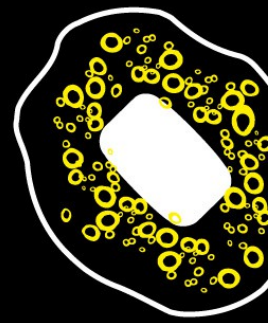
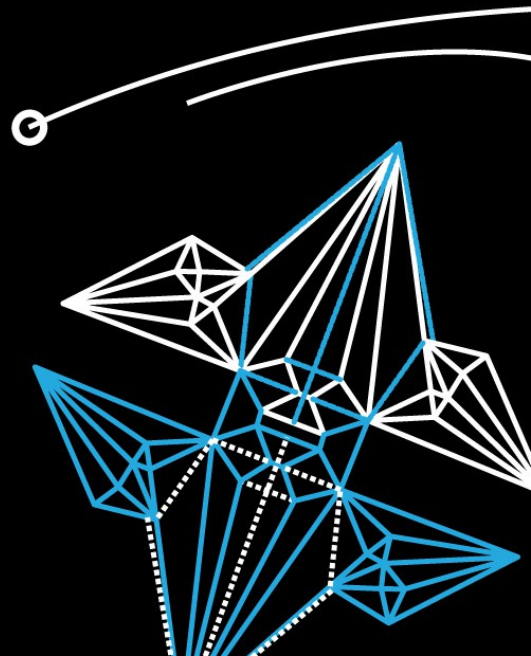
UNIVERSITY OF TWENTE.

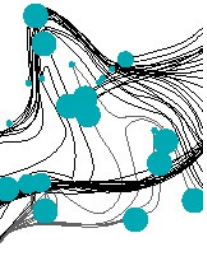


THE CROWD AND THE CLOUD

THE NEXT EVOLUTIONARY STEP OF GEO-INFORMATION PROCESSING?



Frank O. Ostermann
GIP Research Meeting, 24.04.2014



THE CROWD AND THE CLOUD

THE NEXT EVOLUTIONARY STEP OF GEO-INFORMATION PROCESSING?

- **Introduction**
- The Crowd
- The Cloud
- Past Research
- Future Research

THREE DISRUPTIVE INNOVATIONS

INTRODUCTION

- Mobile (Social) Internet
- Cloud Computing
- Internet of Things

… AND CORRESPONDING BUZZWORDS (& BUZZ-VIS)

INTRODUCTION

BEYOND THE BUZZ

INTRODUCTION

THE BIG PICTURE: DIGITAL EARTH

INTRODUCTION

- Real-time data input through ubiquitous sensors
- Citizens as sensors
- Multi-layered, inter-operable data sets
- Linked and open data
- Initiatives like GEOSS, Eye on Earth, …

THE CROWD AND THE CLOUD

THE NEXT EVOLUTIONARY STEP OF GEO-INFORMATION PROCESSING?

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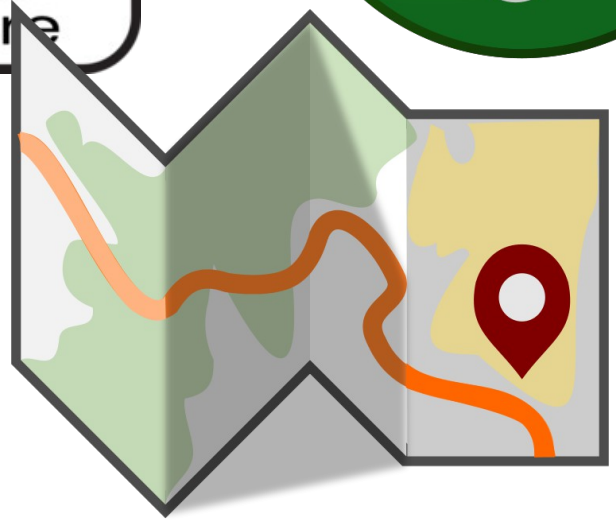
WHO IS THE CROWD?

THE CROWD

WHAT DOES THE CROWD WANT?

THE CROWD



WHAT DOES THE CROWD DO? (GEOSPATIALLY, THAT IS)

THE CROWD

THE CROWD AND THE CLOUD

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WHAT IS THE CLOUD?

THE CLOUD

- Definition has changed often
- NIST uses 5 characteristics, 4 deployment models and 3 service models

- Key Characteristics
  - On-demand self-service
  - Broad network access
  - Resource pooling
  - Rapid elasticity
  - Measured service

WHAT KIND OF CLOUDS ARE THERE?

THE CLOUD

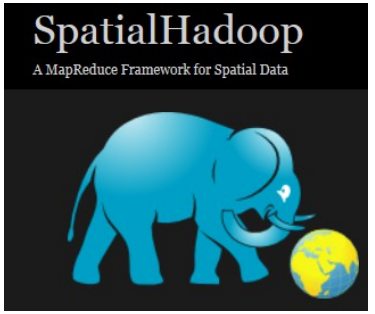
- Deployment models
  - Public
  - Private
  - Community
  - Hybrid

- Service models
  - Infrastructure as a Service
  - Platform as a Service
  - Software as a Service

WHAT ABOUT GEOCLOUDS?

