Journal of Western Archives

Volume 13 | Issue 1 Article 7

2022

To the Moon and Mars and Back to the Archives: Working with Modern Space Collections at the University of Arizona Libraries

Molly Stothert-Maurer
Arizona State Museum, stothert@arizona.edu

Lisa E. Duncan
University of Arizona Libraries, led1@email.arizona.edu

To the Moon and Mars and Back to the Archives: Working with Modern Space Collections at the University of Arizona Libraries

Molly Stothert-Maurer
Lisa E. Duncan

ABSTRACT

With a long history at the University of Arizona with excellence in the lunar and planetary sciences, the University of Arizona Libraries Special Collections has increased its collecting of the History of Science and Technology. These large, modern space collections pose unique challenges and require specific needs to be addressed in order for the collections to be stored, processed and made available for access. It is essential for archivists working with these collections to ask their donors the right questions and learn the limitations and restrictions that often come with acquiring modern space collections. Archives around the country have started tackling the issues unique to space collections, particularly with the conference *To Boldly Preserve* in 2018. Special Collections has encountered these processing and access issues with the Peter Hollingsworth Smith papers (MS 605) including the heavy reliance on acronyms and abbreviations, special restrictions form ITAR and export control that affect access and the effects of grant funding on archiving of materials. While the acquisition of modern space collections can be complicated, the preservation of modern space missions is vital to document the development of the exploration of space and being prepared for these common issues can ease the transition of collections to the archives.

Introduction

Located in Tucson, Arizona, the University of Arizona is a public, land grant university recognized for its work in the planetary sciences. The University of Arizona Libraries Special Collections (Special Collections) provides primary source research materials as part of the University Libraries system. Special Collections has seven major collecting areas such as Literature, Arizona & Southwest, and Borderlands. With the University's long history of involvement in space sciences, one of the fastest growing collecting areas is the History of Science.

Within the History of Science collecting area, the Pioneers of Planetary Science manuscript collections includes materials from notable scientists who worked at the

University of Arizona Lunar and Planetary Laboratory (LPL) and Steward Observatory.[1] These include founder Gerard P. Kuiper, known as the father of planetary sciences for his many contributions and role shaping the discipline.[2] Kuiper relocated his projects from Chicago to Tucson in 1960 to take advantage of Tucson's clear skies and mountains well-suited for observatories and created the Lunar and Planetary Laboratory. Kuiper drew former colleagues to Tucson including astronomers Ewen Whitaker and Tom Gehrels and grew LPL into a preeminent department in space science research. Early contributions included the best lunar atlases as well as the first images of undistorted features on the side of the moon, meant to look as they would from the perspective of an astronaut flying overhead, published in 1963, that aided in the successful completion of the Apollo 11 mission.[3, 4] LPL was the first university organization to manage a mission to Mars with the Phoenix Mars Mission and has participated in numerous spacecraft instrument and mission teams.[5] Most recently, LPL is home to the $800 million OSIRIS-REx sample return mission to the asteroid Bennu which will return to earth in 2023.[6] Special Collections has partnered with the OSIRIS-REx mission to archive their non-data project documentation over the course of their mission.[7]

Preserving space history is an important endeavor and the prominence of LPL in the field of planetary sciences provided an opportunity for the Special Collections to establish a unique and important collection. Through conversations with LPL, it became clear that the complexity of materials and restrictions affecting space collections created a unique set of challenges not normally encountered by archivists. A thorough understanding of the kinds of challenges space collections pose is important for processing and providing access to these collections as well as maintaining good relationships with the departments that produce these materials to ensure that the archives can properly steward them.

1. "Pioneers of Planetary Science", University of Arizona, accessed April 2022, https://speccoll.library.arizona.edu/collections/pioneers-planetary-science

2. "Gerard Kuiper (1905-1973)," NASA Science, accessed April 2022, https://solarsystem.nasa.gov/people/720/gerard-kuiper-1905-1973/; "Gerard P. Kuiper Papers, University of Arizona, accessed April 2022, https://speccoll.library.arizona.edu/collections/gerard-p-kuiper-papers

3. "Mapping the Moon", University of Arizona, accessed April 2022, https://news.arizona.edu/mapping-moon.

