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January 2014

## **A geosocial intelligence framework for studying & promoting resilience to seasonal flooding in Jakarta, Indonesia**

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## **A geosocial intelligence framework for studying & promoting resilience to seasonal flooding in Jakarta, Indonesia**

### **Abstract**

PetaJakarta.org is a web-based platform developed to harness the power of social media to gather, sort, and display information about flooding for Jakarta residents in real time. The platform runs on the open source software CogniCity-an OSS platform developed by the SMART Infrastructure Facility, University of Wollongong-which allows data to be collected and disseminated by community members through their location-enabled mobile devices. The project uses a GeoSocial Intelligence Framework to approach the complexity of Jakarta's entangled hydraulic, hydrological and meteorological systems and thereby converts the noise of social media into knowledge about urban infrastructure and situational conditions related to flooding and inundation. In this paper, PetaJakarta.org co-directors will discuss their GeoSocial Intelligence Framework as it applies to their preliminary findings from their 2014 Twitter #DataGrant, which has allowed them to develop a correlative analysis between historic social media information, the Jakarta government's flood maps, and the infrastructure used to manage critical flood emergencies.

### **Keywords**

seasonal, flooding, geosocial, jakarta, intelligence, indonesia, framework, studying, promoting, resilience

### **Publication Details**

Turpin, E., Holderness, T. & Wickramasuriya, R. (2014). A geosocial intelligence framework for studying & promoting resilience to seasonal flooding in Jakarta, Indonesia. International Symposium for Next Generation Infrastructure (ISNGI 2014) (pp. 1-1). London, United Kingdom: University College London.

# A GeoSocial Intelligence Framework for Studying & Promoting Resilience to Seasonal Flooding in Jakarta, Indonesia

International Symposium for Next Generation  
Infrastructure

Vienna - October 2014

**Tomas Holderness, Etienne Turpin, Rohan Wickramasuriya**





MORE THAN HALF OF THE  
WORLD'S POPULATION LIVES  
WITHIN THIS CIRCLE

Source: Reddit User valierisplenis





**MEGACITIES: CITIES WITH  
POPULATIONS OVER 8 MILLION**

Source: UN World Urbanization Prospects 2011



**20 megacities**

1. KARACHI
2. DELHI
3. MUMBAI
4. BANGALORE
5. CHENNAI
6. KOLKATA
7. DHAKA
8. BANGKOK
9. CHONGQING
10. SHENZHEN
11. GUANGZHOU
12. WUHAN
13. BEIJING
14. TIANJIN
15. SHANGHAI
16. SEOUL
17. OSAKA-KOBE
18. TOKYO
19. MANILA
20. JAKARTA



20 megacities

14 are sitting on river deltas

Source: USGS HydroSHEDS



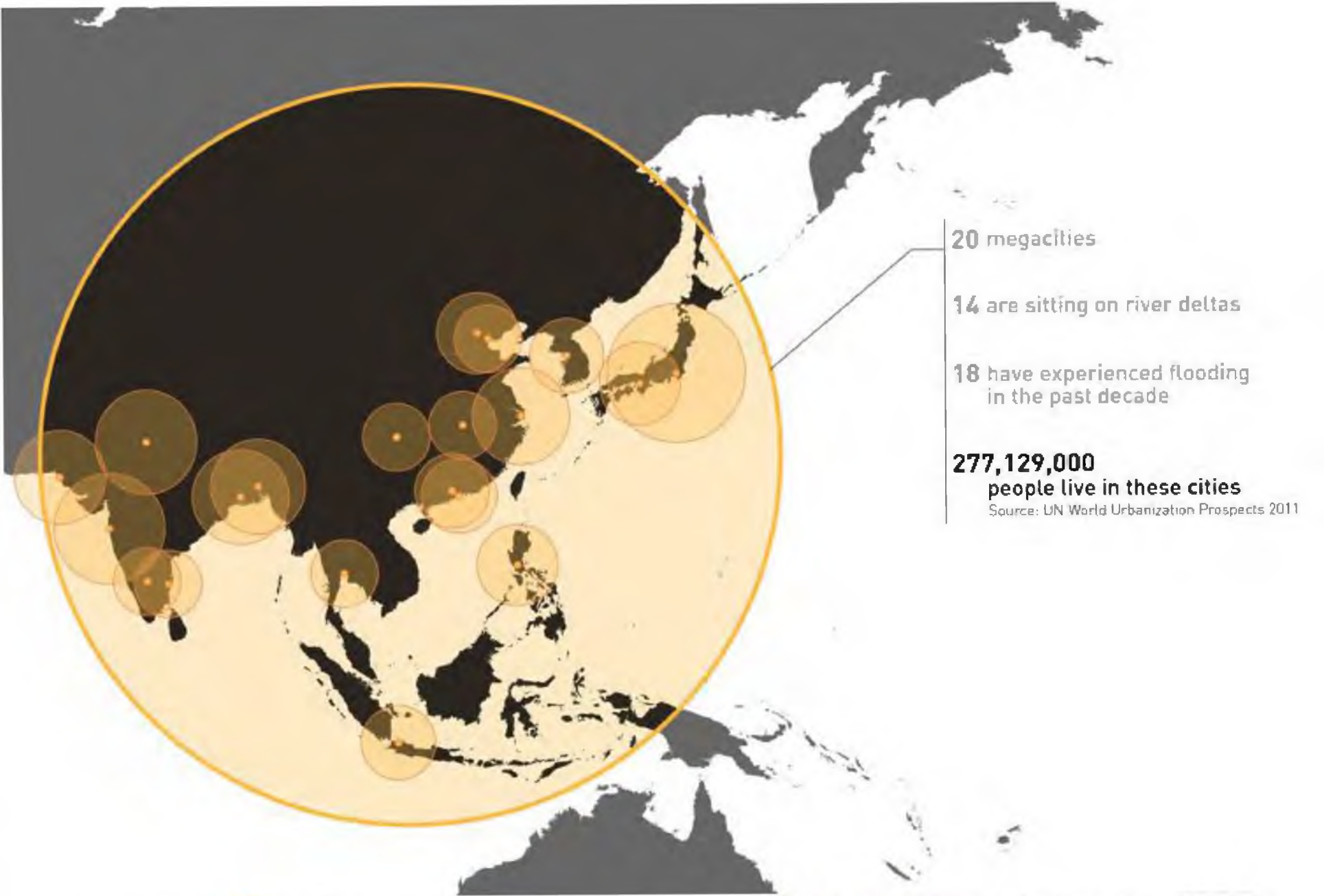


20 megacities

14 are sitting on river deltas

**18 have experienced flooding  
in the past decade**

Source: Dartmouth Flood Observatory



**20** megacities

**14** are sitting on river deltas

**18** have experienced flooding  
in the past decade

**277,129,000**  
people live in these cities

Source: UN World Urbanization Prospects 2011



PETA  JAKARTA

**smart**  
infrastructure facility

UNIVERSITY OF  
WOLLONGONG







PETA  JAKARTA

**smart**  
infrastructure facility

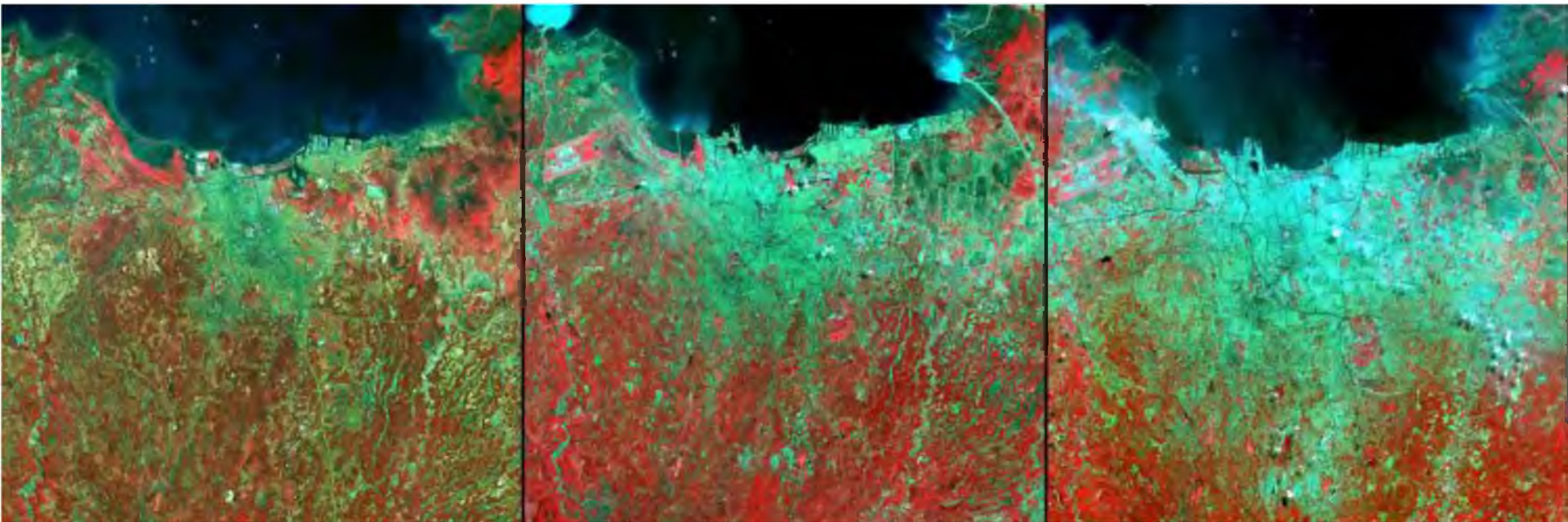
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6 million  
(1976)

9 million  
(1989)

13 million  
(2004)

By 2014, population of the metropolitan Jakarta (known as Jabodatabek) reached 28 million.  
Images courtesy of NASA: Landsat MSS (1976 and 1989), and ASTER (2004).















