



Web Scale collaboration and Crisis Management

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EQUIPE PROJET
Coast
CENTRE Inria
Nancy Grand Est

Coast Team

- Inria/LORIA research team (15/20 people)
- University of Lorraine
- Research topic :
- Web Scale trustworthy collaborative systems
- team.inria.fr/coast
- @InriaLORIACoast



Inria NANCY
Grand Est



Team members

Research Scientist

- ▶ Claudia-Lavinia Ignat [Research Associate (CR), INRIA]

Faculty Members

- ▶ François Charoy [Team leader of SCORE team from September, 1st 2010, Professor, Université de Lorraine, HdR]
- ▶ Claude Godart [Team leader of team-project ECOO until September, 30rd 2009, Professor, Université de Lorraine, HdR]
- ▶ Khalid Benali [Assistant Professor, Université de Lorraine, HdR]
- ▶ Nacer Boudjlida [Professor, Université de Lorraine, HdR]
- ▶ G r me Canals [Assistant Professor, Universit  de Lorraine]
- ▶ G rald Oster [Assistant Professor, Universit  de Lorraine]
- ▶ Olivier Perrin [Professor, Universit  de Lorraine, HdR]
- ▶ Pascal Urso [Assistant Professor, Universit  de Lorraine]
- ▶ Samir Youcef [Assistant Professor, Universit  de Lorraine]
- ▶ Martine Gautier [Assistant Professor, Universit  de Lorraine]

Technical Staff

- ▶ Philippe Kalitine [Research Engineer OpenPaaS, since April 2014]

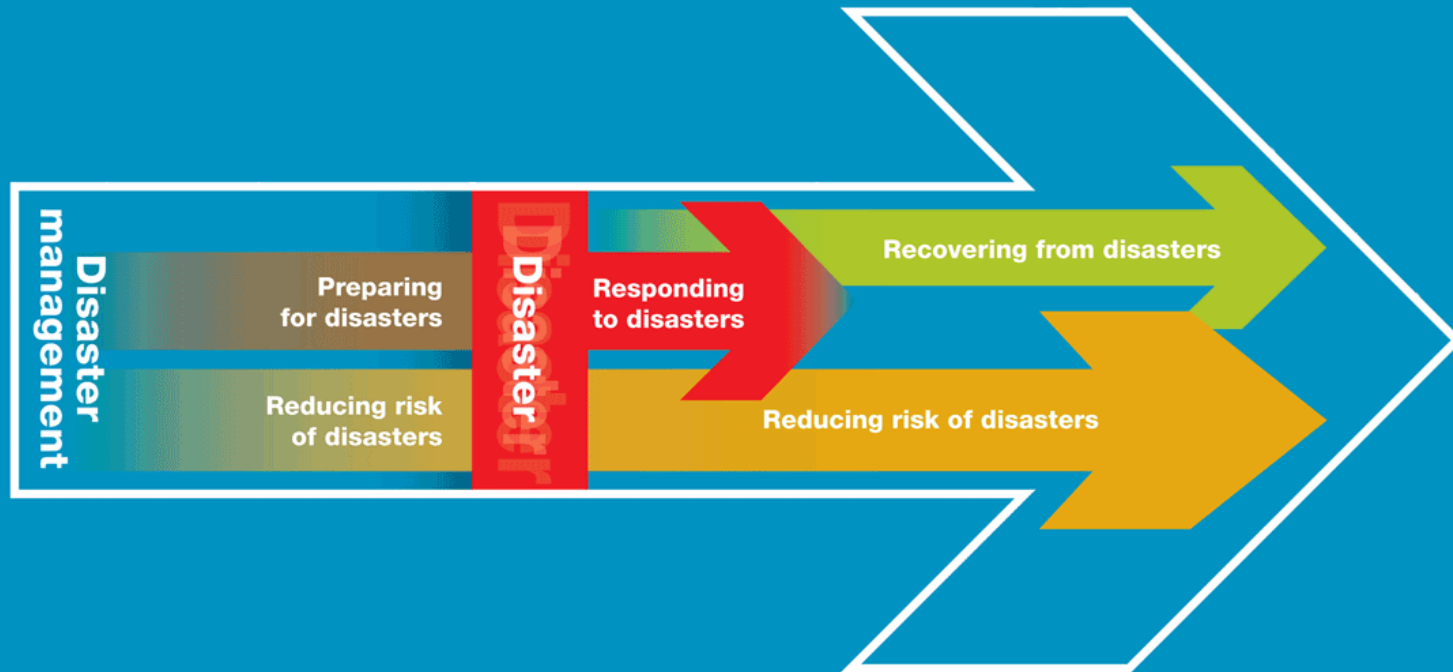
PhD Student

- ▶ Luc Andr  [ANR Grant (Streams) since September 2011]
- ▶ Elio Goettelmann [CRP Henri Tudor since September 2011]
- ▶ Adrien Devresse [with CERN since September 2011]
- ▶ Ahmed Bouchami [OpenPaaS grant since November 2012]
- ▶ Jordi Martori [Syncfree grant since October 2013]
- ▶ Vinh Dang [since October 2014]
- ▶ Guillaume Rosinosky [Th se CIFRE since December 2014]
- ▶ Hoai Le Nguyen [Projet OpenPaaS since september 2015]
- ▶ Victorien Elvinger [Projet OpenPaaS since october 2015]

Goals of the presentation

- Identify specific requirements for collaborative systems in Crisis management
- Introduce some current results and research challenges
- Introduce a new partner : the crowd

Disaster management phases



<http://www.ifrc.org/en/what-we-do/disaster-management/about-disaster-management/>

Emergency management organisation

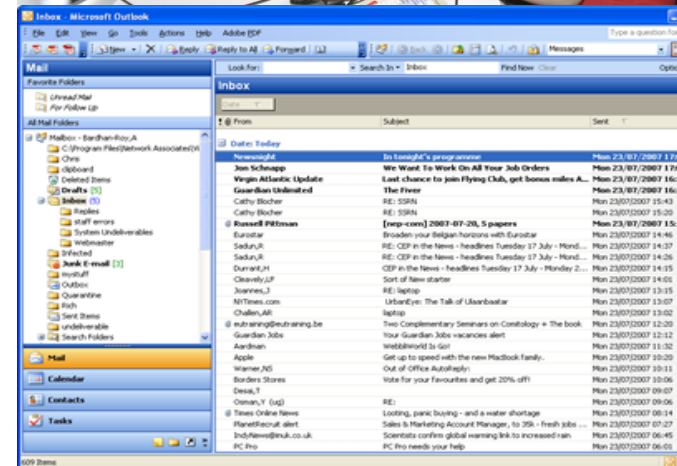
- Multi-organisational :
 - Security organisations,
 - Health care organisation,
 - Safety organisations,
 - Government organisations
- Centralised coordination
- Hierarchical

Collaboration partners

- Traditional actors
 - Police,
 - Firefighters,
 - Healthcare, Hospitals,
 - Civil Security,
 - Military,
 - Red Cross,
 - Local Civil servants...
- Ad-Hoc actors
 - Industry worker,
 - transportation workers
 - Other GNOs

They collaborate with

- Email
- Phone
- Radio
- Other ICT Tools



When the scale increases

- 
- Across borders
 - Across organisations
 - Across cultures
 - Across interests
 - Cluttered by
 - Political and legal issues
 - Limited resources
 - Interoperability issues

It becomes messy

Variation in crisis

- Crisis management is an evolving matter
- Recent crisis have obliged to revise the preconceived view on crisis management
 - 惆 From a technical point of view
 - 惆 From a sociological point of view

Hurricane Katrina 2005

- Category 5 Hurricane
- Caused breaches to flood protections structures
- 80% of the city of New Orleans Submerged (1500 deaths)



Coordination issues

- Very wide area affected
- Several political decision levels
- Lack of preparedness
- Coordination issues during the evacuation

“Some teams displayed their **own initiative** [..]

Unfortunately, [..] **rescuers were forced to leave people on highways [..] in continuing need of transportation, food, and water.**”

(White House Report / Hurricane Katrina)

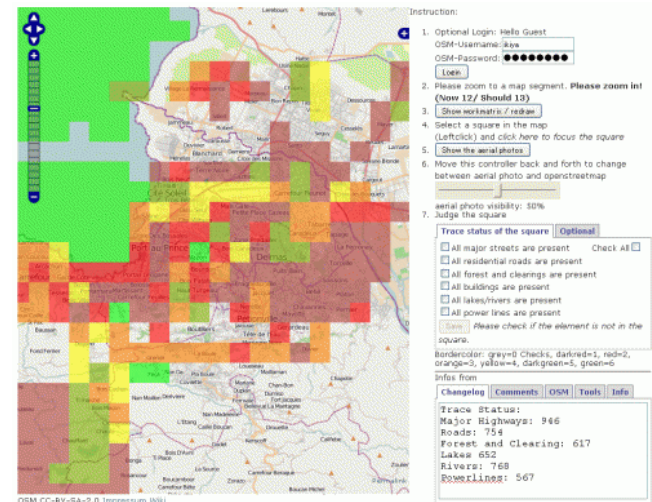
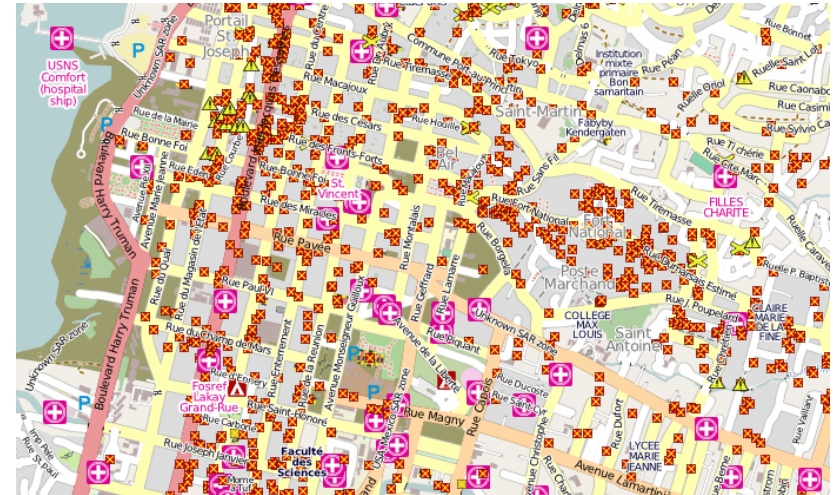
Haiti Earthquake 2006

- 7.0 Magnitude earthquake – 3.5M people affected – 220.000 death (est.)
- Hundreds of responding organisations



Unexpected event at an unexpected scale

- First responder : people
- Overwhelming answer from the international community (hundreds of NGO's)
- First important use of social network
- volunteer based crisis mapping
- <http://www.digital-humanitarians.com/>



Collaboration Challenges

- Social
- Organisational
- Technical
- Trust
- Security
- Safety
- Interoperability
- Culture
- Scalability

Sharing and coordinating actions

Sharing informations

- Collaboration requires
 - To be able to share information
 - Effectively
 - At a large scale
 - To preserve privacy
 - **To trust** the collaborators
 - To control the data distribution

What do we share

Documents
Calendars
Maps
Contacts
Plans

...

Sharing with replication

Reliability

- Possible to continue working when a replica crashes
- Better protection against corrupted data

Performance

- Scaling in numbers
- Scaling with the size of a geographical area

Challenge: how to maintain consistency between replicated data ?

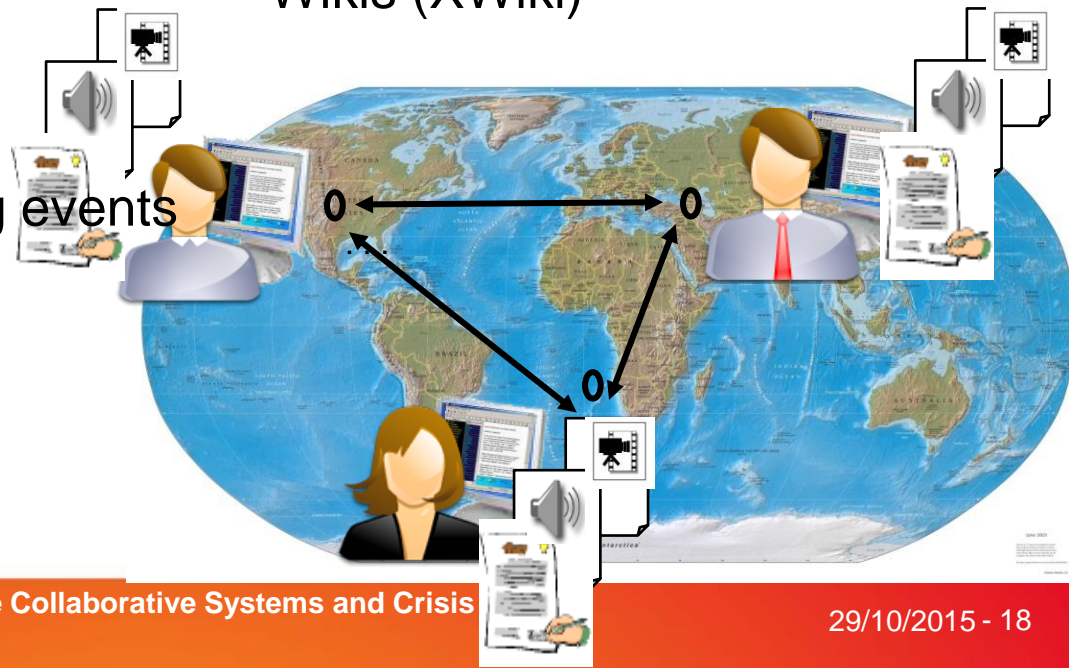
Real-time Collaborative Editing Applications

Collaborative activities:

- Report writing
- Transcription (lectures, movie subtitles)
- Translation
- Note-taking during events

Existing solutions:

