Preliminary Thoughts on a Pan American Agenda For 2009-2019

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Thank you for the opportunity to share some preliminary thoughts with you on the Pan American Agenda for 2009 to 2019. I am pleased to be able to share these thoughts with you today.

I would like to begin with a quote from an editorial that appeared in the Times newspaper of London, in June 1990, which read: "Geography is queen of the sciences, parent to chemistry, geology, physics and biology, parent also to history and economics. Geography embraces every fact on Earth." Although this quote may not be agreeable to all of us in the room today, as we tend to see our commissions as being on an equal footing, I believe that we could all agree that the relationships among cartography, history, geography, and geophysics are strong, and that at their core, these disciplines share some common lineage. I would like to suggest that cartography, and its twenty-first century descendent, digital geospatial infrastructures, can offer a means to apply the important scientific work of all four commissions of the Pan American Institute of Geography and History (PAIGH) to the pressing issues of our respective nations and to ideal of Pan Americanism that is central to our Institute.

In order to explain these ideas, I would like to ask that you imagine that it is now the year 2015, and we have been working on the Pan American Agenda for seven years with great success. Included in this success is the development and implementation of a Spatial Data Infrastructure for the hemisphere which is built upon the SDI initiatives of the nations in the Americas. Since the SDI was implemented in the 2010 to 2012 timeframe, the scientific community has been busy developing applications that use the infrastructure as a base for research, modeling applications, and a method of communicating complex information and spatial relationships to non-technical policy makers and the general public. These applications support a wide range of important functions, including emergency response to natural disasters.

Now that the stage has been set, again, imagine that it is sometime in January 2015 when suddenly, nature provides a terrible shock. In a area of South America which contains territory from three PAIGH member nations, a magnitude 8.6 earth quake occurs, followed shortly thereafter by a Tsunami that inundates the coastal areas in the affected zone. Many communities have suffered significant damage to buildings and infrastructure from the earthquake, its aftershocks, and the Tsunami. The emergency response organizations of the affected nations are called into action. Their respective militaries have been asked to support rescue and recovery operations and international assistance groups like the Red Cross have pledged their support. Thousands of people are left homeless, power and telephone services are damaged, and the situation in the earth quake zone and along the coast is chaotic. Fortunately, however, in the three Capitals, these services are unaffected and all three nations have developed emergency operations centers that have complete geographic information systems capabilities and cadres of trained technicians. It is quickly agreed among the government leaders that each nation will share information resources in the response and recovery operations and that the non-governmental organizations will also share in the resources that the emergency operations centers provide. Because these nations have participated in the PAIGH-sponsored Standards for the Americas initiative, they all have the ability to share and use each other's geospatial data in an interoperable manner. Also, since the metadata for those geospatial data are documented in accordance with ISO standard 19115 and are electronically available along with metadata from the surrounding nations on a server at the PAIGH headquarters in Mexico City, the non-

governmental organizations can search and discover the geospatial data they need without adding to volume of network traffic in the emergency operations centers. The PAIGH metadata service enables the users to access and connect to the needed metadata that includes information about the data held by the host nations, including the transportation network, surface waters, buildings, power transmission lines, and natural gas and oil pipelines for the effected areas. These data are easily brought together and used and because those datasets were all collected to common standards, they can be integrated and overlaid on newly acquired commercial satellite imagery, which has been made available through the International Charter on Space and Major Disasters for Emergency Response. With these data in hand, the three affected nations each conduct a quick analysis of the damage and assess how to get relief to the affected areas and where potential for additional, follow-on damage may occur because of after shocks, dam breaks, or fires from damaged pipelines.

With the assessment of this information in hand, the emergency response directors want to know what lessons have been learned in past disaster responses in the hemisphere, so they can avoid any repeat of past problems. Fortunately, the PAIGH has recently published an up-to-date history of natural disasters in the Americas and the staff is directed to scan that publication as the response teams are being assembled. Very quickly, those teams are deployed and with the hand-held computers and rugged laptops they carry, they bring with them all of the base geospatial information as well as the results of models for flood inundations, potential fire risks, the lessons learned from similar disasters in the past, accurate information about damage to the transportation network, current weather models and analysis of how weather changes may effect their ability to reach those in need. All the information is continually being updated and transmitted to their locations and devices electronically. Initial reports of loss of life and property are coming into the operations centers from local news organizations and the officials in the affected area. Those reports are obviously not from geospatial experts, rather mainly from local residents, who while very familiar with local place names, don't have the ability to reference locations by coordinate systems. But again, thanks to the efforts of the nations to standardize the policies for geographic names, it is very simple for the staff of the operations centers to convert place names to geographic coordinates and provide those real-time reports to the response teams electronically. Thus, this real time information from rescue workers and other citizens is able to be used immediately with precise geolocation information collected by experts with GPS units to respond to the areas of greatest need.

