

Improved situation analysis using open information sources

The QuOIMA Project

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This project is supported by the Austrian National Program KIRAS



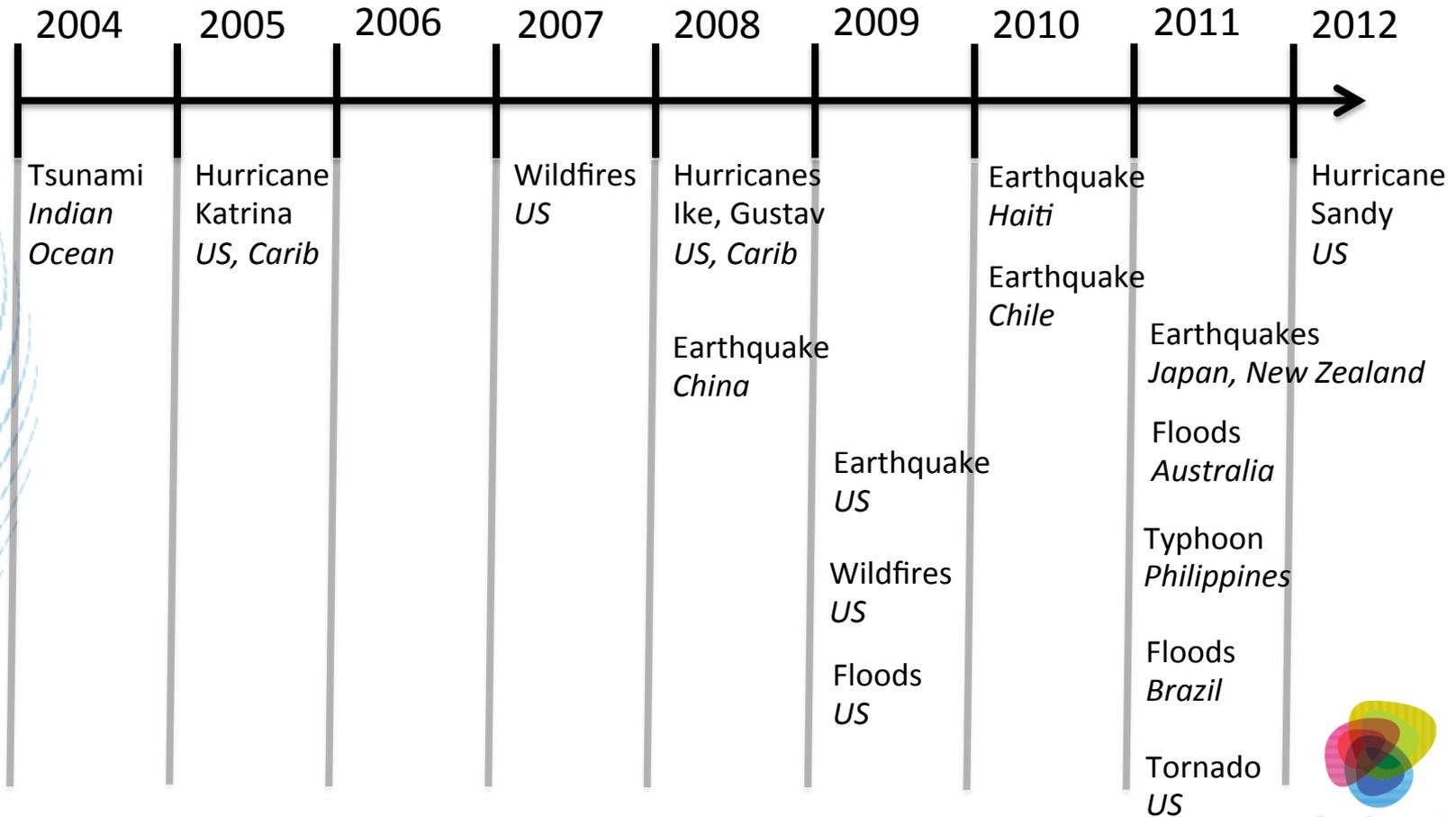
http://bit.ly/QuOIMA_project



THE ROLE OF MEDIA IN DISASTER MANAGEMENT

- Traditional Media still play a strong role
 - TV, Radio, Web-Content
- Open Social Media Sources becoming increasingly attractive
 - Twitter, Facebook, YouTube, Flickr,...

