

DELFT UNIVERSITY OF TECHNOLOGY

MOT 1452 INTER- AND INTRA-ORGANISATIONAL DECISION-MAKING

Conflicts Affecting International Space Collaboration

Group 25

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1 Introduction

In science-fiction, there is a recurring theme. One of a future in which humanity is united and different nations cooperate to achieve a common goal: the improvement of humanity's interests through space collaboration. Steps towards this Utopian view of the future have been realised by pursuing the International Space Station (ISS). Even though humanity's endeavours in space are seen as being above its imperfections, the collaborations are still far from perfect. This report analyses international space collaboration and highlights how geopolitical conflicts can affect this collaboration.

Background and scope

International cooperation in space benefits space activities by expanding the scope of a project beyond the individual capabilities of space agencies due to the increased amount of available resources (Finarelli & Pryke, 2005). With the main benefits affecting the financial, technical and scientific aspects of such projects (Finarelli & Pryke, 2005). The most well-known example of international cooperation in space is the ISS, which is a collaboration between the space agencies of the United States (NASA), Russia (Roscosmos), Japan (JAXA), Europe (ESA), and Canada (CSA) (Vienna, 2021). Since the start of its operations in 1998, the ISS has been a symbol of international cooperation between nations (ISSNationalLaboratory, 2022). New steps continue to be made for international cooperation in space. The Artemis Accords, signed in October 2020, established the cooperation principles. These accords are guiding space cooperation for countries that are going to participate in NASA's Artemis Program, which has the goal to return to the moon (Vienna, 2021).

In this report, the ISS will be used as a case to analyse the different aspects that are involved with international space collaboration. The ISS is a unique example, showing the cooperation of many space agencies since the start of its operations in 1998. Recently, it has become a discussion topic with the Russian invasion of Ukraine. An example of this is the director-general of Roscosmos openly threatening to crash the ISS onto the United States and Europe as a response to Western sanctions on Russia (Smith, 2022).

Wicked problem

When an agreement on norms, values and certainty on required and available knowledge is far from the present, a problem or dilemma can be called "wicked" (Rittel & Webber, 1973). A further characteristic of a wicked problem is that there is no immediate or ultimate test of a solution, meaning that an implemented solution will generate significant and often unforeseen consequences over an extended period (Rittel & Webber, 1973). Comprehensively formulating the wicked problem associated with the ISS is complex, as the information needed to understand the problem depends upon one's idea for solving it, which is by definition not possible (Rittel & Webber, 1973). Collaborations across all stakeholders involved in this project have proven to be difficult. A complex problem in which maintaining the collaboration was always seen as the best solution. This collaboration has changed in recent years through geopolitical turmoil (Brooksbank, Schlosberg, Yamada, Benitez, & Sunseri, 2022). Tensions between stakeholders are what make the previously solvable problem wicked. Maintaining cooperation in space seems impossible when stakeholders are close to war on the Earth's surface, but discontinuing the project would be a disastrous waste of resources. Additionally, discontinuing this project could deter space agencies from collaborating on upcoming projects. A hard to foresee consequence is a characteristic of a wicked problem.

Decision making is key in dealing with wicked problems with no true or false answer. Perhaps only better or worse, which is reduced to bad and worse in this specific case. Therefore, the research question is stated as follows:

“How can international collaboration in space be maintained through times of geopolitical turmoil?”

2 Case description & Analysis

To start the analysis of this wicked problem, the actors involved in the decision-making process are introduced, after which the timeline is briefly discussed. Next, a description of the process will be given using a reconstruction of the decision process according to the appropriate decision-making models and the strategies used by the actors for two key moments.

2.1 Description of the decision process - Actors & Timeline

The main actors involved in the decision-making process of the ISS are the different space agencies that have collaborated with NASA. These are the CSA, the ESA, the Roscosmos and JAXA (Dunbar, 1998). These agencies are all governmental institutions, connecting them directly to each country’s respective government. All these actors understood the mutual benefits of participating in this project, as this would significantly advance their scientific and technological knowledge and improve diplomatic relationships, which has economic benefits (Whitehouse, 1988).

