

Christian Reuter

**Emergent Collaboration Infrastructures:
Technology Design for
Inter-Organizational Crisis Management**

List of Figures

List of Figures

Figure 1: Infrastructural layers of technology development activities (Pipek & Wulf, 2009)	4
Figure 2: Work in the control center A and B	5
Figure 3: Group discussions (here: W4)	5
Figure 4: Evaluation of ISAC and MoCo in the control center (2011-2013)	6
Figure 5: Evaluation of MoCo and MoRep in the control center (2012-2013).....	6
Figure 6: Evaluation of ISAC, MoCo and and MoRep in the control center (2011-2013).....	7
Figure 7: Inter-Organizational Collaboration in Crisis Management during a Crisis Training.....	7
Figure 8: Examples of use of social software caused by the volcanic eruption in Iceland	8
Figure 9: Examples of use of social software during the Love Parade disaster in Germany	8
Figure 10: Classification matrix for social software use in crisis management.....	9
Figure 11: Scenarios, requirements and composition functions dependent on v (influencing the possibility of substitution)	9
Figure 12: Technical system architecture.....	10
Figure 13: Inter-Organizational Situation Assessment Client.....	10
Figure 14: Inter-Organizational Information Repository	11
Figure 15: Screenshot of the mobile geo-collaboration system MoCo on tablet (A), the information pool to manage and select information resources (B) and the administration of the collaboration mode (C)	12
Figure 16: Collaboration mode in the browser and on tablet.....	13
Figure 17: Evaluation of MoCo on smartphones, tablets and laptops in the fire department (2012).....	13
Figure 18: Evaluation: using radio and our mobile application on-site (top) and the web browser version in the control center (bottom) (2013).	14
Figure 19: Supporting decision making through mobile semi-structured information requests	15
Figure 20: Main screen.....	15
Figure 21: Localizing the response units.....	15
Figure 22: Request form.....	15
Figure 23: Determining the location	15
Figure 24: Request overview.....	16
Figure 25: Report on request (I).....	16
Figure 26: Target navigation	16
Figure 27: Report on request (II).....	16
Figure 28: See reports	16
Figure 29: Content of report.....	16
Figure 30: Additional text	16
Figure 31: Evaluation of the mobile application in the fire department	17
Figure 32: Virtual and real emergent volunteer groups	17

Figure 33: “warning”, “tornado watch” and “help”: When the help activities begin to shift to the focus, linking external sites increases while the percentage of retweets decreases.	18
Figure 34: Links and retweets: For virtual emergent volunteer groups, help activities are especially then of interest when potential threats have faded away.	18
Figure 35: Screenshot of the prototype with groups, activities, tasks and comments.....	18
Figure 36: Work infrastructure in the control center.....	19
Figure 37: Architecture of the designed technical artifacts for this thesis	20
Figure 38: Inter-Organizational Social Network: activity stream	20
Figure 39: ISAC: profile, contacts, groups, documents	21
Figure 40: Inter-Organizational Situation Assessment Client (2013).....	22
Figure 41: ISAC: Edit marker, show pictures, annotations.....	23
Figure 42: ISAC in 2011, the basis for the interim evaluation	24
Figure 43: Mobile Collaboration App (MoCo)	24
Figure 44: Localizing the response units.....	25
Figure 45: Request form.....	25
Figure 46: Content of the report, here: picture.....	25
Figure 47: See reports	25
Figure 48: Use of ISAC in the control center (2013).....	25
Figure 49: Use of MoCo on-site (2013)	26
Figure 50: Use of MoRep on-site (2013)	26
Figure 51: Novel concepts and artifacts to support emergent collaboration.....	27
Figure 52: Effects of emergent collaboration infrastructures.....	27

2 Related Work

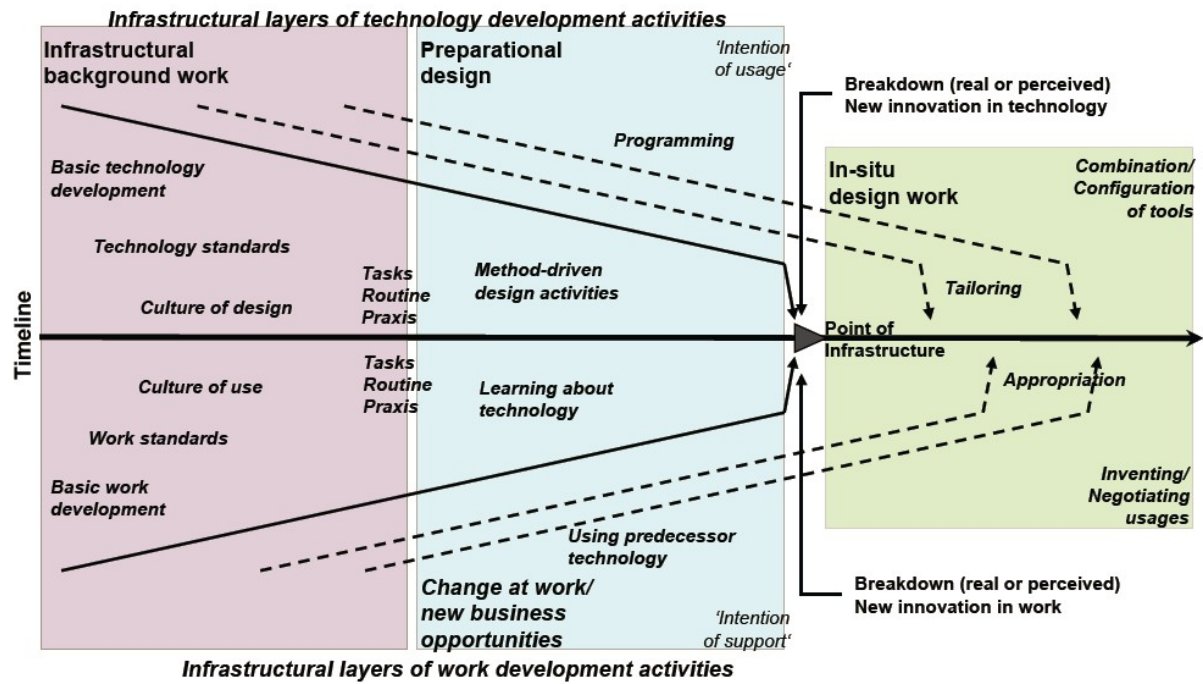


Figure 1: Infrastructural layers of technology development activities (Pipek & Wulf, 2009)

3 Research Design

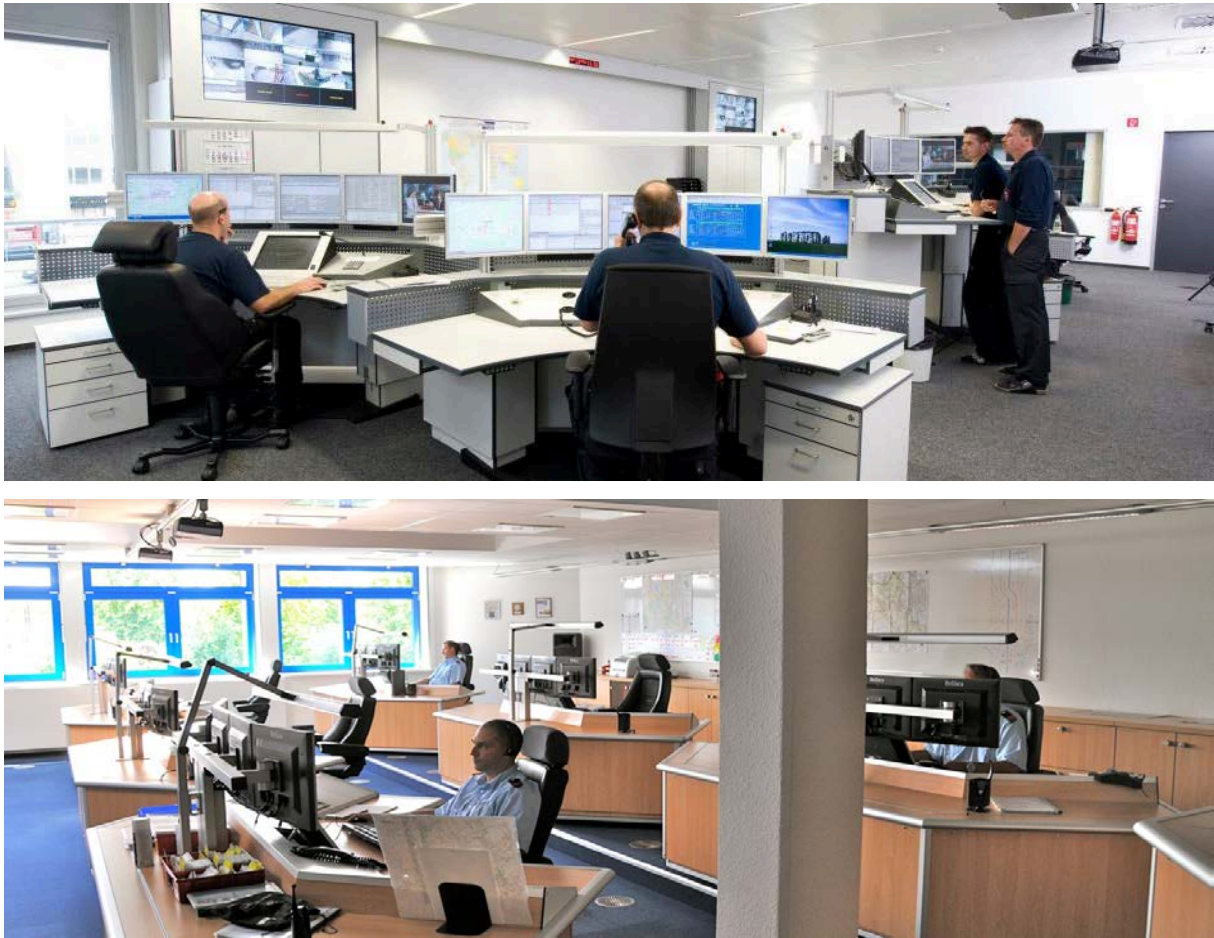


Figure 2: Work in the control center A and B



Figure 3: Group discussions (here: W4)