THE CLOUD

Google Maps Engine



THE CROWD AND THE CLOUD

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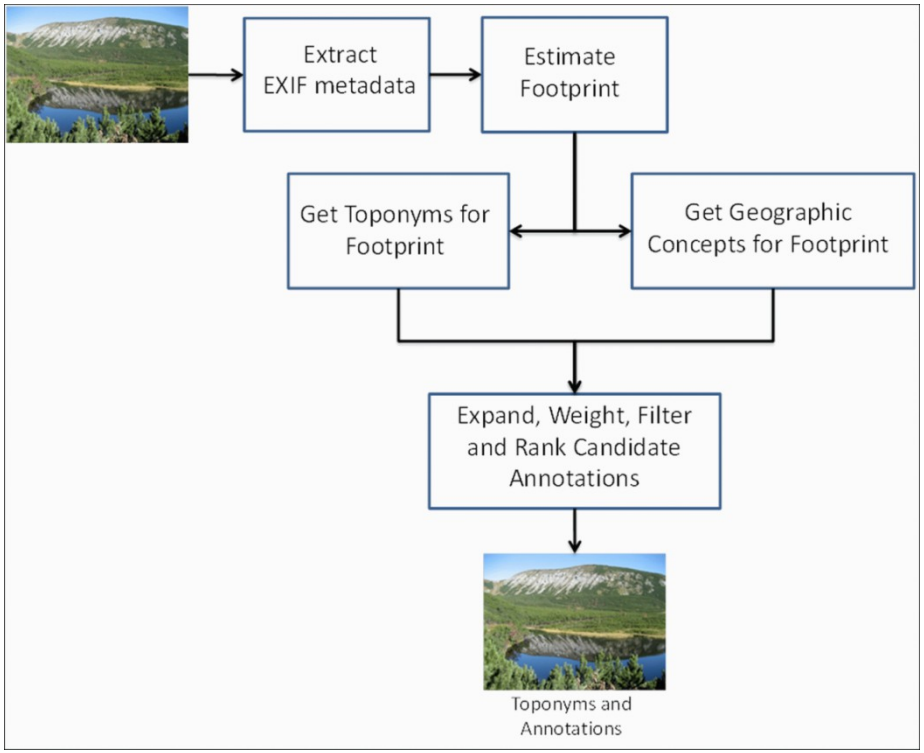
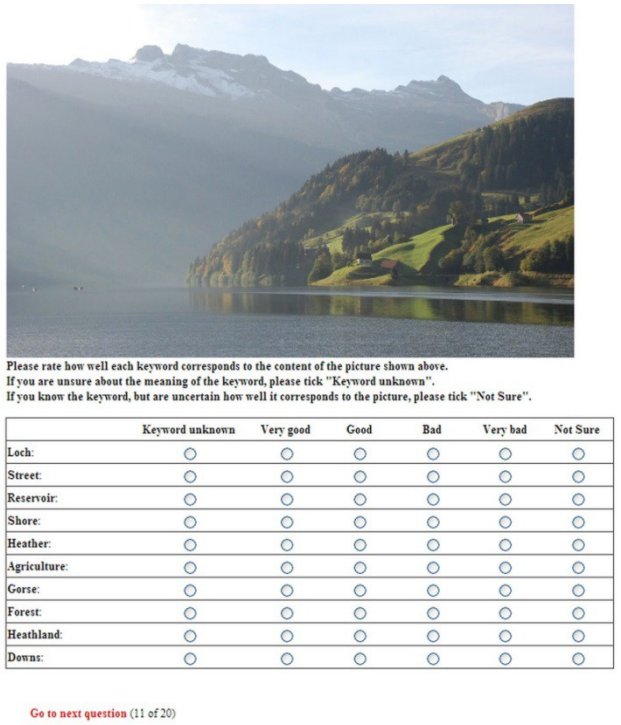
AUTOMATIC IMAGE GEO-TAG CREATION

PAST RESEARCH





Please rate how well each keyword corresponds to the content of the picture shown above.
If you are unsure about the meaning of the keyword, please tick "Keyword unknown".
If you know the keyword, but are uncertain how well it corresponds to the picture, please tick "Not Sure".

	Keyword unknown	Very good	Good	Bad	Very bad	Not Sure
Loch:	○	○	○	○	○	○
Street:	○	○	○	○	○	○
Reservoir:	○	○	○	○	○	○
Shore:	○	○	○	○	○	○
Heather:	○	○	○	○	○	○
Agriculture:	○	○	○	○	○	○
Gorse:	○	○	○	○	○	○
Forest:	○	○	○	○	○	○
Heathland:	○	○	○	○	○	○
Downs:	○	○	○	○	○	○

Go to next question (11 of 20)

Ostermann, F. O., Tomko, M., & Purves, R. (2013). User Evaluation of Automatically Generated Keywords and Toponyms for Geo-Referenced Images. *Journal of the American Society for Information Science and Technology*, *64*(3), 480–499.