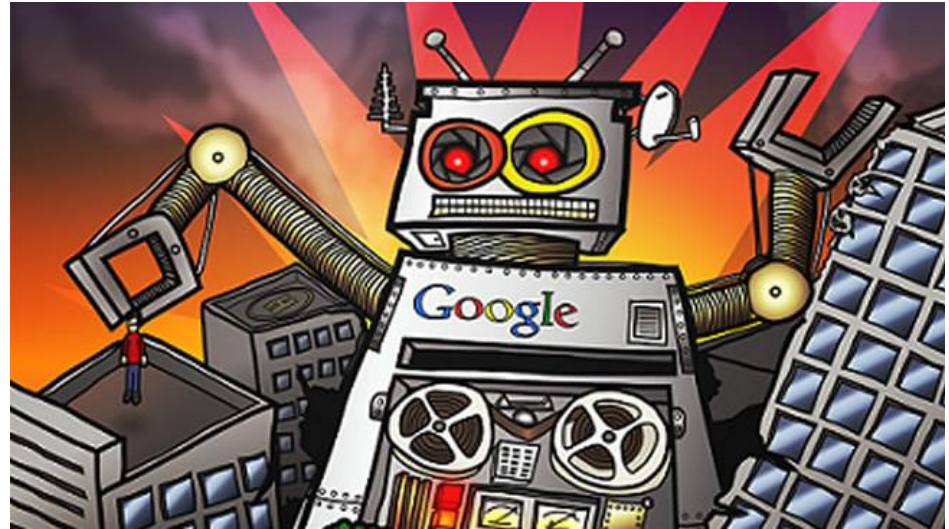
- GoogleDocs, Office365, Etherpad, Real-time editors for Wikis (XWiki)



Limitations of RT Collaborative Technologies

Centralized control

AUTHENTICATION METADATA NETWORK
ENCRYPTION LAW INFORMATION DIGITAL
SEARCH RING RECORD INTERNET ATA
ANONYMOUS TECHNOLOGY API MOBILITY
DATA **DATA PRIVACY** APPS
PROTECTION CLASSIFICATION RISK VIRUS
COMMUNICATION WWW FORBIDDEN
DOCUMENT WEB 2.0 WIRELESS



Scalability issues (e.g. GoogleDocs 50 users sharing limit)

https://docs.google.com/document/d/18cq4ydZkaHL09cX36GnwXH1INPI6XxHACRkLfgk__mA/preview

Wow, this file is really popular! Some tools might be unavailable until the crowd clears. [Try again](#) [Dismiss](#)

Conflicts management

How to avoid them when the number of users grows

1 40 ans d'interaction homme-machine : points de repère et perspectives
2 Depuis qu'il existe les ordinateurs, la question de l'interface avec les utilisateurs s'est posée. En quarante ans, l'interaction homme-machine (IHM) a permis de rendre l'informatique accessible à un plus grand nombre, d'une façon que nul ne pouvait prédire. Que serait le visage de l'informatique aujourd'hui sans les interfaces graphiques ?
3

pouvais

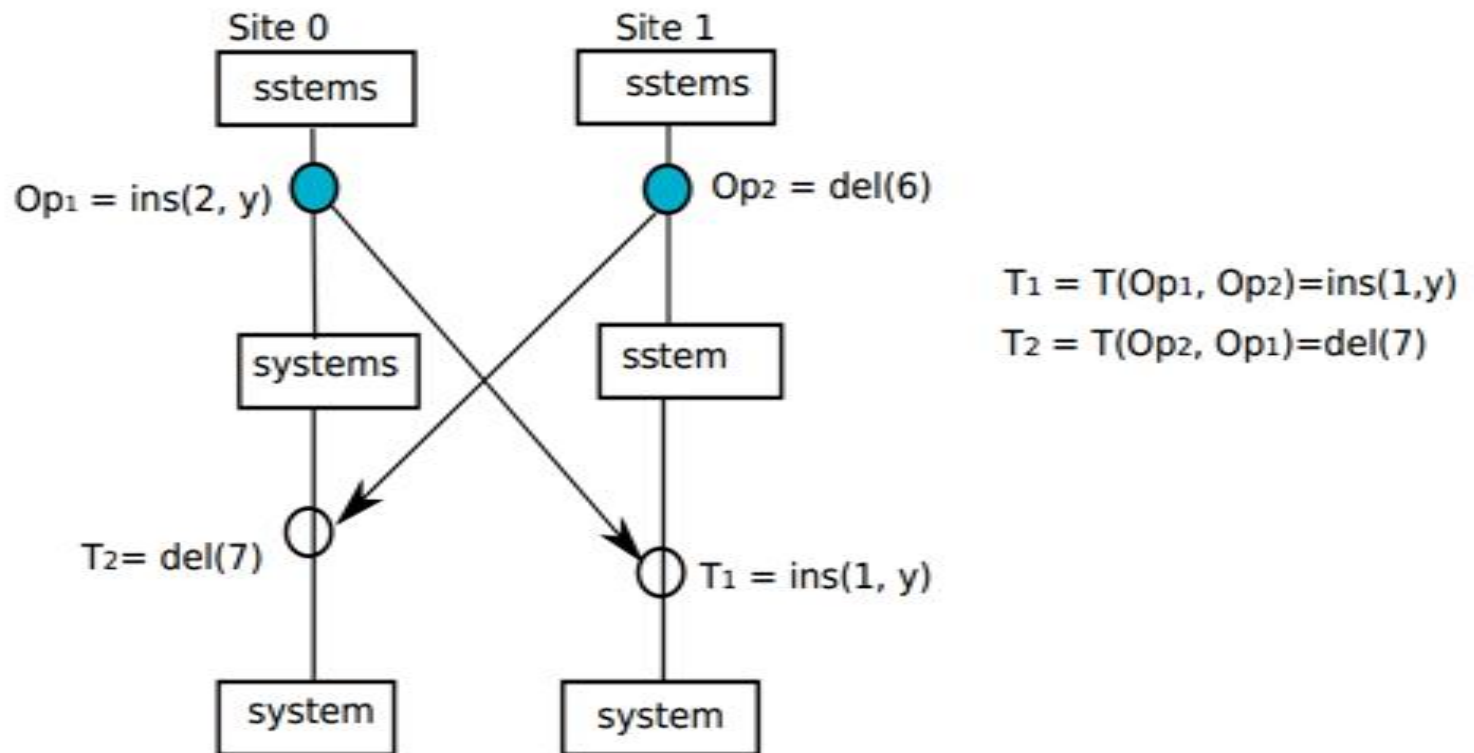
interfaces

1 40 ans d'interaction homme-machine : points de repère et perspectives
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3

pouvait

interfacces

Optimistic replication and Collaborative editing

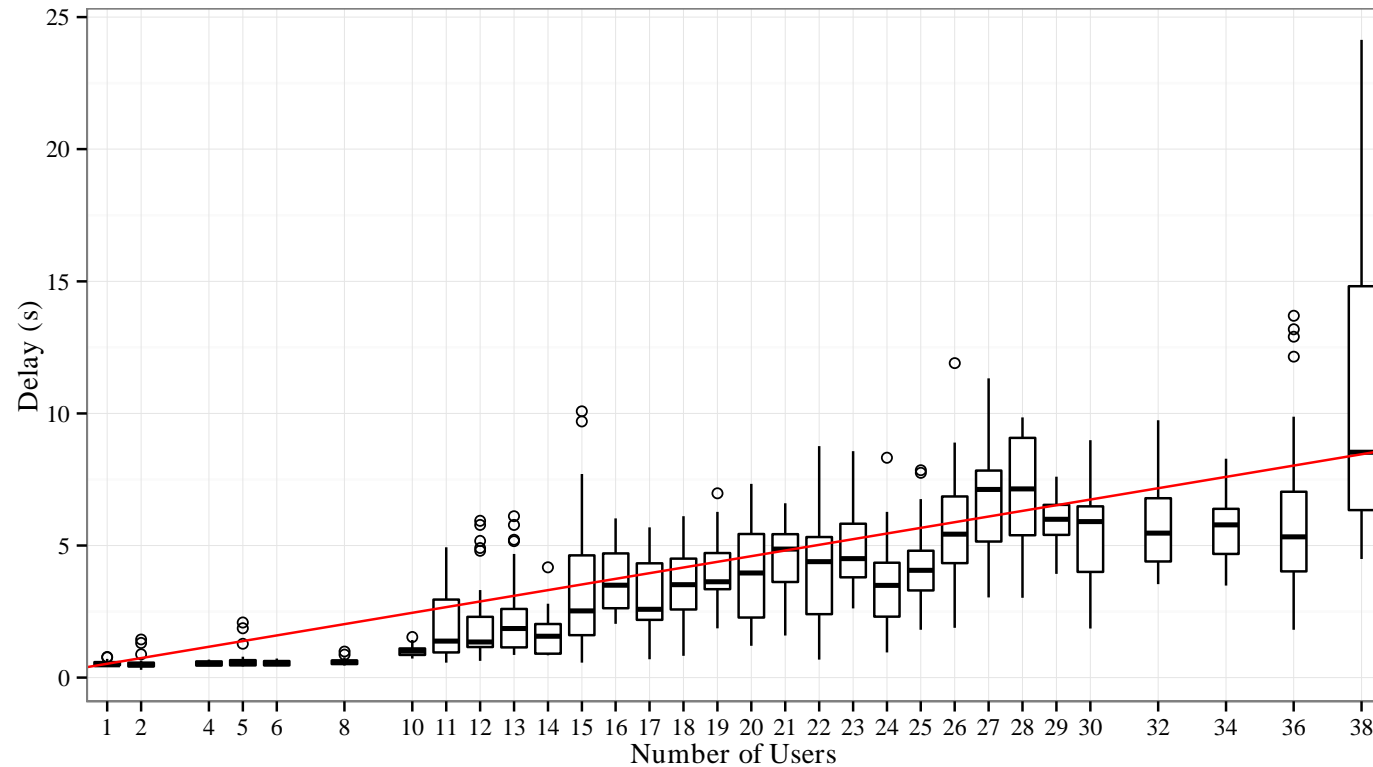


Testing scalability in GoogleDocs/MUTE

■ Simulations

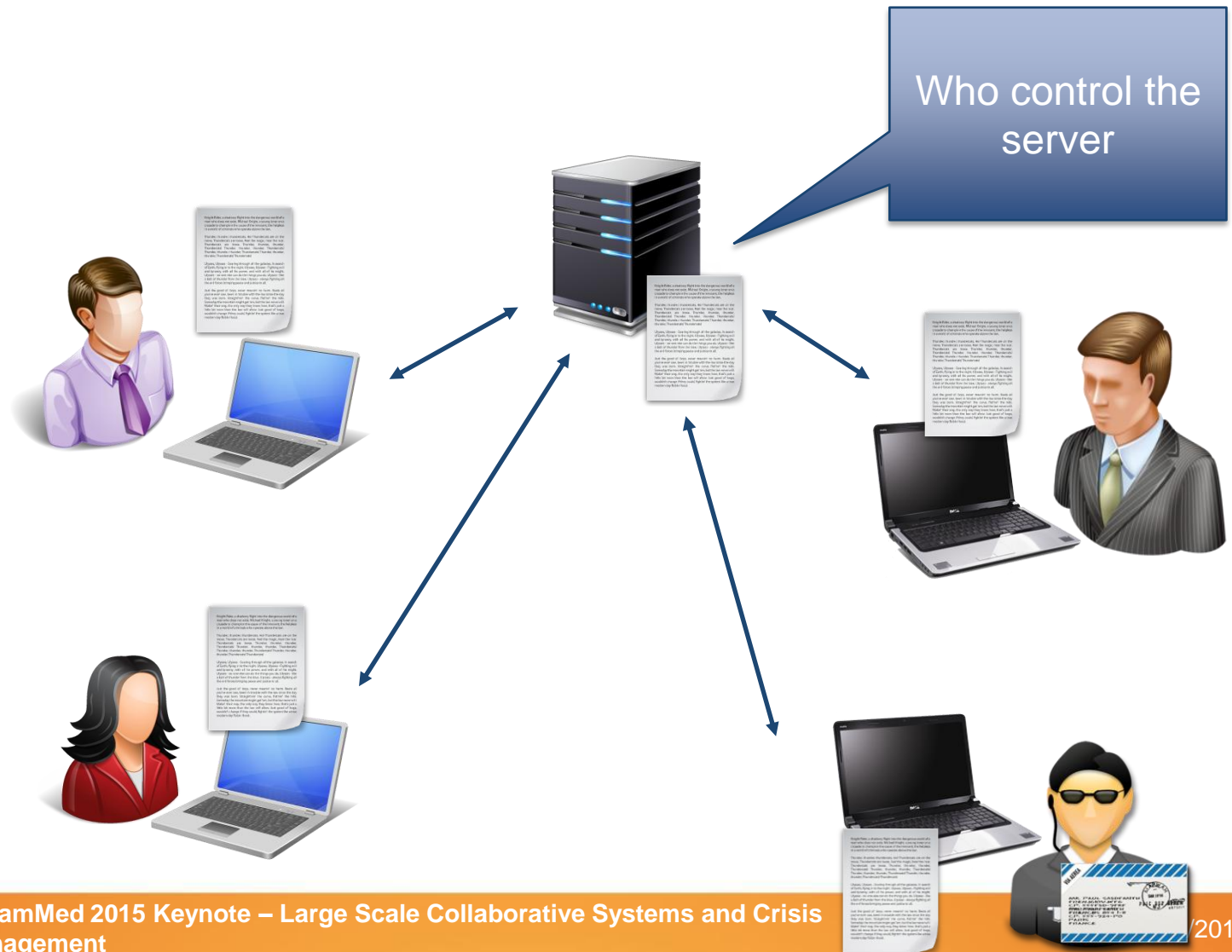
- Simulate users that type simultaneously on shared document
- Simulate different typing speeds
 - Fast groups: 40 wpm
 - Moderate groups: 35 wpm
 - Slow groups: 23 wpm
 - 1wpm=5cpm
 - => 2-4 cps