4. Daniel Stolte, "Mapping the Moon and Worlds Beyond," *University of Arizona News*, published July 16, 2019, https://news.arizona.edu/story/mapping-moon-and-worlds-beyond

5. "LPL At a Glance," University of Arizona Lunar & Planetary Laboratory, accessed April 2022, https://www.lpl.arizona.edu/about/lpl-at-a-glance

6. Ibid.

7. "OSIRIS-Rex: Asteroid Sample Return Mission," University of Arizona, accessed April 2022, https://www.asteroidmission.org/

Literature Review

In March 2018, the National Science Foundation funded the conference *To Boldly Preserve* to address the new constellation of challenges and opportunities that face many aspects of space history, including the challenges that archivists face working in this arena.[8] The impetus for this conference was in part due to the paucity of information available on the topic. In the Call for Papers, a number of challenges were identified including overarching challenges that affect the archives field in general: the rise of big data, email archiving, social media, and the evolving historical record. Concerns specific to space flight included: the boom in space exploration internationally, the shift to non-governmental entities in space exploration, fandoms and do-it-yourself approaches made possible by social and digital media, intellectual property rights, nondisclosure acts, International Trafficking in Arms Regulations, archiving by lawyers, and the lack of best practices in many of these areas.[9] The conference consisted of 90 attendees with presentations from archivists, historians, museum curators, scientists, oral historians, and writers.[10] Some of the conference's outcomes included informal community building, a discussion of goals, the decision to create an online repository for indexing archival resources relating to spaceflight records and to guide donors, a decision to create toolkits of best practices, and the formation of an advisory committee with charged working groups.[11]

Since the conference in 2018, several articles have been published tackling the subjects raised at the conference. One of the themes that emerged from the *To Boldly Preserve* conference was the loss of historical and archival components of space exploration projects. In "Archiving The Final Frontier: Preserving Space History for the Future," Zoë Jackson recounts that space history is a thriving subfield within the history of technology but that research in space history is hampered by large gaps in the archives often due to the failure to understand or value the records.[12] Private industry also presents new challenges as private collections are often not accessible to

8. "To Boldly Preserve," NASA Museum & Informal Education Alliance, accessed April 2022, https://informal.jpl.nasa.gov/museum/content/boldly-preserve

9. Jonathan Coopersmith, Angelina Callahan, and Greg Good, "To Boldly Preserve: Archiving for the Next Half-Century of Space Flight," access April 2022, https://networks.h-net.org/node/7842/discussions/190217/%E2%80%9C-boldly-preserve-archiving-next-half-century-space-flight%E2%80%9D

10. Angelina Callahan and Jonathan Coopersmith, "To Boldly Preserve: Archiving for the Next Half-Century of Space Flight," *American Institute of Physics History Newsletter* 50, no. 1 (2018): 4-5.

11. Ibid.

12. Zoë Jackson, "Archiving The Final Frontier: Preserving Space History for the Future," *Perspectives on History* 56, no. 5 (May 2018), https://www.historians.org/publications-and-directories/perspectives-on-history/may-2018/archiving-the-final-frontier-preserving-space-history-for-the-future

researchers, and archivists want to ensure that historians have access to archival materials representing both public and private actors in the field of spaceflight."[13]

Geoff Nunn, Adjunct Curator for Space History at the Museum of Flight in Seattle also spoke at *To Boldly Preserve* about his role engaging commercial enterprises, or NewSpace as it is termed. In his article "Thinking Historically about NewSpace," he encouraged NewSpace companies to consider 50 to 100 years from now: if there was a wish to create biographies of founders or documentaries about projects, what plans are in place to make sure the stuff of history is still around when you need it?[14] He encourages companies to preserve their legacy and take steps to collect and actively preserve records.[15]

Articles related to specific collections that serve as case studies like Reagan Grimsley's article "One Small Step? Collection Strategies for Libraries, Archives, and Museums in the Space Age" explore how the experience of collecting materials related to Saturn V intersects with the major themes of the conference.[16] Of note is the success of actively collecting materials during the mission which resulted in the gathering of reports, speeches, diagrams, technical leaflets, correspondence, and oral histories contemporaneously to their creation, before memories become fuzzy and documents lost.[17]

