SHAPEFOR BETTER COMMUNITY

Inspire a Geospatial Hackathon unicef

Activity Report

In Collaboration With:

Local Partner:

WE CANNOT STOP DISASTERS, BUT WE CAN ARM OUR COMMUNITY WITH KNOWLEDGE: SO MANY SMILES WOULDN'T HAVE TO BE LOST IF THERE WAS ENOUGH DISASTER PREPAREDNESS.

Contents

Acknowledgements

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SHAPEFOR BETTER COMMUNITY
Inspire
a Geospatial Hackathon
4, 5, 6 OCTOBER 2019 - BANDUNG
unicef
Collaboration with:
esri indonesia
WELCOME
With: GREY_FOX
Password: greyfox135
Microvision

BACK GROUND

Introduction

Spatial (map) is considered as a core infrastructure of modern IT world, which is substantiated by business transactions of major IT companies such as Apple, Google, Microsoft, Amazon, Intel, and Uber, and even motor companies such as Audi, BMW, and Mercedes. Consequently, they are bound to hire more and more spatial data scientists. Based on such business trend, this course is designed to present a firm understanding of spatial data science to the learners, who would have a basic knowledge of data science and data analysis, and eventually to make their expertise differentiated from other nominal data scientists and data analysts.

Disaster constitutes one of the greatest threats to development and socio-economic well being of the people. It retards development and is particularly hard on the poor people. The frequency and magnitude of natural and human induced disasters and emergencies are constantly becoming unpredictable and having grave consequences on present day human civilization. There are three basic phases of disaster management: Pre-disaster, during disaster and after the disaster.

Surveying, mapping and GIS techniques are now used to facilitate disaster management through the production of model for visualisation of the effect of disaster, to mitigate, effectively deploy rescue team and undertake post disaster reconstruction and rehabilitation.

Geospatial Data plays a big role in disaster management. Features impacted by disasters are geographically located and have geographic addresses. Geospatial data constitutes the disaster management information cell for all phases of disaster management through preparedness, damage assessment and relief planning.

Geospatial data will provide information about the areas that are susceptible to flood and locations that people and livestock can be evacuated to incase of a disaster. An Environmental Sensitivity Index (ESI) Map will provide information about possible safe access to an environment and location of other relief facilities and infrastructures in the event of disaster. It serves as a decision making tool as well as a compass for relief teams.

GIS and remote sensing are reliable tools that have been used in the evaluation of geo-environmental catastrophes by providing a sort of synoptic coverage of a very broad area in a cost effective way, which overcomes the bottle-necks and limitations caused by the conventional ground stations in recording hydrological information during an extreme event.

Moreover, remote sensing tools provide the researcher with multi-date satellite imageries, which in turn aids the researcher in monitoring and recording the change progress of the past flood events. In recent years, development in the areas of GIS and remote sensing has been embedded into the assessment of geo-environmental catastrophes, which profoundly facilitated advancement of flood susceptibility mapping, flood risk assessment, and erosion control. It is evident that flood related problems could be solved through planning, studies and also through detailed mapping of flood plains. GIS systems are built to cover a wide range of applications and are designed to integrate a vast variety of environmental data, allowing them to work together in a readily accessible way.

What is Hackathon?

Hackathon is a coding marathon, an event lasting from few hours to few days, usually hosted on weekends. Despite the possible negative connotation with the word “hacking”, those events do not promote malicious or criminal behaviors, as “hacking” can also mean “playful, exploratory programming”. A challenge like that brings together specialists from related fields, like graphic designers, project managers, business analysts and others. It originated from events for programmers, but the formula quickly proved to be attractive to specialists from other fields as well, more on that later. The goal of such event differs depending on what the organizers aim for. Generally speaking, however, the main rule is to find a solution to a presented problem by means of teams competing to produce and present the best project that meets the predefined criteria. Authors of winning projects are awarded in cash, prizes or via other means, as well as a combination of any of those.

SBC Participants on their remaining 24 hours.

It is important to understand the root of such events, since they are based on open collaboration within a distinct culture. The success of a hackathon therefore depends in no small measure on the event’s peceived authenticity, which first must be ensured by embracing the language of hackers.The term “hacker” itself is often misinterpreted by the public when it comes to programmers. There is regularly a need to define “hacking” and to explain what hackathon organizers understand by the term (Word Bank, 2012).

What Makes Us Different?

Baleendah and Andir areas are experience flooding every year. This has worsened since 2005 (Abah Edy, 2019). Riki Waskito from Jaga Balai stated that flooding in this region was not a “disaster” but rather a “tragedy”. The Baleendah and Andir regions themselves are flanked by two large rivers namely Citarum and Cisangkuy (which are tributaries of the Citarum river). The high discharge and overflow of water from the two rivers is one of the cause of flooding in both regions. Poor drainage in settlements is also another cause of flooding. So that the water actually flows from the river to the residents’ settlements and more floods recede longer than in other areas.

In addition to flooding, the areas of Baleendah and Andir also have the potential for earthquake disasters (Rahma Hanifa, 2019). This is still rarely discussed because most of the faults are often discussed in northern Bandung. In general, Indonesia has 295 active faults with a magnitude of more than 5.5. And about 206 million (77%) of Indonesia’s population have the potential to feel an earthquake. The event that needs attention is the earthquake that occurred during the flood. Because this can have a greater impact.