Delays in GoogleDocs

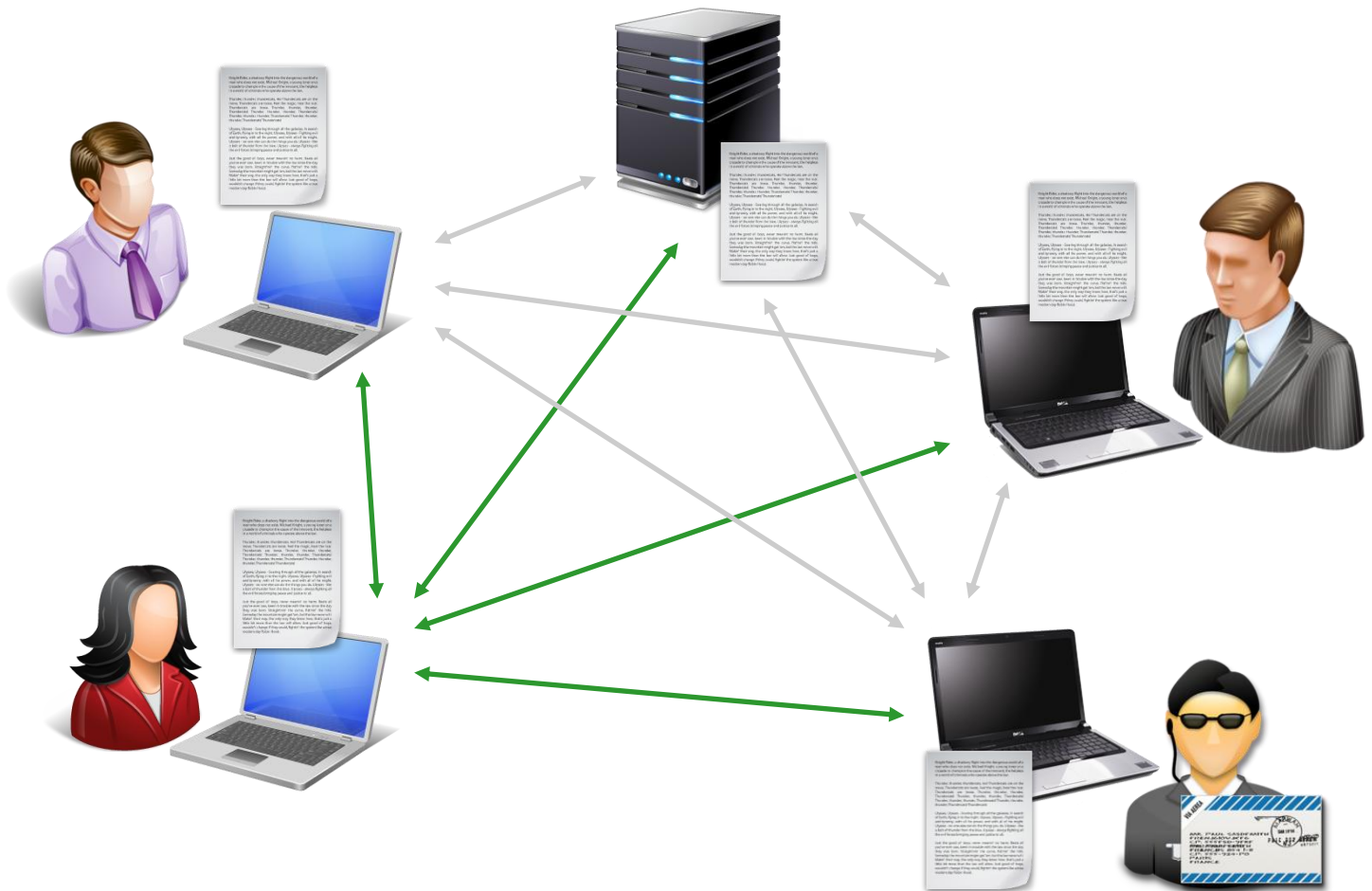


Typing speed:
2 chars/sec

Traditional centralized architecture

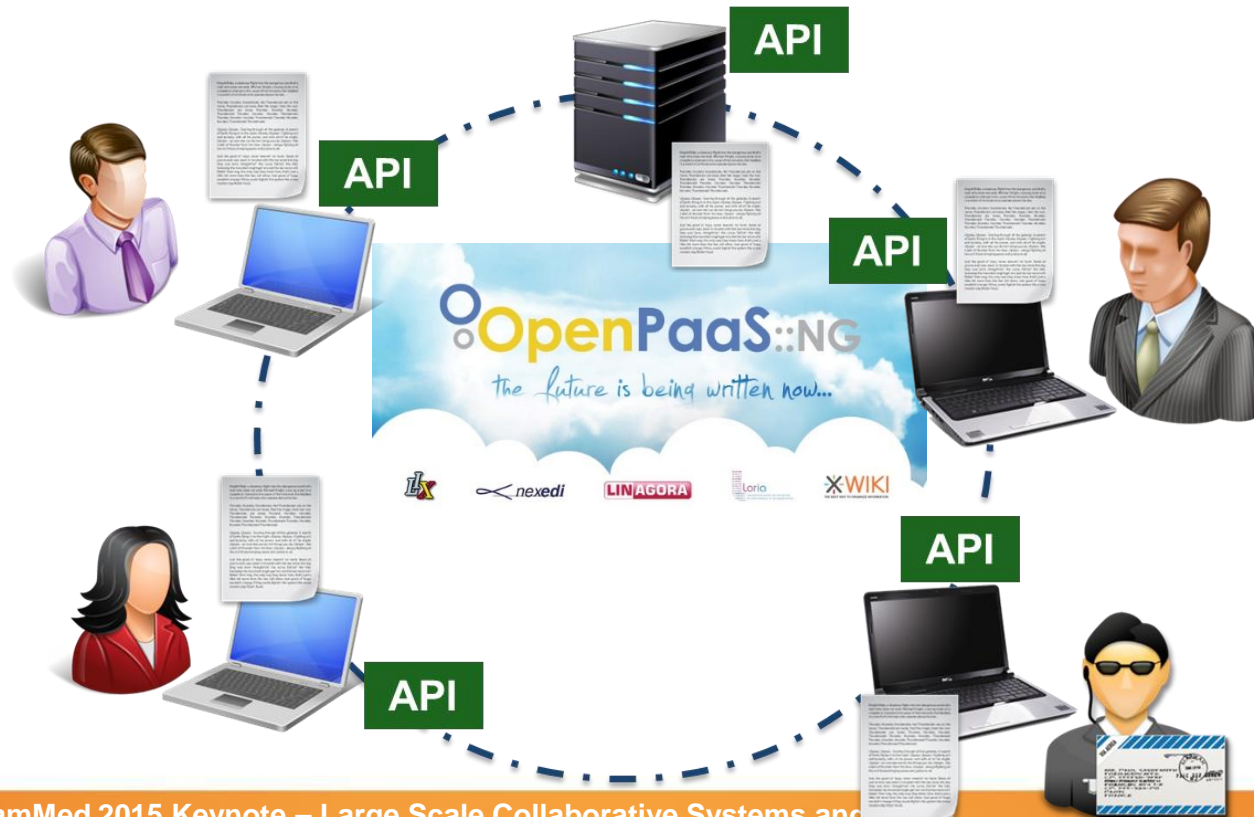


Naive p2p Architecture



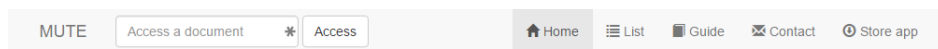
Abstract/Configurable p2p architecture

- Decide of the topology and the contracts



The Mute P2P editor

- Based on CRDT Algorithm (p2p)

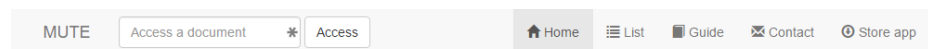
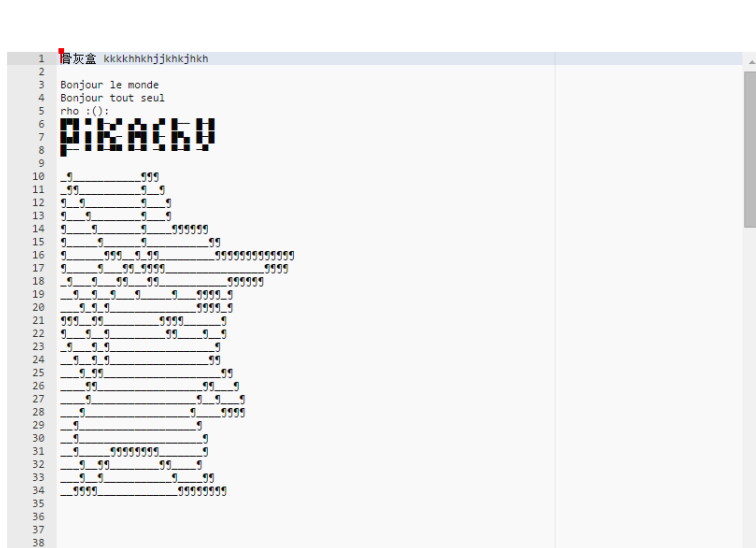


Try MUTE, the Multi-User Text Editor

Switch to history mode

Switch to offline mode

Online!



Try MUTE, the Multi-User Text Editor

Switch to history mode

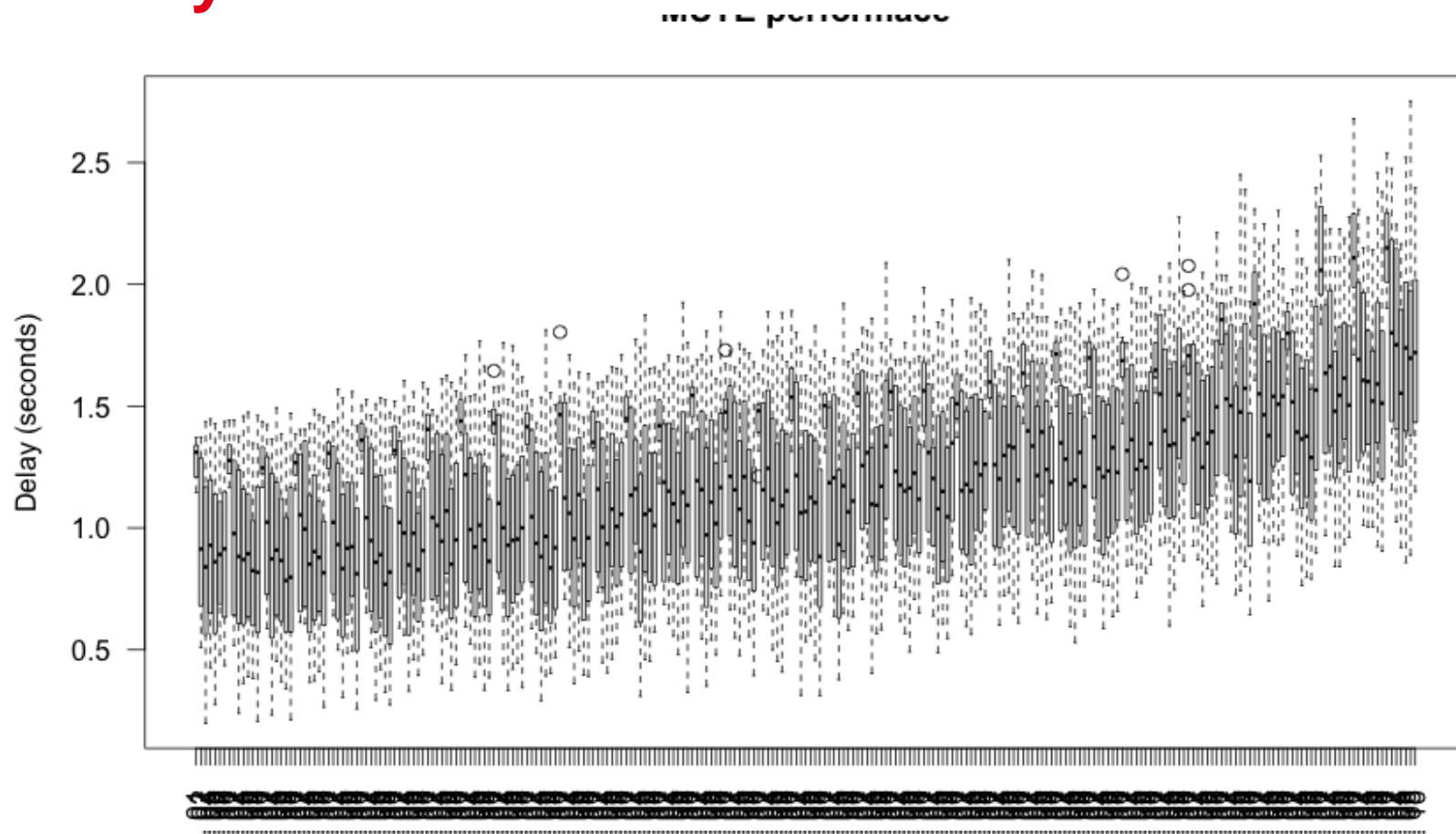
Switch to online mode

Offline!