EXISTING WORK AND CASE STUDIES



Floods Central Europe 2013



Hochwasser in Mitteleuropa



The Role of Media in Disaster Management

- A Strong Case for Cross-Media Analysis
 - Multimedia
 - Multilinguality

THE QUOIMA PROJECT

- Focus

- Use of Open Source Information, particularly of Social Media for Disaster- and Crisis Management to improve the support of decision making and risk estimation

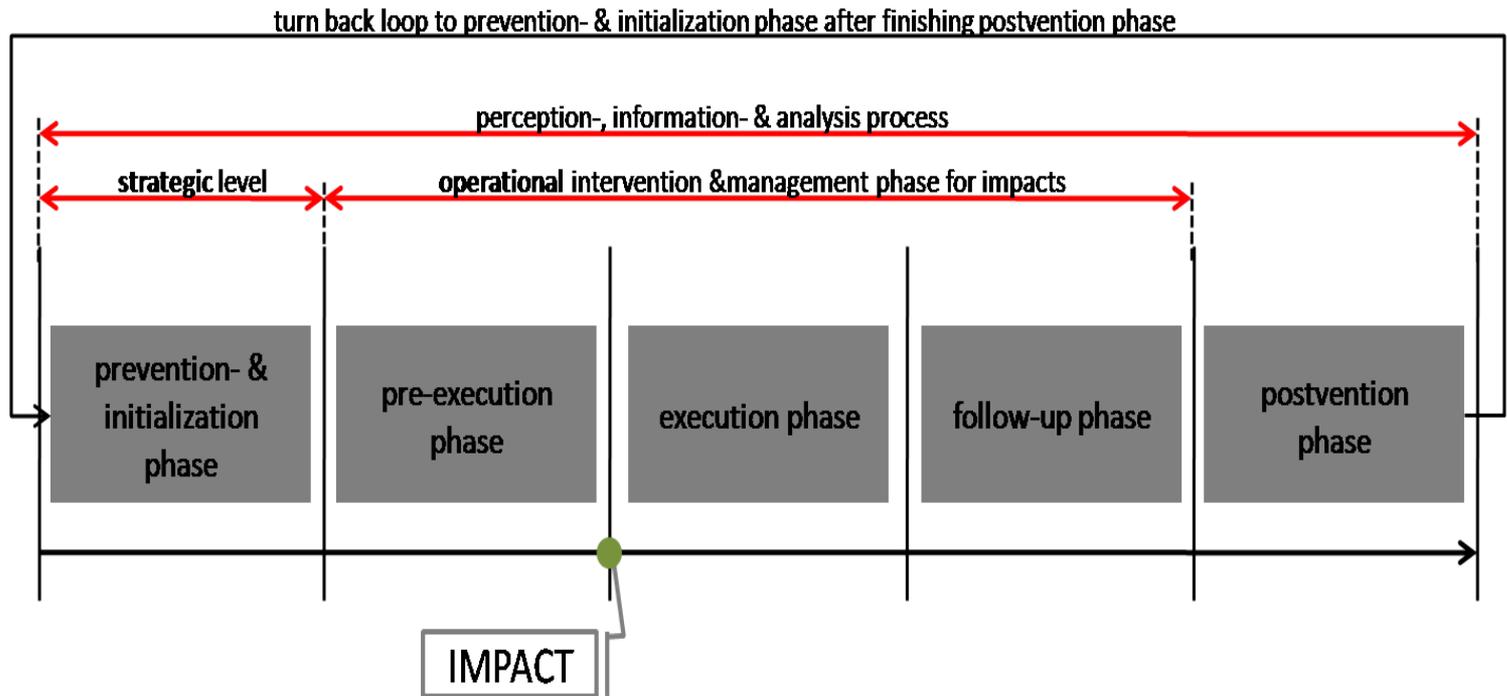
- Partners

- JOANNEUM RESEARCH (Coordinator)
- SAIL LABS Technology AG
- INSET Research & Advisory
- University of Vienna
- National Defence Academy / Austrian MoD



