

Digital Typhoon: Toward the Hub of Typhoon Emergency Information Aggregated from Various Sources

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Increasing Natural Disasters

- Earthquakes and tsunami
- Typhoons and storm surge
- Heavy rains and flooding, landslides
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- We need to know what's really happening in the world, or to acquire emergency information.

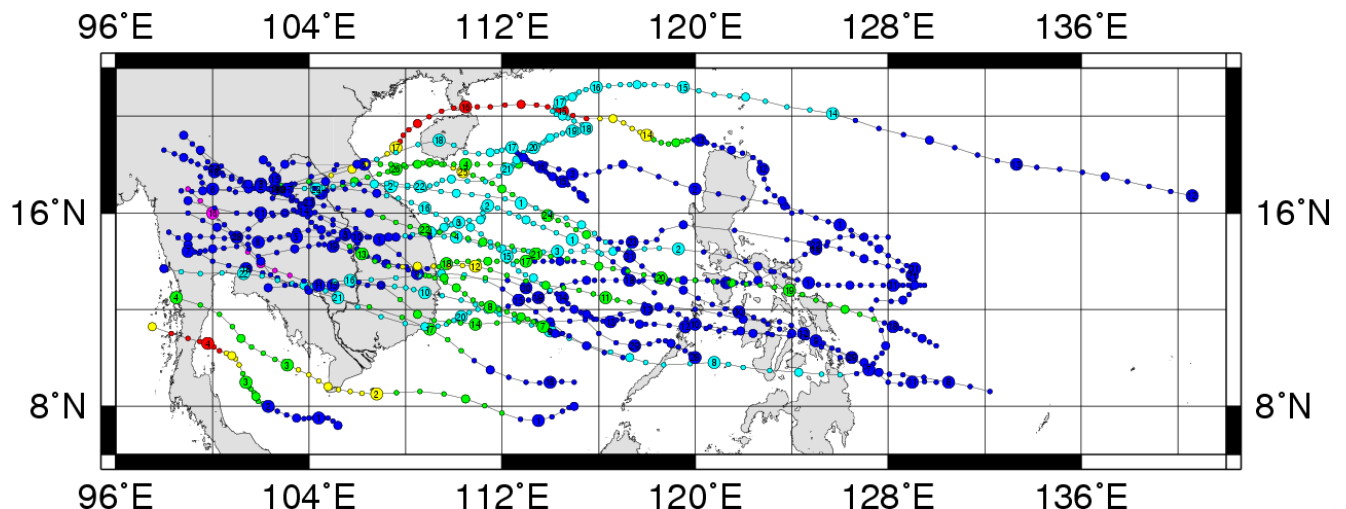
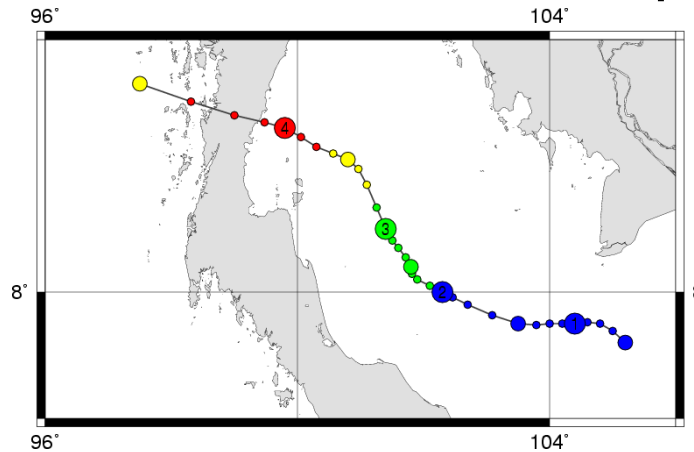
Thailand and Typhoons



Cited from Wikipedia.

Bangkok has been rarely hit directly by typhoons, since they make landfalls first in Vietnam. Their remnants, however, reaches Bangkok.