Figure 4: Evaluation of ISAC and MoCo in the control center (2011-2013)



Figure 5: Evaluation of MoCo and MoRep in the control center (2012-2013)



Figure 6: Evaluation of ISAC, MoCo and MoRep in the control center (2011-2013)



Figure 7: Inter-Organizational Collaboration in Crisis Management during a Crisis Training

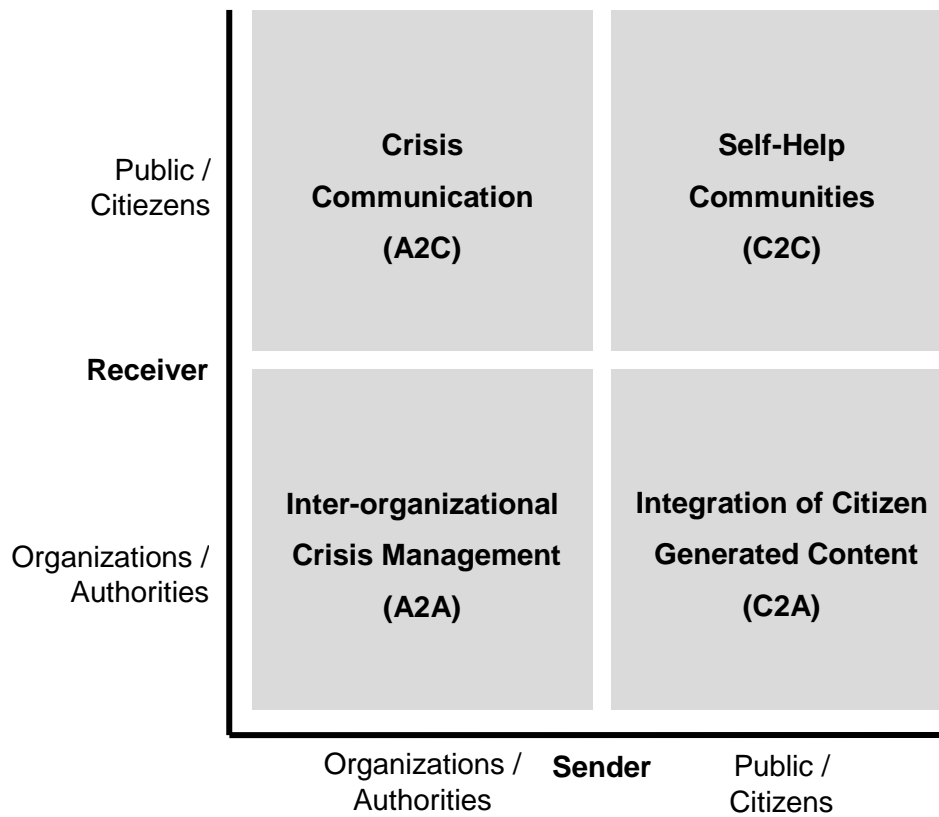
4 Crisis 2.0: Towards a Systematization of Social Software Use (IJISCRAM)



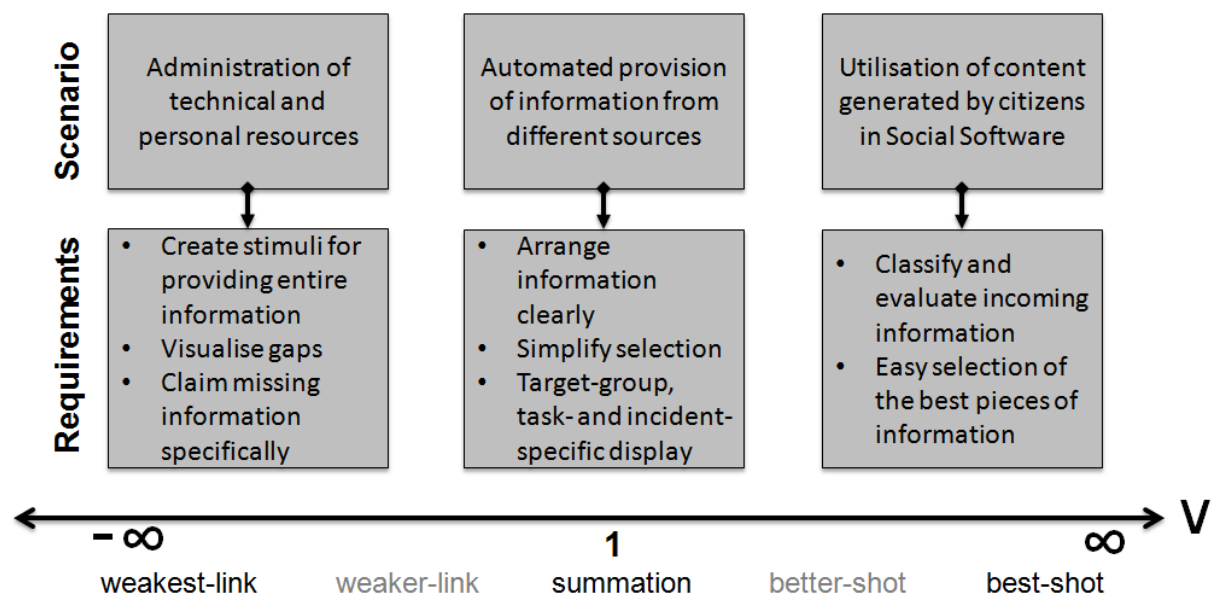
Figure 8: Examples of use of social software caused by the volcanic eruption in Iceland



Figure 9: Examples of use of social software during the Love Parade disaster in Germany

Figure 10: Classification matrix for social software use in crisis management¹

6 Composing Collaborative Information Quality^(IJEV)

Figure 11: Scenarios, requirements and composition functions dependent on v (influencing the possibility of substitution)

¹ Compared to the paper the acronyms (A2C, C2C, C2A, A2A) have been added.