<http://mute-editorcrdt.rhcloud.com/>

Delays in MUTE

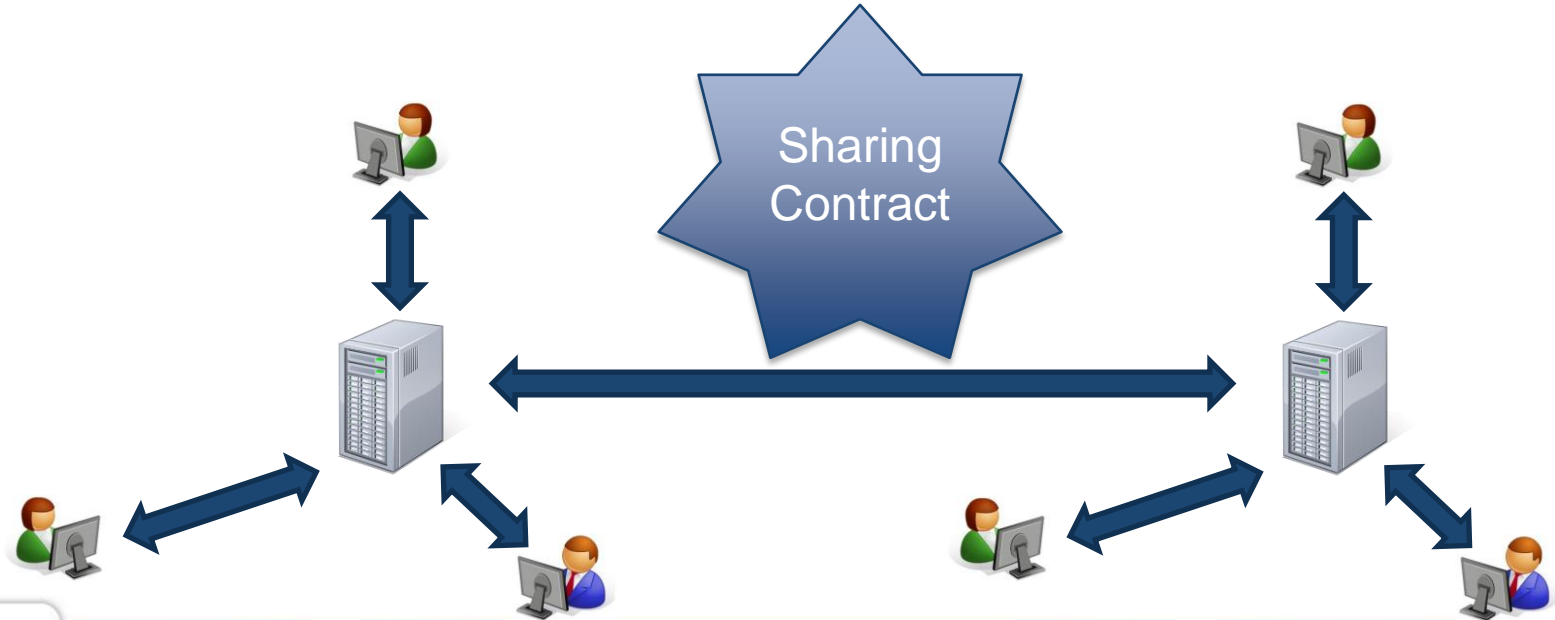


Max. no of users: 50

Typing frequency: 1-10 chars/s

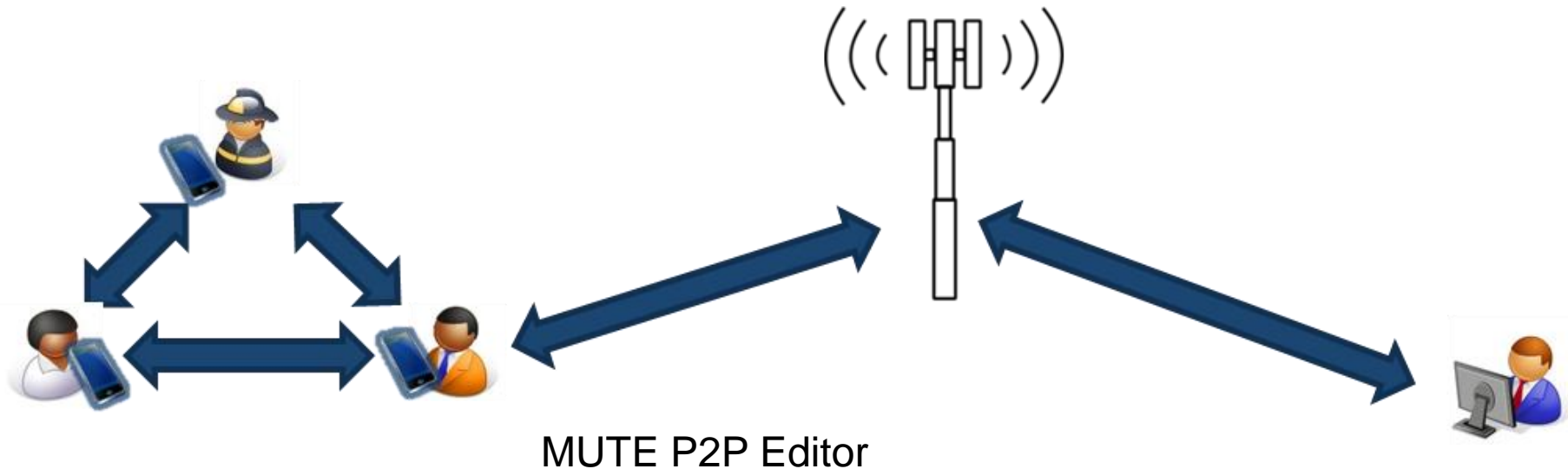
Hybrid collaboration between organisations

- Centralised inside organisations/ p2p between organisations

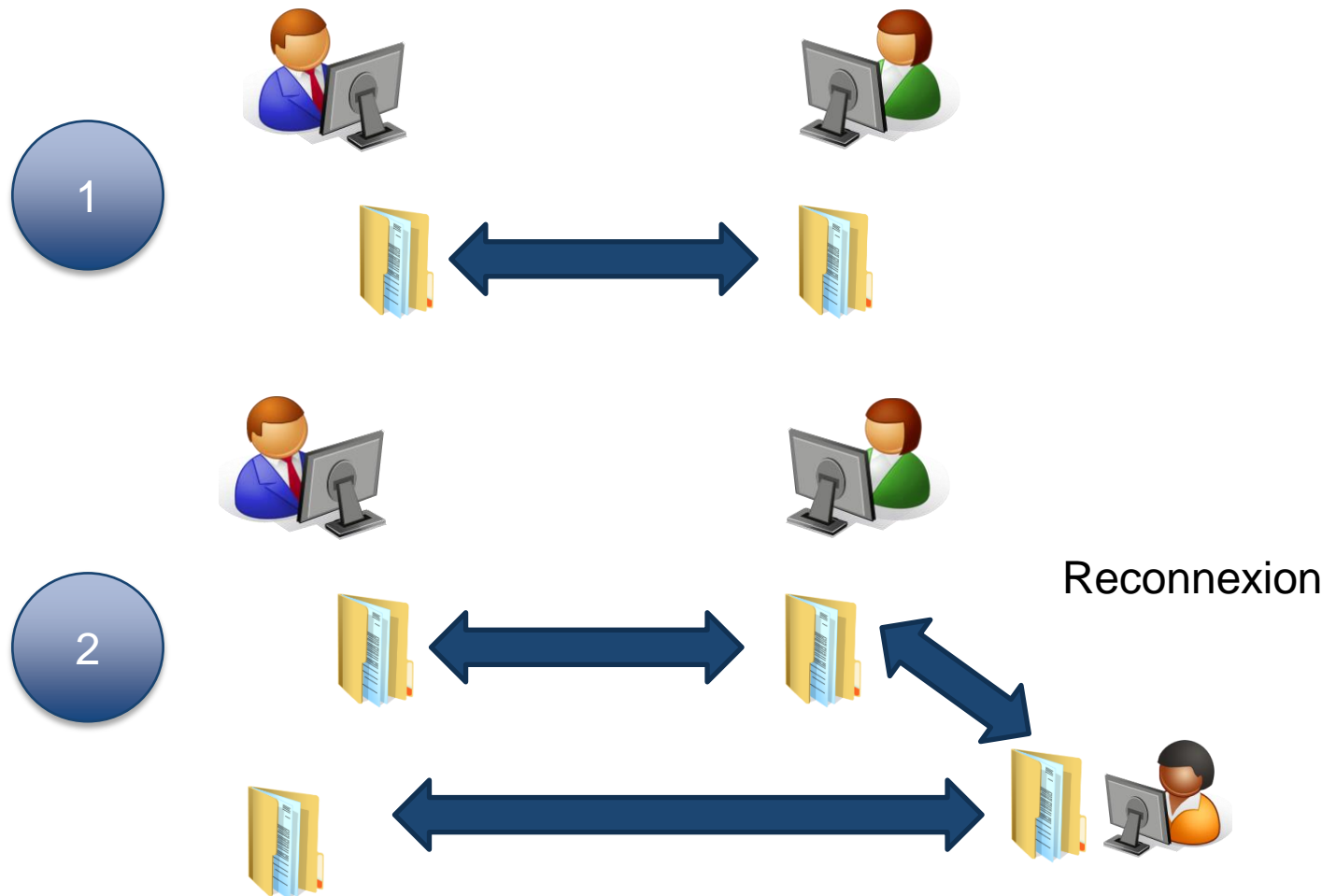


Ad-Hoc collaboration on the field

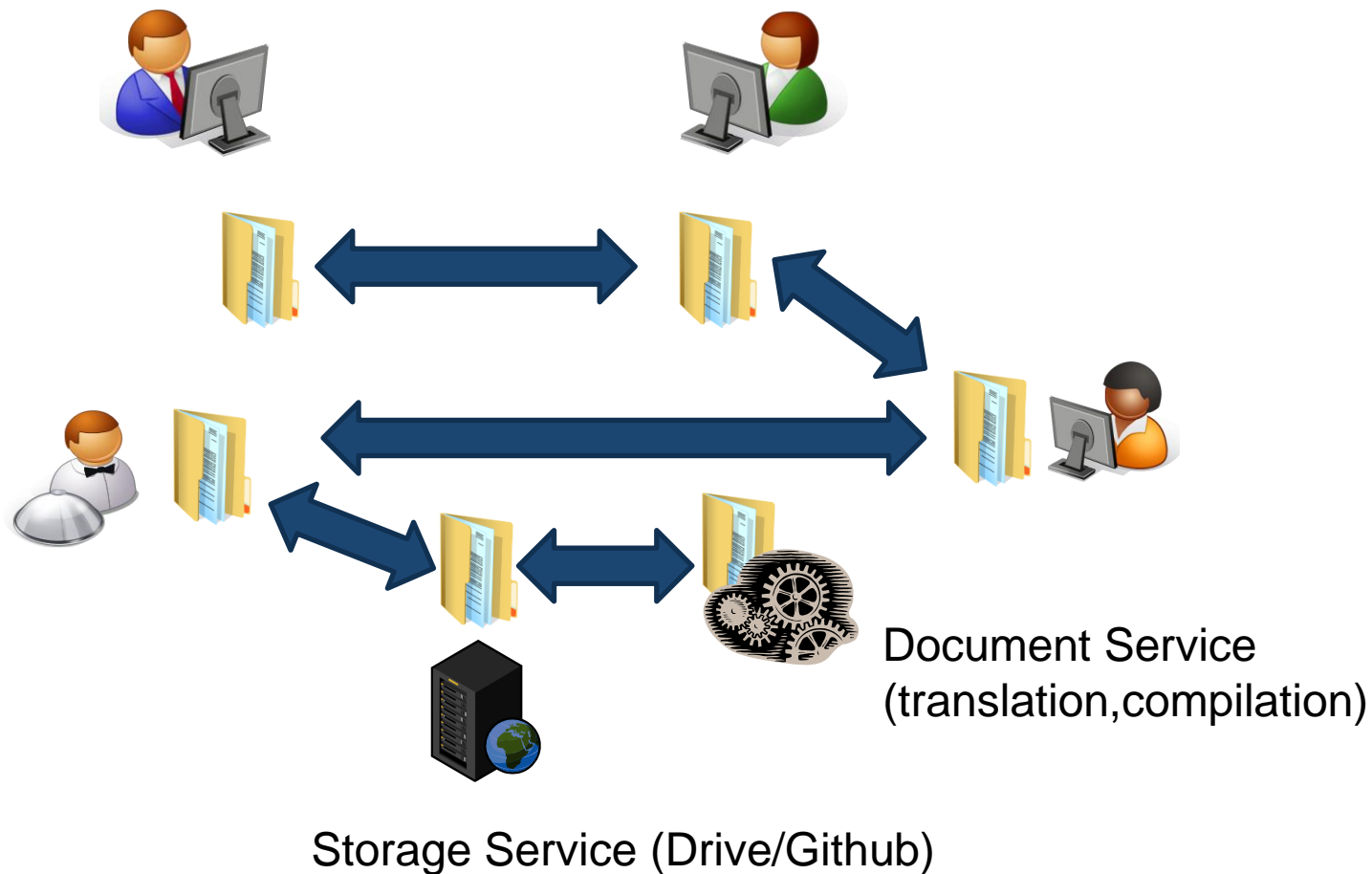
- P2p collaboration between people regardless of organisations



Web based ad-hoc collaboration



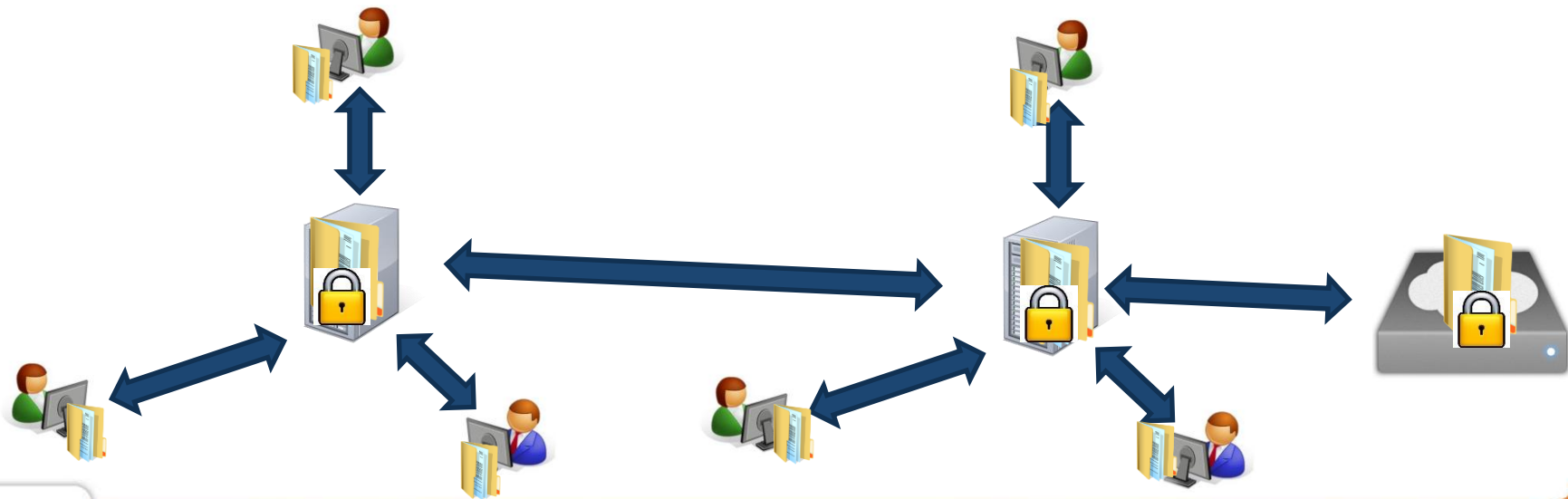
Collaboration Man/Service



Secure distributed collaboration

Future
Work

- Collaboration data can be encrypted and not shared on the cloud (being investigated).
- **Provides guarantees to the participants**

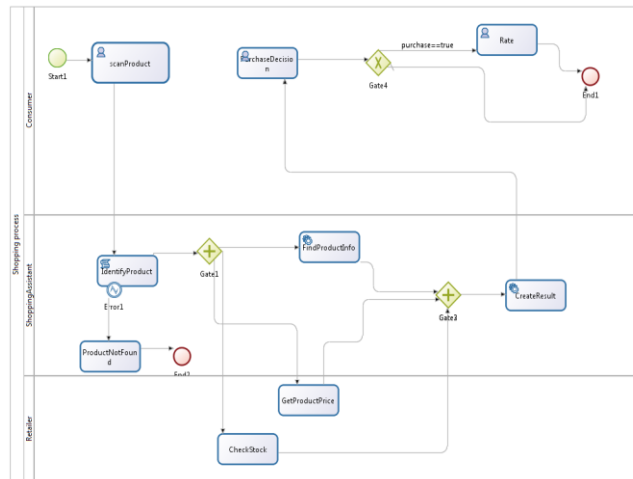


Coordinating actions

- Coordination between organisation is a cornerstone of large scale collaboration.
- Important questions
 - ◻ Who governs the coordination ?
 - ◻ Who owns the process ?
 - ◻ Who design the process ?
 - ◻ Who control the process ?