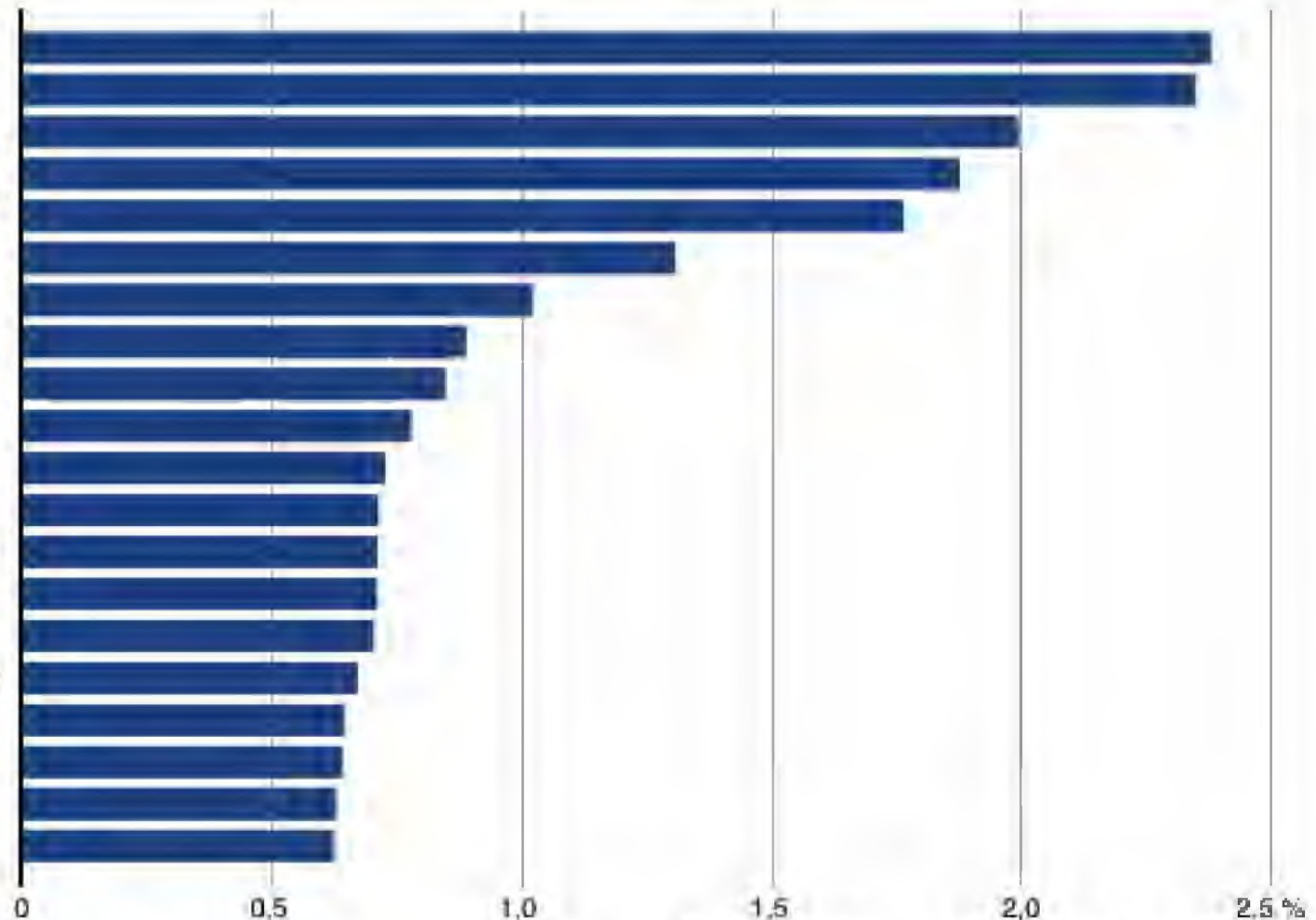


# Top 20 cities by number of posted tweets

Among 10,58 public tweets posted in June 2012

Rank & city

- 1 Jakarta
- 2 Tokyo
- 3 London
- 4 São Paulo
- 5 New York
- 6 Bandung
- 7 Paris
- 8 Los Angeles
- 9 Chicago
- 10 Riyadh
- 11 Singapore
- 12 İstanbul
- 13 Osaka
- 14 Toronto
- 15 Madrid
- 16 Rio de Janeiro
- 17 Seoul
- 18 Miami
- 19 Atlanta
- 20 Houston



Seminar @2012

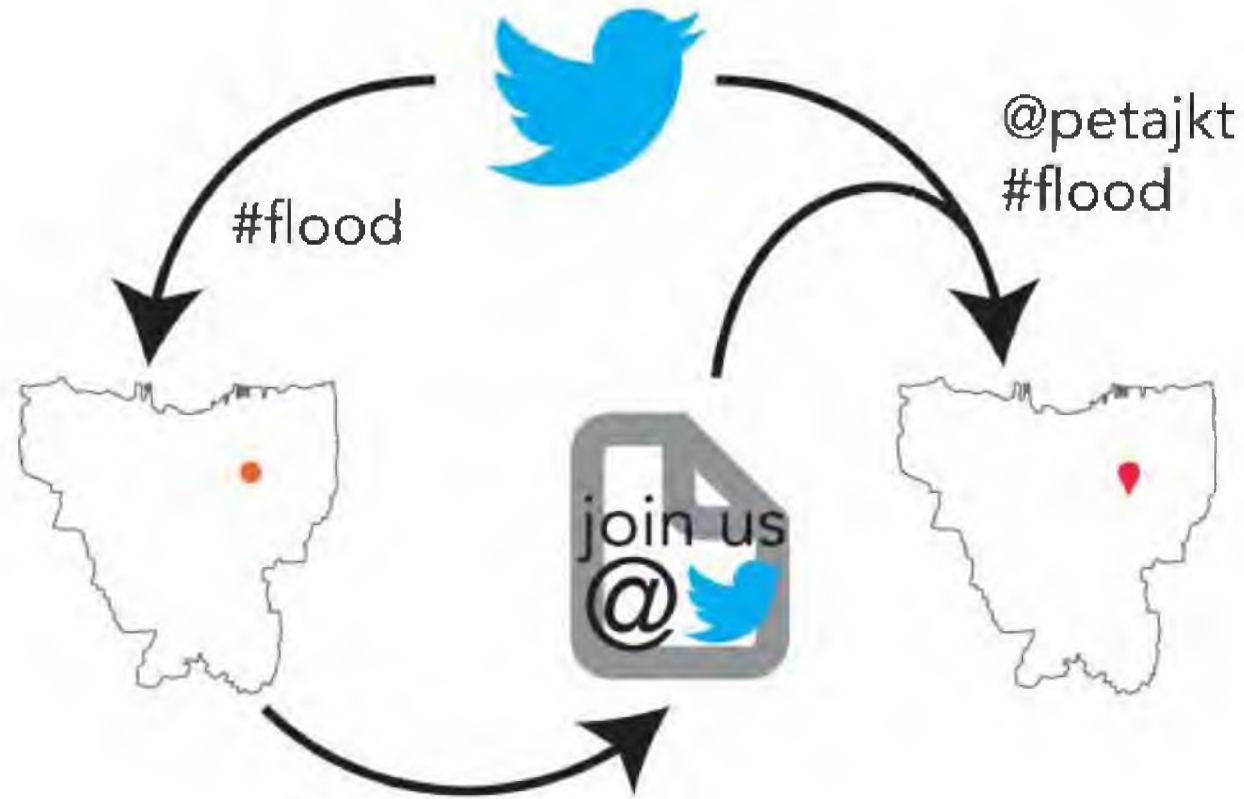
Share of public tweets geolocated at the city level  
(27% of all public tweets)

## 2014 MONSOON SYSTEM TEST

05/02/14 24hrs (from 20:00)

Total number of “banjir” tweets	150,000
Total number of original users	100,000
Geo-located reports	5,000
Average frequency	100Tw/60s