Initially, NASA planned to launch a modular space station as a counterpart to the already existing Soviet Mir space stations. The ESA was invited to participate, and in addition, a Japanese module and Canadian robotic system were planned (Garcia, 2021). This started the negotiations about the foundation of the ISS in 1984 with the Intergovernmental Agreement (IGA). This agreement was signed by the USA, member states of the ESA, Japan, and Canada on September 29, 1988. This hallmarked the start of one of the key negotiation periods. After the ending of the Cold War in 1991, the members of the IGA issued a formal invitation to Russia in 1993 to enter into negotiations and become a full partner in the International Space Station Program. Multiple rounds of negotiations took place in which many of the significant actors participated (Gipson, 1996). In 1998, the decision was made to start the assembly of the ISS, in which the Russian Zarya module was launched first, closely followed by the launch of Unity, a module from the USA (Garcia, 2021), (Cline & Gibbs, 2003). Two years later, in November 2000, a crew of three astronauts was the first to reside on board the station. This expedition spent four months onboard completing tasks necessary to bring the ISS “to life” and began what is now more than 20 years of continuous human presence in space (ISSNationalLaboratory, 2022). In the following years, lab modules from different space agencies have been added, expanding the ISS bit by bit, resulting in its current state. Another key moment in the decision-making process started in 2014 when Russia annexed Crimea after invading Ukraine. This event introduced tensions in the relationship between Russia and Western nations. During a more recent negation moment in April 2021, Russia announced they would investigate to determine whether they would withdraw from the ISS or not (TASS, 2021). The latest development in this key decision-making moment is the Russian invasion of Ukraine in February 2022. Due to the novel and fluid nature of this conflict, the future of the ISS is everything but certain. Only time will tell what this will eventually mean for international collaboration around the ISS. An overview of these events is graphically represented in Figure 1.

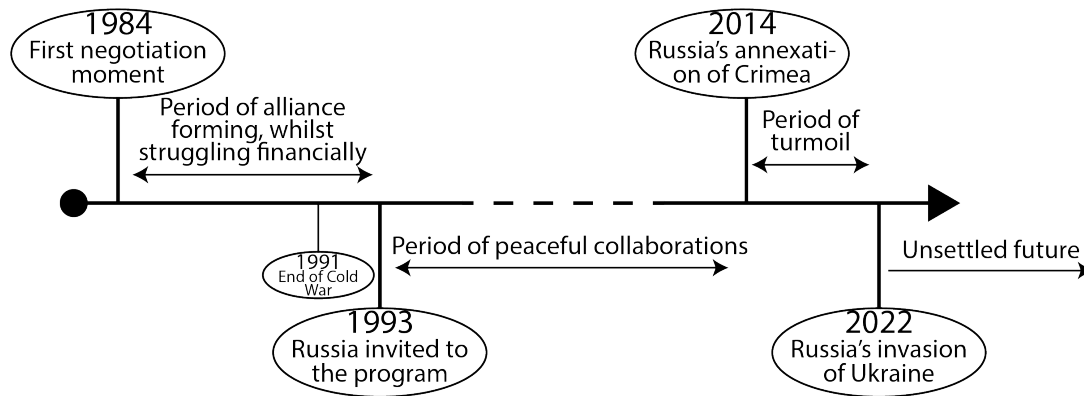


Figure 1: Timeline of events

2.2 Key moment 1: The 80's and 90's, Russia joins international space collaboration

Rounds model - the forming of alliances

In the commencing phase of the ISS, the IGA contained all major actors defined in the previous section, except for Roscosmos. Five different rounds are identified in the process of negotiations. The first round of negotiations started in 1984, initiated by NASA. An alliance was formed between ESA members, CSA, JAXA, and NASA to work on the ISS. The agreements resulting from these negotiations concluded in 1988 and are written in the IGA (Oosterlinck, 1989). Furthermore, these initial members signed the bilateral Memoranda of Understanding (MOUs) with NASA. The memorandum of understanding is an agreement in which parties lay out the common understanding of objectives and goals. The topics revolved around the management, cost and the security of the ISS (van Reeth & Madders, 1992). When consensus cannot be achieved through negotiations, NASA has the final word (Cline & Gibbs, 2003).

