International Aeronautical Federation (IAF)
International Project/Programme Management Committee (IPMC)

2021 Young Professionals Workshop Statement of Work

Sunday October 24th, 2021

Dubai, United Arab Emirates

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1 Introduction

1.1   Scope

This Statement of Work (SOW) describes the workshop activities to be executed and the deliverables required by the IAF's International Project/Programme Management Committee (IPMC) with respect to a set of recommendations that shall be derived to support ongoing development of Young Professionals in the international space industry and the development of the next generation workforce.

1.2   Background for the Workshop

Young Professionals throughout the space industry face daily challenges when it comes to making the transition from their student careers to their professional careers, and from starters to experienced professionals and leaders. These challenges arise from either their perceived, or demonstrated, lack of professional work experience as students and continue into the first five to ten years of their careers. Early career professionals are not only faced with the steep learning curves associated with obtaining real-world skills but are also faced with the need to earn the respect of their more experienced colleagues.

In recognition of these challenges, the IPMC member organizations welcome the active participation of early career employees in identifying challenges, opportunities, and new approaches to nurturing a highly motivated and experienced aerospace workforce. These efforts are being pursued through workshops involving selected Young Professionals and overseen by an appointed organizing committee. The expected output of these workshops are observations, conclusions and recommendations that can be employed by aerospace organizations to ease the transition of Young Professionals into their careers, and to facilitate transfer of know-how to new generations of workforce. The workshop observations and recommendations can also benefit early career employees by helping them navigate and advance in the early stages of their careers.

1.3   Reference Documents

The following documents can be consulted by the workshop participants as they contain relevant background information. These documents can be consulted on the 2021 IPMC_YP Workshop Delegates Folder.

Reference Documents			
No.	**Title**	**Author**	**Date**
RD1 to RD9	IAF-IPMC Young Professionals Workshop – Workshop Results Report (issues from 2012 to 2020)	Workshop Delegates	2012 - 2020
RD 10	Five Years of IAF IPMC Young Professionals Workshop	Birgit Hartman and Maarten Adriaensen	2016
RD 11	The Future Workforce on Learning From and With Peers While Navigating Through The Era of Space 4.0	Birgit Hartman and Marie Botha	2018

1.4 WOC Organization

The WOC is organised along the following work distribution:

Eleonora Zeminiani	WOC Project Manager
Birgit Hartman	Strategy and Implementation Manager
Linn Boldt-Christmas	Communications Manager
Mark Fittock	Operations Manager
Adriana Andreeva-Mori	Correspondence Manager
Takeshi Shoji	Delegates Manager

The WOC team can be reached via ipmc.yp.workshop@gmail.com

1.5 Acronyms and Abbreviations

IAC	International Astronautical Congress
IAF	International Astronautical Federation
IPMC	International Project/Programme Management Committee
SOW	Statement of Work
WOC	Workshop Organising Committee
YP	Young Professional (participants - delegates)

2 Objectives of the Workshop

The goal of the IPMC YP Workshop is to gather inputs from Young Professionals in the international space community to gain the knowledge they need to better develop and empower the next generation workforce. For that purpose, the conducted research by the working groups is intended to produce thoughtful and well-rounded observations and recommendations on the assigned topics.

The observations and recommendations will be gathered in the IPMC YP Workshop report and delivered to the IPMC participants, their member organizations and the other member organizations of the IAF. The YP Workshop report will also be made publicly available on the IAF website (www.iafastro.org).

3 Topic Descriptions

For the purposes of the workshop, delegates are allocated into separate groups, each of which will be responsible for one of the topics hereunder.

3.1 Topic 1 – Management of remote collaboration in the space industry

The recent evolution of the space sector towards remote delocalized teams has been greatly accelerated by the need to cope with the exceptional crisis brought by the COVID-19 pandemic in 2020. The lessons learned can help the space community reflect on the relevance of good communication and improve the methods, skills, and tools used to support it.

