NASA /NWS Spaceflight Meteorology Group Training – A Foundation for the NWS Decision Support Program

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Overview

- **NWS Training Philosophy**
  - Incident Meteorologists (IMETs)
  - Spaceflight Meteorology Group (SMG)
  - EOC Ops/Training

- **NASA Training Culture**
  - SMG Experience
  - Simulation from 30K feet
  - True Collaboration Plans

- **Emerging Decision Support Services**
  - Present status and Future Plans
  - Focused shift in training methods
Weather Forecast Office (WFO) Support

Info ➔ Forecaster ➔ Product

History of NWS Operational Support
Incident Meteorologists (IMETs)

History of NWS Operational Support
Spaceflight Meteorology Group (SMG)

History of NWS Operational Support
Spaceflight Meteorology Group (SMG)

- Created 1962 - SMG provides weather guidance to NASA Human Spaceflight Operations (orig. PMWSG)

- Weather support (details) change as program changes and decision thresholds are modified.

- Supported Mercury, Gemini, Apollo, Skylab, Shuttle Ops, and ISS.

- Member of Flight Control Team – (Ops/Training)
  (NASA sometimes forgets we are NWS…NWS sometimes thinks we are NASA)

- Future – Constellation (Orion and Ares)
Launch is **Optional**; Landing is **Mandatory**!

**Decision Support & SMG**

- An incident is not the place for introductions
- Decisions are based on trust and information
- Joint/collaborative training
- Common experiences/events help solidify trust
Decision Support & SMG

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Launch is **Optional**;
Landing is **Mandatory**!
NWS has increased decision support services for core partners with a similar mission (public safety).
Primary Missions - NASA

**Shuttle**
- Plan, Train, Fly, Next Mission
- Pre Flight/Post Landing
- Lessons learned
- Mission Focus during flight

**International Space Station**
- Plan, Train, Fly with continuous ops
- ISS is a 24/7/365 operation
- Training integrated with operations
NASA Training, Philosophy & Culture

“clear and concise communication is critical to our mission”

- Flight Control Team members – enter SIM with baseline in discipline knowledge.
- SIM world provides chance to work with team, and apply lessons learned (experience)
- Facilitate communications (styles, prefs, and SA)

Knowledge, Communication, and Application

Motto - Plan, Train, Fly
SMG conducts both an NWS training program and a certification program to meet NASA requirements for mission support.

Core Competencies: NOAA / NWS
- Meteorology
- Forecasting
- NWS systems
- Communicating with public

Core Competencies: NASA
- Decision support
- Teamwork
- Technical communications
- Unique systems and data
Training Nuts and Bolts
Certification Process

ISS FD
- ISS FD Training
- Cert SIM
- On Console
- Hot Seat w/mentor
- Full Certification

SMG Lead
- Duty Forecaster/On-Orbit Cert SIM & Mission Training
- TAL Flow
  - TAL Training & SIMS
  - TCDT SIM, with Mentor
  - TAL Certification
  - TAL Console / Hot Seat, with Mentor
- Lead Flow
  - Asst LF on Entry (previous flight)
  - Lead Training & SIMS
  - Final DOP as LF, with Mentor
  - Final TCDT as LF, with Mentor
  - CONUS Certification
  - LF Console / Hot Seat, with Mentor
- Full Certification
Simulation and Mentoring Process

Simulation Plan: Determine objectives, internal or external participation, and identify participants

Pre-simulation mentor meeting
Establish mentoring level and personal objectives

Conduct simulation

Team debrief: (Post-Mortem)
Team performance: Flight Director feedback

Post-simulation mentor meeting / Individual debrief
Review performance and establish next training steps
Debriefings / Feedback

Feedback cycle is critical to the success of any simulation or live operation.

Replay:

*What happened? What went well?*

Reconstruct:

*What could we have done differently?*

Reflect:

*Assess performance and decision making*

*Lessons learned*

Redirect:

*How does this relate to past events?*

*How do we apply this to future events?*

*Action Items*
Decision Support Services

NWS focusing on supporting public safety/first responder mission

Philosophy before DSS

- Scientific experts
- Data to users w/o interpretation
- “Datacentric”
- Gatekeepers of information
- Accuracy/verification
- 9-10-01 thinking
- Training focus
  - Technical/Scientific skill
Decision Support Services

NWS focusing on supporting public safety/first responder mission

Post DSS Culture

- Scientific experts
- Interpretive service with Data
- “Teamcentric”
- Integrated with EOP/EOC
- Timeliness and accurate
- Training focus
  - Technical/Scientific skill
  - Communication
  - SA, reverse role, integrate
Landing Weather Statistics
as of Dec 09  (STS-1 to STS-129)

- SMG has supported 128 missions (127 landings)
- 72 KSC landings, 54 EDW, 1 NOR (15 night landings)
- 63% of all missions impacted by observed/forecasted weather at landing
  - 56 (44%) landing weather changed duration of flight
  - 25 missions had weather-related landing site changes
- Prime landing site is KSC since 1991
  - 66 of 89 missions landed at KSC since 1991
- Low cloud cigs and proximity of precip
  - Most frequent weather flight rule violations, on-time landings
  - Low cloud cigs also most difficult to forecast
THANK YOU!

Questions? Comments?

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Proposed Simulation Levels

- **Level 0**: Training, Professional Development, EOC Visits, NIMS/ICS

- **Level 1**: Developmental Simulation
  - Verification of plans, procedures, equipment – possibly segmented
  - Can serve as a pre-training opportunity for Level 2

- **Level 2**: Internal Simulation (local participation)
  - 1 - 2 Forecasters training, 1 - 4 hours duration
  - Local Simulation Supervisor
  - Not focused on “training/learning” but working out the kinks before real time ops

- **Level 3**: Train with your local decision makers
  - Use available (local) partners, (1 - 2 forecasters training)
  - Local Simulation Supervisor or one from another forecast office
  - 4 - 8 hour duration
  - Opportunity to interact with the decision maker
Proposed Simulation Levels

- **Level 4:** Full WFO Team/Partners
  - WFO shift team, with partners
  - Play the scenario through to completion
  - Use “real” team members in their roles

- **Level 5:** FEMA Table Top style (WFO Team/multiple agencies/ROC-SRH)
  - Full Team (customers, WFO team, SRH ROC, EOC, kitchen sink)
  - Could be a multi-day (most likely would be a FEMA Tabletop with WFO spinning their training into the FEMA big picture)
  - Use all available bodies and any additional that can be loaned
  - Long fuse planning required
  - Major time/resource requirements
Decision Support Model

Team Requirements
- Weather Impacts
- Decision Authority

Decision Points
- Parameters
- Time Frames
- Thresholds

Two-way Outreach
- NWS visit Partner
- Partner visit NWS

Live Ops
- The Real Thing
- Good Training = Smoother Ops

Team Debrief/Feedback

True Collaboration
- Joint Ops/Training
- Formats/templates
- Schedules
- Communication Tools

Integrated Training
- Exercises
- Simulations
- Shadowing during live operations

Build a little, test a little
- What worked?
- What to improve?
- Lessons learned
- Action Items

Decision Support Model
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Partner visit NWS

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