In 1989, Typhoon Gay reached Thailand and killed 529 people.



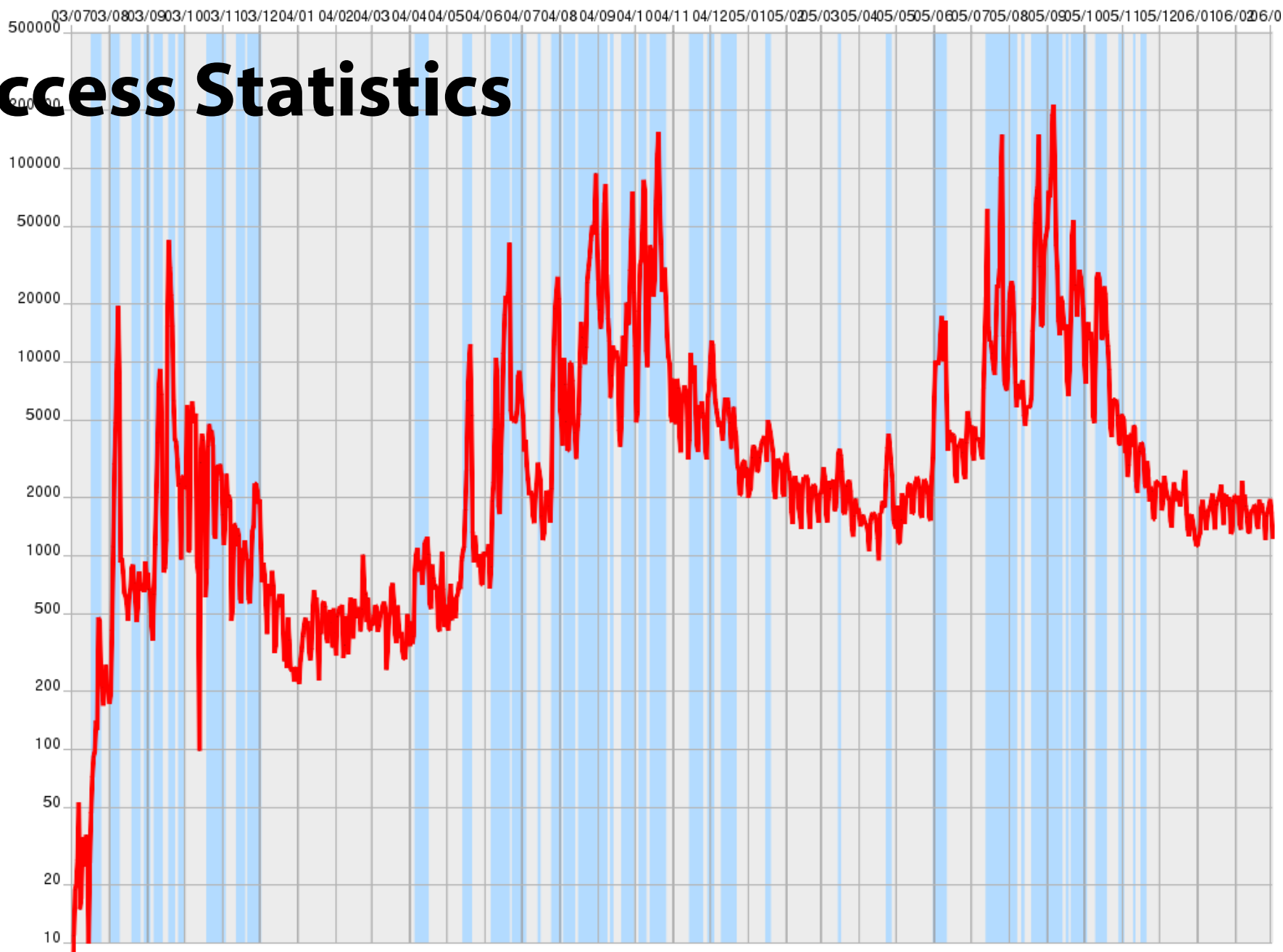
Digital Typhoon and Our Mission

- <http://www.digital-typhoon.org/>
 1. Maintain the comprehensive databases of past typhoon-related information to learn from history.
 2. Aggregate various sources of typhoon-related information to support urgent decision making on the present.

