

## PetaBencana.id

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**Organisation:** PetaBencana.id

**Country:** Indonesia

**Level of government:** Central government

**Sector:** Economic affairs, Environmental protection, General public services, Public order and safety

**Type:** Communication, Data, Digital

**Launched in:** 2013

**Overall development time:** 3 year(s)

**Link to the innovation's website**

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# Description

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Powered by CogniCity opensource software, PetaBencana.id produces megacity-scale visualizations of flooding using both crowd-sourced reporting and government agency validations in real-time. Currently operating in Jakarta, Bandung, and Surabaya, the map displays the rapidly changing conditions that affect infrastructure systems and their users, providing immediate information for residents, first responders, and municipal agencies. By enabling reliable, non-trivial communication between users and government agencies, the platform promotes civic co-management as a form of megacity climate change adaptation. The PetaBencana.id platform, powered by CogniCity opensource software, can work as infrastructure for climate change adaptation precisely because it is not a stand alone application. Instead, by connecting to social media, hydraulic sensors, and other urban applications, CogniCity creates an open platform that redirects existing systems to support disaster response and humanitarian action. Instead of developing large scale, expensive infrastructure, CogniCity uses systems that are already in place toward alternative, humanitarian ends in order to facilitate equitable climate change adaptation.

While the project was pilot-tested as a means to coordinate the response to extreme weather events, including flooding in Jakarta, the framework is transferable to other cities and urban issues, and PetaBencana.id is already being expanded to address other hazards. As cities become increasingly complex systems of people and interconnected infrastructure, the impacts of extreme weather events and long term environmental changes pose acute challenges for disaster response and humanitarian action. Rapidly urbanizing megacities will face similar challenges, and CogniCity OSS is designed to be transferable to other institutions, domains, geographies, and languages.

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## Why the innovation was developed

- Recognizing that residents use social media with an incredible frequency to talk about disaster events, we realised that if we could make use of this data in a safe and anonymous manner, we would have tremendously valuable data to help us map and model disasters in real-time.
  - Information is a highly valuable resource during disaster events and although rapidly urbanizing megacities like Jakarta are often thought to be 'data scarce' by enabling residents to share emergency data openly and in real time, a wealth of information can be leveraged to promote resilience to extreme weather events.
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## Objectives

Enhance public trust, Enhance transparency, Improve access, Improve effectiveness, Improve efficiency, Improve service quality, Improve social equity, Increase citizen engagement

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## Main beneficiaries

Civil Society, General population, Government bodies, Government staff, High-risk populations

# Results

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## Efficiency

- By adopting a 'people as sensors' paradigm, where confirmed reports are collected directly from the users at street level, the project removes the need for expensive and time consuming data processing. The framework creates accurate, real-time data which is immediately made available for users and first responders.
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## Service quality

### Accessibility:

- The open source ethos of the project, and the transparency it facilitates, makes risk information open, accessible, and actionable by residents, government agencies, NGOs, and private sector developers. Designing a single platform to meet the needs of both citizen users and government agencies, promotes civic co management as a strategy for climate adaptation. Information sharing through open data and open APIs is key to the accessibility and success of the project.

### Responsiveness:

- By providing a web-based, publicly accessible, real-time visual overview of flooding (and other relevant disasters), PetaBencana.id improves situational knowledge for residents, increases response times for humanitarian agencies, and aids government agencies in decision making. It also allows National and Provincial Disaster Management Agencies to immediately share emergency information with residents, allowing them to navigate safely.

# Development

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## Design

The project was created and coordinated by Dr. Tomas Holderness and Dr. Etienne Turpin after their on-the-ground research in Jakarta. They noticed that many, many residents used social media during flooding, and began to test experimental software to gather, sort, and display these social media messages in realtime. After testing, they met with the Jakarta Emergency Management Agency, who agreed to partner on the project; Twitter followed with an agreement and the first version of CogniCity opensource software was born under the name PetaJakarta.org. Design time: 3 year(s)

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## Testing

- The CogniCity software was designed, tested, and deployed as an operational platform in Jakarta during a three-year (2013-2016) applied research project.
- As CogniCity's proof of concept, the web-based flood map PetaJakarta.org has been used by hundreds of thousands of residents during monsoon flooding. It was also adopted by the Jakarta Emergency Management Agency to monitor flood events, to improve response times, and to share emergency information with residents.
- PetaBencana.id will further develop CogniCity Open Source Software as a free, transparent, enterprise-level platform for emergency response and disaster management in a growing number of cities throughout Indonesia.
- Additional CogniCity modules are also now being developed to address other hazards, including earthquakes, volcanoes, tsunamis, typhoons, and terrorism.
- CogniCity is also being designed to integrate and coordinate additional data sources, including various instant messaging services.

