

Johnson Space Center/DO46 Mission Planning Operations Group

Tracking the Short Term Planning (STP) Development Process

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International Space Station (ISS) Missions Operations console training. Exposure to the mission operations will be in the area of flight planning and the pointing console. The planning support included exposure to long range planning in the International Execute Planning Center (IEPC) and real time planning on the ISS Operations Planner Team (OPS Plan). The pointing console is about identifying the correct attitude that will function properly towards a particular target and developing the correct orientations for a vehicle to be aligned with that assigned target.

ISS Projects include focusing on 1) Short Term Plan (STP) Process improvement, and 2) Execute Planning Control Panel (ExPCP) information management. The STP Process improvement involves tracking the STP development in the IEPC. The ExPCP information management involves updating the ExPCP Sharepoint webpage with previous ExPCP meeting information so that the old (non-Sharepoint) site can be retired permanently.

The Advance Planning Project supports the Advance Planning Group Lead in preparing for future work after Shuttle retirement. This project involves developing products which recommends reorganization in a certain branch, permitting an associated transition plan, and scheduling which takes into account with the budget planning. These products are designed to assist the management team in strategizing the branch's future organization.

Nomenclature

ISS = International Space Station

IEPC = International Execute Planning Center

Ops Plan = Operations Planner Team

STP = Short Term Plan

ExPCP = Execute Planning Control Panel

STS = Shuttle Transportation System

CxP = Constellation Program

DAP = Digital Auto Pilot

GNC = Guidance, Navigation & Control

GPC = General Purpose Computer

LOS = Line of Sight

AOS = Acquisition of Signal

I. Introduction

Part of the National Aeronautics and Space Administration's mission is to pioneer the future in space exploration, scientific discovery and aeronautics research is enhanced by discovering new scientific tools to improve life on earth. Sequentially, to successfully explore the unknown, there has to be a planning process that organizes certain events in the right priority. Therefore, the planning support team has to continually improve their processes so the ISS Mission Operations can operate smoothly and effectively. The planning support team consists of people in the Long Range Planning area that develop timelines that includes International Partner's Preliminary STP inputs all the way through to publishing of the Final STP. Planning is a crucial part of the NASA community when it comes to planning the astronaut's daily schedule in great detail.

The STP Process is in need of improvement, because of the various tasks that are required to be broken down in order to get the overall objective of developing a Final STP done correctly.

Since there are numerous processes to a long week schedule, someone is bound to make a mistake. When mistakes are made, deadlines can be missed and affect other organizations. Consequently, a strategy has to be developed in order to efficiently and effectively complete the various tasks to avoid missing any deadlines.

The Pointing Console is known for pointing the ISS in the right direction in order to see the wonderful pictures of the moon, the stars, and other targets in space that are seen by the public today. Finding the accurate flight trajectory and body attitude for a particular part on a space craft is the main concept of pointing.

Then a new project came along in order to store various data in a more efficient database. “The SharePoint site is a Web site that provides a central storage and collaboration space for documents, information, and ideas. This website is used as a tool for collaborating with your fellow co-workers, just like a telephone is a tool for communication, or a meeting is a tool for decision making. Communication is the key towards a work team that needs to complete a specific task before a deadline approaches. This site allows groups of people (whether work teams or social groups) to share information and work together. For example, a SharePoint site can help you:

- Coordinate projects, calendars, and schedules.
- Discuss ideas and review documents or proposals.
- Share information and keep in touch with other people.

SharePoint sites are dynamic and interactive -- members of the site can contribute their own ideas and content as well as comment on or contribute to other people (Ref 1).”

After completing the updated webpage, the Advance Planning Project was next on the list. Now, there is a transition from currently supporting three programs (ISS, STS, CxP*) to supporting one program (ISS) in the Advance Planning Project. Plus, an unknown number of future programs are proposed in the President’s Fiscal Year 2011 budget for NASA. Therefore, the Advance Planning Group Lead is leading the management team in brainstorming different strategies to make managing this transition easier for the team.

II. Goals and Purpose of the Project

At the Johnson Space Center the Short Term Planners have to gather all the International Partner inputs for the payloads and systems and use a data configuration to input all the data into one detailed schedule. The goal of this is to determine how much time it is actually taking to develop the Preliminary and Final STP’s from delivery of International Partners (IP) inputs to generation of the final version of the STP. This information could help us shape a different manning schedule or process changes. Before changes can be enforced, my mentor constructed a STP Metric Spreadsheet (shown in **Figure 1** below) in order to collect data on the current process and eventually find a better process that will help the Short Term Planners meet the required deadlines to deliver the Preliminary and Final STP.

Week #XX			
		Mon	
Prelim STP		Time of inputs received for Payloads & Systems	
		Time (POIC)	
		Time (ESA)	
		Time (JAXA)	
		Time (MCC-M)	
	Comments	(1)If inputs from ESA, JAXA and MCC-M were delivered after 10 am, what was the reason they were late? (2)If inputs from POIC were delivered after 14:00, what was the reason they were late?	