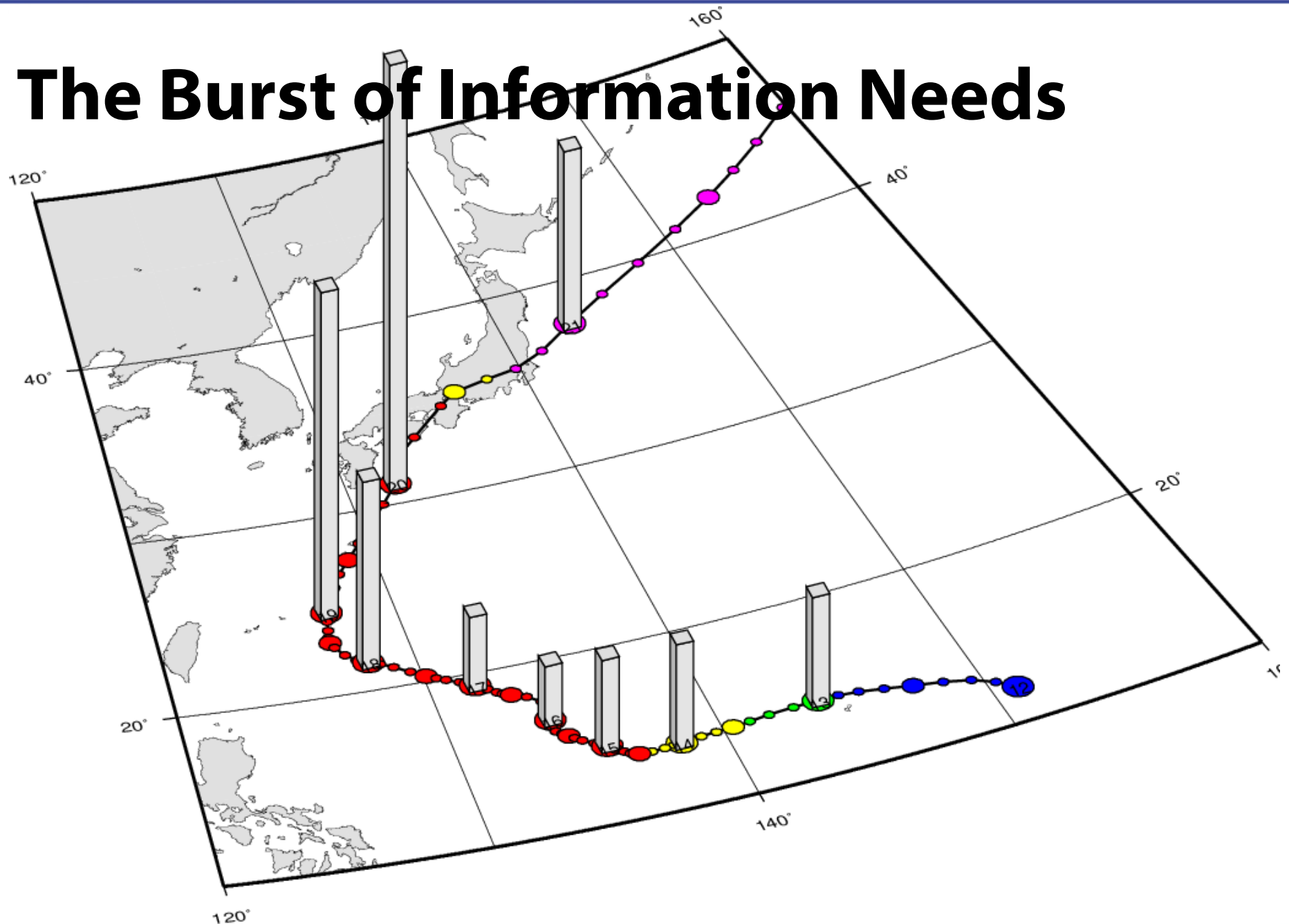
Huge Amount of Information Needs

- Since July 2003, the top page view amounts to about **7.5million**, and the site page view, about **26 million**.
- The daily page view exceeded **550 thousands** (actually more) when a typhoon made landfall in Japan.
- People are in need of emergency information to take their actions.