GEO-SOCIAL MEDIA AND CRISIS MANAGEMENT

PAST RESEARCH

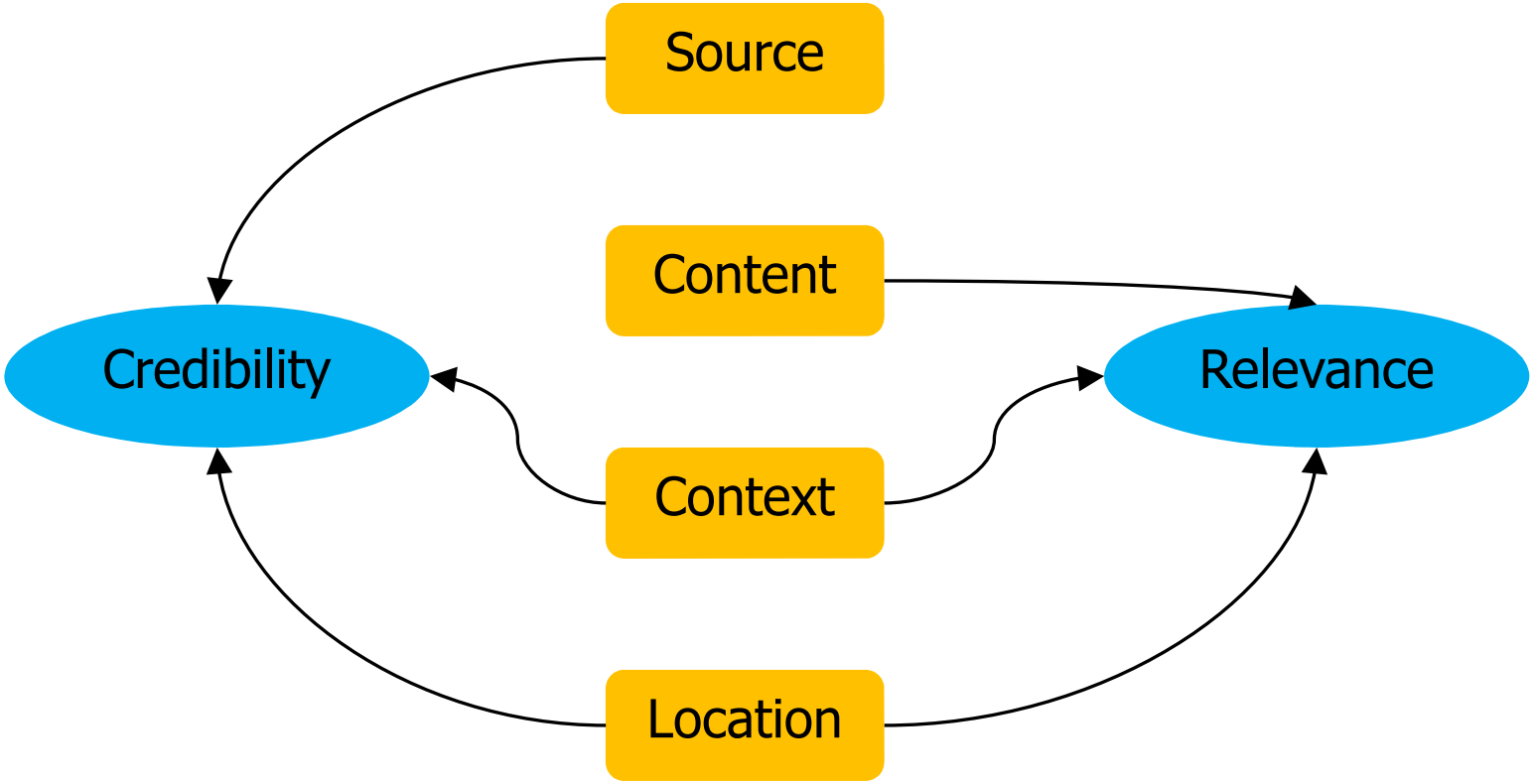
Social media offers…		Crisis management needs…
rich up-to-date information	✓	up-to-date information
new paths of communication	✓	redundant paths of communication
noise, uncertain lineage and accuracy	✗	high-quality and reliable information