7 Scenario A: Information and Expertise Sharing in Situation Assessment (JCSCW)

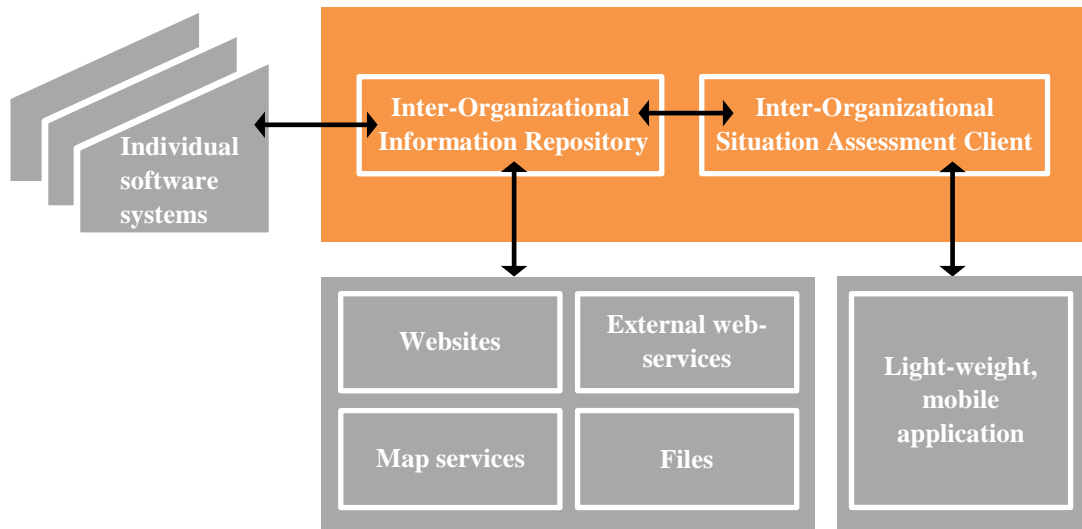


Figure 12: Technical system architecture

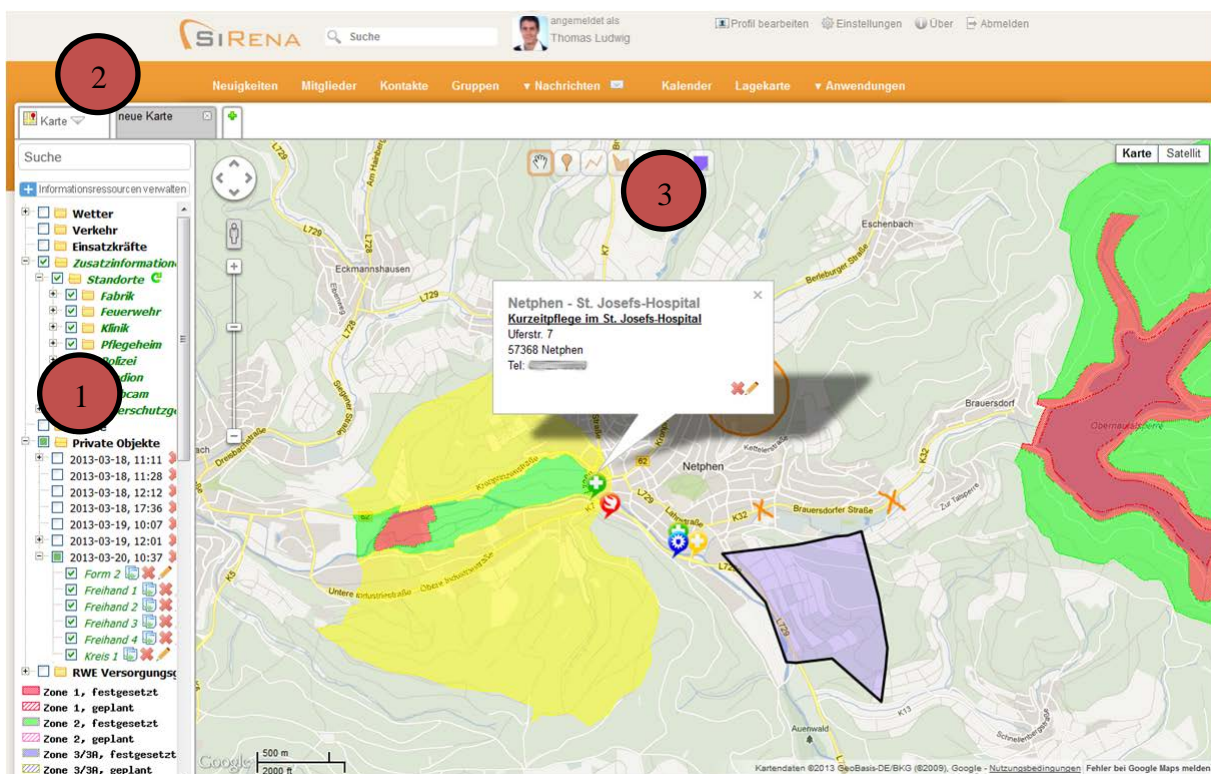


Figure 13: Inter-Organizational Situation Assessment Client

The screenshot displays a web-based interface for an information repository. The top navigation bar includes tabs for 'Neuigkeiten', 'Mitglieder', 'Kontakte', 'Gruppen', 'Nachrichten', 'Kalender', 'Lagekarte', and 'Anwendungen'. Below this, a secondary bar shows filters for 'verwendet', 'von mir', 'Kontakte', 'regional', 'alle', and 'aktueller Kartenausschnitt'. A search bar with the placeholder 'Suchbegriff' is located on the right. On the left, a sidebar lists categories: 'Karte', 'Suche', 'Informationsressourcen', 'Basisinformationen', 'Wetter', 'Verkehr', 'Zusatzinformationen', 'Private', and a date filter for '2013-02-'. The main content area shows a list of information resources with columns for 'Typ', 'Titel', 'Stichworte', 'Änderung', 'Verw.', and 'Optionen'. The list includes items like 'Stromausfallgebiete', 'Standorte', 'Google Verkehr', 'Gebietsinformationen', 'Verkehrsadern NRW', 'Pegelstände', 'Google Wetter', 'Überschwemmungsgebiete', 'Wasserschutzgebiete', 'Hochwassergefährdete Bereiche', 'NRW', 'Karte TK50', 'NRW Karte', 'Wald NRW', 'Freizeitpark Phantasialand', 'NRW Übersicht', and 'Forstamtsgrenzen NRW'. A 'Kategorie vorschlagen' button is at the bottom left of the list.

Typ	Titel	Stichworte	Änderung	Verw.	Optionen
✓	Stromausfallgebiete	Stromausfall	17.01.2013	19	⚙️
✓	Standorte	Standorte, Polizei, Feuerwehr	18.01.2013	16	⚙️
✓	Google Verkehr	Google, Verkehr	16.01.2013	10	⚙️
	Gebietsinformationen	Topographie, Staatsgrenze, Bundesland, Städte, Postleitzahlen, Flüsse, Bahnlinien, Straßen	25.01.2013	8	⚙️
✓	Verkehrsadern NRW	Verkehr	17.01.2013	8	⚙️
	Pegelstände	Pegelstände, Hochwasser	16.01.2013	7	⚙️
✓	Google Wetter	Google, Wetter	16.01.2013	7	⚙️
	Überschwemmungsgebiete	überschwemmungsgebiete, hochwasser	28.01.2013	6	⚙️
✓	Wasserschutzgebiete	Wasser	17.01.2013	5	⚙️
✓	Hochwassergefährdete Bereiche	Hochwasser	16.01.2013	5	⚙️
	NRW	NRW-Karte	12.03.2013	4	⚙️
	Karte TK50	TK50, Karte	17.01.2013	4	⚙️
✓	NRW Karte	NRW	17.01.2013	4	⚙️
✓	Wald NRW	Wald	17.01.2013	4	⚙️
	Freizeitpark Phantasialand	Phantasialand	04.03.2013	3	⚙️
	NRW Übersicht	NRW	28.01.2013	3	⚙️
✓	Forstamtsgrenzen NRW	Forst	16.01.2013	3	⚙️