Shortly after the response teams reach their destinations, they begin to feed updated digital maps, often with embedded ground photos of the damage, back to their respective capitals. The governments of the three nations are then able to quickly assess where non-governmental and international organizations can contribute most effectively and direct their aid efforts. These same products are also used to provide the citizens with updates on the damage and the progress of recovery.

Within days, the situation has stabilized and aid is effectively reaching those who need it most. One of the senior officials from the Ministry of the Interior of one the affected nations is overheard making the comment "I don't know what all this talk about a geospatial data infrastructure is, or what spatial modeling is all about, but I do know that when I needed helicopters to put doctors and supplies where they where needed, and trucks to find a way to get

through those damaged roads, those folks down in the operations center gave me what I needed every time!".

This little fictitious story may help express what I think could be several areas of focus for the geospatial related project work for the coming decade. So now I would like to ask us to consider; what are the necessary components of the Pan American Agenda for 2009-2019 so that a scenario like this could be a reality? I will suggest five areas of focus that could answer this question, and therefore, contribute to our Agenda.

First, we will need a Pan American geospatial standards governance structure and supporting implementation activities under the leadership of the Pan American Institute of Geography and History. Why is this necessary, you might ask, when many of the member nations have their own national standards organizations, and some participate directly with international standards groups such as the International Organization for Standardization Technical Committee 211 (ISO TC 211) or the Open Geospatial Consortium (OGC)? The reason for PAIGH standards governance is that for supranational standardization to assure interoperability among our nations, we must agree on which standards to employ, and of equal importance, agree on the development and adoption of specific implementation profiles of those standards that meet the unique needs of our hemisphere. A good example of these needs can be found in the work that is underway to develop a common metadata standards profile by harmonizing the Latin American Metadata Profile (LAMP) and the North American Metadata Profile (NAP). These two metadata profiles are being brought together both in terms of specific content and in terms of the languages of our respective nations. Standards, like the technology that drives them, never stand still for long. An institutional governance structure with broad and active participation from the effected organizations will help assure that geospatial standards evolve and mature. Our hemisphere will be poised to take advantage of those advances and do so in a well organized fashion that keeps us in step both with our neighboring nations, and the hemisphere as a whole. PAIGH is the right organization to lead this standards governance activity under the banner of "Standards for the Americas".

A Second focus area should be on the build out (data provisioning) of the SDI Americas and in particular, a focus on those data themes that are useful for emergency response, poverty alleviation, health and health services delivery, economic development, cultural preservation, and regional and hemispheric scientific studies. The use of standards as previously discussed will facilitate supranational and global interoperability. It will continue to be the responsibility for each member nation to develop and maintain the data for their territory, but through cooperative program planning, technology transfer, and occasional assistance programs such as the project funding from PAIGH and other international organizations, the goal of an SDI is achievable in the first half of the time period for our Agenda. An activity that PAIGH should strengthen during this period is the outreach to international development organizations such as the Inter-American Development Bank, the World Bank, and the United Nations. The power of geospatial information to assist the projects that these organizations support cannot be overstated, but the actual support provided to the geospatial enterprise seems small in comparison to the opportunities that exist. Again, PAIGH is the right organization to be making the case for additional international investment in the geospatial programs of our nations.