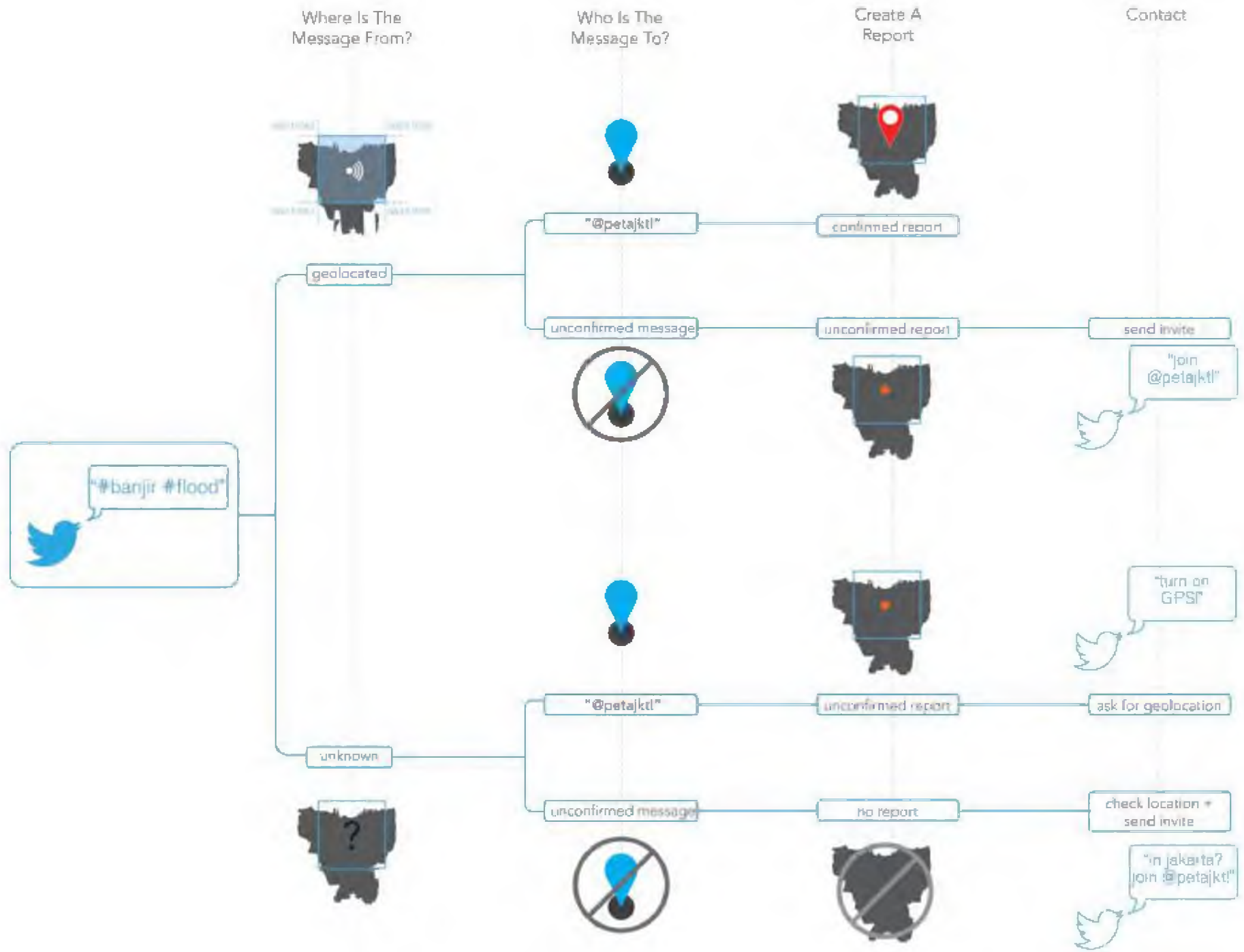


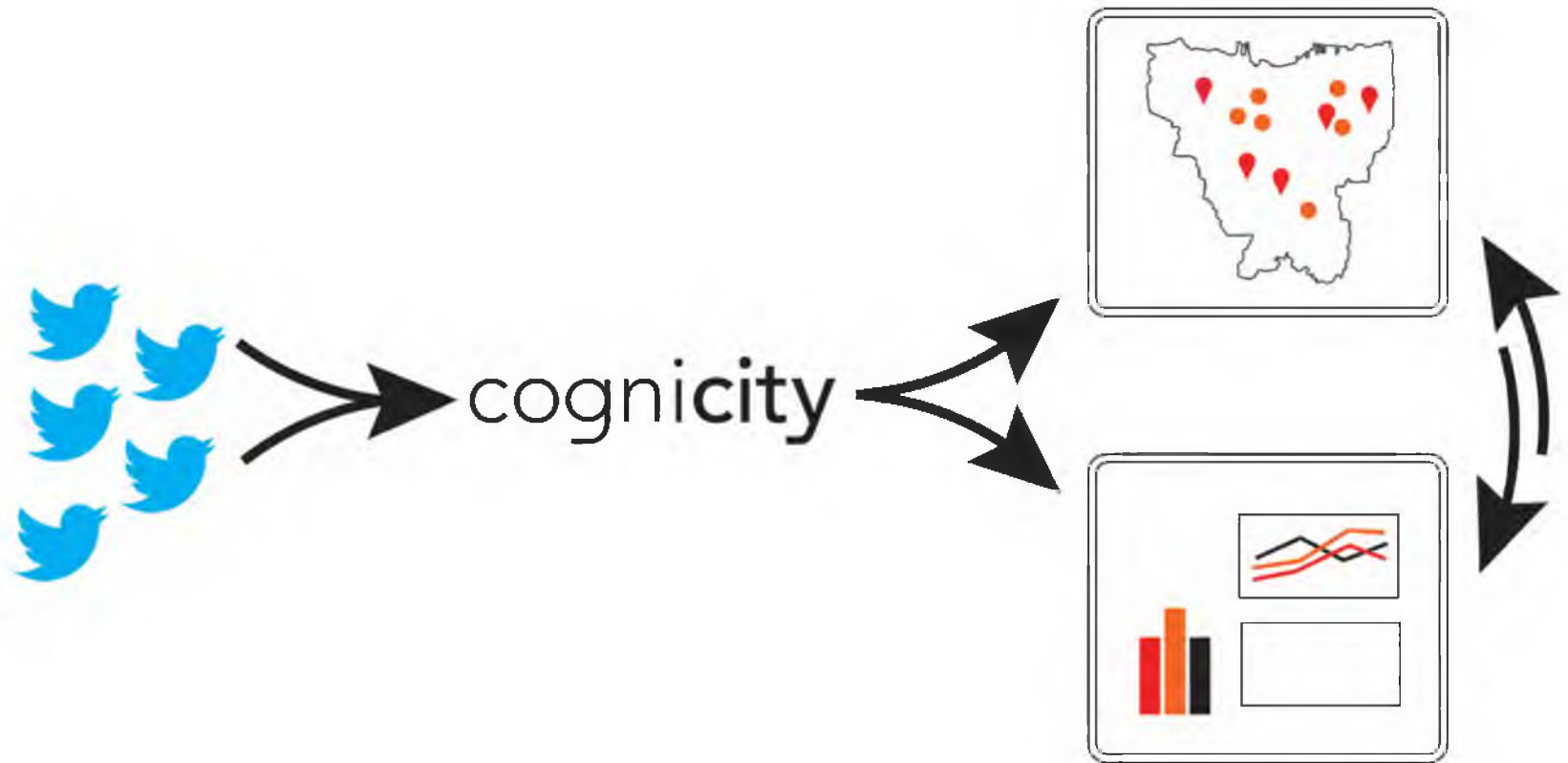














User Interface:  
Geolocation  
+  
Nearby Reports



Institutional Interface:  
Overview  
+  
Report Scaling



Jakarta banjir :'( mangga dua nih  
[pic.twitter.com/89nyPltGDg](https://pic.twitter.com/89nyPltGDg)

