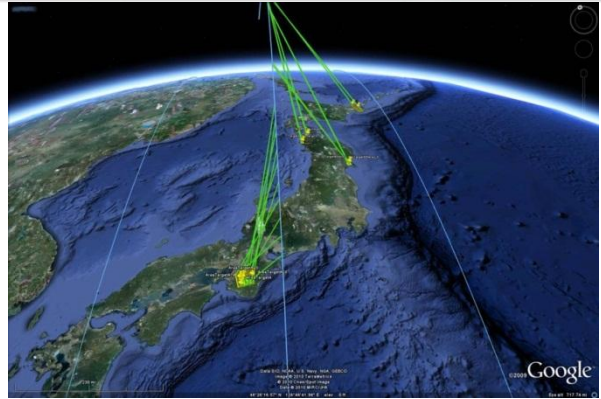




## Better Planning, Better Results

Maximize the quantity and value of imagery collected by your imaging satellites by integrating Orbit Logic's **Collection Planning & Analysis Workstation (CPAW)** into your satellite ground control system. CPAW couples high fidelity spacecraft modeling with multiple advanced scheduling algorithms and a user-friendly interface to generate optimized collection plans for one or more synthetic-aperture RADAR (SAR) or electro-optical (EO) satellites.



Sample CPAW collection track in Google Earth Pro™

ID	Task Order	Step	Priority	Order Dates	Status	CCP	Max C/S	Group	Lang/Prn	Beam	CCP Status	Imaging Start Time	Imaging Stop Time	Access	Access Start Time	Access End Time
1	Imaging_1	1	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
2	Imaging_1	2	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
3	Imaging_1	3	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
4	Imaging_1	4	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
5	Imaging_1	5	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
6	Imaging_1	6	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
7	Imaging_1	7	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
8	Imaging_1	8	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
9	Imaging_1	9	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
10	Imaging_1	10	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
11	Imaging_1	11	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
12	Imaging_1	12	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
13	Imaging_1	13	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
14	Imaging_1	14	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
15	Imaging_1	15	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
16	Imaging_1	16	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
17	Imaging_1	17	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
18	Imaging_1	18	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
19	Imaging_1	19	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
20	Imaging_1	20	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
21	Imaging_1	21	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
22	Imaging_1	22	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
23	Imaging_1	23	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
24	Imaging_1	24	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
25	Imaging_1	25	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
26	Imaging_1	26	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
27	Imaging_1	27	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
28	Imaging_1	28	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
29	Imaging_1	29	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00
30	Imaging_1	30	1	2014-08-10T00:00:00	1	1	1	1	1	1	1	2014-08-10T00:00:00	2014-08-10T00:00:00	1	2014-08-10T00:00:00	2014-08-10T00:00:00

Sample CPAW Planning GUI

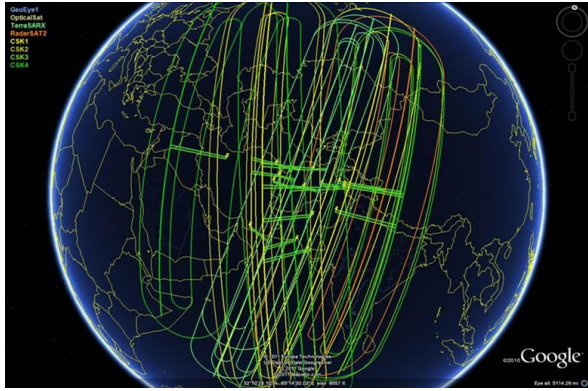
CPAW collection planning is enabled by a set of models that simulate and predict the physical environment, spacecraft subsystems and targets constraints. The CPAW modeling approach and architecture have been **validated operationally** for six different spacecraft from three different manufacturers. This is not just field-of-regard determination. CPAW provides operational-fidelity planning and generates plans that are ready for command generation. This kind of fidelity is needed not only to operate imaging satellites, but is also required by major government imagery customers in order to efficiently allocate their budgeted dollars to get the most possible value out of the satellites available to them.

## Automated and Manual Planning

Multiple collection planning algorithms are provided with CPAW and compete to generate optimized plans. The algorithms generate high-fidelity plans free from spacecraft system and target collection constraint violations. CPAW provides the GUIs and map displays (CPAW can generate maps for both AGI's Satellite Tool Kit (STK)™ and Google Earth Pro™) to provide situational awareness of the planning process, and friendly GUI interfaces top allow the operator to influence or adjust the algorithm-generated plans . . . or even perform manual planning from scratch. Manual plans are validated by CPAW as they are built, helping to guide the operator to a constraint-free solution.

## Constellation Planning

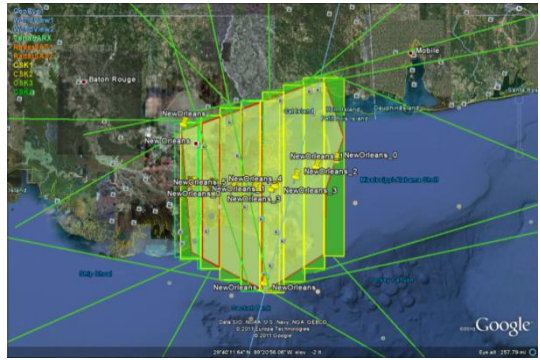
A single CPAW workstation can be configured to perform collection planning for multiple satellites individually, or to perform collaborative constellation planning. Under a CRADA agreement with the National Geospatial-Intelligence Agency (NGA), Orbit Logic demonstrated collaborative collection planning on a single CPAW workstation by a constellation of seven commercial SAR and three commercial EO imaging satellites.