A second round was the USA-Russia Bush-Yeltsin Summit in 1992, when NASA and Roscosmos signed the Human Space Flight Agreement (Seay, 1992). This opened and formalised cooperation between Russia and the USA in space and started the expansion of the ISS program to include Russia eventually.

In the third round, the Space Station Partners were worried that the USA-Russia partnership was only bilateral (Cline & Gibbs, 2003). The Space Station Partners met in October 1993 to discuss this matter and determine Russia's role in the ISS. An agreement was made to formally invite Russia to join this alliance in the Joint Statement that resulted from this meeting (Moenter, 1998). This statement also involved rulings about the existing IGA and MOUs agreements.

These Space Station partners formally invited Russia to join the International Space Station program on December 6, 1993, (Cline & Gibbs, 2003). The intent of this invitation was the cooperation by all members on the development and operation of the ISS to cut costs, develop better ties and learn from each other. This can be regarded as the fourth round. With the invitation, the Integrated Plan was established to include high-level agreements of the partnership (Cline & Gibbs, 2003). Russia accepted on December 17, 1993.

The fifth round can be seen as the formal negotiations regarding the details and implementation of the high-level agreements noted in the Integrated Plan. These negotiations between the Space Station Partners and NASA were about the existing MOUs agreements and a new IGA. This round took place between 1994 and 1997, with NASA representing the original Space Partners in negotiations with Roscosmos. To conduct these negotiations, a Space Station Multilateral Consultative Working Group (SSMCWG) was created, consisting of the original Space Station

Partners (Cline & Gibbs, 2003). The SSMCWG was consulting decisions and negotiations between NASA and Roscosmos to agree on new MOUs.

The reconstruction of the negotiations and forming of alliances with regards to Russia's involvement in the Space Station partnerships is in line with Teisman's rounds model (Teisman, 2000). In this model, the different actors involved are analysed under the assumption that neither problems nor solutions are tied to an individual actor (Teisman & van Buuren, 2012). This is also the case when looking at the forming of the alliances and writing of agreements, as the goal is to cooperate internationally on working on a space station, and each actor has a specific responsibility and task in this regard. As the name of the model implies, the decision-making process is seen as subsequent rounds of negotiations between the different actors, each with concluding decisions being taken (Teisman & van Buuren, 2012).

Streams model (policy window)

The streams model contains three streams: the problem-, policy- and political streams. A window is opened when the policy stream interacts with the problem- or political stream. Such windows allow issues to rise on the political agenda. The windows in the streams model can be seen in Figure 2. The interaction of all three streams is referred to as a policy window, in which a problem with its solution is highlighted while it also has the political support to pursue it. This puts the problem at the top of the political agenda.

After the formation of the initial alliance in 1984 with Roscosmos, an important historic event took place, namely the end of the Cold War in 1991. With the end of the Cold War, the tensions between the USA and Russia eased, which made collaborations possible. The period right after the fall of the Soviet Union can be seen as a window of opportunity, and more specifically a policy window (Kingdon, 1995). As it can be argued that the three streams of the model have crossed. There was a political drive for collaboration as the end of the Soviet Union created a pro-western movement (Boretska, 2015). From the perspective of the problem stream, the initial alliance also had a financial and technological incentive to include Roscosmos into the collaboration (Whitehouse, 1988). Lastly, the involved parties were able to create a collaborative policy. When looking at the complete lifespan of the wicked problem, multiple of these opportunity windows can be established at key moments in the decision-making process. These arguments indicate that the streams model would be well suited for the decisions made (Teisman & van Buuren, 2012).