Figure 14: Inter-Organizational Information Repository

8 Scenario B: Ad Hoc Participation in Mobile Collaboration^(TOCHI)

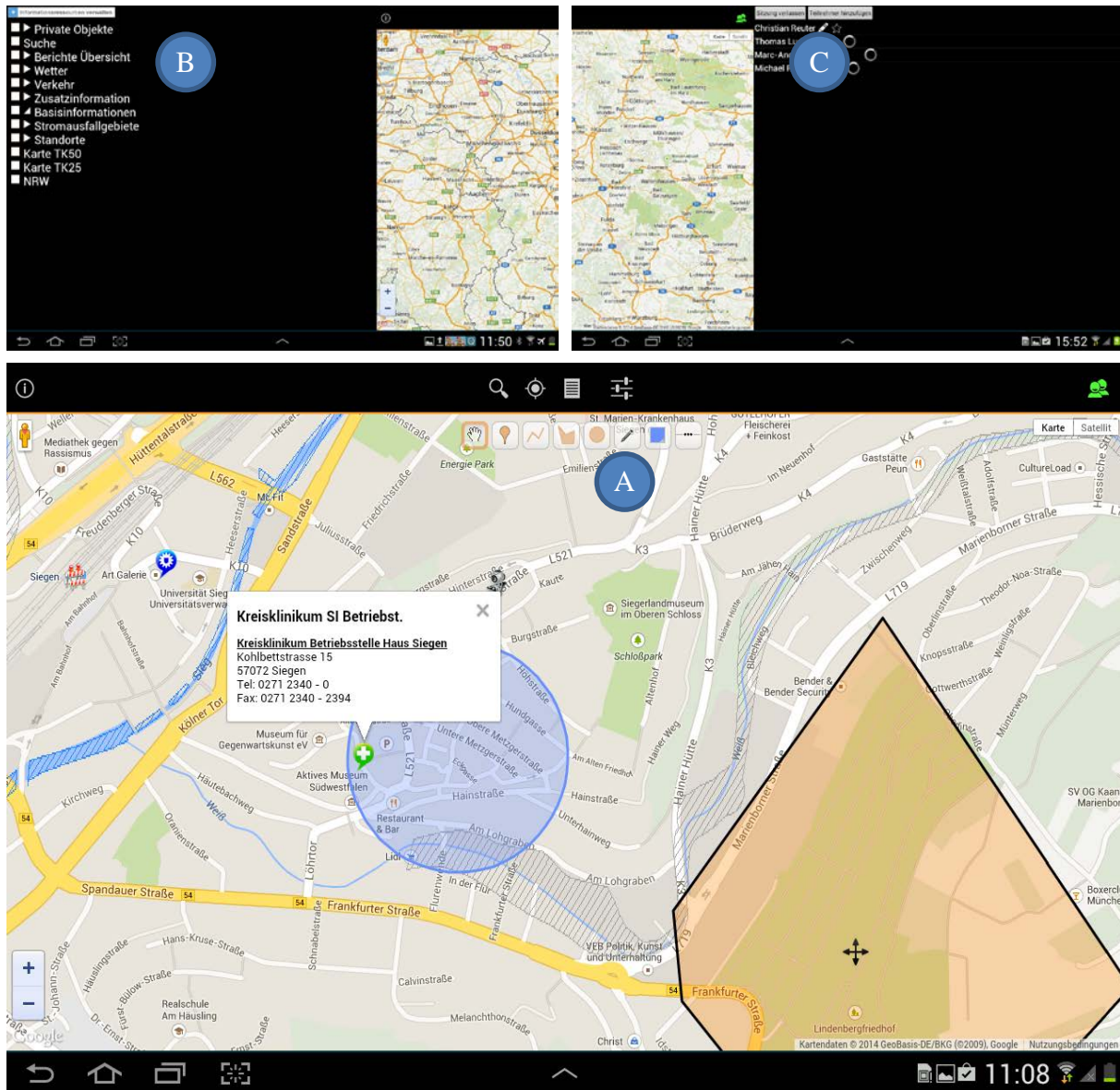


Figure 15: Screenshot of the mobile geo-collaboration system MoCo on tablet (A), the information pool to manage and select information resources (B) and the administration of the collaboration mode (C)

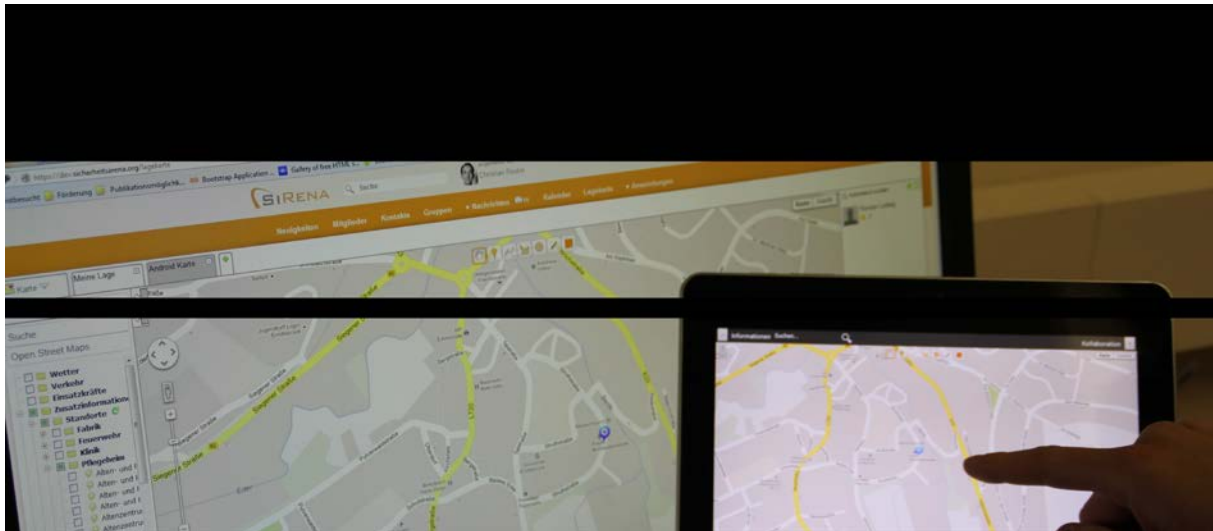


Figure 16: Collaboration mode in the browser and on tablet

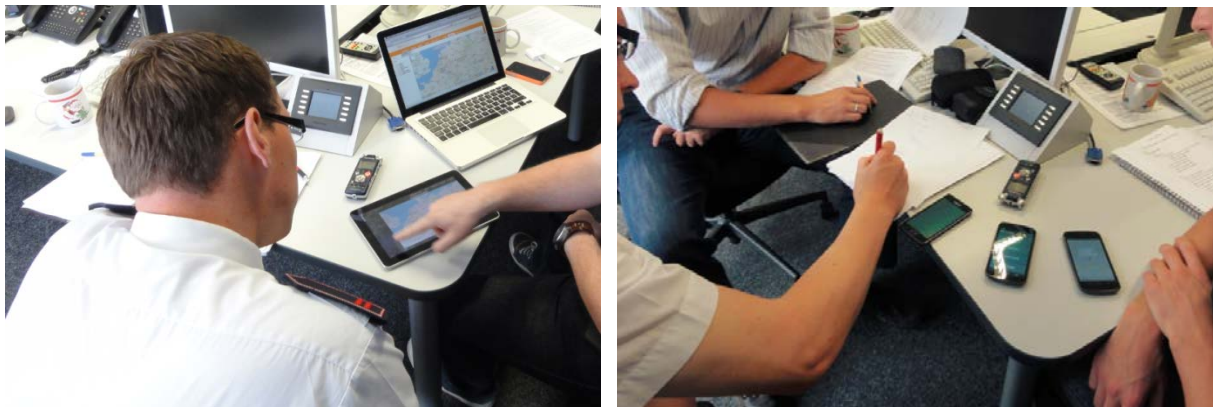


Figure 17: Evaluation of MoCo on smartphones, tablets and laptops in the fire department (2012)



Figure 18: Evaluation: using radio and our mobile application on-site (top) and the web browser version in the control center (bottom) (2013).

9 Scenario C: Articulation Work in Mobile Reporting (ECSCW)

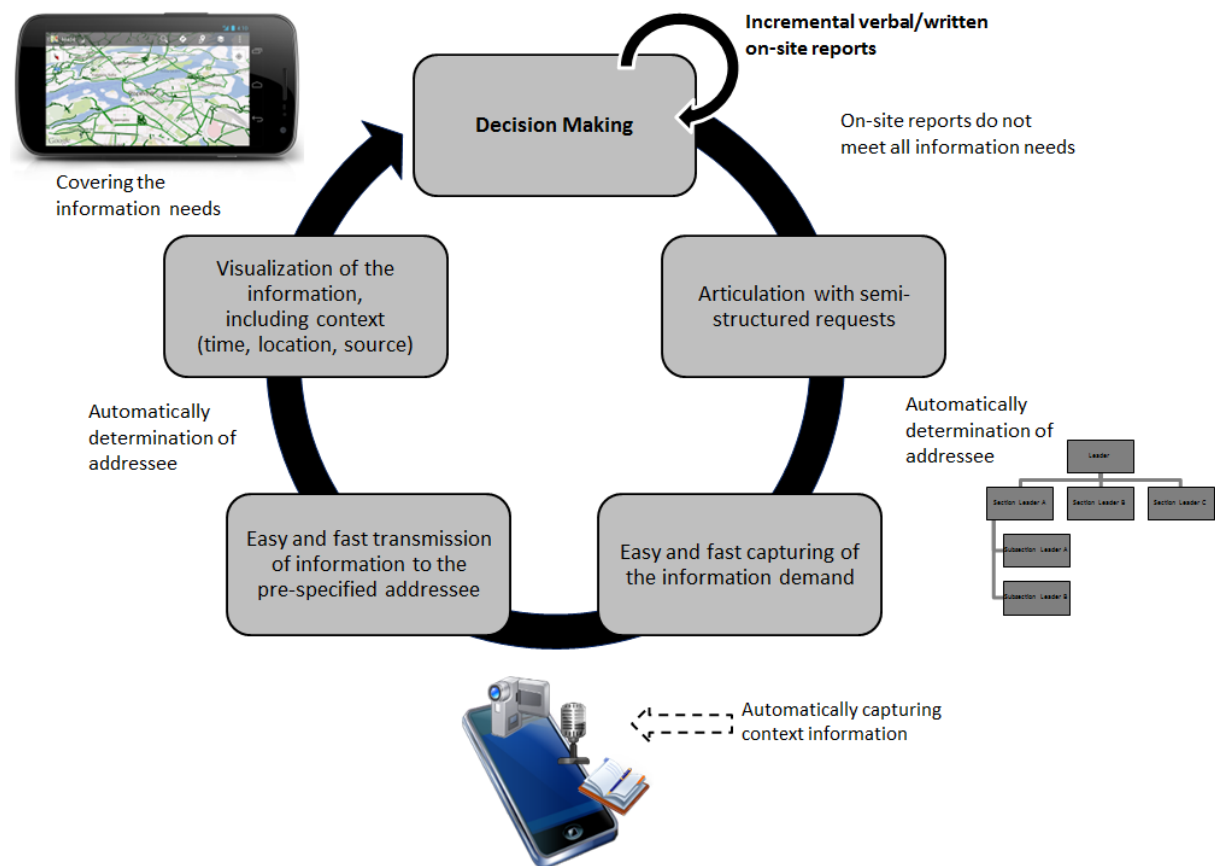


Figure 19: Supporting decision making through mobile semi-structured information requests