Access Statistics

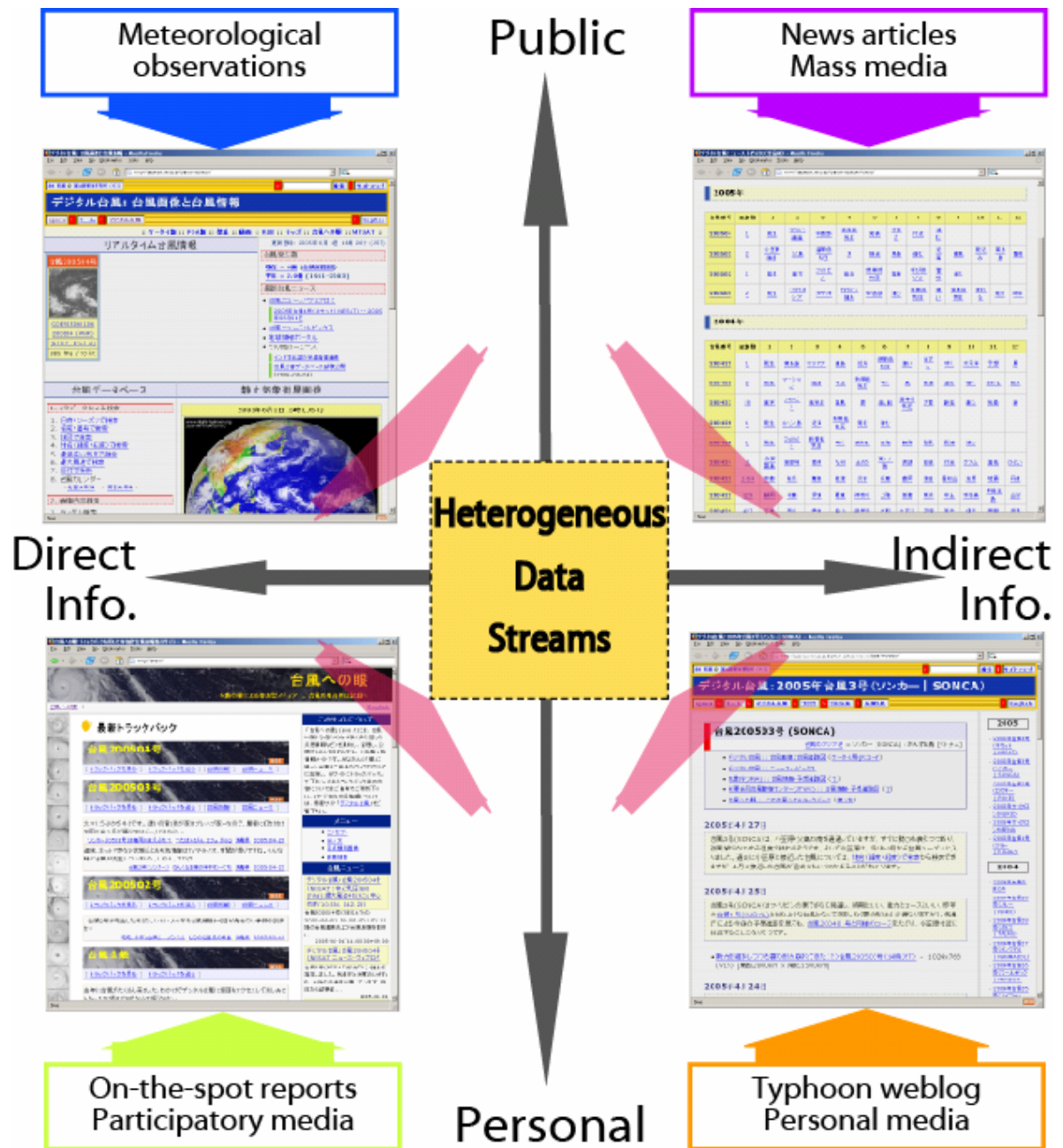


The Burst of Information Needs



Four Facets