The key assignment to be addressed by delegates in this section is:

> **How to collaborate remotely, either across teams in interdisciplinary projects or across different functions within an organization, and across different organisations without losing informal opportunities for information exchange?**

A key success factor for this group is to pinpoint how to best combine the advantages of in-person communication and networking with the advantages of virtual collaboration and the globalization it enables. Delegates are also encouraged to highlight barriers to good interdisciplinary communication and how to best tackle them.

The following elements could be considered in the research:
- How "random knowledge exchange opportunities" (e.g. the informal chat at the water fountain or the side-project discussion over a cup of coffee) can be fostered in a remote environment
- How the social aspect of co-located work environment can be transposed in a virtual setting
- The influence of removing (or introducing) "turn-based" conversations that naturally comes with iterative communication such as e-mail exchanges
- The role of management when encouraging social-professional team interaction, and the willingness (or unwillingness) of the team to participate
- Which existing resources within organizations can be exploited (perhaps in new ways) to improve connection with peers and colleagues from different disciplines/functions and different geographical locations/sites of the same organization
- How can delocalized teams exploit networking to facilitate solving business issues or speed up resolution of problems
- How outreach efforts can improve the understanding of a project by leveraging collaboration between communication staff and technical staff, but also between different technical teams
- How Project Managers can identify potential points of failures in communication chains across teams, and correct them in good time
- Which soft skills are to be nurtured in both young and senior professionals to realize the full potential of communication in a virtual/remote setting

Young Professionals have been growing up in a world where virtual interaction is normal; it works and it is not given a second thought. At the same time, many are less acquainted with building in-person connections, while the concept of virtual interaction is often not deemed sufficient or effective by senior professionals. Delegates are therefore encouraged to investigate and create their own understanding of the value of the different networking methodologies and techniques used by their senior peers.

The presentation at the workshop should present the case for enhancing communication opportunities, methodologies and skills in delocalized teams, both at organizational and project level.

This Topic is linked to several of the Topics researched in the 2020 edition: please consult the findings in the 2020 workshop reports as a reference for previous results and source of inspiration on how your research and reporting should be conducted.

3.2   Topic 2 – Attracting and managing diversity in order to create successfully inclusive teams

Even with the proven importance of diversity and inclusion in the workforce, today's aerospace industry is still working to increase efforts in achieving equality. Traditionally, the space sector is still presented through a narrative focused on conquest, dominance, and power. The effect is the self-perpetuation of an environment that is largely tech-centered and systematically lacking employees of several key underrepresented demographics.

The key assignment to be addressed by delegates in this section is:

> **To provide realistic recommendations on how to change the narrative of the space sector into a more inclusive one, with the goal of creating and managing meaningfully diverse teams.**

A key success factor for this group is to move **beyond** the current widespread diversity programs (such as gender balance, intergenerational cooperation, targeted recruitment of underrepresented demographics...), and to focus instead on the identification and neutralization of micro-behavioural and systematic barriers hampering the formation of truly inclusive workforce and teams.

The following elements could be considered in the research:
- How the narrative of space projects can be modified or tuned to foster diversity and inclusion
- What is the role of micro-diversity (human diversity) in influencing team dynamics
- What are the choices, behaviours, and tools that Project Managers can leverage in order to promote inclusion
- How to measure the impact of diversity and inclusion on the ability and effectiveness of teams and organizations

- Which Knowledge Management and Knowledge Transfer (KM / KT) techniques are best suited for a diverse and inclusive workforce
- How is the Project Manager redefined as the workforce diversity increases
- How to underline and contest systemic issues that disproportionately affect underrepresented demographics in the workplace, ensuring an encouraging environment and implementing a zero-tolerance policy for intolerance
- How to attune and manage diversity in small isolated success-critical teams (such as a scrum team, a "skunkworks" innovation team, or astronauts on a long duration mission)
- How to make up a successful inclusive team for space exploration and how to measure this success
- Organisational adaptation required to enable implementation of these diverse and inclusive teams in the current environment (think educational limitations in certain demographics, corporate policies w.r.t. nationalities, etc.)