As demonstrated at the *To Boldly Preserve* conference, there is little literature specifically on the stewardship of modern space collections and the unique challenges that arise when collecting these materials. Most of the literature from the planetary science community addresses archiving technical data or grant required entry of data into federal systems like NASA's Planetary Data Systems.[18] The majority of this literature discusses the efforts and issues with archiving the large sets of scientific data that are produced by these types of missions. Many of the issues associated with archiving space data from the planetary scientist perspective are problems similar to those archivists regularly encounter: a lack of funding and the need for collaboration among the involved participants.[19]

13. Ibid.

14. Geoff Nunn, "Thinking Historically About NewSpace," *Space News*, April 23, 2018, 29-30, http://bt.e-ditionsbyfry.com/publication/?i=491072&article_id=3066541&view=articleBrowser&ver=html5

15. Ibid.

16. Reagan L. Grimsley, "One Small Step? Collection Strategies for Libraries, Archives, and Museums in the Space Age," *Acta Astronautica*, July 18, 2020, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7368147/

17. Ibid.

18. Joe Zender and Edwin Grayzeck, "Lessons Learned from Planetary Science Archiving," *Advances in Space Research* 38, no. 9 (2006): 2013-2022.

19. Sebastien Besse, et al., "ESA's Planetary Science Archive: Preserve and Present Reliable Scientific Data Sets," *Planetary and Space Science* 150 (2018): 131-40.

The scientific literature also addresses the importance of documentation and preserving historical records. As Bednar, et al. note, "in the case of archival historical research and mission design analysis, detailed and well-designed documentation adds layers to mission data to create even more value for current and future interests. Given this important value of documentation as data context and historical record, the existing gap in planetary science literature on mission documentation needs to be addressed."[20] Along with a well-documented mission, mission staff also address the difficulty of archiving this documentation due to the lack of funding or preparation for the costs and time needed to ensure that materials are archived: "archiving is often seen as the last step of a long process when a mission is established, and as a result it is often difficult to find adequate funding."[21] Barthelemy, et al. urges that mission staff "should make this clear in their proposals and allow for continued support for this work post operations. Funding agencies in turn should understand the need for this and question proposals that may lack these requests."[22]

In 2013, Karen Simmons published an article outlining many questions about the acquisition of space collections that were discussed at *To Boldly Preserve* and possible solutions for mission and project staff. Simmons notes that "science teams routinely discard these mission documents as members retire or move and institutions clean house" but that the information "in mission documents that are essential not only to implementing the recovery of archived data but to understanding how it can be used."[23] She suggests that if "some members of the team were also trained in the archive procedures and formats that are used where data are to be deposited, this person would be able to recognize, document, and save important information" that others staff might not recognize as important historical documents.[24] Simmons also points out the complexity of the materials and that local archives may have difficulty making these types of collections accessible without assistance from the creators of the materials. Finally, she also notes the importance of collaboration: "For archiving to be successful, there must be interplay between data creators, data users, and archivists. But, in the end, it is imperative that each data creator understands that how something is saved is just as important as what is being saved."[25]

20. Daniel Bednar, et al., "Documentation Processes During the CanMars Mission: Observations and Recommendations for Future Application in Analogue and Planetary Missions," *Planetary and Space Science* 174 (2019): 14-20.

21. Maud Barthelemy, et al., "ROSETTA: How to Archive More Than 10 Years of Mission," *Planetary and Space Science* 150 (2018): 91-103.

22. Ibid.

23. Karen E. Simmons, "Lost Science: Protecting Data Through Improved Archiving," *Eos* 94, no. 37, (September 2013): 323-324.

24. Ibid.

25. Ibid.

Case Study

The Peter Hollingsworth Smith papers (MS 605) contain over one hundred linear feet of materials that document Smith's professional activities and scientific achievements, especially his many contributions to research on Mars.[26] Smith is Professor Emeritus at the Lunar and Planetary Laboratory and is best known for his role as Principal Investigator for the Phoenix Mars Mission, a $420 million NASA mission that found the first evidence of water on Mars.[27] His other contributions include leading the team that created the cameras for the Mars Pathfinder and Mars Surveyor Program. Smith's papers document the development of scientific instruments as well as the project management of missions and include research materials, data, correspondence, publications, grant proposals, workshops and conferences, education and public outreach activities, and media coverage. The Smith papers possess all the issues unique to modern space collections: technical acronyms and abbreviations, restrictions and proprietary information, and archiving limitations due to grant funding time constraints. Another hurdle, not uncommon in the archival field, was due to staff departures the team at Special Collections experienced between the donation of the materials and the processing of the materials. If resources had been available to process the collection at the time of acquisition, it would not have been necessary to re-establish the line of communication between archivists, donors, and relevant university departments.