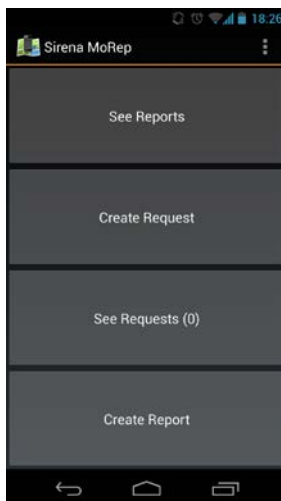


Figure 20: Main screen

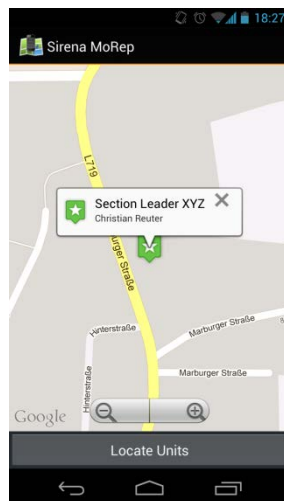


Figure 21: Localizing the response units

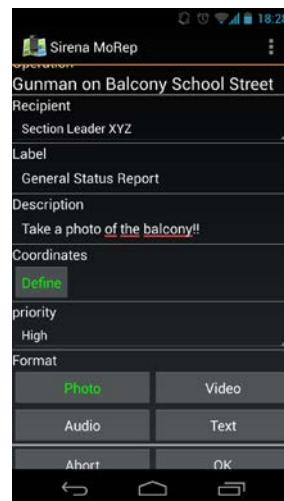


Figure 22: Request form

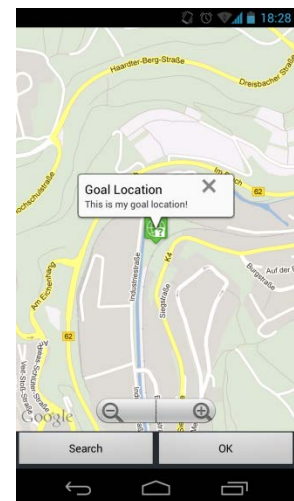


Figure 23: Determining the location

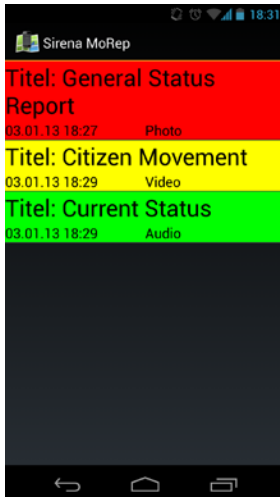


Figure 24: Request overview



Figure 25: Report on request (I)

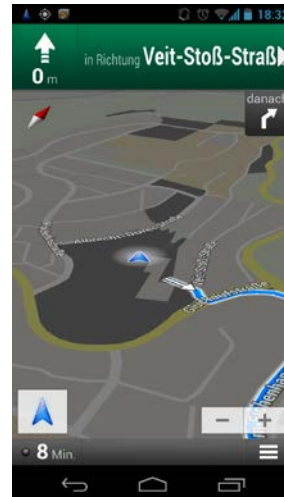


Figure 26: Target navigation

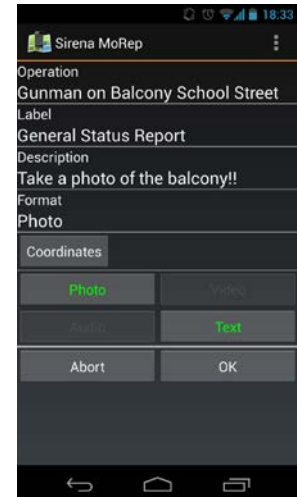


Figure 27: Report on request (II)

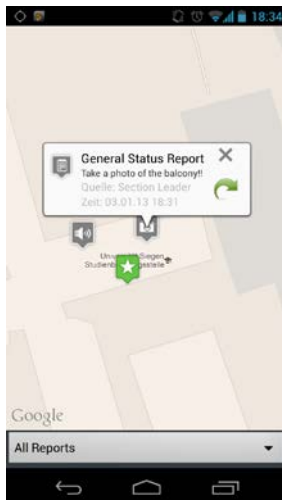


Figure 28: See reports



Figure 29: Content of report



Figure 30: Additional text



Figure 31: Evaluation of the mobile application in the fire department

10 Perspective: Integrating Real and Virtual Emergent Volunteers^(ISCRAM/WI)

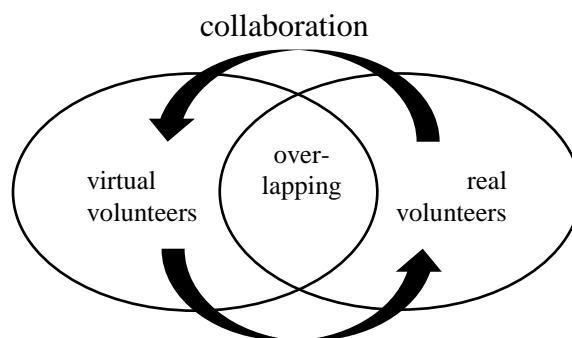


Figure 32: Virtual and real emergent volunteer groups

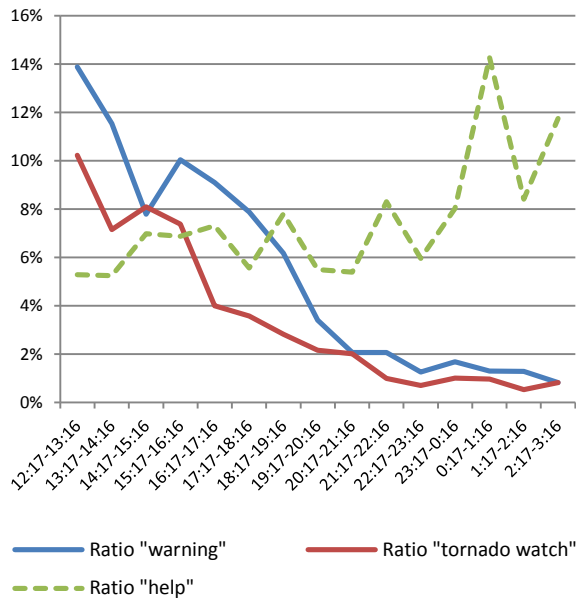


Figure 33: “warning”, “tornado watch” and “help”: When the help activities begin to shift to the focus, linking external sites increases while the percentage of retweets decreases.

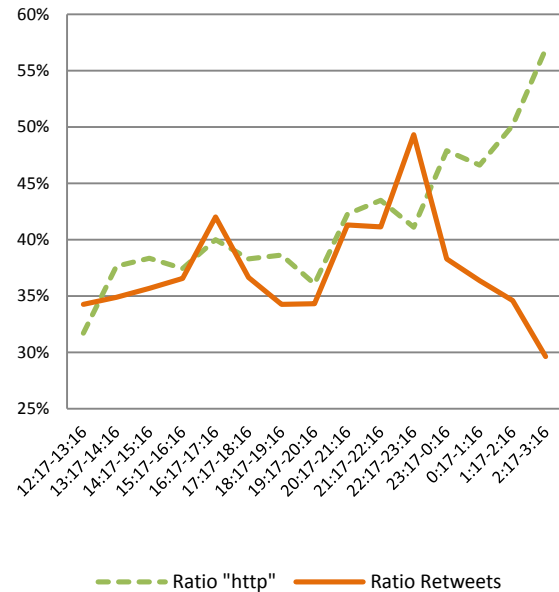


Figure 34: Links and retweets: For virtual emergent volunteer groups, help activities are especially then of interest when potential threats have faded away.



Figure 35: Screenshot of the prototype with groups, activities, tasks and comments

