



International Astronautical Federation -
International Programme/Project Management Committee

IAF-IPMC Young Professionals Workshop

Workshop Results Report

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Group photo of the 2012 International Project Management Committee Young Professionals Workshop delegates on September 28, 2012. (Photo courtesy of Armonica Film.)

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1 Executive Summary

On September 28, 2012, more than 40 young professionals from government, academia, and industry came together from around the world to engage in a workshop about their future careers. Delegates participated in pre-workshop sessions through Skype and teleconferences, and collaborated through a Facebook group before attending the workshop, which was held in Naples, Italy just before the 2012 International Astronautical Congress (IAC).

Organised by the International Programme/Project Management Committee (IPMC) of the International Astronautical Federation (IAF), the workshop focused on opportunities and challenges young professionals face, mentors and mentorship programmes, exchanges and rotational assignments, motivating factors for young professionals, and the link between technical and managerial career paths. Workshop delegates shared stories, insights, and data about their work experiences and developed recommendations to help address these challenges.

The results and recommendations from these discussions will help the IPMC, the IAF's 240 member organizations, and the workshop participants to consider what today's space organisations can do to develop and empower the workforce of tomorrow. Then the next steps are for all parties to help improve and promote schemes for the continuing development of young professionals within the space sector and this progress can be assessed at future workshops.

The conclusions and recommendations provided by the workshop discussion groups are organised into four major categories: 1) Training, Learning, and Networking Opportunities; 2) Exchanges and Rotations; 3) Mentorship Opportunities; and 4) Motivation and Incentives. The high-level findings and observations from the report include:

Establish, maintain, and/or update clear pathways for communication and feedback. It has been said that information that is hard to find is information hardly found. Young professionals identified the importance of current and "findable" repositories that identify training, leadership, learning, and exchange opportunities available to them. Pathways to listen and collect young professional input regarding what motivates them and what professional development needs they have is also critical.

Provide and facilitate a variety of learning experiences. Space exploration is multi-disciplinary and collaborative. The need for young professionals to experience the culture and work of other organisations, disciplines, and generations is essential to the development of today's young professionals into well-rounded and competent leaders for the future.

Offer alternative and/or analogue learning opportunities. Fully-fledged training and development opportunities are not always viable offerings for young professionals due to a variety of reasons (e.g., budget, travel restrictions, proprietary information restrictions, etc.). The workshop delegates encouraged the organisational practice of providing and/or being receptive to alternatives or analogue programmes such as online courses, virtual forums, and short-term shadowing opportunities or rotational assignments.

Stay current and aware of best practices and trends. Young professional development is an area of interest and study to the aerospace industry and beyond. Benchmarking with other organisations or industries to share ideas and stay current on workforce trends or best practices for developing young professionals is recommended.

2 Background

In response to the widening aerospace workforce generational gap, the International Programme/Project Management Committee (IPMC) wished to dedicate its attention to issues pertaining to the young professional community. In order to better understand how their committee might address the needs of this community, the IPMC member organisations agreed to support a workshop for young professionals. A four-person Organising Committee of young professionals was selected to plan and organise the event. The resulting IPMC Young Professionals Workshop sought to gather the input of young professionals in the international space community to provide the IPMC with the knowledge needed to better develop and empower the next generation workforce.

The workshop attracted over 40 young professionals, typically defined as being age 35 and younger, from government, industry, and academic aerospace institutions from all over the world. Together they discussed five topics of interest to the IPMC: overall challenges and opportunities for young professionals, mentorship, rotational assignments and exchanges, motivating factors, and technical and managerial career paths.

The half-day workshop occurred on Friday, September 28 in the Ischia Room, Palacongressi at Mostra d'Oltremare in Naples, Italy, where the workshop delegates participated in active discussions about their topics and produced a brief presentation to summarise their initial findings.

The following day, the Organising Committee presented the preliminary results to the IPMC. Discussion following the presentation resulted in an active conversation about the findings, recommendations, and enthusiasm for the Organising Committee to continue its work in collaboration with the workshop delegates. This report presents the observations and findings of the IPMC YP Workshop.

