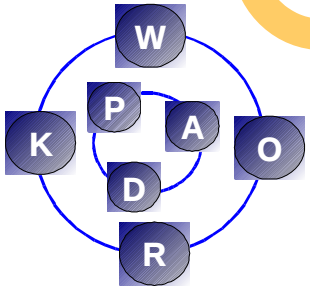
Analysis of a Real Case Study : the WORKPAD Project

Mock-Ups, User Interface Evaluation Techniques

HCI 09/10 Seminars

General Information



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- **Web Page and slides:**
  www.dis.uniroma1.it\~marrella\teaching.html
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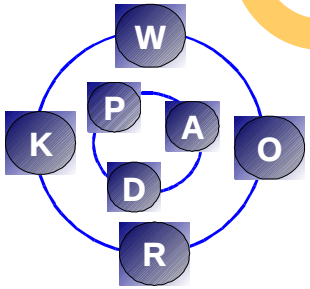
- **Seminars :**
  - **03-05-2010 :** Introduction and Requirements Engineering (Interviews, Scenarios and Task Analysis)
  - **31-05-2010 :** Mock-Ups and Evaluation Techniques

Mock-Up of the Worklist Handler



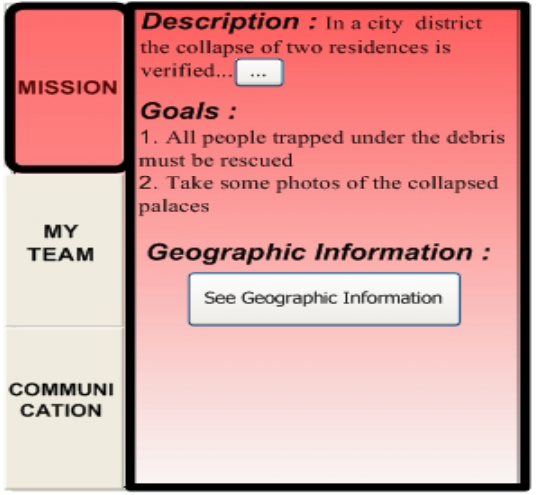
Three categories easily accessible through the use of tabs on the left side of the screen

Every macro-category is characterized by a different color, so that the user gets easier to memorize and locate the context where s/he is

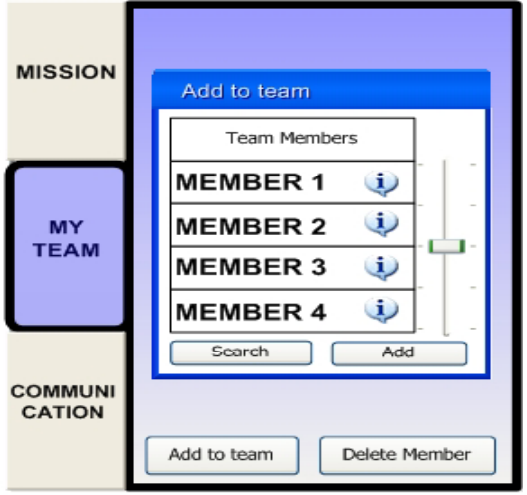
Low probability to push the wrong button

Tasks organized on the screen in a hierarchical way

Each category contains only the essential information


MISSION
MY TEAM
COMMUNI CATION
Description : In a city district the collapse of two residences is verified...
...
Goals :
1. All people trapped under the debris must be rescued
2. Take some photos of the collapsed palaces
Geographic Information :
See Geographic Information