11 Empirical Results



Figure 36: Work infrastructure in the control center

12 Concepts and Artifacts

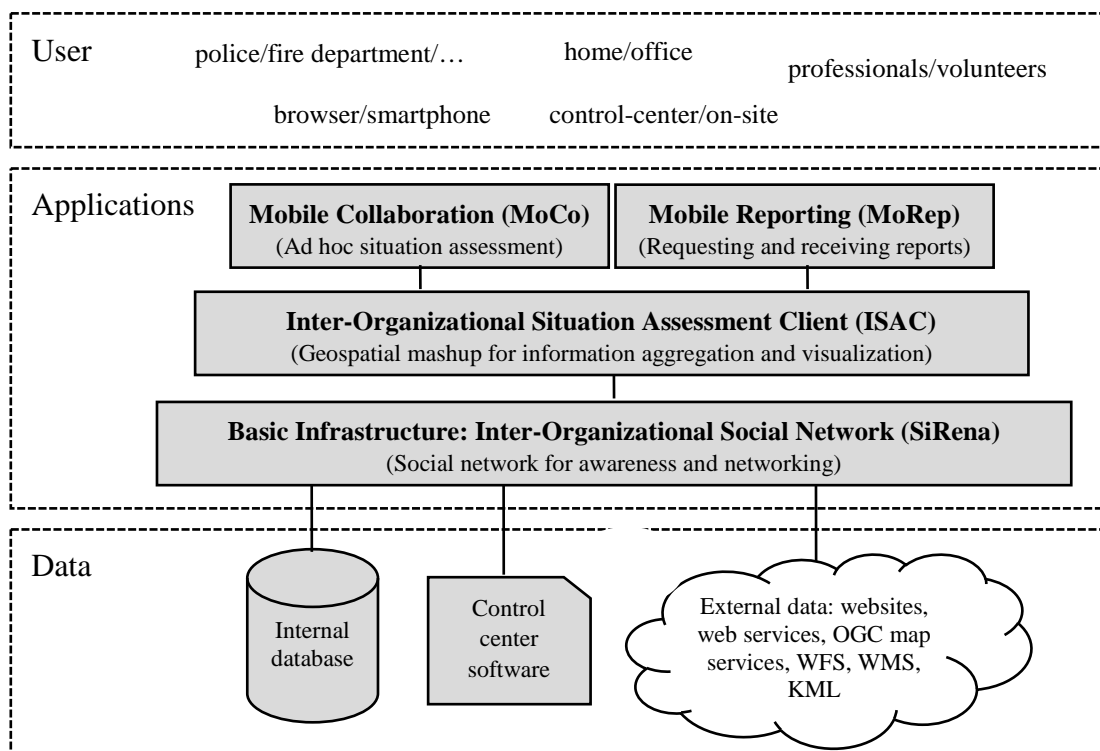


Figure 37: Architecture of the designed technical artifacts for this thesis

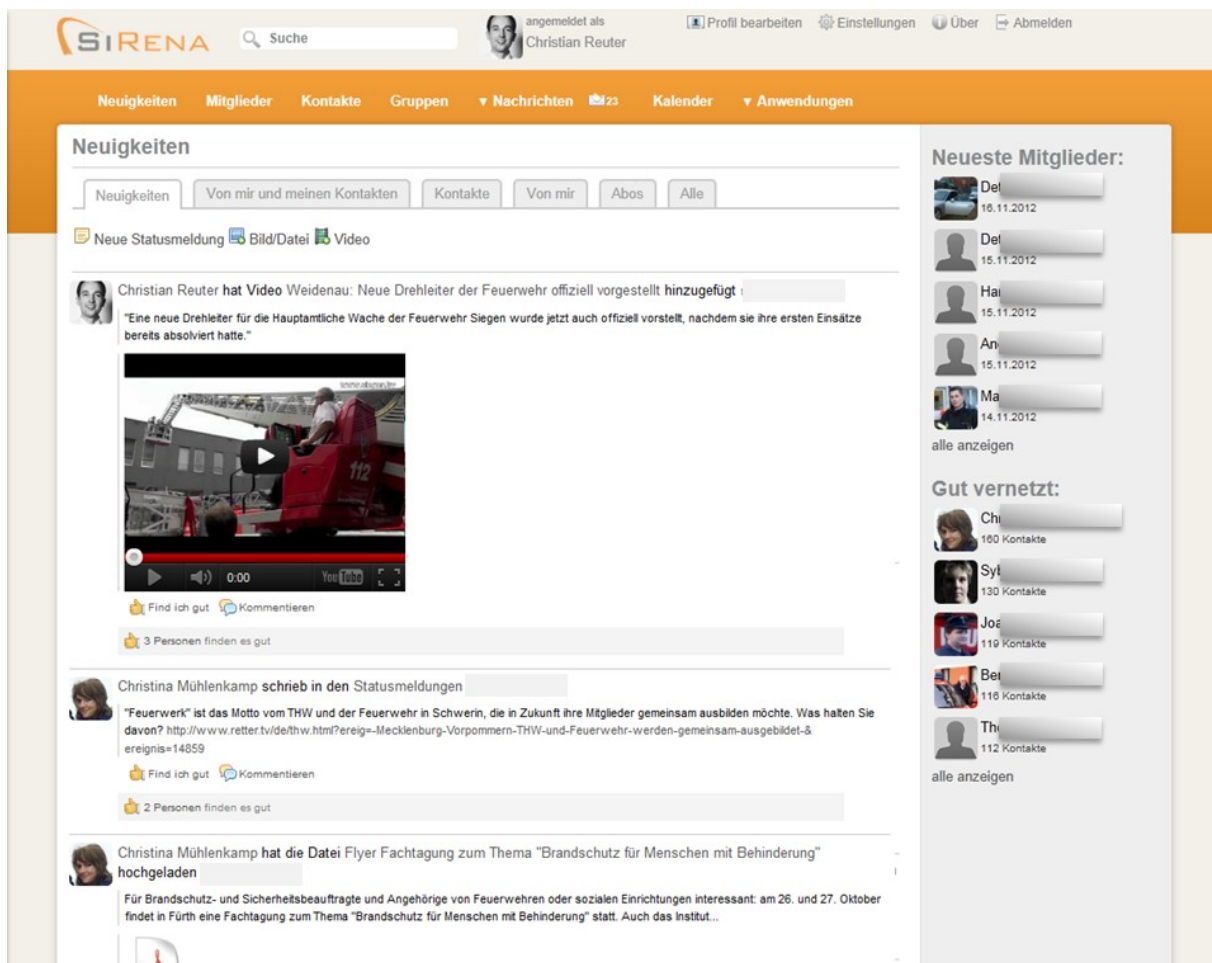


Figure 38: Inter-Organizational Social Network: activity stream

The screenshot displays the SiRena web application interface, which is organized into several sections:

- Header:** Includes the SiRena logo, a search bar, and user information (Christian Reuter, logged in).
- Navigation Bar:** Contains links for Neuigkeiten, Mitglieder, Kontakte, Gruppen, Nachrichten (24), Kalender, Lagekarte, and Anwendungen.
- Profile View (Christian Reuter):**
 - Left Sidebar:** Profile picture, links to edit profile and profile picture, and a list of media (Dateien, Gemeinsame Texte, Lesezeichen, Nachrichten in den Statusmeldungen, Videos).
 - Main Content:**
 - Allgemein:** Kreis: Siegen-Wittgenstein, Organisation: InfoStrom, Art der Tätigkeit: Hauptamt, Organisationseinheit: Universität Siegen, Institut für Wirtschaftsinformatik, Dienstgrad: Diplom-Wirtschaftsinformatiker, Funktion: Wissenschaftlicher Mitarbeiter, Geschlecht: Männlich, Geburtstag, Sprachkenntnisse: Englisch.
 - Dienstlich:** Straße: Hölderlinstr. 3, PLZ: 57076, Ort: Siegen, Telefon: 0271 / 740 4070, Mobil: I.
 - Right Sidebar:**
 - Kontakte:** A grid of contact avatars with navigation buttons (Zurück, 1, 2, Weiter).
 - Gruppen-Mitgliedschaft:** A list of groups, including "InfoStrom - Alumni" and "SI: Lagekarte".
- Contacts View (Kontakte von Christian Reuter):**
 - Left Sidebar:** A list of contacts with their names and roles (e.g., duin (RWE, Ltr. Netzführung), us (THW, Sachgebietsleiter), kardt (DRK, Lehrrettungsassistent/ZF), rfers (InfoStrom, Wissenschaftliche Mitarbeiterin), uer (Feuerwehr, Administrator Leitstelle)).
 - Right Sidebar:** Buttons for Bestätigte Kontakte, Kontakte einladen, and Meine Einladungen.
- Groups View (Gruppen):**
 - Left Sidebar:** A list of groups with their names and member counts (e.g., "Symposium: ABC-Gefahren", "0. SiRena: Einführung", "ABC-ErkKW BF Bochum", "AK Ausbildung BR Arnsberg").
 - Right Sidebar:** Buttons for "Starte eine neue Gruppe", "Von mir verwaltete Gruppen", "Einladungen zum Gruppenbeitritt", and "Gruppensuche".
- Document View (SiRena_Lagekarte_Kurzhilfe_30072013.pdf):**
 - Left Sidebar:** A list of documents with their names and upload dates (e.g., "SiRena_Lagekarte_Kurzhilfe_30072013.pdf").
 - Right Sidebar:** Buttons for "Download", "Bearbeiten", and "X".
 - Main Content:** A preview of the document, showing a title "Kurzbeschreibung der SiRena Lagekarte" and a description of the map's purpose.

