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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

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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

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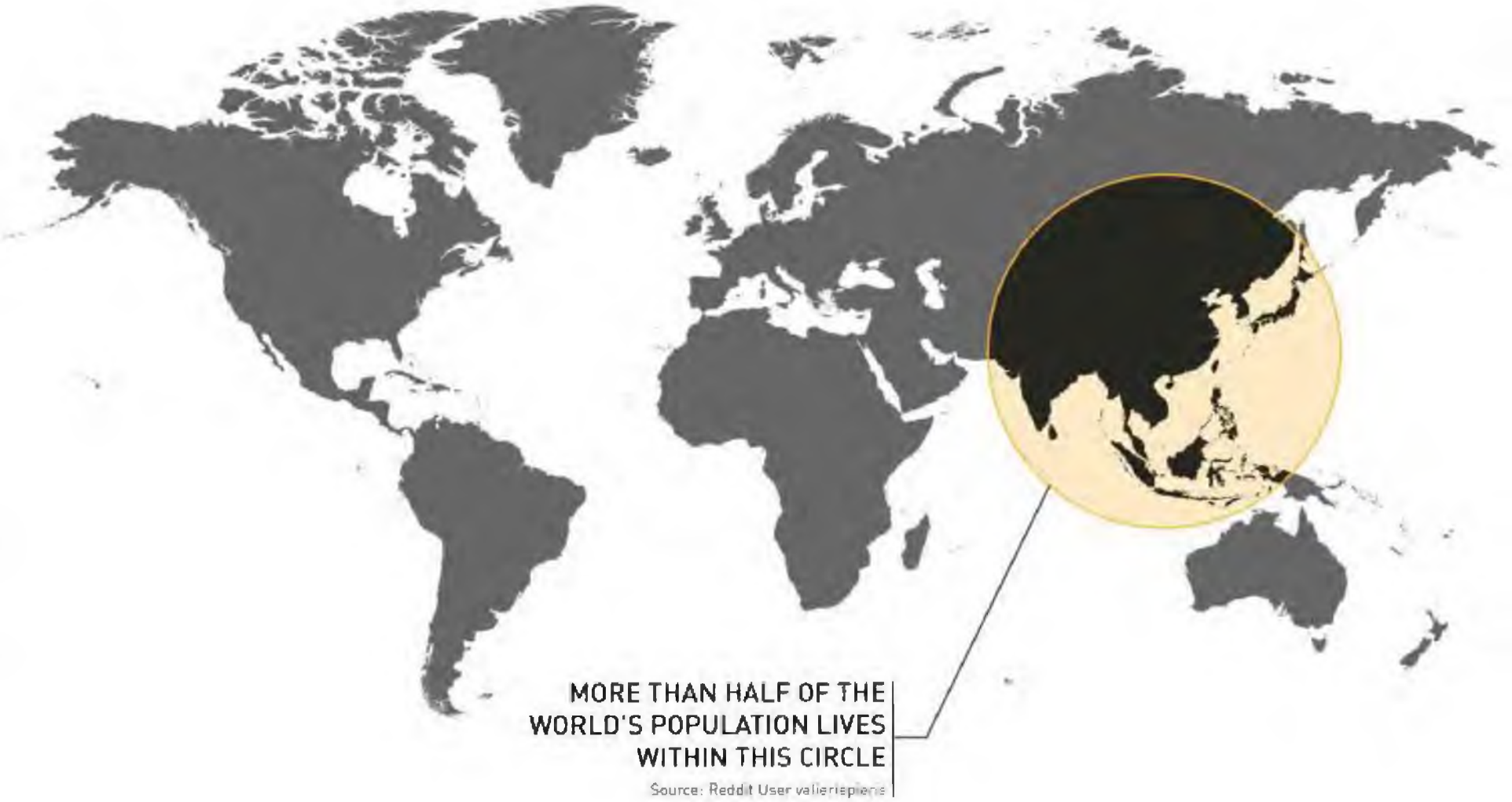

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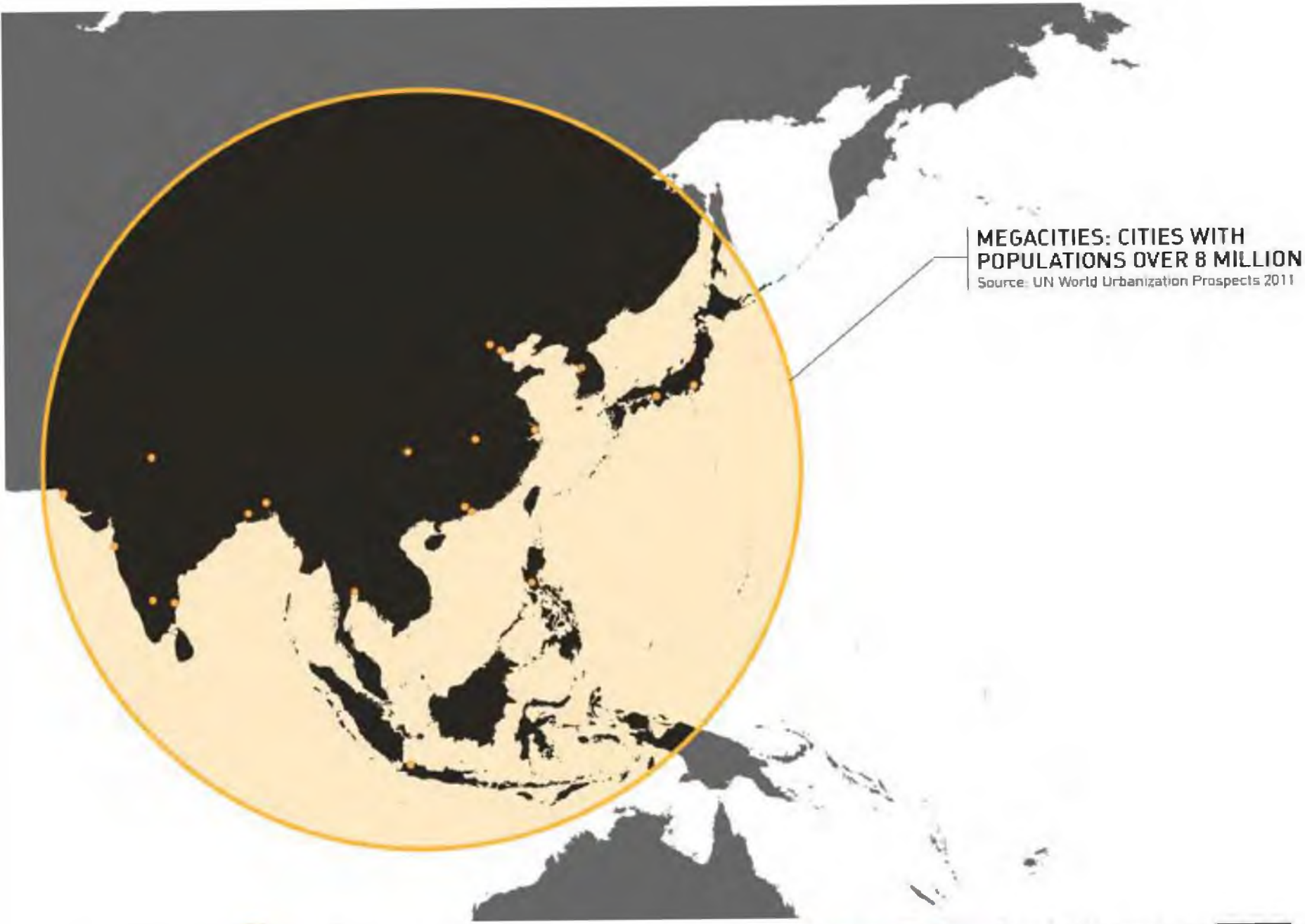

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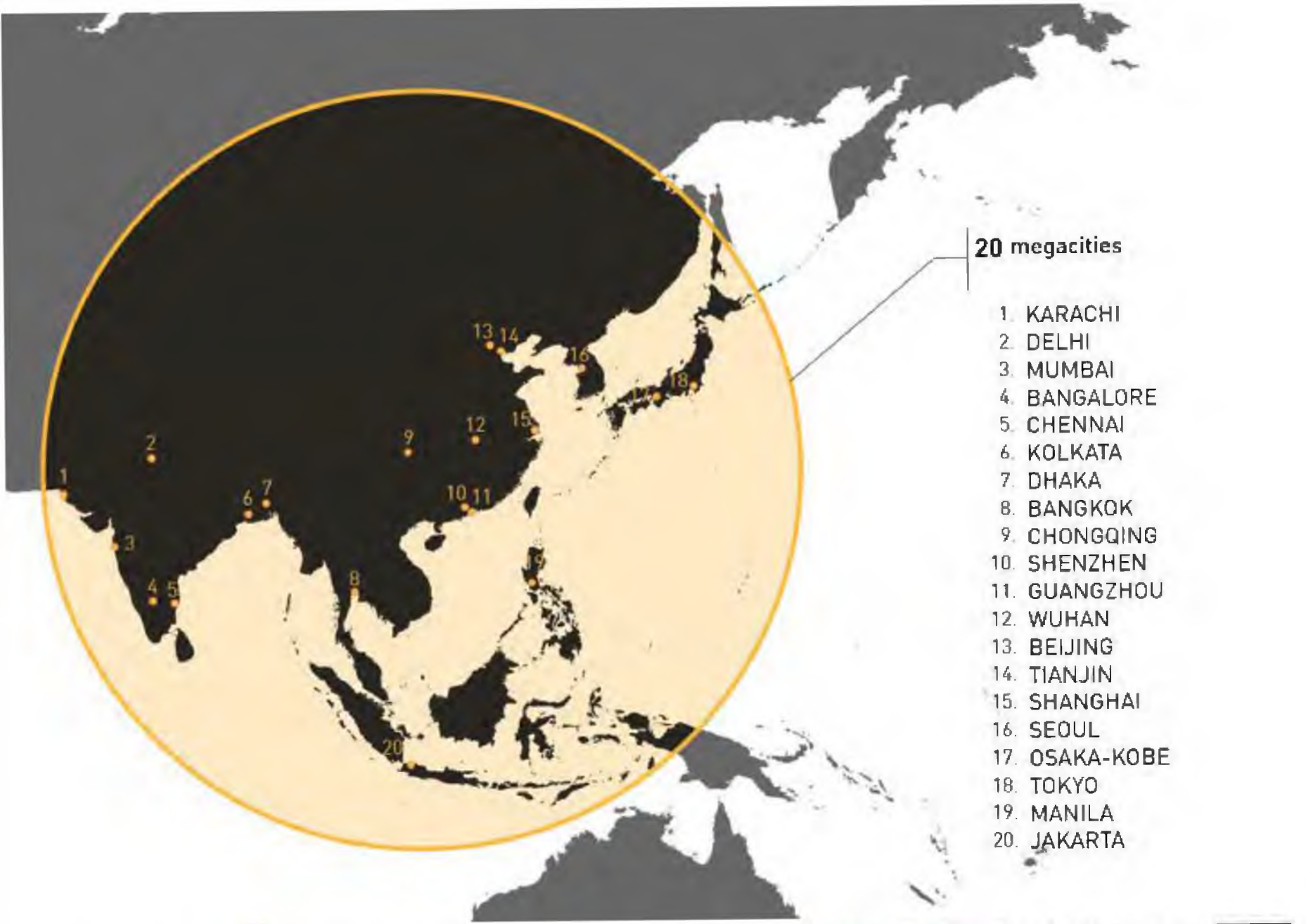