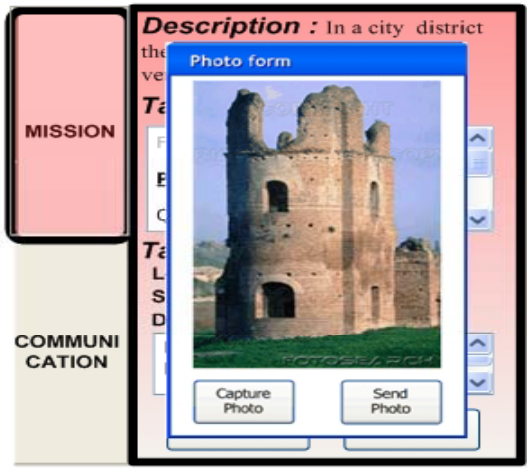
(a)


MISSION
MY TEAM
COMMUNI CATION
Add to team
Team Members
MEMBER 1
MEMBER 2
MEMBER 3
MEMBER 4
Search
Add
Add to team
Delete Member

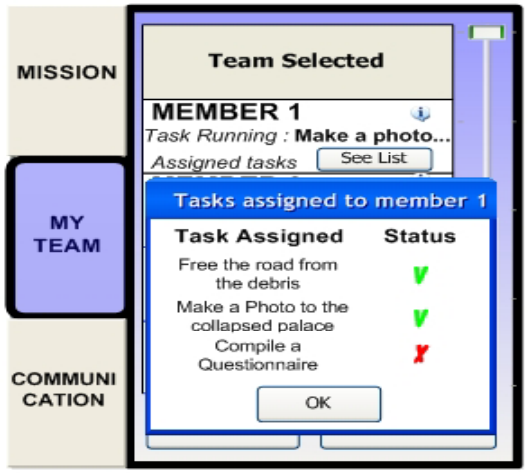
(b)


MISSION
COMMUNI CATION
Description : In a city district the collapse of two residences is verified...
...
Task Selection :
FREE THE ROAD
PHOTO
QUESTIONNAIRE
Task Information :
Location : <LOCATION A >
Service Name : <SERVICE A>
Description :
Make a photo to the collapsed palace
Accept
Start

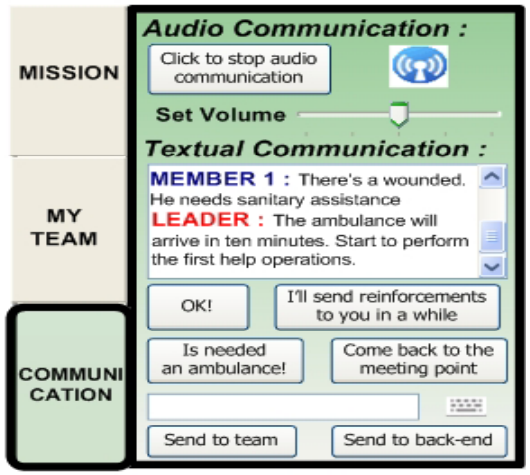
(c)


MISSION
COMMUNI CATION
Description : In a city district
Photo form
Capture Photo
Send Photo

(d)

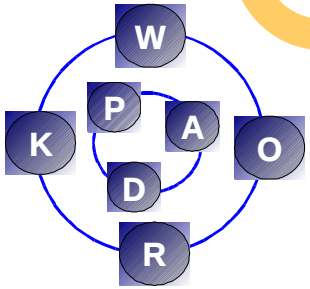

MISSION
MY TEAM
COMMUNI CATION
Team Selected
MEMBER 1
Task Running : Make a photo...
Assigned tasks
See List
Tasks assigned to member 1
Task Assigned
Status
Free the road from the debris
Make a Photo to the collapsed palace
Compile a Questionnaire
OK

(e)


MISSION
MY TEAM
COMMUNI CATION
Audio Communication :
Click to stop audio communication
Set Volume
Textual Communication :
MEMBER 1 : There's a wounded. He needs sanitary assistance
LEADER : The ambulance will arrive in ten minutes. Start to perform the first help operations.
OK!
I'll send reinforcements to you in a while
Is needed an ambulance!
Come back to the meeting point
Send to team
Send to back-end