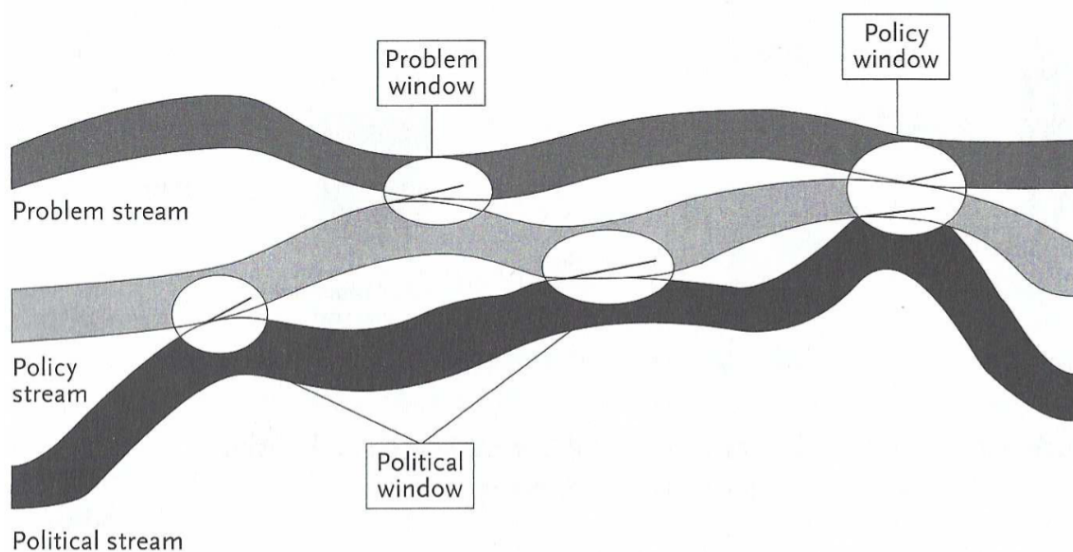


Figure 2: Schematic visualisation of the streams model (Enserink et al., 2010).

Strategies

Varying reasons have played a role for NASA to cooperate with Russia after the Cold War. First of all, there were diplomatic motivations to invite Russia to become a full partner in the International Space Station Program after the Cold War. This invitation had its origins in the Bush–Yeltsin Summit in 1992, as previously stated in subsection 2.2. At this summit, the USA and Russia signed an Agreement on “Cooperation in the Exploration and Uses of Outer Space for Peaceful Purposes”. Space was at the forefront of Cold War strategies, and it was appropriate to be used to help end the Cold War (Seay, 1992).

Second, the aim of NASA was to create a research platform in space from which all partners could benefit. Openly sharing outcomes of this research among the partners is seen as an unprecedented achievement in global human endeavours to excel in technology and science (Guzman, 2022).

Another incentive for collaboration was the economic attractiveness of a deal. “The contributions of the Russians, including the use of Russian launch vehicles to carry hardware and supplies to the Station, a Russian emergency escape vehicle, and Russian modules as part of the Station, would accelerate the completion of the Station from September 2003 to June 2002, and would result in a net savings of \$2 billion” (Whitehouse, 1988).

Because of the variety of incentives for the different stakeholders, the involvement of Russia in the ISS Program could be seen as a multi-issue game, a strategy deployed by NASA. According to de Bruijn (2022), a multi-issue game is characterised by broadening the agenda and inviting the stakeholder to mention issues. This way, the perspective of gain could be created for each stakeholder to encourage cooperative behaviour. A reason NASA applied this strategy is to be able to take ownership of the ultimate decision and create an acceptable outcome (de Bruijn, 2022).