 View translation

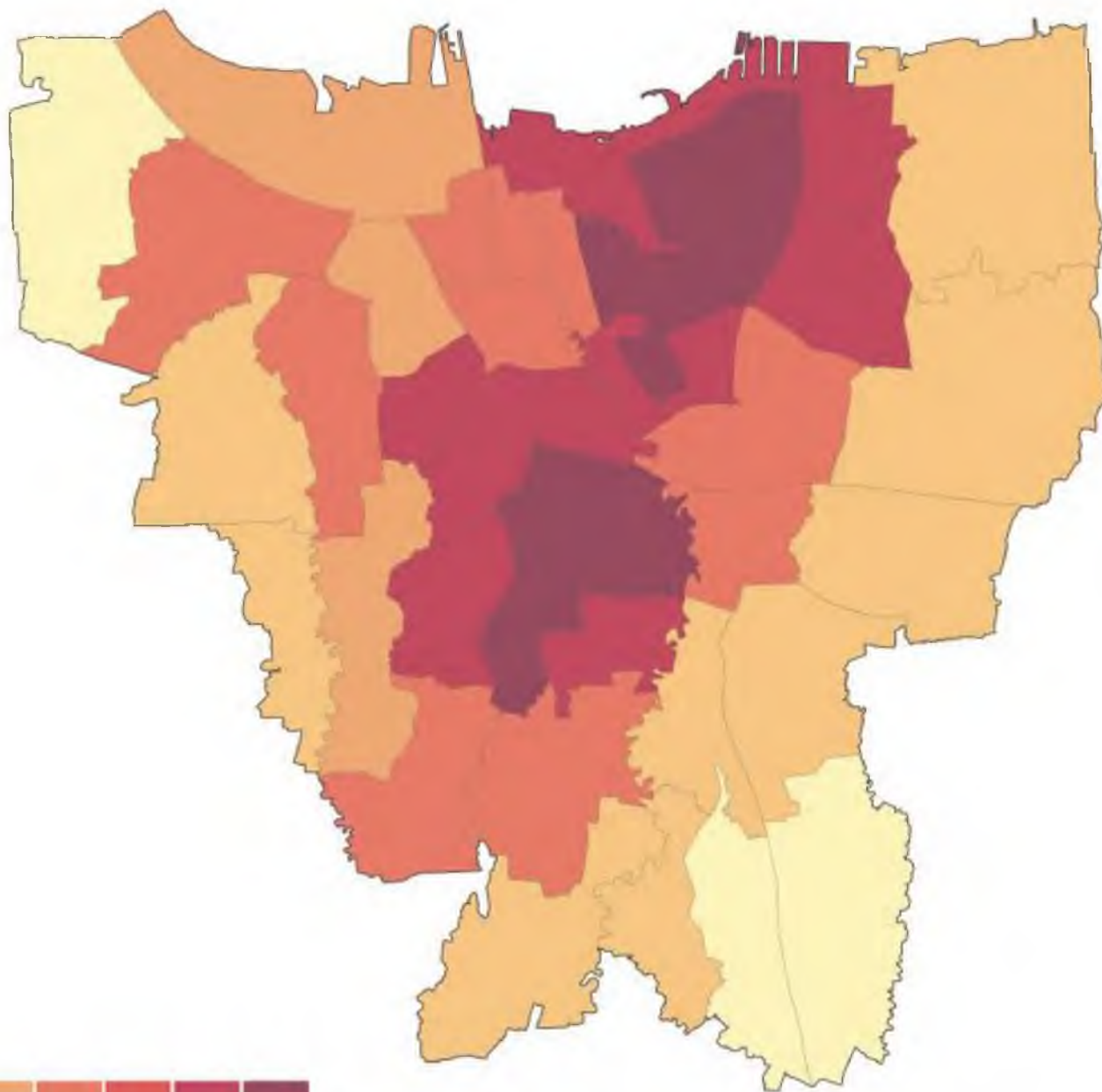
 Reply  Retweet  Favorite  More



2:28 AM - 7 Feb 2014  from Tamansari, Jakarta Barat

[Flag media](#)





City Overview - By District





**PEMERINTAH PROVINSI DKI JAKARTA  
BADAN PENANGGULANGAN BENCANA DAERAH**

## LAPORAN DAERAH BANJIR

**BERDASARKAN KEJADIAN BANJIR  
31 JANUARI 2014 PUKUL 18:00 WIB**

Nomor Peta: BANJIR-310114-003

Skala: 1:100,000

Proyeksi: World Mercator

Datum: WGS 84

U



### Legenda

Tinggi Genangan Air Rata-rata

10 - 70 cm

71 - 150 cm

> 150 cm

Belum ada data

Sungai

Keterangan:

Peta ini menggunakan unit analisis batas RW (diproses berdasarkan program generasi partisipatif dengan OpenStreetMap pada tahun 2012) sebagai daerah terdampak banjir.

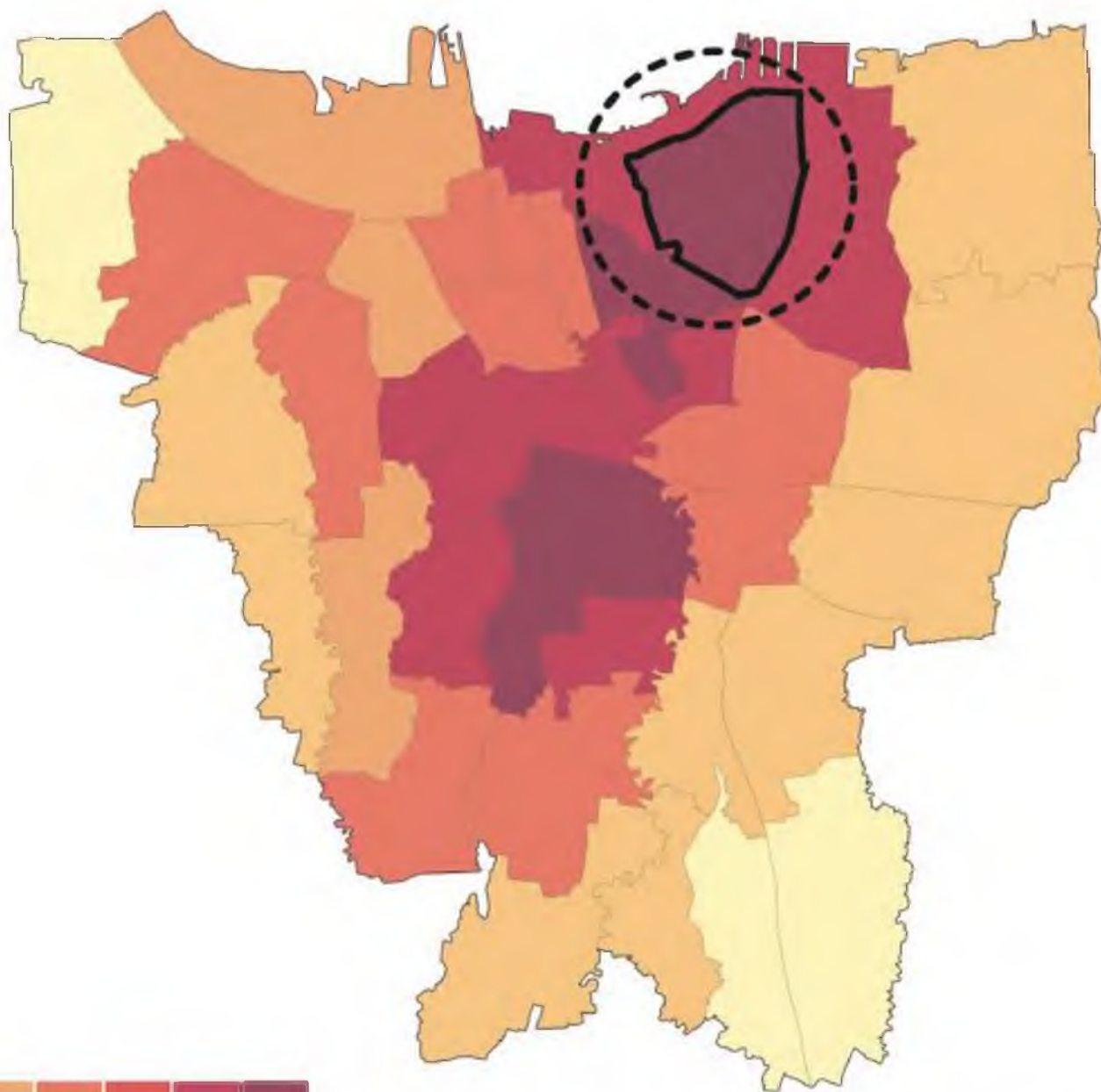
Informasi lebih lanjut hubungi:  
Badan Penanggulangan Bencana Daerah (BPBD)  
Provinsi DKI Jakarta  
Jl. Medan Merdeka Selatan, No. 8-9 Blok F Lantai 3.  
Telpun (021) 164 atau 3521623

Didukung oleh:

**Australian  
Aid**

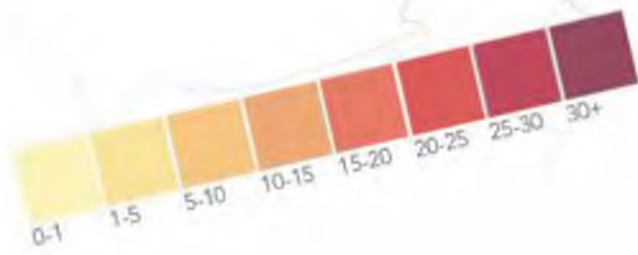


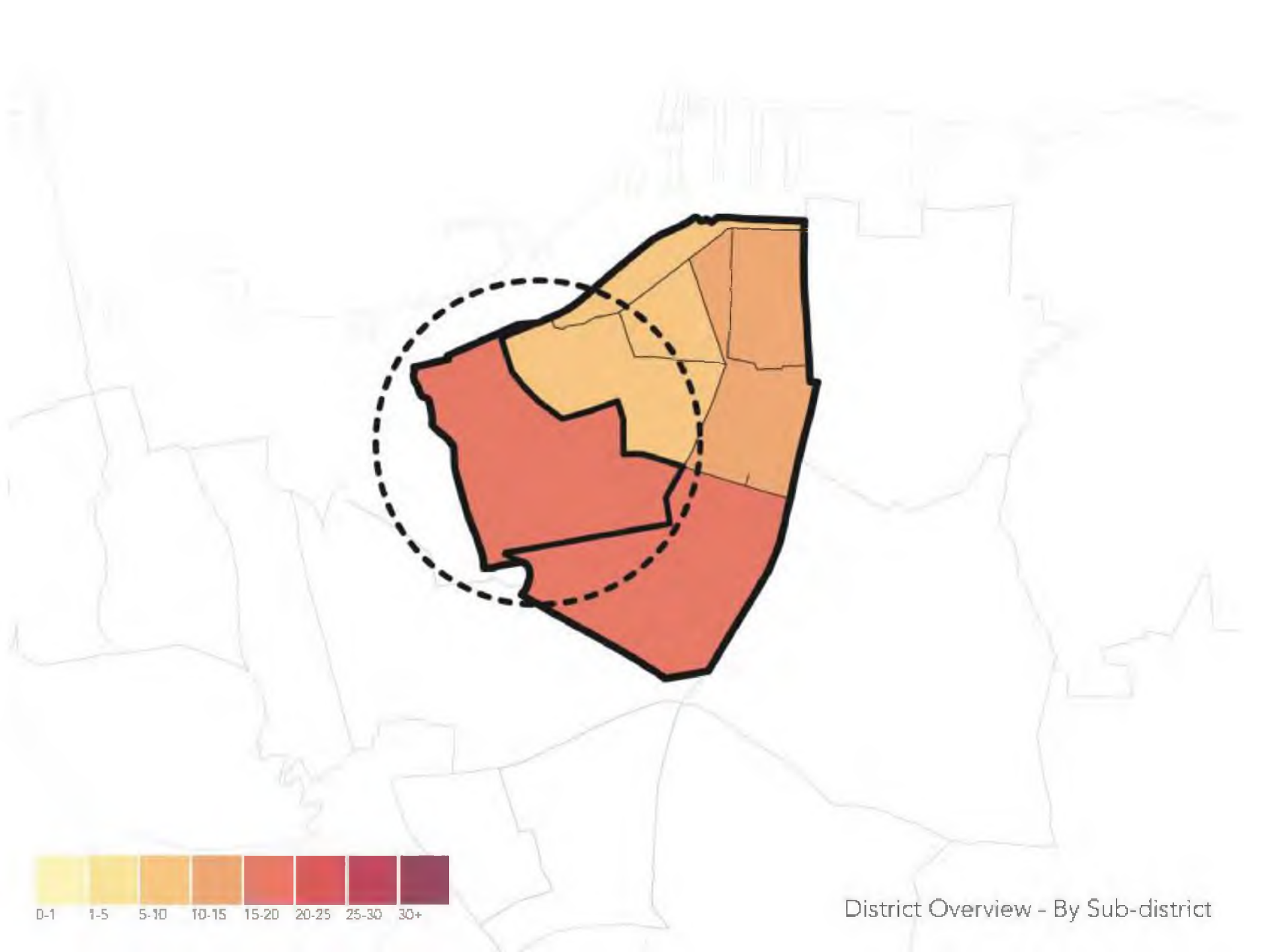




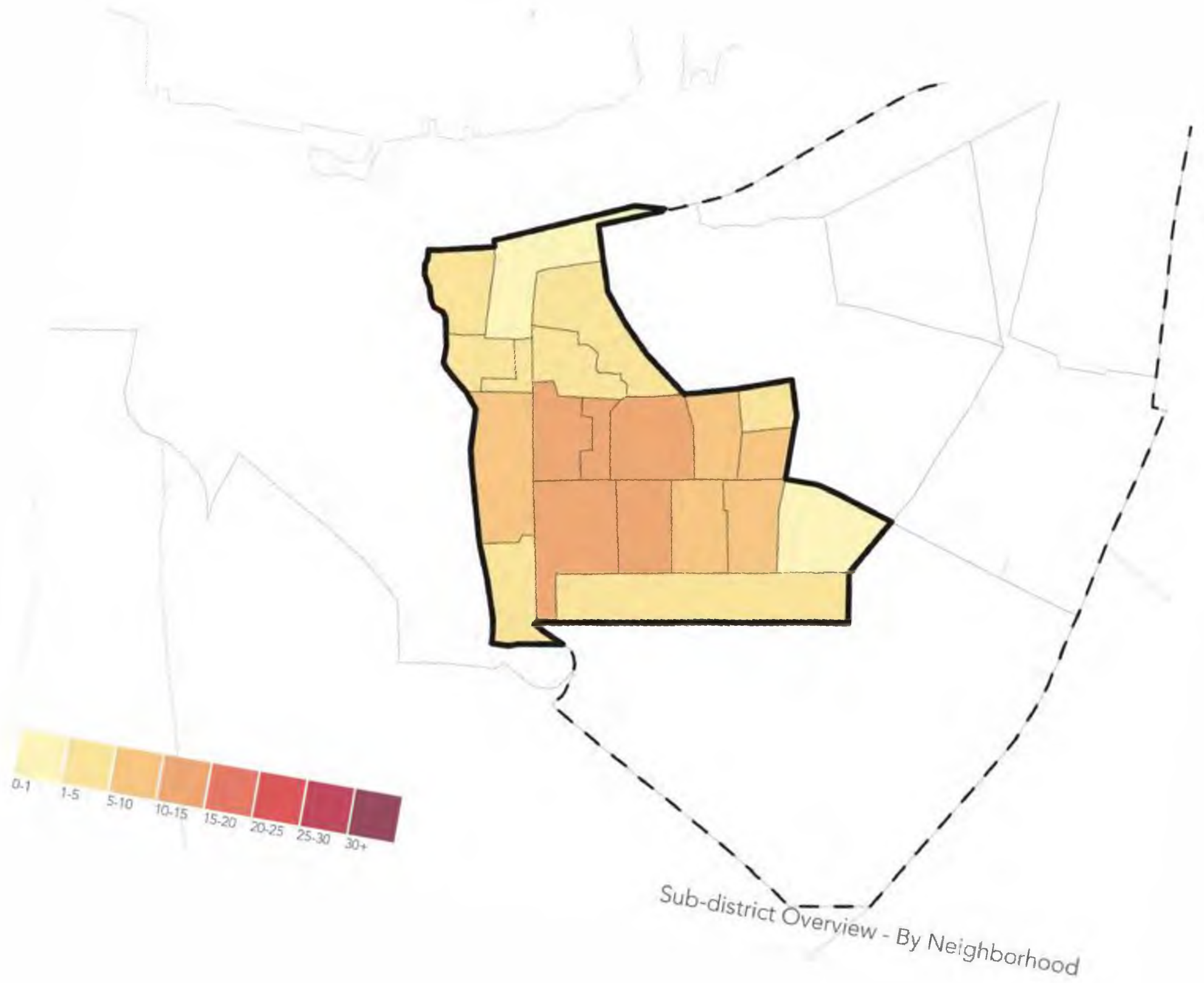
City Overview - By District

District Overview - By Sub-district





District Overview - By Sub-district















**CogniCity.info**  
**an OSS Framework for**  
**Applied GeoSocial Intelligence**  
**Engineering**

# cognicity

An open framework for urban data

CogniCity harnesses the power of social media by gathering, sorting and displaying real-time situational reports from urgent urban infrastructure issues such as flooding or traffic congestion. Our powerful toolset makes this information available in real-time to citizens in need of daily information, and meanwhile conducts predictive analysis to better inform prepare for future planning.