Spatial data is one of the important keywords used in the field of disaster. In carrying out mitigation, emergency response, and also rehabilitation and reconstruction activities always require location information. This location information is important to be provided, used, and understood by all parties ranging from the central government, local government, private sector and community it self.

In this event we are combining flash talk, site visit and the hackathon it self. We hope that the participants can fully understand what the community is facing and they can dig more insight from the community and the solutions that they develop can have a direct impact to the beneficiaries in Baleendah.

Objectives

The objectives of SBC is to generating innovative solutions for flood and earthquake risks, that fully take into consideration the needs of local beneficiaries, in this case, included Jaga Balai, Barudak Baraya Cisangkuy Citarum (B2C2), and BPBD of Bandung Regency. Solutions would be based on integrations of various data sources, including geospatial data, in various forms, such as software/apps, data visualization, and/or integrating other disaster platforms.

The Challenge

Using geospatial datasets and findings from Pre-Event, we challenge the participants to address:

1. Enhancing city, school and community resilience toward flood and earthquake risk
2. Reducing disruptions to public facility and critical infrastructure
3. Improving information management and build a unique way to disseminate it.

Outputs

We are looking for practical solutions that give solution the following:

1. Software/Apps solutions
2. Data Visualization solutions
3. Integrating other platforms

PRE-EVENT

Bandung, 4 – 6 October 2019

The five selected teams were invited to the three-day Pre-event of SBC in Foxlite Hotel, Bandung. The pre-event's objective was to provide insights to the participants on disaster risks, particularly earthquake and flood, and on design thinking. Participants were expected to gain insights through Deep Talk Sessions with the following topics:

a. Session 1: **"What are we facing?"**, delivered by:

- Dr. Rahma Hanifa, U-Inspire Lead, on earthquake risks in Bandung
- Riki Waskito, Jaga Balai, on local flood risks

b. Session 2: **"Geospatial Data on Disaster"**, delivered by:

- Arsyad Iriansyah, InaRisk, on the function of InaRisk Personal, an application that provides information on disaster risk in a particular area, which was developed by BNPB.
- Dirga Imam Ghazali, Geocreate (Geospatial Creative Institute), on the GIS technology and remote sensing data in case of disaster early response.
- Septian Firmansyah, SkyVolunteer, on the usage of UAV in the context of disaster.

c. Session 3: **"Tech Insights"**, delivered by:

- Stephen Akbar, Labtech Indie, on product development and design thinking

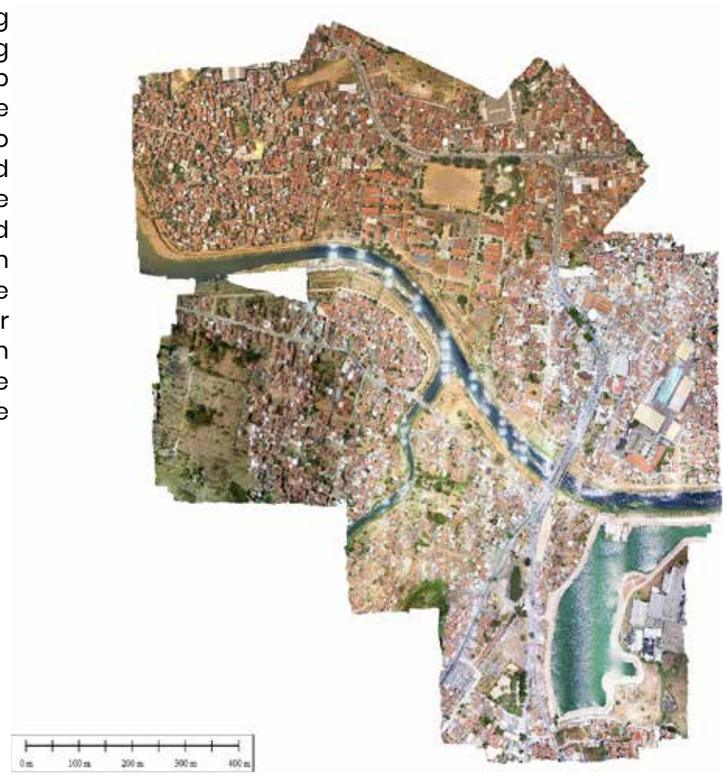
d. Session 4: **"Data Processing and Analysis"**, delivered by:

- Regina Maria Hitoyo, ESRI Indonesia, on location-based analysis for actionable intelligence.

A field trip was conducted on the second day, where participants were expected to gain insights on the complexity of the problems through direct interaction with the local communities. During the field trip, participants were divided into two groups learning in two different districts, i.e. Baleendah and Andir Districts, in Bandung Regency.

On the field, after interviewing the respective local leaders on their flood and earthquake experiences, the participants visited the frequently-flooded areas and observed the trace of the inundation.

On the same day, the organizing team conducted aerial mapping to create an up-to-date base map in a form of Geo-TIFF as a reference for the participating teams to work on the project. After the field trip, the participants shared the key learning points from the field trip and received feedback from the resource persons on how the project prototype should be further developed. The teams were given two weeks to build the prototype before they finalize it during the Main Event.