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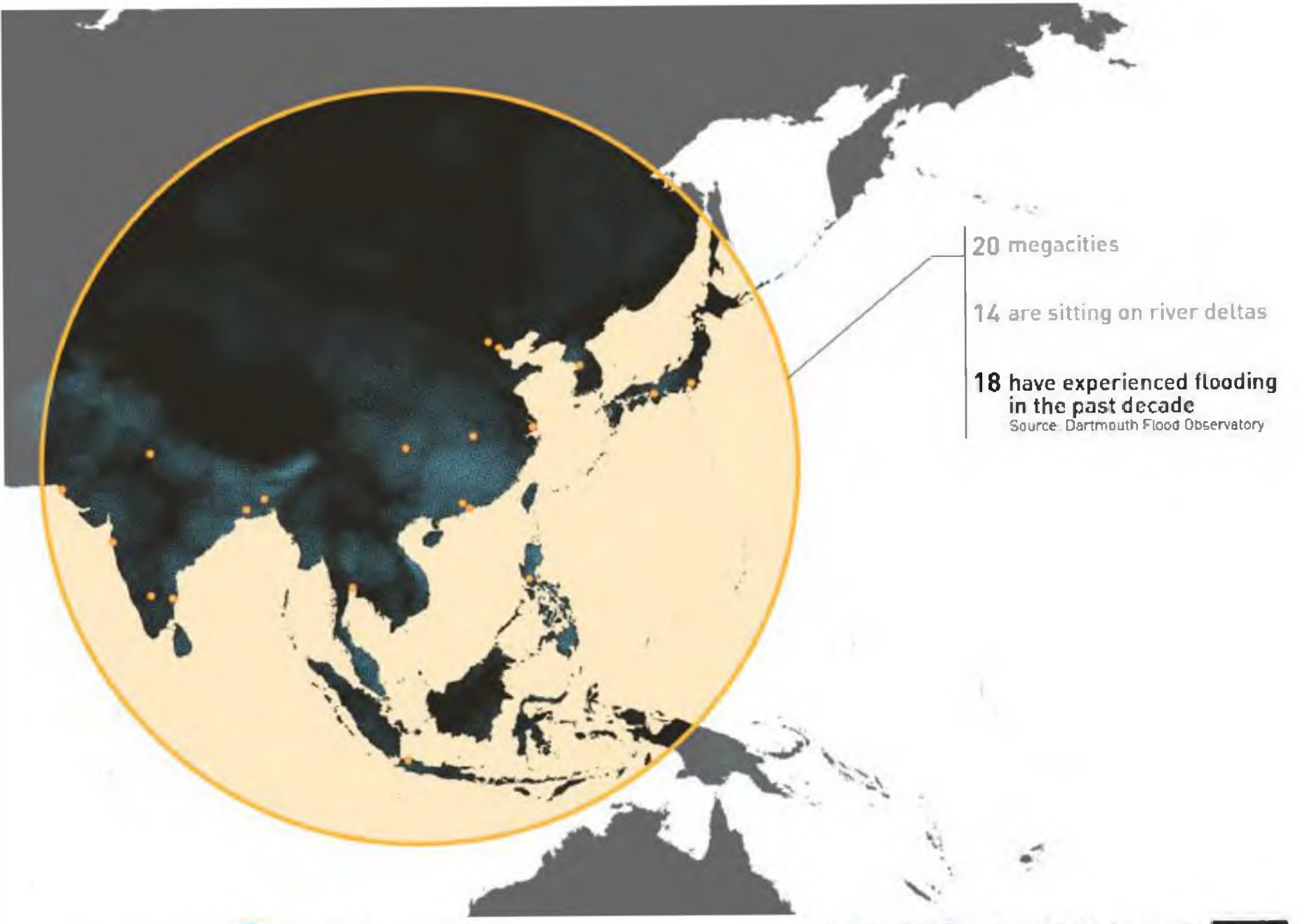

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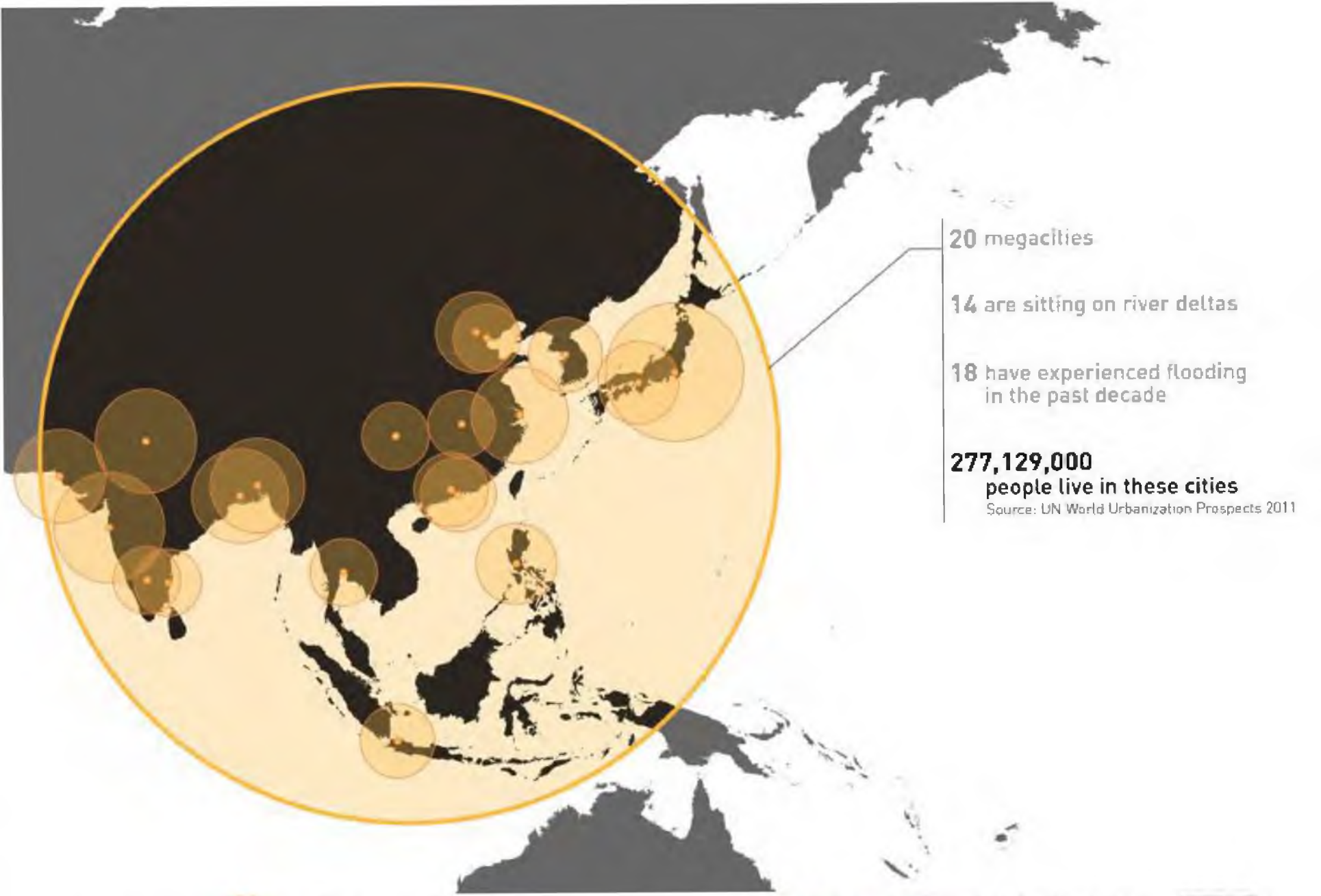

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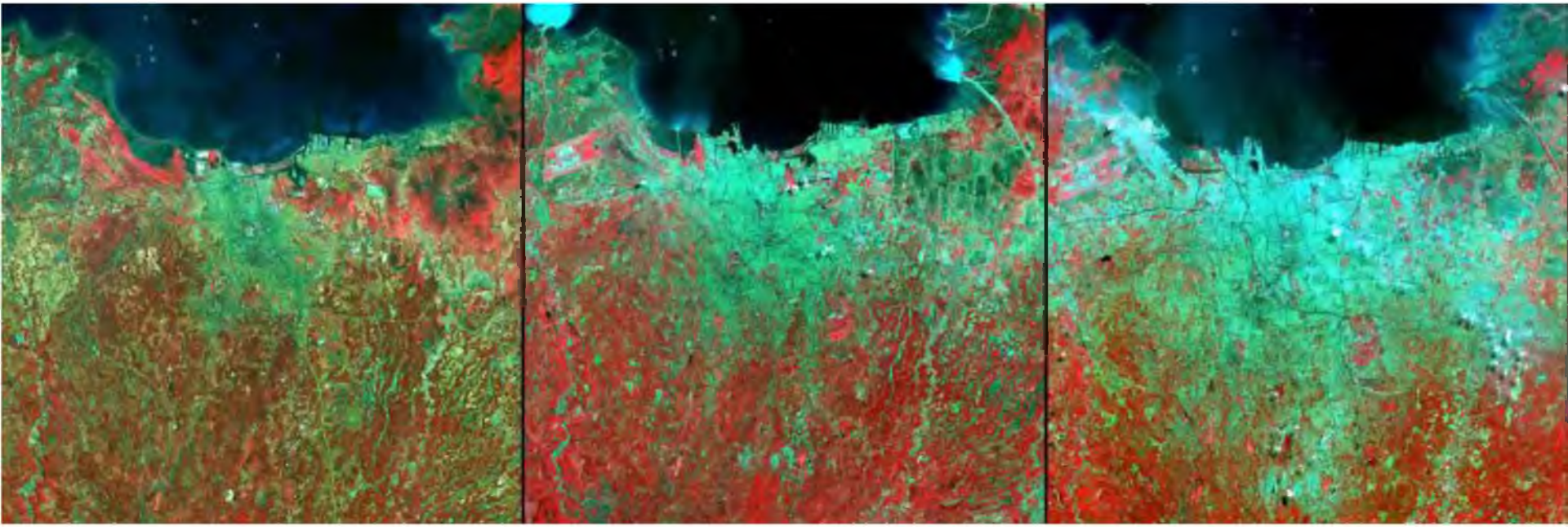

6 million
(1976)

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).

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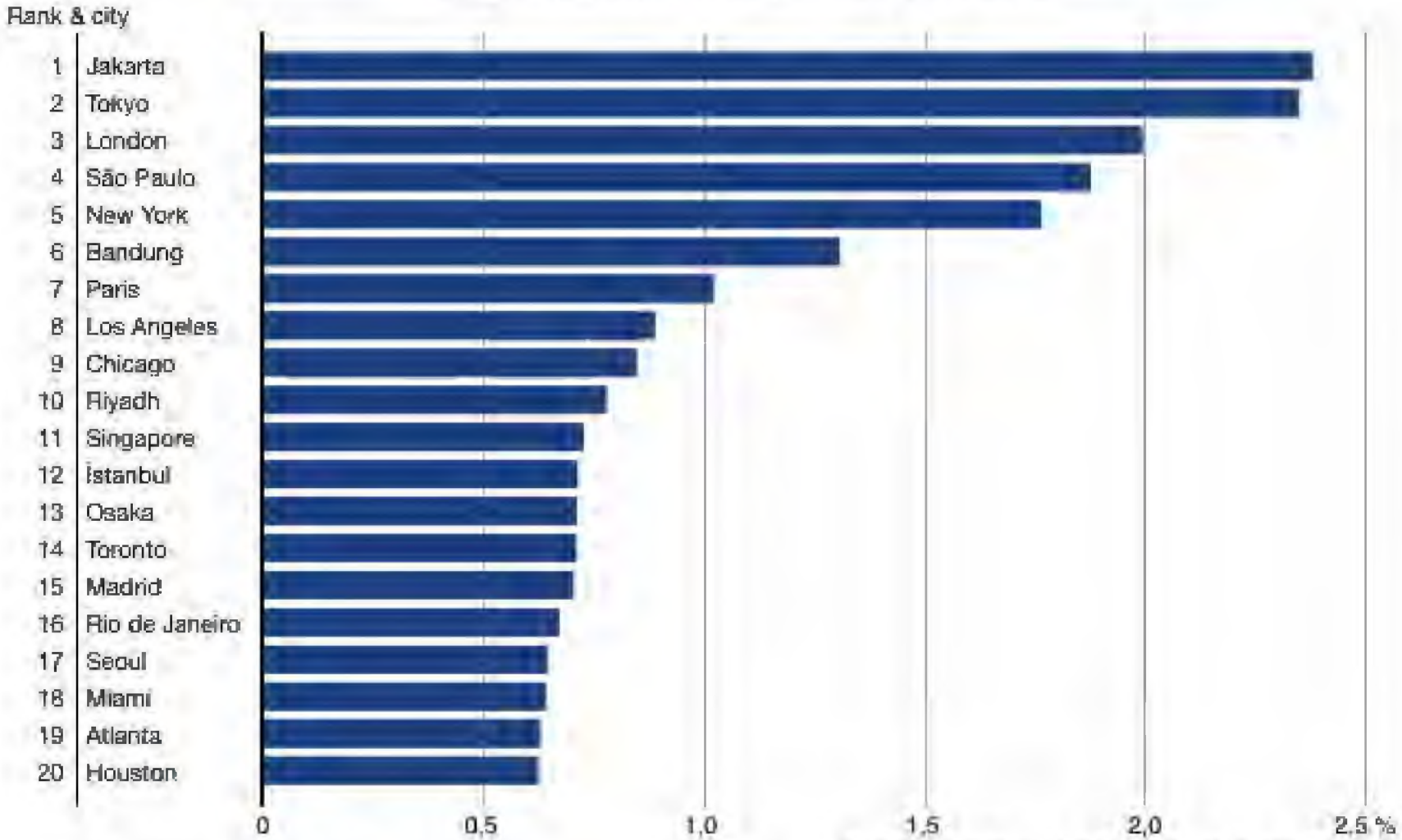
Top 20 cities by number of posted tweets

among 10.5B public tweets posted in June 2012



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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