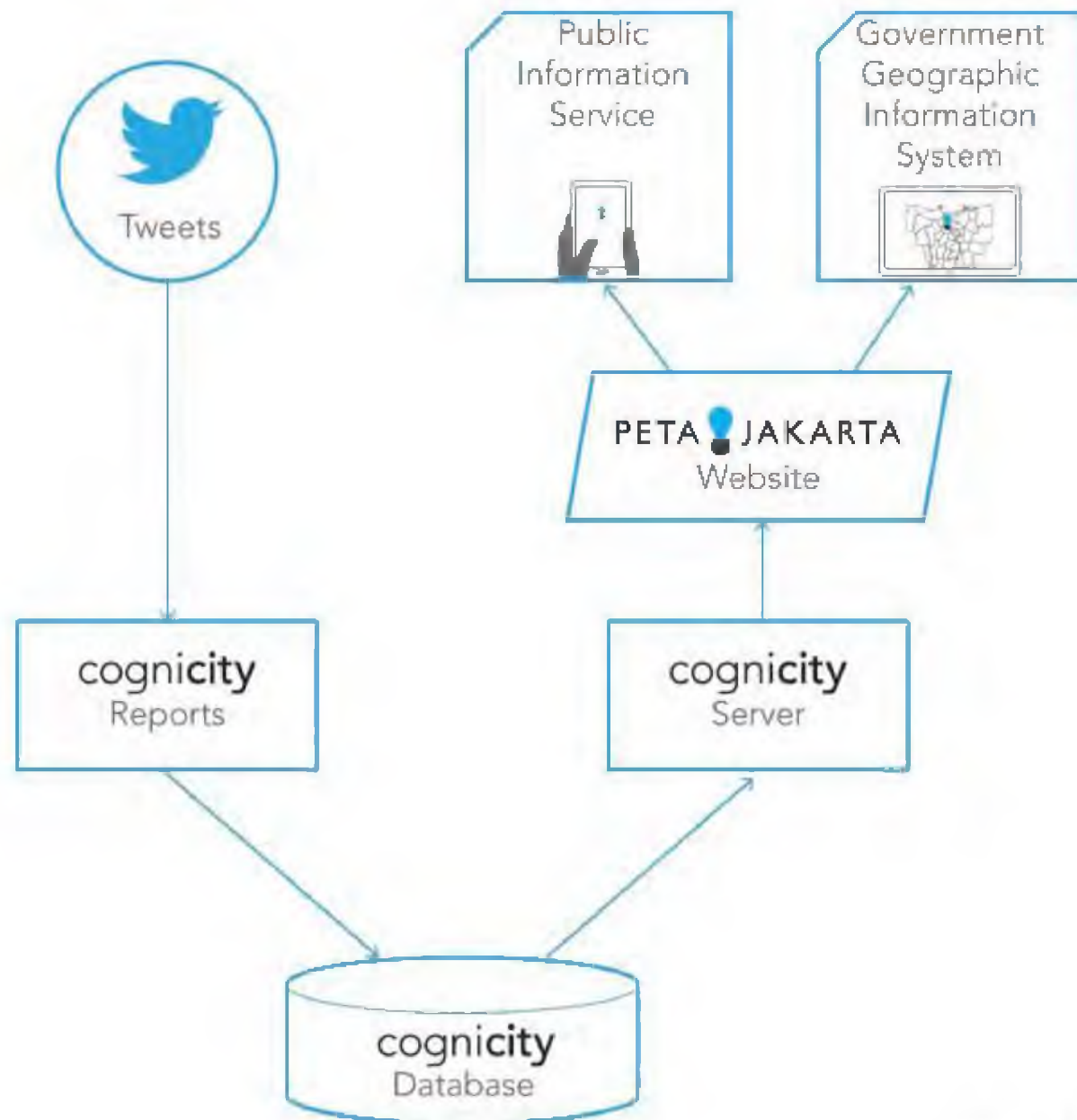
**Collect**



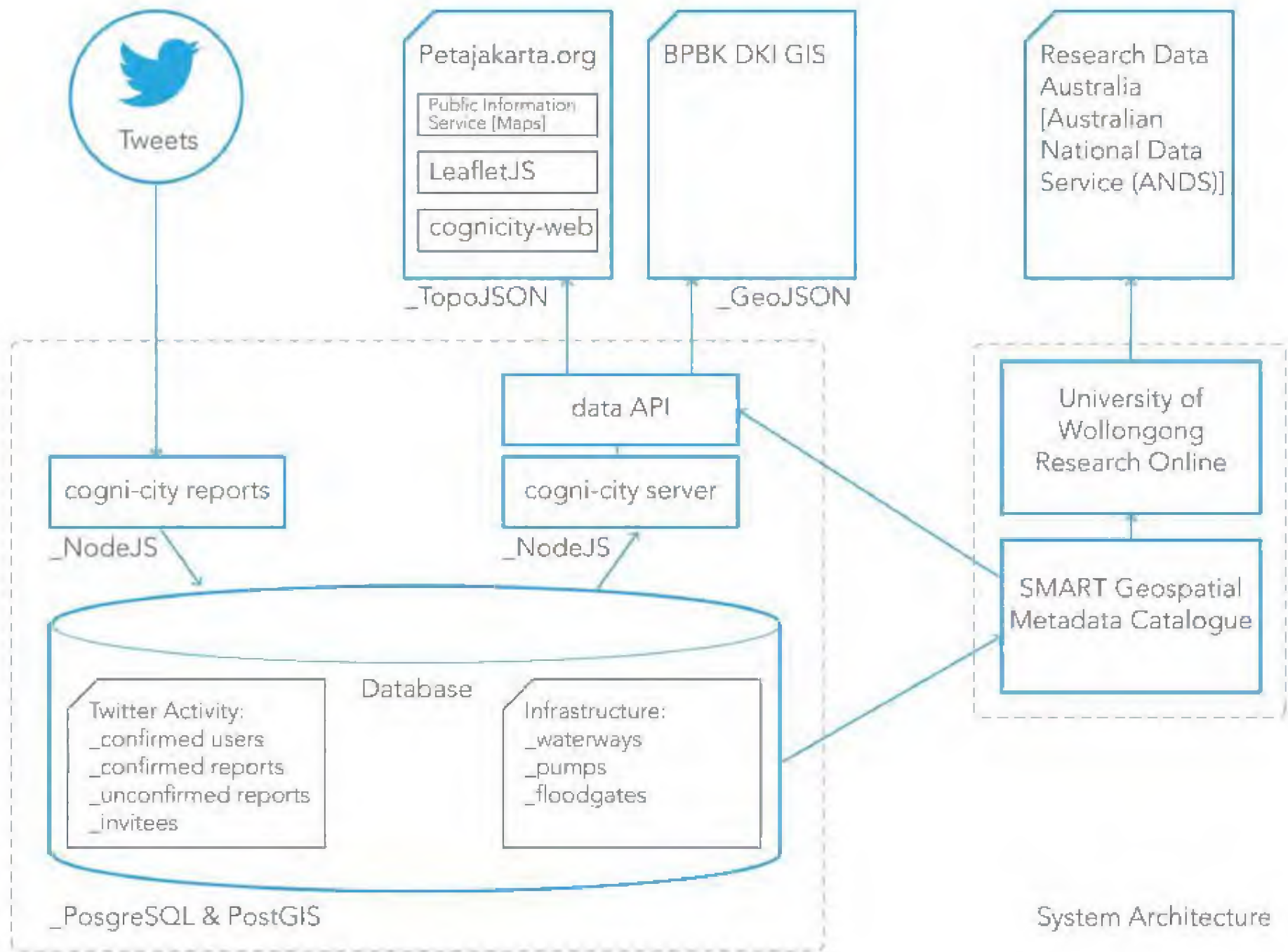
**Analyse**



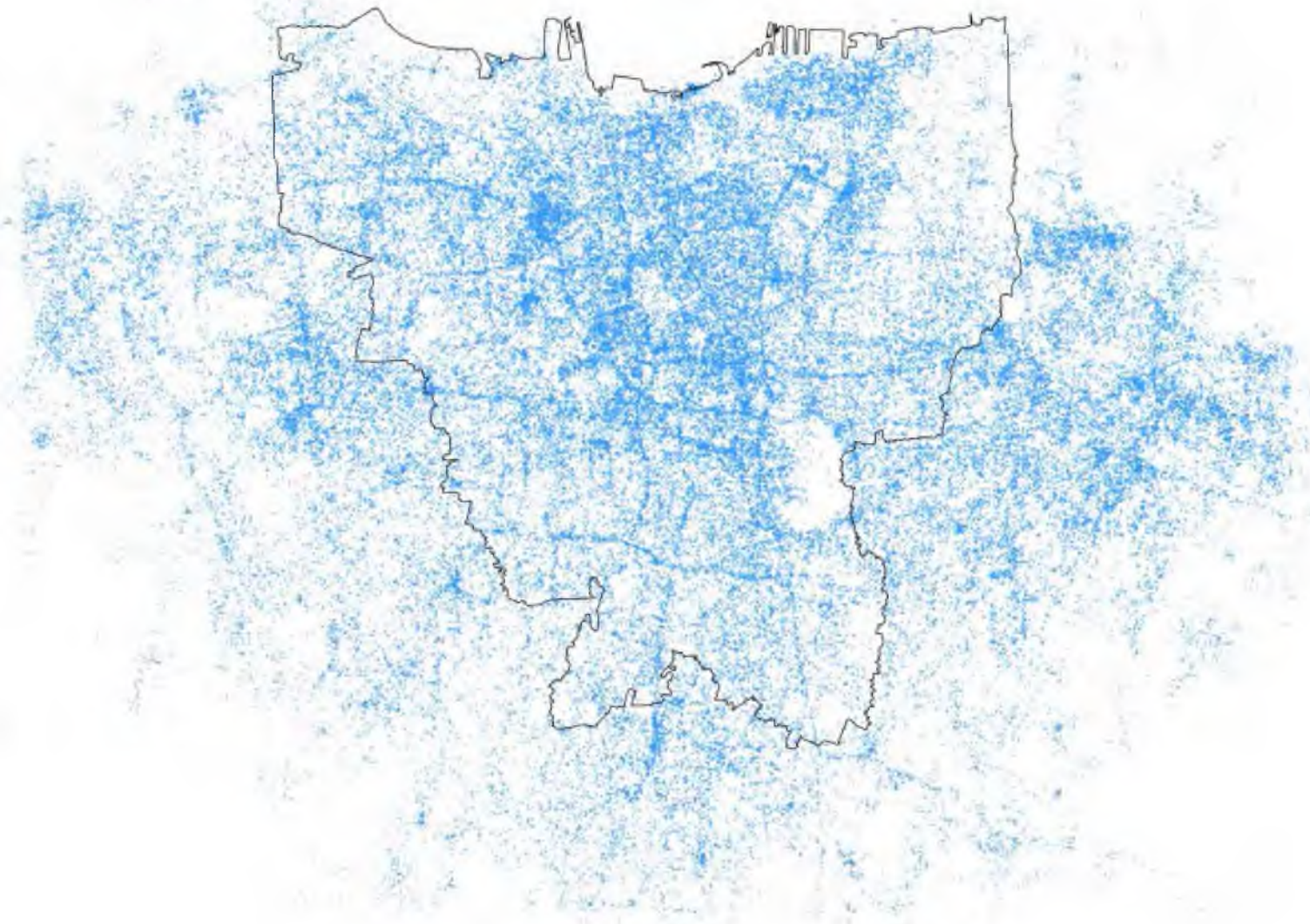
**Communicate**



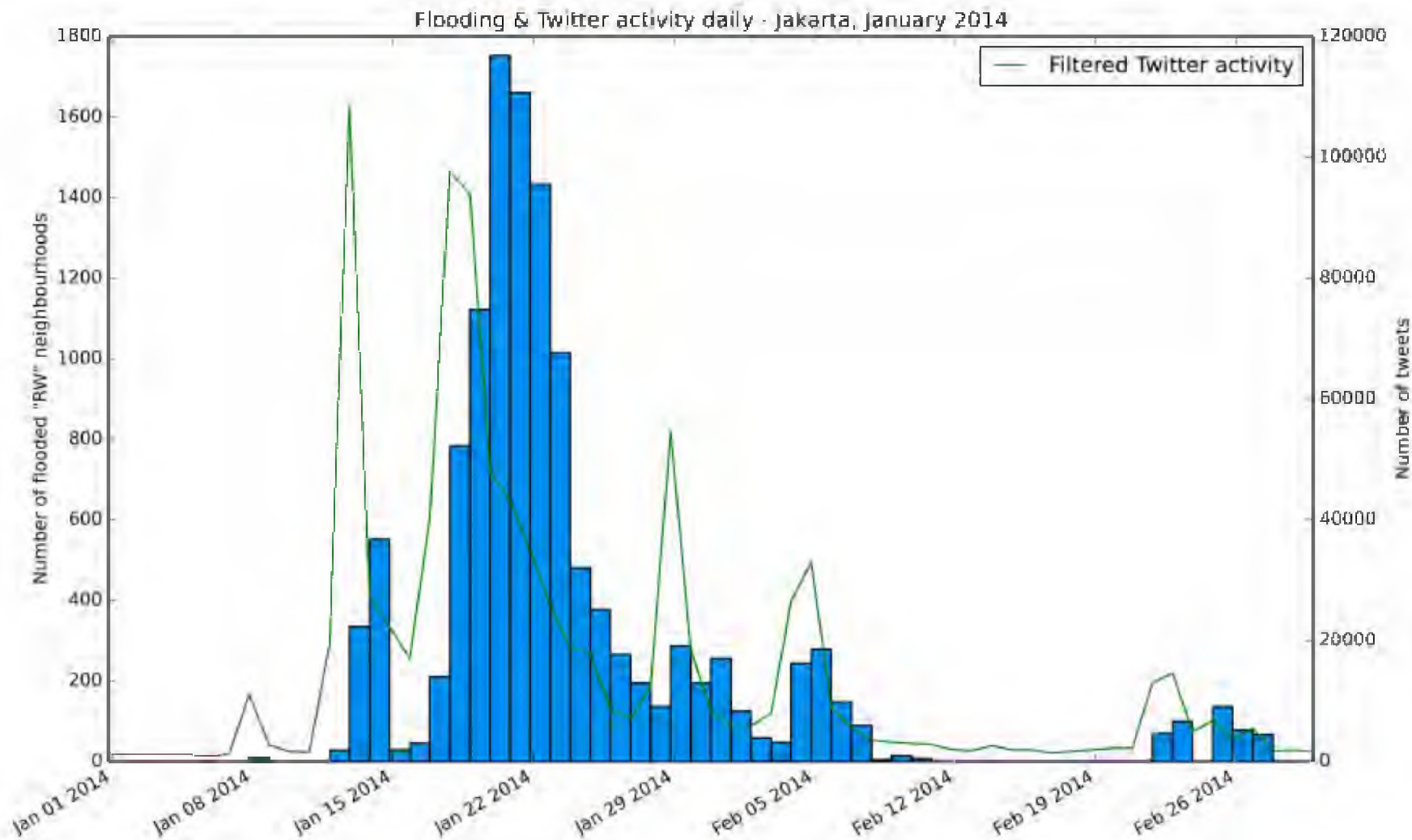




**Regression Analysis  
& CogniCity Calibration  
Through Historical Twitter Data  
via #DataGrant**







# **Community-led Data Collection for Resilience & Recovery Part 1**























## LEGEND

- team safe evacuation
