

Lessons Learned from DECam Shipping

David Finley / February 10 2012

This is a subjective summary of some of the arrangements that were set up to assure the shipments to CTIO of various DECam parts went well. These arrangements included getting items to CTIO and establishing the proper custodianship of the items.

The main lesson is an old one: Communication and Organization are keys.

Overview from the DES Project Office

It was imperative in starting out to understand which people were already in place, to carefully set up specific people who would cover what was lacking, and to establish effective communication among them. It was also imperative to follow the agreements, understandings, rules, laws or regulations set up by the DES Collaboration, agencies of various governments, or other DES related institutions.

The person in the DES Project Office specifically responsible for shipping was David Finley. He worked for the DES Director in this role, which mostly involved non-technical coordination. The initial DES Director, John Peoples, set in motion the manner in which DES would do shipping, and then Josh Frieman (the second and current DES Director), along with David, carried things out and made course corrections as needed. This "way" for shipping is mainly documented in two places: "Memorandum of Understanding for the Dark Energy Survey" and "The Dark Energy Survey DECam Shipping and Custodianship Plan". Also the "MEMORANDUM OF UNDERSTANDING BETWEEN THE U.S. DEPARTMENT OF ENERGY AND THE NATIONAL SCIENCE FOUNDATION FOR TRANSFER OF DARK ENERGY CAMERA PROPERTY AND RELATED EQUIPMENT" was created. Finally, various arrangements among DES related institutions were also needed to address issues limited to a subset of the institutions. In addition to people in the DES Project Office, these items also required the services of lawyers or bureaucrats from DOE, NSF, FRA, AURA, Fermilab, NOAO/CTIO or other DES related institutions.

The overall paradigm was: Identify what needs to be done. Organize people to accomplish these needs. Coordinate. Communicate. Be prudent and patient.

Overview of Key People

In addition to those already mentioned, key people included Brenna Flaughner and Wyatt Merritt (DECam Project Manager and Deputy); Al Elste, Cliff Aldrich and Edilia Cerda (Fermilab Shipping, AURA US export and AURA Chile Import); Jack Kelly, Jerry Smith and Teresa Pierce (Fermilab Property, AURA Property and NSF); and Alistair Walker (CTIO.)

David's job was to keep these people communicating as necessary so that DECam items arrived at CTIO before they were needed. Brenna delegated most project related shipping responsibilities to Wyatt, but she took a heightened interest in the details of the imager shipment.

Al worked with Cliff to make sure that items leaving Fermilab had the appropriate information required for Cliff to do his due diligence to follow US export laws and regulations, that the appropriate shipping vehicles showed up at the right place and time, and that the appropriate Chilean import documentation was in place. Engineers, technicians or physicists provided technical information as appropriate, along with the dates the items were needed at CTIO. Al and Cliff arranged specifics of shipments on a case-by-case basis.

The earliest shipments were sent to Tucson so Cliff could check the items for shipment (and re-pack them if necessary) and arrange the proper paperwork based on information from Al. After several of these shipments Al and Cliff arranged for shipments to leave Fermilab and skip the Tucson trip. The PreCam shipments were done early and they were quite effective in "prototyping the shipping system". They blazed the path and set precedents to the great benefit of the later DECam shipments.

In addition, Cliff worked directly with people initiating DECam shipments from US non-Fermilab locations (i. e., SLAC and TAMU) so that he could do his due diligence to follow US export laws and regulations. For all items being exported from the US, Cliff also assured Edilia was in the loop so that she could get the items out of customs in Chile and make arrangements to get the items to their final destinations within Chile. In addition, Edilia worked directly with people initiating DECam shipments from non-US locations (i. e., Japan and the UK) so that they would have the necessary documentation to follow Chilean import laws and regulations.

Jack worked with Jerry to assure the first US property accountability transfer from DOE to NSF worked. Subsequently Jack worked with Teresa on the remaining US property accountability transfers from DOE to NSF.

Initially David made sure the items transported by Edilia to either LaSerena or CTIO got into the hands of those who needed them. Then Alistair took this over.

Jack, David and Wyatt worked with Fermilab budget people and accountants to assure the property value to be transferred from DOE to NSF would be appropriate at the close of the DECam project. It is to be noted that the value the shipping people want to use and the value that the property people want to use are not the same because each serves a different purpose.

David informally briefed Josh and Brenna, Fermilab Division and Section Heads, people in the Fermilab Directorate, and DOE people when asked or when he wanted to check signals. John (followed by Josh) and Brenna used formal channels.

Specifics

The motto throughout this process was: Make maximum use of available resources and create ONLY what is needed. Examples follow.

Permissions or agreements were needed so that Fermilab could ship non-DOE funded DECam items as necessary. One example was the Front End Electronics cards made by DES-Spain; the documentation was an email from the head of DES-Spain.

Because DES will not be the only user of the DECam instrument, the use of the DECam items by AURA at CTIO needed to be specified. This was done in the DES MOU, the NSF/DOE MOU, or in individual agreements between AURA and the appropriate DES related institution.

Cliff obtained, on AURA's behalf, a single US export license for all of the DECam items leaving the US destined for CTIO. This allowed almost all otherwise single shipments to be exported under a single "permission slip" from the US government. On two occasions Cliff produced the paperwork needed so that DES collaborators could "hand-carry" items through US and Chilean customs.