Aerial Mapping assets and post processing result can be accessed at https://drive.google.com/open?id=1ABOXgcepQQELcuCdeh7FMfn-mwBFwNVL2

MAIN-EVENT

Jakarta, 19 – 20 October 2019

The main event, which was held in Yello Hotel Manggarai, Jakarta, was officially opened by Bernardus Wisnu Widjaya, Deputy of System and Strategy of BNPB, followed by a Flash Talk by Khaled Mashfiq from UNITAR Office Bangkok on “The Use of Geospatial Information Technology for Understanding Disaster Risk”. In the remaining 24 hours, the five teams continued to finalize their prototype. Further, within two hours duration, they prepared for the pitch and demonstration to be presented before the judges and observers from UNICEF, UNFPA, WFP, BMKG, ITB, UI, UHAMKA, IRBOX, Baznas, LPBI NU, Rumah Zakat, MDMC, Save the Children, YKRI, HFI, CSIS, PMI, MPBI, and Grab Indonesia.

Opening remarks from Bernardus Wisnu Widjaya, Deputy of System and Strategy of BNPB

Judges

The judges consist of BNPB and BPBD West Java Province who represented the government, especially in disaster management. OpenstreetMap Indonesia and ESRI Indonesia, which represent companies engaged in providing spatial data and are also often used in the field of disaster. Jaga Balai and Synersia communities represent communities that often provide assistance to communities in the affected areas. And finally, UNICEF and UNITAR represent international bodies that care about the community and society, especially in the affected areas. The overall jury will also assess some of the demos with several criterias, such as:

Addresses Challenge, User Interface & Design, Creativity, Execution, Impact, Wow Factor and Pitch.

Results

Prototypes developed by the five finalists during the SBC, based on the awards given, are presented as follows.

Awards	Team	Short Description of Prototype
1st Place	Ci-Situ Team	GIFA (Geo-Intelligence System for Flood Prone Area) Apps - using a gamification system to attract the public to report by using the apps. This app could also simulate evacuation routes, not only for humans but also for rubber boats, and it can visualize data for an easier understanding of the general public.
2nd Place	Sarijadi Troops	HEPI App and Concept, a low-cost near-real-time and prediction of inundation, using crowd-sourcing data reported by the community through cell-phone.
3rd Place	Geovetsuko	Combining spatial and non-spatial data using the platform developed by ESRI, i.e. ArcGIS online and story maps, to visualize disaster risk information in a more attractive and interactive way.
The Best Future Potential	Geodis-Tech	Social Media Data for Disaster Early Warning Application by integrating 4 entities: communities, government, Apps & WebGIS, and multidisciplinary practitioners.
The Best Modeling	BISMA	A crowdsource-based modeling technology to predict the area of inundation by combining the spatial data and hydrologic model from a rainfall-runoff model.

Judges listening to the team pitch and demo.

Lessons Learned

Based on the organizing team and participant's reflections, the key lessons learned from the whole process of SBC are that:

1. It is possible for a two-week duration of Call for Proposals to attract quite a number of enthusiastic applicants in Indonesia. However, since the number of qualified applicants having interest in geospatial-based solution for DRR was rather limited, only enough for small-scale hackathons, a better strategy to attract more relevant applicants need to be explored for a larger scale hackathons.
2. The field trip during the Pre-Event was essential for the participants to grasp the real and complex situation of the area.
3. For a geospatial hackathon, a two-week time might be feasible to build the first prototype. However, learning from all the finalists' solutions which were crowdsourced-base, where the gathered data rely upon the willingness and capacity of local communities, a genuine understanding of the community, as well as the community's connection with the apps and the maker, should be first built. And this process could not be "hacked" as quick as just hacking software.
4. In relation to the second point, a prototype test and further exploration with the local community should be conducted in order to realize an effective product.
5. Fresh innovative ideas could be generated within a limited time by youth and young professionals -- more opportunities for them to innovate and collaborate need to be provided in order to accelerate disaster risk reduction.

Follow Up

The prototypes developed by the three winners will be followed up collaboratively by several organizations, namely Synersia, UNICEF, InaRisk, BNPB, and U-Inspire, within the next six months. The follow-up plan includes:

1. Mentoring (substantially and technically) to finalize the product by testing the prototype, pitching to potential donors, implementing and maintaining the sustainability of the product;
2. Facilitating the integration of a selected prototype to InaRisk platform;
3. GIS Training by Open Street Map Indonesia;
4. Monitoring and evaluation of the mentoring process by Synersia and U-Inspire.

TEAM PROFILE

Mobile Phone-based Flood Early warning System by Integrating Crowdsourcing Data and Flood Inundation Model

Bisma will develop mobile phone-based Flood Early Warning System (FEWS) in susceptible area along the Ci Tarum river. This platform will predict the area of inundation by combining the spatial data, hydrologic-hydraulic models from rainfall-runoff model, and social media data. The participatory mapping will also include in this idea for complementing and improving the accuracy of flood inundation model.