- government route
- community route
- people helping
- team mobile clinic
- team distribusilogistic
- team clapur umum/public kitchen
- sleeping spots





# **Community-led Data Collection for Resilience & Recovery Part 2 #GRASP**

Photo



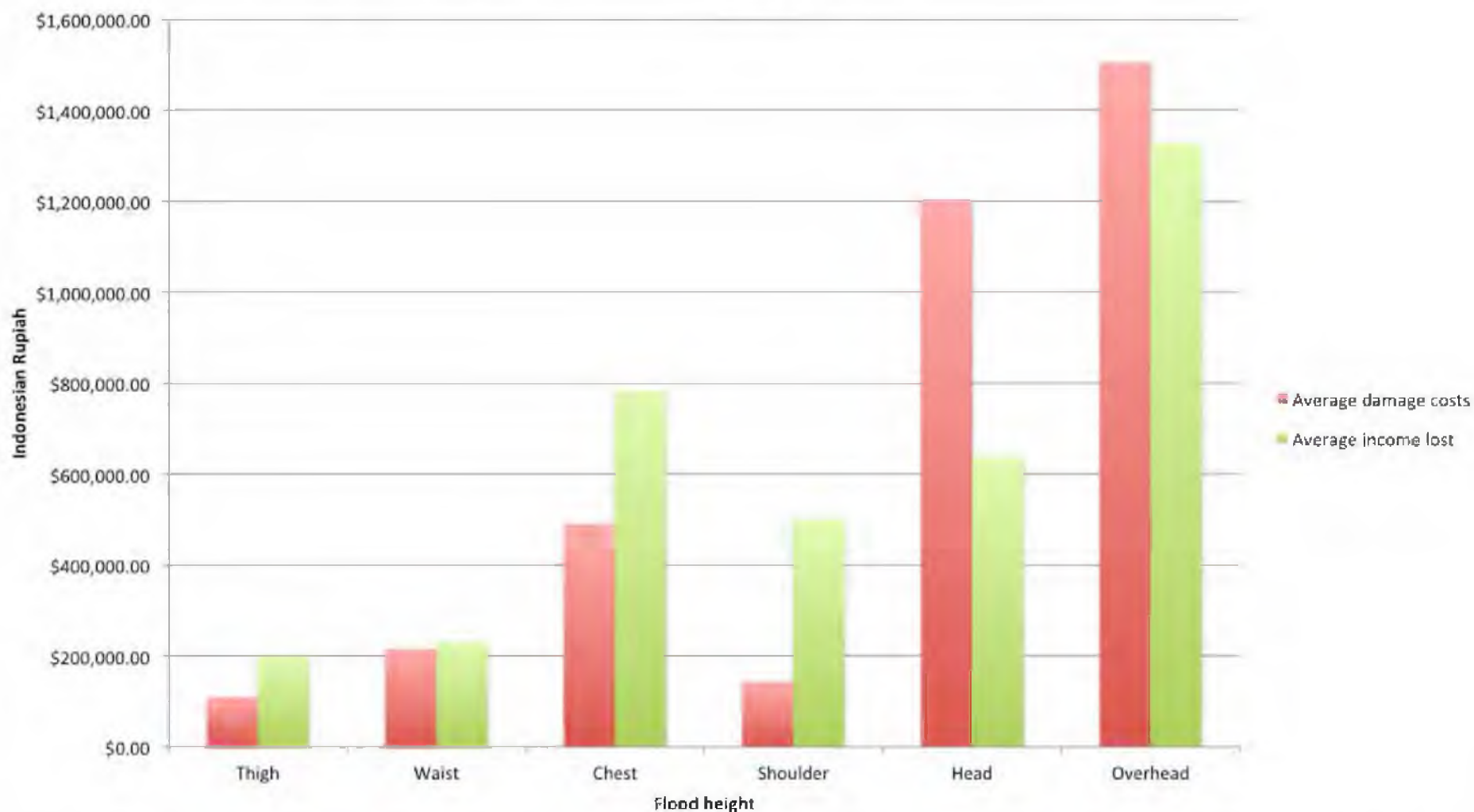
**PetaJakarta.org** @mapjkt · Feb 12

@mapjkt #grasp Rmh52 Brp5 KrjY15Rp1.5m Sklh45 Skt30  
Rp220000 BjrBahu [pic.twitter.com/qRjx4Fql69](https://pic.twitter.com/qRjx4Fql69)