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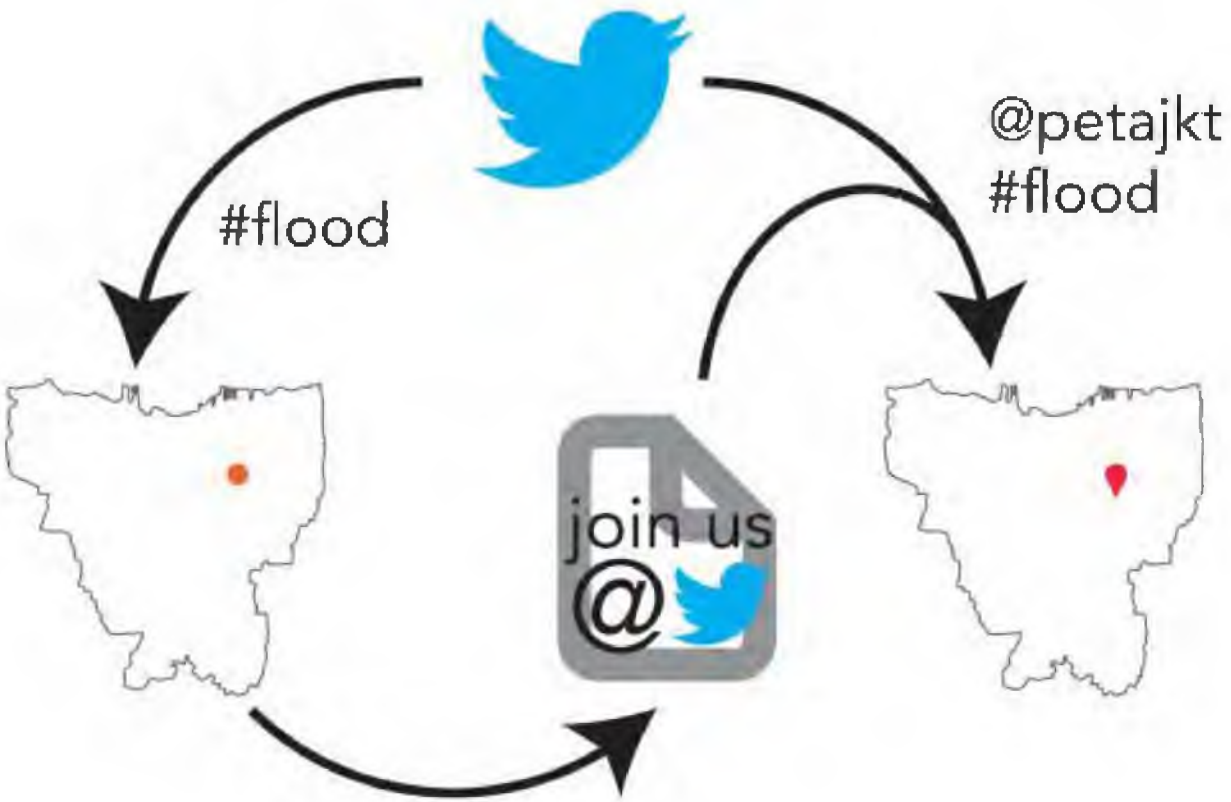

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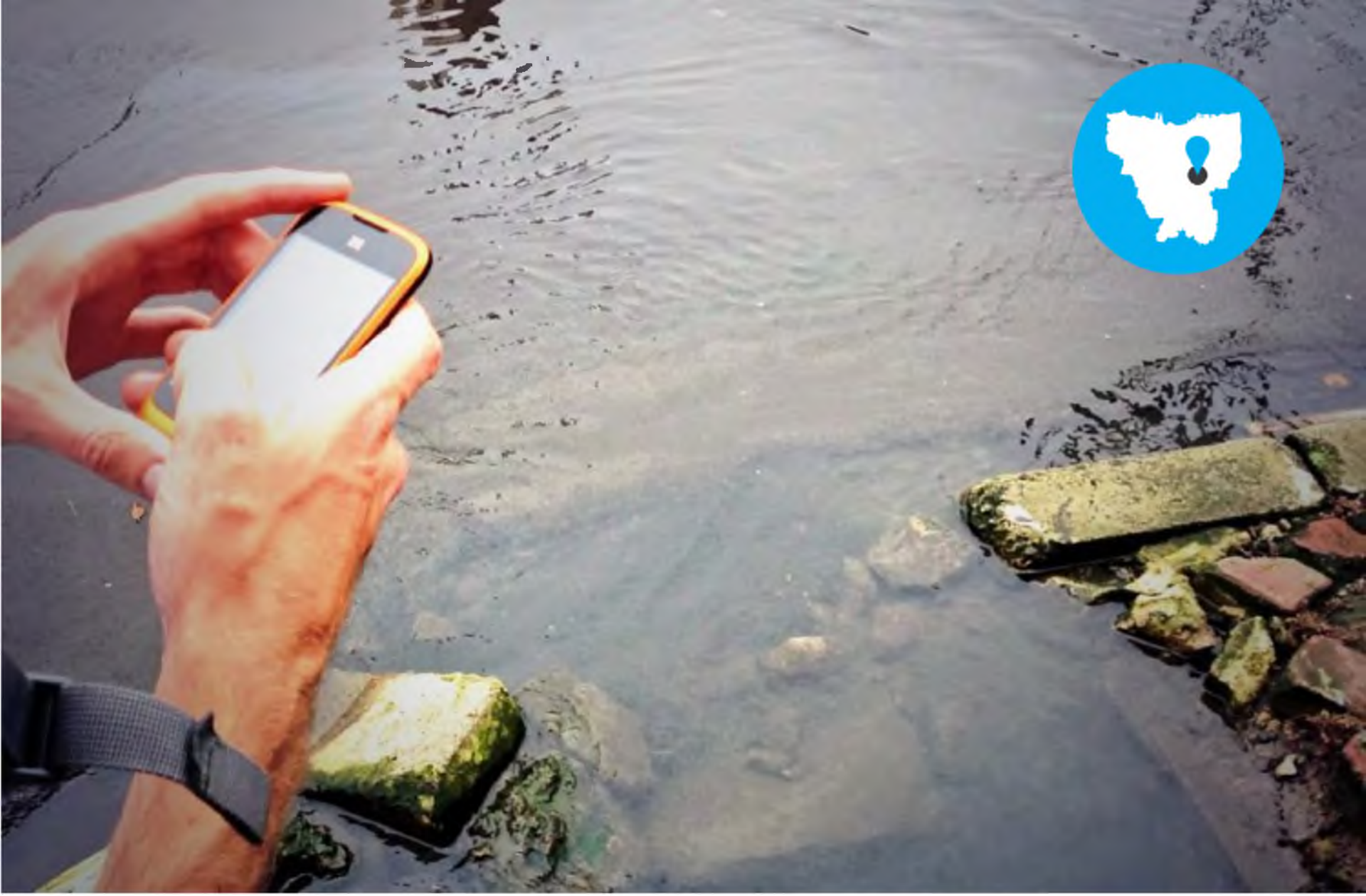

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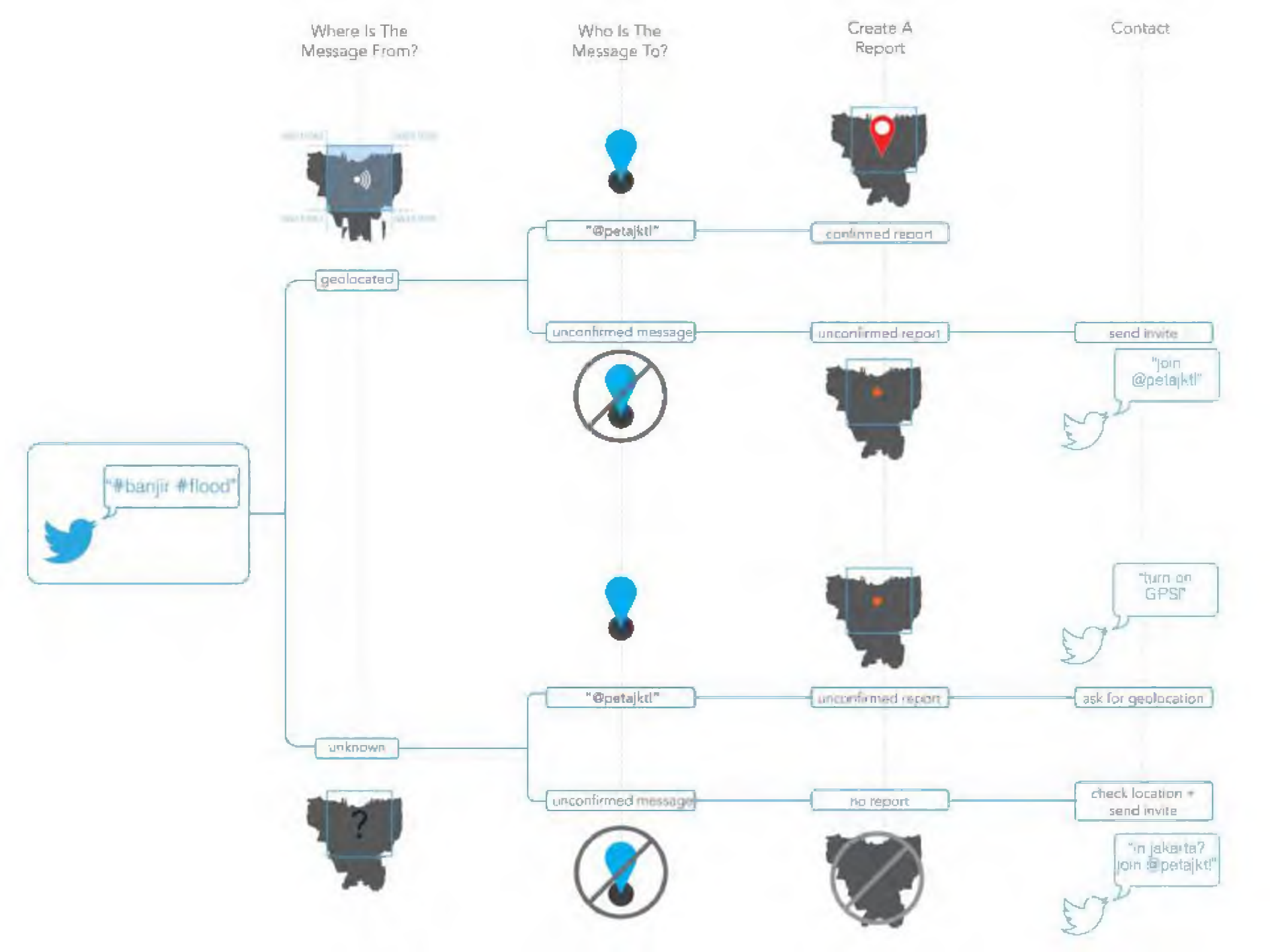
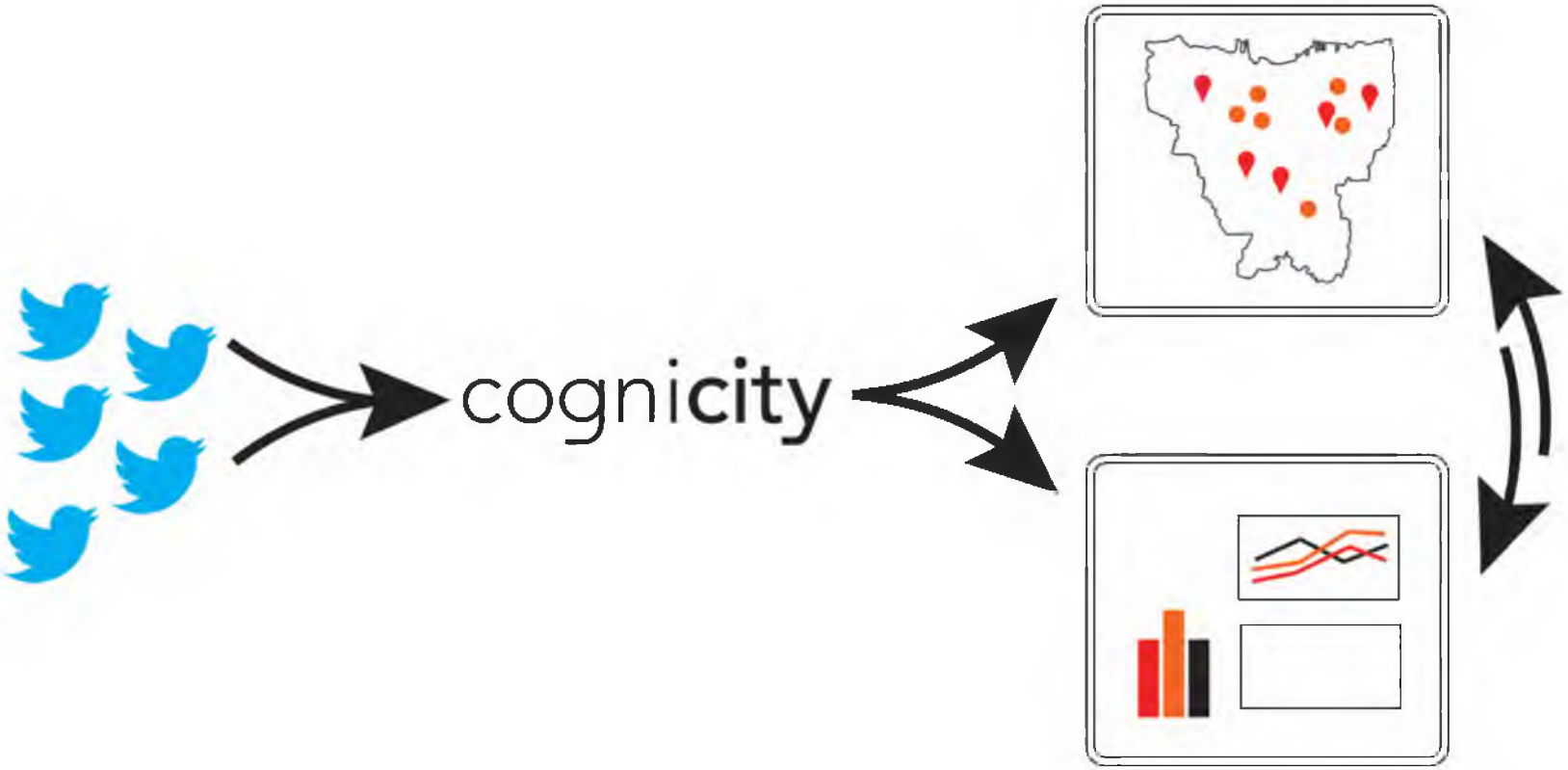
"#banjir #flood"