The sections below describe the experiences of the archivist processing the Peter Hollingworth Smith Papers, as well as larger administrative and collections management aspects of the project, along with recommendations for archivists beginning a conversation with a donor or department interested in donating similar collections. With prior knowledge of the types of issues that archivists will encounter when acquiring, processing, and making accessible these collections, archivists can prepare the right questions to successfully steward modern space collections.

Restrictions

Many archivists have never heard of the federal regulations International Trafficking in Arms Regulations (ITAR) or Export Control, and may never stumble across these regulations unless they work with specific fields such as space exploration, engineering, optical sciences, and increasingly technology and software code. These laws relate to the transmission of items and data to foreign nations and to non-U.S. persons and are designed to protect national security.[28]

26. "Peter Hollingsworth Smith Papers" University of Arizona, accessed April 2022, https://speccoll.library.arizona.edu/collections/peter-hollingsworth-smith-papers

27. Sarah, Alicia, "First Discovery of Water on Mars," The Payload Blog, Kennedy Space Center, July 31, 2018, https://www.kennedyspacecenter.com/blog/31/first-discovery-of-water-on-mars

28. University of Arizona, "Export Compliance Program Manual," accessed April 2022, https://research.arizona.edu/sites/default/files/export_control_manual_02.02.2021.pdf

When spelled out, the words "trafficking," "arms," and "regulations" convey a sense of importance and urgency. However, the term export control is of equal importance, but at first glance may fail to sound alarm bells. An export is "the transfer of export-controlled information, technical data, technology, commodities, software, or providing a defense service to a non-U.S. person or entity."[29] Export control restricts information that is deemed sensitive to only U.S. persons and entities.[30] The Department of State is the government agency responsible for "the export and temporary import of defense articles and services governed by 22 U.S.C. 2778 of the Arms Export Control Act (AECA) and Executive Order 13637.[31] The International Traffic in Arms Regulations (ITAR, 22 CFR 120-130) implements the AECA."[32] Most universities or organizations that host projects or administer funds where ITAR or Export Control regulations are required will have an office responsible for compliance of these projects. The University of Arizona complies with all federal laws related to Export Control and research operations are regulated by the Office of Research, Innovation & Impact. University policy also requires that all individuals affiliated with the University who work with, or have access to, export-controlled data, items, equipment, materials, and software are required to be familiar with and fulfill the requirements of the U.S. export controls laws and University export control compliance protocols.[33]

These laws have significant implications for archives with ITAR or export-controlled materials in their possession. Like the Health Insurance Portability and Accountability Act (HIPPA) and the Family Educational Rights and Privacy Act (FERPA) regulations, there is no statute of limitations or expiration of protections. All ITAR and export-controlled information is bound by extensive regulations until it is officially uncontrolled. The regulations that governed the research activities that used or created the information also govern the handling of materials transferred to libraries or archives. There are regulations governing the security of the storage and

29. University of Arizona, "FAQs-Export Control," accessed April 2022, https://rgw.arizona.edu/sites/default/files/faqs_10.13.2020.pdf

30. A U.S. Person includes "An individual with U.S. citizenship, Permanent resident alien (Green Card holder) or protected individual status such as refugees and asylees. Corporations or organizations incorporated in the United States are U.S. Persons for purposes of the ITAR and EAR. It is also any business entity incorporated to do business in the United States." University of Arizona, "Export Control FAQs," accessed April 2022, https://research.arizona.edu/compliance/export-control-program/faqs

31. U. S. Department of State Directorate of Defense Trade Controls, "Arms Export Control Act (AECA)," accessed April 2022, https://www.pmddtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=b9a933addb7c930044f9ff621f961932

32. U. S. Department of State Directorate of Defense Trade Controls, "The International Traffic in Arms Regulations (ITAR)," accessed April 2022, https://www.pmddtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=24d528fddbfc930044f9ff621f961987

33. University of Arizona, "Export Control Policy," accessed April 2022, https://policy.arizona.edu/research/export-control-policy#policy

who has access to these areas. One criterion for secure storage requires export-controlled records to be physically secured with key controlled access.[34] Many secured storage facilities are unlocked during business hours and rely on staff for security for the collections. Some repositories use locking mechanisms for compact shelving or install cages around shelving tiers to secure valuable collections. For export-controlled storage areas, the regulations also require access restrictions on non-U.S. employees, students, interns, volunteers, or anyone who could potentially access the materials.[35] Additionally, ITAR maintains lists of Statutorily Debarred Parties and Export Control maintains lists of parties of concern that could potentially inhibit a person or entity from accessing or viewing potentially controlled materials.[36, 37] Anyone with access must be crosschecked to the current list of persons or entities who are barred from access to ITAR or export-controlled materials.

