

# Facilitating Collaboration between the Higher Education and Practitioner Communities to Promote Advancements in Scientific and Geographic Literacy

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# Table of Contents

<b>Table of Contents</b> .....	<b>ii</b>
<b>List of Figures</b> .....	<b>ii</b>
<b>Introduction</b> .....	<b>1</b>
<b>Report Methodology</b> .....	<b>3</b>
Communication Opportunities.....	3
Collaboration Opportunities.....	3
Data Guidelines.....	4
<b>Findings and Recommendations</b> .....	<b>5</b>
3.1 Communication Opportunities.....	5
Professional Organizations and Events.....	5
National Emergency Management Association (NEMA) .....	5
International Association of Emergency Managers (IAEM) .....	6
National Alliance for Public Safety GIS (NAPSG).....	6
Association of State Floodplain Managers (ASFPM) .....	6
State Emergency Management Conferences .....	6
Peer-Reviewed Journals.....	7
FEMA Higher Education Program .....	7
3.2 Collaboration Opportunities.....	7
Research.....	8
Internships.....	9
Webinars and Workshops .....	9
Finding Collaborators .....	10
Local Outreach.....	11
Challenges.....	12
Academic Calendar Limitations .....	12
Contracting Challenges.....	12
3.3 Data Guidelines.....	13
Data Best Practices .....	13
Design for Repurposing .....	13
Legal or Policy Constraints.....	14
Data Submission Requirement.....	14
Data Documentation .....	14
Data Distribution.....	15
<b>Acknowledgements</b> .....	<b>19</b>

# List of Figures

Figure 1: Map of Hazards and Disaster Research Centers at Academic Institutions .....	11
Figure 2: North Carolina Risk Management Portal Example of Mitigation Options .....	16
Figure 3: IndianaMap Layer Gallery .....	16
Figure 4: IndianaMap Layer Gallery Watershed Layers.....	17

## Section

# 1

# Introduction

According to the Natural Hazards Center<sup>1</sup>, there are currently more than 100 hazard and disaster research centers at academic institutions in North America and the Caribbean doing work on a wide range of social science, public health, and engineering research that is related to disaster management.

Research centers, along with the faculty and staff who support them, represent an essential resource. Effective communication and coordination between researchers and practitioners can only enhance the practice of emergency management both now and in the future.

In August of 2017, FEMA's Emergency Management Institute Higher Education Program released a report titled *Next Generation of Core Competencies for Emergency Management Professionals: Handbook of Behavioral Anchors and Key Actions for Measurements*.<sup>2</sup> The report identified a series of core competencies, which included scientific literacy and geographic literacy defined as follows:

### Scientific Literacy

*The emergency management professional possesses an understanding and working knowledge of scientific processes, as well as a familiarity with the natural, social, fiscal, and applied sciences. Diverse scientific knowledge is essential as they inform the management and understanding of disaster risk and vulnerability on local, regional, national, and global levels. Scientific literacy is the capacity to objectively and systematically work through complex problems, using the scientific process to identify questions, interpret evidence based findings to inform decision making, and effectively communicate the results to policy makers and the public. Through the use of the scientific process and principles in relationship to hazards, risks, and vulnerabilities, practitioners can deliver enhanced value to enable the communities they serve to thrive.*

### Geographic Literacy

*The emergency management professional possesses a foundational and comprehensive understanding of the geographic configurations of hazards, vulnerability, and risk. Geographic literacy comprises knowledge of the earth's physical and human systems, utilizing a spatial foundation where hazards, vulnerability, and risk can be conceptualized. The interconnections,*

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<sup>1</sup> Natural Hazards Center, 2018. <https://hazards.colorado.edu/>

<sup>2</sup> Feldmen-Jensen, Shirley; Jensen, Steven; Maxwell Smith, Sandy. *Next Generation of Core Competencies for Emergency Management Professionals: Handbook of Behavioral Anchors and Key Actions for Measurements*. Federal Emergency Management Agency. August 2017.

*interactions, and implications across complex physical, built, and social environments can be analyzed to track changing disaster risk profiles and inform decision making.*

The recommended competencies should be integrated into higher education curricula to prepare future generations of emergency management professionals. There is also a need for those in academia to engage with current practitioners to communicate advances in scientific and geographic research and to ensure that the experience and needs of practitioners inform research, teaching, and service agendas. In addition, academics and practitioners should seek opportunities to collaborate in the application of scientific and geographic advances toward current and future needs. The paper provides guidance on how collaborations can develop and thrive.

## Section

# 2

# Report Methodology

Seventeen in-person and telephone interviews with representatives of state and local government, academia, and the private sector were conducted. Participants were selected based on their length of tenure in a position related to a subject area of relevance to the study. Previous collaboration experience with the opposite stakeholder group, practitioners with academics or academics with practitioners, was also required in order to better ensure that feedback was based on actual experience rather than speculation. All opinions expressed by participants were their own and do not represent the positions of the organizations with which they are affiliated.

