Weather Hazard Management Services (WHaMS☺)

An Outlined Approach / Summary

(Based on the Discussion from the Workshop of Oct 27-29, 2009)

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This is an outlined summary of my notes and thoughts from the three-day workshop. This is not to be taken as a complete and fully thorough accounting, nor is it to be taken as a firm recommendation as to how to proceed. I wanted to get my thoughts more coherent, and creating this document helped me. I share this in the hopes that it can be useful to others involved in the Weather Hazard Management Services arena.

The title is also my suggested title for this task. We do not want to use the term "nextgen" and I believe "Services" is more in line with the future of the NWS than "System".

Note that the variability of the sophistications of those who receive and take action based on the weather hazard information the NWS provides suggests we probably need to continue to provide legacy text products with legacy suggested actions with legacy levels of severity (Watch/Warning/Advisory), but allow for more sophisticated users to do more than any usable text product ever could allow.

- 3 main software components:
    - **AWIPS-side front-end management utility (GUI)**
        - Steps to create a "Hazard Alert" should be pretty much the same, no matter the phenomena.
        - Provide built-in sectorization assistance
        - Remove land-sea disparity issues
        - Allow for the creation of 'hazards' by:
            - Forecaster-defined Polygon
            - Automated blob
            - Paint-by-* (ie: by county, zone)
            - Geo-threshold (ie: altitude)
        - Types of GUI panels:
            - Provide time-line panel
                - Allow for easier extension, cancellation, monitoring, augmentation, change of confidence level
            - Geo-panel
                - Provides generation methods

        - Provides real-time rapid-updates. Ie: the ability to see what other forecasters in the office or other WFOs are generating as they generate it.
        - If this is a pane in CAVE (as I expect), then this could contain any other of a large number of available graphics in AWIPS.
    - Text panel (for legacy text product)
    - Chat panel?
- Allow for nesting, ie:
    - A large area of moderate confidence of event occurrence may contain a smaller area of high confidence of event occurrence (such as automated storm cell blobs).
    - A large area of moderate event magnitude may contain a smaller area of higher event magnitude
- Provide First Pass capability: Guidance that can create an auto-generated first-guess at hazard definition. (What to use for the basis for this and how it will be used will be tough to define, however there may be some overlap potential here with ***ADVISOR*** profiles.) (ADVISOR = 'AWIPS Data Visualization and Monitoring System for Operational Records')
- Provide chat capability
    - Separate channels for each Recipient (as defined below) ?
- Provide attachment capability. ie:
    - Attach images of event to the Hazard
    - Attach real-time reported observations to the hazard
        - Via upgraded LSR interface?
        - Via chat search or data entry from web-based front-end, with forecaster QC
    - Via a flexible Windows-like clipboard cut-and-paste function
- Provide good automation when it comes to generating legacy text products
- Provide the capability to handle hand-off situations (ie: for moving hazards that cross CWA boundaries or other areas of responsibility)

o Common Database

- Stores all components of a hazard. See the section below entitled "Weather Hazard Alert Components" for a list of these components.
- Must be accessible by AWIPS and the world (but with different restrictions)

o Web front-end utility

- Accessible by the world
- Dis-allow any type of input? OR integrate the new Local Storm Report (or, as I'd like to call it, the Local Event Report) input function into this interface?
- Allow for sophisticated-user-defined thresholds and responses.

        - How to manage the potential tens of millions of these?
    - Types of responses: see section below entitled Weather Hazard Alert Communication Methods.
    - Leverage from iNWS
    - Provide methods for ultra-sophisticated users, such as:
        - Full data base read-only access
        - Xml export (for use as ingest by other software)
    - Provide a handful of "starter-kits" (ie: configurations) to encourage sophistication

- **Recipients** of Weather Hazard Information
    - Need to satisfy all types of recipients
    - The recipient types are:

Type	Sophistication	Variability of Needs	Degree of Independence
General Public	unsophisticated	moderate	Mostly Not. Need direction/guidance on resultant actions
Decision-Makers	mix	high	Somewhat. Guidance may be needed based on other factors (such as event type, degree of sophistication, arena, etc)
Oth	technical	Low (always need all info possible)	independent

erNWS			
PrivateSectorbusiness	technical	high	independent

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- Weather Hazard Alert **Components** and re-specification
  - The Event itself (ie; snow, rain, tornado, visibility, small craft advisory, etc)
  - Optional magnitude (ie: (respectively) 12 in, 3 in, large, ¼ mile, none, etc)
    - Allow for magnitude ranges
  - Valid time range
  - Valid geographical area (polygon, blob, list of entity IDs, etc)
  - 'Confidence' of each of: **event occurrence, magnitude of event (and possibly area of event and timing of event)**
    - Can be numeric probabilities OR
    - Categorical confidences
    - However – always provide categorical confidences to unsophisticated users. The Categories **could** be:
      - Moderate confidence

                - High confidence
                - Very high confidence
                - Certainty
        - Allow for
            - Polygons
            - Blobs
            - Political entity based (ie: counties)
            - Geographic entity based (ie: altitude thresholds)
        - Allow for spatial translation (ie: moving storm cell blobs)
        - Allow for temporal morphing (ie: continually re-shaped storm cell blobs or updates to a cluster of counties)

- Weather Hazard Alert **Communication Methods**
    - Legacy:
        - Text Products
        - Tone alerts
        - NWR
    - New:
        - Graphic products
        - Reverse 911
        - Geo-located cell-phone alerts
        - Flavor-of-the-month (ie: tweets)
        - Multi-tone public siren
        - Sophisticated User-defined;
            - Via sophisticated user defined thresholds
            - Notification via:
                - Email
                - Text message
            - Allow access to full data base (read only) for ultra-sophisticated users OR have the web front-end provide xml export capability.
    - Continue to provide suggestions for action for unsophisticated users, but allow sophisticated users to define their own actions.

- **Miscellaneous**
    - Case matching (finding 'similar' scenarios in past events)
        - This is more like a Decision Assistance tool for the forecaster
        - However, some EMs ***may*** find this **very** useful.
    - Decision Support Services vs. Weather Hazard Management Services
        - Whatever graphical interface is used by the forecaster for Weather Hazard Management, it should be an extension of, and not contain any, Decision Support Services. We should not accept a whole new GUI, which attempts to

replicate a lot of what AWIPS CAVE can or will already do. We should add to what AWIPS CAVE can do in order to satisfy the Weather Hazard Management System.

- Forecaster Decision Support Services would likely exist in AWIPS itself (taking advantage of all of that flexibility and ability)
- Decision Maker Decision Support services should be an independent issue (ie: hospital XYZ will begin evacuation when conditions ABC are met), but it might make sense to provide Decision Support capabilities in the web-based front-end (ie: an EM wants to know when a certain geo-area will get 2 inches of rain, as certain roads will be automatically closed), thus the thresholding capability mentioned in the web-based front-end section above.

- Need to re-evaluate the list of weather hazard events/phenomena to consolidate the many overlapping types. It is currently too complicated. Hopefully, the approach using event type and magnitude will help in this regard.