Figure 39: ISAC: profile, contacts, groups, documents

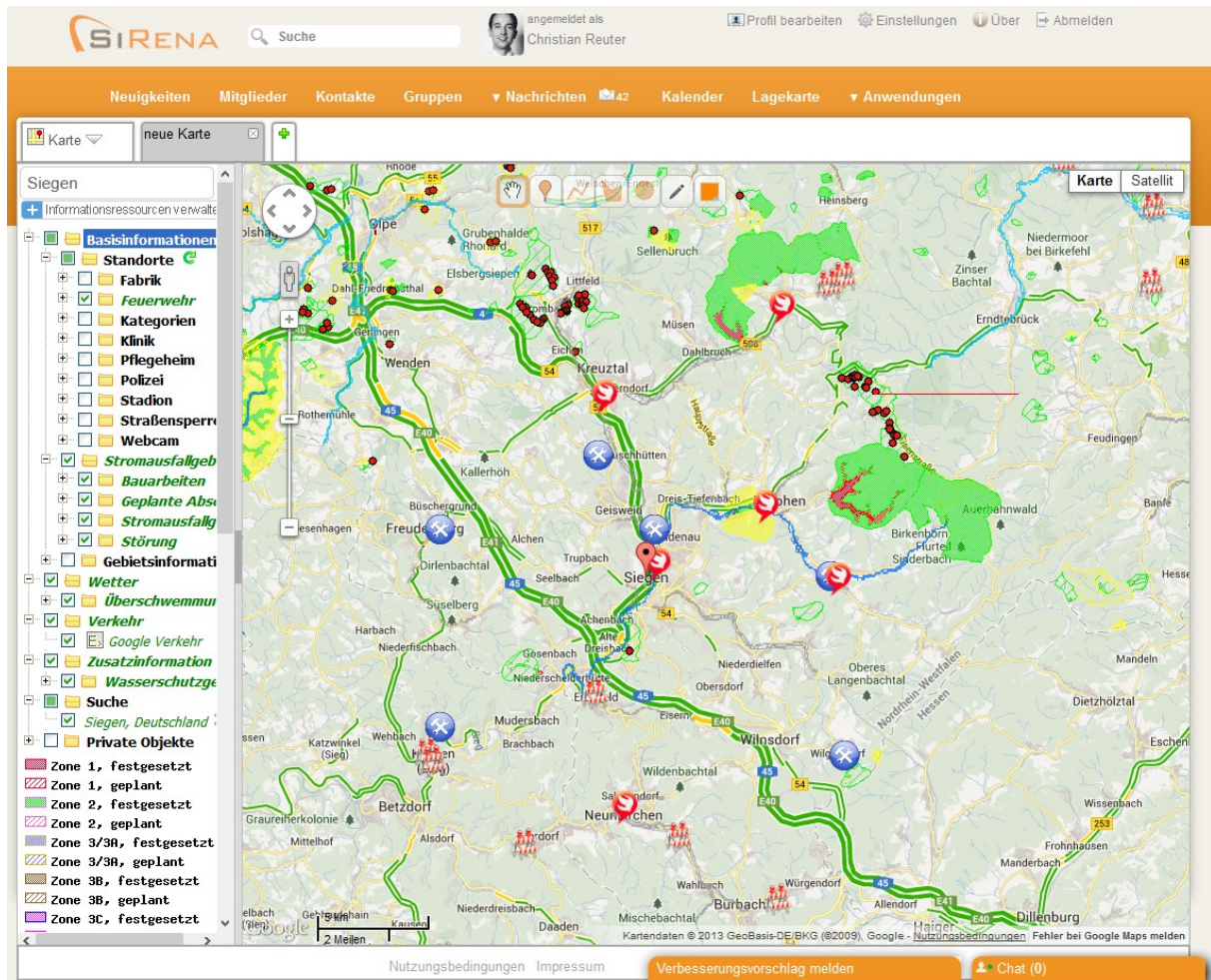


Figure 40: Inter-Organizational Situation Assessment Client (2013)