Most of Flood Early Warning System (FEWS) doesn't involve the participation of people around the susceptible area. In addition, it also doesn't integrate yet and doesn't consider the flood inundation potential area. Then we will fill the gap to develop FEWS by using integrating the general rainfall-runoff model and participative method to generate the flood inundation area.

The FEWS application can be installed in mobile phone and people along Ci Tarum River can get the information of flood inundation hazard quickly and accurately. This apps will predict the real-time inundation from AWLR (common hydrologic-hydraulic model) and social media data. People around the susceptible area also will be facilitated by this apps and can contribute to improve the accuracy of model by reporting the existing flood (flood height, picture, video, coordinate, rainfall report) as a ground-truth data. This ground-truth data then will be used for improving the accuracy of FEWS. All of these inputs will be model to communicate the condition of flood (waspada, siaga, awas)

CROWDSOURCE BASED FLOOD HAZARD & EXPOSURE MODELING

BISMA
(Better in Spatial Management)

1. Iqbal Putut (Team Captain)
2. Faris Zulkarnain
3. Satria Indratmoko
4. Ardiansyah

01 Background

Hundreds and thousands deaths of human and animal stock, damaging buildings and other infrastructures, and resulting in economic loss caused by disaster events every years.

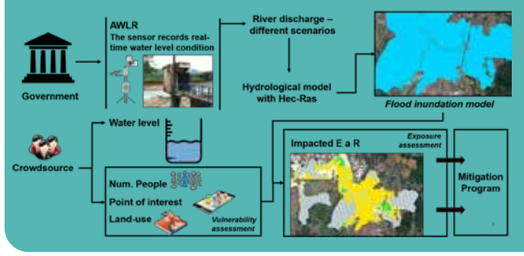
In 2018, there are more than 2000 disaster events occurred in Indonesia (BNPB, 2018). Indonesia has growing number of people. Statistics recorded by BNPB shows that in 2018 disaster event more than 3500 death and loss & more than 330.000 severely-damaged houses.

Problem 02

1. People are aware of the danger.
2. The flood occures every year, so they are prepared.
3. What they do not know is the extent of the flood event and the area flooded in a certain pre-event condition.
4. From the government 's point of view, the mitigation program might reach the wrong party due to the unsufficient element at risk

03 Our Idea

Framework



This platform will predict the area of inundation by combining the spatial data, hydrologic-hydraulic models from rainfall-runoff model, and crowdsourced based data. The people participation will also include in this idea for complementing and improving the accuracy of flood inundation model especially in validating element at risk data such as demographic data, POI (Point of interest) and landuse data.

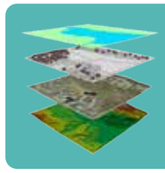
People can collect those data using open source mobile application (Open Data Kit, Survey123, ArcGIS Collector etc) as a ground truth data.

OPEN DATA KIT · Collector for ArcGIS · Survey123 for ArcGIS

04 Activities

1. Study Literature
2. Field Survey
3. Flood Inundation Modeling
4. Steady State Hydrologic-Hydraulic Model
5. People in Pixel with Dasymetric model
6. Exposure Modeling

Product 05



Plugins desktop application capable in generating hazard model and estimating the impacts (exposure modeling).The application accomodates GIS-based spatial analysis in a user friendly interface and suitable for many platforms.

IN COLLABORATION WITH: unitar · UNESCO · BNPB · CEST · esri Indonesia · Universitas Indonesia · PPGT Pusat Penelitian Geografi Terapan

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GEODIS-TECH

Community Engagement by Spatial Data Utilization for Disaster Resilient Preparedness in Bandung

Their ideas

- Communities along Ci Tarum face flood every year and they are used to it, but they cannot do any preventions.
- We are trying to develop the spatial dataset that can be used for communities' preparedness for disaster resilient strategies through user friendly platform
- Empowering the communities by utilizing the integration of various data sources from the platform has been made.

Outcome & impact

- Communities can access disaster information for free, easy, and quick
- The communities' preparedness will be enhanced by the information easy access
- The easiness of data access will be generated by integrating early warning system of disaster to internet-based communication platform
- This program is expected to yield a lot of benefits to various actors suchas Jaga Balai Community, BPBD Bandung, and local communities

Geodis-Tech Team

M Iko K, Ahmad Zubair, Riza Putera, Fathia Hashilah

Social Media Integration as Disaster Warning Application: Enhancing Community-based Engagement by Spatial Data Utilization for Flood Resilient in Bandung

1. Background

- Many disaster-related platforms have been developed. E.g. InaSafe, InDRA BNPB, Info BMKG, Petabencana.id, MAGMA Indonesia, etc.
- 49.1% of 58 respondents (*online random sampling) do not know about Indonesia's disaster-related platforms

2. Problems

- Various disaster-related platforms do not reach the impacted communities
- Lack of knowledge and low engagement among communities with spatial disaster-related platforms → reduce effectivity and efficiency of disaster-related platforms. E.g. Evacuation route, health facilities, etc.