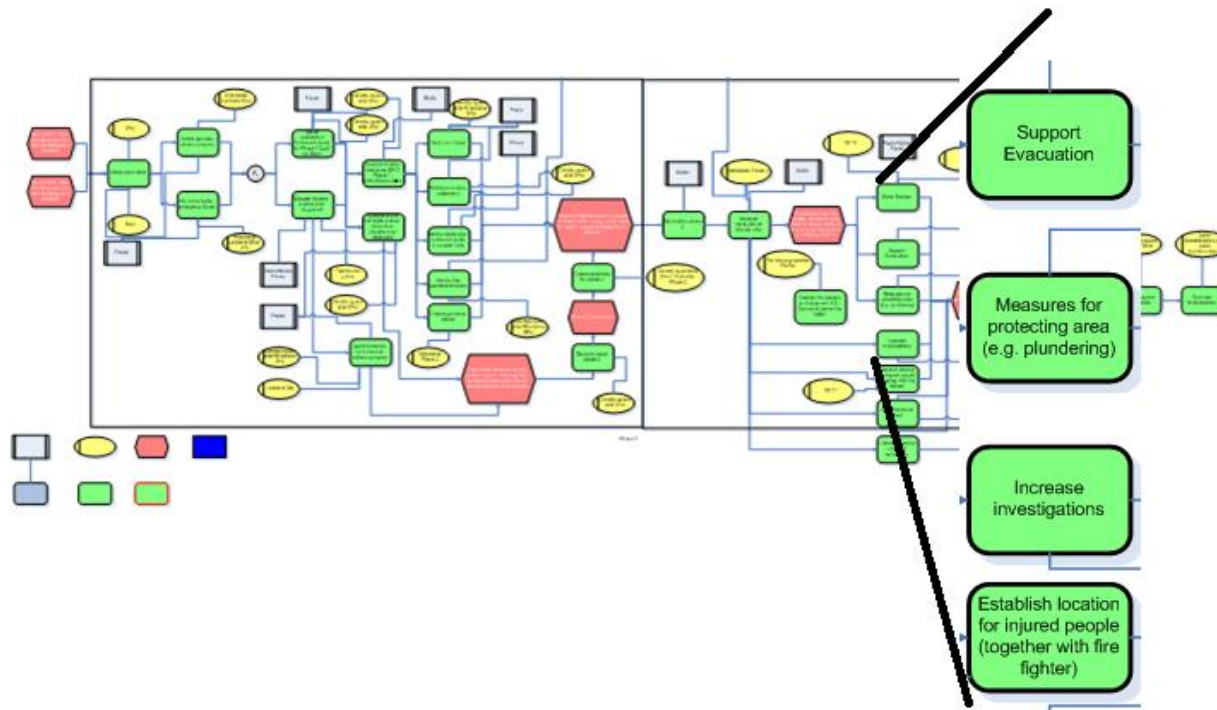
BPM and Crisis Management

- Business Process Management/Workflow Systems have been suggested for emergency management
- do they work for disaster management?



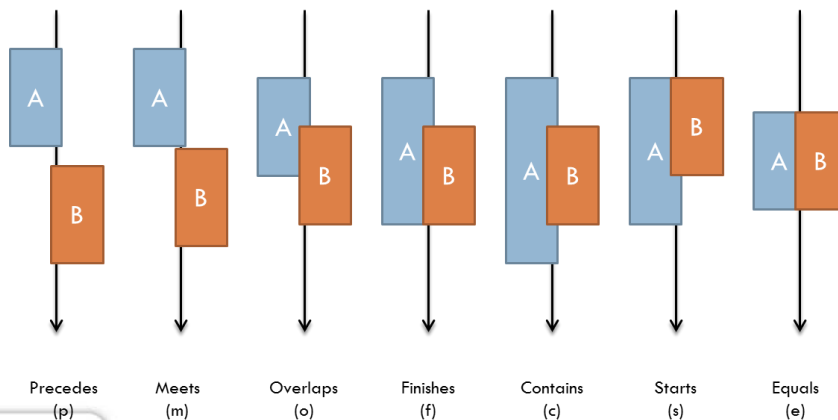
The answer is no/not really/probably not

- Outcome of a workshop with Firefighters



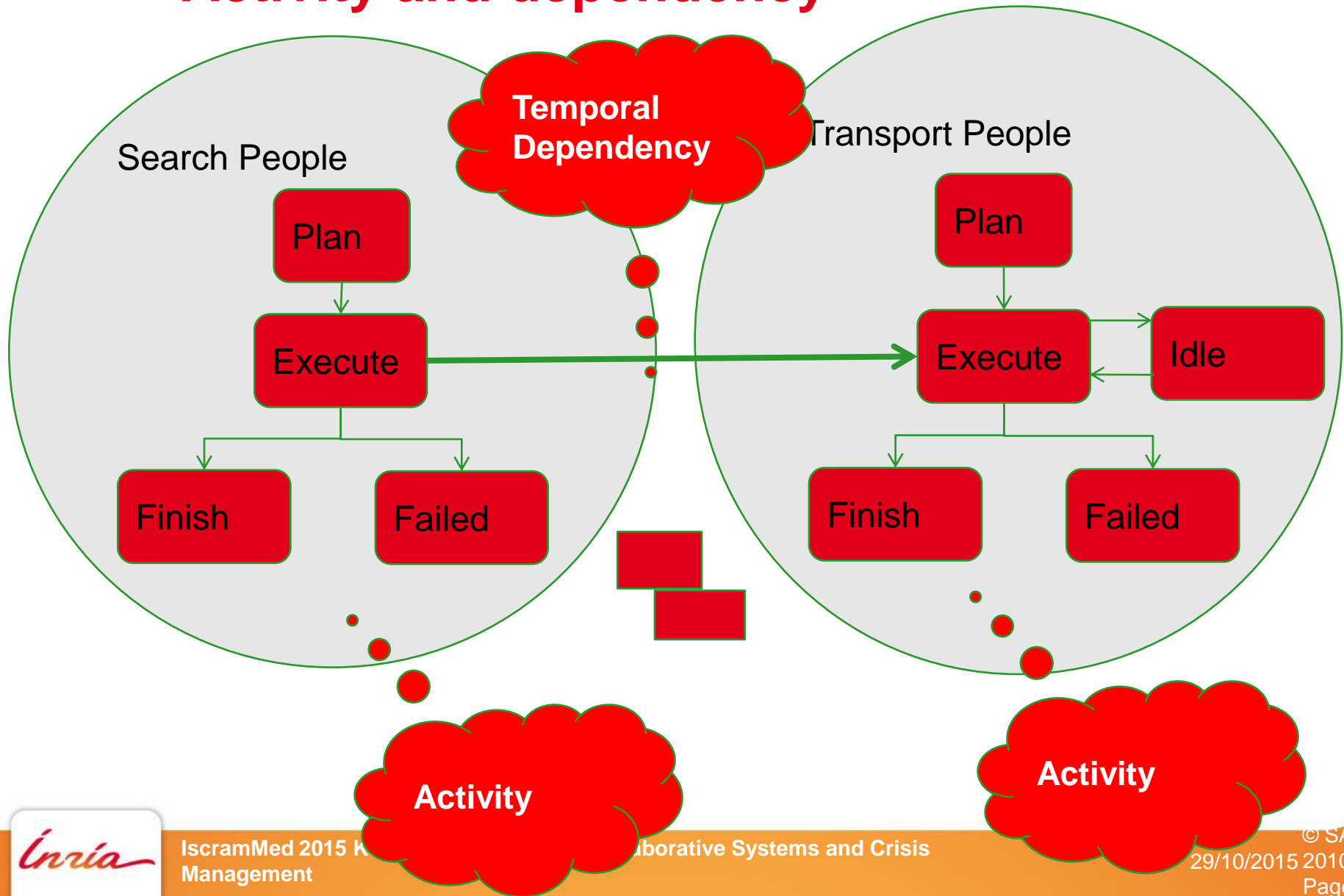
Four principles

- The model has to be dynamic
- Design time = Execution time
- Dependencies requires flexibility
- No one should own all the control

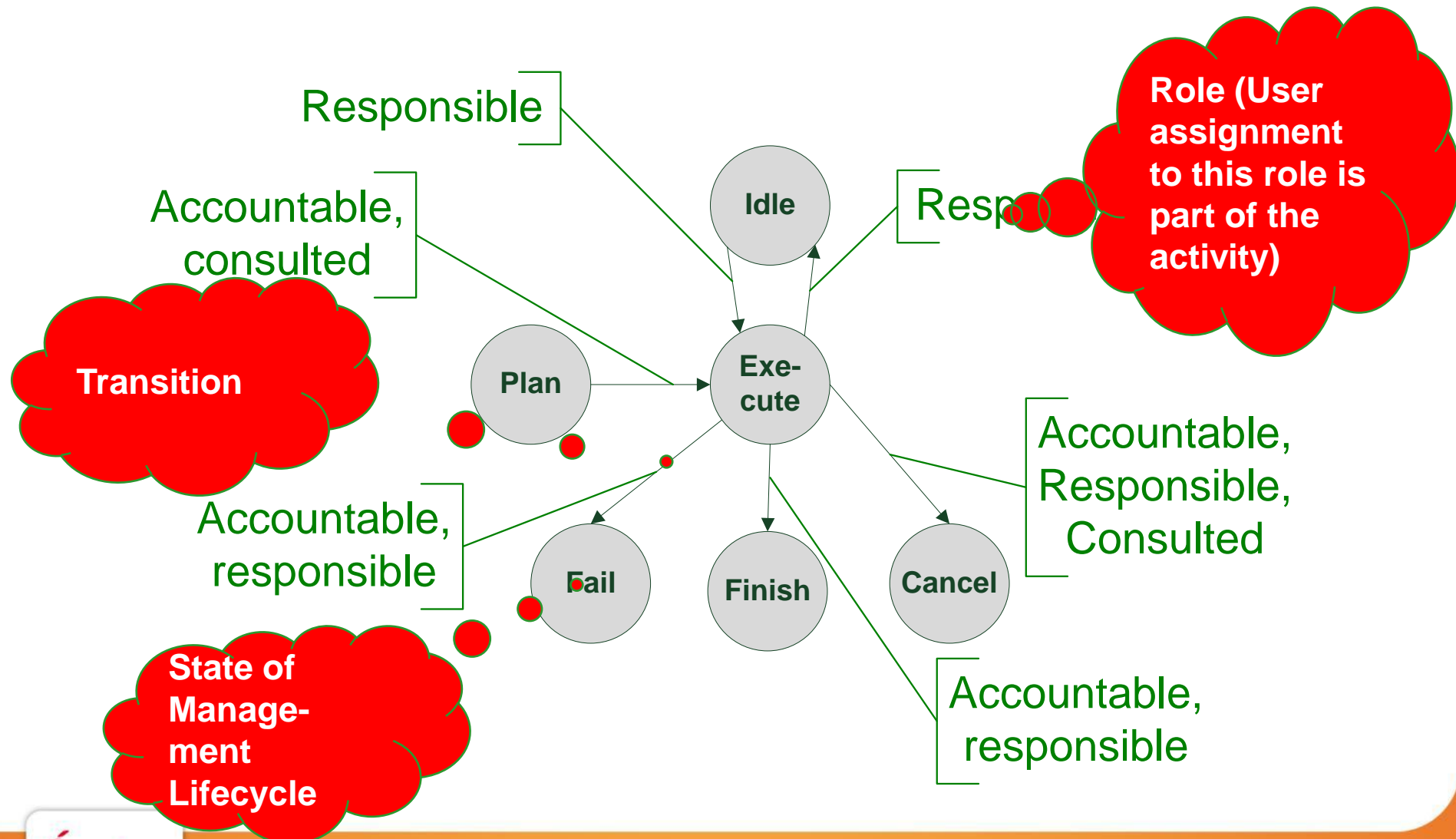


Allen Temporal dependencies

Activity and dependency



Activity and governance



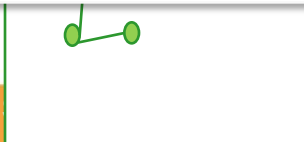
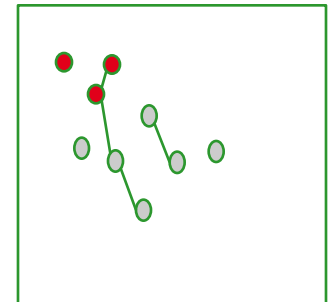
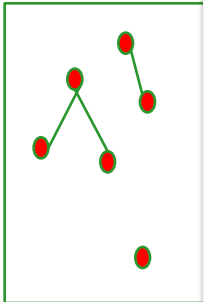
Inter organisational issues



“we are exchanging text information real-time through either cell or mobile units or satellite”

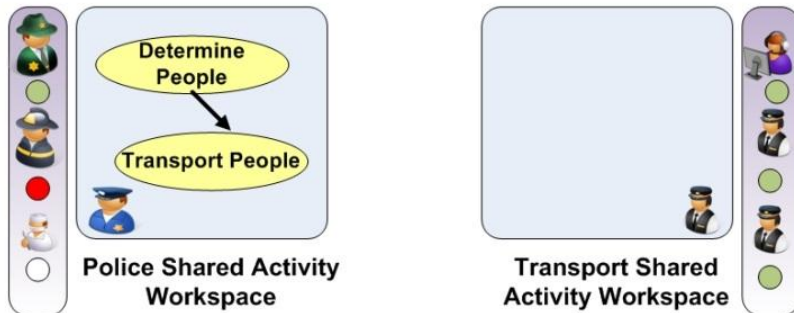
[..]

