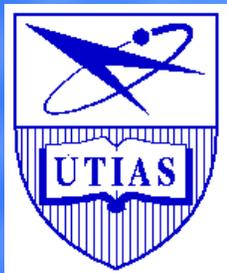




Analogue Deployment Management





Mauna Kea Analogue Deployment 2008





Mauna Kea Analogue Deployment 2010



NORCAT





2010 Analogue Mission

Predeployment Activities

- Integrated Schedule
- Cargo packing
- Safety plan
- Tent layout

Camp Infrastructure

- Tent deployment
- Power
- Communications
- Food, water, comfort
- Transportation





2010 Analogue Mission

Daily Routines

- Safety briefing
- Daily administration meeting

Deployment Recession

- Tent teardown
- Cargo packing





2008 Schedule

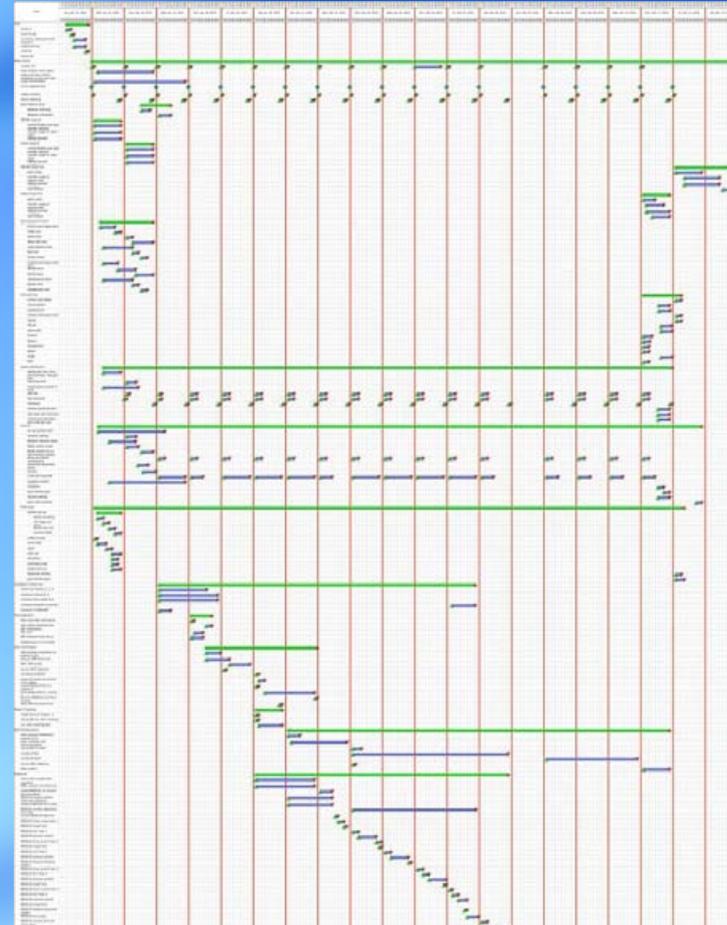
- Excel schedule of activities
- Hardware primarily dedicated to single integration activity
- Multiple disparate objectives for some systems led to scheduling conflicts
- Finite infrastructure resources (gen sets etc.) not scheduled





2010 Integrated Schedule

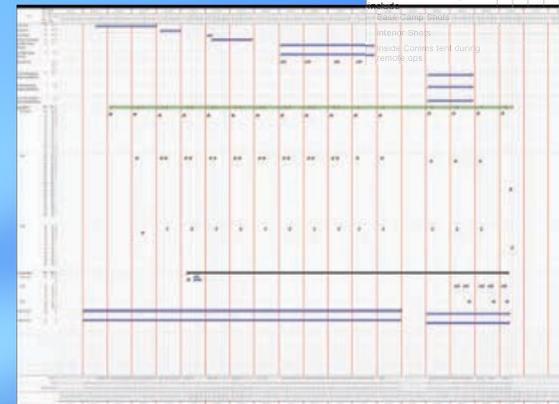
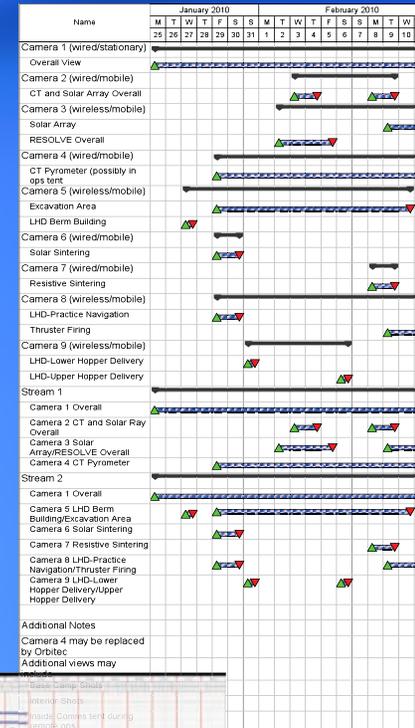
- Detailed hourly schedule of all activities of all participants
- Allocation of SRCan personnel for SRCan specific activities and infrastructure support
- Allocation of hardware involved in integrated activities for successful end to end demonstration





