The Role of the
Science and Operations Officer

Kevin Scharfenberg
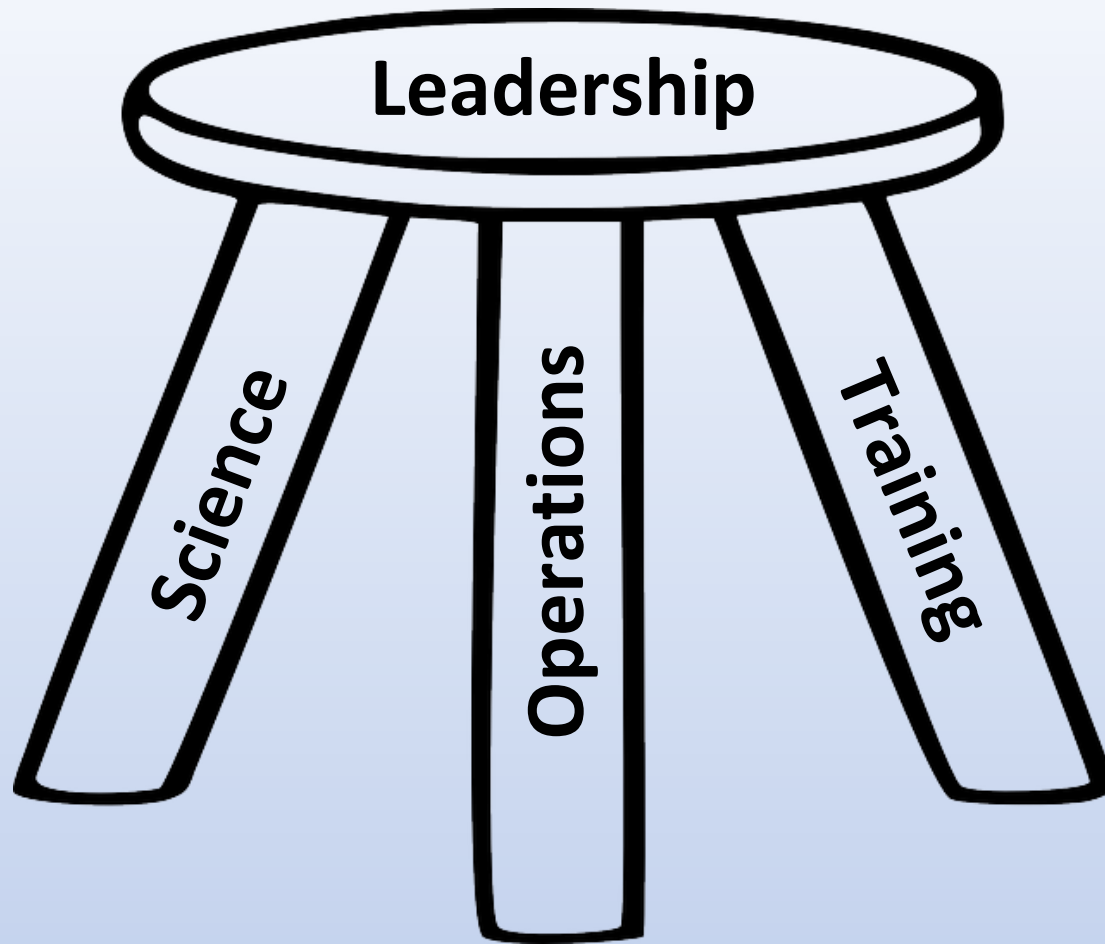
The SOO's Three-Legged Stool