Where Is The Message From?
Who Is The Message To?
Create A Report
Contact
"#banjir #flood"
geolocated
unknown
"@petajkt!"
unconfirmed message
confirmed report
unconfirmed report
send invite
"join @petajkt!"
"turn on GPS!"
"@petajkt!"
unconfirmed report
ask for geolocation
unconfirmed message
no report
check location + send invite
"in jakarta? join @petajkt!"



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User Interface:

Geolocation
+
Nearby Reports

Institutional Interface:

Overview
+
Report Scaling

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Jakarta banjir :'(mangga dua nih
pic.twitter.com/89nyPltGDg

View translation

Reply Retweet Favorite ••• More

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

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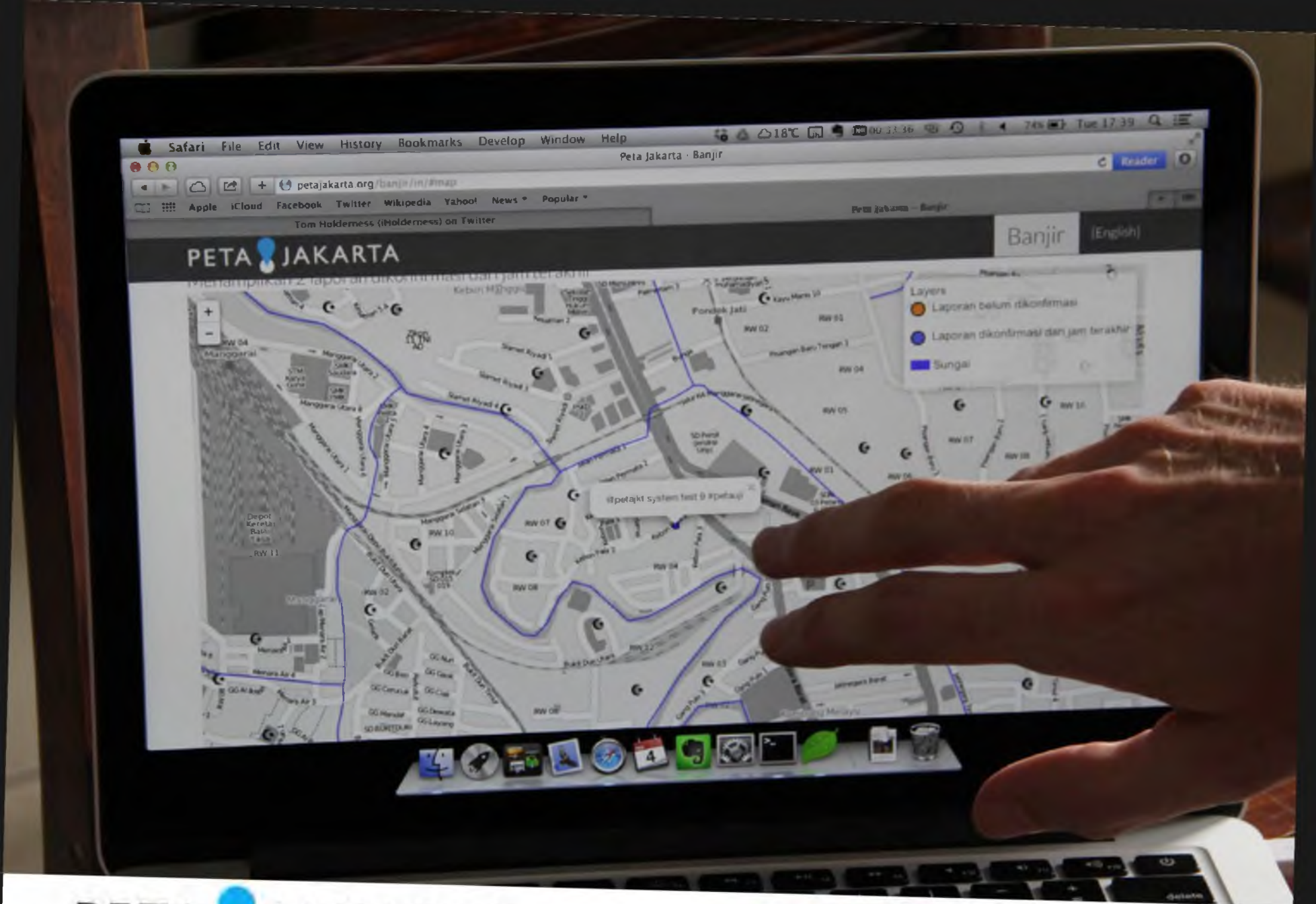

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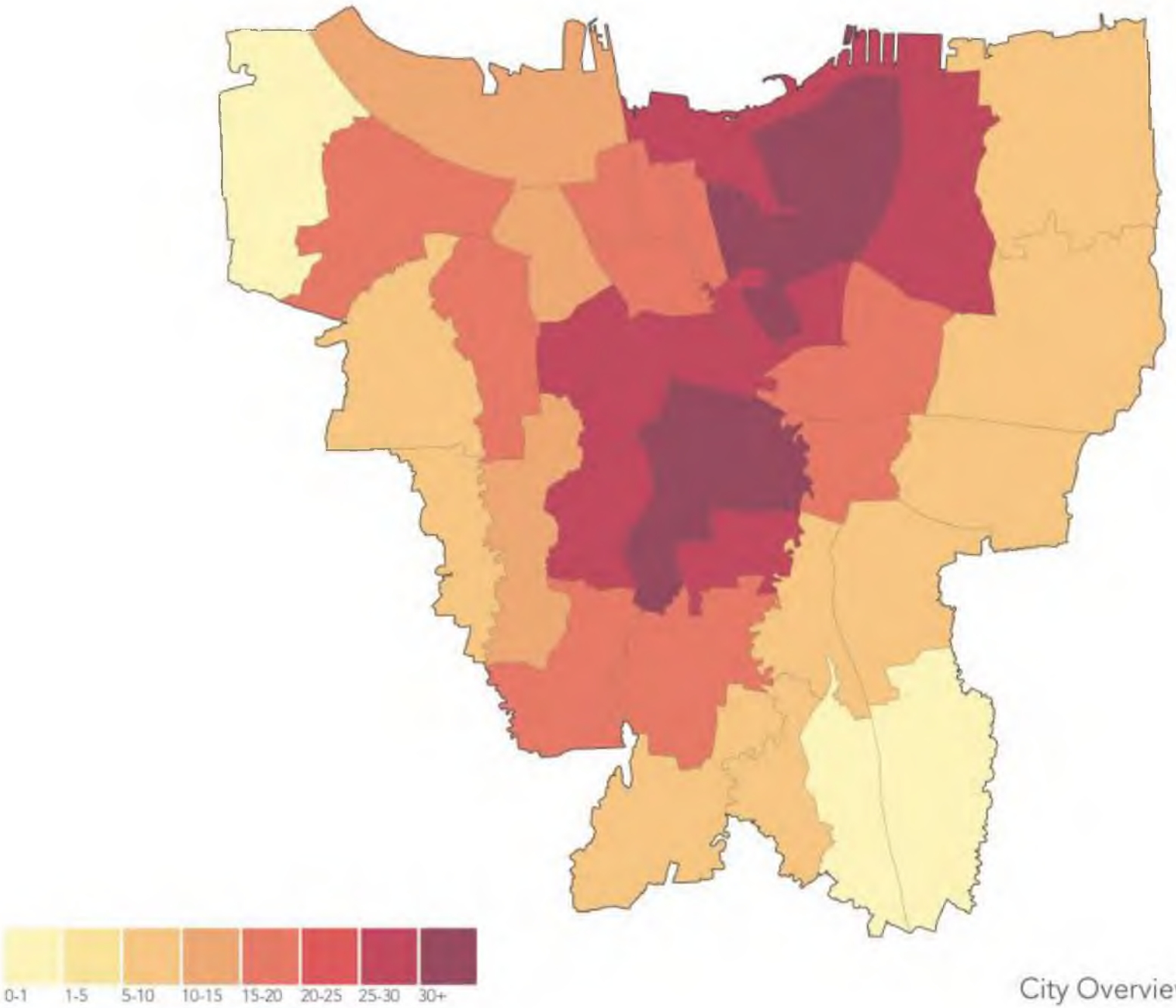


City Overview - By District

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: 1:180.000
Proyeksi: World Mercator
Datum: WGS 84

