#### **Application of Various New Technologies in Wilderness SAR**

Appalachian Search and Rescue Conference Winter Retreat - February 2014

ASRC Technology Team



Appalachian Search and Rescue Conference Mountaineer Area Rescue Group

## Outline

> Do we need to improve, do we need innovation?

- > What is technology?
- Innovation Applications
  - Administration / Documentation
  - Mapping: Operations, Planning and Logistics
  - Field Teams
  - Off-site support (Remote Support)





#### Do we need to improve?

- > How do we know if need to or can improve?
  - A well management search could still result in a suspension and a poorly management search could result in a find.
  - What factors contribute to a "good search" / "bad search"?
  - Is just getting people into the field an attribute of a "good search"?
  - SAR exercises are a poor surrogate for the real thing
  - We know from experience that documentation and planning are important.





## Why do we need to improve?

Safety

Each time someone is sent into the field we are putting them at risk.

#### Efficiency

- This is not just about getting teams into the field quickly
- Putting them in the optimal location
- Providing them with the up-to-date information
- Properly documenting the activity
  - Although most searches end quickly, for the ones that don't we often spend A LOT of time trying to re-create what happened during the initial phase of the search.



Utilizing GPS Track data to account for searching outside of the assigned area





## Why do we need to improve?

- Increase number of available resources
  - Never enough Incident Staff particularly in the early phase of an operation.
  - Free staff for other activities
  - Alternative scenario analysis
  - Require personnel to understand the various technologies to permit this activity
    - Mapping software
    - Electronic forms
    - ✤ E-mail and Dropbox







#### Why do we need to improve?

#### Improve communications

Date: 10/14/2011



e Group

#### Innovation for SAR (Personally you have been doing all this for years)

Electronic forms	INCIDENT BRIEFING (ICS 201)				
	1. Incident Name:	2. Incident Number:	3. Date/Time Initiated: Date: Time:		
	<ol> <li>Map/Sketch (include sketch, showing areas, overflight results, trajectories, imp assignment):</li> </ol>	the total area of operation pacted shorelines, or other	s, the incident site/area, impacted and threatened graphics depicting situational status and resource		
1. Resource Type:       Search and Resc         2. Planning #:       Task Assignment F         3. Priority:       ICS 204-SAR (1 of 2)	ue 4. Task Complet orm ۵. Task Partially Finish ۵. URGENT Follow-U	ed 🗆 ed 🗔 o I Г			
7. Mission Number / Incident Name 8. Task Number 9. Team Ider	10. Task Map(s)				
<sup>11.</sup> Branch <sup>12.</sup> Division/Group <sup>13a.</sup> Map Datum	✓ <sup>13b.</sup> Coord	-			
14. Task Instructions	<sup>15.</sup> Briefing Checklist:     □ Expected Time frame     □ Target POD subject     □ Target POD clues     □ Teams nearby     □ Applicable clues     □ Terrain/Hazards     □ Weather, Safety Issue     □ Press, Family Plans     □ Subject Information     □ Rescue/Find Plans	'S			
17. Transportation 18. Equipment Issued	☐ Others Mag Declination				
		—			



## Innovation for SAR (Personally you have been doing all this for years)

- Carbonless paper for forms
- Wireless printers and plotters







# Mapping Technologies

- Terrain Navigator Pro
  - Can do a lot both on-site and off-site for producing maps and racking information but it is limited (no database).
- Geographical Information System (GIS)
  - Geodatabase records both spatial and non-spatial data
  - Process automation
  - Sophisticated geospatial modeling





## Mapping Software - Operations







Auto-generation of task assignment forms and task tracking



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## Mapping Software - Logistics

Communications planning









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### Mapping Software - Planning



#### **Cumulative Probability - ROW**





![](_page_13_Picture_1.jpeg)

## GPS Data Upload...Segment Boundaries

Using DNRgps (preferred - Frees up PC running TNP)

- Create Segments as Tracks using TN
- Save file as "Segments\_(IncidentName).gpx"
- Start DNRGPS
  - \* Check Projection: File > Set Projection
  - Connect GPS
  - File > Load From > File
  - Select which segment to upload
  - ℁ Track > Upload

![](_page_14_Figure_11.jpeg)

D	NR GPS									h	
File	Edit	GPS	Waypoi	nt Tra	k Route	Real Time	Help				
9	garmin - G	iPSMAP 7	6S Softwa	re Version	4.00						
	Waypoin	ts Track	s (2020)	Routes	Real-Time						
וה		type	tident	ident	Latitude	Longitude	y_proj	x_proj	comment	new_trk	new_seg
н		TRACK	Seg01	T1	34.25931	-117.034504	3790713.624905	496823.273130249		True	True
4		TRACK	Seg02	T56	34.250767	-117.047075	3789766.84533697	495665.443559249		True	True
		TRACK	Seg03	T142	34.263953	-117.058889	3791229.4689789	494578.483701029		True	True
J		TRACK	Seg04	T206	34.259272	-117.058357	3790710.41331563	494627.163778268		True	True
		TRACK	Seg05	T254	34.265082	-117.064466	3791354.9632979	494065.125841252		True	True
		TRACK	Seg06	T286	34.263654	-117.048397	3791195.80681238	495544.396283724		True	True
		TRACK	Seg07	T334	34.264451	-117.055917	3791284.53271326	494852.126233319		True	True
		TRACK	Seg08	T380	34.251031	-117.052223	3789796.34867925	495191.442670501		True	True
	+	TRACK	Seg09	T454	34.251031	-117.052223	3789796.34867925	495191.442670501		True	True
		TRACK	Seg10	T505	34.25483	-117.06386	3790218.19063888	494120.202231889		True	True
		TRACK	Seg11	T530	34.249897	-117.063528	3789671.20321655	494150.429214158		True	True
		TRACK	Seg12	T572	34.249573	-117.071224	3789635.74728026	493441.7668674		True	True
		TRACK	Seg13	T632	34.255029	-117.079792	3790241.2907425	492653.308188017		True	True
		TRACK	Seg14	T702	34.257399	-117.0802	3790504.10474866	492615.949431356		True	True
	- 1	TRACK	Seg15	T774	34.262481	-117.073742	3791067.14519189	493210.948832465		True	True
		TRACK	Seg16	T812	34.262481	-117.073742	3791067.14519189	493210.948832465		True	True
		TRACK	Seq17	T861	34 266708	-117 074421	3791535 87909018	493148 779490501		True	True