Crowd-sourced data curation faces limits of

- Sustainability
- Scalability

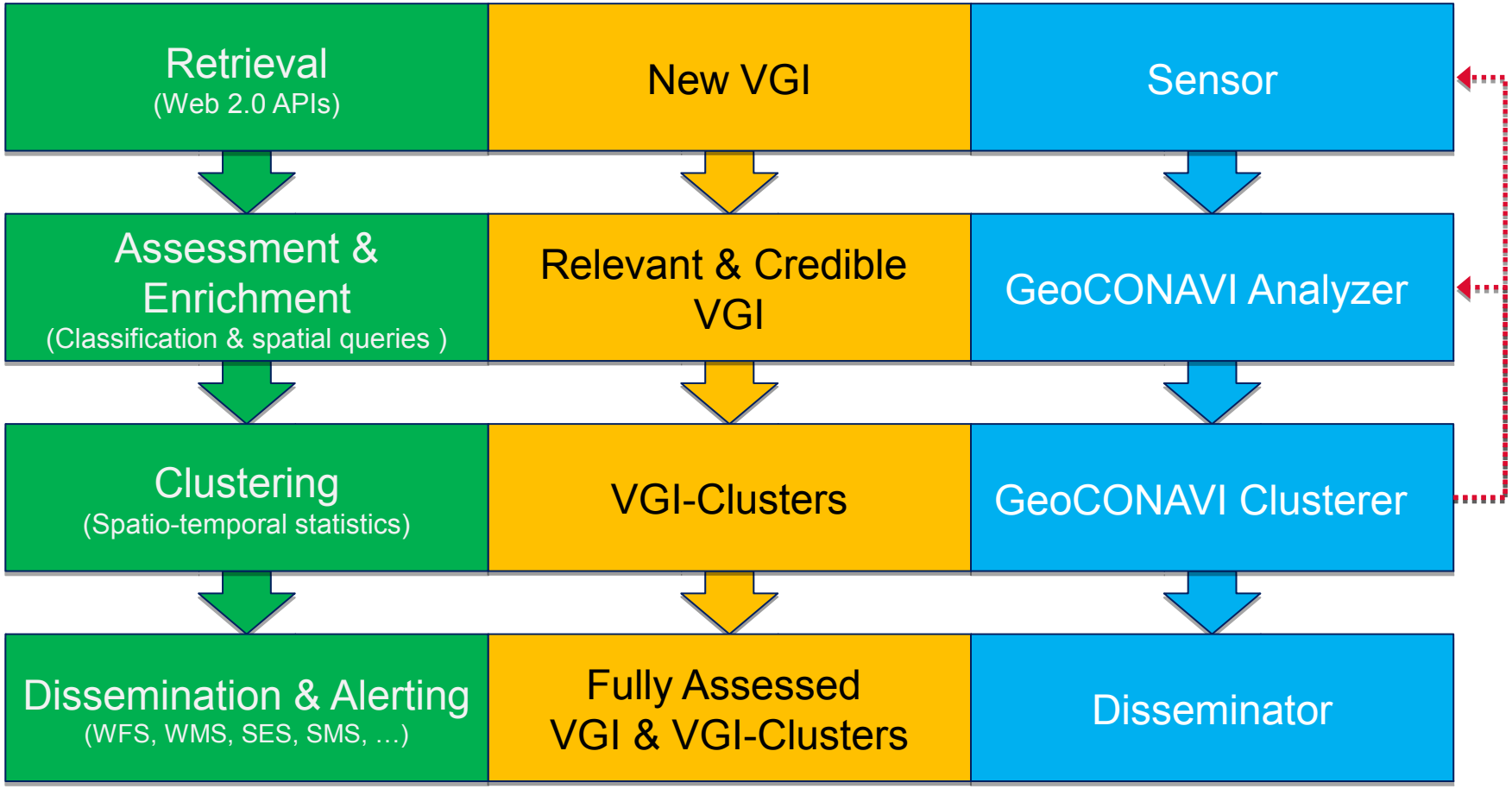
GEO-SOCIAL MEDIA AND CRISIS MANAGEMENT

PAST RESEARCH



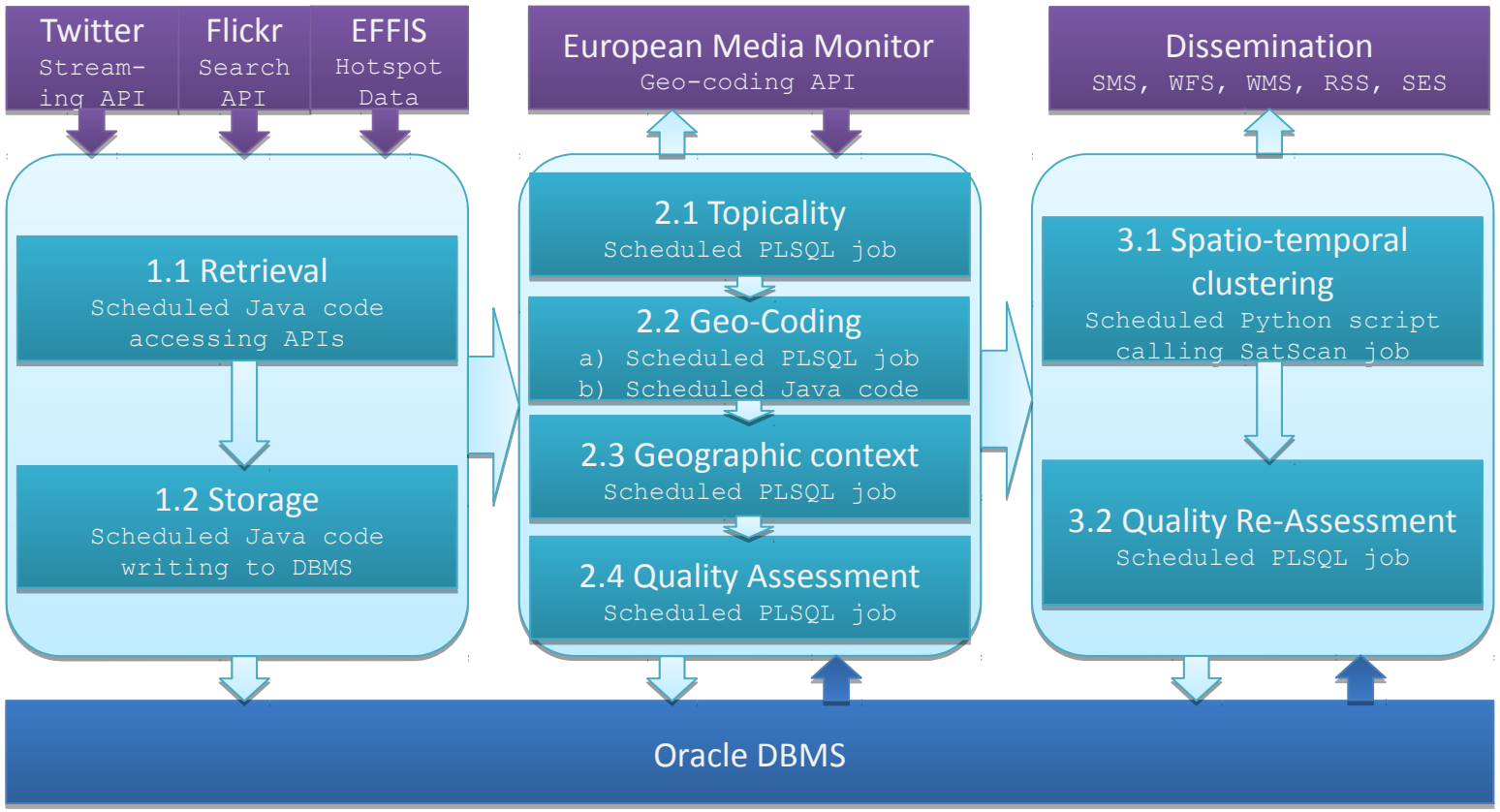
GEO-SOCIAL MEDIA AND CRISIS MANAGEMENT

PAST RESEARCH



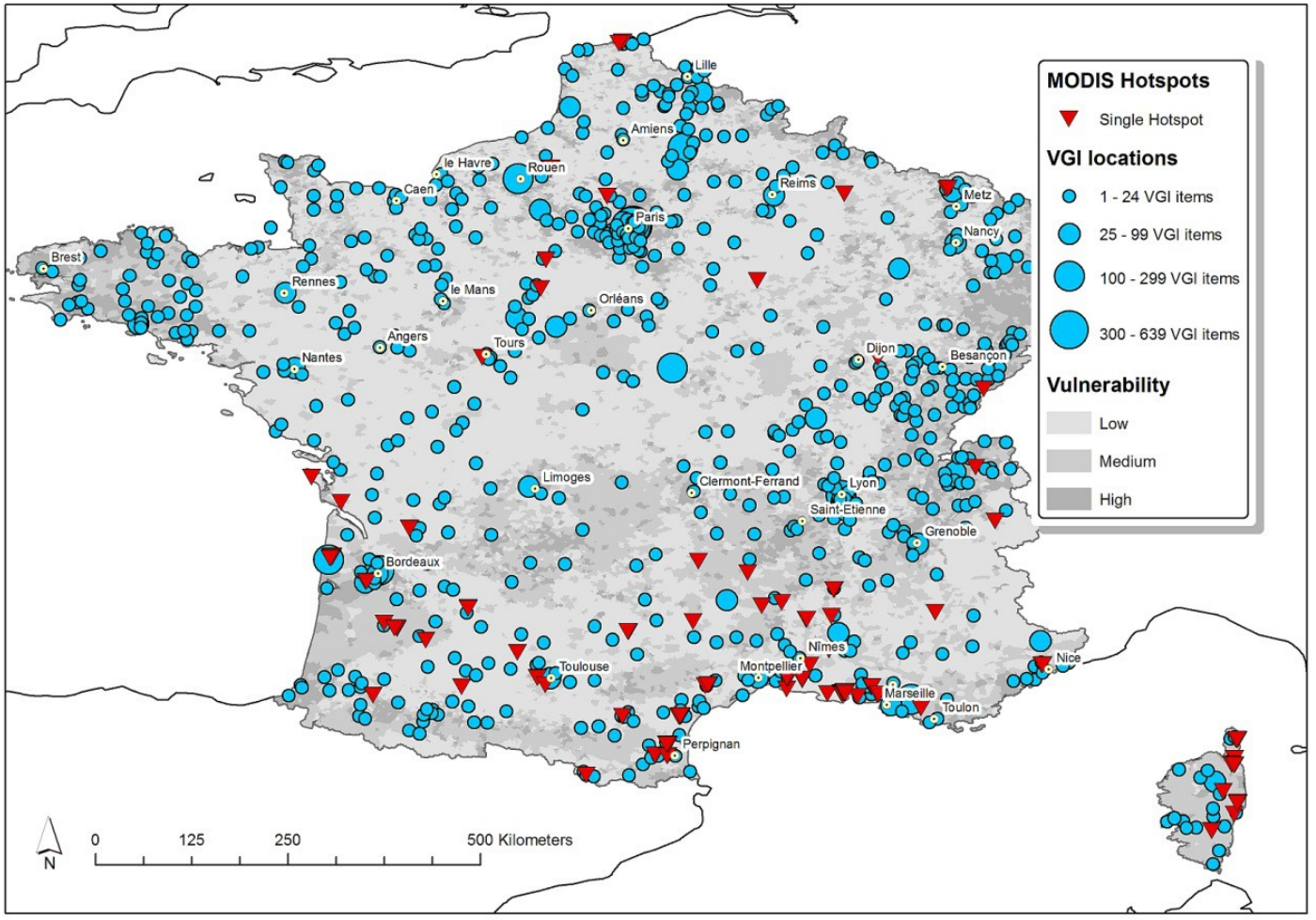
GEOCONAVI

PAST RESEARCH



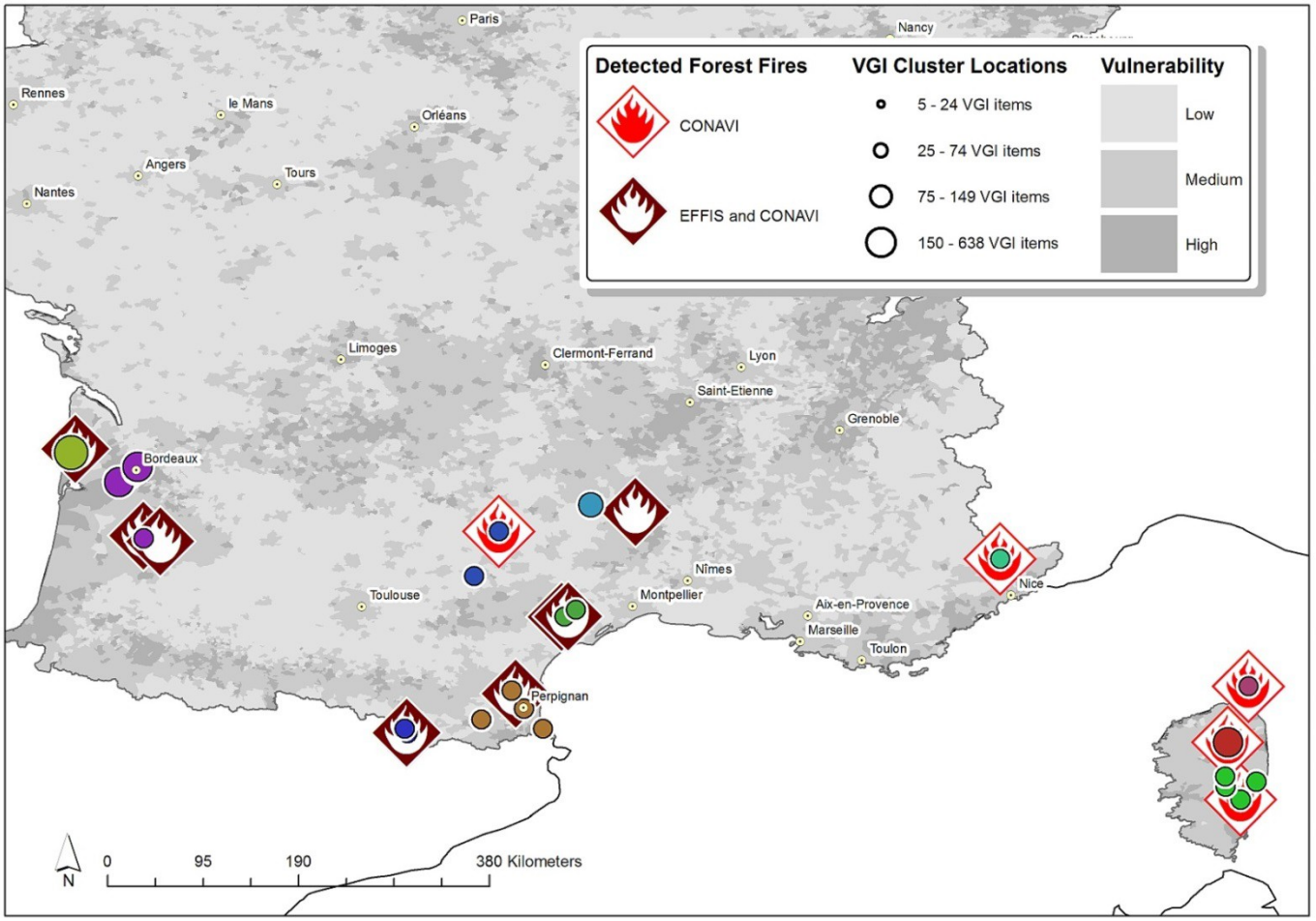
