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REPORT

Facilitating Information Sharing Across the International Space Community

Lessons from Behavioral Science

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Prepared for the United States Air Force
Approved for public release; distribution unlimited



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The research described in this report was sponsored by the United States Air Force under Contract FA7014-06-C-0001. Further information may be obtained from the Strategic Planning Division, Directorate of Plans, Hq USAF.

Library of Congress Cataloging-in-Publication Data

Keller, Kirsten M.

Facilitating information sharing across the international space community : lessons from behavioral sciences /
Kirsten M. Keller, Douglas Yeung, Dave Baiocchi, William Welser IV.

pages cm

Includes bibliographical references.

ISBN 978-0-8330-7694-6 (pbk. : alk. paper)

1. Space debris—International cooperation. 2. United States. Strategic Command (2002-)
3. Communication—International cooperation. I. Yeung, Douglas. II. Baiocchi, Dave. III. Welser, William. IV. Title.

TL1499.K45 2013

363.12'472—dc233

2013012884

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Published 2013 by the RAND Corporation
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Summary

Over the past 60 years, an increasing number of countries and organizations have realized the advantages that space-based assets can provide. Currently, a handful of countries have the independent ability to launch unmanned orbital missions. Many more have also built what are known as *hosted payloads* for launch via partnerships with other countries. Hosted payloads use excess capacity on spacecraft or rockets that are already scheduled for launch. In addition, private companies, such as Arianespace, Orbital Sciences, and SpaceX, have started to develop capabilities that will provide the public and private sectors with additional spacelift capacity.

Along with the increase in spacefaring activity, there has been a commensurate increase in the number of operational satellites and an even greater increase in space debris. As a result, there is renewed interest among such entities as the U.S. military and private spaceflight companies in reducing future debris populations using political and technical means.

The 2010 U.S. Space Policy (White House, 2010) makes several policy recommendations for addressing the space congestion problem. One of the policy's key suggestions instructs U.S. government agencies to promote the sharing of satellite positional data, which can be used to predict (and avoid) potential collisions. This type of information is referred to as *space situational awareness (SSA) data*. The organizations that keep track of such information have traditionally treated it as proprietary or sensitive because it can reveal information about a satellite operator's intent or vulnerability.

This document seeks to facilitate the data-sharing process by highlighting a few of the key behavioral and psychological barriers that may prevent diverse entities from sharing data and their processes more freely. Specifically, this document addresses the following questions: What are key psychological and motivational barriers to information sharing? What steps can the U.S. Air Force (USAF) take to facilitate improved information sharing among spacefaring entities?

To address these questions, we primarily drew on literature focused on information sharing at the individual level to examine potential psychological and motivational factors that may influence decisionmakers to create certain policies on information sharing. This work, therefore, provides a complementary perspective to such fields as political science, which often takes a broader view to explore relations at the nation-state level. However, it is important to note that, in the context of the space community, more macro-level factors and organizational dynamics, including legal, security, and political concerns that are beyond the scope of this review, will also play a role in how these psychological and motivational barriers ultimately manifest and influence policy decisions. Furthermore, this review focuses predominantly on empirical psychological and organizational behavior literature. Other disciplines, such as economics, political science, and sociology, may provide additional perspectives on the issue of

information sharing among members of the space community that are beyond the scope of the current review.

Barriers to Information Sharing

There are several key barriers to information sharing that may be particularly relevant to space community decisionmakers. First, one of the primary barriers to information sharing is the extent to which relationships with others are viewed as competitive or cooperative. Rivalries likely exist within the space community, such as between the United States and other nation-states or between private companies competing for the same business. Therefore, the more that space community members view each other as competitors and perceive that providing information is a detriment to achieving their individual goals (i.e., incentives to not share information exist), the less likely they will be to share information.

Similarly, given that possessing information is viewed as a competitive advantage and provides a source of power, research finds that sharing information with others, particularly others that may be viewed as competitors, requires a considerable amount of trust. It may not be possible to develop completely trusting relationships among members of the space community, given the existence of defense and intelligence satellites, which require a certain degree of secrecy and security. However, without any level of trust among members of the space community, there is little motivation to share information and believe that information others share is accurate.

Attitudes and beliefs can also play a role in information sharing, such as perceptions of information ownership. For example, research in online communities has found that members are more likely to share information that is perceived as belonging to the community—that is, information they consider to be a “public good.” Therefore, to the extent that members of a community view themselves as belonging to that community and information as benefiting the whole community, they are more likely to share information. Likewise, when individuals do not view themselves as part of a larger community, they will be less likely to share information.