2.3 Key moment 2: Conflict 2014, Russia invades the Crimean Peninsula of Ukraine

After Russia’s invasion of the Crimean Peninsula in 2014, the US government imposed economic sanctions on Russia (Stromberg, 2014). Russia subsequently left the G-8, further straining diplomatic ties. Additionally, the Russian Deputy Prime Minister angrily tweeted veiled threats to exclude NASA astronauts from future trips to the ISS. They were threatening to stop transporting American astronauts to the ISS aboard their Soyuz spacecraft (Heilweil, 2022). By doing this, Russia is effectively using the ISS as leverage as the other ISS partners were completely dependent on the Russian Soyuz spacecraft (Stromberg, 2014). In a reaction to Russia’s threats, the USA initiative on the ISS was strengthened through a written document on the US national political policy compiled by the US executive branch in 2015. “The intention of this document was aimed at expanding international cooperation and strengthening stability in space” (Abdurrahman, 2021). The goal of this strategy is to use the ongoing space cooperation in the ISS with Russia as an element of strategic engagement to decrease the international conflict and tensions generated by Russia’s annexation of Crimea (Abdurrahman, 2021). Both parties still had an incentive to keep talking, since at that time two US astronauts and three Russian cosmonauts were aboard the ISS. The interdependence was strengthened by the fact that the US depended on Russia to transport astronauts. On the other hand, Russia was reliant on the USA, as the US segment makes up the majority of the space station, including electricity from the solar panels (Stromberg, 2014).

Streams model (problem window)

The invasion of the Crimean Peninsula by Russia is another moment of opportunity that can be identified. However, this time the situation did not lead to an interaction between all three streams of the model. During this opportunity only the problem stream and the policy stream

have interacted, as is visualised in Figure 2 as a problem window. After the invasion of the Crimea the USA imposed sanctions on Russia. In response, Russia used their leverage on the the space collaboration to apply pressure (Stromberg, 2014). This is clearly part of the problem stream. From the perspective of the policy stream, a policy for the Space Station Partners would be to stop collaborations with Russia. However, from the perspective of the political stream there was no support for this policy. Therefore, according to the model, the issue was moved to a higher position on the political agenda, but not high enough to force any immediate actions (Kingdon, 1995), (Teisman & van Buuren, 2012).

Strategies

Back in 2014, Russia used the ISS in an attempt to pressure the USA into recognising its annexation of Crimea. In an apparent bid to pressure the USA into formally recognising Russia's claims on the region, the Roscosmos suggested it would relocate astronaut training to Crimea (Heilweil, 2022). At the time, this was a critical threat: NASA astronauts needed training to travel on Russia's Soyuz rocket, which back then was the only way to get to the ISS. The conflict came just months after the US instituted sanctions that were meant to punish Russia for its invasion of Crimea. In response Roscosmos had implied it would stop transporting any NASA astronauts at all (Heilweil, 2022).

This trend continues in 2022, in a response to sanctions following Russia's invasion of Ukraine. The head of Roscosmos suggested that the ISS could fall out of orbit and crash into the USA or Europe as a result of sanctions on Russia (Smith, 2022). This refers to Russia being responsible for the propulsion of ISS, resulting in disastrous consequences if Russia decides to stop the support for these engines.

Although politics should not influence the ISS (Heilweil, 2022), reality proves the opposite. It has become a bargaining chip in international politics on multiple occasions, with threats being a recurring strategy applied in this case by Russia. The sunken costs of other involved parties are being misused to strengthen the bargaining position of Russia, resulting in less trust for future collaborations.

3 Recommendations

This paper has used the unique example of the ISS as a case in order to analyse the different aspects that are involved with international space collaboration. The Russian invasion of Ukraine has highlighted the issues that can arise when countries cooperate in space in times of geopolitical turmoil. The introduction covered how the ISS is a wicked problem. This makes it difficult/impossible to "solve". The possible options for the ISS problem in this case are decoupling of the two domains (Earth and space) or terminating the project as a whole.