In many ways, records of modern space projects are intended to be created and kept in secure, often governmental, facilities with required background checks. For example, to visit the Drake Building where the Phoenix Mars Mission was headquartered and where the OSIRIS-REx mission is led, you have to submit a government identification in advance and gain clearance before entering the facility. While the assumption is that no export-controlled materials would ever be transferred to the archives, it is still important to understand the implications ITAR and Export Control have on the requirements of the archives. Another consideration is having the department or mission not only ensure that export-controlled materials are not transferred to the archives but also have a system in place to free materials from export control if they are important to preserve in the archive. Departments with export-controlled materials work closely with the export control offices on campus and understand the requirements and processes to uncontrol materials.

Export control elicits many questions without easy answers. For example, are unpublished papers, lab notebooks, schematics that aren't marked ITAR/export control still controlled? While current projects are usually highly regulated with teams that are conscious of staying in compliance, materials that should have been controlled, especially in older projects could have been missed. Without specific knowledge of the materials and regulations, archivists cannot determine the status of materials. Does locking tiers of compact shelves together suffice as security? Unless an archive is specifically designed for the increased security for certain kinds of

34. University of Arizona, "Export Compliance Program Manual," accessed April 2022, https://research.arizona.edu/sites/default/files/export_control_manual_02.02.2021.pdf

35. Ibid.

36. U. S. Department of State Directorate of Defense Trade Controls, "Statutorily Disbarred Parties," accessed April 2022, https://www.pmddtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=7188dac6db3cd30044f9ff621f961914

37. U.S. Department of Commerce Bureau of Industry and Security, "Lists of Parties of Concern," accessed April 2022, https://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern

materials, it can be difficult to segregate space collections for the required security requirements. This means that the entire repository would need to be in compliance which can be a large task. According to government regulations, most space technologies are subject to export controls with "controlled technologies includ[ing] defense articles (e.g., missiles), defense services (e.g., integration of a spacecraft onto a launcher), and dual use items (e.g., commercial spacecraft and components)."[38] Special Collections was advised by its collaborators that no military grade secrets are in our collections, but that doesn't mean that staying in compliance isn't important. Not complying with laws protecting export-controlled materials could compromise a university for current or future grants which, for space missions and projects, are easily in the hundreds of millions of dollars. These regulations deeply affect these highly collaborative multi-year projects that often have partnerships with international organizations.

Other potential restrictions include the multitude of materials created by private corporations and vendors external to the University such as large defense contractors. Frequently their reports, proposals, and other deliverables are marked "Proprietary" or "Trade Secret." Unlike copyright, if a trade secret has economic value from not being generally known, has value to others who can't legitimately obtain it, and reasonable efforts are made to maintain its secrecy, there is no limit to the amount of time a trade secret is protected.[39] This makes it difficult post-project for historians or archivists to know when or if materials can ever be made accessible. For instance, do the materials actually contain a trade secret? In the case of one company, a legal clause about proprietary information was included in the fax transmittal sheet, begging the question, does all communication via fax bear the warning, or was it included based on an assessment of the content being faxed?

Grant proposals to NASA and other agencies contain the salary information of participants which is generally not publicly available in the private sector. It is possible that making this salary information available to researchers could violate laws depending on the state or raise ethical issues. If permission to provide access to salary information must be obtained by each corporation or institution, this would be a daunting consultation process sure to overwhelm the staffing levels at most archives. Consultation and advice from the project team during the donation of the collection may be helpful in determining next steps for private vendor materials. These teams usually have relationships with the vendors and can help determine end dates, if any, for protected information.