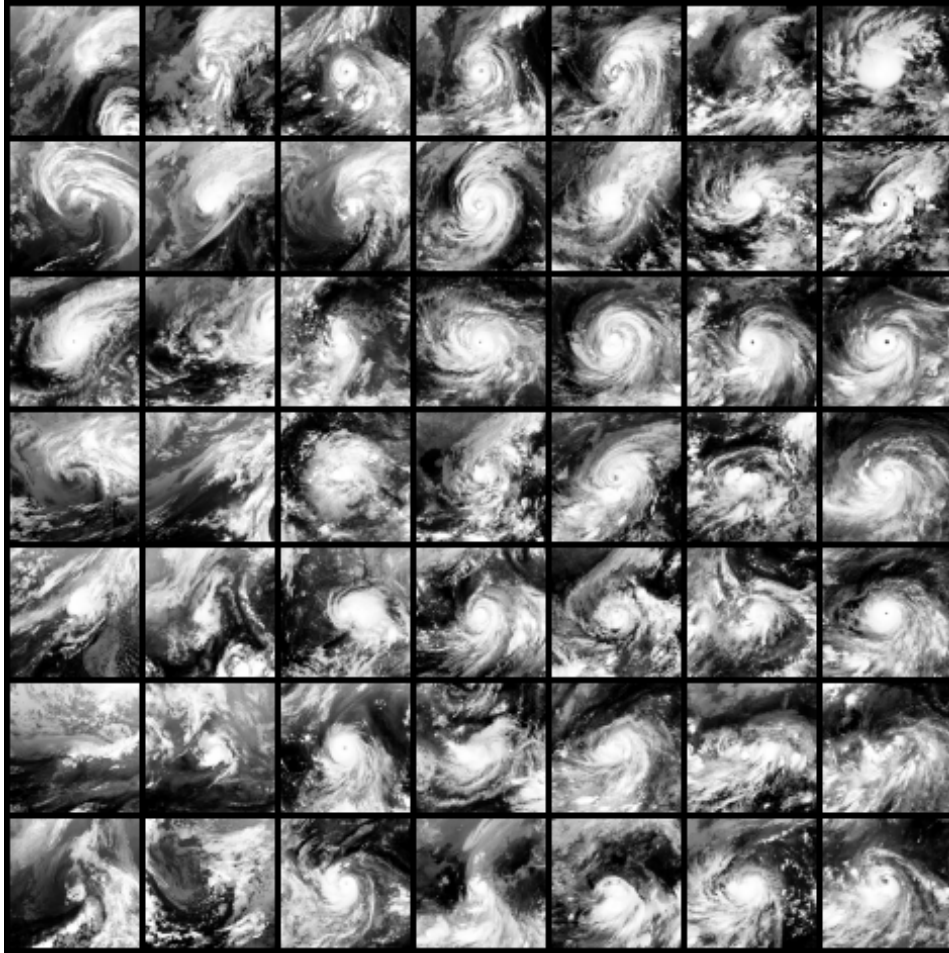
- Public vs. personal dimension.
- Direct vs. indirect dimension.
- Integration of 4 quads.