A third focal point for our institute should be to assure that the human capital resources are in place in each nation to exploit the data and applications of the SDI. The information infrastructure, scientific modeling applications, land cover classifications, and other components of the SDI Americas will only be of value if there are knowledgeable, skilled people in each of our nations to take advantage of these resources. PAIGH should strengthen and increase its commitment to educational activities for the development of geospatial expertise in the member nations. The PAIGH Commission on Cartography should examine the scholarship programs of the Commissions on History and Geophysics and determine the viability of initiating a scholarship program for the geospatial sciences. Additionally, the José Joaquín Hungría Morell Course on Geographic Names should be examined as a potential role model for the development of additional technical training courses to be offered by PAIGH. The benefits of the Geographic Names Course go well beyond simply providing technical training and include a focus on developing a standardized names policy structure across our hemisphere. The educational mission of PAIGH cannot be focused solely on the technical training of geospatial analysts or operators, but must also include the need to provide education to those in other professions that use geospatial data, but are not in our production cycle. These professions include health care, agriculture and forest management, transportation planning, water treatment and distribution systems engineering, and emergency response. By increasing the awareness of non-geospatial practitioners about how geospatial information can support their work, we will be increasing the demand and customer base for the data and services that we in PAIGH member organizations provide. This in turn will highlight the need to provide resources to the important work of our organizations. Additionally, an increasingly diverse customer base will open new opportunities for partnerships with organizations that can assist in the development of the infrastructure and the applications.

The three focus areas above are really about building the foundation, so that the development of applications, models, and visualizations can turn the investment in those focus areas into solutions to real world problems that our nations face. There are many pressing questions that spatial data can help to answer, some of these include:

> What are the best ways to characterize areas at risk from natural hazards and communicate the hazards and risks to a diverse community of decision makers, emergency response teams, and the public?
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> What types of information do our business and national leaders need to make the most informed decisions about appropriate and cost effective mitigation strategies and ultimately reduce losses from natural hazards to businesses, residences, and critical facilities and infrastructure?
>
> How do ever-changing land-use patterns influence hydrologic system dynamics? For example, the timing and magnitude of stream flow and recharge?
>
> How do environmental processes and human activities influence the distribution, availability and toxicity of natural and man-made toxicants in water, air and biota?

How do the impending changes in climate potentially affect the supply and demand for water, food, energy, and other related economies?

Providing the answers to questions like these, which I have adapted from the US Geological Survey's Science Strategy work, will provide a significant return on the investment in a Spatial Data Infrastructure for the Americas. These types of questions really matter to the quality of life of our citizens and are important for the work of PAIGH as we move into the next decade. All of these questions cross national and scientific discipline borders and so require both multi-national and multi-disciplinary research to be adequately addressed. It will be increasingly important for us to considering sponsoring projects that help develop the applications and models that address these issues using the investments that we will continue to make in spatial data infrastructures.

Finally, the fifth focus area I will propose is outreach and marketing. Each of the four areas discussed above contain elements of an outreach strategy, but what I would like to suggest is that we take a focused approach to the challenge of developing wide awareness of and support for the Pan American Agenda, by using the development of the agenda itself as a means for gaining this support. Specifically, I propose that each of us in the Institute, through our own national sections, serve as ambassadors for this activity to our respective organizations. By actively soliciting the participation of our home organizations in the process of developing the agenda, I believe we will be sowing the seeds of future participation in the scientific work of the agenda. People are much more likely to support work they believe they have had a voice in helping to design. The specific mechanisms for engaging those organizations need more thought, but the principal of engagement is what I propose today. Additionally, I believe that outreach to other international organizations would be very beneficial. The fact that PAIGH is identifying our strategic goals for the next decade should make the opportunities for collaborative and jointly funded projects with other international organizations more plentiful. However, for that environment to develop, we must assure that those organizations know about and support the goals that we have set in our Pan American Agenda. I suggest that we specifically target a small number of potential partner organizations and conduct a thorough outreach campaign to those organizations to assure their buy-in to our agenda. The national sections from the nations that those organizations are resident in, would potentially be good candidates to help carry out the campaign. The thinking behind these outreach proposals is simply that we expand beyond the traditional lines of communication that we have established and increase the visibility of the work of the institute with a goal of increasing funding for projects that are part of our agenda.

These thoughts are presented today with a hope that they may stimulate some ideas either for discussion later today, or as we work on the Pan American Agenda in the coming months. If I have prompted you to either agree with the focus areas I have suggested, or to disagree, than I am satisfied that I have achieved what I set out to do. To begin the dialogue was my goal.

I opened this talk with a quote about geography, and would like to close with a quote in deference to my colleagues in history; Oscar Wilde said "Anybody can make history. Only a great man can write it."

Thank you very much.