38. U.S. Department of Commerce Office of Space Commerce and the Federal Aviation Administration and Office of Commercial Space Transportation, "Introduction to U.S. Export Controls for the Commercial Space Industry," accessed April 2022, https://www.faa.gov/about/office_org/headquarters_offices/ast/media/export_controls_guidebook_for_commercial_space_industry_doc_faa_nov_508.pdf

39. United States Patent and Trademark Office, "Trade Secrets / Regulatory Data Protection," accessed April 2022, https://www.uspto.gov/ip-policy/trade-secret-policy

Reading Room Access

With the uncertainty of the extent of export-controlled materials, Special Collections restricted all research materials in the Peter Hollingsworth Smith Papers to only U.S.-persons.[40] The collection was processed into series that separated types of materials, with some series having materials that very likely didn't need to be restricted which included publicity and media coverage, draft publications, correspondence, personal ephemera and workshop and conference materials. The Smith Papers is the first collection at Special Collections to carry this type of restriction and it poses new questions and challenges for access. How do you verify citizenship? Do we require passports or multiple forms of identification? Are staff equipped to review these kinds of documents? Will the Lunar and Planetary Laboratory or University Export Control need to be involved? The University of Arizona Libraries has an open access policy which states that the faculty of the University of Arizona is committed to disseminating its research and scholarship as widely as possible. While restrictions can be commonplace for archival collections, how will this new type of restrictions affect our commitment to open access?

When other institutions' restriction statements were surveyed, some used blanket access statements restricting access.[41] For example, the Jet Propulsion Laboratory requires access to collections through an application process. Access is granted at the discretion of the institution/director. Other language involves simply stating that "some parts of the collection may be restricted due to ITAR/Export Control." Currently Special Collections has isolated all material marked ITAR/Export Control or Proprietary/Trade Secret in a separate series that is restricted to all researchers. Eventually, when time, resources, and expertise allow, an effort should be made to undertake clearing the materials for access or to gain permission from the vendors and private companies to lift restrictions on their materials.

Special Collections does not currently have a streamlined system or the ability to quickly review controlled materials with an appropriate department or agency that can make decisions about the status of materials. Another option for archives to consider is working closely with a department at the time of acquisition of potentially controlled materials in order to negotiate the use of their expertise and resources as a part of the process of uncontrolling materials before they are sent to the archives. Developing strong working relationships with departments with these types of complicated materials is an important part of making the collections easier for the archive to manage. It helps allow access to the potentially controlled materials without putting a heavy burden on the archive to figure out how to allow access to

40. The finding aid restriction is noted in the access restrictions as well as the series description which states "Restricted due to International Traffic in Arms Regulations (ITAR), materials labeled 'Export Controlled' and materials and files marked as proprietary."

41. See Appendix A and B for more examples of language related to restrictions.

the materials.[42] Understandably, the University and departments working on export-controlled projects are focused on staying in compliance with federal regulations during the life of the grant and fewer resources are available to teams to handle the potentially controlled materials that have archival value. With the scale of these modern science collections, many repositories may not be willing to take a collection with such complex restrictions but the importance of documenting the evolution of space history should make the upfront effort and planning for these collections worth the effort.

How Collections Are Used by Researchers

Despite the myriad hurdles in working with science collections, the impact they have on researchers and the general public make them important to collect. In the past five years, Special Collections made History of Science collections available to researchers for a plethora of topics: poets interested in spaceflight, artists looking at maps of the moon and planets, space history journalists, historians interested in NASA funding and grant allocations, a Special Collections exhibit on the moon, history of international lunar nomenclature committees, and former scientists, colleagues, family and personnel who worked on or were familiar with projects covered in Special Collections. On one very solemn occasion, a researcher showed Special Collections staff the handwritten journal entry from a science team meeting where a question was raised about the issue that eventually caused the loss of an entire spacecraft and the cancellation of a subsequent mission.

The Niels Bohr Library & Archives at the American Institute of Physics provides a robust guide to scientific source materials. The resource explains that scholars are concerned with the evolution of research problems and not just the final solutions, and explains in detail the wide range of materials that archivists and scholars seek.[43] This includes correspondence, student course notes, laboratory notebooks, diaries and appointment calendars, grant proposals, writings and drafts of scientific publications, meeting minutes, memos and administrative files, legal and policy records, summary financial records, reports, membership lists, email and electronic records, ephemeral publications, photographs, pictorial works and biographical materials.[44] According to the Niels Bohr Library & Archives, researchers are concerned about the broad spectrum of scientific life, not just Nobel-level research, and that the papers of influential scientists, including teachers and administrators at all levels, are important to the historical understanding of science.[45]

42. See Appendix C for examples of important questions to ask creators before acquisition of space collections.

43. "Scientific Source Materials," American Institute of Physics Niels Bohr Library & Archives, accessed April 2022, https://www.aip.org/history-programs/niels-bohr-library/scientific-source-materials.