3. What we've got from the field

- *"…retention pool was just for temporary condition…we are survive because we adapt to these tragedies…" Abah Edi, Interview Oct 5th 2019*
- *"…Abandoning their home was a painful choice…they hoped floods could be handled…so they could coming home again…" Abah Edi, Interview Oct 5th 2019*

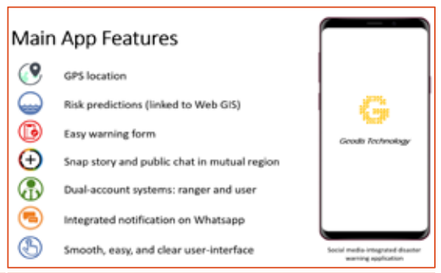
4. Idea to solve the problems: Concept of Community Engagement

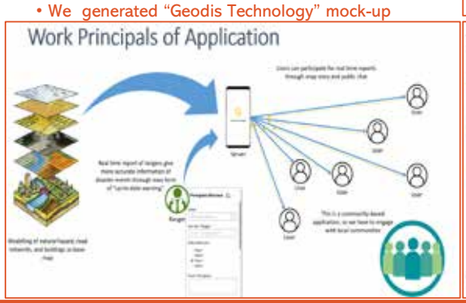
- Engagement process will involve the four entities to complete the circle
- This circle will acquire a comprehensive solution to reduce the risk of natural disasters
- Socialization and education are required to catch the attention of societies including promotion of app and Web GIS

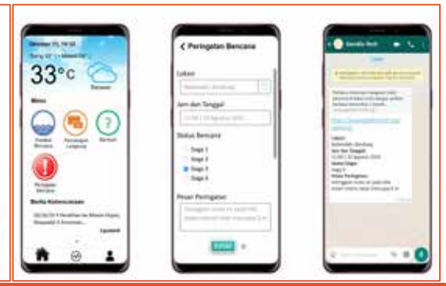
5. Activities

- We did an online survey about disaster-related platform utilization to people round us
- We did a one day field survey to observe the actual condition and we interviewed two key informants
- We utilized DEM data and other datasets to generate inundation and other uses (e.g. potential exposures)
- We generated "Geodis Technology" mock-up

6. Products







Pictures: Hashilah 2019

3rd

Development of Storymap for Flood Disaster Mitigation for High School Students

Storymaking could be used as nonstructural mitigation media of high school students against flooding. In the storymap will provide information about the threat of flooding and mitigation efforts that can be done to reduce its impact. Understanding the threat of flooding and mitigation efforts that can be done to the environment needs to be given to students. However, students today are less interested in conventional media and tend to like digital media based.

Information about the threat of flooding and mitigation efforts that can be done can be packaged in the form of digital media that is of interest to students. The development of digital media in the form of storymaps aims to minimize losses and casualties through appropriate measures when floods come.

Storymaps are prepared using the ESRI platform so that they are able to display not only text data but also visually spatially. Media can be accessed through the internet making it easier for students from anywhere to use it. After reading the storymap, teenage students will know the shape of the threat and location of the flood. They can practice flood mitigation efforts in daily life. In addition, they become agents of change by sharing this flood mitigation storymap link.

Storymap, as a digital media, that provides information about threats and efforts to mitigate floods is a part of campaigning that we are part of nature. So, if we protect nature, nature will protect us. This digital media is intended for middle school students (junior and senior high schools). This storymap can be used for curricular purposes of teaching and learning outside of class hours.

ENHANCING SCHOOL AND COMMUNITY RESILIENCE TOWARD FLOOD AND EARTHQUAKE RISK THROUGH INFORMATION MANAGEMENT BY UTILIZING STORY MAP

By : Geovetsuko

BACKGROUND

The inhabitant of Baleendah is severely suffer due to annual flooding that strikes their area everytime the rainy season is coming. This type of disaster even becomes a "normal guest" that has been already anticipated by people who live in this area since they regularly face it from previous generations. Up till now, there is still no appropriate solution that can solve this problem and offer better life quality for people who live within (Pre-event Hackaton speakers & Field Survey, 2019).

Even worse, Baleendah is also geologically vulnerable to earthquake due to the presence of Lembang fault that lies northern to this region. LIPI and U-INSPIRE (2019) reported that this fault was indicated becoming the source of some earthquakes that recently happened in western part of Java, particularly in Bandung area. Even though this disaster can give more seriously damage, people still have less awareness about the risk due to the lack of information about this topic. At the worst case, people of Baleendah will be put in a serious danger when these two disasters are coming simultaneously.

PROBLEM IDENTIFICATION

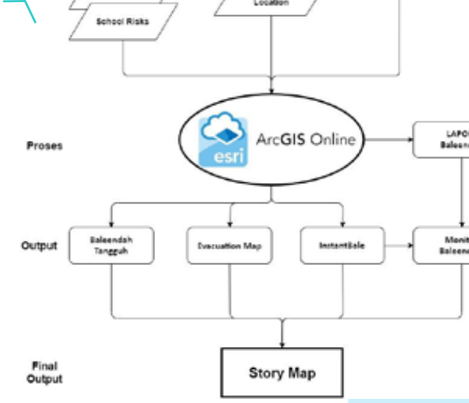
1. Baleendah is highly vulnerable to flood and earthquake
2. The risk information about flood and earthquake is still not properly delivered to society
3. There is a need to improve public awareness and engage local community to participate in the effort of disaster risk reduction in Baleendah

CURRENT ACTIVITY

Currently, we are developing an application that can provide information about disaster risk (flood and earthquake) to society in Baleendah. This application also provides other options to engage people to take action in response to disaster emergency situation. We are also trying to develop an embedded application that can gather public information to visualize the current situation in affected area to support emergency response activity.