Each participant was asked to respond to questions related to communication and collaboration between practitioners and academics. Participants were also asked to comment on questions related to scientific and geographic data collected by researchers and practitioners. Specific questions included:

### Communication Opportunities

- What strategies would be successful to connect emergency management practitioners to academics who are working or researching in topics related to scientific and geographic literacy?
  - a. How should practitioners learn about academic research related to scientific and geographic literacy?
  - b. How should practitioners learn about the existence of faculty/staff who specialize in topics related to scientific and geographic literacy that provide services to practitioners?
  - c. How can practitioners/academics learn about and/or share opportunities for student internships?
- In addition to other communication opportunities, are there emergency management practitioner professional organizations that academics should know about and, conversely, what academic organizations should practitioners know about? In each case, what is the most effective way to engage with those entities?

### Collaboration Opportunities

- What obstacles to collaboration between practitioners and academic institutions have you, or others that you know, experienced?
- Do you have any recommendations for how existing obstacles could be overcome?

- Do you have an example of a successful collaboration between your organization and an academic institution/practitioner organization that you would be willing to share? Did you encounter any logistical hurdles and how did you overcome those?

### **Data Guidelines**

- What guidelines should be considered by practitioners and academics when collecting scientific or geographic data that will make it possible for the data to be repurposed in the future? For example, what information should be collected that can allow data to be mapped and analyzed using GIS or other similar technologies?

## Section

# 3

# Findings and Recommendations

Two themes emerged from the interviews. One was a need for greater awareness among emergency management practitioners of scientific and geographic advances that impact the emergency management profession. The other was that, while there exist successful examples of collaboration between academics and practitioners, there is clearly a need to facilitate more opportunities.

## 3.1 Communication Opportunities

One of the most frequently cited obstacles to realizing the benefits of collaborations between academics and practitioners was overcoming a lack of awareness on the part of each. Researchers within the higher education community tend to publish their findings in peer-reviewed academic journals or present them at academic conferences. While some practitioners may explore these resources, it is far more common that this is not the case. In addition, scientific research tends to be reported in specialized language that is not easily understandable by non-experts.

Suggestions for enhancing awareness offered by those interviewed for the report are described below.

### Professional Organizations and Events

Emergency management professional organizations offer potential opportunities for academics to interact with practitioners. The following list, while not intended to be comprehensive, provides examples of some of the better known organizations.

#### **National Emergency Management Association (NEMA)**

According to its website, NEMA is a nonpartisan, nonprofit 501(c)(3) association dedicated to enhancing public safety by improving the Nation's ability to prepare for, respond to, and recover from all emergencies, disasters, and threats to our Nation's security. NEMA is the professional association of and for emergency management directors from all 50 states, 8 U.S. territories, and the District of Columbia. NEMA provides national leadership and expertise in comprehensive emergency management; serves as a vital emergency management information and assistance resource; and advances continuous improvement in emergency management through strategic partnerships, innovative programs, and collaborative policy positions.<sup>3</sup> NEMA conducts two annual national forums. They focus on policy development, emergency management concerns, legislative issues, and Federal relations.

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<sup>3</sup> National Emergency Management Association - <https://www.nemaweb.org>

## **International Association of Emergency Managers (IAEM)**

IAEM is likely the largest of the professional emergency management organizations. According to its website<sup>4</sup>, IEAM has more than 6,000 members worldwide. IAEM describe its mission as being “to advance the profession by promoting the principles of emergency management; to serve its members by providing information, networking and professional development opportunities; and to advance the emergency management profession.” While most of the professional organizations listed here do not appear to have a formal process that encourages collaboration with higher education, such is not the case with IAEM, which established a memorandum of understanding for working with academic institutions that value the IAEM certification program.

## **National Alliance for Public Safety GIS (NAPSG)**

NAPSG defines its mission as “to equip emergency management and public safety with the knowledge, skills, and resources to apply decision-support technology and data in enhancing preparedness and building a more resilient nation.”<sup>5</sup> It is a consortium of national organizations which represent local government, public safety, and health professionals with a shared vision of advancing the effective use of GIS for public safety. NAPSG provides a range of resources including best practices and standards, education and training, and more. In December of 2018, NAPSG will holds its fourth annual National Geospatial Preparedness Summit which it describes as the Nation’s only preparedness summit dedicated to advancing the use of innovative technology for first responders.

## **Association of State Floodplain Managers (ASFPM)**

The ASFPM is an organization of “professionals involved in floodplain management, flood hazard mitigation, National Flood Insurance Program, and flood preparedness, warning and recovery. ASFPM represents flood hazard specialists of local, state and federal government, research community, insurance industry and the fields of engineering, hydrologic forecasting, emergency response, water resources and others.”<sup>6</sup> ASFPM holds an annual conference, and its 37 state and regional chapters tend to also host conferences within their local areas. ASFPM provides a wide range of resources for its members along with managing the well-known and respected Certified Floodplain Manager credentialing program.