FOREST FIRES IN FRANCE 2011

PAST RESEARCH



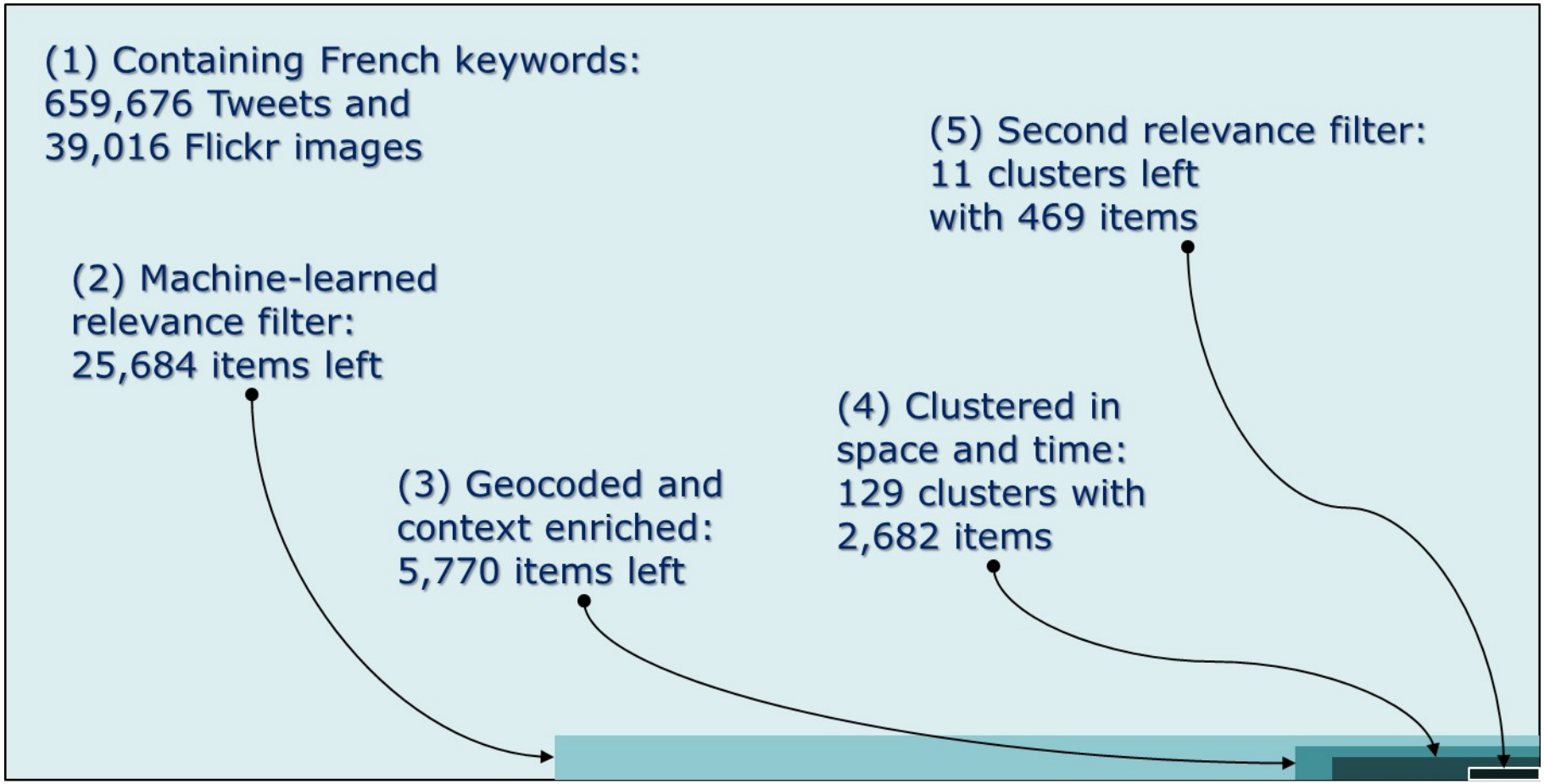
FOREST FIRES IN FRANCE BY GEOCONAVI

PAST RESEARCH



FRENCH FOREST FIRE SOCIAL MEDIA

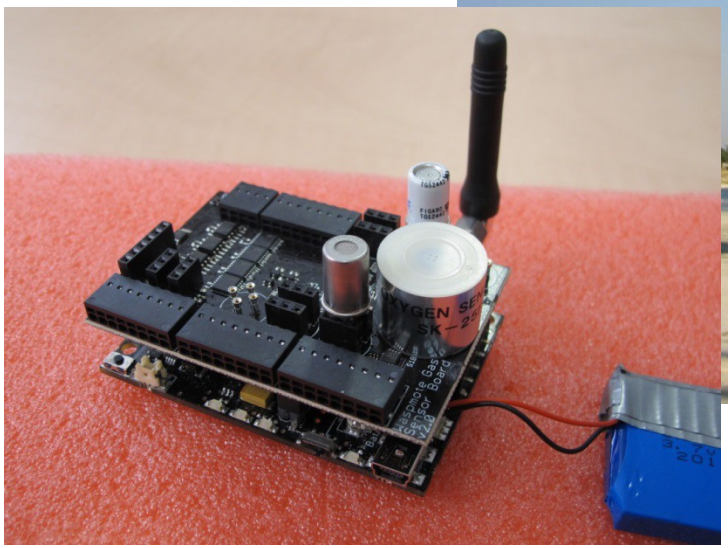
PAST RESEARCH



LOW-COST IN-SITU AND MOBILE SENSORS

PAST RESEARCH

Mikrokopter.de



Libelium
Waspmote

Publiclaboratory.com

LOW-COST IN-SITU AND MOBILE SENSORS

PAST RESEARCH

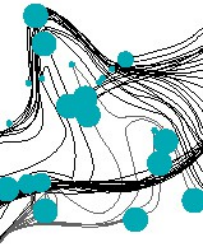
SOME PUBLICATIONS

PAST RESEARCH

- Craglia, M., Ostermann, F., & Spinsanti, L. (2012). Digital Earth from vision to practice: making sense of citizen-generated content. *International Journal of Digital Earth*, *5*(5), 398–416.

- Ostermann, F., & Spinsanti, L. (2012). Context Analysis of Volunteered Geographic Information from Social Media Networks to Support Disaster Management: A Case Study On Forest Fires. *International Journal of Information Systems for Crisis Response and Management*, *4*(4), 16–37.

- Spinsanti, L., & Ostermann, F. (2013). Automated geographic context analysis for volunteered information. *Applied Geography*, *43*(9), 36–44.