Testing time: 6 month(s)

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## Implementation

### Tools used:

- The most important tool was conversation; the team met with the Twitter engineers and the Jakarta Emergency Management Agency repeatedly for a long-term 'institutional ethnography'. This methodological tool was critical for development.
- In addition, the team used a multidisciplinary approach that included ethnography, agile software development, iterative UX design, and extensive training and outreach.

### Resources used:

- The project had a core staff of 8 members, with additional support from IT Architect, software engineers, and developers.
- The financial resources were mainly the result of competitive grants, including financial awards from the Australian National Data Service, the Australian Department of Foreign Affairs and Trade, and the University of Wollongong Global Challenges Program.

Implementation time: 3 year(s)

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## Challenges and solutions

- Institutional objectives are set within the context of government agencies; in order to develop the project to support and meet these predetermined objectives, the team conducted an ongoing, intensive institutional ethnography to help the government representatives meet their KPIs.
  - Data-sharing is critical to the success of the project; in order to overcome this challenge the team developed long-term data-sharing agreements with the partner organizations by demonstrating the value to Jakarta's residents when data is shared and available in a single portal.
  - Participation was a key challenge; by using state-of-the-art, custom-made, opensource software, the team leveraged the use of social media to solicit flood reporters from across the city.
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## Partnerships

### Multiple partners

Academics and Research Bodies, Other Public Sector

Throughout the project history, partners include: the Urban Risk Lab at the Massachusetts Institute of Technology, Indonesian National Emergency Management Agency (BNPB), USAID, University of Wollongong Global Challenges Program, DM Innovation, AusAid, Twitter, the Department of Foreign Affairs and Trade of the Government of Australia, World Vision Indonesia, Australian National Data Service, Open Data Institute, Pasang Mata (Citizen Journalism Platform), Jakarta SmartCity, Humanitarian OpenStreetMap Team (HOT), the Pacific Disaster Centre (PDC) of the

Data partners (e.g. Twitter, Pasang Mata, SmartCity Jakarta) allow PetaBencana.id to take data from multiple platforms and enabling efficient cross-checking to corroborate reports. Integrating and visualizing data also helps assess connectivity between different infrastructure components and analyze their performance during extreme weather events. A Twitter #DataGrant gave the research team access to historical data about flooding in Jakarta, allowing the system to be developed and calibrated, thereby ensuring its operative functionality during the monsoon seasons. Co-research with community and academic organizations including the Universitas Indonesia, the Urban Poor Consortium, Ciliwung Institute, Ciliwung Merdeka, and the Humanitarian OpenStreetMap Team, have supported data collection efforts.

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## Lessons Learned

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### Lessons Learned

- The most important lesson we learned is regarding 'depth'. While many initiatives invest in the breath of apps and related digital systems, producing many outcomes, by investing in 'depth' that is, in a comprehensive, long-term partnership as 'co-research' all parties benefit from the outcomes.
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### Conditions for success

- The support of Open Source Software (OSS) and open data are critical for the platform to act as infrastructure for equitable and collaborative climate change adaptation.
  - Whenever possible, disaster risk management projects should also offer open Application Programming Interface (API) streams to maintain transparency and foster further development and innovation of the DRM software ecosystem.
  - Access to data via open APIs enable the integration of vulnerability information and potential hazard exposure to facilitate integrated risk evaluation and assessment.
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### Other information

Supported by the Open Data Institute's Open Data Award, the following video explains how CogniCity Open Source Software gathers and disseminates flood data: <https://www.youtube.com/watch?v=O7VDjjeEdN8> Additional information about CogniCity Open Source Software can be found at: <https://github.com/smart-facility/cognicity-server>