44. Ibid.

45. Ibid.

Acronyms and Abbreviations

A major feature of the Smith Papers and similar space collections is the intense reliance on acronyms and abbreviations. A typical folder might read "98 MVACS SSI IPR," which stands for: Mars Surveyor Program, 1998, Mars Volatiles and Climate Surveyor, Surface Stereo Imager, Informal Peer Review. The learning curve is steep, but most abbreviations in these materials are very carefully defined. It helps to create a key to abbreviations alphabetized and at the ready, posted close to the processing area. Additionally, whenever you encounter a list of abbreviations, photocopy and pin them to the wall. A great place to find these lists are inside grant proposals where acronyms and abbreviations will be defined for grant evaluators.

Abbreviations related to project management rather than the hard science are particularly hard to unravel. For example, a folder titled "KO" was a mystery, since nothing in the folder started with the letter "K". It turned out that "KO" stood for "Kickoff Meeting." Project management terms and master plans may be hidden from archivists if they don't work closely with the project team members and ask the right questions. The Phoenix Mars Mission used something called "The Gateway," which wasn't a term the archivist came across when processing the paper files. It could be this was a computer-based platform that didn't make it into the paper or digital media transferred to Special Collections. If this information had been shared it would have helped in the organization of the materials and in providing greater context and chronology. It was frequently difficult to disambiguate these project management terms like IPR: Informal Peer Review, from IPR: Integration Peer Review. When possible, archivists should ask as many questions as possible about the organization of materials and about the central project management systems at the time of acquisition of a collection.

Grant Funding

One risk to the preservation of space collections is the nature of grant funded projects. Project teams are rapidly assembled and disassembled on timetables dictated entirely by funding constraints associated with the grants. This means that the day after the mission comes to a close and the grant has ended, members from the project team are not available to work with archivists and historians. Mission data is carefully deposited in compliance with grant requirements but oftentimes there is contextualizing and project management information that isn't accepted into data systems that could potentially be lost as the project team leaves to work on other projects. Luckily for the Smith Papers, Peter Smith was a faculty member of the University of Arizona and kept the materials of his previous projects. Special Collections was able to continue to work with Smith as he retired to preserve the materials of his career including these grant funded projects. Without his involvement, information kept by other project members that was not included in Smith's papers could have been potentially lost.

Currently, the OSIRIS-REx Mission at the University of Arizona is actively working with Special Collections to ensure that no information is lost. They are partnering with Special Collections to archive data from earlier phases of the mission before the mission ends. The collaboration includes OSIRIS-REx funding a two-year graduate assistant (GA) to archive their born-digital project management and internal mission documents in our institutional repository that fall outside their grant requirements as well as to web archive their social media sites and to process their limited physical materials. The GA is cross-trained and supervised by both teams which allows for better contextual understanding while processing the material and at the same time, showing the mission staff the value the archives can bring to making their materials accessible. The release of these contextualizing materials with the mission data was important to the mission team and Special Collections has been able to fulfill these expectations, strengthening our relationships with LPL.

Conclusion

While the acquisition of modern space collections can be complicated, their preservation is vital to document the development of the exploration of space. As the To Boldly Preserve conference demonstrated, the interest in making space history accessible is high but the lack of standards and procedures has hampered obtaining and maintaining these collections. The acquisition and processing of the Peter Hollingsworth Smith Papers (MS 605) introduced Special Collections to these complexities and prepared our archivists to ask the right questions, build relationships and collaborations with the appropriate staff, and ensure that the collections in our care are properly stewarded.

Being prepared for these common issues can ease the transition of collections to the archives. Continued collaboration with these departments and projects will also make the questions that archives ask about the acquisition of these collections become a normal part of the dialogue as new collections are discussed for transfer to the archives. Collaborating early with existing mission or project staff would also ensure that preservation of materials is integrated into their plans. Not only does it open possibilities for monetary or personnel contributions to the processing of collections but also allows these complex issues to be agreed upon long before the materials are transferred to the archives.