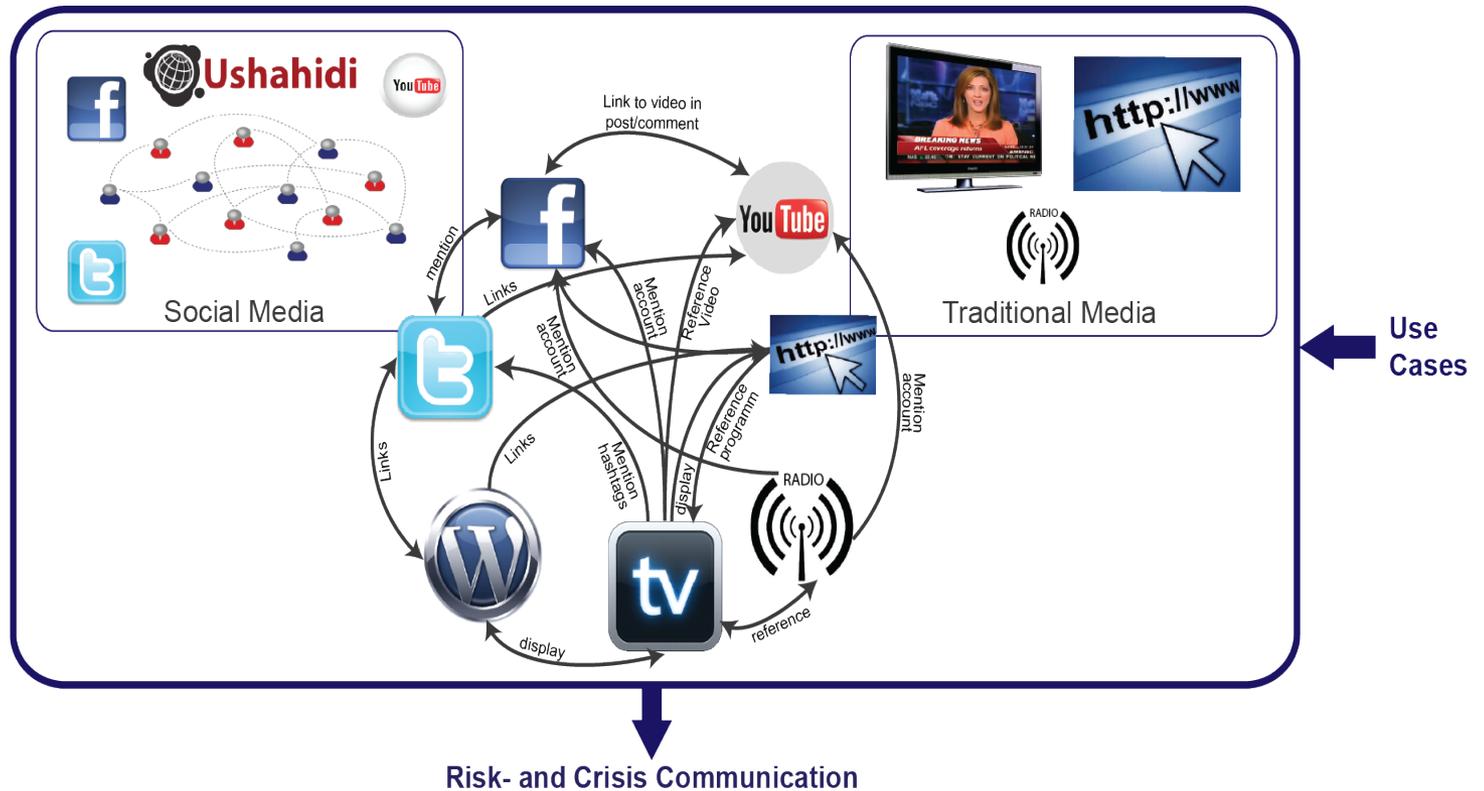
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Five-phase disaster model as basis



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