Various Information Sources

1. Meteorological satellite images (1995-)
 2. News articles (Mid 2003-)
 3. Weblog (End 2002-)
 4. On-the-spot reports (Mid 2004-)
 5. Disaster databases (Various periods)
 6. Fixed-point Camera (Mid 2004-)
- Integration of information from various sources is important.

Meteorological Satellite Images



- The image center is identical to the typhoon center.
- 49,100 images for the WN Pacific, 13,900 images for Australia.
- Morphological typhoon analysis.

News Articles

2. Typhoon News Topics

The table below shows the most relevant 12 keywords that characterize each typhoon from its birth to its death. The target of this table is nouns, adjectives, verbs, etc. Please click the link of the typhoon number to view the detail of the list of keywords for each typhoon.

:: Other Parts of Speech :: [Only Proper Nouns](#) :: [Only Adjectives](#) :: [Only Verbs](#) ::

Number	Articles	1	2	3	4	5	6	7	8	9	10	11	12
2005													
200501	2	発生	ミクロネシア	太平洋	カロリン諸島	中西部	進む	熱帯低気圧	早い	温帯低気圧	昨年	変わる	発表
2004													
200429	1	発生	南鳥島	マリアナ	諸島	近海	熱帯低気圧	速い	円	達する	吹く	太平洋	予想
200428	2	発生	マーシャル	諸島	付近	熱帯低気圧	吹く	風	風速	進む	強い	変わる	発表
200427	28	東京	強風	フィリピン	低気圧	夏	遅い船	大雪	温帯低気圧	師走	都心	気象	潮
200426	1	発生	ルソン島	近海	熱帯低気圧	発表	進む						
200425	1	発生	フィリピン	熱帯低気圧	変わる	吹く	東海	観測	風速	強風	進む		
200424	31	与那国島	座間味	南岸	九州	土のう	東シナ海	仮設	総統	付近	グアム	ひどい	温低
200423	1328	京都	被災	舞鶴	宮津	災害	復旧	府	豊岡	支援	兵庫	地震	中越
200422	224	静岡	千葉	関東	神奈川	伊東	首都	上陸	横浜	中止	宇佐美	伊豆半島	山梨
200421	414	三重	宮川	愛媛	海山	新居浜	鳥取	土石流	不明	西条	再開	伊勢	停滞
200420	9	最悪	死者	不明	本州	岐阜	豊橋	発生	危機	人的被害	甘い	以来	政府

- Public information from mass media.
- Natural language processing for significant keywords.
- Coverage is wide, but limited locality.

Personal and
localized
information from
motivated people.
Weblog articles are
aggregated using
TrackBacks.
Can we trust them?