3 Virtual Session Collaboration

Since the workshop was a half-day event, the Organising Committee felt it was necessary to establish foundational relationships among the delegates who would attend through virtual means. With a globally distributed, diverse group, the Organising Committee elected to employ online social and collaborative tools, such as Google Documents, to facilitate “breaking the ice” and initiate group conversations around the chosen discussion topics.

After the delegates were selected, the Organising Committee administered a survey to obtain information that would include their profile for the workshop handbook and their preferred social networking tools and capabilities. This information helped establish a private Facebook Group for the delegates to share information and begin initial discussions.

In addition to Facebook, the Organising Committee scheduled at least one virtual session per group through video Skype or teleconference. The online scheduling tool Doodle provided the capability to determine the best times for the majority of the delegates to participate in an introductory conversation about the workshop. Each group had a leader to facilitate and guide the discussion. At least one Organising Committee member attended each conversation in a supportive role. It is important to note that not all participants had access to Skype due to restrictions on their computers. This is a lesson the Organising Committee will take into consideration for the next workshop.

Overall, the sessions worked well as a means to bring the delegates together prior to meeting in person at the workshop. It was an effective exercise that enhanced the overall workshop experience.

4 Group Discussion and Findings

4.1 Topic 1 – Challenges and Opportunities

“What opportunities and experiences does the next generation workforce need to be successful? Conversely, what challenges are hindering their success?”

Introduction

The next generation of space professionals seek to be widely engaged and have the opportunities available to best utilise their skillsets in order to maximise their potential. This involves being given demanding tasks so that they can learn on the job, take ownership of parts of their development process and be recognised for their commitment to professional growth and excellence. This will also help them develop as managers or technical experts. Therefore, the challenges identified are the need to create an environment in which young professionals can continue to develop by occupying positions of greater responsibility and participate in new learning experiences, while having a network of support within their organisation to ensure their professional development goals are achieved.

Opportunities

The next generation of space professionals look forward to engaging in the following opportunities:

Mentorships - The various opportunities of mentorships provide an avenue for informal, tacit knowledge exchange. This process cannot be forced and needs to be a process of trial and error. The process that works for one mentor-mentee pair may not work for another. The Japanese sempai/kohai relationship, which is practiced within the Japan Aerospace Exploration Agency (JAXA), is an example worth noting. The social significance and importance for an elder to train and teach those developing within the community is widely recognised within the organisation.

Exchanges - Individuals should be able to learn from many fields to develop a unique set of capabilities and skills, which provides an organisation with a well-rounded individual who is able to comprehend the impacts and consequences of their decisions on other organisational units. Possible exchanges include departing from an on-going assignment to acquire new knowledge and then returning to a previous assignment to advance their discipline. This activity is encouraged at all levels of the organisation including management in order to avoid stagnation of a business unit.

Concomitant Development Activities – Participation and involvement in professional organisations (e.g., IEEE, IAF, SGAC) or attending career development activities outside of the day-to-day work (e.g., IPMC YP Workshop, SGC, IAC IISL IAF Moot Court) provide greater opportunities for young professionals to network and further their careers. Manager support for these activities is critical to developing the next generation in addition to increasing the capacity and capability of the organisation at large.

Hindrances

The next generation of space professionals identified the following elements as potential hindrances for their development:

Limited Learning Opportunities: It is often said that there’s no better way to learn how to do something

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than to go and do it. The opportunity to participate in a development programme, exchange or rotational assignment, or a course is tremendously valuable to young professionals. Budget cuts, travel restrictions, and international regulations have increasingly limited these opportunities and therefore hinder the professional development of young professionals. Furthermore, these opportunities should present themselves regularly rather than once every few years. This provides young professionals with the ability to plan out their career development appropriately.

Challenges with Accessing Information about Existing Career Development Opportunities: Some workshop participants were not aware of the current opportunities open to them. When opportunities are available, young professionals sometimes do not know where to look in order to learn about them or take advantage of them. Access to online resources, providing clear information on development opportunities, rotational assignments, training and courses, or conferences for young professionals is challenging and/or insufficient within organisations.

Insufficient Managerial Support: For managers, time and attention are valuable resources that are often distributed across many competing needs. As a result, attention to providing sufficient support to young professionals may decrease and, consequently, hinder their motivation and growth. Managers are encouraged to acknowledge the importance of making the effort to enable opportunities for their younger employees to grow and providing alternatives when a best-case solution is not viable. It is important to have good managers who understand the dynamics of the workforce and are willing to work with the next generation for the benefit of all.

Inconsistent Communication with Young Professionals: Reaching out to the next generation workforce is important in order to understand their current and future needs. Including young professionals in the decision-making processes for programmes and projects introduces a fresh perspective, and also makes the final solution richer and more robust. Often, young professionals have a keen and current sense for new and innovative ideas or technologies that could benefit the organisation if not overlooked.

Insufficient Stake in Career Planning – Often, young professionals feel they have insufficient ownership of their career development. Young professionals should be empowered to take charge of their career development. Exploring different disciplines and organisations, deciding what interests them, and pursuing development in their chosen area benefits both the individual and the organisation.

Conclusions

It is important for young professionals to be able to shape and determine their long-term objectives; whether to become more technical and specialized or less technical and more managerial. Those wanting to take on management roles need to be able to experience different parts of the organisation and be exposed to the dynamics of the organisation's requirements. Therefore rotational assignments and increased exposure to front-line management are effective ways to develop these individuals. This is part of JAXA's management selection process; candidates must have had two to three different assignments of one to two years in duration, including a non-technical rotation before they are eligible for a management position. It is recommended that both radial and rotational models be applied at all levels of an organisation.

Learning from the practices of other organisations in order to foster an engaged and knowledgeable workforce will benefit the growth and development of young professionals. There are a variety of approaches organisations can take to meet the varying development needs of young professionals, and benchmarking with other organisations could prove to be beneficial.

4.2 Topic 2 – Mentorship

“How can mentors help with young professional development and how should such schemes be encouraged within organisations?”

Introduction

The importance of mentorship within an organisation is widely recognised. Within the past decade, space institutions have become increasingly globalised and the workforce generational gap has become more pronounced. Mentor-mentee relationships enable the transfer of individual and organisational knowledge, encourage continual learning, and promote the introduction of new and innovative ideas. The desire among the young generation to connect with experienced practitioners, who forged the pathways into space, put men on the moon, and built the International Space Station, is powerful and sincere.

Defining Mentorship

When a young professional enters an organisation, they are usually assigned to a supervisor or manager. While a supervisor has the potential to serve as mentor, they are generally not always one and the same. Supervisors and managers are responsible for assigning tasks and formally monitoring an individual’s workflow. Mentors serve a different function, providing guidance and advice on a more informal level.

Because the importance of mentorship and the benefits it provides are widely recognised, most organisations actively encourage the practice. However, effectively implementing such schemes is a challenge.

Mentors, formal or informal, have an interest in the enrichment of a young professional’s career and as well as their own. Mentor-mentee relationships are built upon trust, constructive feedback, and mutual learning opportunities. Mentors come in many different forms. They may be more traditional and come from within a young professional’s discipline or network, or from an external department or discipline.

Formal mentoring programmes seek to forge such connections, but these connections are often characterised as inorganic or forced. While these sorts of relationships have the potential to evolve into something more meaningful and substantial, young professionals report finding greater value in mentor-mentee relationships developed through informal activities and interactions.

This is not to discount the efforts put forth by formal mentorship programmes. Formal programmes offer an initial platform for mentors and mentees to be introduced to this valuable practice.

More often, it is through informal or serendipitous opportunities that young professionals are exposed to potential long-term mentors.

Encouraging Mentorship

Organisations should promote participation from all employees in mentorship activities. For formal programmes, establishing regular or scheduled meetings and perhaps mechanisms for reflection and feedback on a young professional's progress is suggested. Additionally, social events geared towards mentoring or other shared experiences for the mentor and mentee are other options.

However, if a formal pairing does not prove to be beneficial, the mentor and mentee should not feel obligated to maintain the relationship. In this event, the mentor and mentee should continue to seek out such relationships through informal means.

Young professionals should have the opportunity to engage with potential mentors through social or networking events, forums, training events, rotational assignments, conferences, or short-term shadowing opportunities. Often many young professionals and mature practitioners cite "being at the right place, at the right time" when they met their mentor or gained an opportunity to learn from a mentor. While young professionals must strive to develop their career and seek out opportunities for mentorship, the organisation must cultivate a culture that supports, facilitates, and empowers their young professionals to do so.

There seems to be a preference for formal mentoring opportunities early upon initially joining an organisation. Then there is usually a transition to engaging in more informal opportunities after the individual has developed his or her own network. So, preferences change and the organisation must have mechanisms to listen and respond to feedback from young professionals about their needs as far as opportunities to access and engage with seasoned, experienced, or expert practitioners.

The potential benefits for mentors also need to be emphasised within an organisation. This will increase the number of available mentors and promote long-term engagement. Benefits could include supporting the mentor's career development, rewards or financial incentives, and providing evidence of continuing professional development for the mentor.

Conclusion

The importance of mentorship must be properly communicated and maintained throughout the organisation. Promotion and practice among organisational leadership is critical.

Events that provide opportunities to engage with potential mentors, older and younger, should be regularly planned and communicated effectively. It is through these activities that young professionals and all members of an organisation develop a sense of belonging and value that builds and sustains a cohesive and connected work culture.

4.3 Topic 3 – Exchanges and Rotations

“How can organisations support and encourage exchange or rotational assignments across agencies, industries, and organisations?”

Introduction

In an increasingly globalised world and due to the co-operative nature of space exploration, increasing the number of exchanges of people between organisations will have a large number of benefits to organisations and individuals alike. The exposure to other cultures and working practices are an important part in aiding collaboration between organisations, and will simultaneously promote personal growth of young professionals. This applies to both inter- and intra-organisation exchanges and rotational assignments.

Rotational Assignments

New starters and graduate entrants can more easily undertake rotational assignments within a single organisation due to their increased flexibility (e.g. less geographic/family ties) and as they are still in the process of establishing the direction of their careers. Rotations will also be of particular interest for people who work in broad areas like system engineering, which require a general understanding of different skills and job types. However there is worth in making such rotations available for mid-career professionals as well in order to facilitate career growth. Intra-organisation rotations can be organised by functional and/or geographic tracks.

One successful example in the aerospace sector is the “Progress” programme at EADS¹. Another programme of note is the NASA FIRST young professional leadership programme². Also other industry leading companies have similar tracks and alternative schemes (e.g. Google with 20% free research time) that could be used as models for further innovative schemes in the space sector.

Secondments in Other Organisations

The initiation of inter-organisation rotational tracks could be proposed among space stakeholders to enable more embedded teams (e.g. space agencies with an exchange of staff, industry to industry co-operation) and foster knowledge exchange and build long-term partnerships. There is also scope for short-term or part-time exchanges when both organisations are located nearby. Due to the likelihood that an inter-organisation exchange will have a complete geographic relocation, the employee participating in the exchange will need to be more flexible. This tends to be more feasible for people early in their career.

However such schemes have extra implementation challenges due to their cross-organisation nature (e.g. intellectual property) and so are less common. There is more opportunity for exchanges between agencies and academia in terms of funding but all types of exchange should continue to be developed.

Benefits and Justification for Exchanges

Rotational assignments help expand the training and development strategies available to support

¹ <http://www.airbus.com/work/early-careers/graduates/progress/>

² http://leadership.nasa.gov/nasa_first/home.htm

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organisations talent-management and workforce-planning initiatives. The primary benefits are to foster knowledge exchange and build long-term partnership among staff of different organisations. The secondary benefits are that it would facilitate attracting new talents and retain them by providing life-long learning and good opportunities for personal development.

Possible Professional Benefits for the Individual:

- Improving technical skills related to the assignment
- Learning new methodologies and tools, and learning about project organisation
- Understanding the working culture in different organisations or departments
- Training in diversified positions
- Establishing new relations across organisations and fields and growing his or her professional network
- Improving language skills

Possible Benefits for the Organisations:

- Training workforce and encouraging employees' growth
- Gaining insight on the needs and capabilities of other organisations and departments
- Fostering collaboration between different organisations and departments
- Improving communication between organisations or departments
- Offering attractive jobs to employees

Potential Drawbacks with Exchanges

There are drawbacks to implementing these programmes. For the individual, such an exchange may involve relocating away from friends and family for a period of time. Also, the individual's original job may no longer be available after their return, and even if it is, there may be issues with returning to it. To maximise benefits from the exchange, the skills and experience gained by the individual needs to be adequately leveraged in the home organisation upon return and this may not suit the opportunities available. This is compounded by the fact that a short-term slowdown of the individual's career is to be expected (as often performance during the exchange is not a formal part of the employer's annual assessment).

The participating organisations will also have issues including the risk that employees may decide to change jobs after returning and projects (on both sides) might suffer from employees leaving or participating for a relatively short time. There is also the need to finance the costs and administration of a rotational assignment. In order to minimise the drawbacks, such schemes need to be planned for the long term and implemented accordingly.

Conclusion

Rotational assignments need to be implemented in a long-term strategy, a model followed by a number of organisations in order to maximise the benefits in improving efficiency and the wider success of space mission collaborations. The creation of a truly international scheme can be facilitated by creating an exchange framework based on the lessons learned from established two-way exchanges (e.g. between ESA and DLR) and consolidating such schemes into a wider network with a common set of procedures.

Therefore all the existing exchange schemes should be assessed and a baseline set of procedures drawn up by a working group to propose next steps.

4.4 Topic 4 – Motivational Factors

“What are the motivating factors that drive young professionals to grow and develop in their space-related careers within their organisations and what can senior practitioners do to be sure they are nourishing the next generation workforce? What impact do awards, incentives, and other forms of appreciation have on the next generation workforce?”

Introduction

The allure and excitement of space exploration attracts motivated and dedicated individuals to the space industry. However, young professionals’ (YP) motivation to stay within the industry can fade when their employers only minimally provide some of the basic support and tools they need to enhance their careers. Most motivating factors are not costly, but do need some dedicated time and attention given to them.

Motivating Factors

The following areas were considered as the motivating factors that drive the YPs.

1. **The Space Industry Itself:** Space is interesting and exciting. There are various fields for research and development. This keeps the YPs motivated to work and engage in such a dynamic field. There are a lot of opportunities for YPs to provide strategic inputs to their respective organisations.
2. **Involvement in Grand Projects:** Involvement in Grand Projects encourages YPs to learn new things and add value to the organisation. It was noted that sometimes when a young professional starts working in a new place, they can end up working on menial tasks and a balance of work should be encouraged to avoid this.
3. **Recognition:** It is important for the organisations to make more visible what the young professionals are doing, via papers and internal media. Also to promote effective feedback to the YPs.
4. **Financial Security:** It is important for organisations to create sustainable packages for the YPs so that they can be motivated to grow within their respective organisations.
5. **Knowledge:** YPs are motivated by being a member of a good team of people within the project. Learning from knowledgeable people will help keep them motivated and eager to learn more.
6. **“Flexi-time”:** The balance between work and private life is very important. Excessive working hours per week are accepted in exceptional cases and during an important peak in a project, but are considered very demotivating when happening on a regular basis and if without compensation.

Senior Practitioner Contributions

The following were considered as important contributions senior practitioners can make to nourish the next generation workforce.

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1. **Mentorship:** As explained in detail in Topic 2, mentoring can have a very positive effect on YPs.
2. **Vision:** Employees at all levels need to be invested in the organisation's long-term vision and be able to have a role in facilitating it. The vision of an organisation should be brief and compelling, written in plain language that engages people emotionally, as well as intellectually.
3. **Culture of Involving YPs:** Involving young professionals in creating the organisation's vision and values not only brings a fresh view to the table, but also motivates the employee. By involving people from all levels and functions, it becomes easier to create a web of communications that carries energy and ideas deep into the organisation. When possible, senior practitioners are encouraged to invite YPs to meetings so they can make contributions to the planning of projects. Not only could this prove valuable in helping YPs feel their voices are heard, but also in generating the energy to help build a useful culture. YPs also need confidence to speak freely with colleagues in a team and project.
4. **International Collaboration / Exchanges:** As explained in detail in Topic 3, exchange programmes offer great opportunities for the YPs to learn in a different environments and cultures. Senior practitioners should encourage exchange programmes to support YPs in their respective organisations.
5. **Stay Motivated:** It is advisable that senior practitioners can also contribute by remaining motivated themselves which will help maintain everyone's motivation during the various challenges. Also by being open to different ideas and approaches to achieve the team goals.

Incentives

It is generally found that most YPs work in the space sector due to their passion and motivation for the industry and by being able to work on significant projects like manned spaceflight. However in addition other forms of incentive help to motivate and encourage the YPs to excel in their jobs and avoid burnout; from financial compensation, more vacation time, expenses for conferences and training, to payment for overtime.

These incentives vary between organisations and countries and this should be taken into account in any comparisons. For example in Korea, the main incentive is financial, as they have fewer holidays, and have to work many hours. Also one YP emphasised that sometimes you just need to work a lot of hours in a short period but there needs to be a limit on the durations. Some organisations pay overtime and/or have introduced flexi-time (such as ESA). It was noted that long periods of extra work need to be compensated for in some way in order to maintain the level of engagement by the YPs and other employees.

Conclusion

Inclusion in the important work of programmes and projects and the ability to grow within the organisation is a common denominator for the motivating factors described above. If addressed, proper motivation not only empowers YPs to perform their jobs, but to perform their jobs to the best of their abilities. The industry cannot afford to lose such a unique pool of young professionals.

4.5 Topic 5 – Technical and Managerial Tracks

“What role does creating a better understanding between the less technical, management-focused community and more technical, science-focused community play in young professional development?”

Introduction

Space is a challenging business. The potential for division between the more technical, science-focused community and less technical, management-focused community is high and is usually a result of a lack of understanding and mutual respect for one another’s roles. Creating opportunities to cultivate a better understanding between the technical and management communities plays an important role in a young professional’s career development. Through this understanding, a young professional has the capacity to see the whole picture of how an organisation operates. As a result, he or she will not only feel a part of the organisation, but also contribute to its mission in a more meaningful way.

The space and high-technology sectors are project driven and so the need for project management is critical. However within any organisation, there is a common-goal strategy and a goal-driven approach. Project management serves as an important link between people working on strategy at the management level and people working at the scientific and technical levels.

A project’s stakeholders are united around the project goal; however, the determination of which path to take in order to achieve that goal may not be as well understood by all the parties involved. Project management is focused on maximising a project’s quality within the limitations afforded by scope, schedule, and cost. These elements compete with one another, often shifting the project goal to develop the best feasible technical solution, rather than the best technical solution outright. It is an optimisation problem to find the best trade-off solution.

Facilitating Understanding across Communities

One observation is project managers do not successfully motivate or involve all communities involved in the project. Awareness and communication of the project goals are key motivating factors that drive young professionals to grow and develop throughout their careers.

A second observation is young professionals often do not have the opportunity to see both the technical and managerial sides of a project. Introductory training for young professionals in the field of project management is recommended. Similarly, from a more technical perspective, training on concurrent engineering and systems engineering processes is recommended.

A third observation is opportunities for knowledge transfer between the technical and managerial communities are also critical. Training through lessons learned and effective knowledge management techniques enable building a better understanding between for young professionals about these two communities.

Learning Opportunities

One workshop delegate expressed that she gained insight into the technical and managerial communities through her internships at various organisations. The opportunity to provide insight

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through rotational assignments and exchanges in other departments and institutions (e.g., international, government, industrial, academic, etc.) to gain hands-on or observational experience is critical and recommended.

Alternatively, if rotational assignments and exchanges are not feasible, the opportunity to observe and/or participate in high-level meetings, design reviews, or cross-agency discussions are other ways to educate young professionals about the interaction between the technical and managerial communities. "Having the experience or just to listen or ask questions in an important meeting helps us to understand the big picture," said a workshop delegate.

Lastly, online courses, networking opportunities, and forums offered through an organisation or others are another way to create understanding around the interface between the managerial and technical communities. Organisations should be open-minded about providing credit for external online resources that might not currently be recognised as part of the traditional organisational training or learning management system.

Conclusion

Creating a better understanding between the less technical, management-focused community and more technical, science-focused community plays a very important role in young professional development. This understanding can be achieved through opportunities for training in project management, systems engineering, and concurrent engineering; rotational assignments and exchanges for hands-on training; participation in and observation of high-level meetings, reviews, and meetings; and recognition of online learning opportunities.

5 Workshop Findings, Conclusions and Recommendations

In today's project world, there are many factors competing for time and attention from the leaders of space organisations. The demands of responding to budget constraints, technological advances, and increased international collaboration, have added to the complexity of meeting the professional development needs of the next generation poised to plan and execute the space programs of the future. Instituting change to meet the career needs of young professionals requires time and thought, both of which are precious and valuable.

With the support of the IPMC, the delegates wish to continue their discourse and put in the time and thought necessary to implement effective improvements. The conclusions and recommendations in this report are only the beginning of an ongoing effort to produce informed and productive actions to cultivate and nurture a knowledgeable and skilled generation of young professionals today and in the future.

At the close of the workshop, IPMC Co-Chair Bettina Boehm paraphrased ESA Director General Jean-Jacques Dordain speaking to a group of young professionals in the days before the IPMC YP Workshop: "You are the future, so don't let the organization change you. You need to change the organization."

With those words in mind, the delegates of the inaugural IPMC YP Workshop present these aggregated conclusions and recommendations in the hope that the organisations charged with preparing the next generation of space programme managers will consider implementing them in their ongoing work.

Training, Learning, and Networking Opportunities – The practice of continuous learning and reflection upon career development is encouraged through the ability to attend training courses and events and participate in forums and conferences. The opportunity to not only learn new skills and knowledge is paired with the opportunity to present and share one's work. Limitations on travel and conference budgets have heightened the barriers for young professionals to benefit from these activities.

Online training and education has dramatically increased in the past few years. Offering internal opportunities online or recognising/providing credit for external online training opportunities serve less-expensive alternatives.

Recommendations –

- Minimise and mitigate administrative barriers for young professionals to take advantage of learning opportunities. Make the information about career development and the processes to participate in such activities transparent and accessible online. Additionally, provide a point of contact for inquiries from young professionals.
- If budget and travel restrictions are tight, work to accommodate learning needs through alternative proposals. For example, instead of a fully-fledged international rotational assignment, perhaps participating in or shadowing a local project team with international aspects may serve as an appropriate analogue or alternative learning experience.
- Promote and encourage a culture that is accepting of sharing through group activities (e.g., lunch-time presentations or impromptu discussions). Young professionals should have the opportunity to seek out and learn from older generations.

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- Remain up to date on the types of training opportunities available through digital means and open to formally recognising them for organisational credit. Online courses and virtual forums are emerging as popular alternatives. Young professional employees should be encouraged to pursue them.

Exchanges and Rotations – The experience gained from working in an unfamiliar environment, field, or discipline provides a tremendous opportunity for a young professional's growth in skillset and knowledge base. While such programs offer tremendous benefits to the participants and the organization, often times these programmes are expensive and limited to a small group of applicants. Exchanges to other international or industry organizations are often complicated by international regulations and intellectual property concerns. Despite these challenges, exchange programmes and rotational assignments do exist and there is a call to increase the number of opportunities for young professionals to participate in existing programmes and promote the development of others. Often, young professionals are unaware of what opportunities already exist and/or where they might go to learn about what opportunities are already available to them.

When a fully-fledged exchange programme is not a feasible option, the opportunity to have a similar experience is still desired. Short-term shadowing opportunities and participation to observe meetings, reviews, or the work that occurs in other disciplines or projects within an organization are recommended.

Recommendations –

- Effectively communicate and/or advertise the exchange opportunities that already exist within your organization to the young professional community.
- Continue to support and promote existing exchange programmes and rotational assignments.
- Benchmark with other organizations and evolve current exchange frameworks based on lessons learned and best practices.
- Institute and encourage alternative options such as shadowing and observation schemes.

Mentorship Opportunities – Mentor-mentee relationships strengthen an organisation by enabling the transfer of individual and organisational knowledge, instilling the motivation to learn, and promoting and introducing of new and innovative ideas. The pronounced generational gap has enhanced organisational awareness about the importance of knowledge transfer to the next generation before it is too late. Formal mentoring programmes offer a starting place for organisations to instil and promote the practice in its workforce; however informal mentor-mentee relationships often prove to be the most rewarding.

Recommendations –

- Continue to promote formal mentorship programmes as a place to initiate and encourage the practice of mentorship. However, do not rely on them as a sole solution.
- Create and encourage opportunities (e.g., events, forums, shadowing, lunches, talks) for multi-generational interactions and networking so facilitate the development of an informal mentorship opportunity.
- Demonstrate and promote the practice of mentorship from the highest levels of the organization. Mentorship should be a culturally accepted practice throughout an organisation.

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Motivation and Incentives – The allure and excitement of space exploration attracts intelligent, motivated, innovative, and dedicated individuals to the industry. Space programme professionals are a unique population within the global skilled workforce. Unfortunately, this allure often wanes due to insufficient support (e.g., involvement in meaningful work, financial compensation), opportunities for growth (e.g., training, rotational assignments, exchanges, conference/workshop attendance), work-life balance (e.g., flexible time, telework), and recognition (e.g., opportunity to introduce innovative ideas, present papers, inclusion in meetings and events). While it is challenging to meet these needs when so many other factors are competing for attention, young professionals may look – reluctantly so – to other industries or organisations to obtain fulfilment of their careers if not provided with sufficient support and guidance.

Recommendations –

- Develop and/or improve on the effective feedback loop for young professionals to communicate their career needs and motivations to the appropriate organisational leadership or human capital advocate.
- Remain observant and receptive to publications, studies, reports, and articles pertaining to the next generation's needs (e.g., 2012 *Aviation Week* Young Professional Workforce Study).
- Benchmark with other organisations to learn about their best practices and how they might impact your organisations' work with the young professional workforce.

Concluding Thoughts

It is with these conclusions and recommendations the work of the inaugural IPMC YP Workshop comes to a close, but not to an end. The work started by this global gathering serves as a springboard to continue the discussions initiated here, refine the findings, and explore other ways of supporting the development of a robust young professional workforce in future workshops and forums. *Per aspera ad astra.*

6 List of Workshop Delegates

| Organisation | Participants |
|---|---|
| Astrium Ltd. | Nick Fishwick |
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| Korea Aerospace Research Institute (KARI) | Dong-Hyun Cho |
| National Aeronautics and Space Administration (NASA) | Nicole Herrmann (ADNET Systems, Inc.) Haley Stephenson (Valador, Inc.) |
| QinetiQ Space NV | Mattias Genbrugge |
| Snecma Space Engines (Safran) | Lauren Nguyen Duc |
| San Jose State University | Jessica Culler |
| SKY Perfect JSAT Corporation | Chiharu Kikkawa |
| SMART Solutions Srl | Andrea Esposito |
| SNU Aerospace Propulsion and Combustion Laboratory | Ji Hyun Park |
| Tauri Group | Paul Guthrie |
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