Ample literature already exists on the definition and benefits of diversity and inclusion. Delegates are encouraged to investigate past the usual mainstream exemplifications.

When investigating the points listed above, workshop participants should bring into the discussion their experience and standpoint as Young Professionals and reflect on the role that diversity and inclusion have on their engagement and their ability to communicate openly and effectively (both within a project but also with peers).

The presentation at the workshop should present the case for how to improve and leverage the narrative of space projects in order to attract a diverse workforce, and how Project Managers can create and manage diverse and inclusive teams.

Please consult the findings in the previous workshop results as a reference, in particular the reports from Topic 2 in the 2018 Workshop and Topic 2 in the 2019 Workshop. Their work and conclusions shall not be duplicated and shall constitute a basis for your research.

3.3   Topic 3 – Engaging Young Professionals in large space programs

One key characteristic of the space field has always been the presence of very large programs which span long timescales and involve personnel on a global level. Recently, the push for the Return to the Moon has opened a new era of large-scale endeavours.

The key assignment to be addressed by delegates in this section is:

> *How do Young Professionals engage in large programs/projects? Which characteristics of large programs/projects can constitute a decision factor for a Young Professional on whether to remain in the field/project or leave it?*

A key success factor for this group is to convey how the peculiarity of working in large-scale projects affects Young Professionals (YPs) and their willingness to remain and grow into the space field.

The following elements could be considered in the research:
- How do the YPs define a long term, large scale project
- Which are the benefits and drawbacks experienced by YPs working in ongoing large-scale projects
- How would the new generation workforce, manage a long term and large-scale space project
- Which project management techniques are considered by YPs to be vital for project success (different project phases may imply different solutions, therefore the dissertation can be broken down accordingly)
- How does the existence of large space programs affect space entrepreneurship and the chance of non-space actors integrating into space economies
- How does the new generation share the commitment and long-term investments needed in large-scale projects
- Which is the level of engagement of YPs involved in large scale projects with respect to their peers involved in smaller and quicker development activities
- Which are the key factors or characteristics of large space programs positively affecting YPs, and which ones have instead a negative impact
- How do large space projects score against the ideal job description of the next generation's workforce
- What qualities, experiences, and knowledge could a YP bring to large space programs
- What would be a YP's next large space program and how does this relate to the existing large space programs (Moon, Mars, etc.)
- How does the fact of being involved in a large program play as decision factor for Young Professionals when it comes to deciding on whether to remain in the field or leave it
- How long-term or large space projects score in terms of attractiveness and YP's engagement, given the current fast moving and rapid development space era

One of the key goals of the IPMC YP WS is to understand how to better engage and develop the future workforce. Delegates are therefore encouraged to openly convey their view of large space projects and to make sound and reasoned recommendations on how to leverage large space programmes for the development of Young Professionals.

The presentation at the workshop should present the case for evaluating the impact of large space projects in the engagement and development of Young Professionals.

Please consult the findings in the previous workshop results as a reference, in particular the reports by Topic 4 in the 2012 Workshop and by Topic 2 in the 2015 Workshop. Their conclusions on Motivational and Decision Factors for Young Professionals are a basis for your research.

3.4   Topic 4 – Knowledge management for the Generation Z: how, when, and what do Young Professionals choose to learn?

Knowledge management and professional education are key to the growth of individuals and organizations. The way these are implemented changes wildly across the space sector, according to the size, age, and goal of the entity taken into account. However, another key factor that is often overlooked is generational diversity and how it affects learning practices.

The key assignment to be addressed by delegates in this section is:

Which education and knowledge management strategies are best suited to motivate and empower the future workforce and ensure engagement?

A key success factor for this group is to present professional development, learning practices, and knowledge management from the perspective of Young Professionals through expressing sound recommendations on how to improve them for the benefit of the future workforce.