“obvious the more complex a situation gets, for instance where you may have many organizations working collectively in order to accomplish a goal, but at the same time working independently in terms of their own interests, where you get in those in situation like that, you know it get to the point, to be so complex that it would be overwhelming”

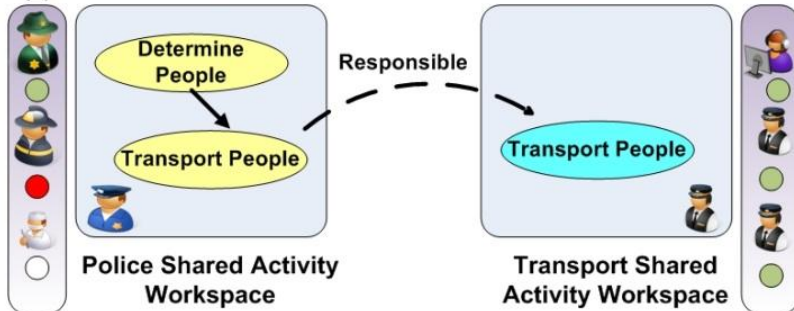


Coordination problem awareness

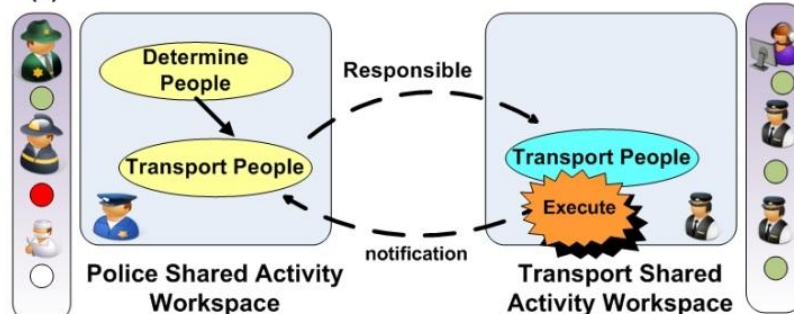
(1)



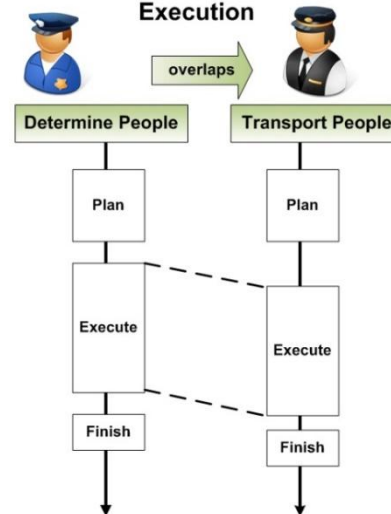
(2)



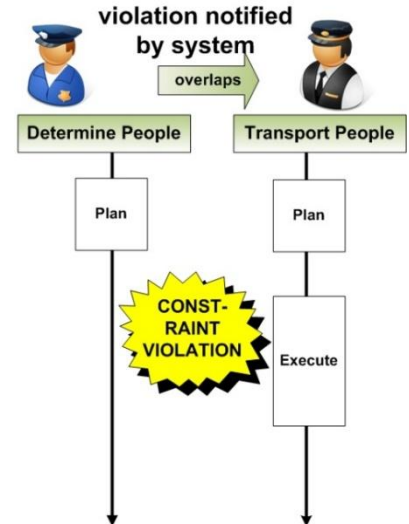
(3)



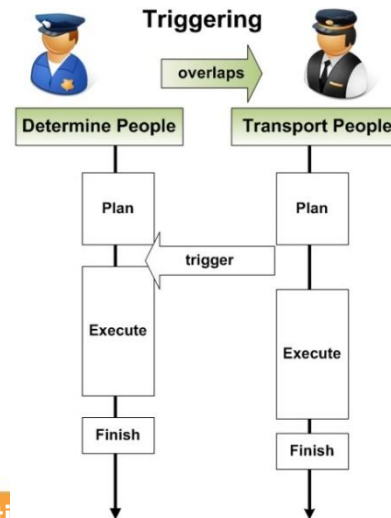
Normal Execution



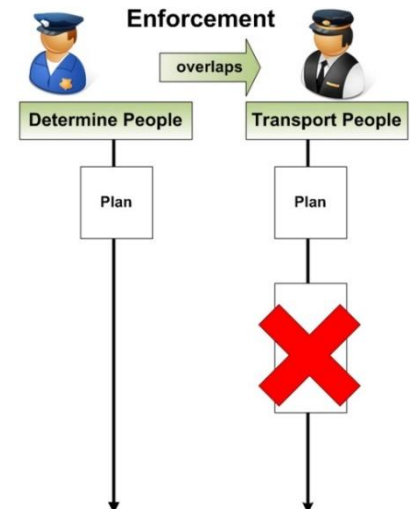
Constraint violation notified by system



Triggering



Enforcement



Implementation on Google Wave

The screenshot displays the Google Wave web interface. At the top, the browser address bar shows the URL: <https://wave.google.com/a/wavesandbox.com/#minimized:search,restored:wave:wavesandbox.com%252Fw%252Bq9d4nRSjA.1>. The interface includes a sidebar with navigation links like 'Inbox', 'All', 'By Me', 'Requests', 'Settings', 'Trash', and 'Spam'. The main content area is titled 'Activity Dashboard' and shows a list of activities. A 'Create Dependency' dialog box is open, allowing the user to define a dependency between two activities. The dialog includes fields for 'Independent Activity' (BuildBlock(2x2, light green)), 'has dependency' (Precedes), and 'Dependent Activity' (TransportBlock(2x2, light green)). It also features a visual diagram showing the flow from the independent activity to the dependent activity, and a text box explaining the dependency: 'Precedes: 'BuildBlock(2x2, light green)' has to enter state (Execute) and leave this state before 'TransportBlock(2x2, light green)''. The dialog has 'OK' and 'Cancel' buttons.

Google Wave will remain in service into 2011. [Learn more](#)

Unstructured | [Debug](#) | [Terms](#) | [Privacy](#) | [Help](#) | [Sign out](#)

Activity Dashboard

Me and UPoMan:

Activity Dashboard

Shared Activities with you

My Managed Activities

New Activity | Publish State Changes | Share Activity

Activity Name	Status
BuildBlock(2x2, light green)	Plan
TransportBlock(2x2, light green)	Init

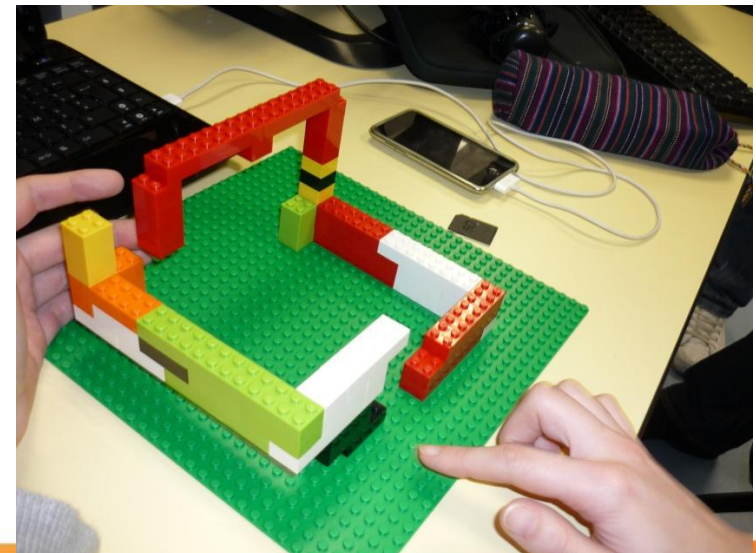
Tags: [modelwave](#)

Next wave →

Search "in:inbox"

Experimentation

- How to validate the model ?
- Crisis are difficult to replicate
- Very few crisis management exercises



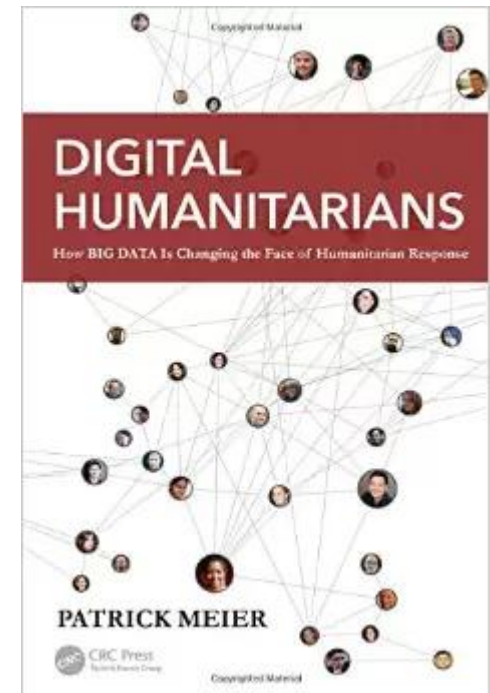
A new partner for crisis management: the citizen

- A challenge for traditional response organisation
- They are the first responders
- They have sophisticated communication tools
- They have volunteers all over the world
- It's simple but it's challenging

International and official recognition

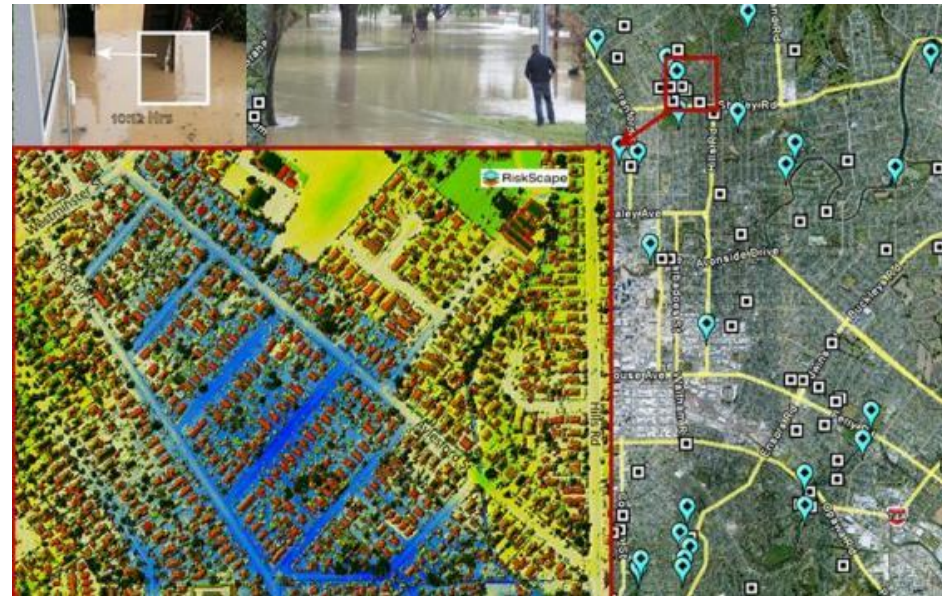
- Since Haiti the role of social media and of digital volunteers is recognised
- Ushahidi
- Digital Humanitarians
- Visov (French organisation)
- ...

But...



Photos help NIWA map Christchurch flood

- Updating a flood map
- Citizen + expert coordination
- Manual execution



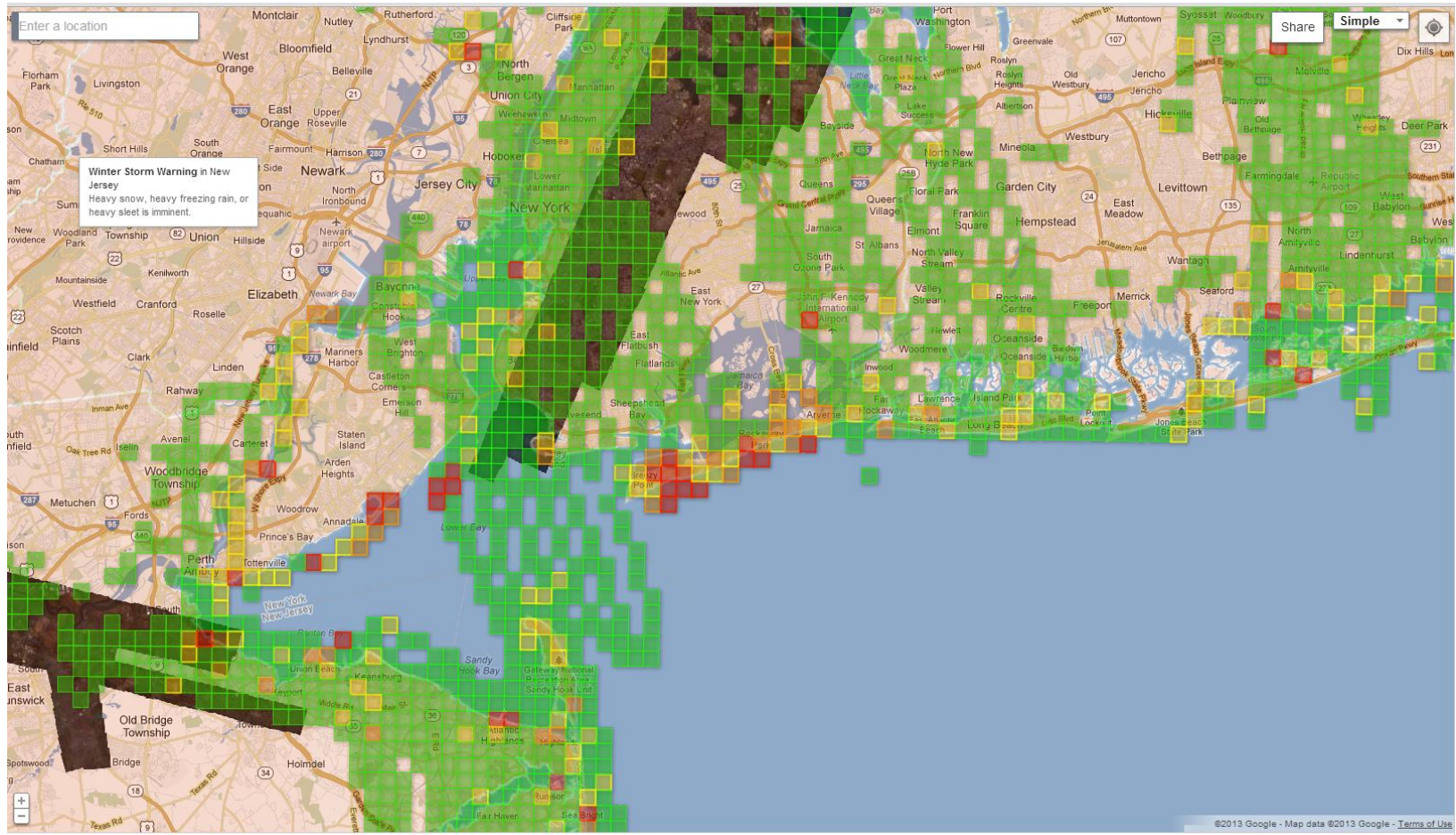
<http://tvnz.co.nz/national-news/photos-christchurch-floods-help-plan-future-video-5870548>

Sandy Damage Assessment

- Crowdsourcing satellite pictures
- Results with short term validity



Sandy Map

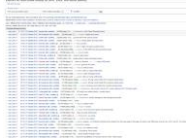


Google Crisis Response - How are you using this map? Tell us - Help

Large scale real time coordination

Unsolicited individual data

Collaborative data



Wikipedia 1500 edit to the main page between the 28 and the 30th of october, not mentioning the talk or the area related pages

Twitter– 35000 geolocalised tweet/day



Flickr – 3000 geolocalised photos/day

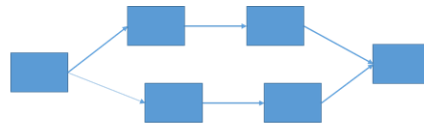


10 photos/s on instagram during sandy



Process

INPUTS



Computers

Crowd

Experts

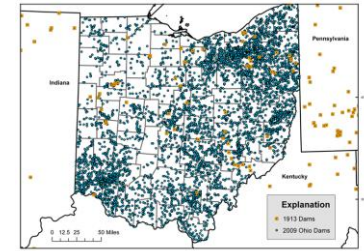
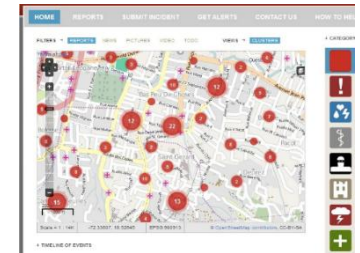
Citizen Sourcing Data



FEMA dedicated app

Dedicated app can receive notification and but used to ask for data


How to make the best use of these resources



The Refugee crisis 2015

- A very tricky kind of crisis
- Affect international relationships
- Difficult agreement on the response






Christinchen @christl_vd_post · 5m
RT @AIWS6 at the moment no #refugees from #Bapska walk direction #Opatovac. But maybe later... TAKE CARE on streets!