Cross-media communication patterns



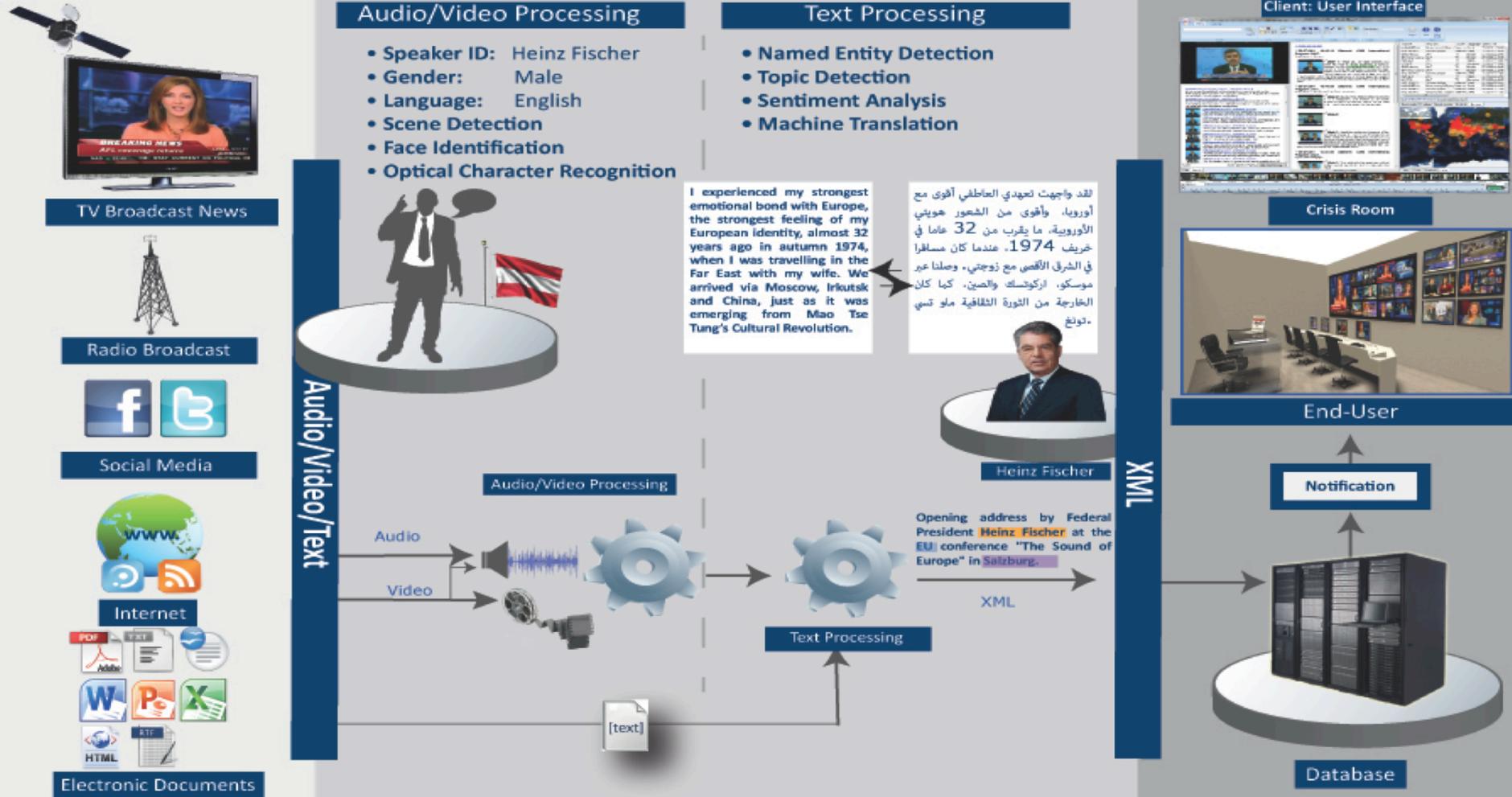
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Architecture