U

Legenda

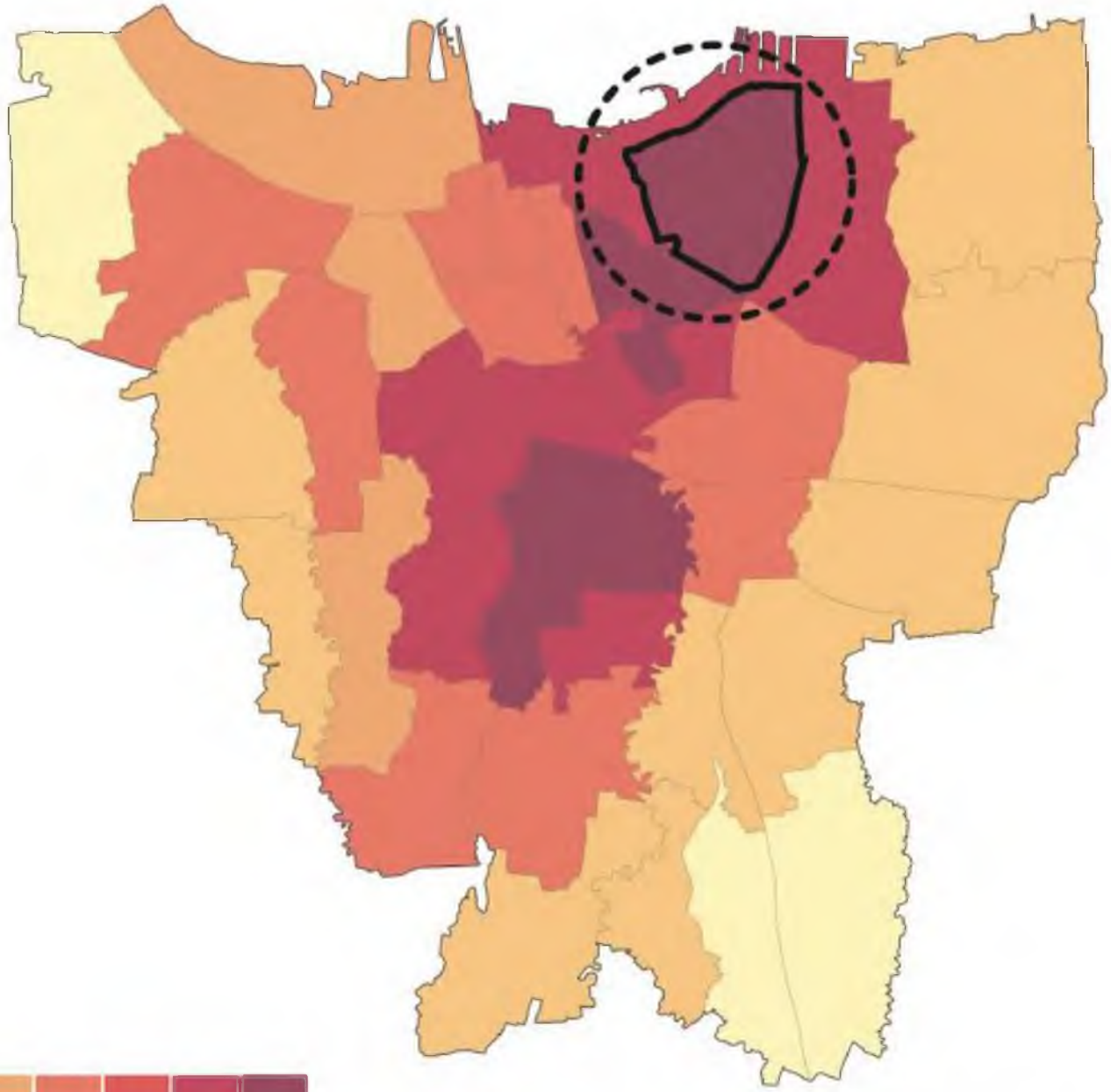
Tinggi Genangan Air Rata-rata

- 10 - 70 cm
- 71 - 150 cm
- > 150 cm
- Belum ada data
- Sungai

Keterangan:
Peta ini menggunakan unit analisa batas RW (dipersiapkan berdasarkan program clarification partisipatif dengan OpenStreetMap pada tahun 2012) sebagai daerah terdampak banjir.

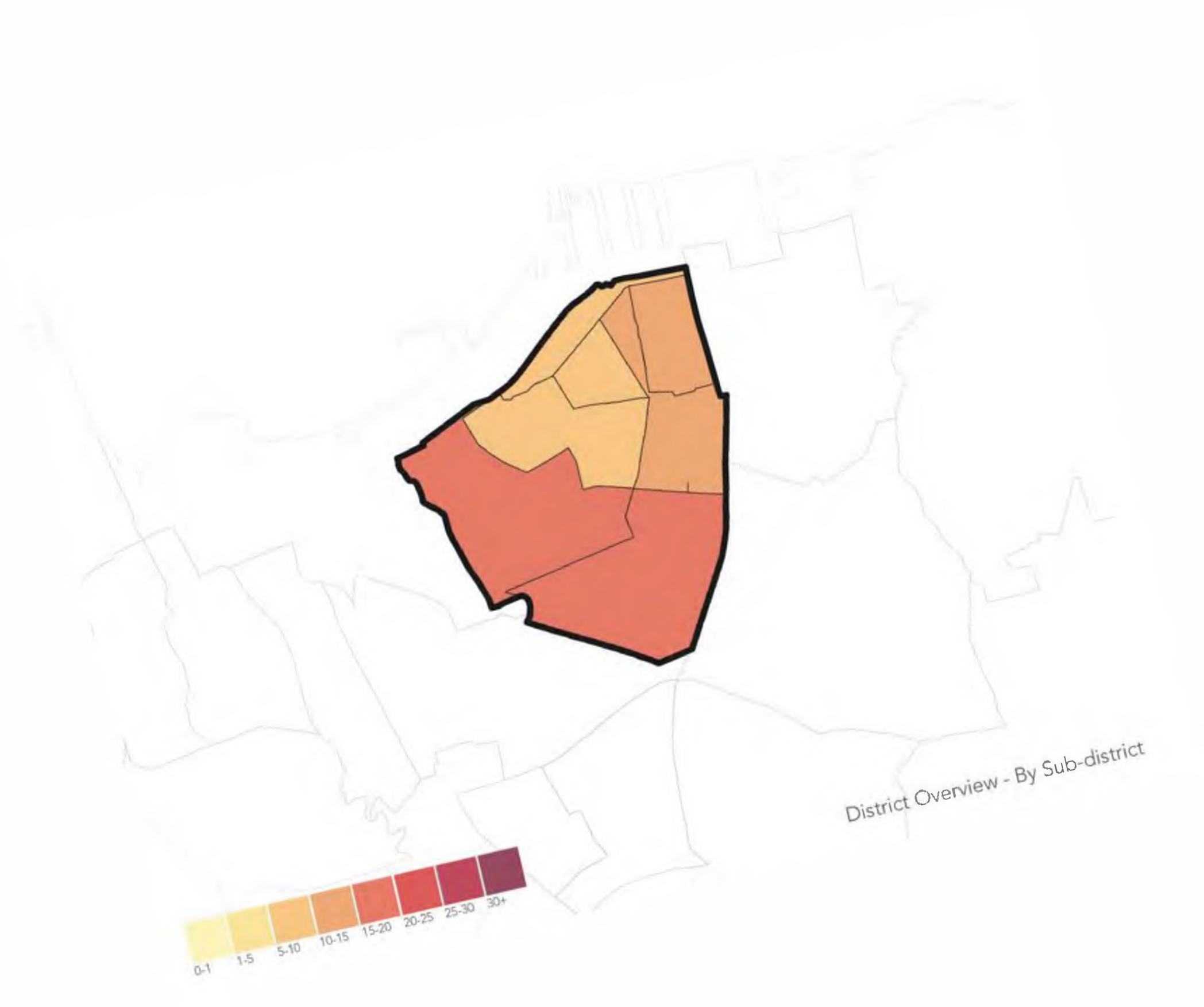
Informasi lebih lanjut hubungi:
Badan Penanggulangan Bencana Daerah (BPBD)
Provinsi DKI Jakarta
Jl. Medan Merdeka Selatan, No. 8-9 Blok F Lantai 3.
Telpon (021) 164 atau 3521623