THE CROWD AND THE CLOUD

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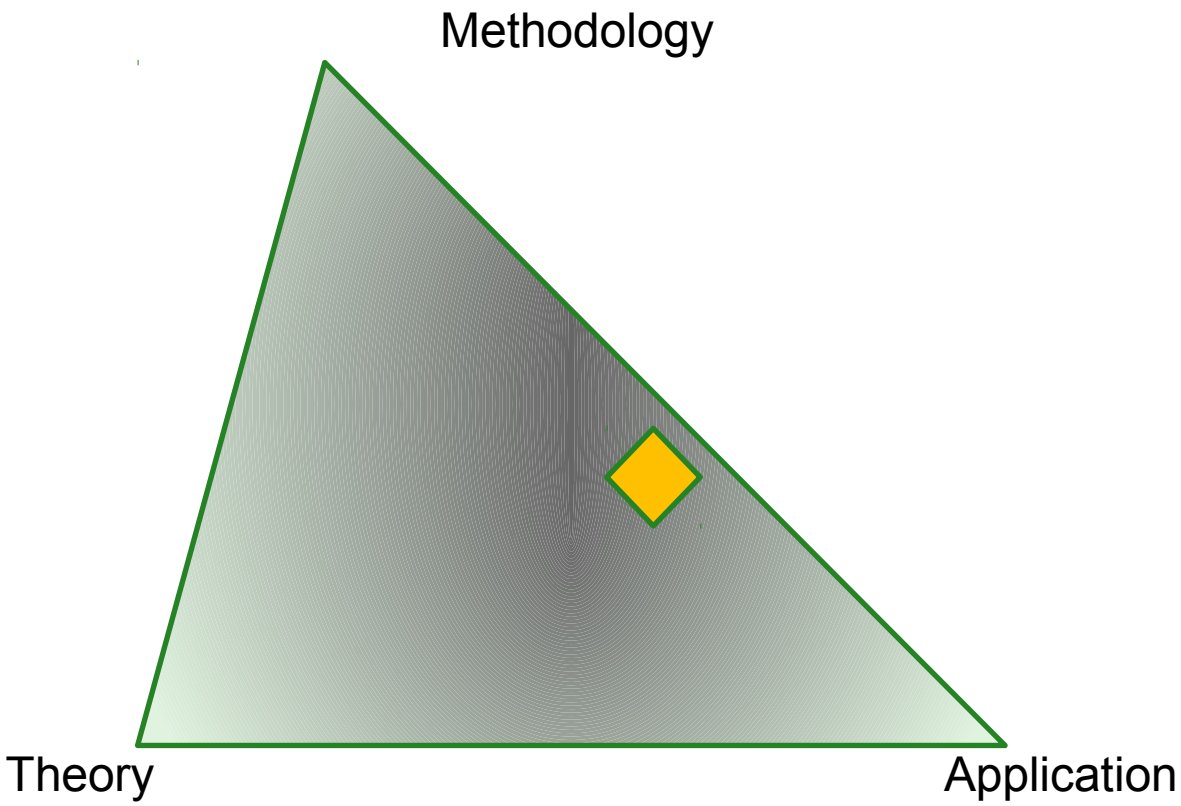
MY RESEARCH TRIANGLE

FUTURE RESEARCH



RESEARCH THEMES

FUTURE RESEARCH

1) **Societal implications** of new production and consumption modes of geographic information.

2) Methods to assess and improve crowd-sourced and volunteered geographic **information quality**.

3) Methods to increase **interoperability** through geographic data integration and linking.

4) Applications to empower citizens, increase participation, and improve **quality of life**.

NEW SOURCES OF GEO-INFORMATION

FUTURE RESEARCH

		Geography	
		Explicit	Implicit
Participation	Explicit	**Volunteered Geographic Information (VGI)** Open Street Map.	**Volunteered geographic content (VGC)** Wikipedia articles about non-geographic topics containing place names, Foursquare
	Implicit	**User-generated geographic information (UGGI)** or Contributed geographic information (CGI) Public Tweets referring to the properties of an identifiable place.	**User-generated geograhpic content (UGGC)** Public Tweets containing a place name

NEW MODES OF GI-PRODUCTION

FUTURE RESEARCH

Issues

- Crowd-sourced vs. volunteered
- Opportunistic vs. participatory sensing
- Open data and sharing
- Liability
- Privacy

Project proposal

- Identify factors that influence success and failure of collaborative or crowd-sourced (software) projects
- Approach: Meta-data and usage data analysis, social network analysis

NEW METHODS FOR GI-PROCESSING

FUTURE RESEARCH

Issues

- Data quality (reliability, relevance, accuracy)
- Rapic decision-making
- Geographic information streams

Project Proposal

- Combine suitable quality assurance mechanisms for near real-time processing of geo-information streams
- Approach: Geographic information retrieval, distributed processing, geo-statistics

INTEROPERABILITY OF GI

FUTURE RESEARCH

Issues

- Syntactic heterogeneity
- Semantic heterogeneity
- Place-based vs. space-based perspective

Project Proposal

- Assess and adopt place-based approaches to improve GI semantic interoperability
- Approach: Theoretical reasoning, information science

APPLICATIONS OF CROWD AND CLOUD APPROACHES

FUTURE RESEARCH

Issues

- Digital divide and uneven information geographies
- Lack of technical infrastructure and expertise
- Entrenched power structures

Project Proposal

- Cloud-based spatial data infrastructures and processing for volunteered or crowd-sourced information to increase resilience in developing infrastructures
- Approach: Political science, sociology, information science, computer science

RESEARCH NETWORKS

FUTURE RESEARCH