Decision Making Training in the Mission Operations Directorate

Improving Space Operations Workshop
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Overview

- Space Flight Resource Management (SFRM)
- Training for Problem Solving/ Decision Making
- Training for Risk Assessment
- Moonbase Table-Top ‘simulations’
- Team Problem Solving
- Training Challenges
Space Flight Resource Management (SFRM)

- A set of inter-related team skills designed to break the error chain
- Allows the individual to be an effective member of the team
- SFRM, if used during ‘slow’ periods, may prevent needing SFRM during time-critical periods
- Time affects how you use SFRM
Space Flight Resource Management (SFRM)

- SFRM Skills
- Moonbase_1.1
- Situation Awareness
- STAR
- Active Listening
- Moonbase_1.2
+ Culture and Safety lessons
Space Flight Resource Management (SFRM)

- Problem Solving for Operators
- Risk Assessment
- Personal Plan
- Moonbase_Adapting Priorities
- Moonbase_Problem Solving
+ SFRM embedded in technical lessons (?)
Space Flight Resource Management (SFRM)

- SFRM embedded in simulation scripts; debriefed at end
- Part task training teaches individual skills, introduces team skills
- Full task training teaches team skills in full team, full mission context
Space Flight Resource Management (SFRM)

- Team Problem Solving lesson in Specialist flow
- SFRM embedded in simulation scripts; debriefed at end
- Full task training teaches team skills in full team, full mission context

Boot Camp (the first 8 weeks)

Discipline-specific training (6-9 months)

Part task and full task simulations (6-9 months)

Specialist training
Training for Problem Solving/ Decision Making

**SFRM Skills: Decision Making**
- The cognitive process leading to selecting a course of action, including an assessment of options and risks.

**STAR (Stop-Think-Act-Review)**
- Generic PS/DM model
- Situation Assessment
  - How is it different/same?
  - What are the critical circumstances?
  - How is the assessment validated?
- Course of Action Selection
  - Evaluating options against critical circumstances
  - Traded against benefits, costs and risks
Training for Problem Solving/Decision Making

Problem Solving for Operators

- Mission Control Center specific PS/DM model
  - Modeled after how experienced flight controllers solved problems
- Provides them with ‘17 Questions’ for them to answer
  - 9 questions for Situation Assessment
  - 8 questions for Course of Action Selection
9 Questions for Situation Assessment

**Failure**
1. Can you **recognize** and (dis)confirm the failure?

**Impact**
2. Any immediate **crew** actions required for safety?
3. What **functionality**/ capability has been affected?
4. What are the **immediate** impacts?
5. What are the **near-future** impacts?
6. What are the **Times**-to-Effect?
7. What are the **critical** circumstances?
8. How have you **checked** your assessment?
9. What is your immediate **goal**?
8 Questions for CoA Selection

Workarounds
1. Is there an **existing** course of action?
2. What are the **options**?
3. What are the **risks** of each option?
4. What are the Benefit/ Cost/ Risk **trades**?
5. What is your **contingency** plan?
6. What is your **Plan** of Action?
7. How have you **checked** your plan?
8. What is your **next** goal?
Training for Risk Assessment

• Mentioned in all SFRM lessons
• Demonstrated, practiced and received feedback during Moonbase Table Top simulations

• Risk Assessment lesson
  – Operational risk; not project/program risk
  – Risk that something may deviate from expectations
  – Evaluated at current state, end state and during workaround
  – Evaluated at technical/human/process/environmental levels
  – Traded as part of benefit/cost/risk trades
Moonbase Table Top Simulations

• “Paper simulation”
  – Planning session stressing SFRM
  – Training run
  – Debrief stressing SFRM
• Players must work together
• Risk is introduced by their actions
  – Players know that their actions may constitute a benefit, a cost, or a future risk
• Changes to the ‘rules’ occur randomly
  – Forces the players to re-evaluate/ re-do their plan
Team Problem Solving for Specialists

- Specialists solve problems, make decisions and manage risk in a multi-team structure
  - They are simultaneously a leader, follower and co-worker
  - Their situation assessment (including risk) is fed up, down and sideways to build the team’s situation assessment
  - The team’s situation assessment provides context and direction for the specialist
  - Same is true for CoA selection/planning
  - Team’s situation assessment and planning is constantly re-evaluated/re-cycled as circumstances change
Training Challenges

- SFRM has a cultural aspect that needs to be trained
- SFRM classes just generate the model and terminology
- SFRM is learned in context during technical lessons and simulations
- **Good** feedback is essential
- Everyone values SFRM training until …
- SFRM training must constantly change
Training Challenges

• Requires commitment from top down
• You need a champion
• It is harder to do than technical training
• It is especially hard if your instructors and ‘operators’ work in different organizations
• Needs to be ‘designed in’ and not ‘added on’
• Just because your ‘experts’ can do good SFRM doesn’t mean they can teach it
Summary

• MOD’s SFRM/ PS/ DM/ RA training program:
  – Classroom lessons to introduce the model and terminology
  – Part & full task simulations in increasing context to allow them to practice and receive feedback
  – The ‘final’ model must train how experts solve problems in real life
    • 17 Questions helps them ask the right questions
    • SFRM allows them to develop the answers as a team