Didukung oleh:
Australian Aid
BNPB

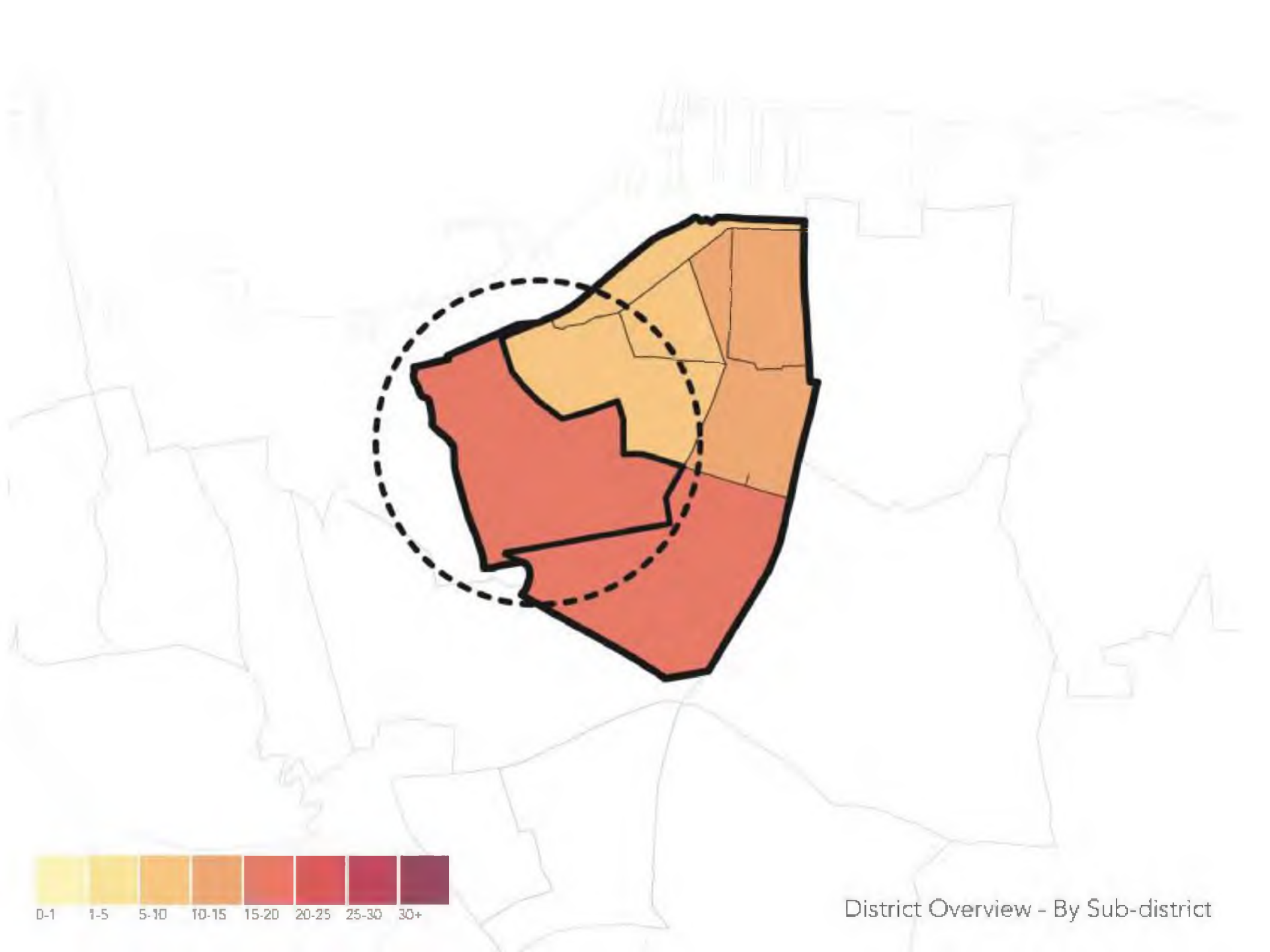


0-1 1-5 5-10 10-15 15-20 20-25 25-30 30+

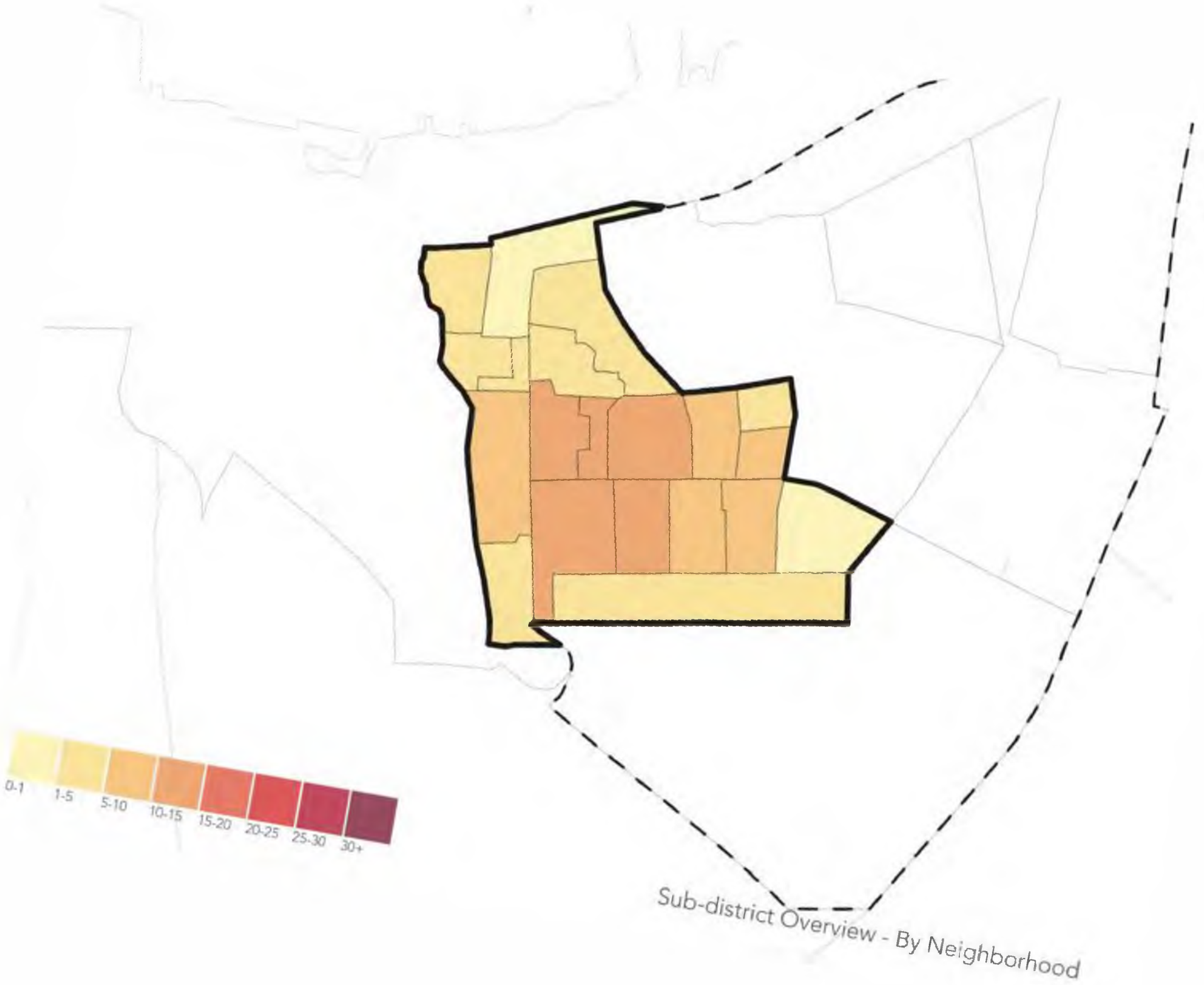
City Overview - By District



District Overview - By Sub-district



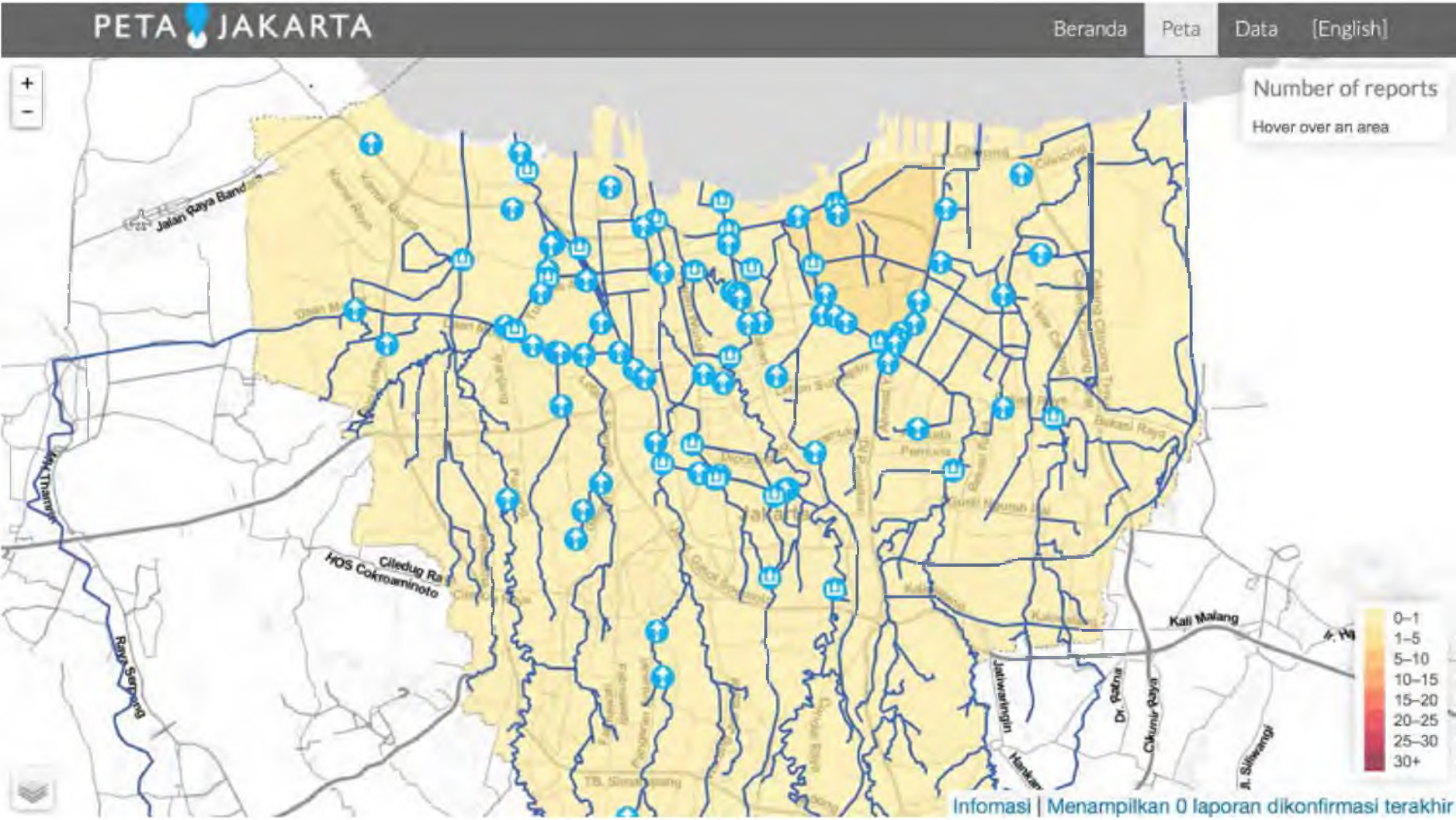
District Overview - By Sub-district



Sub-district Overview - By Neighborhood

Sub-district Overview - By Neighborhood

Neighborhood View - Individual Reports



Hydraulic Infrastructure Spatio-topological Network Model

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CogniCity.info

an OSS Framework for

Applied GeoSocial Intelligence Engineering

cognicity

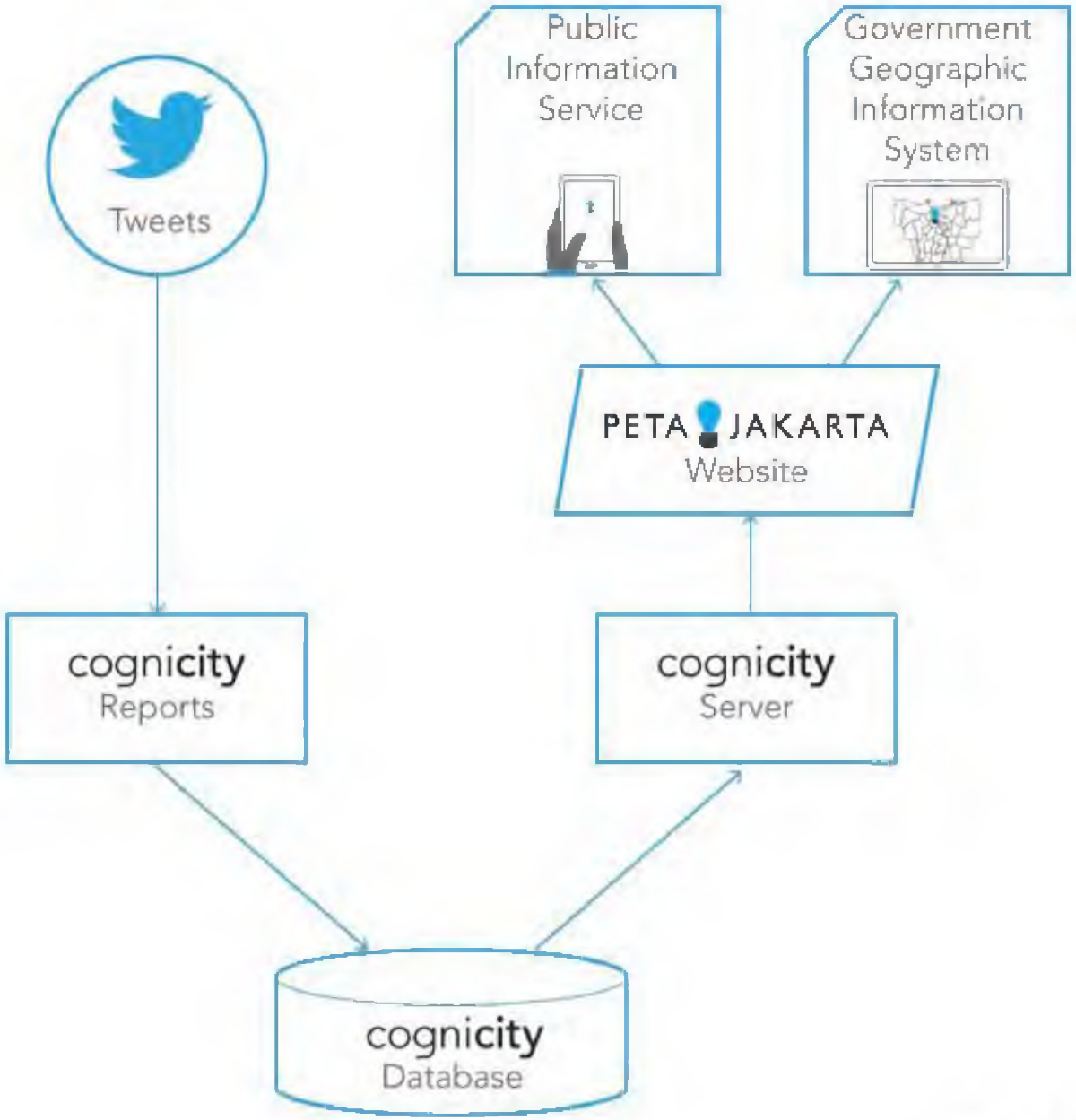
An open framework for urban data

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.