Science
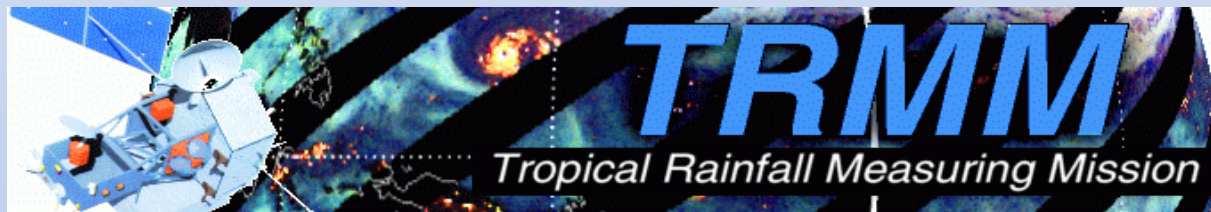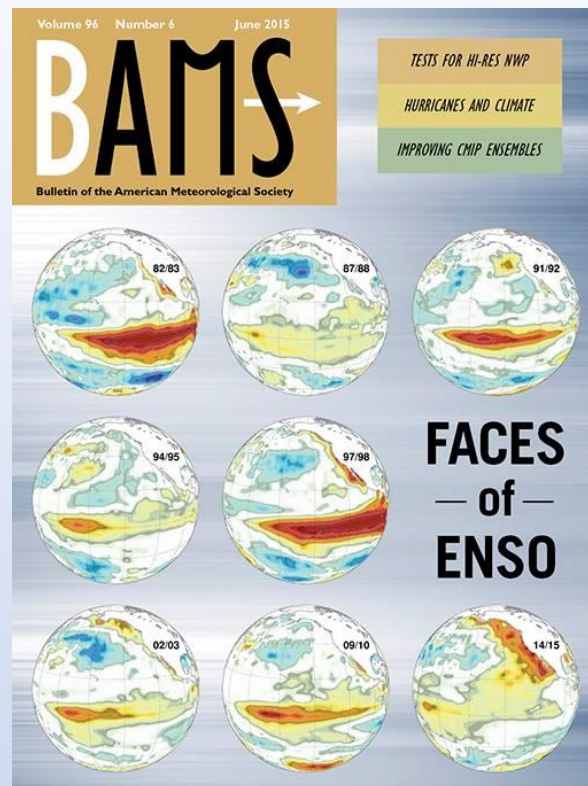
Science and Technology
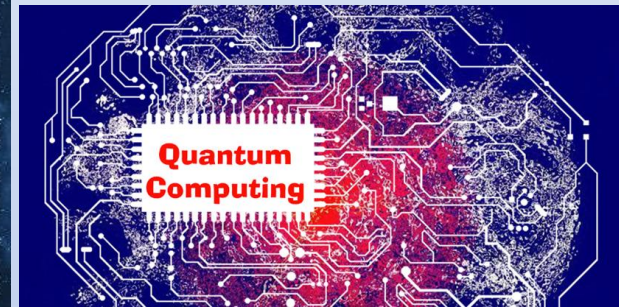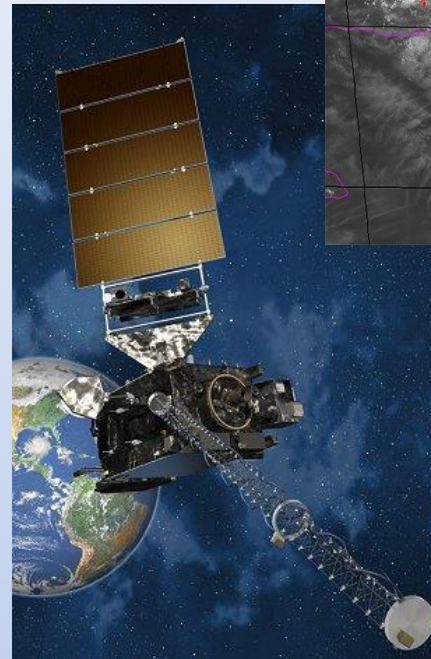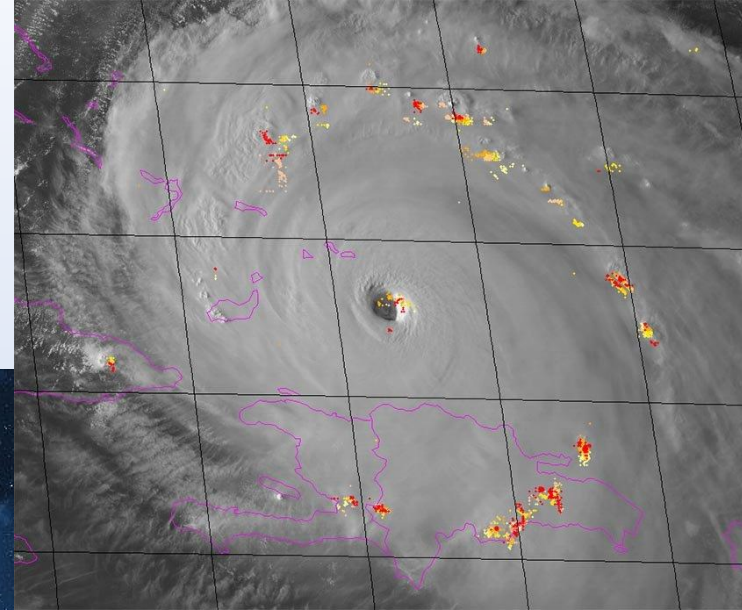
Leadership
Science
Operations
Training

Virtual Reality

Quantum Computing

Social Sciences

- Behavioral sciences
- Communication
- Linguistics
- Sociology
- Social Geography

Question #1

Which of these is the _best_ approach to being an effective station scientist?

a) Attending every relevant science conference in person
b) Buying every piece of new technology to try it out
c) Becoming an expert in social geography and human communication
d) Being curious about a wide range of science and technology

Question #1

Which of these is the _best_ approach to being an effective station scientist?

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b) Buying every piece of new technology to try it out
c) Becoming an expert in social geography and human communication
d) Being curious about a wide range of science and technology

Discussion

What emerging science and technology do you think will improve future tropical operations?
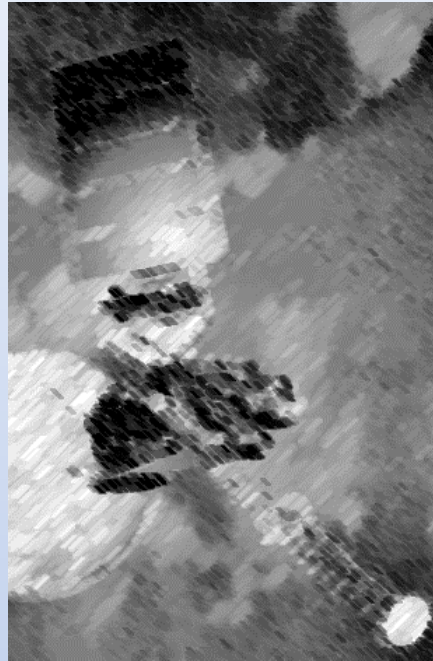
Operations

Continuity of Operations Plan (COOP)

Warnings 1   TAFs

2018 Tropical Operations Plan

Priority: Preparing, issuing, and dissemin[...]

Tropical Operations Staffin[...]

- The plan should be implemented in part on[...]
- The plan should also be implemented as re[...]

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MIAMI
SOUTH FLORIDA

Operations – Must Haves

1) **Operations Plans for Various Scenarios**
2) **Continuity of Operations Plan**
3) **Training, exercises, and drills**
4) **Help Sheets**
5) **Supplies and materials**

Operations

Meteorological service's emergency operations strategy:

- Planning in advance for the threat
- Practicing and exercising the plan
- Implementing the plan
- Periodically assessing and adjusting the plan
- Reviewing the event
- Applying lessons learned to future plans

Emergency Operations Plan

Planning in advance

For each reasonable threat, determine:

- Tasks necessary
- Level of effort for each task
- Skill sets needed

Then develop a staffing strategy to achieve the tasks. Think ahead about how to match the team's skill sets with the tasks.

Emergency Operations Plan
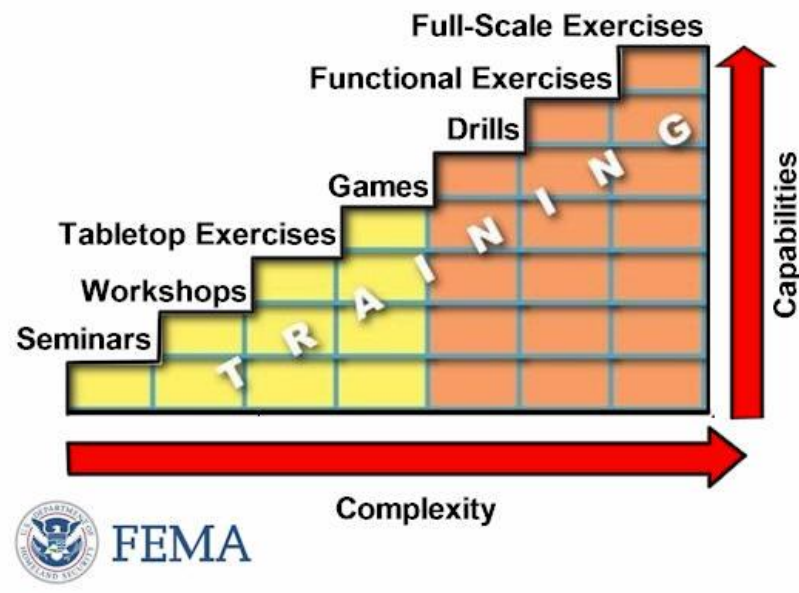
Practicing & Exercising

Various levels of exercise based on resources.

Make drills and exercises as realistic as possible.

See FEMA courses IS-120.A and IS-139.A

"Train like you fight"

Building-Block Approach to Exercise Scheduling

Full-Scale Exercises
Functional Exercises
Drills
Games
Tabletop Exercises
Workshops
Seminars

TRAINING

Capabilities

Complexity
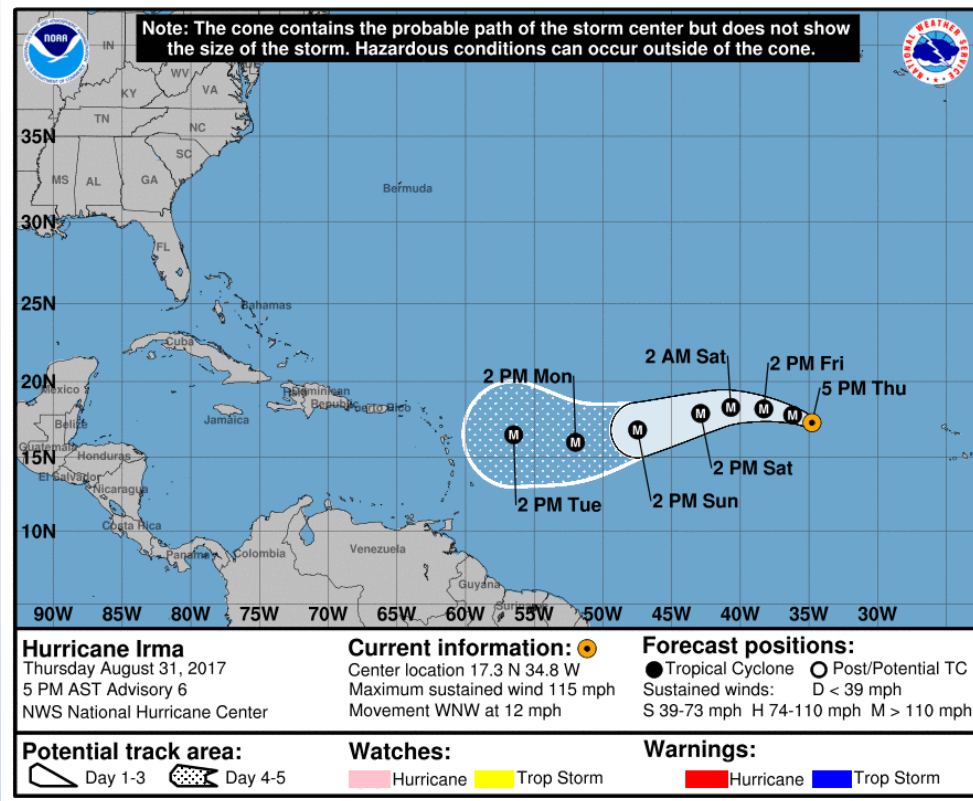
FEMA

Emergency Operations Plan

Implementing the Plan

Need a clear trigger for implementing the plan

Too early and risk exhausting personnel on many false alarms

Too late and might get behind

Have a list of tasks at start of plan

Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.

Hurricane Irma
Thursday August 31, 2017
5 PM AST Advisory 6
NWS National Hurricane Center

Current information: ⊙
Center location 17.3 N 34.8 W
Maximum sustained wind 115 mph
Movement WNW at 12 mph

Forecast positions:
● Tropical Cyclone ○ Post/Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area:
◺ Day 1-3 ▨ Day 4-5

Watches:
▨ Hurricane ▨ Trop Storm

Warnings:
▨ Hurricane ▨ Trop Storm

Emergency Operations Plan

Implementing the Plan

Discussion:

What are some possible action items needed at the start of emergency tropical operations?

- Prepare building for damage
- Fill generators with diesel fuel
- Stock water, food, essentials
- Send personnel to backup office?

Emergency Operations Plan

Assessing and Adjusting

During the event:

- Are requirements not being met?
- Is the meteorological situation changing?
- Is the community situation changing?
- Are personnel getting tired?

Adjust the plan as necessary.

Emergency Operations Plan

Reviewing the event

After operations & the community have stabilized:

- Gather feedback from your staff and from partners
- "Hot wash" – Conducted as soon as possible while memories are fresh
- "After Action Review" – Somewhat more in-depth
- "Service Assessment" – Most thorough

Output

- Findings – Factual statements
- Recommendations – Specific ways of improving
- Best Practices – Successes that are repeatable

Emergency Operations Plan

Applying Lessons Learned

*Assure **recommendations** and **best practices** are incorporated into the future plans*

Gather feedback from your staff and from partners during and after the event

- "Hot wash" – Conducted as soon as possible while memories are fresh
- "After Action Review" – Somewhat more in-depth
- "Service Assessment" – The most thorough

Emergency Operations Plan

Continuity of Operations Plan (COOP)

A <u>generic</u> plan for how the department will perform essential operations during an emergency and/or community disruption.

- Focus on any type of disaster, with or without warning
- Can't possibly plan for every disaster scenario
- Think about people, infrastructure, data, food/water, etc.
- Consider short term and long term disruptions
- Have a couple of separated backup sites

Question #2

Which of these is a part is part of a meteorological service's emergency operations strategy?

a) Planning in advance for the threat
b) Practicing and exercising the plan
c) Implementing the plan
d) Periodically assessing and adjusting the plan
e) Reviewing the event
f) Applying lessons learned to future plans
g) All of the above

Question #2

Which of these is a part is part of a meteorological service's emergency operations strategy?

a) Planning in advance for the threat
b) Practicing and exercising the plan
c) Implementing the plan
d) Periodically assessing and adjusting the plan
e) Reviewing the event
f) Applying lessons learned to future plans
g) All of the above

Discussion Break

What are some examples of lessons learned in previous emergencies you have applied to future plans?

Operations – Must Haves

1) **Operations Plans for Various Scenarios**
2) **Continuity of Operations Plan**
3) **Training, exercises, and drills**
4) **Help Sheets**
5) **Supplies and materials**

Help Sheets for Operations

Training is necessary but help sheets assure performance in a crisis

Use simple job sheets, checklists, or diagrams

	A	B	C	D	E	F	G	H	I	J	K
1	**COORDINATOR -- ADVISORY CYCLE** Place checkmark next to time when completed								**UTC DATE:**		**NAME OF STORM:**
2	0300 UTC Cycle		0900 UTC Cycle		1500 UTC Cycle		2100 UTC Cycle				
3	UTC	EDT	UTC	EDT	UTC	EDT	UTC	EDT	**WHO**	**WHAT**	**NOTES**
4	2215	1815	0415	0015	1015	0615	1615	1215	OPL/Intern	Prep for upper air observation	Make sure communication duties are covered.
5	2215	1815	0415	0015	1015	0615	1615	1215	HLS desk	Begin analyzing output from PSurge in D2D	
6	2215-30	1815-30	0415-30	0015-30	1015-30	0615-30	1615-30	1215-30	HLS desk	Run TCStormSurgeThreat procedure	After running turn ISC on to compare to neighbors. This Psurge is from previous advisory cycle. Save but don't publish.
7	2215	1815	0415	0015	1015	0615	1615	1215	HLS desk + coordinator	Internal Coordination for upcoming Storm Surge Watch/Warning	This is the step where we look at guidance closely so we are ready for the collaboration with NHC/SSU
8	2300	1900	0500	0100	1100	0700	1700	1300	HLS desk	Make edits to storm surge watch/warning grid - save to ISC within 30 minutes	When received from NHC. Watch for red banner and join NWSchat room
9	2300	1900	0500?	0100?	1100	0700	1700?	1300?	OPL/Intern	Launch balloon	Make sure communication duties are covered.
10	---	---	---	---	1230-45	0830-45	---	---	Comms	EM Webinar	
11	0030-40	2030-40	0630-40	0230-40	1230-40	0830-40	1800-10	1400-10	HLS desk	Run TCTornadoThreat procedure and edit	After running turn ISC on to compare to neighbors. Times based on SPC advisory cycles assuming day 1 & day 2 threat. For 09Z cycle - wait til 0400am EDT for TCTornadoThreat if it's primarily a Day 3 threat.
12	0040	2040	0640	0240	1240	0840	1840	1440	HLS desk	Start WRKHLS situation overview	
13	0100	2100	0700	0300	1300	0900	1900	1500	Grid desk	Finalize QPF grid	Use closest model/blend, ISC on, check WPC forecast.
14	0115-30	2115-30	0715-30	0315-30	1315-30	0915-30	1915-30	1515-30	HLS desk	Run TCFloodingRainThreat procedure and edit	Turn ISC on after running to compare to neighbors! Save but don't publish yet.
15	0130-0210	2130-2210	0730-0810	0330-0410	1330-1410	0930-1010	1930-2010	1530-1610	Grid desk	Finalize background wind fields - cap at 30 kts (run Limit30 smart tool on all times)	Use model with track closest to the expected package track. DON'T PUBLISH.

NATIONAL WEATHER SERVICE
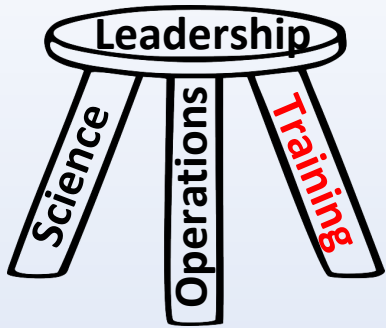NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MIAMI
SOUTH FLORIDA

Supplies and Materials for Operations

Training

There is no one-size-fits-all training solution.

Every student and every topic is different

The key is reinforcing key points during & after

Consider:

- *Baseline training*
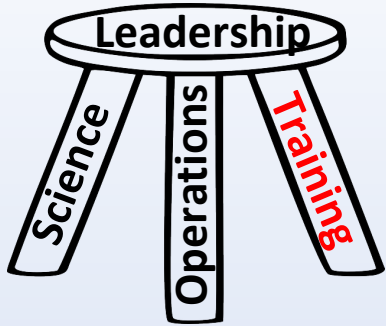
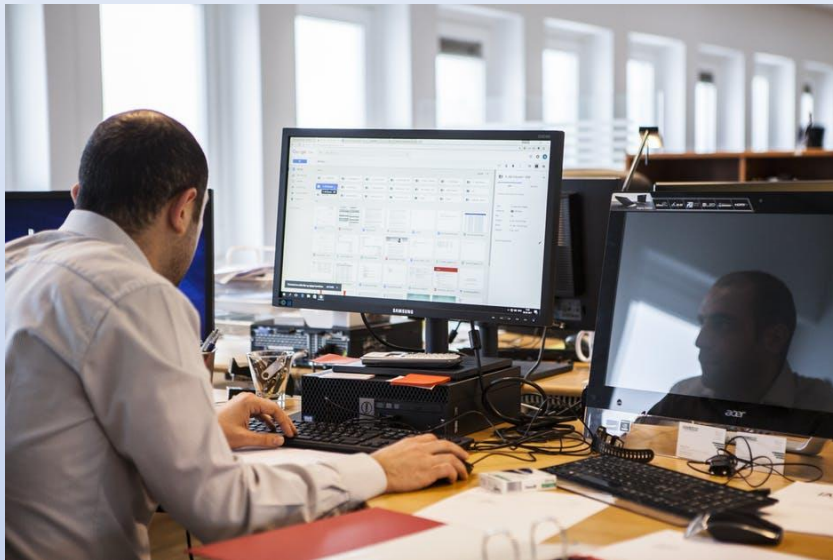- *Specialist training*

- *Cross training*

Training

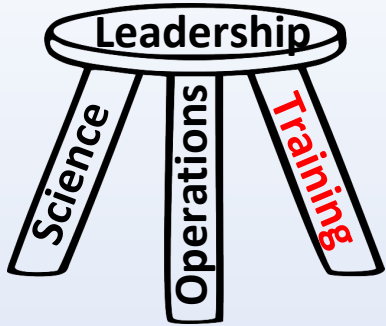## *Baseline training*

- Skills everyone in the group should have

- Frequently exercised
- Minimal need for "cheat sheets"
- Can perform with limited oversight
- Preference for lower risk tasks

Training

Leadership
Science
Operations
Training

Specialist training

- For critical but less-frequently needed requirements

- *Regularly exercised*
- *Special course work*
- *Considerable oversight when learning*
- *Certification & recertification*
- *Background education, skill sets, and interest*

Training

Cross training

- Assuring enough people can carry out tasks to meet a challenging situation

- *Occasionally exercised*
- *Job aides needed such as cheat sheets, workflow diagrams*
- *Considerable oversight when learning*

Question #3

Which of these is a best practice for a training program?

a) Sending a list of reading materials to the students
b) Continuing reinforcement of key material
c) Showing a long training video with a quiz at the end
d) Hoping they learn what they need from colleagues

Question #3

Which of these is a best practice for a training program?

a) Sending a list of reading materials to the students
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Discussion Break

Do you have any experience with training techniques that were successful?

Case Study

NATIONAL WEATHER SERVICE/NATIONAL HURRICANE CENTER

TROPICAL STORM ▭ AND HURRICANE ▭ FORCE WIND SWATHS OF MATTHEW
FROM ADVISORIES 1 THROUGH 47

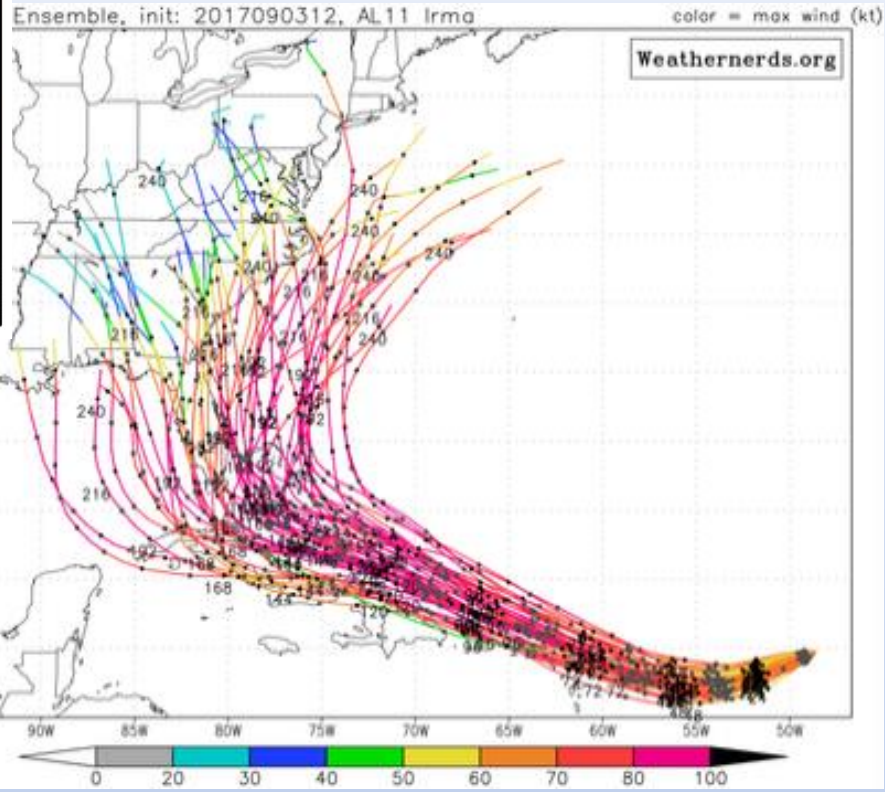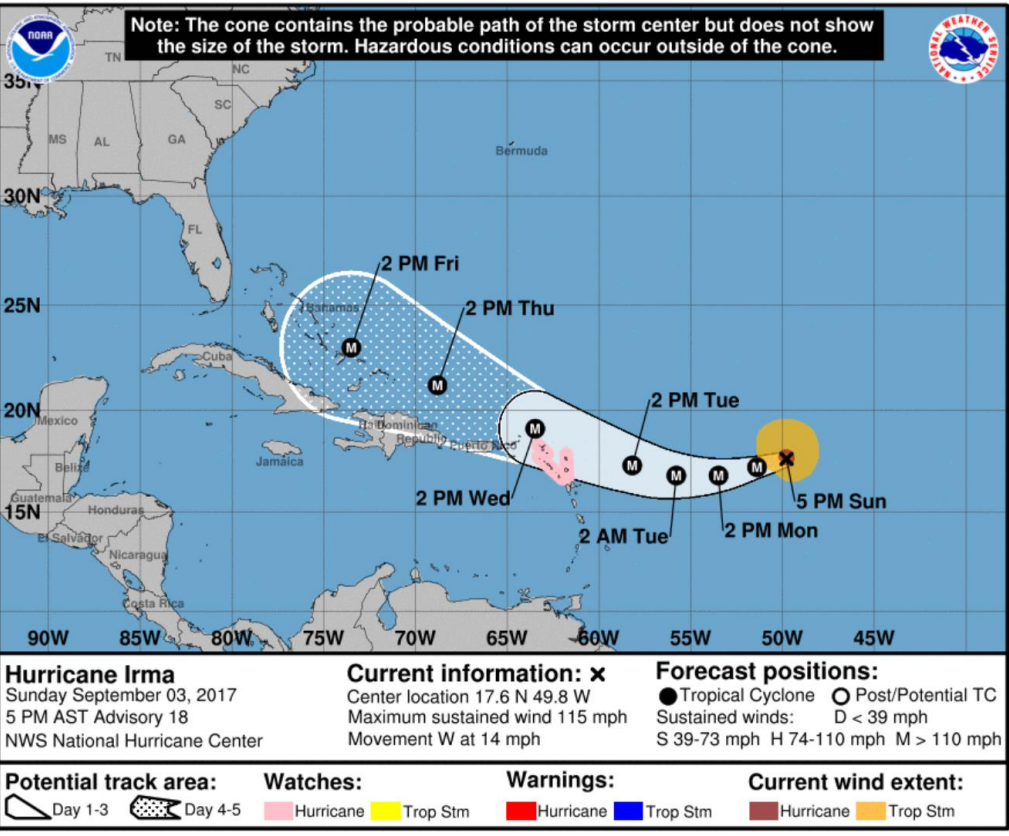Hurricane Matthew 2016

True at 30.00N
SM 125 250 375 500
Approx. Distance Scale (Statute Miles)

WFO MIAMI HURRICANE MATTHEW FINAL AFTER ACTION FINDINGS AND RECOMMENDATIONS

Best practices:
- Great feedback from partners for this event
- **Did partial deployment to Miami-Dade EOC**
- **We were able to field numerous interviews, including nearly 100 Spanish language interviews and about 150 overall.**
- On-site ITO was familiar with existing software/systems and was proactive anticipating and responding to potential issues, saving considerable time compared to relying on remote ITO assistance/ticketing systems.
- 6am/pm shift changes worked for most
- Good internal coordination at night, but perhaps due to less interview/phone load
- **Periodic time-outs on the floor to discuss message/strategy helped**
- **Pushing out HTI grids/graphics ASAP after advisory time got good feedback. Graphics used on air.**
- Don't wait on package to issue AFD, and make it local impact value added
- **Great coordination with NHC storm-surge unit**

Hurricane Irma
Sunday September 03, 2017
5 PM AST Advisory 18
NWS National Hurricane Center

Current information: ✕
Center location 17.6 N 49.8 W
Maximum sustained wind 115 mph
Movement W at 14 mph

Forecast positions:
● Tropical Cyclone ○ Post/Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area:
⬡ Day 1-3 ⬡ Day 4-5

Watches:
🟪 Hurricane 🟨 Trop Stm

Warnings:
🟥 Hurricane 🟦 Trop Stm

Current wind extent:
🟫 Hurricane 🟧 Trop Stm

2 PM Fri
2 PM Thu
2 PM Tue
2 PM Wed
2 AM Tue
2 PM Mon
5 PM Sun

Ensemble, init: 2017090312, AL11 Irma
color = max wind (kt)
Weathernerds.org

Hurricane Irma Interviews

File Edit View Insert Format Data Tools Add-ons Help   All changes saved in Drive

	A	B	C	D	E	F	G	H
1	Notes:	BOLD items are scheduled (unbold when completed)						
2	Sunday, September 3							
3	Who	When	Where	Type	Medium	Language	Reach	Outlet
4	Tony	315 pm	NHC Media Room	Live	TV Crew	Spanish	International	CNN Espanol
5	Ian	500 pm	Phone	Live	Radio	English	Local	610 WIOD am M
6	Monday, September 4							
7	Who	When	Where	Type	Medium	Language	Reach	Outlet
8	Tony	1005 am	Media Room	Live	Skype	Spanish	International	America TV
9	Tony	1115 am	Media Room	Live	Skype	Spanish	International	Radio Caracol
10	Tony	1145 am	NHC Media Room	Live	TV Crew	Spanish	National	Noticias Telemur
11	Tony	1230 pm	Phone	Recorded	Radio	Spanish	Local	Noticias 1260 Mi
12	Tony	105 pm	Phone	Live	Other	English	National	NY Times
13	Tony	305 pm	Media Room	Recorded	Skype	Spanish	Local	Telemundo Orla
14	RAG	515 pm	Media Room	Live	Other	English	Local	Miami Herald
15								
16								

Alarm — Edit

Time	Label	
7:25 AM	FEB briefing (PS), every day	on
8:25 AM	Briefing to EMs, every day	on
9:25 AM	USACE tag up , every day	on
11:13 AM	FL SERT call (listen), every day	on
1:25 PM	Media met tag up , every day	on
3:25 PM	Briefing to EMs , every day	on

World Clock Alarm Bedtime Stopwatch Timer

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Hurricane Irma Contingency Schedule

	12a	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12p	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p
Media/grids/SM	MT	MT	MT	MT	MT	MT													MT	MT	MT	MT	MT	MT
Coord/HLS	SK	SK	SK	SK	SK	SK													SK	SK	SK	SK	SK	SK
Warnings	IL	IL	IL	IL	IL	IL													IL	IL	IL	IL	IL	IL
UA/grids/TAFs	LK	LK	LK	LK	LK	LK													LK	LK	LK	LK	LK	LK
UA/pub svc/SM	AN	AN	AN	AN	AN	AN													AN	AN	AN	AN	AN	AN
Warnings	JT	JT	JT	JT	JT	JT													JT	JT	JT	JT	JT	JT
Coord/HLS	KS	KS	KS	KS	KS	KS											KS	KS	KS	KS	KS	KS	KS	KS
Grids/Warnings							BB	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB						
Warnings/Mesoanalysis							DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD						
Coord/HLS							RAG	RAG	RAG	RAG	RAG	RAG	RAG	RAG	RAG	RAG	RAG	RAG						
UA/SM/pub svc/TAFs							AH	AH	AH	AH	AH	AH	AH	AH	AH	AH	AH	AH						
UA/SM/pub svc							CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF						
UA/SM/pub svc/TAFs							CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC	CC						
Coord/HLS/media							AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR	AR						
Briefings/Grids							DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG						
Coord/Briefings/media							RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM				
	7	7	7	7	7	7	9	9	9	9	9	9	9	9	9	9	10	10	8	8	7	7	7	7
Deploy MDC								AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM					
Deploy Collier								SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI					

NATIONAL WEATHER SERVICE

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SOUTH FLORIDA

Wallet: AT1
ETN: 1011

Hurricane IRMA

HTI	Surge	Wind	Flooding Rain	Tornadoes

Tropical formatters ARE in use for CWF and ZFP

Key Messages (keep short & simple!)

- Irma is a serious threat to South Florida. This is a potentially deadly situation!
- Residents and visitors must now implement emergency safety plans.
- Preparations to protect life and property should be completed **by Friday night.**
- People in mobile homes and evacuation areas should move to safer location.
- Take final shelter **by early Saturday morning.**
- If not evacuating, prepare a safe room to hide from destructive winds. Interior room on lowest floor.
- Monitor official info and don't spread rumors.

Hurricane Warning entire CWA, surge warning all coasts

Chat rooms to monitor: mfldsschat, NHCchat, stormsurgecollaboration, savi_coord, mas_coord

Current ops level: **1 Emergency Ops**

Location	TS Force Cumulative odds/Time window	Hurricane Force Cumulative odds/Time window
Miami-Dade	near 100% Sat. am thru Mon. am	6 in 10 Sat night - Sunday
Broward	near 100% Sat. am thru Mon. am	1 in 2 Sat night - Sunday
Palm Beach	>9 in 10 Sat. midday through Mon midday	1 in 2 late Sat night - Sunday
Collier/Hendry/Glades	9 in 10 Sat midday through Mon midday	1 in 2 late Sat night - Sunday

Current Duties

Coordinator	Robert G.
Meso+Warnings	Dan G./Ian
HTI+HLS+HWO	Ian/Robert G.
Grids + TAFs	Chuck/Dan G.
Pub. Svc. + UA	Chris/Andrew
Comms + media	Dan D./Andrew
Soc. Media	Team

Public Information

http://www.ReadySouthFlorida.org
511 for Transit information in FL
311 in Miami-Dade & Broward
211 in PB, Collier, Glades, Hendry
FDEM PIO for media/EM inquiries:
850-321-8503
Kelli Pirtle 405-203-4839
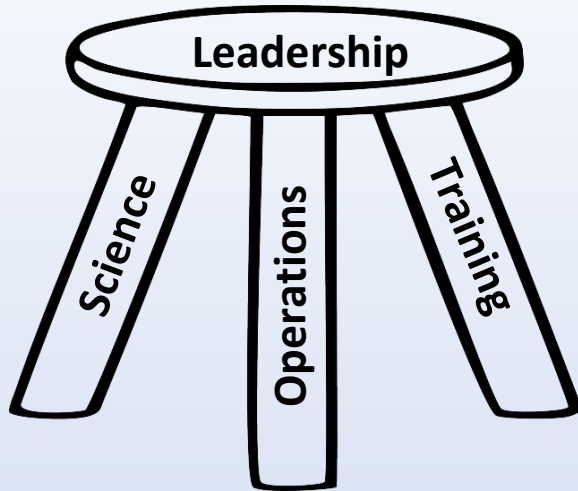
Challenges for Irma

- Parking spaces for cars - our plan failed

- Several on our staff didn't *actually* have arrangements for family/pets/etc.

- Visiting forecasters - travel problems & spin-up

- Duplicated/overlapping info requests coming from above

- "Evacuation pay" and travel orders

- Shelter-in-place logistics

Review

- Be curious about a wide range of science and technology, including social science

- Remember the emergency operations cycle – plan, practice, implement, assess, correct

- Continually reinforce key training concepts

Thank you!

Kevin.Scharfenberg@noaa.gov