AIWS @AIWS6


@christl_vd_post @musoude oh thanks,didn't see this question. I don't think anyone is walking to Opatovac, they are waiting for buses.




treyci @treytreyyy · 5m
Supporting the most vulnerable shouldn't be a zero sum game. @J_Dijsselbloem support #refugees with additional funds to agreed aid budget

euro topics


What Europe thinks! @eurotopics_en · 5m
In forcing decision by majority, the #EU has opted for division, says @la_stampa ovr.ly/SyIsF #refugees #asylum #quotas





sojournImages @sojournimages · 6m
Hoax Christian #Obama to deport 12 Christian #refugees WHILE Importing 10,000 Militants. #jihad / buff.ly/1iolF2d



★NEWS NOW★ @juergen_p · 7m
Die Germans bräuchten jetzt mehr Fußball und Ami-Serien,damit nicht so viele auf die Straße gehen...#BrotUndSpiele #Pegida #Refugees #Dresden

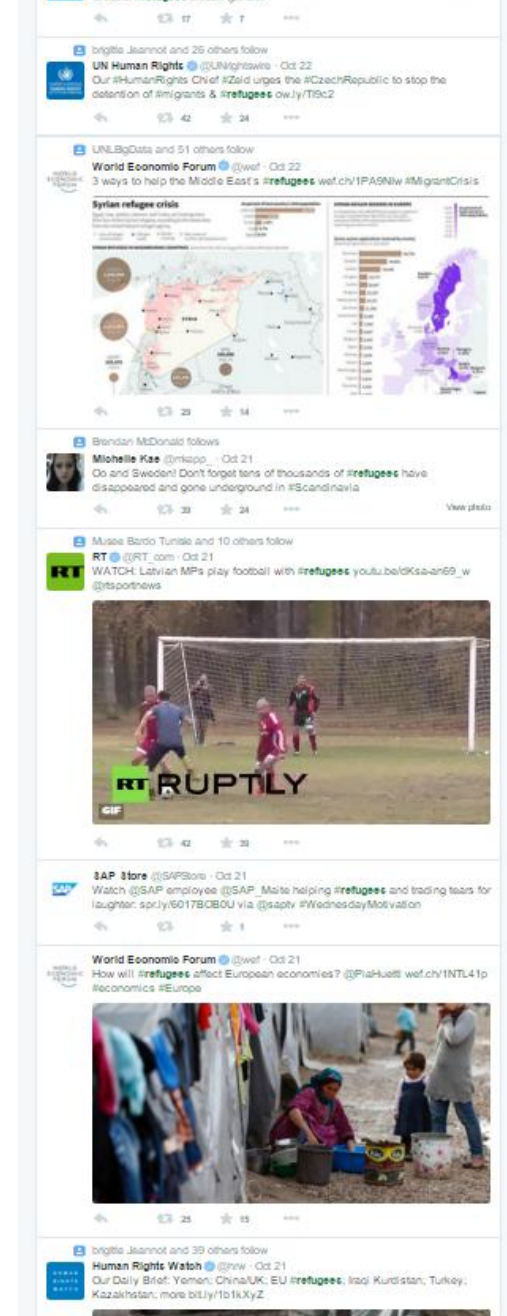
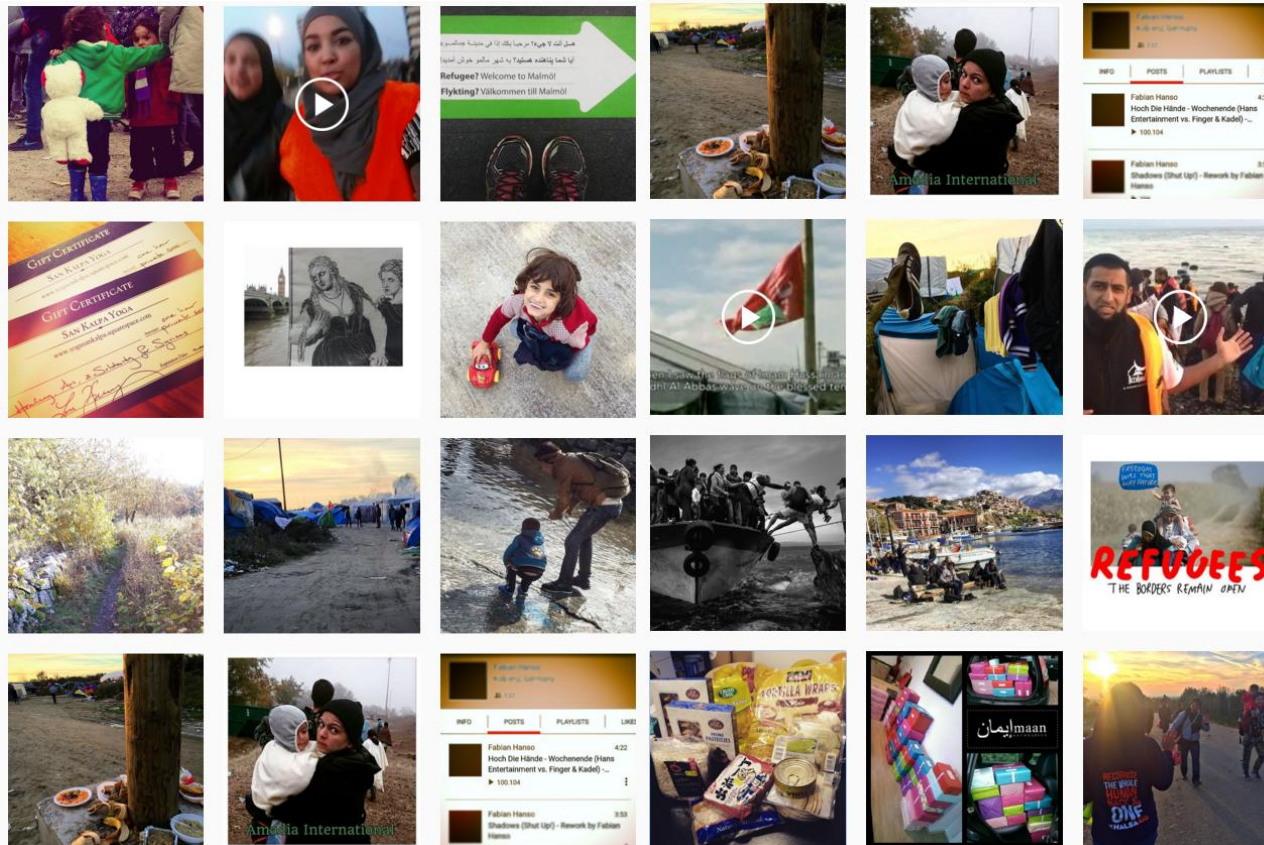


Lucy Westcott @lvzwestcott · 7m
Stepped inside this booth today at the UN and spoke with 3 #refugees living in @ZaatariCamp newswk.com/digital-portal...

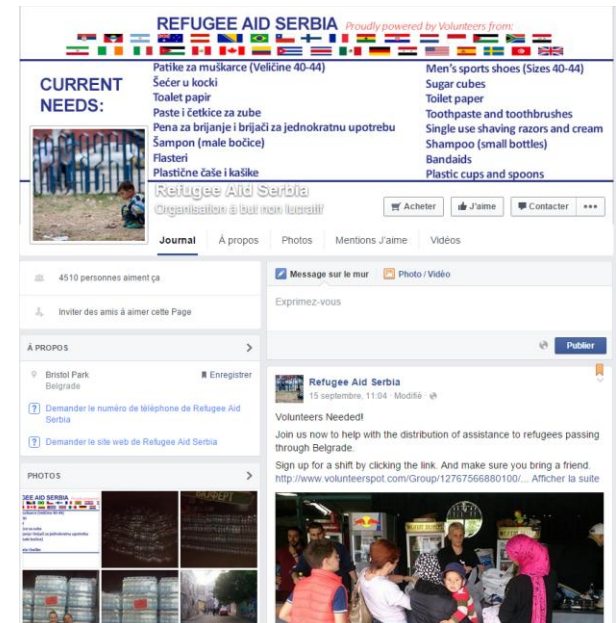
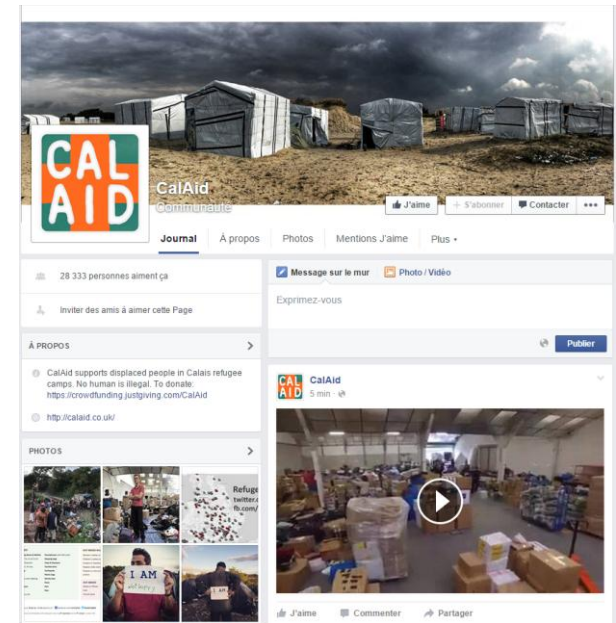
Írta

More recent streams



Citizen initiative

- Citizen create Facebook pages to coordinate
- Different dimensions and scale
- Collect and distribute resources directly




Crowdfunding

- Citizen initiative
- With or without NGO support

Home village for Calais refugees

Construction

Home 7 news 6 comments 344 supporters



About

Hi everybody,

Thanks to all the contributors for helping us to reach and overpass our target of 10 000 €. Don't stop! Go on! Facing the huge needs and work to be done we will, however, never have enough...

The creation of the new day center on the outskirts of the city is related to the willingness to dismantle all the camps, squats and jungles. Thousands of people will become homeless.

€12,786

127 %

committed on a goal of €10,000

Successfully FUNDED

Funded on the 04/19/2015

Creator

COH

Calais

1 created project

[Send a message](#)

Rewards


For €5 or more

Un énorme merci de la part de tout-e-s les bénévoles actuellement sur le terrain ainsi que de la part de toutes les personnes futur pour survivre actuellement et pour qui ces constructions sont indispensables.

A ship for refugees

Be a part of the crowdfunding effort to fund the first rescue campaign of SOS MEDITERRANEE in partnership with Médecins du monde.

Home 8 news 95 comments 2326 supporters



new goal : 200 000 € !

BNP Paribas supports this project

As part of its engagement to help support refugees, BNP Paribas has contributed 50 000 euros to this "favorite" project

About

Charities & Citizen Solidarity Humanitarian

Since January 2015, over 100,000 people have risked their lives, leaving off the coast of Libya and crossing the Mediterranean Sea, hoping to find refuge in Europe. According to the OIM (the International Migrations Observatory), more than 2,500 refugees lost their lives in an attempt to reach European shores.

€180,922

180 %

committed on a goal of €100,000

33 days left

Contribute

starting at €1

Payment secure

Creator

SOS Méditerranée

Marseille, Berlin

1 created project

[Send a message](#)