# Searchers can now fill in the boundaries on the GPS

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![](_page_14_Picture_15.jpeg)

# Off-Site (Remote) Support

- Provide more incident staff
- More opportunities for experience
- Operations
  - Generate tasks and maps
- Logistics
  - Communications planning support
- Planning
  - Lost person behavior modeling
  - Alternative Scenario Analysis

![](_page_15_Picture_10.jpeg)

#### **Alternative Scenario Analysis**

				H1	H2	H3	H4	H5	H6
				Subject had a medical issue and somewhere along the trail between the trailhead and the intended distination	along the trail and made a wrong turn and is now waiting on the trail for rescue.	Subject attempted to short cut across country to the intended distination and lost the trail and is now waiting for rescue.	Subject attempted to short cut across country to the intended destination and became incompaciated.	the trail somewhere due to bad weather and succumb to hypothermia.	Dispondent, off trail suipide
	Weighted inconsistency score - Lower score less probability		tency score robability	-6.414	-5	-1	-1	-2.414	-6.414
lence	Туре	Credibility	Relevance						
Subject's vehicle located at 1 trailead	HUMINT	HIGH	HIGH	N	Ν	Ν	N	Ν	Ν
LPQ with fellow hikers do determine previous itinerary (do 2 not have yet?)	HUMINT	HIGH	HIGH	с	с	С	С	NA	NA
health condition (Subject appears to be in goos health - 3 runner)	HUMINT	MEDIUM	MEDIUM	с	Ν	Ν	Ν	NA	NA
Subject had recently hiked in the area and may feel familiar 4 with the trail	HUMINT	HIGH	HIGH	с	I.	С	С	Ν	с
K9 Alert at N end of Road Hollow 5 Task 1805, 17 642250 4243500	MASINT	MEDIUM	MEDIUM	N	Ν	С	С	С	С
K9 Alert at N end of Road Hollow 6 Task 1807, 17 642650 4243380	MASINT	MEDIUM	MEDIUM	Ν	Ν	С	С	С	С
Para-cord on Shenandoah Mt Trail, Task 1805, 17 642010 7 4243010	MASINT	LOW	MEDIUM	Ν	Ν	Ν	Ν	Ν	Ν
Task#: 1805 - Stocking cap, 17 8 641470 4242270	MASINT	MEDIUM	MEDIUM	N	Ν	Ν	Ν	Ν	Ν
Task#: 1805 - Rice Krispie 3 Package, 17 642200 4243550	MASINT	LOW	MEDIUM	Ν	Ν	Ν	Ν	Ν	Ν
Task#: 1802 - Bottle, 17 642370 10 4243270	MASINT	LOW	MEDIUM	с	С	Ν	N	Ν	Ν
<i>Lost Person Behawor (LPB)</i> Hikers tend to stay along linear 11 features (trails, drainage, etc)	LBP	HIGH	HIGH	сс	сс	С	Ν	С	I
Errors at decision points 12 account for 56% of lost cases.	LBP	MEDIUM	HIGH	I.	СС	С	С	I	L
52% of lost subjects are found 13 downhill (in relation to IPP).	LBP	MEDIUM	MEDIUM	NA	NA	NA	NA	NA	NA
Subjects found in drainage - 14 12%	LBP	MEDIUM	MEDIUM	1	I	сс	сс	с	NA
Subjects found on linear feature 15 25%	LBP	MEDIUM	MEDIUM	сс	сс	I	I	I	I.
16 Existing risk factors for suicide	LBP	MEDIUM	MEDIUM	NA	NA	NA	NA	NA	I
17 Suitable location for suicide	GEOINT	MEDIUM	MEDIUM	NA	NA	NA	NA	NA	С

![](_page_16_Picture_2.jpeg)

![](_page_16_Picture_6.jpeg)

## **Training Needs**

> There is a need for people with specialized skills.

Do they need to follow the normal "SAR" progression?

![](_page_17_Picture_3.jpeg)

![](_page_17_Picture_7.jpeg)

### Future Trends

- More database usage
  - On-site id (barcode readers for tracking personnel and data entry such as TAF, accountability)
- Better geospatial models
- ArcServer
- Cellphone repeaters
- Cellphone "Sniffer"
- > UAV

![](_page_18_Picture_8.jpeg)

![](_page_19_Picture_0.jpeg)

Contact information:

Don Ferguson Mountaineer Area Rescue Group <u>dferguso@mix.wvu.edu</u> (304) 290-9118

![](_page_19_Picture_3.jpeg)