		Time of Prelim STP delivery to IP's	
		Time (MCC-H)	
		If Prelim STP was delivered after 1900 CT (7 pm), what was the reason it was late?	
Final STP			
		# of comments submitted after 11 am / # of total comments	
		Time updated Final STP posted to OSTP	
		Time of Final STP verification with FCT	
		Time of MCC-H delivery	
	Comments	(1) If the majority of the comments after 11 am were related to a specific operation or activity, list what that was including discipline owner? (2) If there was a significant delay (>2 hrs) from Final STP posting to OSTP and the verification with the FCT, explain why. Otherwise, Major objective of the day?	
		If final review was after 1700 CT (5 pm), what was the reason it was delayed?	
	Questions	Answers (Time)	
		Prelim	Final
	STP planning prep and instruction from STP Leads	Time (HH:MM)	Time (HH:MM)
	material gathering\research	Time (HH:MM)	Time (HH:MM)
	tool initialization\preparation	Time (HH:MM)	Time (HH:MM)
	delays due to procedural requirements (including other planning or non-planning meetings to make decisions on plan content, paperwork processing)	Time (HH:MM)	Time (HH:MM)
	tool unavailability	Time (HH:MM)	Time (HH:MM)
	actual time spent on STP development in CPS\OSTPV	Time (HH:MM)	Time (HH:MM)
	work directly with system or payload specialists due to further clarification required	Time (HH:MM)	Time (HH:MM)

delay in job\information handover	Time (HH:MM)	Time (HH:MM)
keeping the work area neat and clean	Time (HH:MM)	Time (HH:MM)
personal breaks	Time (HH:MM)	Time (HH:MM)
time spent on work other than STP development	Time (HH:MM)	Time (HH:MM)

Figure 1: STP Metric Spreadsheet. *This spreadsheet was created as a friendly visual with related questions concerning the time frame of each delivery and the reason why a delivery did not meet the deadline at a reasonable time.*

The role of pointing is to identify the Pointing Officer in Shuttle missions and Station operations.

The Pointers get an assignment and are required to figure out the best attitude by using the Digital Auto Pilot (DAP) Table. This table includes Guidance, Navigation & Control (GNC) parameters into the General Purpose Computer (GPC) so the Pointers can start at a specific factor to determine an accurate attitude. When analyzing the different parameters on the table the Pointers have to check if you can see the target during that time. These targets can be blocked by various parts on the space craft, the earth, and the sun. When developing the Acquisition of Signal (AOS) to see each assigned target, blockage is the main priority.

When on the Pointing Console, the Daily Forecast is used to find what is actually blocking the target. The Digital Auto Pilot (DAP) Table is submitted into a configuration that creates the Daily Forecast into a long timeline that is manually fixed. You need the best satellite that shows the majority of Acquisition of Signal (AOS) before it hits the Loss of Signal (LOS). Once the Daily Forecast is completed the data is submitted to the Lead Officers working with Pointing.

The ExPCP Sharepoint webpage is filled with historical information that is required by the government that all information should be kept in order to prevent any mistakes from happening again. Even though the information is historical, it does not mean that the webpage language has

to be ancient. Since this delicate information needs to be stored for a long period of time, the language of the webpage should be updated. The HTML (HyperText Markup Language) has been around for almost two decades and it is time to place these files in somewhere that will not create any trouble for the user. The goal of this is to accomplish some website transition work that is needed.

The Active Server Page Framework (aspx) that is used for the Microsoft language has only been out for several years now, so it would be best to update to a better webpage language that will organize any information properly. When using the aspx Microsoft language, the webpage should be user friendly when sharing various files amongst your co-workers. Now that the ExPCP Sharepoint webpage has been updated, transferring all the data to the new version is the next step.

For the Advance Planning Project, it is about planning for the unexpected. Since life is full of surprises you always need a Plan B. Now that the President's Fiscal Year of 2011 budget for NASA has been proposed, there are some programs that will be downsized. In order to develop a strategy towards the President's Fiscal Year, there has to be an Advance Planning Group that can deliberate on creative ideas that will make this transition as simple as possible.

III. Impact of the MUST Internship on My Career Goals

As I double major in Electrical and Computer Engineering, I have discovered that engineering is not all technical; it is also about managing your career with everyday life. This MUST Internship helped me realize that there are two sides to any and every career. Planning is an essential component when striving for a successful career. Since planning was the main topic of my project, I have learned that there is much more involved in planning. When creating a schedule

it's not all about arranging your tasks in a certain order; it takes time and you need engineering skills in order to process an accurate schedule that best fits the user. Therefore, a Short Term Planner does not necessarily mean you have to be an Engineer. Everyone is an Engineer in their own way, because engineering is about planning, designing, and inventing.

My experience at the Johnson Space Center has opened my eyes to how the real world functions in the work force. The transition from handling a school schedule to a work schedule was a challenge. My school schedule is scheduled to fit my needs as far as breaks between each class. While the work force only allows twenty minute breaks through out an eight hour work day. When there are little breaks and long work hours, you really have to enjoy your career. Passion is the key to a successful career.

As I worked on console with Pointing, I realized that there are numerous steps that are involved for NASA in general; from the major task like launching a shuttle or a space station to scheduling the right amount of sleep time for each crew member in space. The task that seems so small is actually crucial if not included. Therefore, you always have to work from the bottom to the top to get the precise solutions.

While working on my project I had plenty of guidance from my mentors. Whenever I needed help they were happy to lend a hand and setting one-on-one meetings was the only opportunity before they were on the run again. The most challenging task was finding my building, then finding my room because the Johnson Space Center buildings are like endless mazes. There are numerous directions to go to find one specific area.

The NASA family was so angelic, making my experience both educational and pleasant. I have learned that communication is the key, especially when dealing with a planning project. Even when I am not certain of my questions, I should still ask in order to be clearer about my task. Sometimes you have to be selfish in order to gain the knowledge that you need, because you might have one chance to get all the information you need before that opportunity is no longer available.

IV. Acknowledgments

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V. References

- ¹ National Aeronautics and Space Administration, Johnson Space Center. (2008, April 23). ExPCP. Retrieved from <https://modspops.jsc.nasa.gov/mod/DO/DO4/ISS/ExPCP/default.aspx>