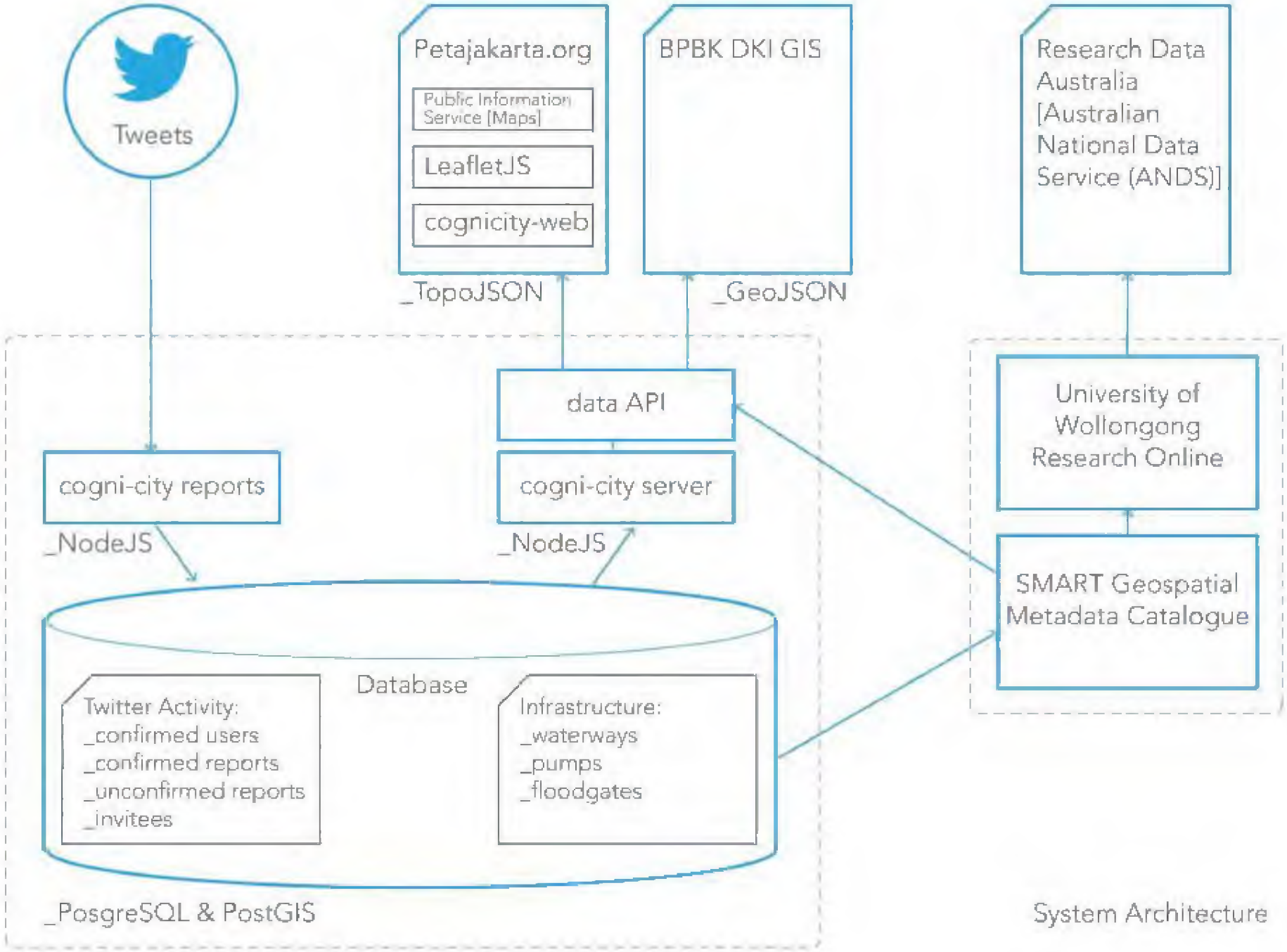
Collect

Analyse

Communicate



System Architecture


Tweets
Petajakarta.org
Public Information Service [Maps]
LeafletJS
cognicity-web
_TopoJSON
BPBK DKI GIS
_GeoJSON
Research Data Australia [Australian National Data Service (ANDS)]
data API
cogni-city reports
_NodeJS
cogni-city server
_NodeJS
University of Wollongong Research Online
SMART Geospatial Metadata Catalogue
Database
Twitter Activity:
_confirmed users
_confirmed reports
_unconfirmed reports
_invitees
Infrastructure:
_waterways
_pumps
_floodgates
_PosgreSQL & PostGIS
System Architecture

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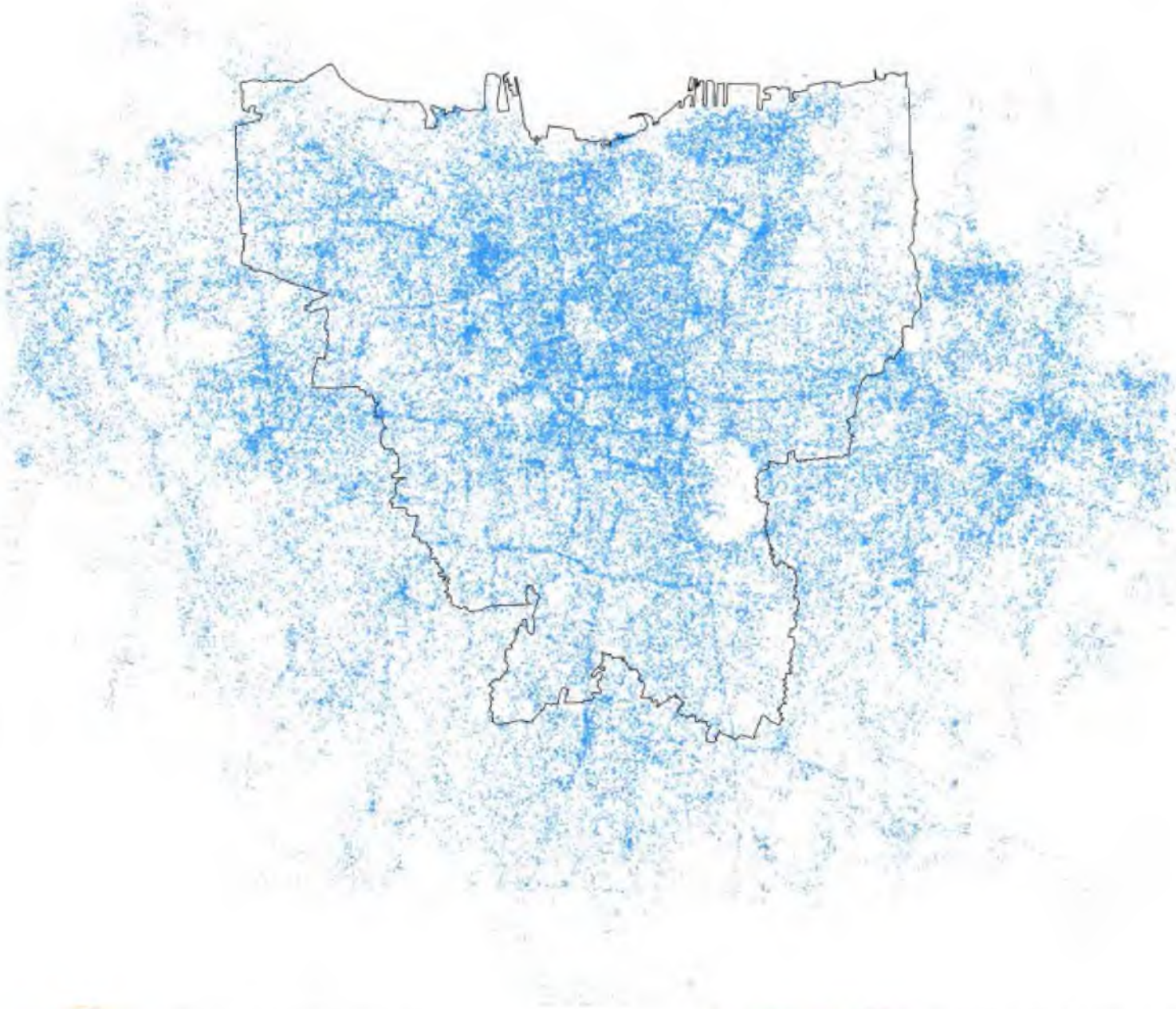
Regression Analysis & CogniCity Calibration Through Historical Twitter Data via #DataGrant



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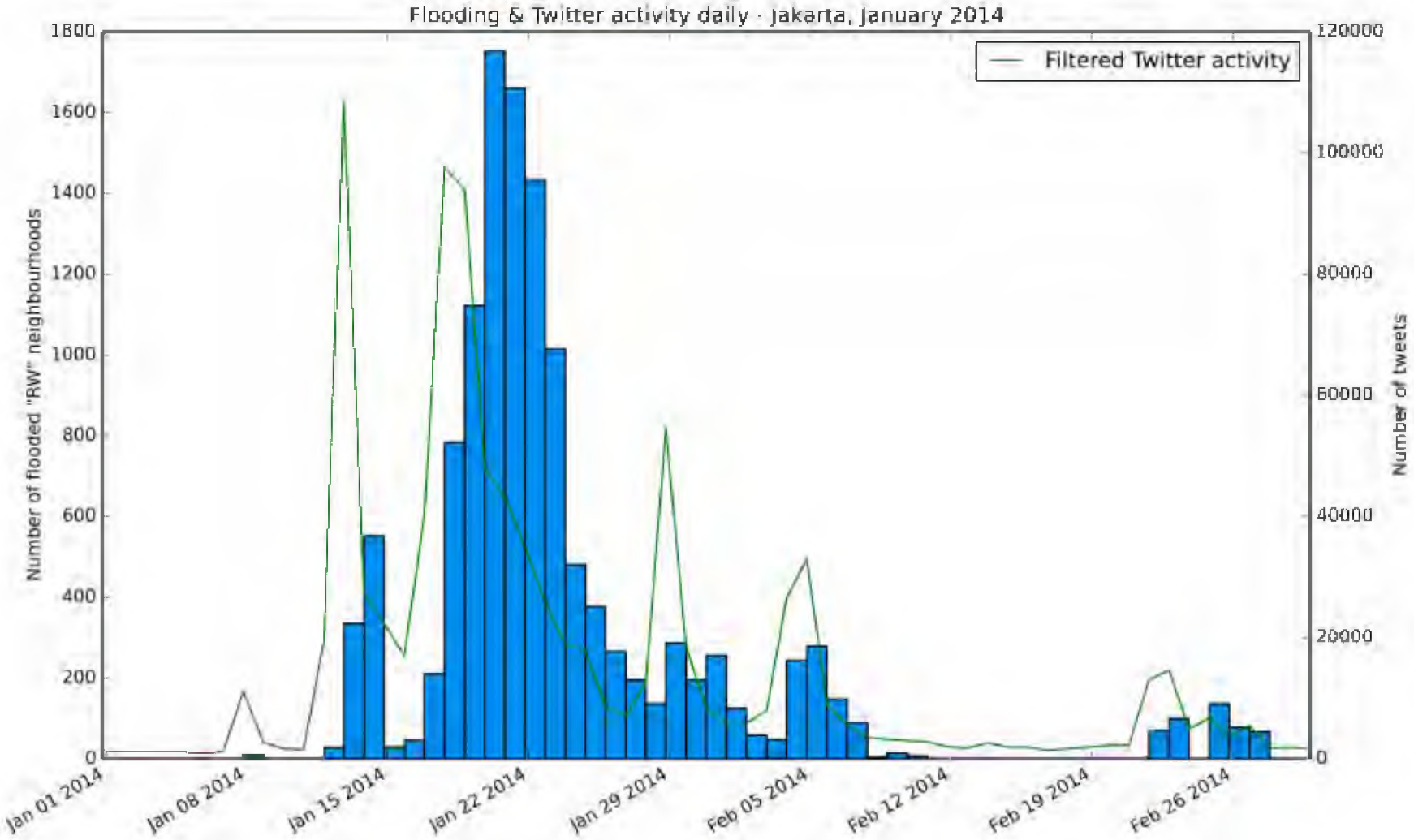

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Community-led Data Collection for Resilience & Recovery

Part 1

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LEGEND
team sar-evacuation
government route
community route
people helping
team mobile clinic
team distribusi|logistic
team dapur umum|public kitchen
sleeping spots

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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