Feeder

Media Mining Indexer

Media Mining Server/Client



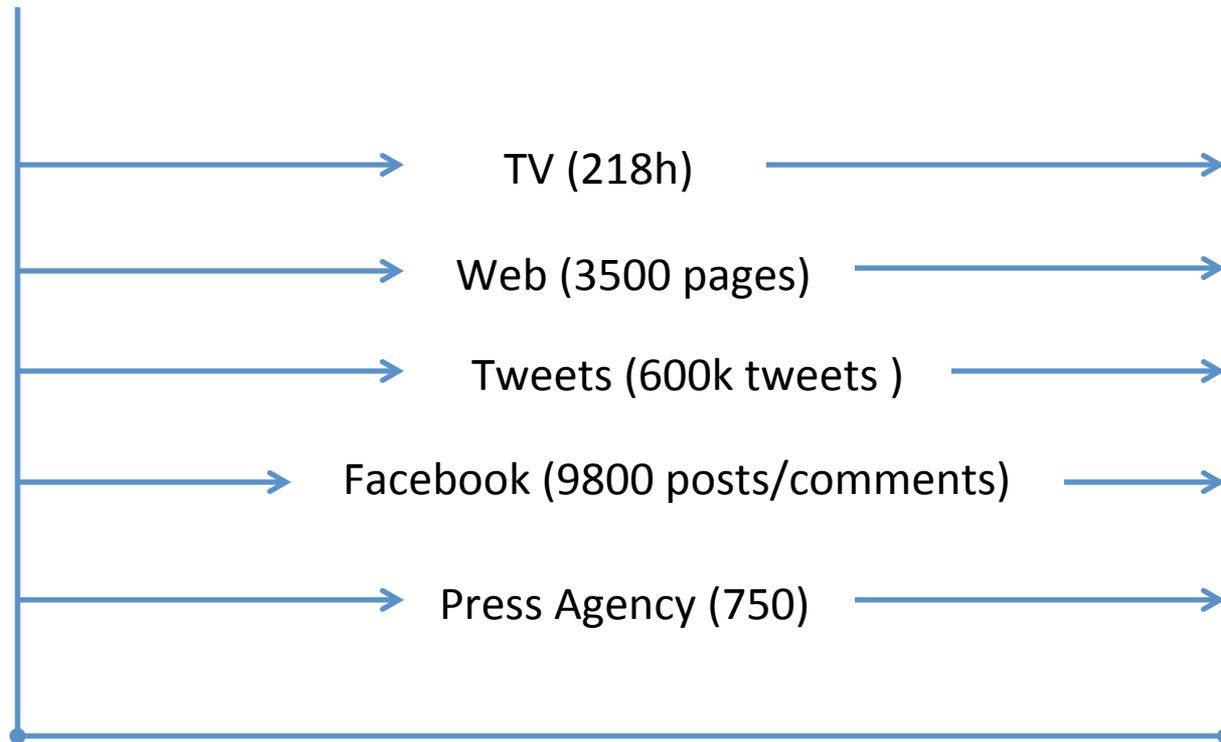
Document Clustering

- Cross-Language
 - English, German, Russian
- Domain
 - Natural disasters
 - General news
- Clustering
 - Temporal
 - Spatial
 - Disaster type
- No ground truth
 - Number of clusters is not predefined
- Database for evaluation
 - 751 press releases (German, May/July 2013)

