Application of real-time GIS cloud-based context-aware information services for local government emergency preparedness in the era of big data for a resilient and smart city management. Mbongowo Mbuh

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Arts & Sciences



INTRODUCTION



SMART CITY COMPONENTS



- World is rapidly urbanizing, solutions needed for the challenges it brings
- Data and technology driven society
- Create efficiencies and improve wellbeing
- "Smart Cities"



https://www.arcweb.com/industries/smart-cities

- Obtaining a large amount of data and in real time can be very valuable for managing different sectors of the city
- Real-time data, analysis, visualization, and interpretation for smart and intelligent decisions regarding smart energy, street and traffic lights, grid, mobility, transport, safety, education, planning, healthcare, smart governance
- Emergency preparedness
 - Cities need to have a plan
 - Citizens need to be aware of that plan.



http://www.grandforksherald.com/content/blizzard-era-bell-forces-closure-interstate-29



https://www.usgs.gov/media/images/flooding-grand-forks-north-dakota-1997-0

Objective

This study aimed to use real-time spatial analytics that integrates state—of—the art ICT approaches for smart solution making process across different sectors of the community.

Scope

- A health resource inventory that integrates medical information and treatment facilities for smart healthcare decisions.
- Used ArcGIS Survey123 to map the preparedness of a city's residents for in natural disasters such as winter storms, blizzards, and floods.
 - Emergency and non-emergency management app using an operational dashboard to help law enforcement and city managers manage operations in real time

METHODS

 Survey 123 (formcentric)
 Web app builder
 Operational dashboard



- Both general and hazard specific preparedness
- -Developed questions by consulting literature from the Federal Emergency Management Agency's Ready Campaign
- -The American Red Cross
- -The Centers for Disease Control and Prevention's disaster resources.

Survey 123 for severe weather preparedness

Designing the survey

- Variety of questions covering location, residence characteristics, items on hand, knowledge of emergency protocols

Survey123 fo	or ArcGIS - My Surveys Help		(Peter 🗸		
Emergency F	Preparedness Survey	Overview Design Collaborate	Analyze [Data <		
	Emergency Preparedness Survey		+ Add	Edit	P Appearance	© Settings
	This survey is being conducted to help assess the community's emergency preparedness in the event of a disaster, such as a flood or winter storm.		Common Q	uestions		
1	Survey Completion Date: *		SingleliSingle	ine Text Choice	T Multiline	Text Choice
		•		own	☆ Rating	
2	Participant Location: * e.g. address, street name, or nearest cross streets	° °	⊷ Likert		12 ³ Number	
			E Image		Signature	e
3	Locate your residence on the map: * Note: If you would prefer to not locate your home, please use the nearest intersection/cross		♀ GeoPoi	int	🖸 Email	
	+ Find address or place		Websit	e	D Note	
	City of Grand Forks, State of North Dakot		Saved	 Previ 	ew	Publish

Survey design interface in Survey123 for ArcGIS

https://survey123.arcgis.com/share/92dd674e577e49c28dfaa568acac3969



Usefulness

City officials: assess level of preparedness across the city, can tailor public education efforts to address shortcomings Citizens: greater awareness of their preparedness and how they may need to improve

Completed survey

- 31 questions
- Shared publicly
- Can be filled out by anyone with a web browser

	Emergency Preparedness Survey	
	This survey is being conducted to help assess the community's emergency preparedness in the event of a disaster, such as a flood or winter storm.	
	Survey Completion Date:*	
	2018-05-04	
	Participant Location:* e.g. address, street name, or nearest cross streets	
	Locate your residence on the map:*	
	Note: If you would prefer to not locate your home, please use the nearest intersection/cross streets	
	Alignetic cash cards	
	etrearing Grand Forts	
	City of Grand Forks. State of North Daketa, Ext. HERE, Garmin, USGS, NGA, EPA, USDA, NPS Powered by Ext.	
	Lat: 47.90714 Lon: -97.05116	
	What type of residence do you live in?	
The completed survey	v was shared to make it put	olicly accessible,
https://survey123.ar	rcgis.com/share/92dd674	e577e49c28dfaa5