The following elements could be considered in the research:
- How do Young Professionals choose to learn (e.g., case studies, online courses, traditional instructor-led courses, hands-on experience, a combination…)
- Which are the tactical know-hows in the space field according to Young Professionals and how do they differentiate between knowledge and information
- Which new procedures or new channels for continuous learning and knowledge management are more appealing to Young Professionals
- How would Young Professionals imagine or describe the perfect "knowledge broker" (person or means to link the end-user with the knowledge source)
- What motivates Young Professionals to engage in knowledge sharing
- How would Young Professionals document lessons learned, both in terms of granularity (individual, team, organizational level...) and in terms of information management (lessons learned databases vs other innovative ways)
- How would Young Professionals use and integrate lessons learned into projects and how would they measure the associated return on investment
- How do programs/projects learn according to Young Professionals

The objective of this topic is not to elaborate on the relevance of continuous learning and knowledge management, which is an aspect properly covered by published literature and past Workshops. Instead, delegates are invited to ponder and deliberate on what continuous learning and knowledge management mean to them and how they would change current practices in order to make them more appealing and beneficial for the younger generations and future space workforce.

The presentation at the workshop should present the case for designing and introducing new or improved learning and knowledge management practices specifically targeted to Young Professionals.

Please consult the findings in the previous workshop results as a reference, in particular the reports by Topic 3 in the 2015 Workshop, by Topic 2 in the 2016 and 2017 Workshops, by Topic 5 in the 2018 Workshop, and by Topic 4 in the 2019 Workshop. Their conclusions on Knowledge Management and Learning Partnerships are a basis for your research.

3.5   Topic 5 – Project management practices for enabling short term and rapid turnaround activities for space projects

It takes several years and substantial funding for any space product to go from concept inception to launch. But with the changing space economy, there is a need to rethink how we can rapidly design, launch, and operate new products, similarly to what is done in other technology fields.

The key assignment to be addressed by delegates in this section is:

> ***Why and how should Project Management embrace and encourage this dramatic change towards more rapid design timelines?***

A key success factor for this group is to address aspects of rapid product development and of short fused product life cycle (including but not limited to the so-called "fail-fast" approach).

The following elements could be considered in the research:
- Which are the different ways to speed up the product life cycle in the space field and how can rapid product development be exploited
- How to measure, ensure and maintain quality when managing this rapid and aggressive product development
- Which are the programmatic and financial implications of accelerating the product life cycle (e.g. benefits and drawbacks in terms of risks, scheduling, costs...)
- How an accelerated life cycle would impact product safety, and which project management procedures would need to be in place to ensure safety when implementing "the riskier, the faster" approach as used in other fields
- Which are the impacts of rapid product development on risk management
- How a faster product lifecycle can impact the long-term strategic technological and business orientation of space institutions and companies
- Which changes in organizational and project management culture are needed to enable and exploit rapid prototyping and fast life cycles in space programs
- How to ensure quality, security and safety standards for rapid product development
- How to mitigate technical, scheduling, financial, and quality risks when non-space actors participate in the development of space projects
- How to apply the "quick-win / fail-fast" Minimum Viable Product (MVP) philosophy to space hardware products that are intrinsically expensive, labour-intensive and with long Manufacturing Assembly Integration and Testing (MAIT) times

In developing their research, delegates are invited to take into account the role and example of the so called "new space players" and compare it with the approach of "legacy space players". Young Professionals are also welcome to highlight their first-hand experience with rapid prototyping and development, either in the space sector or in other fields.

The presentation at the workshop should present the case for introducing new project management approaches in order to enable rapid turnaround activities and prototyping as part of a fast-paced product life cycle.

Please consult the findings in the previous workshop results as a reference, in particular the report by Topic 5 in the 2019 Workshop. Their conclusions are a basis for your research.

