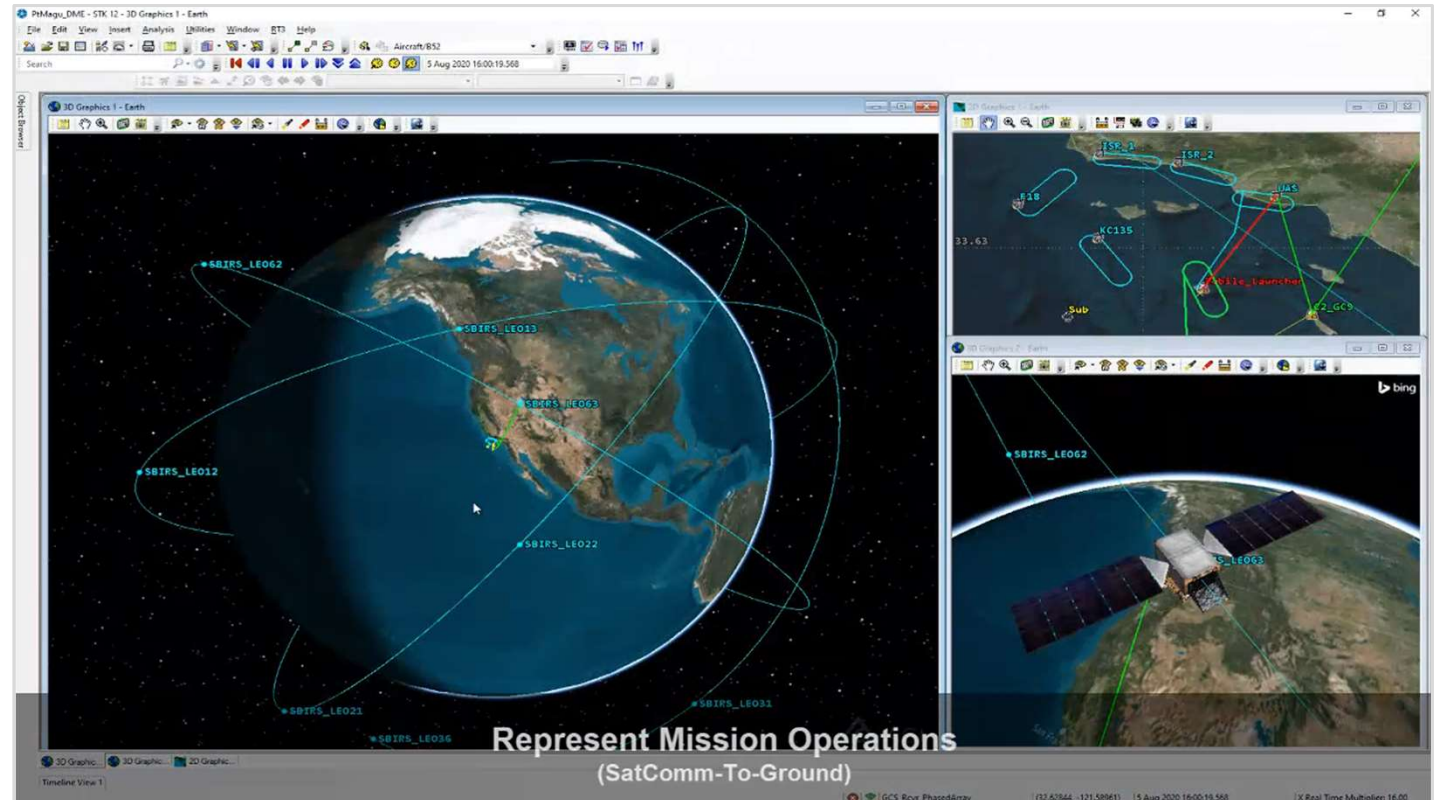


Multi-Domain Systems Modeling and Simulation



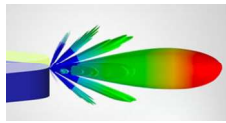
Systems Tool Kit

- Dynamic Geometry Engine
- Multi-Domain Missions
- Detailed Physics
- Rapid Scenario Generation
- Convey Operational Outcomes
- System-of-Systems Approach