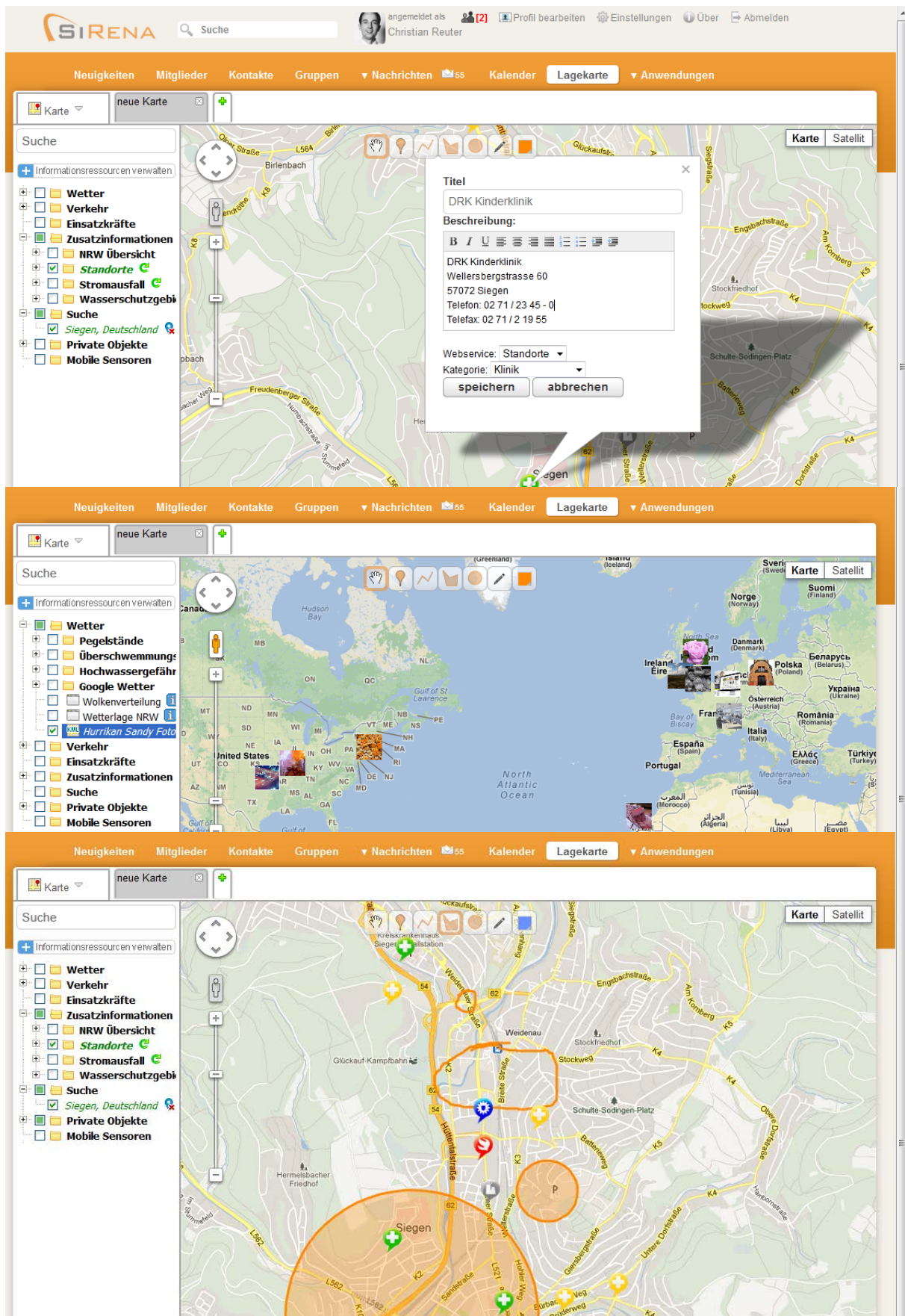


Figure 41: ISAC: Edit marker, show pictures, annotations

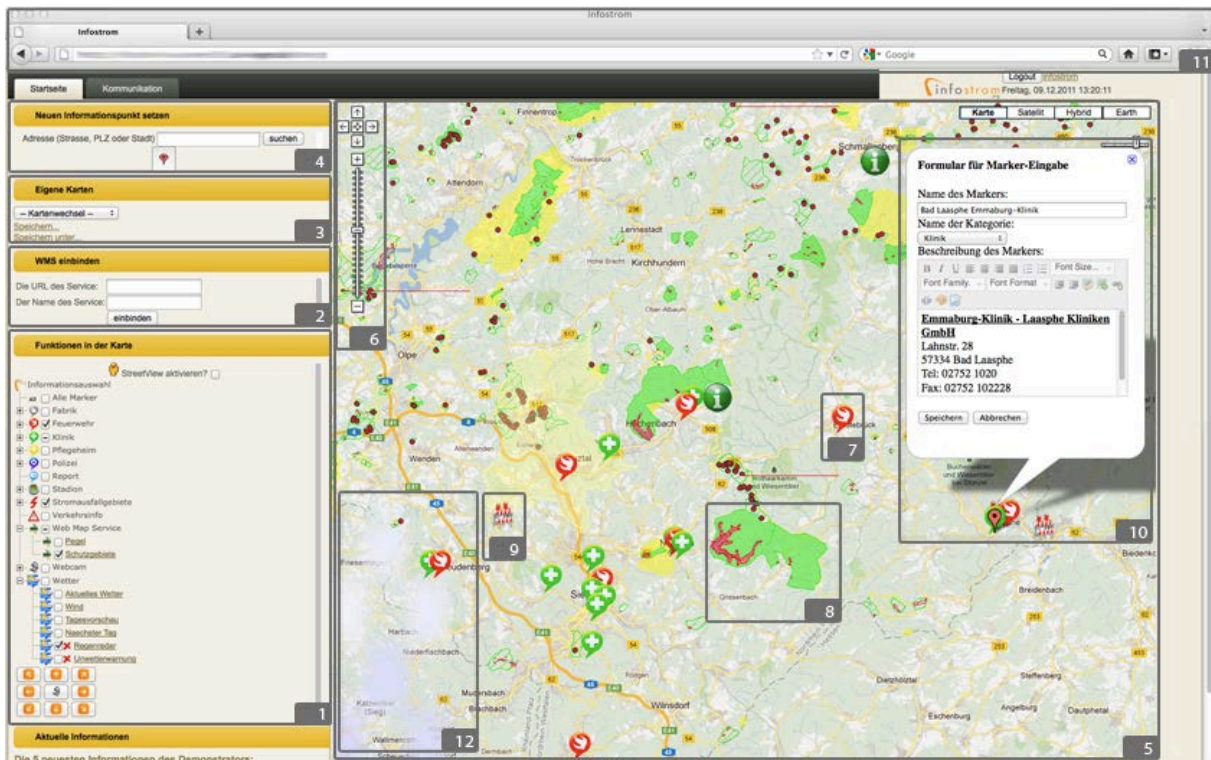


Figure 42: ISAC in 2011, the basis for the interim evaluation

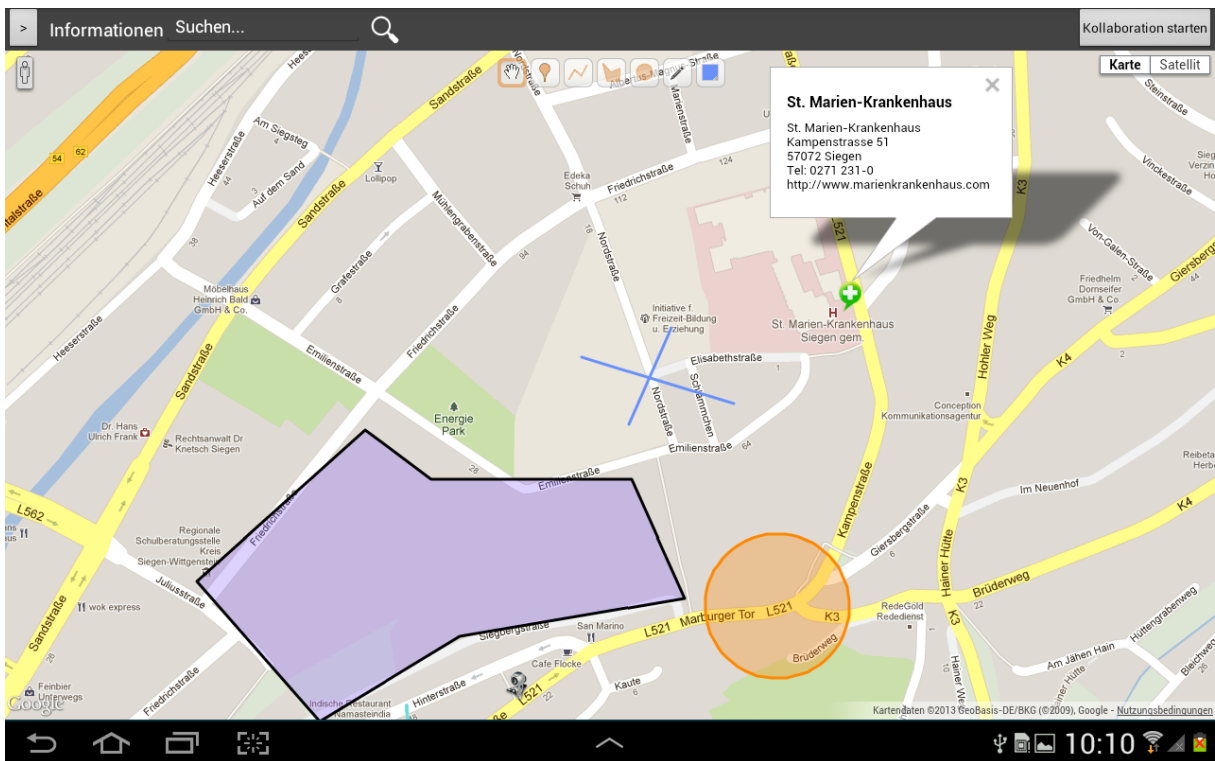


Figure 43: Mobile Collaboration App (MoCo)

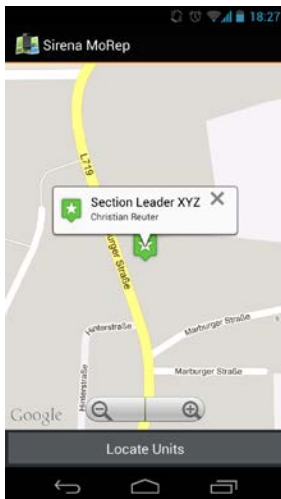


Figure 44: Localizing the response units

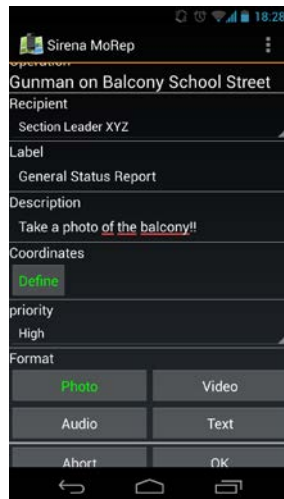


Figure 45: Request form



Figure 46: Content of the report, here: picture

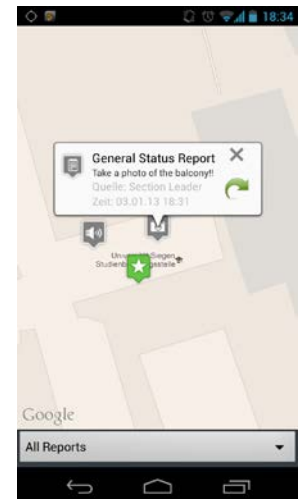


Figure 47: See reports

13 Evaluation

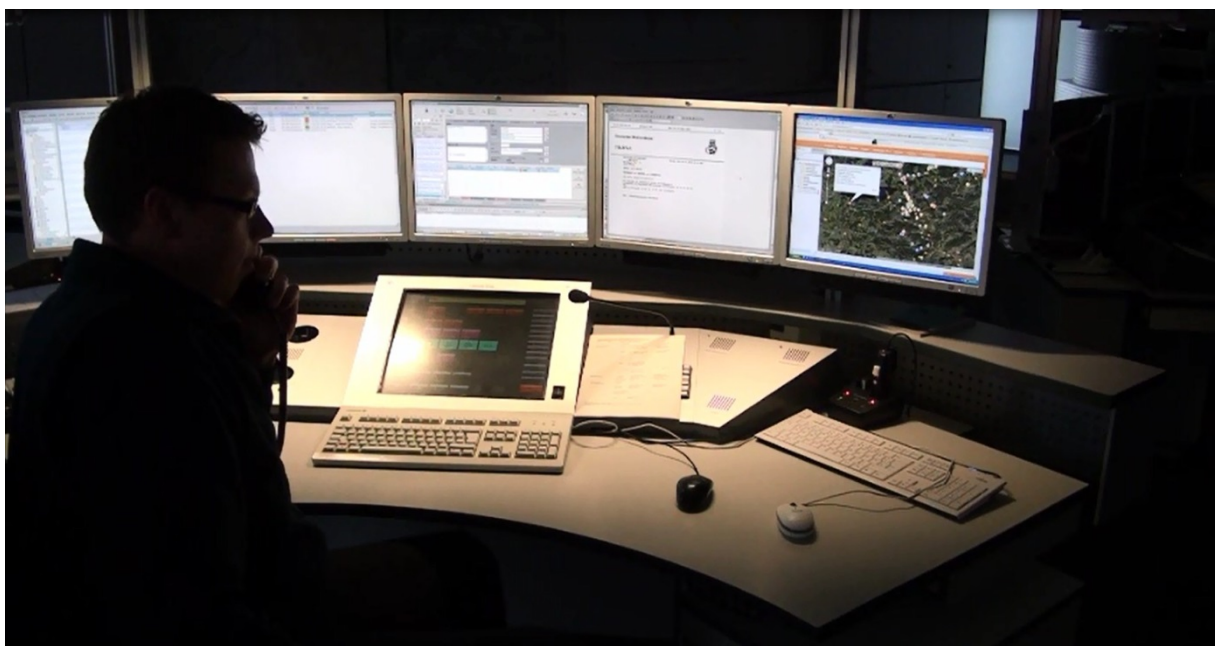


Figure 48: Use of ISAC in the control center (2013)



Figure 49: Use of MoCo on-site (2013)



Figure 50: Use of MoRep on-site (2013)

14 Towards Emergent Collaboration Infrastructures



Figure 51: Novel concepts and artifacts to support emergent collaboration



Figure 52: Effects of emergent collaboration infrastructures

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