A final potential barrier to information sharing is cross-cultural differences. In particular, differences in individualism-collectivism, a dimension that measures the degree to which a society reinforces individual or collective achievement and interpersonal relationships, may influence information sharing. Research studies have found that collectivist cultures make a sharp distinction between in-group and out-group members.¹ This distinction then influences information-sharing behaviors, with individuals more likely to share information with members of their in-group and less likely to share information with members of an out-group.

Recommendations

We found several key factors that may affect the motivations of decisionmakers to allow information sharing with others in the space community. Again, it is important to note that more

¹ *In-groups* may be defined by relationships to family, friends, or coworkers, and in a broader context, even by national identity. Collectivists have strong loyalty to in-group members, while disliking and distrusting out-group members (Triandis, 1989).

macro-level factors and organizational dynamics that are beyond the scope of this review will also play a role in final policy decisions. However, these psychological and motivational factors highlight several key barriers the Air Force may wish to consider as it works to facilitate information sharing within the space community. Based on our review, we developed the following four recommendations for promoting greater collaboration across the space community:

Recommendation 1: Show Each Organization That the Benefits of Information Sharing Outweigh the Perceived Risks. Members of the space community may perceive inherent risks in sharing information with potential rivals, particularly when defense and intelligence satellites may be involved. Therefore, a key first step is to show each organization that the benefits of information sharing outweigh the perceived risks, or similarly, that the risks of *not sharing* information are greater than the risks of *sharing* information with others. USAF can help in this effort by (1) quantifying the explicit costs of not sharing information and (2) demonstrating that information sharing will result in more good than harm.

Recommendation 2: Encourage Organizations to See Themselves as Members of a Broader Group: The Space Community. The more members of the space community see themselves as competitors, the less likely they will be to openly share information. Therefore, encouraging these diverse organizations to see themselves as belonging to a single community with a common goal can help facilitate information sharing. Examples of ways USAF might be able to help build this broader community identity are by (1) communicating the importance of preventing collisions due to space debris and that this issue affects all members of the space community (i.e., a common goal), (2) showing that the United States wants to be a collaborative partner by demonstrating a willingness to share technical information and pool resources across the space community, (3) having senior military leadership encourage all military members representing the United States at conferences and public forums to treat others as equal members of the space community, encouraging collaboration instead of competition, and (4) encouraging adherence to existing international guidelines or agreements for space activities to illustrate that all members are part of a single community governed by similar guidelines.

Recommendation 3: Establish SSA Data as a Public Good That Benefits the Entire Space Community. Information is most likely to be shared when it is viewed as belonging to everyone, for use as a public good. USAF can help establish key types of information as public goods that should be shared within the entire space community by designating specific information types as public. It is important to note that not all information can be made public; organizations will not share everything. Therefore, members of the space community will need to attempt to explicitly agree on which information can be made public, providing mutual benefit without harming individual members.

Recommendation 4: Build Trust Among Members Through Successful Information Transactions over Time and Transparency of Processes and Systems. Given that many of the organizations and international agencies within the space community are likely to see themselves as potential rivals, there may be an initial lack of trust between many members of the space community. Trust will need to be built over time and can develop through continued successful transactions between space community members. Providing transparency regarding the processes and systems used to share information can also help reassure organizations that the information they share is secure and will not be used against them. USAF can help establish this sense of trust by (1) increasing its own sharing of information, starting with its closest

allies; (2) disseminating related U.S. policies and procedures to promote increased transparency; and (3) disseminating information on proposed mechanisms for sharing data.

Additional Considerations

As noted earlier, additional factors are likely to be important in making decisions to share information within the space community. First, many members of the space community, particularly nations and their militaries, may have security concerns regarding information dissemination, such as with classified or otherwise sensitive information. Such information may need to be declassified or deidentified before sharing is possible. There may be legal barriers to information sharing as well. Export control regulations or antitrust laws may preclude sharing certain types of information, either outright or with particular countries or corporations. Finally, a shifting landscape in how space operations are funded and conducted may affect information sharing in unknown ways. The space community has become increasingly commercialized as government agencies, such as the National Aeronautics and Space Administration (NASA), have refocused efforts toward funding private firms. Whereas national space programs could easily engender cooperative motives, such as by appealing to national pride, private firms competing for market share may be less likely to trust and cooperate with one another.