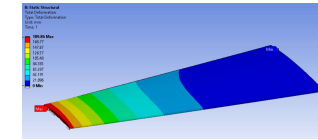
From Microchip to Mission

ELECTRONICS HFSS



- EM tool for R&D and virtual design prototyping
- Evaluate as-installed antenna performance
- Link to mission simulation for communication link budget analysis

STRUCTURES Mechanical

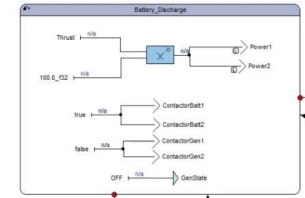


- Finite element analysis (FEA) for structural analysis
- Evaluate stress, strain and deflections based on loads/forces from the mission simulation

MISSION STK

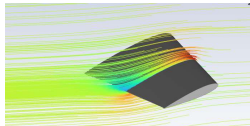


Embedded Software SCADE



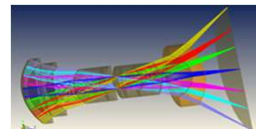
- Model-based development environment for reliable embedded software
- Execute software in the loop with the mission environment

FLUIDS Fluent



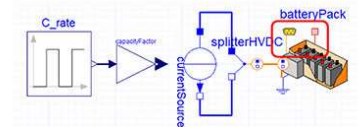
- Generate accurate and reliable fluid simulation results
- Export aerodynamic performance models for the mission simulation

Optics Lumerical Zemax



- Optical sensor design including lens, photonic components and environment
- Evaluate sensor performance in the mission context

Digital Twin Twin Builder



- Accelerate Export and Deployment of Digital Twin
- Link components to build system representations and evaluate ROMs in the mission simulation

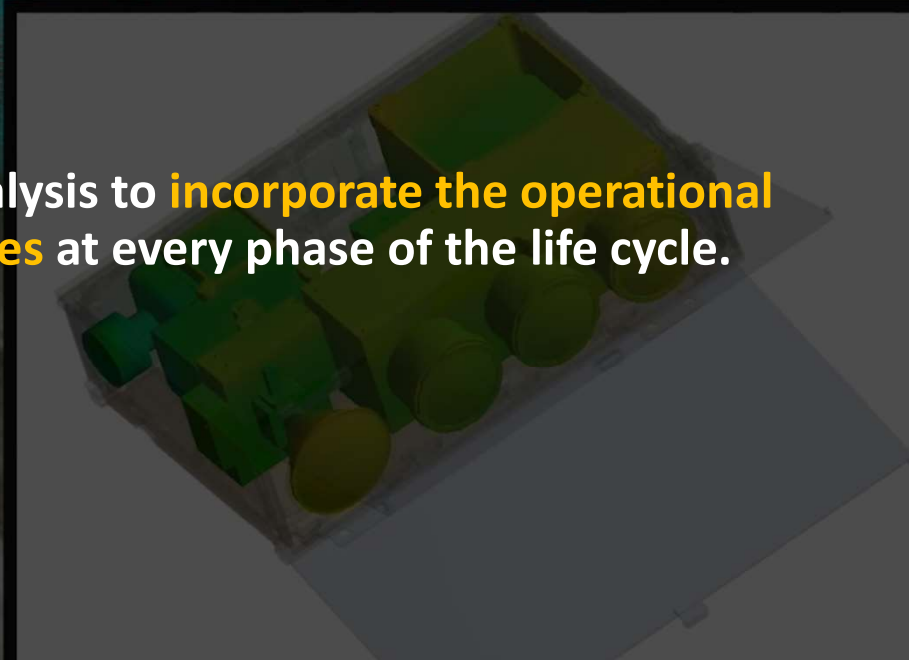
STK Systems Tool Kit



- Developed for more than 30 years
- Validated accuracy
- Focused on aerospace and defense

Digital mission engineering:

- Using digital modeling, simulation, and analysis to **incorporate the operational environment and evaluate mission outcomes** at every phase of the life cycle.



Questions





Thanks a lot for your attention

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