SOLUTION

To tackle those problems, we try to develop an online platform that can share needed information among society in order to increase public awareness and to engage local community participation. Alternatively, it also can be used by related stakeholder such as local BPBD to support decision making system in term of handling emergency response situation. Therefore, the solution that we offer is not merely perceived by local people, but also useful for local government. To do so, we utilize an online sources called ArcGIS online as a product from ESRI to build this platform.



PRODUCT

The main product of this project is Story Map that can visualize disaster risk information in more delightful user experience. It also has benefit to combine spatial and non spatial information in more attractive and interactive way. Along with story map, we also develop other applications such as LAPOR! Baleendah (public field survey), InstantBale (social media mapping), Baleendah Tangguh (Disaster Risk Web Map Application), and Monitor Baleendah (Emergency Response Dashboard App) that are embedded within our story map. All these products are developed in one application (story map) that expectantly can improve the community resilience toward disaster and able to support disaster risk reduction effort in Baleendah.

Geovetsuko Team :

1. Talitha Rahmawati
2. M. Amin Sunarhadi
3. Ary Wijayanti
4. David Hario Utomo

Spatial Maestro !

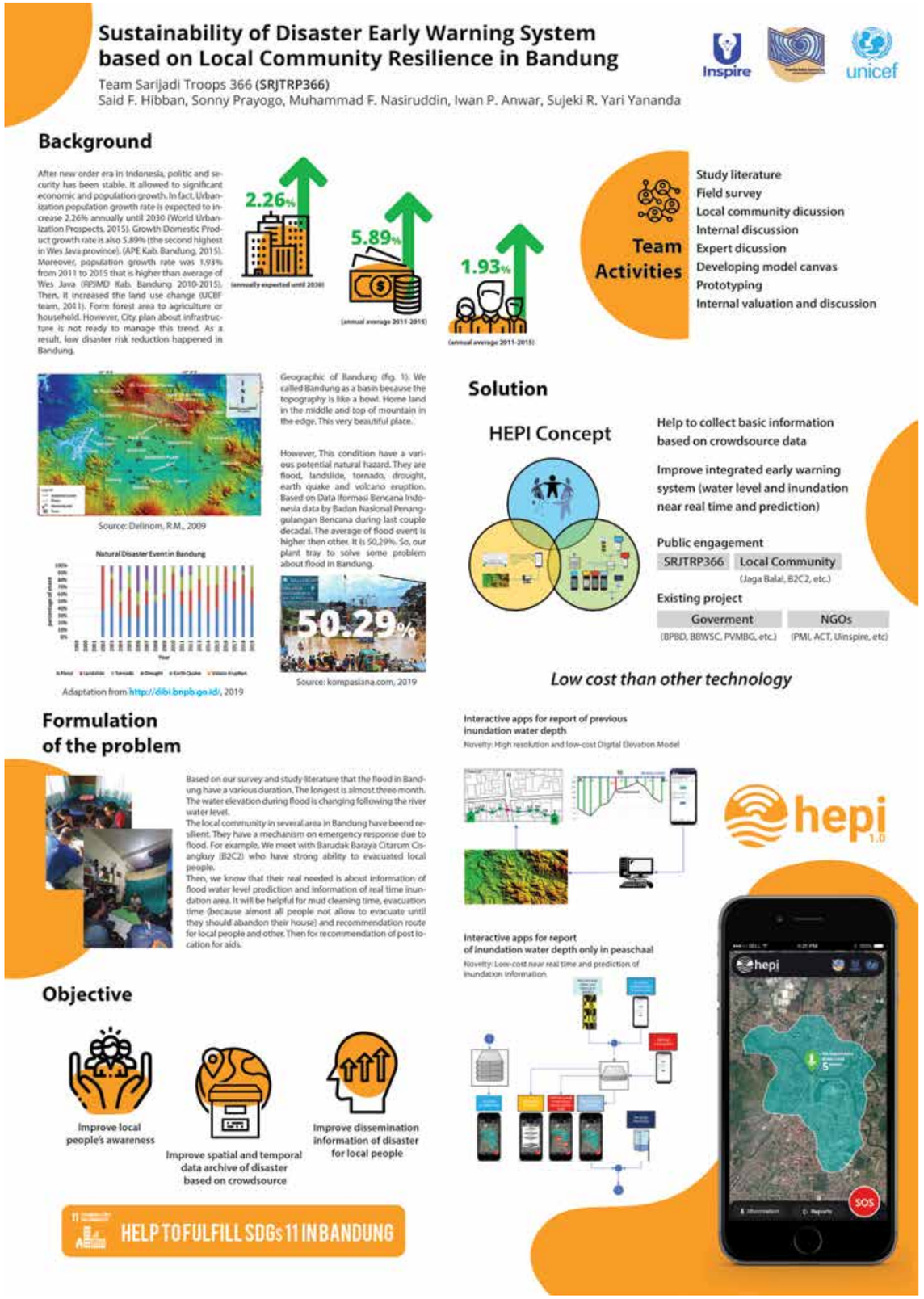
SARIJADI TROOP 3-66

2nd

Sustainability of Flood Early Warning System based on Local Community Resilience

SARIJADI TROOP 3-66 would like to create an early warning system based on crowdsource and artificial intelligence in potential flooding areas. First, we will make preparations by installing the ruler at some flooded areas and rainfall measuring tools in areas related to flooding in the area. The ruler can indicate the height from above sea level (amsl) so that each point has the same height reference. second, when flood happens the system received ruler level data reported by the local community through our crowdsource system. then, the system will produce short-term information in the form of real-time visualization of flood inundation which is useful for knowing areas that will be flooded some time later. in addition, the system also will collect rainfall data at several points and will be analyzed using artificial intelligence to produce rainfall treshold that can cause flooding in certain areas.

In the first year, this system will produce actual information about floods at any point that has flooded before to local governments and potentially flooded people, so local governments can resposively formulating policies and the community can do preparedness for themselves. Furthermore, this system will raising public awareness about flooding and affected-environment. In the next following year, after amount of flood and rain data has collected, the system will recognize the local characteristics of the flooded areas better. So that early warning can be released earlier.Furthermore, local governments and local community have longer time to prepare themselves.