2010 Integrated Schedule

- Additional schedules for situational awareness cameras and bandwidth use.
- Allowed refinement during planning with an understanding of how proposed changes affected other aspects
- Able to make adjustments on site when required due to weather, equipment maintenance and repair, etc.
- All SRCAN personnel had an understanding of all activities scheduled, prep and clean-up to provide and logistics support for which they were responsible
- More down time for personnel needs to be scheduled





Cargo Handling 2008

- SRCAN team had limited equipment in comparison to 2010
 - Argo Avenger and trailer, winch
 - RESOLVE drill
 - Assorted tools and spares
 - TriDAR
 - Satellite comms gear
- Cargo shipped in a variety of ways from different origins
 - Some on C130 with NASA gear (RESOLVE drill), fedex, air cargo
- Cargo held up in customs due to inclusion of some 'consumable' items
- Repeated trips to local suppliers for items (from refreshments to canned air to nuts and bolts)





Cargo Handling 2010

- Consolidation, crating, documentation, and shipping of Canadian equipment
- Canadian contingent independent this deployment
 - Allowed shipping to be tailored to schedule
 - Significantly larger cargo – more hardware plus TFSS infrastructure
 - First international commercial shipment of TFSS equipment
- ‘Supercrates’ concept applicable for other deployments
 - Reusable
 - Multifunction
 - Size variations possible
- Not a trivial undertaking – significant documentation (carnet, TDG), logistics, tracking





Health and Safety 2008

- NASA completed hazard assessment for their equipment
- Cultural awareness presentation via webex
- SRCAN team employed a simple tracking system to understand where each member of the team was at any time
- Limited number of handheld radios for communication
 - Different teams employed different systems
- mock emergency showed some deficiencies
 - Comfortable method of transport for patients
 - Communication protocol
 - Evacuation procedure





Health and Safety 2010

- WHMiS, site specific safety orientation, personnel tracking system, radio procedures, emergency evacuation procedures, daily safety briefing
 - Included cultural awareness
- stretcher specifically designed for Argo
- Computerized personnel tracking system used to ensure safety of all deployment participants
- Specific health and safety officer assigned
- Daily safety briefing
- Personal radios for almost all





Base Camp Plan 2008

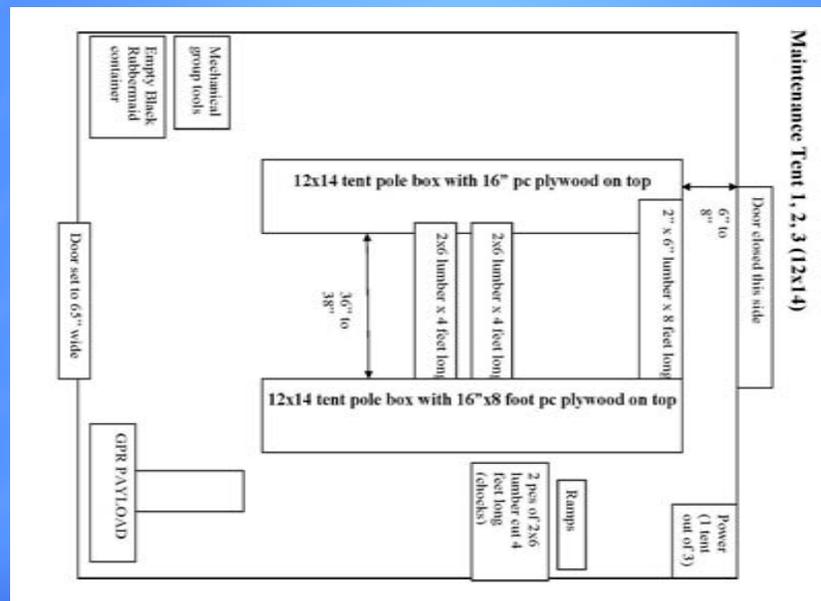
- Pre-selection of specific site based on terrain
- Smaller deployment, fewer tents to accommodate
- Crowding in designated command and control tent
 - Multiple functions in single tent
 - Constant movement in and out of personnel
- Materials used to mark off experimental areas could not withstand weather conditions
- Initial tent set up by Pisces with ad hoc additional tents during deployment
- Tents furnished by participants to suit with available tables, chairs





Base Camp Plan 2010

- Significantly larger and more complex deployment than 2008
 - Pre-deployment surveying and mapping
 - Operations space, command and control space
 - Self-contained: packing materials reused for furnishings and infrastructure





Base Camp Infrastructure 2008

- Pisces provided gen sets, tents, power cabling, ropes, tarps
- Multi-function tents
- Limited number of gen sets necessitated double duty
- Lunch (dining alfresco) provided through Hale Pohaku
- Portaluas provided
- SRCan provided satellite communications
 - Remote command and control to CSA's PTOC in Montreal
- CSA provided Argo Avenger and trailer (for RESOLVE GSE)
- Pisces supplied tents
- Tents provided inadequate protection from dust storms, too bright for computer screens





Base Camp Infrastructure 2010

- TFSS provided double-walled canvas tents, tarps
- power supply and distribution
 - 26 TFSS gen sets of various sizes
- Single purpose tents to alleviate congestion
 - control, maintenance and mess tents, admin, comms
- On-site food prep, constant supply of beverages, snacks
- CSA Argo Avenger and trailer





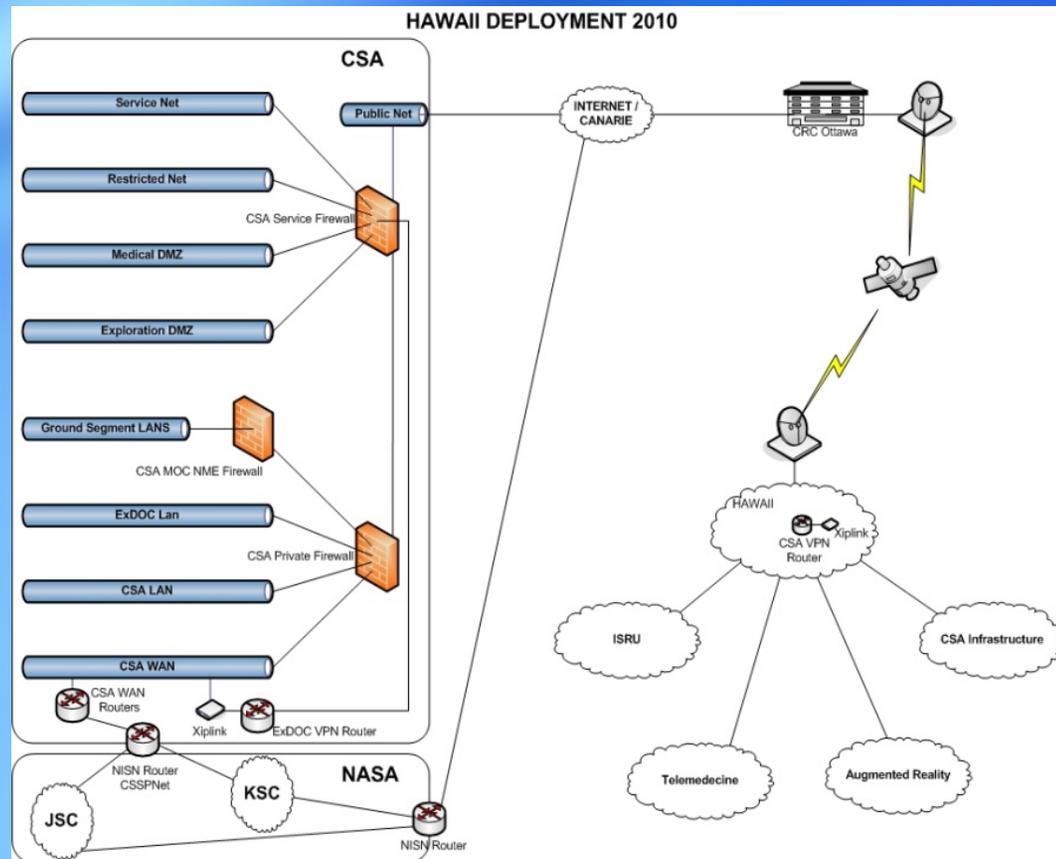
Base Camp Infrastructure 2010





Base Camp Infrastructure 2010

- Comms links available throughout camp, in crater
- 8 situational awareness cameras on 2 streams
- Comms through CSA's ExDOC in Montreal to KSC, JSC





Base Camp Infrastructure 2010

- On site field com for interface between participants and communications team
- Capcom stationed at ExDOC for direct communication with field com





Administration 2008

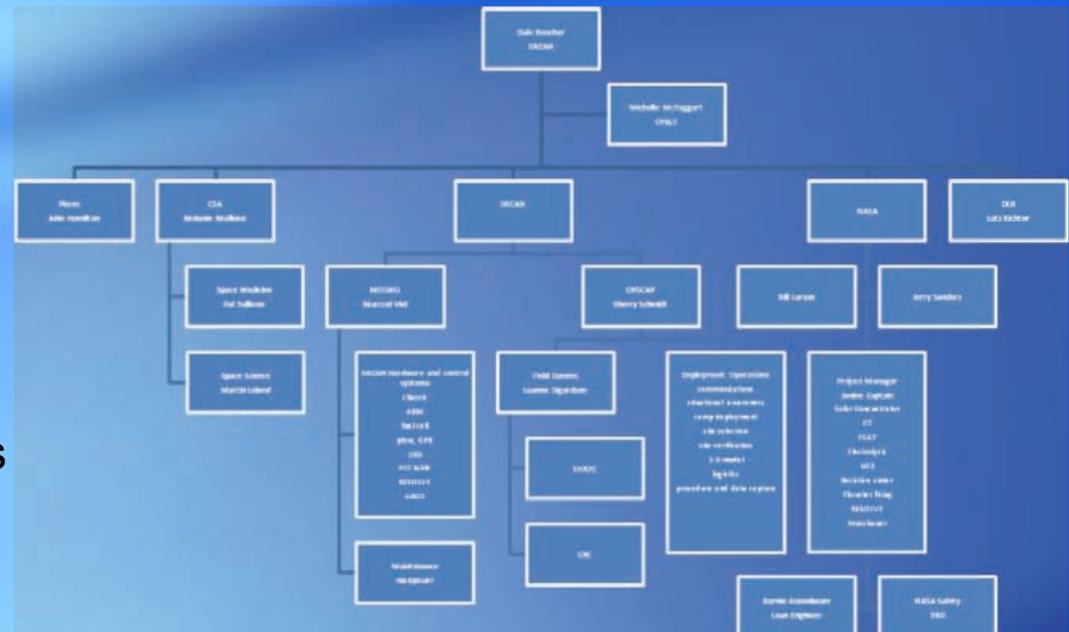
- Ad hoc meetings to adjust schedule
- Requests for infrastructure support directed to Pisces staff from a variety of sources
- Roles and responsibilities defined within teams, but not clear between teams





Administration 2010

- Management plan identified roles, procedures for communication and conflict resolution
- Single facilitator
- Daily meeting with representation of all key roles
- Consensus based
- Key to successful integrated deployment
 - Facilitates completion of objectives of various parties which may be disparate
 - Fosters international collaboration





Media and Public Outreach 2008

- School visits
- Display at Imiloa Science Center
- Individual groups conducting media relations
- Media day – activities staged for the purpose





Media and Public Outreach 2010

- Media coordinator
 - Cohesive message to public
 - Equitable representation for all groups
 - Promotion/organization of media day
- Media day scheduled to showcase technologies through planned experimental activities
- Embedded students with SRCan team
 - Geologist, physicist, hospitality
- School visits





Deployment End 2008

- Extensive exit plan not required for the size of the deployment
- Ad hoc exit of some groups somewhat disturbing to ongoing experiments
- Pisces assumed primary responsibility for dismantling infrastructure
- Participants pitched in





Deployment End 2010

- Extensive exit plan for SRCan team and associated infrastructure essential due to magnitude of cargo
 - Repacking required to be precise for customs documentation
 - Staged to allow packing of tents, gen sets as vacated and decommissioned
- Detailed exit plan for NASA participants
 - Dependant upon SRCan transportation, handling support
- SRCan team assumed responsibility for dismantling, packing majority of infrastructure (TFSS supplied)
 - Pisces and NASA support
- Dismantle and repack accomplished in less than allotted time





Summary

- **Successes**
 - Detailed schedule with resources, personnel
 - Detailed planning for cargo, deployment
 - Infrastructure (tents, gen sets, mess tent)
 - Detailed base camp layout planning
 - Administration process
 - International collaboration
 - Public outreach
- **Improvement Opportunities**
 - Schedule adjustments for personnel rest
 - Continuous/overnight power requirements defined
 - Test radios for interference
 - Consider additional bandwidth to facilitate continued non-deployment work for participants