## **State Emergency Management Conferences**

Most states have at least one annual emergency management conference. Conference participants typically include local leadership as well as members of their staff such as planners. For those in academia who are seeking opportunities to engage with local practitioners, conferences offer an excellent opportunity to do so. State emergency management conferences are typically managed by an emergency management association within the state that supports conference coordination and other functions for the emergency management practitioner community.

Several interviewees suggested that breakouts or workshops that provide opportunities for academics and practitioners to collaborate on topics of mutual interest would be desirable at conferences. For

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<sup>4</sup> International Association of Emergency Managers - <https://www.iaem.com/>

<sup>5</sup> National Alliance for Public Safety GIS Foundation - <https://www.napsgfoundation.org/>

<sup>6</sup> Association of State Floodplain Managers – <https://www.floods.org>

example, a workshop on how to make communities more resilient to the potential impacts of climate change could incorporate academic research on climate change as well as discussion and planning to address the practical applications of that research.

### **Peer-Reviewed Journals**

As earlier noted, it is not common for practitioners to read peer-reviewed literature. Reasons range from lack of awareness of publications to the tendency for them to be theory based and frequently written in specialized terms that may be difficult to understand by those without extensive scientific knowledge. At times, they may also lack specific examples of practical applications. As a result, the valuable work of researchers may be under-utilized in informing and guiding how communities prepare for and respond to disasters.

The FEMA Higher Education Program should convene a meeting of journal editors who publish material in areas of interest for the purpose of developing a model that more effectively gets the work of scholars into the hands of practitioners. The meeting should take place either at a FEMA facility or at an academic forum such as the annual Association of American Geographers conference. One idea that should be considered is requiring—or at least encouraging—descriptions of practical applications of research in paper submissions.

FEMA should also encourage academic newsletters to include practitioners in their mailings, with an opt-out option, to convey scientific and geographic research advances.

### **FEMA Higher Education Program**

The FEMA Higher Education Program serves a key role in facilitating communication within the academic community as well as between the academic and practitioner communities. Among its many services, this program publishes a weekly newsletter that provides a wide range of information about current events, research, and opportunities within the academic and professional emergency management communities. It also supports a webinar series and publishes white papers such as this that convey research of relevance to these communities. In addition, it hosts a number of events including an annual conference at the FEMA National Emergency Training Center that engages hundreds of academics and practitioners over several days who collaborate on identifying ways to educate current as well as future emergency management professionals.

## **3.2 Collaboration Opportunities**

One of the most consistent interview findings was a desire for more collaboration between academics and practitioners. There is an increasing tendency for practitioners to embrace advances in science and technology. The key is to provide them with the resources and opportunities to learn about advances. Section 3.2 outlines some opportunities, discusses how to better connect practitioners and academics, and explores a series of challenges that need to be overcome.

Three areas of possible collaboration are explored: research, educational webinars and workshops, and internships.

## Research

One of the most important areas in which academia can contribute to the practice of emergency management is through research. As earlier noted, the Natural Hazards Center has identified more than 100 academic research centers in the United States. Research centers frequently leverage the talents of multiple faculty and professional staff in providing a range of services that include applied research, workshops, and others. In addition, there exist non-research center-affiliated researchers in emergency management as well as related fields such as engineering, economics, geology, sociology, and many others who conduct valuable research that can and should inform practitioners.

Unfortunately, while academic research can offer valuable insights and guidance related to the practice of emergency management, a number of challenges limit the potential that it offers. For example, tenure is typically tied to the ability of faculty to publish in peer-reviewed journals which, as noted earlier, tend to focus on theoretical vs. applied research. While universities do value applied research and community service, they tend to value basic research more highly in the reward structure for faculty.

Researchers may also have research priorities that do not align with those of practitioners. For example, practitioners, especially at state or national levels, tend to be more interested in generalized approaches to addressing issues than community-specific ones. This tendency can be problematic when conducting systematic research.

Funding research through some sources, such as the National Science Foundation (NSF), can also be challenging for a variety of reasons. For example, many grants are typically less focused on addressing specific, practical questions and more on research that addresses fundamental or basic scientific problems. There is also a perception that grants are vehicles to advance the prospects of tenure-track faculty, with the rewards system favoring basic science rather than applied research.

There were several suggestions offered for advancing opportunities for applied research that could better connect academia with practitioners.

### *Opportunities*

- Federal agencies, such as FEMA, could specifically require that research-related funds involve collaboration between academia and practitioners. A good example is the NOAA/NWS Collaborative Science, Technology, and Applied Research (CSTAR) Program which “creates a cost-effective transition from basic and applied research to operations and services through collaborative research between operational forecasters and academic institutions which have expertise in the environmental sciences.”<sup>7</sup>
- Universities could be encouraged to recognize the value of applied research in their system of rewards, whether in awarding tenure or promotion or through merit pay increases. Providing

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<sup>7</sup> CSTAR Program - <http://www.nws.noaa.gov/ost/cstar.htm>

specific examples of how the work benefits communities would appear to fit well within the civic engagement mission of universities.