↩ Reply ↻ Retweet ★ Favorite

Flag media

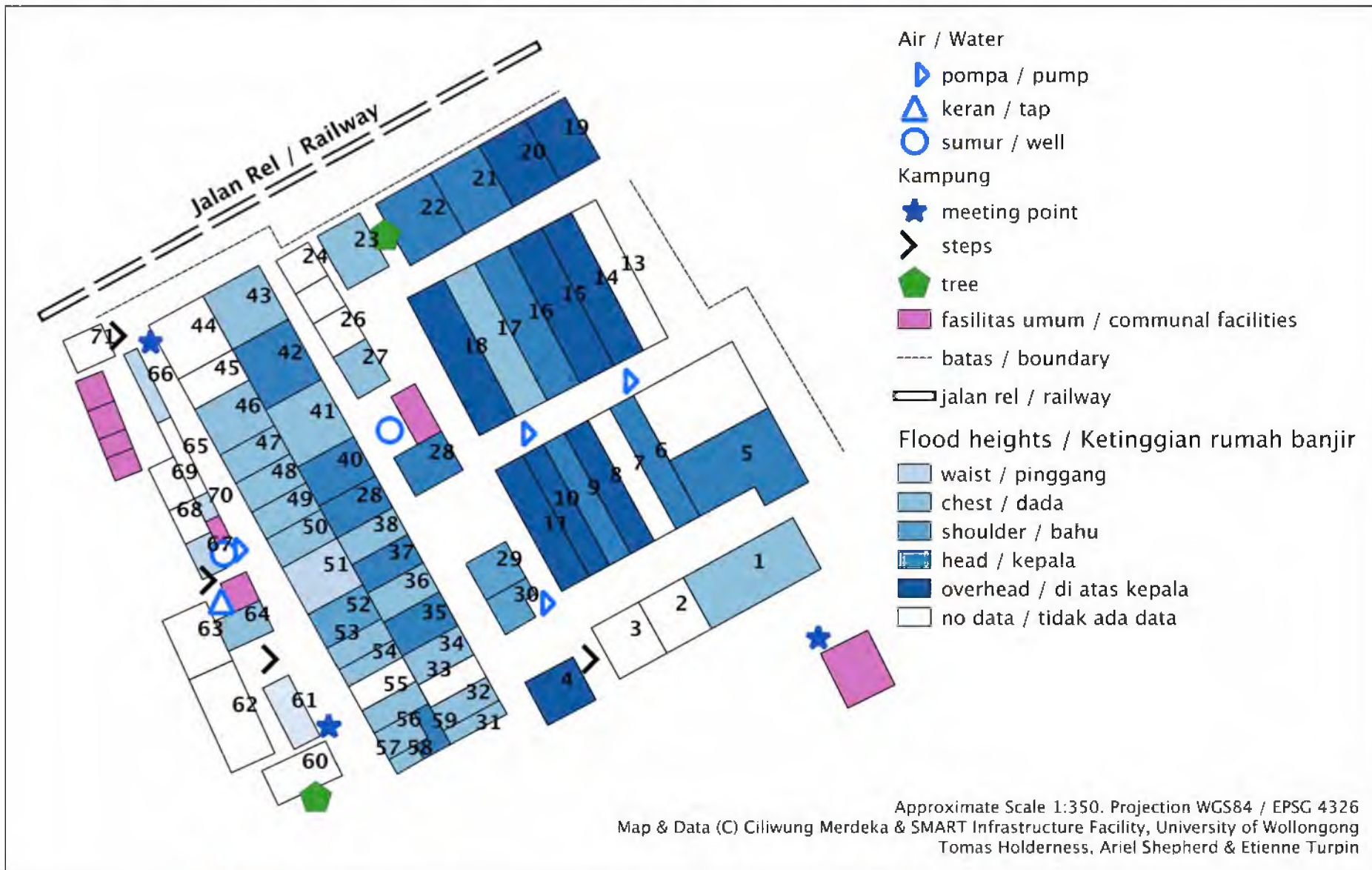
**RT08/RW12 - Average income loss and damage cost per household by flood height**







# RT008 / RW012 BUKIT DURI- Peta Banjir









# **Surveying Ecosystem Services & Disaster Risk Reduction (Eco-DRR)**













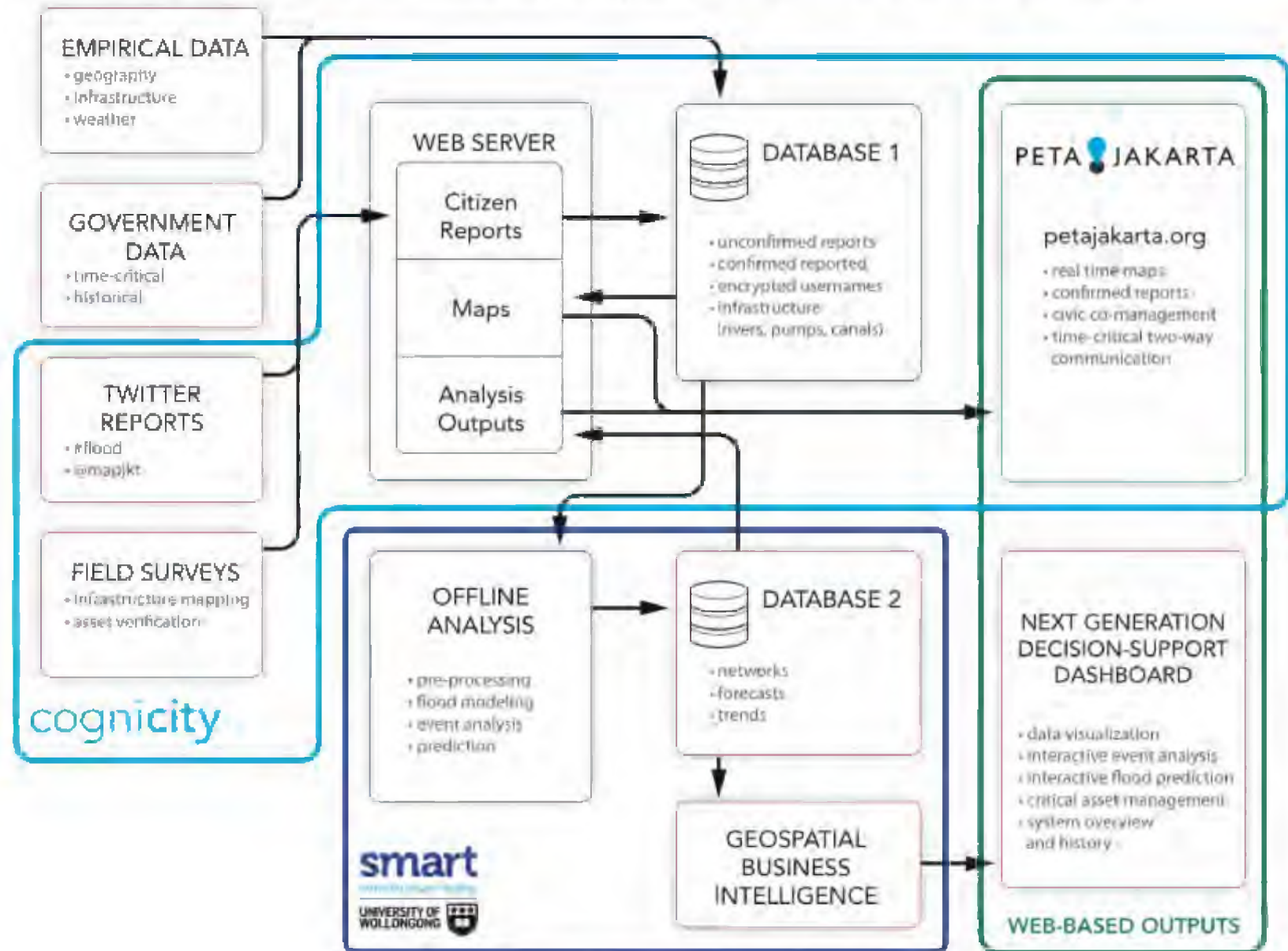
# **UAV Infrastructure Audits & Critical Asset Management**





# GEOSPATIAL INTELLIGENCE FRAMEWORK

System Diagram for Jakarta Pilot Study on Urban Resilience & Climate Adaptation







SMART Infrastructure Facility & Jakarta Emergency Management Agency  
Joint Pilot Study on Urban Resilience  
May 2014 – May 2015



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**ANDS is supported by the Australian Government through the National Collaborative Research Infrastructure Strategy Program**

