1st Annual Workshop

October 30, 2009

1. List of attendees/critical IPLER collaborators

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2. Discussion Summary

***NOTE**: Workshop summary, presentations, and links will be available on the IPLER website by mid-December 2009 at www.ipler.cis.rit.edu*

(i) Don Boyd (RIT: VP Research): Introductory remarks

Don introduced provided details of the NSF PFI program, background to the NSF PFI award to RIT through a previous PFI project (*The Upstate Alliance for Innovation*), and introduced the IPLER team.

(ii) Don McKeown (RIT): Overview of IPLER & Collaborator Expectations

Don McKeown provided an overview of IPLER and got the discussion going. Ron Eguchi (ImageCat) and Brian Tomaszewski (RIT) mentioned two comparable initiatives, namely NASA's Real Time Mission Monitor (RTMM; http://rtmm.nsstc.nasa.gov/index.html) system and the GeoVantage project (www.geovantage.com). The first is especially applicable and relates to situational awareness, asset management, (e.g., during wildfires and hurricanes), and integration of various complementary data types and information. Charles Mondello (Pictometry) added a Pictometry initiative with the DHS towards real-time data transmission.

Most attendees agreed that

- it is essential to get from large data sets to products. Users do not want to interpret data, they want to base decisions on products.
- we have to identify the users and public of interest. This will vary by disaster type and also lead to different product requirements in terms of type, temporal and spatial scales.
- the expected outcomes/deliverables for various disasters have to be determined. There has to be a defined meta-document that defines how (i) the data were generated, (ii) products were derived, and (iii) how these products should be implemented.
- we have to research remote sensing model calibration. E.g., the insurance industry does not want to rely on simulation only, but require validated models.
- different products are required at various stages of disaster events. Focus on temporal stages is required. This might require a multi-tiered approach, where we monitor regions/events at lower spatial resolution and then "drill" down using higher spatial/spectral/temporal resolution sensors where red flags were raised at the first level.
- sparse data sets could prove useful for setting boundaries on models. Thus one could select a model of choice from various options using remote sensing data and analysis. An example is where the event scale could have an impact on areas outside the immediate scope of a disaster, e.g., earthquakes that have local and regional impacts. The collaborator interaction of the IPLER project will be essential. for example, DigitalGlobe at regional scales, followed by assessment at fine/local scales by airborne sensing (Kucera International and Pictometry).

- we should be aware of oversimplifications. E.g., weather conditions could severely restrict data collection over disaster areas, thus planning is required to properly dove-tail data and products from various sensors or platforms. Simulation tools could be very useful for this purpose, where integration of data and products towards answering specific disaster-related questions can be evaluated. Also, the disaster management should not focus on remote sensing alone, but should integrate all available "sensing" modalities and auxiliary data.
- data fusion will become increasingly important. This has different meanings to different people. One set of specialists want to fuse at the pixel-level, i.e., literal data fusion. Users might want to fuse at the object-level (buildings, land cover regions, etc.) or apply decision-level fusion, where products at the highest level are used for decision making. This will be evaluated in IPLER through fusion of multi-spectral and lidar data.

This was followed by a discussion around IPLER partner interactions and interaction with agencies/responders:

- Charles mentioned the need for product-level metadata that explains to agencies how the geospatial disaster engine should move. This metadata generation has to accompany all research and product development in IPLER.
- Partners (end-users) need to keep researchers and technologists in line: The USFS Resource Order and Status System (ROSS) system was used as an example - modules are sold for fire management. Perhaps IPLER can insert a new product module in this system; however, end-users need to (i) be aware of what you have to offer and (ii) need to see the value in that product offering to their "cause" (Marketing 101).
- The NSF contact and dissemination avenues need to be used to further market IPLER, its products, and capabilities.
- Ed Freeborn (private) mentioned that RIT & UB work with S&T type organizations. These organizations' blessing will go a long way towards integration and implementation of IPLER products.

Finally, the discussion focused on expectations and the following key points were mentioned:

- No money will initially exchange hands, the expectations hinge on data and information flows, as well as directing product development and aiding integration of said products in semi-operational environments.
- SBIR-type collaborations could stem from IPLER activities. Request: Please keep the IPLER team informed of initiatives that are direct results of IPLER discussions or networking. This is essential for reporting purposes.
- Internships and/or scholarship opportunities are possible from the industry collaborators. This has the benefit of training the next generation of disaster responders and providing continuous feedback to the research team regarding disaster products.

- NDA's or alternative licensing agreements are required for dissemination of example datasets from ImageCat, Pictometry, and DigitalGlobe. For use only within the IPLER framework and by collaborators. (Another option is the use of MOU's for sub-licensing of data to 3rd parties.)
- Fixed-cost contracts with IPLER co-PI's are also possible for specific disaster-related product development.