Their prototype can be accessed at http://51.79.142.76:3000/

CI-SITU

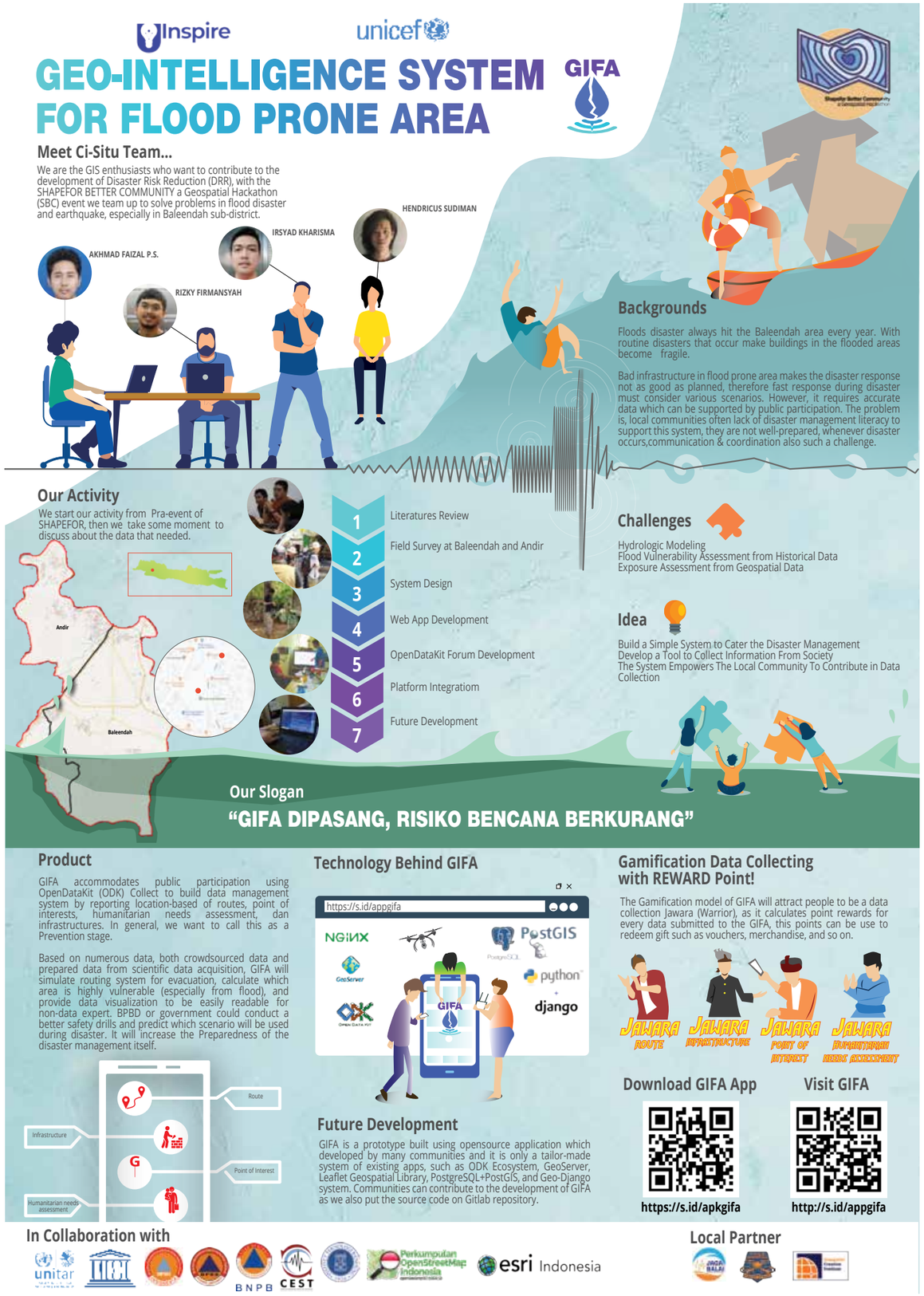
1st

GIFA: Geo-Inteligence System for Flood Prone Area

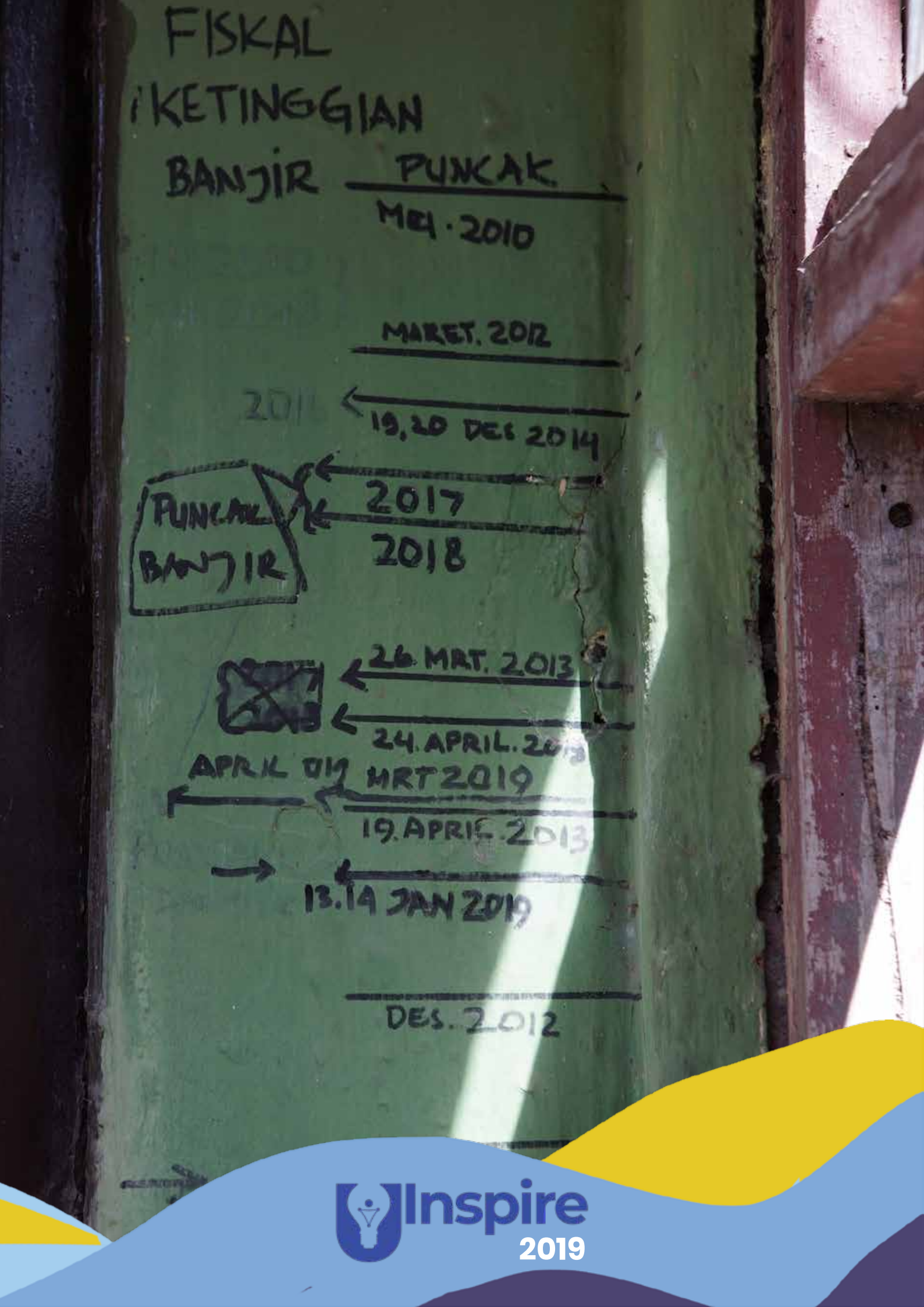
The Geo-Inteligence system for Flood Prone Area or GIFA, is a low- cost system developed using opensource application such as, OpenDataKit Collect and Leaflet for geospatial library to support routing system to generate scenario for disaster management and powered by such alert system to deliver critical information for local communities.

Bad infrastructure in flood prone area makes the disaster response not as good as planned, therefore fast response during disaster must consider various scenarios. However, it requires accurate data which can be supported by public participation. The problem is, local communities often lack of disaster management literacy to support this system, they are not well-prepared, whenever disaster occurs, communication & coordination also such a challenge.

GIFA provide disaster management cycle through data collection and simulation, giving support for Prevention, Preparation, Response, and Recovery processes. It collects data through OpenDataKit (ODK) Collect, requires public participation, can be deployed using mini online Cloud- server which cost only US$5/month. Data will be processed in the system in order to provide both pretty visualization and early warning system. Don't forget, it involves public participation as well.



Their prototype can be accessed at https://github.com/gifa-hackathon/gifa-django



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