Choose your rewards

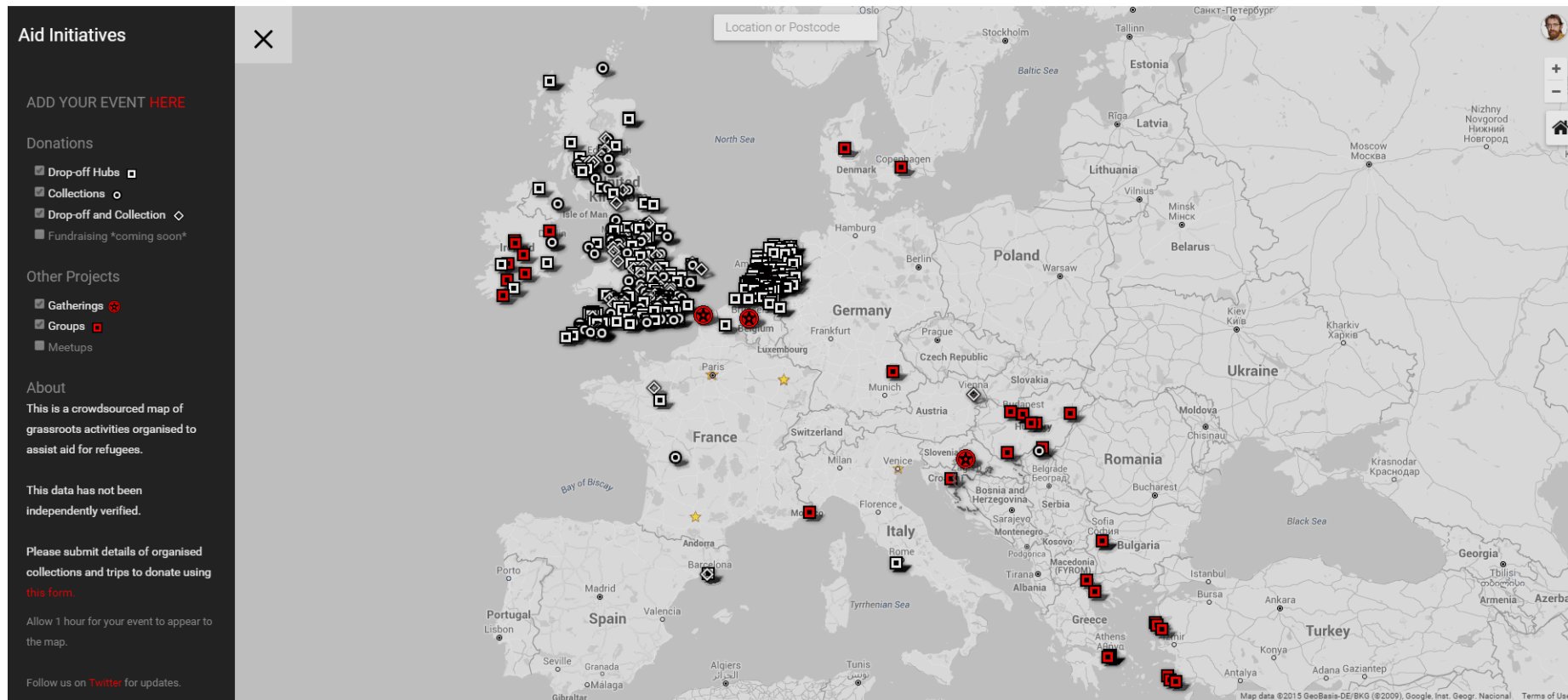
For €1 or more

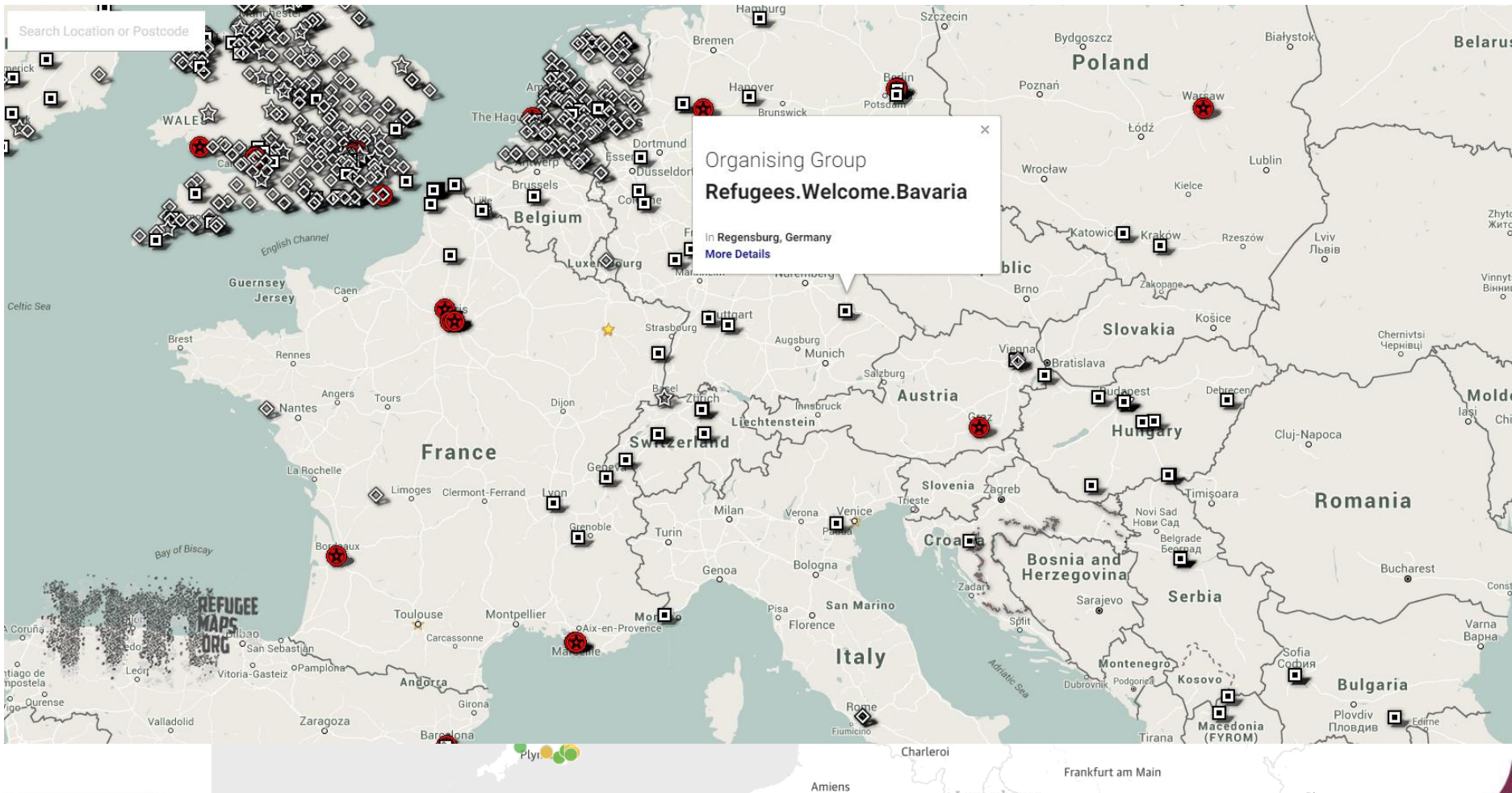
You will be registered for our mailing list, to receive our «Situation Reports». The report is regularly updated by our teams.

This will keep you updated on our operations, as well as the general situation of refugees crossing the Mediterranean Sea.

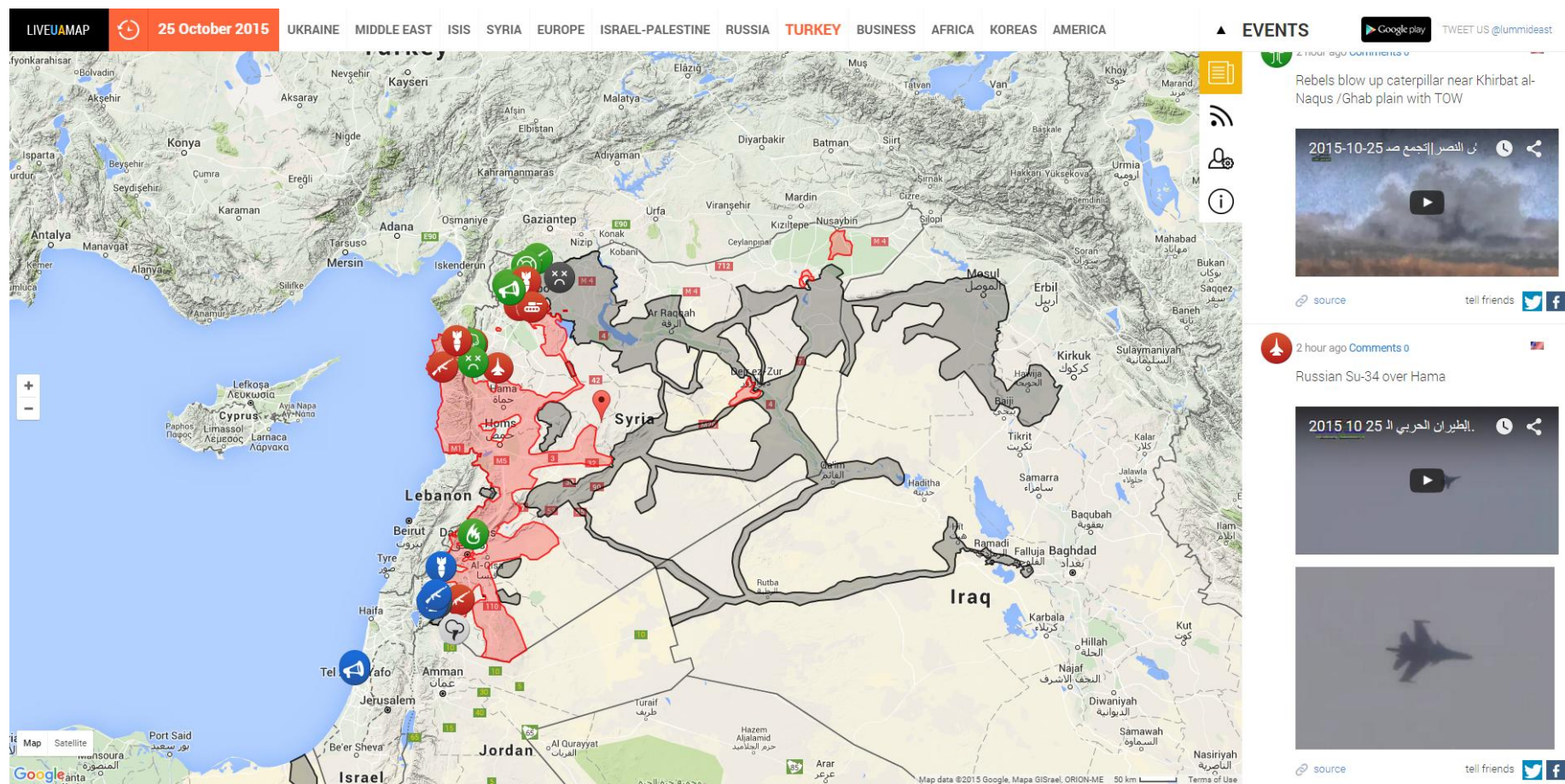
Mapping information about aid initiatives

Mapping Information Network for Refugee Support / where to donate, local groups and other useful info.

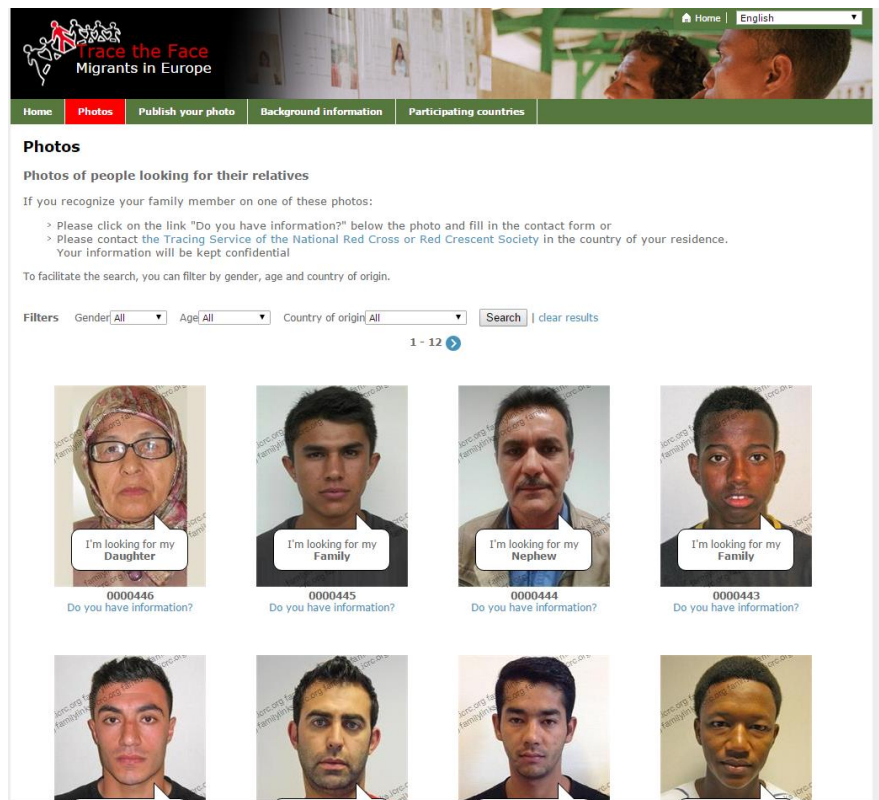




Mapping of events in Syria



Official vs citizen initiative



Airbnb for refugees

STAYCALM

Vous avez le statut de réfugié ?
Vous cherchez un logement ?

Vous cherchez une solution de logement pour quelques jours, quelques semaines ou quelques mois ? Et surtout, vous cherchez une expérience humaine qui va vous permettre de vous familiariser avec la France?

Inscrivez-vous ci-dessous et nous essaierons de vous trouver un logement qui vous donnera le sentiment d'être comme à la maison.

Inscription

BE CALM

Vous avez une chambre de libre dans votre appartement ?
Hébergez un réfugié !

Rejoignez un réseau unique de citoyens qui s'engagent pour l'hébergement des réfugiés et surtout pour une meilleure inclusion socio-professionnelle des personnes qui fuient la persécution. CALM n'est pas un simple réseau d'hébergement, c'est une véritable expérience humaine qui doit nous permettre de nous rencontrer et nous enrichir les uns les autres.

SINGA vous accompagnera et formera tout au long de la démarche pour s'assurer que cette expérience humaine soit la plus inoubliable possible.

Inscription

Flüchtlinge Willkommen

Idea Countries Support Concept FAQ Team Press Blog

Germany
We started the project in November 2014 from Berlin. Since then we are working on a new culture of welcome in Germany : www.fluechtlinge-willkommen.de.

Austria
Since January 2015 our sister organization in Austria is working hard on a new culture of welcome : www.fluechtlinge-willkommen.at.

Your country?
At the moment we're supporting groups in more than 20 countries all over the world with setting up "Refugees Welcome" in their country. Here you can have a look if your country is already listed

So far we've matched 176 refugees to shared flats!

Through Refugees Welcome people have moved in to 95 homes in Augsburg, Berlin, Bonn, Darmstadt, Dortmund, Dresden, Frankfurt, Hamburg, Hannover, Konstanz, Leipzig, Marlburg, Munich, Münster, Norderstedt, Offenburg, Stuttgart and Wolfenbüttel. Through Refugees Welcome Austria (our Austrian sister organisation) people have moved in to 61 places in Eisenstadt, Kitzbühel, Salzburg and Vienna. The new flatmates are from Afghanistan, Albania, Nigeria, Bangladesh, Burkina Faso, Cameroon, Eritrea, Gambia, Ghana, Kenya, Liberia, Mali, Niger, Nigeria, India, Iraq, Iran, Pakistan, Russia, Senegal, Somalia, Sri Lanka, Syria, Tunisia and Ukraine.

New challenges for Collaboration in crisis management

- Fast set up of large scale collaborative network
- Coordination at different scales
 - People/Organisations
- Updating and sharing data at a large scale
 - Trust/Privacy issues
- Involvement of people/The crowd

QUESTIONS ?

Credits

- Some slides have been prepared by
 - Jorn Franke (Activity management)
 - Gérald Oster (P2P sharing)
 - Claudia Ignat (Collaborative Editing)