<u>acac3969</u>

Approximately what year was your residence built?	
1974	
How many levels does your home have? include the basement as a separate level (if applicable) 12 ⁹ 2	
Flood preparedness: Does your home have a basement?	
O Yes ○ No	
Flood preparedness: Have you waterproofed your basement?	
Flood preparedness: Do you have a sump pump, with backup po	wer?
O Yes O No	
Flood preparedness: Do you have valves installed in your drain lir prevent floodwater from entering?	nes to
Ves No Unsure	

Questions asked pertained to general emergency preparedness but also some that specifically address flooding and winter storm preparedness. The survey completed through a web browser, and on the phone. Collected data can be analyzed, viewed in charts, tables, and histograms

Winter storm preparedness: Select items that are in your car when you travel.
Check all that apply
Shovel
Windshield scraper
Booster cables
Sand or cat litter for traction
Chain or rope
Blankets
Water and food
Flashlight
First-aid kit
Phone Phone
Do you have a way of receiving locally broadcast emergency warnings?

Have you created an emergency plan and discussed it with all members of your household?			
O Yes	No		
Do you have a current e Including an out of town location there.	vacuation plan? on where you can stay for a perio	od of time and how to get	
O Yes	No No		
Do you have a local neig	ghborhood or communit	y disaster plan?	
O Yes	O No	 Unsure 	
Additional comments: please list other resource items	that could be useful in an emer	gency	
	Submit		

The survey application could provide city officials with information about the preparedness of their citizens, revealing the effectiveness of public education initiatives.

This provides a benefit to both citizens and government officials.



Can view results in various graphs, maps or in ArcGIS Online map viewer



survey data mapped in Survey123 for ArcGIS and ArcGIS Online map viewer. http://nodak.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&panel =gallery&suggestField=true&layers=979973e2139342b3bdca4724c72bcc7c

Operations Dashboard for Smart city Management

New Map 🐖 Crea

Home 👻 Emergency Management Services Grand Forks ND 🥒



http://arcg.is/8a9ir

Operations Dashboard for Smart city Management

Emergency Management Services Grand Forks ND



http://nodak.maps.arcgis.com/apps/opsdashboard/index.html#/062bb64a120d49ae81948106e463 d94a

Smart health system

With practical tools, both professionals and the general public can quickly have access to data and make treatment decisions based on available data and services offered.

- Substance Use Disorder (SUD)
 - Causes clinic and functionally significant impairment
 - Tremendous toll on US population as a public health burden and safety emergency issue
 - Overdoses are leading cause of accidental death
 - Contribution to diseases such as HCV and HIV
 - Correlated with homelessness and mental health







Photo: Substance

Use Health Resource Inventory



Locations of substance abuse treatment facilities, drug drop-off locators, mental health facilities, and homeless/ emergency shelter services icons. http://nodak.maps.arcgis.com/home/webmap/viewer.html?webmap=597e95dbb9594d549ad3bfffa4d50127

Use Health Resource Inventory



health resource inventory app - additional information in pop-ups

http://nodak.maps.arcgis.com/apps/webappviewer/index.html?id=f0c3bb7ce6f7490493c549a4e5513fa4

CONCLUSION

- We aimed with this study to explore the use real-time spatial analytics with an operational dashboard for smart decision-making process across different sectors of the community.
- Cities will continue to expand, and emergencies will continue to happen.
- Cities can be more prepared for planning and responding to these incidents

A health resource inventory that integrates medical information and treatment facilities for smart healthcare decisions.

Used ArcGIS Survey123 to map the preparedness of a city's residents for in natural disasters such as <u>winter storms</u>, <u>blizzards</u>, and floods.

Emergency and non-emergency management app using an operational dashboard to help law enforcement and city managers manage operations real time.



THANKS



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