While many important lessons were learned, challenges with acquiring and providing access to these collections remain. The best approach to ITAR/export control materials remains an outstanding issue. Any materials that potentially could be in our collections, either marked or unmarked, will need to be either returned, destroyed, or uncontrolled to be accessed freely. While Special Collections now makes a point to verify with donors that the collections do not contain any ITAR, export control, trade secret, or controlled materials, there is bound to be either materials that are important to preserve or unknowingly included. Efficient systems to open these materials would be helpful to establish.

Through the lessons learned working with the Smith Papers, Special Collections can more confidently understand and work with space collections and ensure that missions to Mars and beyond will continue to be documented at the University of Arizona Libraries.

Appendix A. Examples of Restriction Notices Printed on Documents

EXPORT CONTROL WARNING: This Document may contain Technical Data whose Export is Restricted by the Arms Export Control Act (Title 22, USC Sec 2751, et seq.) or the Export Administration Act of 1979 (as amended, Title 22, USC Sec 2751, et seq). Violations to these Export Laws are subject to SEVERE CRIMINAL PENALTIES. Disseminate in accordance with the provision of DOD Directive 5230.25.
This package is controlled by the International Trafficking in Arms Regulations and may not be transferred to foreign entities.
This drawing and the items it depicts are proprietary and confidential information of [company]. Recipient will not disclose the drawing to any third party. By accepting this drawing, recipient agrees to the foregoing and further agrees that all intellectual property in the drawing belongs to [company].
"NOTICE" The information contained herein is proprietary to [company] and shall not be reproduced or disclosed in whole or in part.

Appendix B. Survey of Restriction language

Language retrieved between January 2018 and November 2020

Institution	**Collection(s)**	**Restriction**
Caltech (California Institute of Technology)	All	Access to the Caltech Archives for the non-campus community is by appointment only. Campus community is encouraged to phone or write ahead to be sure of staff assistance and space availability.
Caltech (California Institute of Technology)	Richard P. Feynman archives	The collection is open for research. Researchers must apply in writing for access.
Hagley Museum & Library	Sperry Corporation Aerospace Division photographs	Access restricted; please contact staff in advance of research visit at askhagley@hagley.org for instructions on how to apply for access to material.
Hagley Museum & Library	UNITE, Inc. records	Records less than 25 years old are closed to researchers.
Huntington Library	Albert R. Hibbs papers	Open to qualified researchers by prior application through the Reader Services Department. For more information, contact Reader Services.
Jet Propulsion Laboratory Archives	All	The JPL Archives is open to JPL, Caltech, NASA, and the public. You must make

		an appointment and submit an application in advance for on-site visits and to utilize materials in the collection. Most requests from the public must be submitted as Freedom of Information Act (FOIA) requests. Please contact the Reference Desk first, and you will be notified if a FOIA request is necessary. For more information about the FOIA process, please see the JPL FOIA web page, contact the Library Reference Desk at 818-354-4200 or email archives@jpl.nasa.gov.
NASA Ames Research Center	Lunar Prospector Project records, 1995-1998	Access to portions of the collection is subject to national export restrictions. Contact the repository for a complete inventory.
San Diego Air & Space Museum Library & Archives	Convairiety newsletters	Materials may have some ITAR (International Traffic in Arms Regulations) and proprietary restrictions. Consult with the library director for more information.
San Diego Air & Space Museum Library & Archives	Curtis Peebles personal papers	Some restrictions might apply. Will need to be evaluated for International Traffic and Arms Regulations based on researchers request and review.

Appendix C. Recommendations for Discussing New Acquisitions

With advanced knowledge of the types of issues that archivists will encounter when acquiring, processing, and making accessible these collections, archivists can prepare the right questions to successfully steward modern space collections.

1. What resource can you point me to that explains acronyms and abbreviations?
2. Is there a set of documents that outline the phases of the mission that might help with our organization?
3. What internal project management tools or systems were used that might still be available for our reference?
4. Are there any Export Controlled materials in the collection?
5. What internal system was used to separate or identify these materials?
6. Is there an instrument or project phase where these restrictions are particularly common?
7. Are there any materials related to industry or commercial partnerships that may carry proprietary information or trade secrets and any agreements, such as financial agreements, that may be sensitive?