3.6 Topic 6 – Successful outreach practices in the space sector

Current outreach personnel in space organizations often have scientific or technical background but do not necessarily have access to detailed knowledge of the projects they are promoting; meanwhile, many of the technical staff on projects who do have this knowledge do not have enough management support to devote their effort to outreach initiatives. This can often lead to a disconnect between the messages that are being promoted by outreach initiatives and their actual scientific objectives, with technical or scientific staff of these projects often finding themselves with a desire to participate but without time or support from their Project Managers to engage with outreach activities.

The key assignment to be addressed by delegates in this section is:

> **How can outreach be improved by exploiting a combination of technical expertise and communication expertise in teams or organizations?**

A key success factor for this group is to assess how current outreach initiatives score in terms of effectiveness and traction on both internal stakeholders and general public, and how they can be improved.

The following elements could be considered in the research:
- How organizations can support outreach and communication initiatives, considering whether this effort should be organization-based or project-based
- How organizations can add integration and support of outreach initiatives into projects, and how project managers can support these activities from a project perspective
- How managers can gauge the efficiency of outreach efforts
- How to best communicate within an organization about the importance and payback of outreach efforts in order to gain management support
- How certain roles and their terms of reference can be adapted to encourage everybody to engage in outreach initiatives, securing more freedom for staff to engage in outreach initiatives
- How outreach initiatives can be framed as a way to "give back" to the organization and to society
- Which are the blind spots of project teams in communicating about their work and in incorrectly assessing the level of familiarity of the general public with their disciplines
- Which professional figure is best suited to plan and perform outreach initiatives (e.g. existing staff, maybe with dedicated training, vs new specialist outreach staff)
- How can the relationship and collaboration between young and senior professionals improve the quality and results of outreach initiatives
- How good outreach practices can be used inside organizations to enhance the effectiveness of the organization itself

Young Professionals are expected to perform a financial analysis on the ROI (return on investment) and provide solid references on the economic viability of engaging in outreach activities.

In developing their research, delegates are invited to take into account the role and example of the most successful communicators in the space field (both individuals and organizations), and

compare their approach with the one(s) Young Professionals experience in their own organizations. Young Professionals are also welcome to highlight their first-hand experience taking part in outreach initiatives and reflect on how this helped them – as space professionals – and their organizations.

The presentation at the workshop should present the case for improving, funding, fostering and sponsoring outreach initiatives in the space sector.

Please consult the findings in the previous workshop results as a reference, in particular the report from the 2020 Workshop in which several teams stressed the need for good outreach practices. Their conclusions are a basis for your research.

4 Requirements for Management, Meetings, Deliverables and Reporting

4.1   Management

Each topic group shall have an appointed group leader who will be responsible for overseeing the timely execution of the tasks assigned to that group. The group leader will represent his or her group at all relevant meetings with the WOC. At such a time where the group leader cannot attend a meeting, the group leader should appoint an ad hoc representative. The group leader shall be the main point of contact between the group and the WOC.

Duties of the group leader include:
- Establishment of a project schedule including major milestones and deliverables
- Scheduling and execution of regular group meetings
- Representation of group at all relevant meetings of the WOC
- Accountability for all group deliverables and their quality

Each group shall have an appointed rapporteur who will be responsible for the compilation and distribution of group minutes of meeting and reports.

The group leader will be in charge of organising the team as they wish, provided the various tasks will be shared between the team members and all deliverables will be submitted timely.

4.2   Mentor

A mentor is the experienced senior professional the WOC refers to in the SOW. The mentor in question has years of valuable experience, built profound knowledge on the topic, and should be considered as the voice of reason and the group's "reality check".

The mentor is requested to share their insightful knowledge with the Young Professionals; guide them through the topic; highlighting important aspects to be researched, suggest literature reviews, the right questions to ask when interviewing peers, etc. If time permits, the mentor can be invited to proofread the deliverables.

Depending on the group's requirements, the mentor can be present at each meeting, or regularly attend meetings. This will be up to the mentor and the group to decide.

The groups are invited to listen to the mentor and take their input to heart.

The mentors role is not necessarily to promote their own organisation, but to share their inputs to the groups based on their overall experience and acquired knowledge.

4.3   Meetings

Each topic group is required to hold regular meetings (advised is at least weekly during the first few weeks, twice per month during the summer, and again weekly the weeks leading up to submission deadlines and the workshop) to ensure project tasks are on schedule and in line with WOC expectations. One member of the WOC is to be in attendance regularly during these meetings to offer guidance and insight as requested by the group members. However, it is the task of the group leader to define a meeting agenda and moderate the meeting.

A Kick-off Meeting will be held in May to officially begin the pre-workshop activities. All delegates and members of the WOC are expected to be in attendance. Those who cannot attend must inform their group leaders. Group leaders who are not able to attend must inform the WOC and appoint a representative in their place.

The workload of the workshop is estimated at 4 hours per week per person, with peaks just prior to the workshop to ensure timely finalization of the report and presentation.

Group leaders are expected to submit their final input to the IPMC YP Workshop 2021 report one week before the workshop, please refer to the section 4.4 as described below.

4.4   Deliverables

Each group shall provide a detailed analysis of their group's topic which will be used for the 2021 report.

When writing the report, please ensure the manuscript format complies with the rules described below.

The following list of deliverables shall apply:

1. Group meeting minutes (living Google document is sufficient) including work distribution, planning and execution of research and writing/editing
2. Draft report, including the full and complete outline of the report (see section 4.5 below) – due week 37
3. Draft presentation, including an overview of the total intended content for presentation (including format) – due week 40
4. Final report (maximum 50 pages not including references and annexes) – due week 41
5. Final presentation – due week 42

As much detail as possible should be provided in all major deliverables. As a rule, enough detail should be provided in each document such that a reader who was not involved in the research can clearly follow the steps taken in the research in order to reproduce the results.

4.5 Reporting

As the individual reports of the different groups will be inserted into one final report to the IPMC, a unified structure, format, and referencing style has to be adopted.

For your preliminary and final report submission, the use of **APA style referencing** is mandatory. APA referencing system uses the author-date citation system in text. All sources are cited in the references. Do not use the automatic referencing style of Google documents.

Accompanying the Group Report must be an Executive Summary. The Executive Summary should be **between 3 to 5 pages**. An Executive Summary should summarize the key points of the report. It should restate the purpose of the report, highlight the major points of the report, and describe any results, conclusions, or recommendations from the report. It should include enough information so the reader can understand what is discussed in the full report, without having to read it.

Structure for the Group Reports is:
1. Executive Summary (3-5 pages)
2. Methodology
3. Research/Investigation/Discussion
4. Recommendations
5. Concluding remarks
6. Annexes

The discussion groups should keep the executive summaries they prepare as concise and to the point as possible.

Manuscripts format:
- US English
- **Third person (the team, the group)**
- **Past tense**
- Times New Roman for text, font 12
- Arial for graph/picture/table labels
- 1 line spacing for entire document
- Justified alignment for text
- Centered alignment for graphs/pictures/tables and their labels
- No break pages nor blank pages

- Number all headings
- References and footnotes should include and show the full link to any online sources
- All drafts shall be kept in Google doc format
- Submission of documents as deliverables in the execution plan shall be done in Excel or Word format and pdf format

A link to a quick APA citation guide can be found here:

http://www.libraries.psu.edu/content/dam/psul/up/lls/documents/APA_Quick_Citation_Guide.pdf

Link to a FAQ on APA:

http://www.apastyle.org/learn/quick-guide-on-references.aspx#Websites

4.6   Evaluation by IPMC

The final report will be edited by the WOC before the end of 2021. Once finalised, the report will be distributed to the IPMC members. The final report will also be distributed to all IAF member organizations and published on the IAF website, accessible to the general public.