Reply Retweet Favorite Flag media

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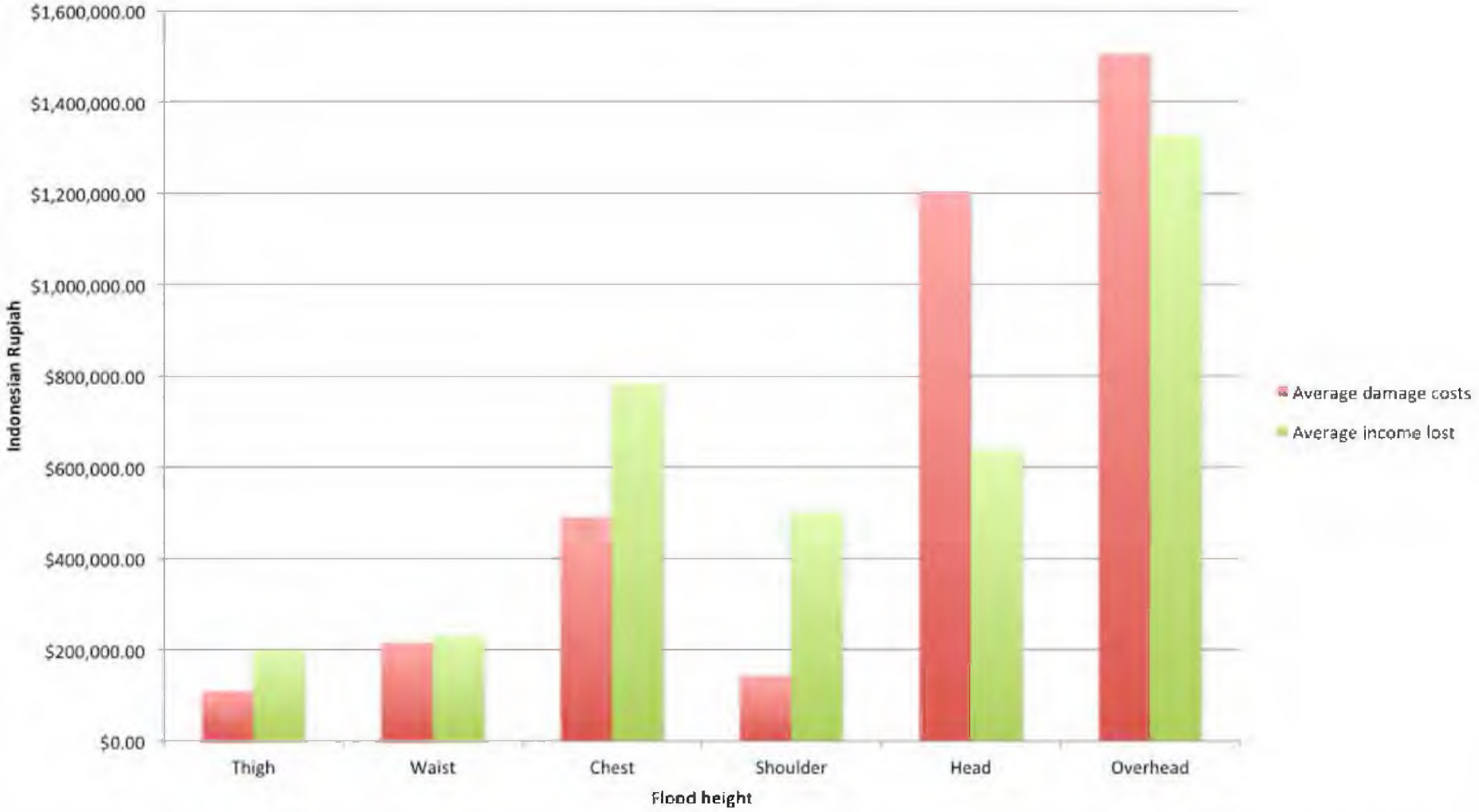
RT08/RW12 - Average income loss and damage cost per household by flood height



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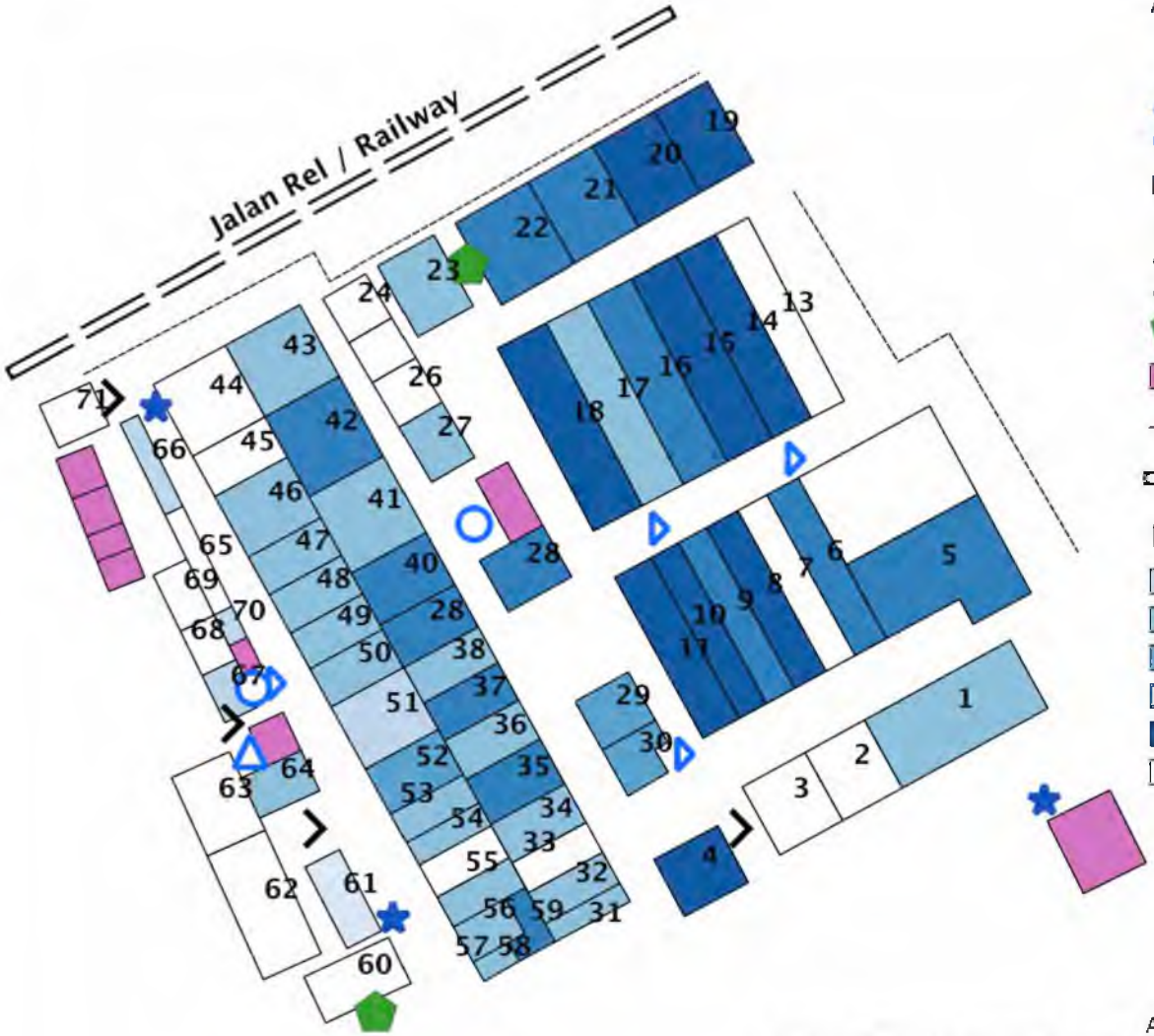
RT008 / RW012 BUKIT DURI- Peta Banjir



Air / Water
- pompa / pump
- keran / tap
- sumur / well

Kampung
- meeting point
- steps
- tree
- fasilitas umum / communal facilities
- batas / boundary
- jalan rel / railway

Flood heights / Ketinggian rumah banjir
- waist / pinggang
- chest / dada
- shoulder / bahu
- head / kepala
- overhead / di atas kepala
- no data / tidak ada data

Approximate Scale 1:350. Projection WGS84 / EPSG 4326

Map & Data (C) Ciliwung Merdeka & SMART Infrastructure Facility, University of Wollongong
Tomas Holderness, Ariel Shepherd & Etienne Turpin

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

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UAV Infrastructure Audits & Critical Asset Management

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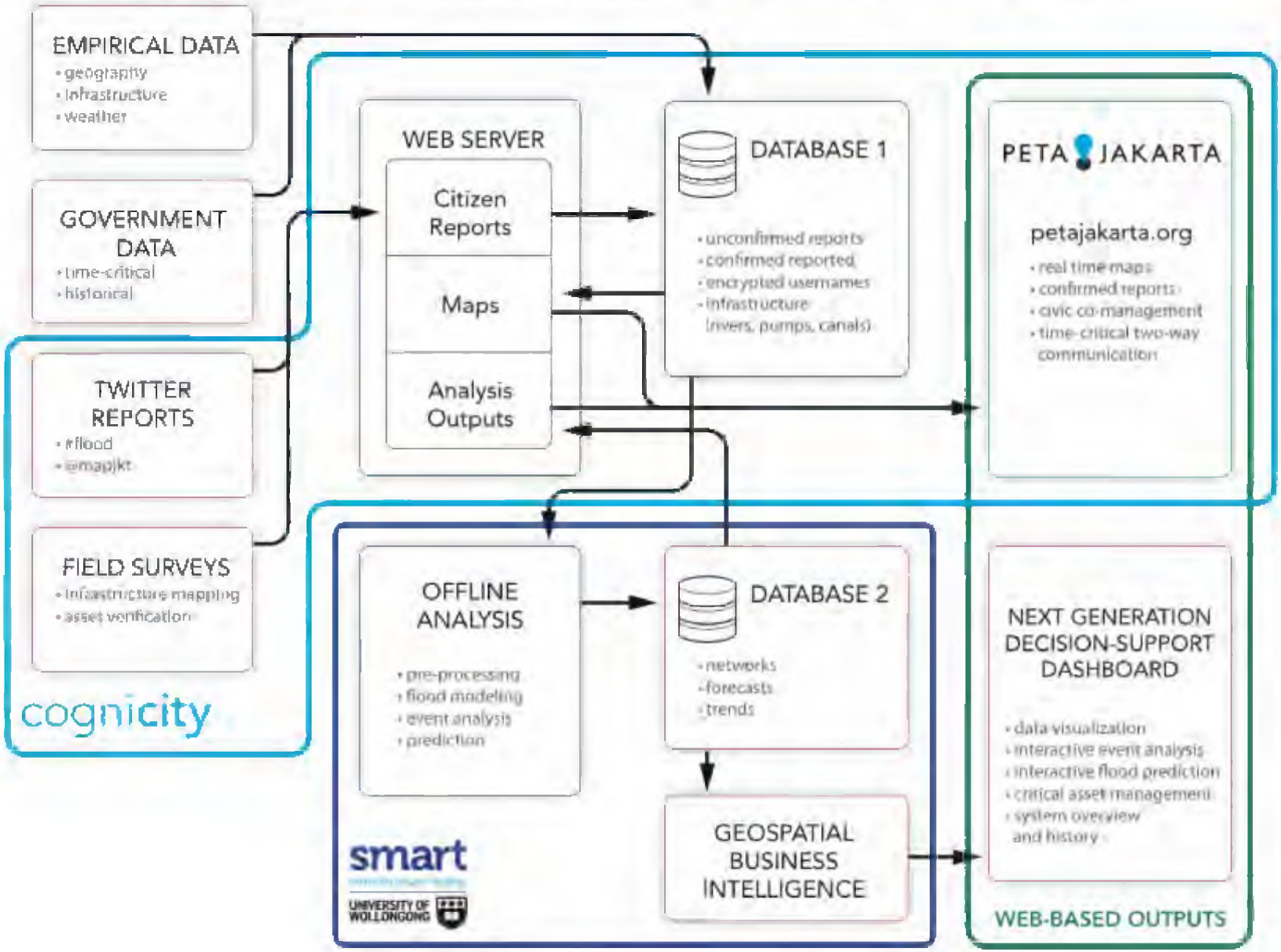
GEOSPATIAL INTELLIGENCE FRAMEWORK

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

This project is supported by the Australian National Data Service (ANDS)

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

NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative