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Inventing a shared Science Diplomacy for Europe

InsSciDE Work Package 8: Space: European science diplomacy for cooperation in a global space competition	
Case Study n°8.2	**Space Racks Diplomacy for Earth: Orbital laboratories producing European Diplomacy for intercultural cooperation in the global Space competition**
Author	**David Burigana**
Consortium Partner n°9	University of Padua (UNIPD)
Author affiliation	Professor, Department of Political Sciences, Law and International Studies (SPGI) and Center for Space Studies and Activities "Giuseppe Colombo" (CISAS) University of Padua

Abstract

Aboard the International Space Station (ISS), space racks are the international standard payload racks containing miniaturized scientific instruments used for experiments in micro-gravity. They permit advances in life sciences and in health experiments, and lend insight on environmental issues, for instance the science of fluid dynamics and the control of energy exchanges between space and Earth. Embarking these miniaturized laboratories represents the outcome of a multidimensional negotiation engaged from the start of conceptual development of the space station in the 1970s. These "machines", scientific research tools, represent and symbolize an international negotiation not only inside the European Space Agency between the scientific communities of different ESA member states, but also at global level between Europeans and other countries engaged in space research, or which need to conduct experiments in microgravity. Usually the participants in such experiments have space capabilities or high level financing. Can space racks represent an international arena for a European diplomacy aiming to include scientists from countries without space and financial capabilities in order to develop a real global space network? This question may be strategic for the European Union and ESA in view of acquiring a political role in the next most relevant step for space exploration, Mars. The historical analysis of who, why, and how space experiments have been organized and managed may suggest a track for a Space Racks Diplomacy.

Introduction

Since the beginning of human space flight in the 1960s, the US and URSS thought of bringing in spacecraft biological experiments on the cellular and organismal effects of weightlessness, as well as of studying human life in outer space by analyzing astronauts' body modifications (ageing, osteoporosis, balance disorders, and muscle loss). A first experiment in materials science was conducted in October 1969 aboard the Soviet space probe *Soyuz-6*, with US research started immediately afterwards in the Apollo program. Launched in May 1973 and lost five years later, US orbital laboratory *Skylab* was a strategic step for outer space science, but only for the American scientific community in regard to the selection and management of experiments. Concerning international cooperation, the real turning point was the Euro-American laboratory *Spacelab* designed to be flown by the future US re-usable shuttle. This ten-day mission laboratory was a future cornerstone of any space station, opening the US space experiments to Western cooperation but more generally constituting a tool for US space diplomacy between cooperation and competition. Various Multifunctional Logistic Modules (MLM) were developed for NASA and in cooperation with Europeans, with Italy's Donatello, Leonardo, and Raffaello programs, and by two European consortia led by German industries.

In 2008, NASA published an analysis of more than 400 experiments conducted in the first ten years of the ISS; CNES, GSOC and ASI as well as ESTEC listed their national or multilateral experiments. Since February 1971, the "prestige" series of *Saliut*, and then more rapidly by the real station *Mir* launched in February 1986, Soviet and Russian experiments represented a "propaganda" competitor to be tested by Europeans as a concrete alternative in the winding down of the Cold War.

Actors

By tracing the operating life of these space laboratories – from the call for experiments and the simulation in ESTEC by ESA up to the control of the experiment by the Crew Interface Coordinator in the ISS – and by paying particular attention to the European nationalities participating in the space experiments, it's possible to define the practices of negotiation, the modes of interplay, and above all the actors themselves. By observing their interplay with institutional stakeholders at national and international level, we intend to distinguish a sort of techno-science diplomat or diplomat scientist from among the complexity of traditional actors of foreign policy on science and technology: ministers, diplomats, scientists, military, managers of public or private firms, national and international officials, astronauts, specialized journalists.

Fields and disciplines, interfaces with technology

Several scientific disciplines are engaged in outer space experiments, as well as the design and construction of modules needingan exchange with the scientific community to standardize and organize these space laboratories. Historians have to enter a real interdisciplinary cooperation with their scientific colleagues in order to select the more significant experiments, and to understand their meaning for the scientific community, as well as their possible applications for the next steps of space exploration. The Center for Space Studies and Activities "Giuseppe Colombo" (CISAS, Padua University) may guarantee the needed interdisciplinary network, as well as a vision on new program perspectives thanks to the Padua University Mars Exploration Team.

Networks and communication

A recent history project of Padua University, "ExPost: Experts and Politics on Science and Technology in Europe since 1960s" (2015-17), allows us to apply some conceptualizations to key actors of space racks diplomacy. These concern firstly the interplay between experts as advisers and political stakeholders in foreign policy making and more specifically multilateral negotiations, and secondly networking activities inherent to transnational politics as seen in the history of European integration. By combing these conceptualizations, we propose to assess the "transdisciplinary" expert and "diplomat scientist" as a key actor of a European space racks diplomacy.

Politics and policies

Exploring the inevitable tension between competition and cooperation, the relationship with third countries, and the subjects of the experiments may suggest how this "diplomacy" linked to the use of a common scientific language in Outer Space creates an interlinked community of networks, starting from the European scientists acting as a sort of diplomat, but engaging scientists from third countries too, and not only from the big powers: USA, China, Japan, India. We will seek to identify the role and the originality of a European space diplomacy facilitating an actual cultural exchange focused less on techno-industrial competitive challenges and more on cooperation in the face of global challenges: climate, security, communication, Earth evolution and the new horizon for space exploration, Mars.

Disciplinary/methodological approach

We need an interdisciplinary approach interconnecting history of international relations with histories of science, technology, economics, industry, culture and society. History of European Integration as well as history of international organization will provide a useful framework. The first examples of research interconnecting science and technology with international history are the history projects on CERN and ESA.

Rooted in national and international archival material, these studies led by John Krige influenced all subsequent research. Despite some essays, diplomatic history and more generally the history of international relations have received only recently the opportunity to use science and technology as interpretative keys useful for new conceptualizations serving political science as well.
Our case study will rely on ESA and EU archives and some national and private archives in Europe and USA, as well as on interviews. Thanks to a special post-doctoral fellowship the Russian point of view will be explored.

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