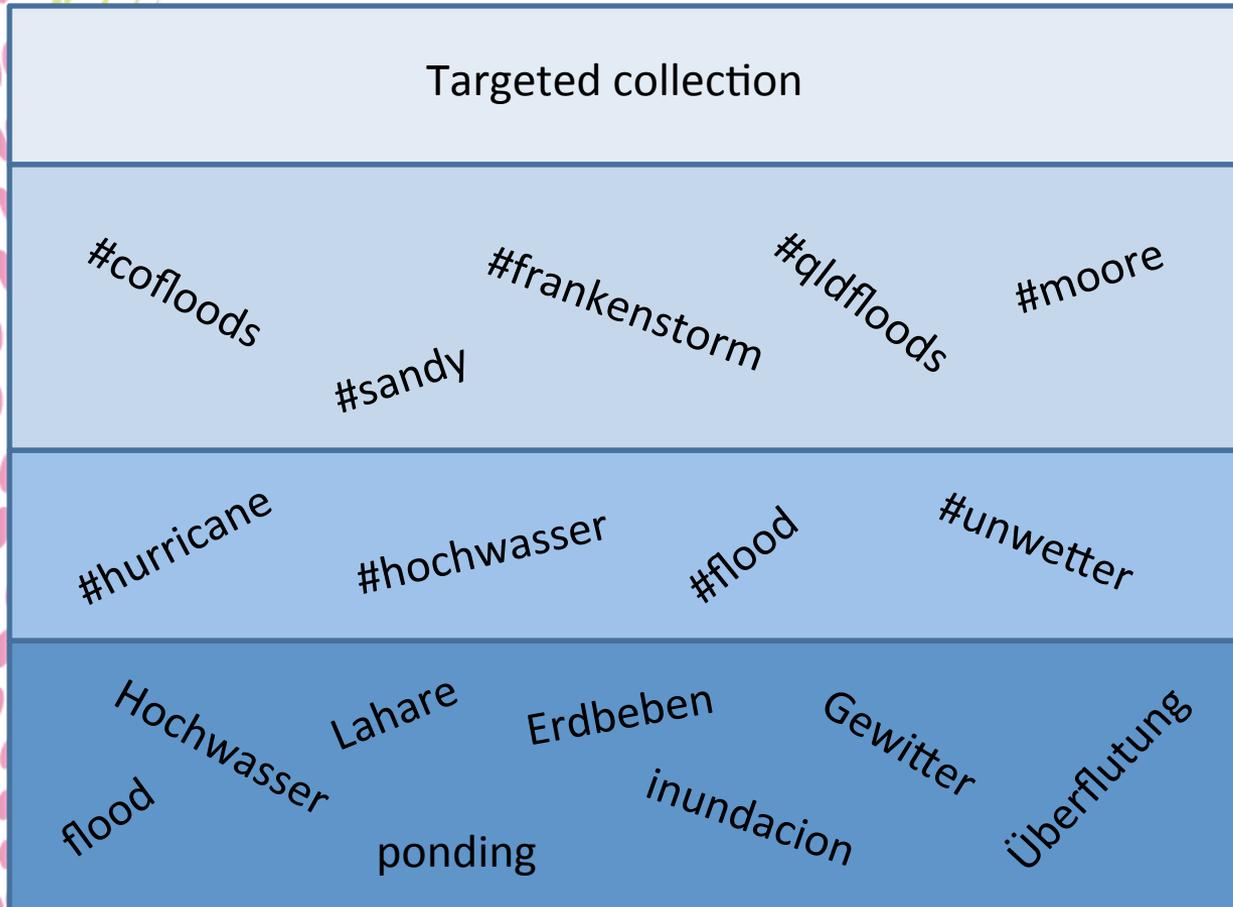
Floods 05/06 2013

05/20/2013

06/23/2013



Twitter Collection



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Specific hashtags

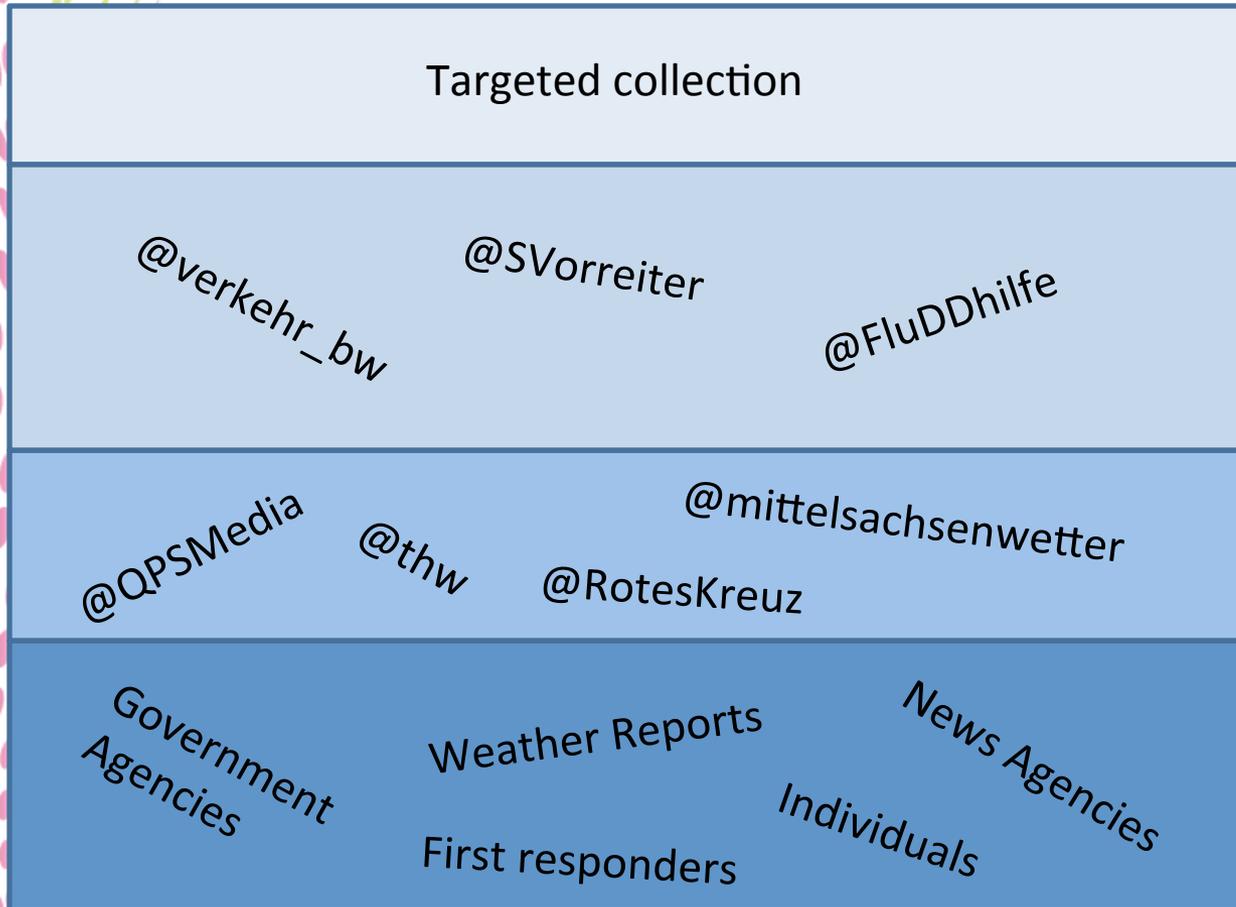


General hashtags



General terminology
Specialized terminology

Twitter Accounts



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Specific actors within
particular disaster



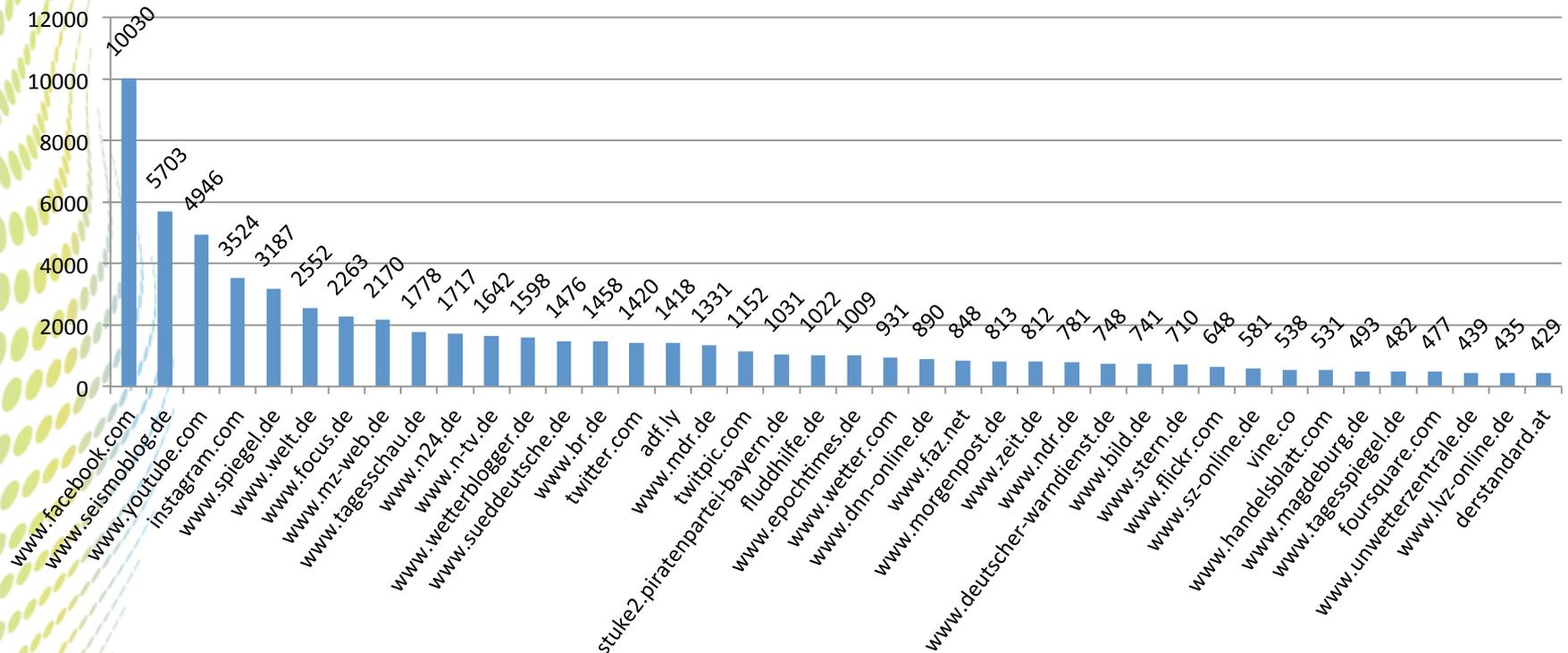
Actors on Twitter



Actors

Twitter: tweeted urls stats

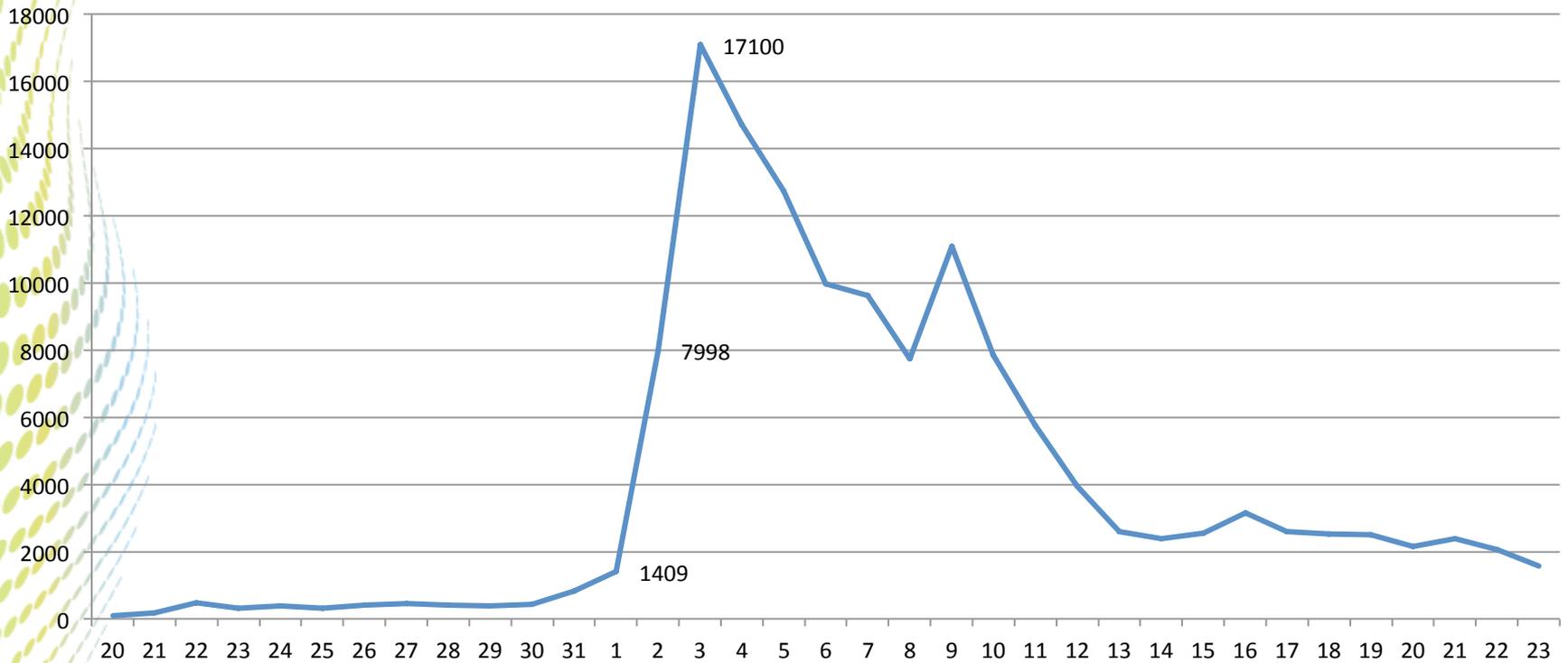
number of urls per domain



- Social networks
- Photo/Video sharing
- Blogs, domain experts
- Media outlets

Twitter: Hashtag stats II

number of tweeted hashtag "Hochwasser"