Fred Rion (Monroe County Office for Emergency Management) mentioned the county's review of their disaster mitigation plan (11/9/2009). The top disaster to NY Monroe County is flooding. he extended an invite to the IPLER team to attend the upcoming planning meeting, partake in disaster response drills, and contribute to the new Emergency Operations Center's functioning. Such disaster response exercises will form great venues for evaluation of products as potential DHS tools. Don McKeown will attend on IPLER's behalf and interact with the county's emergency response team. RIT's WASP sensor (multispectral/thermal) will potentially be used in upcoming demonstration and drill exercises.

(iii) Current status/updates

Tony Vodacek (RIT) - fire research

Tony provided an overview of fire research at RIT and discussed the key elements for next-generation research:

- Fire behavior modeling - where is the fire and where is it going next? This will facilitate proper response and resource distribution. Auxiliary data include wind speed, national fuel maps, topography, etc.
- Fuel and fuel structural assessment - will facilitate the planning activities.
- Assessment of fire impact (intensity) and subsequent recovery. What are the impacts on the affected system?

Chris Renschler (UB) - flood research

Chris provided an overview of flood/hydrology research at UB and discussed the key elements for next-generation research:

- Focus should be given to different NIST scales - refer back to integration of disaster assessment scales.
- How does one model stochastic disaster impacts? Decision support tools are required that would answer questions such as "where are disasters allowed and at what levels?"
- Ron highlighted that relatively straightforward models could be used for flood mapping. E.g., ESRI's hydro model (Ester Worker) or flood risk maps based on topographical data sets.

- Tony mentioned the need to have a temporal focus, i.e., not only response, but the entire disaster chain.

Jan van Aardt (RIT) - lidar (structural) research & products

Jan provided an overview of structural (lidar) research at RIT and discussed the key elements for next-generation research:

- Potential algorithm needs
  - Accurate and efficient surface extraction to raster formats
  - Compression algorithms for real-time applications
  - Change detection – pre- and post-disaster (quantifying change)
  - Automated feature extraction: Buildings, structures, vegetation
  - Complex structures, e.g., vegetation, built environments
- Determine requirements regarding
  - Disasters - type of products, temporal needs, etc.
  - Algorithms - complexity, product requirements
  - Systems - type, characterisctics, data match
  - Acquisition parameters - coverage and density trade-offs

(iv) Discussion: Project target sites

- Complementary/available data sets (ImageCat, Pictometry, etc.)

  - Rita disaster (Ron Eguchi; ImageCat)

    Ron mentioned that ImageCat has an online data library available (www.ecityrisk.com; www.virtualdisasterviewer.com). This includes hurricanes, floods, and fire data. ImageCat is willing to share these, but will require a NDA or licensing agreement. USGS also has NOAA data available for IPLER purposes.

    Dave Messinger mentioned that the NGA will release the Hurricane Katrina dataset January 2010 for use. This includes high spatial resolution airborne and satellite imagery. Might only be available to NGA-funded researchers, but NSF could perhaps follow-up and obtain access.

  - Galveston disaster (Charles Mondello; Pictometry)

    Pictometry demonstrated selected data set from the Galveston disaster - these data will also be made available for the IPLER project collaborators under NDA's.

  - Fire burn sites (RIT & USFS; e.g., Kentucky forest) (Bob Kremens) & floods (Cattaraugus County, NY)

Bob Kremens (RIT) also mentioned the availability of RIT WASP thermal data over fire events. ESRI was interested in making use of such temporal data to generate a fire progression sequence.

(v) Future disasters and products

- Additional areas for potential research
    - These include severe weather events (e.g., wind storms), fixed and in-transit hazmat-type situations, urban-wildland interface fire events, situational awareness, and asset management. Additional IPLER team members will be contacted in the insurance and utilities sectors.
    - Slower onset disasters, e.g., disease monitoring, also deserve attention as next generation IPLER product research. An examples is standing pools (malaria) that can be monitored via remote sensing. We need to develop base maps that can be used for change detection purposes.
    - Smaller area (fine-scale) disaster also require investigation. an example is a chemical spill that might necessitate sensing detection and products.
    - Finally, sensing should not be constrained to airborne platforms. In situ sensing instruments and networked systems will be equally important. Auxiliary data, e.g., databases of critical assets, will also facilitate modeling, monitoring, and response efforts. The full set of image processing tools and techniques need to be identified to address disaster events.

(vi) IP issues

RIT technology transfer guidelines and IP information were discussed by Bill Bond (RIT). The crux of the matter was that RIT is not on the "money-making business". The idea is to transfer knowledge and tools to the private industry for deployment and use by their clients. However, where distinct IP and potential patents become evident, RIT will negotiate with the collaborator on behalf of the institute and faculty to reach an agreement on licensing issues.