CPAW Collaborative multi-satellite Plan Visualization

## Order Management and Fulfillment Tracking

CPAW also provides order deck management features to accept tasking from external systems and/or define tasking on the fly. Order fulfillment tracking ensures that large areas are efficiently collected:

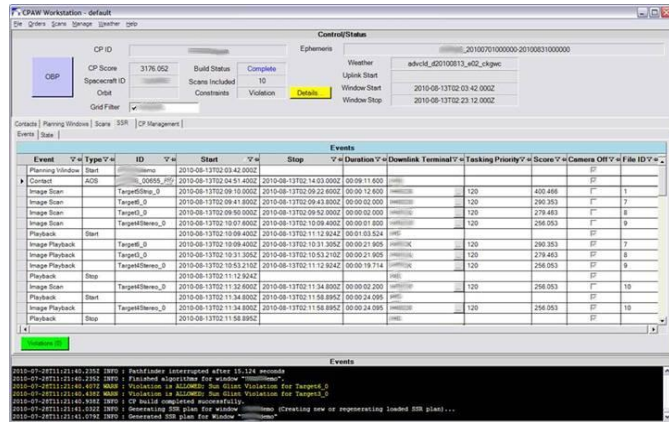


Area Fulfillment Tracking – Detailed View



## Contact Scheduling and Recorder Management

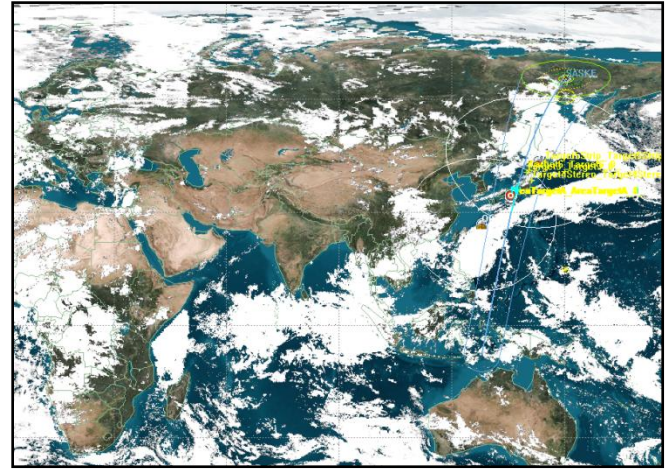
CPAW can be configured to perform automated contact scheduling based on the latest spacecraft ephemeris, ground antenna locations and elevation masks, and ground station maintenance/blackout schedules. Based on the contact schedule and committed collection plans CPAW can also perform downlink planning and manage the onboard recorder using high-fidelity recorder models with configurable settings.



CPAW SSR Manager GUI

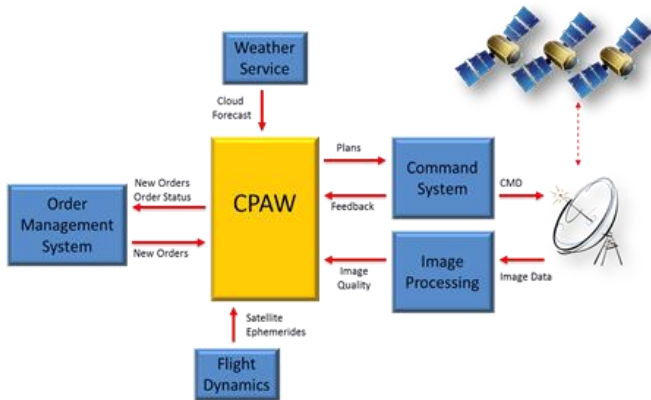
## Rapid Satellite Integration

New satellites can be added to CPAW quickly, sometimes in a matter of hours without the need for new software development. XML files define most satellite parameters, and plug-in interfaces for spacecraft agility and imaging models ensure that conforming models can be added and replaced easily. Under the NGA CRADA Orbit Logic integrated 10 new satellites into CPAW in under 4 months.



Sample CPAW STK Map View

## Context of the Collection Planning System:



## Enterprise Solutions

Take your planning to the next level with Orbit Logic's **Collection Planning Manager (CPM)™**. CPM can be customized for any mission operations concept to manage multiple CPAW workstations and provide a clustered and scalable computing solution for improved performance. CPM's distributed architecture supports collaborative planning by multiple geographically distributed organizations, and also provide a lights-out fully automated planning option.

## Orbit Logic CPAW solutions provide the following benefits:

- **Operationally Proven Heritage** – Years of operational experience for multiple high resolution imaging satellites.
- **Maximized Imagery Value** - Optimized planning is one of the linchpins in a successful, and efficient, imaging system.
- **Flexible Planning** – Configurable Figure-of-Merit (FOM) and multiple planning process flows supported.
- **Low Cost and Low Risk** – CPS is a COTS solution that can greatly reduce or eliminate new software development.
- **Ready for Operations quickly** - A CPAW workstation for a new satellite can be configured and running in a matter of days.
- **Scalable for Performance and Multiple Satellites** – For lights out automation and maximized collection planning performance Orbit Logic can provide the CPAW in a distributed clustered computing architecture.

For additional information about Orbit Logic's Collection Planning Solutions™ please review [www.orbitlogic.com/products](http://www.orbitlogic.com/products).