QUOIMA TECHNOLOGY

Image and Video-based Clustering

- Clustering und Linking of image and video content
 - (Near) Duplicates
 - clustering of events / places
 - Approach
 - Based on local interest points and descriptors
 - Supports matching of parts of images
 - Incrementally build similarity matrix between images / video segments
- Filter (Near-) Duplikates



Image and Video-based Clustering

- Challenges

- Varying size of objects, lighting, point of view...
- Differences in quality, coding across different media
- Scalability

- Benefits

- Reduce amount of data screened by an operator
- Supports efficient user interfaces

EXAMPLE RESULTS

Near Duplicate Detection

- The same (or very similar) content was used multiple times in various TV reports



```

#20265;20290;111940;111965;205;235;237;244;253;259;  perc=252.000000,mc=7,median=244,zh=0.000000
#21070;21090;199465;199485;139;148;211;211;221;  perc=216.000000,mc=47,median=211,zh=0.000000
#20130;20140;106060;106020;76;180;717;  perc=17.000000,mc=3,median=180,zh=0.000000
#19610;1955;613;33;3800;0;1310;200;140725;140870;133;49;0;133;54;800; 100 106 123 125 146 148 149 151 155 155 173 176 176 178 179 180 181
-274;048780;mc=177,median=244;
19620;19755;0;13;4;799;0;13;10;200;8450;8585;0;5;38;0;0;5;43;399; 101 107 123 125 135 147 154 161 161 166 166 167 170 172 176 178 181 184
19620;19755;0;13;4;799;0;13;10;200;231970;232105;2;34;38;799;2;34;44;200; 92 99 133 135 144 145 161 163 165 169 170 174 175 175 178 181 184
19620;19755;0;13;4;799;0;13;10;200;50390;50535;0;33;35;399;0;33;41;10; 66 73 77 80 90 109 109 114 116 118 120 120 123 127 128 139 129 129
19790;20125;0;13;11;600;0;13;25;0;107355;107690;1;11;34;199;1;11;47;600; 0 101 103 111 111 111 114 115 116 119 121 122 124 127 127 129 13
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21070;21430;0;14;2;799;0;14;17;200;287005;287365;3;11;20;200;3;11;34;600; 186 200 212 217 218 219 220 224 232 237 239 240 241 242 242
21120;21465;0;14;4;799;0;14;18;600;198895;199240;2;12;35;600;2;12;49;600; 185 194 211 218 220 226 228 228 229 232 232 233 235 237 237 238
21815;21865;0;14;32;600;0;14;34;600;4;199825;199875;2;13;33;0;2;13;15;0; 0 78 83 88 102 104 118 118 119 124 128;perc=121.400000,mc=27,media
21815;21895;0;14;32;600;0;14;35;799;287685;287765;1;11;47;399;3;11;50;600; 84 92 93 95 96 97 99 99 100 106 110 116 119 120 124 126 133;per
21860;21910;0;14;34;399;0;14;36;399;287620;287670;3;11;44;799;3;11;44;799; 0 71 96 97 97 99 99 100 102 109 111;perc=104.200000,mc=11,medi
#Ongoing scenes?
#Filtered scenes
#20265;20290;111940;111965;205;235;237;244;253;259;  perc=252.000000,mc=7,median=244,zh=0.000000
#21070;21090;199465;199485;139;148;211;211;221;  perc=216.000000,mc=47,median=211,zh=0.000000
#20130;20140;106060;106020;76;180;717;  perc=17.000000,mc=3,median=180,zh=0.000000

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QuOIMA: Status & Outlook

- Done
 - Scenario Development – Use Cases
 - Data collection on demo-scenario
 - Floods in central Europe 05/06 2013
 - Filtering/screening of Data
 - Privacy Aspects
- Ongoing
 - Implementation of methods for text & image processing
 - Identification of communication patterns and allocation to phases of the disaster model
- Outlook
 - Evaluation & Tests

JOANNEUM RESEARCH - DIGITAL

Institute for Information and Communication Technologies

- Remote Sensing and Geoinformation
 - Machine Vision Applications
 - Space and Communication Technology
 - Audiovisual Media
 - Intelligent Information Systems
 - Smart Acoustic Solutions
-
- Staff: 120
 - Location: Graz, Austria

JOANNEUM RESEARCH - DIGITAL

Security Research: Focus of Interest

- Digital Security
 - ICT in Infrastructure Protection
 - Disaster Resilience
 - Disaster Resilience and Climate Change
 - Critical Infrastructure Protection
 - Fight against Crime and Terrorism
 - Urban Security
 - Border Security and External Security
 - Maritime Border Security
 - Supply Chain Security
-

Thank you for your attention !

Contact:

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[http://www.joanneum.at/en/digital/
application-area-security-research-and-
transport-telematics.html](http://www.joanneum.at/en/digital/application-area-security-research-and-transport-telematics.html)

QuOIMA project

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Project Coordinates

http://bit.ly/QuOIMA_project