It was important to recognize specific technical features of each shipment early. These include technical aspects such as unique high-tech items that might be export controlled (like the infra-red camera used in RASICam), shipments potentially containing hazardous materials, or containing difficult to replace items (like the imager and corrector). In addition it was important to determine what other governments were to be involved for export (i.e., Japan for the filters and the UK for the corrector.) Sometimes it took a relatively long time to get the appropriate paperwork in place (like six months for Cliff to get permission for the infrared camera.)

It is to be stressed that experts in shipping need to document information needed to properly export and import all items, not just "high-tech" items. The technical experts (who have the information) need to provide it to the shipping experts.

Trust But Verify

Brenna decided that most shipments to Chile went by air, and which (few) shipments went by boat. Shipping companies each have their own websites to provide customers with information regarding their shipments. There is a wide range of usefulness in these sites and generally David could find out the status without help, but on occasion Al or Cliff had to contact the company's customer representative.

The people who actually do the shipping and accountability transfers are experts in what they do, but they are necessarily constrained in how they do their jobs. The DOE and NSF also specify details of what is allowed and not allowed. It

was important to involve all of these people early in the overall plans on how to coordinate tasks so they were done efficiently with neither overlaps nor holes in the process. If their perceived constraints did not allow the experts an appropriate level of comfort, then their management or advisors needed to sort things out to establish the appropriate comfort level. This also created a sense of trust and the appropriate level of expectation among them concerning who does what.

It was important to make managers, shipping and property experts aware of upcoming situations in time for them to do their jobs sensibly. It was also established by experience that shipping people, accountants and property people work best with information and items directly at hand at the moment. They are not comfortable making up estimates (unlike physicists or engineers.)

There were two occasions on which a shipment "got lost", meaning David could not figure out where it was. On both occasions the item had not left the US according to the prediction by the shipping company for over a week, so it did not "arrive" at the Santiago airport when it was expected by David. On both occasions Cliff tracked it down and got it going.

There was an occasion when DECam items were unpacked at CTIO and it was reported that there was damage during shipping. As it turned out the damage was due to inadequate restraint of some items within the package given to the shipping people. The trust developed earlier among those involved helped to quickly sort out who needed to do what to prevent such damage in future shipments.

There was one accountability transfer that was "lost." This came to light when Wyatt tried to reconcile the value of the estimated total transfer with the sum of the values sent to her in individual emails. In particular, the liquid nitrogen property category did not add up. As it turns out neither David nor Jack had any evidence that a particular expected accountability transfer had ever been sent to Teresa for approval. After Jack sent it, it was approved, and the question was resolved.

The imager shipment got special attention, and arrangements out of the ordinary were done. This led to not unexpected inefficiencies because many proven procedures already in place were bypassed, and new ones had to be created specifically for this shipment. Cliff did the shipping company arrangements for the non-imager shipments from the US, but it was decided that Fermilab would do these arrangements for the imager. One very memorable surprise that came up shortly before the imager was to leave Fermilab: The Fermilab purchase order for the shipping company was not in place. In fact, getting it done in time involved people in the upper management of the Fermilab Business Section. It was understandable this shipment was to receive special attention, and things did in fact work out OK, but it did result in high-anxiety activities.

Predictions by managers are the best they can do, but the predictions are almost always based on incomplete, transitory or inaccurate information. Thus

predictions were often wrong by enough to impact anticipated actions of the shipping people, the property people or the accountants. The most egregious example of this was: The estimated delivery date of the g-band filter slipped and slipped and slipped, often month-by-month. This happened for good technical reasons of course, and the property people and accountants made adjustments as needed. All sides should realize that the motto here is: Plans are useless but planning is essential.

There was no coherent scheme for naming shipments or accountability transfers. This led to confusion on several occasions. The various people involved often named the same "package of items" differently. These included the technical people (physicist, engineer or technician), managers, Al who typically received items at Fermilab, David who was coordinating activities, property people, Cliff who arranged for exportation of shipments from the US, Edilia who arranged for importation of shipments into Chile, Alistair, and whoever needed it at CTIO. Multiple names did not always happen, but it did happen too often. This likely would have happened far less often if there had been a Project Engineer who would have taken on the "naming duty." This paragraph is included as a lesson for others.

Final Lesson and The Future

The final lesson is: Identify what things and activities belong in Operations rather than in the Project, clearly delineate them and then establish them in Operations as soon as practical.

The connections among the people doing the shipments for the DECam project are in place for future shipments of items in support of the DES experiment. (At least until specific people move on or new connections or arrangements need to be established.) Thus although the specific coordination role of the DES Project Office is no longer needed, the DES MOU must still be followed. (Please note: Shipments of items that are not part of DES are not subject to the DES MOU.)

People working on behalf of Josh and Brenna should contact Al, Cliff, Edilia and/or Alistair as described above for future DES shipments. (Cliff has told David he will contact David or Brenna if something looks out of line to him.) Some shipments will include items returning from CTIO to their home institution. Return shipments were done during the project, and future return shipments should also follow the arrangements established during the project.

The property people and accounting people will transition from their project roles to their usual roles during operations.

The End.