Option 1: Decoupling of the two domains - Earth & space

The first option revolves around the ideal covered in the introduction, in which conflicts on Earth are independent from the collaboration between nations in space. This decoupling between the two domains would enable nations to continue collaborating in space. However, a downside is that Russia will not allow the decoupling of the two domains, as there is no explicitly written agreement that these two domains are separated. The ISS is a bargaining chip that Russia can use in order to try and alleviate some of the pressure that is applied on them by sanctions. The second downside is that this approach would be immoral towards the victims of the Russian invasion of Ukraine and a violation of the stakeholders' values. Setting a precedent that would be hard to defend to the general public, in light of geopolitical developments.

Option 2: End partnership (in-)voluntarily

Although ending the ISS project prior to the extended end of its life cycle is not a way to maintain cooperation or to “solve” the wicked problem, it might be an option to prevent further escalation. Russia would lose its bargaining power over the other stakeholders, and an ethical statement would be made regarding recent developments. Downsides of this option, showing the wickedness of the problem, are twofold. First of all, cutting short the ISS’s life cycle is a financial catastrophe, as costs involved to replace the ISS are substantial. Another downside is the effect stopping this project will have on future space collaborations, as agencies will be less likely to cooperate knowing that geopolitical conflicts on Earth could jeopardise operations in space. Therefore, this option is strongly discouraged.

4 Conclusion

Saving the ISS from an imminent termination is concluded to be impossible due to the associated wicked problem. Although this outcome is tragic, it does create a clear case to learn lessons for future collaborations in space. Where the first option is not applicable in case of the ISS, as Russia is not eager to hand over its bargaining power, it could be implemented in future collaborations to mitigate the effects of wicked problems in times of turmoil. Decoupling, or making future space collaborations independent from developments on Earth, takes away bargaining power of individual stakeholders. This can be achieved by formulating collaboration guidelines for each new space project. An important power that should be taken away from the individual is the ability to jeopardise the project by pulling out. A way to accomplish this is by forcing a stakeholder to hand over knowledge and resources prior to pulling out to keep the project ongoing. International cooperation in space through times of geopolitical turmoil can therefore be maintained by decoupling the two domains - Earth & space. Not forming a solution for the wicked problem, but mitigating its effects.

5 Discussion

Decoupling space and Earth will act as a high barrier to enter into the project. Due to the fact that explicitly decoupling the two domains takes away bargaining power of nations, it ensures that they are committed to fulfilling their duties that they agreed to without room to negotiate. This goes against one of the important design principles of a good process, the availability of an easy exit option for stakeholders (De Bruijn, Ten Heuvelhof, et al., 2010). Such an exit mechanism has the benefit that it gives stakeholders safety and space, while it also nourishes cooperation and decision making in the process (De Bruijn et al., 2010). This means that it would be more difficult for nations to cooperate together in space, it will likely limit it to nations that are politically and culturally aligned and are already cooperating on other tasks outside of space related activities.

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A Participation check

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Disclaimer:

As a short disclaimer, all group members were responsible for every part of the report. Meetings and brainstorming sessions with all of us resulted in the initial backbone of the report, after which tasks were distributed among individuals or pairs to work on different parts of the report. However, after a part was finished, the other group members were tasked to read through the written parts and give feedback. The same holds for the final check of the report on for example coherency. So please note that the table below is just an indication, and that the final product was truly a group effort.

Participation table: documentation of each group member's contribution in the group report

Section of the group report	Planned allocation of work	Actual work done	Comments (Aimed word count upfront)
1. Introduction			750 words
1.1 Context	Osman & Dennis	Osman & Dennis	325 words
1.2 Research question and summary of paper	Osman & Dennis	Osman & Dennis	325 words
2. Descriptive & Analysis Section			2000 words
2.1 Decision making process	James & Kiet	James & Kiet	500 words
2.2 Reconstructing decision process with theory	Cemal & James	Cemal & James	750 words
2.3 Negotiation and strategies	Sander	Sander	750 words
3. Conclusion /Discussion Section			750 words
3.1 Discussion	Osman	Osman	200 words
3.2 Summary/synthesis	Kiet	Kiet	150 words
3.3 Recommendations	Dennis & Cemal	Dennis & Cemal	400 words

Signatures:

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I hereby agree with the table contents

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