- Universities receive reimbursement for indirect costs in their federally negotiated rates. Some universities direct a portion of this income to the faculty that generate them with the stipulation that the funds be spent to further research. FEMA could encourage other universities to consider a similar model.

## Internships

Internships were one of the most often suggested forms of collaboration. Both practitioners and academics recognized the multiple benefits of embedding students in emergency management organizations. Students benefit by seeing how the information that they learn in the classroom applies to “real-world” practice. The practitioner benefits through new ideas and knowledge that the student brings to his/her organization. Faculty benefit through establishing relationships with practitioners that can guide their teaching, research, and service.

While the value of internships has long been recognized, it was repeatedly observed in the interviews that there are impediments to making them even more successful. Many practitioners complained that they simply did not know where interns could be found. Likewise, faculty with students seeking internships were unaware of the opportunities for internships within practitioner organizations.

There are examples of successful and ongoing activities that seek to promote and facilitate internships. The International Association of Emergency Managers maintains an internship opportunity board.<sup>8</sup> The FEMA Higher Education Program posts internship opportunities in its weekly newsletter and it supports a Jobs & Internships Special Interest Group<sup>9</sup> whose mission is to serve as the Higher Education community hub for inquiry, information, and sharing good practices to create and sustain meaningful internships and successful job placement in the field of Emergency Management.

In addition to these solutions, an additional approach for addressing lack of awareness identified during the interviews for this study is to develop state-level web-based platforms that provide a single point through which to share information about credit or fee-based internship needs and opportunities. A platform for each state could be housed either within a state agency or within another entity such as a university or college. Faculty with students seeking internship opportunities could communicate their needs through the platform. Likewise, practitioners could share information about the availability of internship opportunities. FEMA should support the development and testing of a prototype platform to identify the most effective design of the tool as well as marketing of its availability. The tool could then be distributed to other states.

## Webinars and Workshops

Many higher educational institutions offer workshops and webinars that provide scientific and geographic awareness to practitioner audiences. Some of these educational offerings consist of short

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<sup>8</sup> International Association of Emergency Managers Internship Opportunity Board - <http://www.iaem.com/jobextboard.cfm?cat=intern>

<sup>9</sup> Jobs & Internship Special Interest Group - <https://training.fema.gov/hiedu/specialinterest/jintsig.aspx>.

presentations while others may involve workshops with hands-on activities and last from hours to days in length.

Practitioner communities are increasingly seeking out academics to support their own training and educational outreach. For example, the Indiana Geographic Information Council offered a series of webinars on emergency management topics in the spring of 2018. The series included a webinar on the latest advances in spatial technologies and methods related to atmospheric hazards offered by a research faculty member from the University of Wisconsin.<sup>10</sup>

The FEMA Higher Education Program also offers a webinar series that addresses topics of interest to academics as well as practitioners. 2018 webinars, for example, have addressed topics ranging from the role of culture in FEMA's strategic plan to the Next Generation Core Competencies that should inform the design of academic emergency management programs. These presentations, as well as those offered in previous years, can be accessed from the Higher Education Program website.<sup>11</sup>

One of the higher education respondents also suggested that they commonly invite practitioners to audit, and even participate in, classroom lectures. This provides a learning opportunity for everyone present. The practitioner learns about advances in research while students and faculty are able to hear about and consider how research might be applied in practice.

## **Finding Collaborators**

While there are ample reasons for better collaboration between academics and practitioners, one of the most daunting challenges is simply connecting these groups. It is not realistic to suggest that practitioners will seek out individual faculty members who have overlapping interests. Instead, the most effective path to establishing connections could be through academic research centers and institutes. Figure 1 shows a map on the Natural Hazards Center website which reveals the location of academic hazards research centers in the United States. Users of the Natural Hazards Center website can obtain contact information for each center by interacting with the map.

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<sup>10</sup> Hubbard, S. "There's a tornado coming! Advances in GIS for mapping and modeling weather related hazards. February 21, 2018.

<sup>11</sup> FEMA Higher Education Program webinar series library - <https://training.fema.gov/hiedu/femawebinar.aspx>

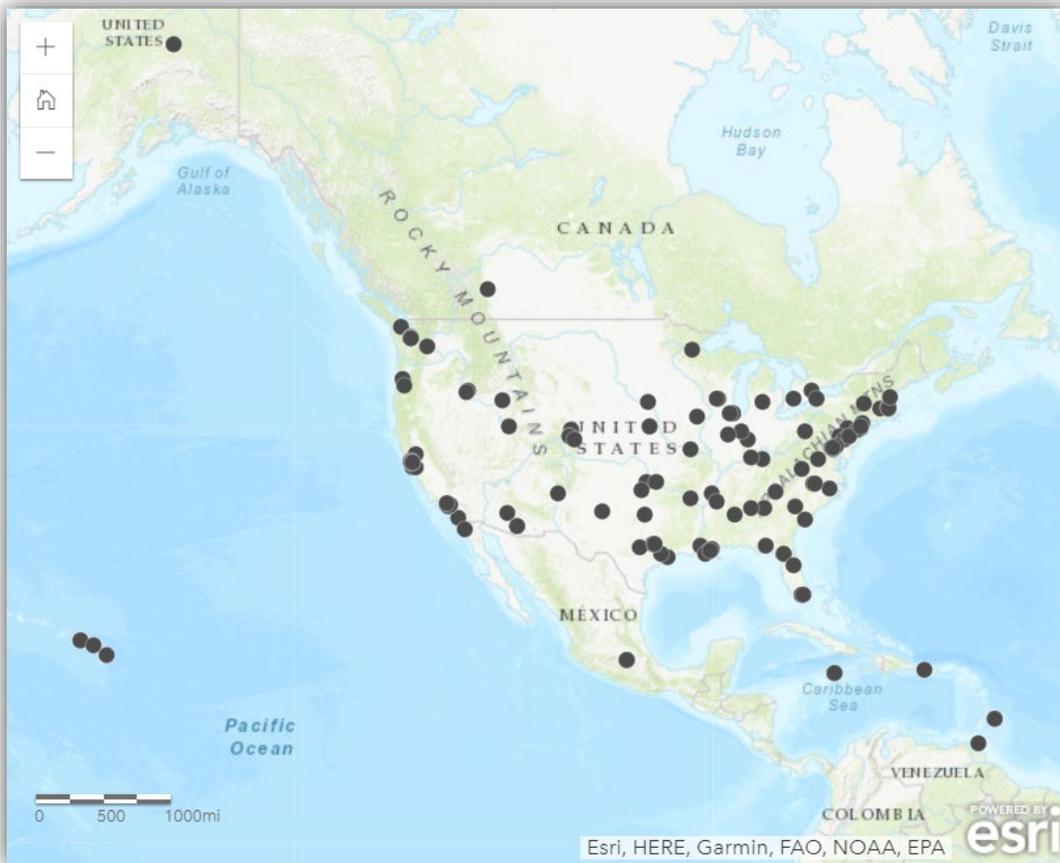


Figure 1: Map of Hazards and Disaster Research Centers at Academic Institutions

Research centers bring together experts in their fields within, and often across, universities. They can offer a variety of services of interest to practitioners including publications that describe practical applications of research, workshops, mitigation planning support, tool development, and more. The recent creation by the Natural Hazards Center of a user-friendly map of research centers is a considerable advancement in bringing awareness of their existence to practitioners. The existence of the map and associated information should be heavily promoted by Federal agencies as well as regional and state emergency management stakeholder organizations.

### Local Outreach

Local emergency management representatives interviewed for this report expressed interest in having faculty from area colleges and universities visit with them. The purpose of such visits would be to share information about what they or their colleagues are researching that might inform and guide mitigation planning or other aspects of emergency management. The key is to understand which faculty are engaged in research that is relevant to emergency management professionals. FEMA should make university academic and research officers aware of this need and ask for their assistance in connecting faculty with the local emergency management community.

A particularly promising new local outreach initiative of the FEMA Higher Education Program is a series of 1-day regional engagements. These are designed to offer an opportunity for higher education

institution faculty and staff to share success stories and identify opportunities to partner with one another as well as the practitioner community through internships, service, and education. These engagements are facilitated by the FEMA Higher Education Program in collaboration with FEMA regional staff. This approach serves to inform all who participate of the needs of the emergency management community within the region and the opportunities for academia to serve them. Materials from recent regional engagements can be accessed from the FEMA Higher Education Program website.<sup>12</sup>

## Challenges

While there exist many opportunities for collaboration, there are also a few challenges in addition to those noted above that must be overcome. Two of the most common are academic calendars and contracting requirements.

### Academic Calendar Limitations

Availability of faculty as well as student interns may be limited by the academic calendar. Faculty-supported projects and internships may have to be structured to exist within the confines of a semester, for example. Certain aspects of emergency management, particularly those related to disaster operations, are on-demand in nature with short response times to prepare and deliver products. For this reason, there is typically not a good fit for academic collaboration with practitioners in this segment of emergency management. While academics may be available in summer months when teaching loads are typically lighter, they are often better equipped to support activities that have flexible timelines.

### Contracting Challenges

Federal and state contracting guidelines can often conflict with university policies. Typical areas in which problems surface include intellectual property and arbitration clauses. Resolving these issues can lead to long negotiation periods and related delays in securing funding. In order to head off these difficulties, it is often useful to arrange Memorandum of Understanding between organizations so that tasks can easily be identified and contracted with minimal delay. One interviewee offered that a creative strategy for overcoming contracting challenges might be to identify a cadre of experts who could be enlisted by emergency management organizations when needs arise and to negotiate in advance with the university and faculty the terms on which they can be engaged. Practitioners should also be aware that some faculty may provide support on a pro-bono basis depending on the situation, although this should not be an expectation on the part of practitioners.

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<sup>12</sup> FEMA Higher Education Program Regional Engagement Materials - <https://training.fema.gov/hiedu/latest/2018.aspx>

## 3.3 Data Guidelines

One of the most significant opportunities for expanding the relationship between academics and practitioners relates to the creation and sharing of scientific and geographic data.

### *Data Creation Examples*

- **Mitigation Planning** – County and state mitigation planning often involves collection and/or development of a vast amount of data that characterize exposure and risk in a community. Examples of data related to exposure to hazards may include information about buildings, infrastructure, population characteristics, and more. Risk-related information may include depictions of hazard extent and frequency as well as potential loss impact models. Additional information may also be gathered related to costs associated with the mitigation planning process such as administrative overhead costs.
- **Disaster Response and Recovery** – The types of data collected during and after a disaster include depictions of the hazard extent from imagery or other sources; estimations of social and economic losses; distribution of aid; and more.
- **Research Initiatives** – The range of data collected to support research can vary widely. However, unlike the type of data typically collected by practitioners to support disaster mitigation planning, response, or recovery, data gathered for academic research is typically focused on addressing a specific question. Awareness of data may be limited to a very small community but, depending on the information collected, may have value beyond the purpose for which it was created.

University libraries are increasingly creating data repositories that manage research data. An example is Indiana University which leverages DSPACE<sup>13</sup> in its Digital Library of the Commons to create an open data repository for the collection and management of research data. Knowledge of university research libraries is likely limited among practitioners. FEMA should consider holding discussions with university libraries to consider how resources and associated data could become better known and available to practitioners.

### **Data Best Practices**

There are a variety of opportunities to more effectively leverage scientific and geographic data collected by those working in academia as well as practitioner organizations. The following illustrates some of the steps that data developers can implement to make their data more accessible and useful beyond its original purpose.

#### **Design for Repurposing**

Data repurposing involves using existing data to answer new questions. Data repurposing is very different than data reuse which involves using the same data to do the same thing multiple times. While data design is often driven by project goals as well as time and budget constraints, the potential for data

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<sup>13</sup> DSPACE - <https://duraspace.org/dspace/>.

repurposing can often exponentially increase with the addition of a few new variables or the modification of others.

One of the most important types of information that can greatly expand the value of data is location. By “spatially enabling” data, tools such as geographic information systems can be leveraged to manipulate and visualize it in many different ways. Perhaps more importantly, spatially enabling data empowers researchers and practitioners to determine how different types of data relate. There are a variety of ways to spatially enable data. The most obvious is inclusion of a coordinate location – for example, the latitude and longitude of a building impacted by flooding. However, other geographic location information can also often be leveraged to associate data to a map coordinate such as street address, zip code, and parcel number.

Another factor that influences how easily data can be repurposed is the format in which it is stored. Whenever possible, data should be stored in a format that is easily transferrable to other formats. For example, an Excel file can be migrated into a statistics application or a GIS software tool with relative ease. Such is not necessarily the case when data is stored in a Word document, PDF file, or other format.

### **Legal or Policy Constraints**

Data authors need to be aware of constraints imposed on data sharing by laws as well as policies. In some instances, such as with personally identifiable information associated with health, laws exist that specify strict limits on what can be shared and how. Where possible, there should be language included in contracts for the development of data resources that make the data available for reuse with limited or no restrictions.

### **Data Submission Requirement**

One very simple action that could expand the amount of data available for repurposing is to require data inputs used in the preparation of reports related to emergency management to be included as a deliverable. A good example of where such a practice could be implemented is in the preparation of mitigation plans. Many mitigation plans currently incorporate maps, tables, charts, or other information generated with a geographic information system or other technology. The data developed to support mitigation plans can often be repurposed for a wide range of other uses. For example, a map of critical facility locations developed for a mitigation plan would also be an invaluable asset for disaster operations. However, the utility of that data is severely diminished if it is not available in a digital, GIS-enabled format so that it can easily be integrated with other information.

### **Data Documentation**

Detailed documentation is one of the essential elements required for enabling data to be repurposed. Yet, one of the most common deficiencies of data is a lack of documentation. Critical documentation elements include when the data was developed, why it was developed, when it was created and how often it is updated, any use constraints, detailed information about the data structure and attributes, and more. Data authors should diligently ensure that data is properly documented according to

established standards and protocols. For example, GIS data should adhere to the Federal Geographic Data Committee's metadata standard<sup>14</sup> or some equivalent.

## **Data Distribution**

Web-based portals and platforms offer a venue through which to ensure that data associated with disaster mitigation, preparedness, response, and recovery can be discovered and shared with ease. Portals and platforms are especially helpful in managing and sharing geospatial data. These resources are being developed with increasing frequency by various government and academic organizations. One of the most recent examples at the Federal level is GeoPlatform Disasters<sup>15</sup> which brings together disaster-related information compiled across multiple Federal agencies as well as contributed data from communities. The platform includes multiple applications and tools that can be used on the platform or even incorporated into other web applications. GeoPlatform Disasters currently has more than 160,000 datasets registered in its catalog.

One of the best vehicles for discovering FEMA-related data resources is through the OpenFEMA website.<sup>16</sup> In addition to helping users discover these resources, FEMA also solicits feedback on how it provides access to its data through this site. This provides an important opportunity to play an active role by informing FEMA of how its data is used and how it could be delivered in a manner that is most favorable for those purposes.

There are also multiple examples of state government-managed web-delivered resources for emergency management related to data discovery and sharing. For example, as shown in Figure 2, the North Carolina Risk Management Portal<sup>17</sup> provides access to tools that enable businesses, homeowners, and other stakeholders to assess the potential risk to their assets along with the effectiveness of various actions that could be taken to mitigate those risks.

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<sup>14</sup> Federal Geographic Data Committee Metadata Standard - <https://www.fgdc.gov/metadata>

<sup>15</sup> GeoPlatform Disasters - <http://disasters.geoplatform.gov/>

<sup>16</sup> OpenFEMA - <https://www.fema.gov/openfema>

<sup>17</sup> North Carolina Risk Management Portal - <https://rmp.nc.gov/portal/#>

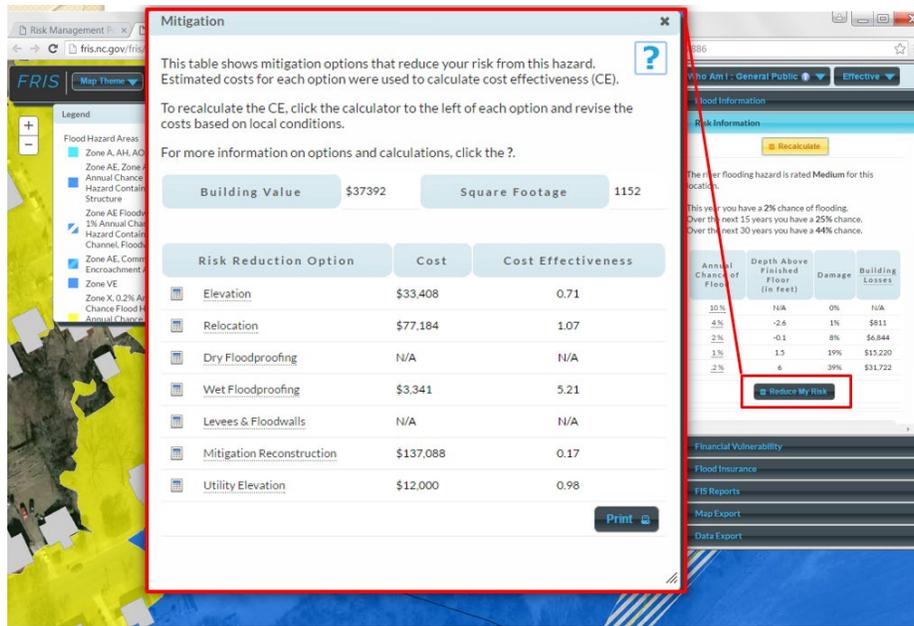


Figure 2: North Carolina Risk Management Portal Example of Mitigation Options

Another exemplary model of data sharing is the IndianaMap.<sup>18</sup> It contains more than 300 layers of information about a wide variety of topics ranging from geology to population demographics, infrastructure, imagery, and more. The IndianaMap offers the ability to view, download, and connect to all of those resources free of charge to anyone. All resources can be accessed via a Layer Gallery as shown in Figures 3 and 4.

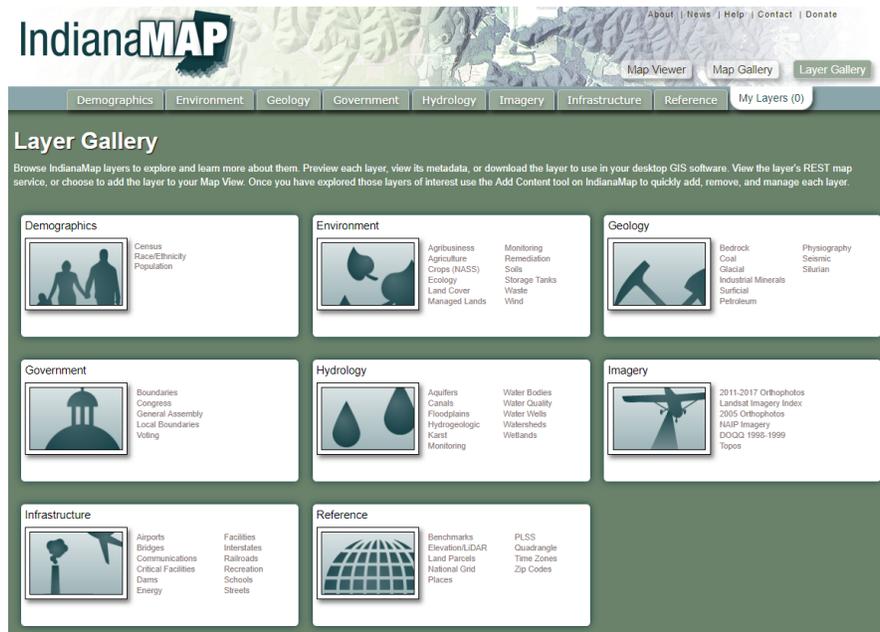


Figure 3: IndianaMap Layer Gallery

<sup>18</sup> IndianaMap - <http://indianamap.org/>

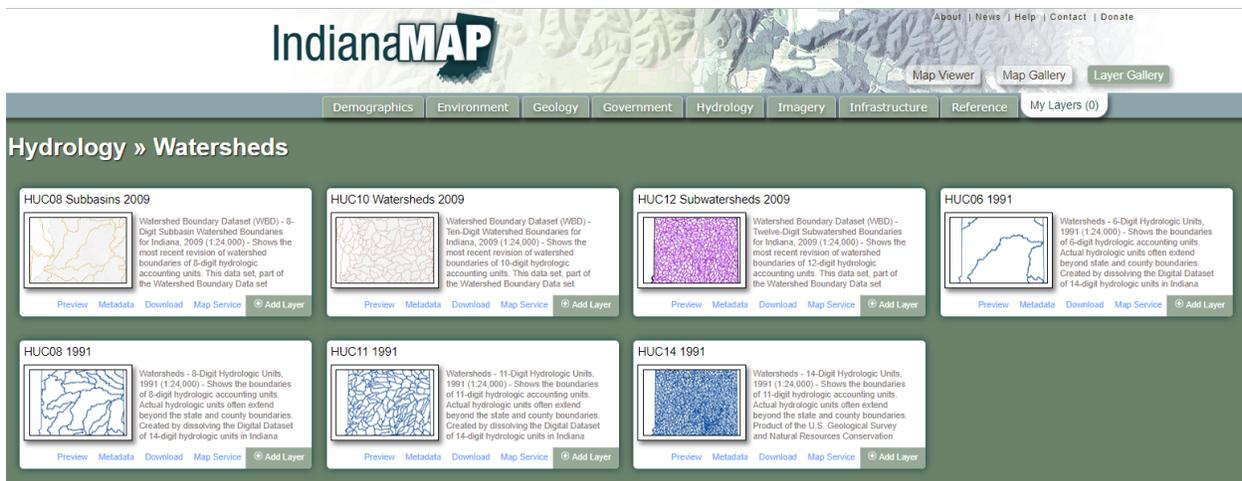


Figure 4: IndianaMap Layer Gallery Watershed Layers

One of the most powerful aspects of the IndianaMap is that it gathers data for multiple layers, such as parcels, on a frequent basis from individual counties using automated processes—thus ensuring up-to-date and accurate spatial data.

Data distributed via web-based resources is usually developed and maintained by one or more designated data stewards who are responsible for data development, collection, and maintenance. Web-delivered data resources are not new; the earliest examples of web-delivered GIS extend back to the early 1990s. What has improved over time is the accuracy and currency of data. As a result, they are becoming increasingly valuable both for emergency management researchers and practitioners. However, it is also true that many web resources still do not make available the most current or accurate information. Data may be developed as part of emergency management processes, such as mitigation plan creation, that could be shared with those who publish web resources. To make data sharing possible, issues such as data quality, currency, and processes for establishing collaborations between data products and platform managers need to be addressed.

Most web-delivered resources are guided by policies that dictate the currency and content of data including such things as the attribution of data elements. Implementation of policies ensures consistency in data quality and content. Those who produce data resources should become aware of policies and, where practical, incorporate them into their data development process. In addition, administrators of web-delivered data resources should have a clear understanding of the update cycle in place by the data steward as well as how and when the update will be made available to users of the web resource.

Additionally, there needs to be awareness among data developers of web-based data platforms and portals that could host their data in order to enable its distribution to a wider audience. Data producers need to establish contact with portal and platform managing organizations to discuss opportunities for integrating the data that they have created into the provided resources.

A particularly positive legislative development that will likely lead to greater data sharing collaboration between producers and distributors is the passage of H.R. 302 in October of 2018. The bill includes language that governs how Federal agencies are to collaborate with other organizations with regard to

geospatial data. This bipartisan legislation requires Federal agencies to coordinate and work in partnership with other Federal agencies, agencies of state, tribal and local governments, institutions of higher education, and the private sector to efficiently and cost-effectively collect, integrate, maintain, disseminate, and preserve geospatial data.

Now more than ever it is to the mutual advantage of researchers as well as emergency management practitioners to seek ways to collaborate.

**Section**

**4**

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