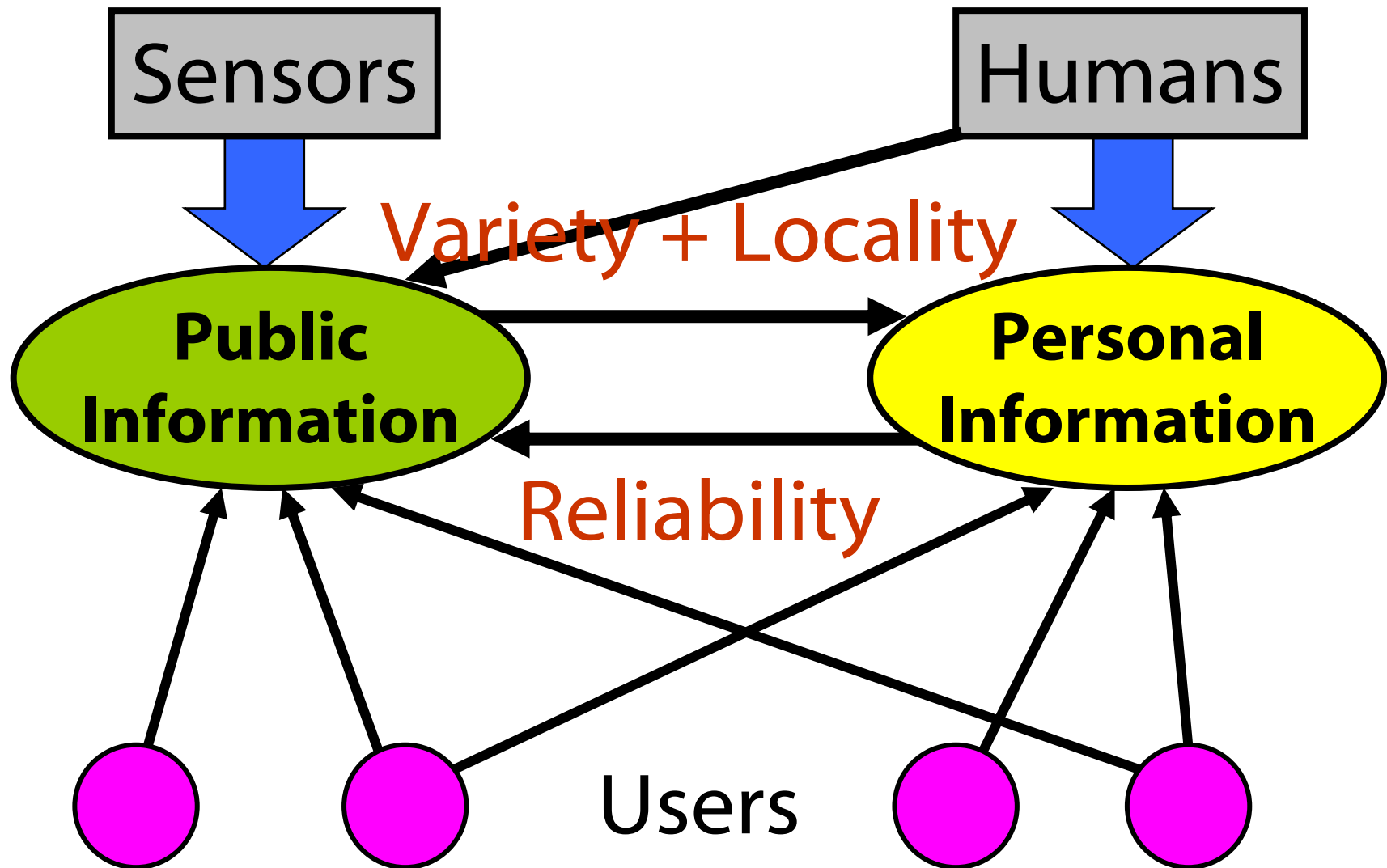
Participatory Media

- **Motivated people participate** in the activity of submitting personal information they actually see or feel.
- **The aggregation of information** contributes to reconstructing the entire description of the event.
- How to build **the architecture of participation?**

Needs for the Hub of Information

1. **Decentralized architecture** is effective for the participation of the variety of sensors and humans.
2. Distributed information should be **aggregated at the hub** for urgent decision making and monitoring.
3. Network infrastructure is important to deal with **the burst of information**.

Reciprocal Information Sources



Cyber Science Infrastructure

- Data streams from ubiquitous devices: sensors, computers, mobile phones, cameras, etc.
 1. How to deal with many devices across protocols, formats and specs?
 2. How to cope with the burst of information?
 3. How to choose reliable information?

Worldwide Tropical Cyclone Databases

- Our system can be extended to **tropical cyclones in other basins**, e.g. cyclones in the Bay of Bengal.
- More ambitious plan is to aggregate real-time **on-the-spot reports from the world** through the network.
- We need to know what's happening in the world due to tropical cyclones.

Summary

- “Digital typhoon” is a **showcase of large-scale scientific databases**.
- **Integration of various sources** is important and a challenging topic.
- Why do we build **the hub of worldwide tropical cyclones**?
- Send me your comments and ideas on **<http://www.digital-typhoon.org/>** .

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