



The importance of people management for successful operations and outstanding performances

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During the last 7 years, the Belgian User Support and Operations Centre (B.USOC) – a Facility Responsible Centre for the European Space Agency (ESA) - has been operating different ESA payloads on the International Space Station with outstanding results. Some key factors of this success are the people in the team, and the strategy applied to balance life and work in such a demanding world as operations for human space flight. The stress and tensions between the different Operators that could generate a negative atmosphere was converted into a positive vibe of opportunities and advantages for everybody. The paper presents the applied human resource strategy which relies, on one hand, on the conversion of a working constraint into flexibility for the people depending on their needs, and on the other hand, on a team composed on purpose of heterogeneous profiles and with very different lifestyles.

I. Introduction

Member homogeneity is a recurrent subject in several research studies. Theoretical to field studies have been conducted in order to determine the advantages and disadvantages of homogeneity vs heterogeneity in a team, especially in terms of gender, age, education and personality. This paper presents the different challenges faced by the B.USOC Operations Team and the approach followed in order to naturally integrate all the heterogeneous profiles into one team. The consequences of this approach are elaborated together with the advantages and disadvantages.

The B.USOC was created in 1999, together with several other User Support and Operations Centres (USOCs) spread around Europe, as part of decentralized concept adopted by ESA to operate European payloads onboard the International Space Station (ISS). The mission of the USOC network is to provide operational services for scientific institutions and space agencies.

In 2008, the SOLAR payload, assigned to the B.USOC, was deployed together with the European module, Columbus, in the International Space Station. From that moment onwards the Operations Team has been providing 24/7 support. The nature and operations concept of the different payloads deployed in the ISS under the B.USOC responsibility required a variety of staffing schemes, from 24/7 on console during long periods, to 16/7 during 10 consecutive days or even 8/5. These different schemes are possible thanks to the constant flexibility provided by the team.

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Having a heterogeneous team, with people of different age, different educational background, and different personal situations, can be experienced as a weakness in order to build a soldered team; however, it became one of the greatest strengths of the B.USOC team. The strategy for dealing with the shift work, has also been extended in a more general way. Different profiles have different needs, and coping with those needs is crucial to increase the loyalty and the devotion of the team members to the project. Team members can evolve and develop according to their interests and capabilities. Ideas and creativity are encouraged, and the difference in personalities, experience, and interests make the team members complementary to each other and allows the B.USOC to compete in an ever challenging environment.

The paper will focus on the two main challenges of the B.USOC Operations Team: the shift assignments, and the distribution of tasks and responsibilities . The initial approach will be elaborated, and the final concept explained together with some identified advantages and disadvantages of the proposed solution.

II. Challenges of an Operations Team

The Operations team handles two distinguished types of work: the off-line and the real-time work. Off-line, the team prepares the payload operations, develops and validates the operational products, plans the on-board activities and support anomalies resolutions. In real-time, the Operator is on console conducting a shift of 8½hours, to control and monitor the payload and executes the payload operations following science requirements. During flight operations, the ratio between off-line and real-time work is quite variable, it mainly depends on the real-time support required by the payload, in which phase of the payload life cycle one is and whether or not there are parallel payload preparation or execution activities. The time spent on console rarely goes above 70% of the Operator working time.

A. Shift scheduling

One of the most difficult challenges faced by the B.USOC Operations Team is the balance of the shift distribution within the team, especially during holiday periods or weekends, and following the applicable laws. The science objectives sometimes require full console support continuously for long periods, and these periods are independent from public holidays or weekends. Moreover the actual timing of payload operations is dependent of many external factors, such as crew daytime, visiting vehicles, or other external constraints, which are not in the control of the USOC and sometimes not that predictable.

B. Tasks and responsibility distribution

The operational preparation of a mission is progressive. The involvement of the Operations Team starts ideally at the early phase of the payload development. The following tasks will be undertaken to reach finally readiness for flight operations:

- Revision of engineering documentation
- Preparation of operations execution, from development of the operations concept until the validation of the operations products.
- Coordination with the different stakeholders
- Engineering troubleshooting analysis and execution
- Planning of the activities on-board

III. Shift handling

A. Initial Approach

During the first months of real time activities, the shift compensation schemes were defined. Due to the nature of the operations, and the limited resources in the number of Operators, the selected approach was to split equally the efforts, meaning equally sharing the number of shifts on a monthly basis.

The initial 24/7 support was based on 3 shifts of 8½hours with an overlap of 30 min for handover activities. This concept of equal shift distribution was quickly proven wrong from the first months, creating considerable tensions between the team members and resulted in demotivated employees. Therefore, efforts to reduce the amount of on-

site shifts were started¹. In parallel, additional people were recruited to join the team. The new recruits showed more flexibility regarding the shift work, so instead of maintaining the balance in the amount of shift assignments, the weight for the non-standard working hours was moved to the newcomers. This change released the senior team members and was welcomed by the newcomers.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Night	A	A	C	C	B	B	D
Morning	B	B	D	D	A	A	C
Afternoon	C	C	B	B	D	D	A
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Night	D	A	A	C	C	B	B
Morning	C	B	B	D	D	A	A
Afternoon	A	C	C	B	B	D	D

Figure 1. Possible 2-week shift schedule filled by four operators (A,B,C,D), each covering 2 morning, 2 afternoons, 2 nights and 2 rests

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Night	A	A	A	A	F	F	F
Morning	B	D	D	E	E	C	C
Afternoon	C	C	C	C	D	E	E
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Night	F	F	B	B	B	B	B
Morning	G	H	H	I	I	G	H
Afternoon	C	J	J	J	J	K	K

Figure 2. Real shift schedule based on preferences and longer night shift rows (B-USOC, April 2014)

There is a lot of documentation regarding the different possible shift schedules in an operational environment. Some sequences were tested (2 mornings followed by 2 afternoons and by 2 nights) as shown in Figure 1. This fixed option did not fit from the beginning with the team needs and the science requirements, and therefore alternatives were required. In case a homogeneous team willing to perform 24/7 shifts would have been selected from the beginning, the problems could have been reduced. However, this 24/7 support requirement was unknown at the start of the mission. With such difficult situation, new profiles were required in order to convert this situation into an opportunity, and generate from a heterogeneous team, a successful one.

B. Updated concept

As explained previously, six months after the start of the SOLAR mission, new team members were recruited. The coming of the new members initiated a revision of the shift scheme and the associated compensation tailored to the specific profiles of the team and their preferences:

1. Economic compensation

Reduction of the number Operators involved on tough shifts (as per personal preferences). The economic compensation of having a couple of nights or weekends shifts is not relevant compared to a nominal salary; however, having 6-10 shifts per month is a considerable budget. A win-win situation is reached: the ones that prefer night shifts are compensated economically from it, and the ones that prefer to avoid them are not losing purchasing power from the previous schedule pattern.

2. Time compensation

No extra time compensation policy is applied at the B.USOC as the standard monthly hours are respected. The disposition of these hours has some flexibility, which converts what could be a sacrifice, into a reward. Other teams apply the 1 shift for 2 days off, or they use strict rules in terms of when to recuperate the extra hours.

The perception from the B.USOC team members is that working on a weekend could be rewarded with a recuperation day of choice. However, this approach is not fitting with all the profiles. For example, an employee with children might find it easier to have a schedule closer to the school rhythm rather than flexible during the week.

3. Hard shift distribution.

The transition from nominal working hours to night shifts, requires a lot of effort, and therefore having only 3 night shifts on a row is not straight forward. From this experience, persons volunteering to support the night shifts requested sequences of 5-6 shifts in a row as bio-rhythms adapted more easily this way. In addition to this, the update of the SOLAR operations concept resulted in a reduction of the amount of required night shifts to an average of 11 per months. This released the team and resulted in an overall motivation increase. The few that wanted night shifts had them with the sequence more suitable to their needs, and the ones that preferred daytime were only required to do night at exceptional occasions.

4. Continuous revision of the concept.

One of the most important problems to solve during shift planning is uncertainty. For that reason B.USOC developed a tool and a set of processes that allowed each Operator to provide his/her month availability, provide feedback to his/her monthly shifts assignments and leave the flexibility to request late-minute swaps if possible. On top of that, a regular meeting is scheduled to evaluate the current preferences. The team leader assigns the shifts monthly based on those two sources of information, and is nominally able to respect all requests and preferences. This generates a feeling that somehow each person is leading their own schedule.

IV. Task and responsibility assignment

A. Initial Approach

As stated above, the initial team of Operators at B.USOC was composed of 3 certified Operators and 3 trainee Operators who were allowed to cover console during no-commanding shifts and under the responsibility of a certified Operator on call. It quickly appeared that a full time console presence with only 6 Operators did not leave time for the proper off-line support such as operations planning, operation products update, and contact with scientists or reporting to ESA. Due to this, off-line tasks and responsibilities were distributed following availabilities and not following profiles. The revision of the SOLAR operations concept¹ and the recruitment of new team members allowed a change in this approach.

B. Distribution of the duties based on natural motivation of the Operators

A wide range of activities is performed by the B.USOC Operators. These activities require different skills and motivations. For that reason, during the recruitment process, candidates were carefully selected to fit on the different fields of expertise. In addition to that, each profile had his/hers field of interest which and, in most of the cases, are not overlapping with others. For that reason, each team member is encouraged to go pursue their motivational path, and to share this expertise with the rest of the team. A motivated person is not only able to acquire a deep understanding of the subject, but also capable of sharing it with the rest of the team.

1. Engineering background, analyst profiles.

One of the engineers/science profiles characteristic could be their curiosity and their need for understanding. On the operations environment many subjects are suitable for that curiosity. From the ground segment, the mechanical or electronic design of a specific payload, to the software design, many are the items were an engineer can leave his/hers fingerprint. For each of the fields covered by and related to the B.USOC payloads operations, the B.USOC has an expert.

2. Product preparation, methodic profiles.

Some of the daily task of the B.USOC team is the preparation of the different operational products. These products in some cases are defined as rules for operations and, for that reason, wording is key for mission success. What is considered as a tough work for some of the team members is a sign of quality and excellence for others and is therefore extremely motivating. The preparation of those products is making use of this situation, and while some profiles provide some general definition of the operational products, others analyze deeper each word, and adapt it to what if scenarios that were in principle not identified in advance.

3. Coordination and management, leader profiles.

Another relevant aspect of the operations world is the coordination of the different aspects of the payloads. Efficiency and good practices are among the main objectives of the B.USOC. For that reason Process Management and Lean Management have been introduced in the team. Some of the team members have experience on coordination and enjoy this kind of work. Consequently, they naturally evolve into coordinators, and receive further tasks in that field as their expertise grows.

C. Distribution of some management duties by Increment

Most of the B.USOC team members are continuously looking for new challenges. In order to satisfy these needs, some of the management tasks are distributed periodically. These tasks are not only good for the entitled team member, but also for the processes improvement, as each profile is bringing fresh ideas and energy. The Increment Coordinator is a single person, assigned for one specific increment, and leading the B.USOC operations preparation, execution and close-out activities related to the given increment. The Increment Coordinator has a deputy, as a back-up when he/she is not available.

V. The resulting concept

A. Recruitment approach after the first months

Recruiting a profile able to cope with all these requirements is not an easy task. That is the reason why, since the beginning, the selection process was focused on the following aspects:

- High educational background (University preferred) required for the Operator, “smart” Operator able to take the responsibility in the operations preparation periods, and especially, when supporting the execution on console.
- Ability to understand instruments design and scientific objectives
- Ability to handle stressful situations, handling of several issues, prioritization of problems, all in real-time and on their own.
- Willing to work on shift and with irregular working hours.

These characteristics were considered as mandatory for the selection process. However, the main strength of the team relies on the quality of work during the preparation phase, and the offline coordination and analysis.

B. Disadvantages

The proposed and used concept at the B.USOC has some weakness, described below:

- The implementation of this concept is not easy on the long run, as it is based on the needs of the team members which could, and usually do, change with time. Especially, it is the nature of the selected profiles to be ambitious and to have a natural need for challenges. In the long run, experienced Operators might not find the required challenges in their assignments, even when getting a new payload or responsibility.
- An overlap of the different tasks can generate some tensions between the team members. Boundaries should be pre-established and the interfaces between the different tasks should be prepared in advance. In that sense a good practice is to set deadlines.

- Deep knowledge is not equally spread over the team. What is considered a key factor of this concept, can also be interpreted as a weakness, as each Operator has his or her field of expertise. Knowledge transfer is one of the duties of each Operator and periodic trainings are given. On the other hand, the selected profiles are such that each team member has a natural level of curiosity and sense of responsibility so that they require to get a minimum level of knowledge to provide the necessary support. Moreover the set-up of the team is as such that, ideally, each has a backup.
- Flexibility is especially required during some critical phases. The nature of the USOC environment is such that the console workload is not constant and has some difficult peaks. Normally the team copes with this by providing extensive flexibility. Obviously this flexibility is not endless, and care should be taken to not exhaust team members. The flexibility of a persons is often dependent on their personal life and personal approach to work. Changing rhythms and schedules can be easy at a certain age, but this might change with time.
- Another thing that could be considered a disadvantage is that the team members can hardly get bonds outside the working environment. The different ages, family situations, motivations, are normally barriers to that. In that respect, team proudness does not have to be affected by this.
- ISS Operations is an extremely dynamic environment and it is very hard to predict the upcoming workload. The B.USOC Operations Team is following the schedule of the payload development and the ISS Increment requirements. From a full 24/7 support of more than 6 months, hence requiring a team of 10 Operators to a 12 month period with no shifts is perfectly possible. This is very difficult to handle and keeping the motivation is sometimes very challenging.

C. Advantages

- Reduced turnover. The B.USOC team has been growing over the past years, and the turnover was extremely reduced considering the challenging and demanding environment. The core team was maintained from the start of the mission and was able to successfully face critical and extremely demanding periods.
- Increase of quality and performances. Having heterogeneous profiles in the team allowed B.USOC to cover all the different aspects of the off-line work as each one evolved on their respective field naturally. On the other hand, being heterogeneous on the personal side also allowed extreme flexibility and adaptability during the critical missions or periods when high shift workloads were required.
- Increased motivation. Each team member knows that in case of need somebody from the team will take over their shift, and respect the preferences from the others. Having profiles covering all the different subjects of the off-line work increases also the motivation, as each one is growing on the field of expertise that they enjoy the most.
- Optimization of the resources, make use of the best people on the best spot.
- Reduced compensation scheme. The initial compensation scheme, both on the economic and on the time scale was unchanged during the last years, and was only adapted to avoid big impacts on the team.
- The B.USOC has managed to keep a high standard on qualitative work. Thanks to the heterogeneous nature of the team, new insights and approaches are continuously brought forward challenging existing concepts and way of workings and contributing to continuous improvement.

VI. Conclusion

The B.USOC Operations Team has been able to conduct successful preparation, implementation and execution of all the assigned payloads, offering a 24/7 support 365 days a year and with limited/no impact to science during the most critical periods as summer or Christmas. This flexibility is very appreciated by all the different counterparts and extremely necessary for the mission success and the science outcome. Thanks to the people management approach followed at the B.USOC, the work satisfaction within the team has been increased, and the continuous challenges have been successfully finalized. Flexibility for the Operators to select their shifts based on their preferences, and flexibility in terms of work domain selection were key factors for such success. Heterogeneous profiles were used as resources to improve team bonds while the different profiles acquired deeper knowledge of all the available subjects. This enlarged know-how was naturally integrated within the team members allowing the team to succeed on all the different challenges received during the last years.

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VIII. References

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