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DECENTRALIZATION OF SPACE RESEARCH WITHIN EUROPE AND ITS EFFECT ON TECHNOLOGY DEVELOPMENT

Abstract

The European Space Agency (ESA) has long been the epicenter of space science in Europe, launching space-based science missions such as EXOSAT, Planck, Rosetta, and more. These satellites contain instrument suites designed and built by science institutes across Europe. As these instruments increase in functionality and complexity, they require decades of technology development before being considered mission-ready. Furthermore, they rely on a range of expertise and resources, not always found within one institute, or one member state. This necessitates some level of central coordination among stakeholders in order to be successfully designed, developed, and launched; a role that ESA has fulfilled in decades past. In recent years, however, ESA has reduced instrumentation research within its centers, and cut funding for early stage payload oriented research, compelling the European institutes to coordinate and conduct these development activities within their national space context. This agency-level policy, though respectful of the juste retour concept and strong in promoting science research within the EU member states, has impacted the dynamics of technology development at the working-level. Our paper will explain how decentralizing costly flight instrumentation development across Europe has served to unintentionally prioritize certain types of space-based science missions. There is an implicit incentive for narrowly focused innovation, since larger undertakings necessitate ad hoc coalitions between institutions in different member states. Without centralized funding, these coalitions must apply for separate funding in their respective countries, causing a disjoint between overall project timelines and national funding mechanisms. Our analysis suggests that as mission complexity increases, centralized funding and coordination will be unavoidable. We illustrate these dynamics with an in-depth case study of a particular instrument research project: the Transition Edge Sensor Microcalorimeter x-ray detector, developed by a consortium consisting of Dutch, Finnish, German, French, and British researchers. Initially slated to serve aboard the XEUS (later IXO) grand observatory mission, this new detector design has the potential to improve sensitivity by orders-of-magnitude. However, despite being a serious contender on an international stage at the height of their efforts, a funding mismatch and a lack of institutional prioritization by the funding agency caused the project to lose its competitive position.