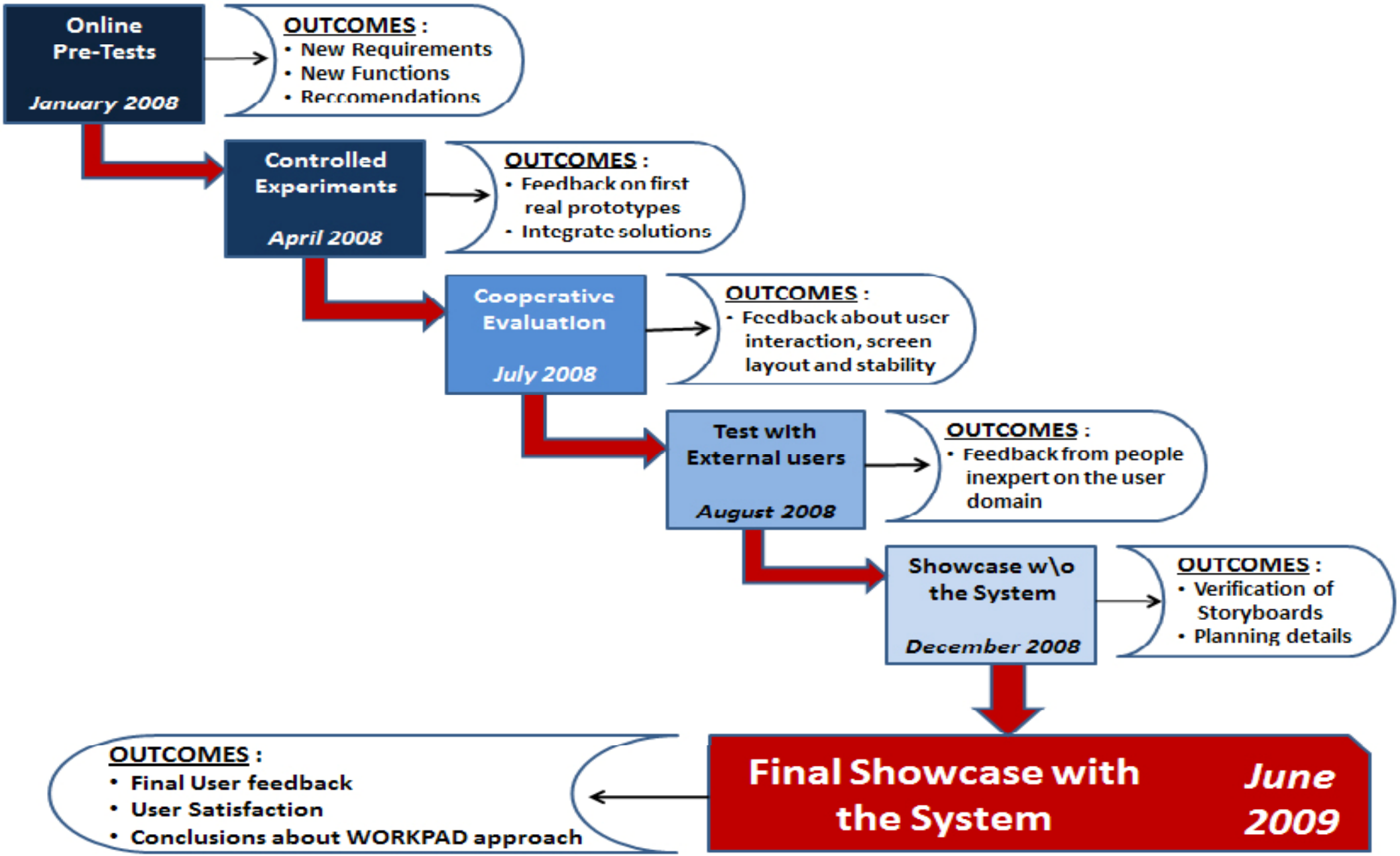
(f)

Overview

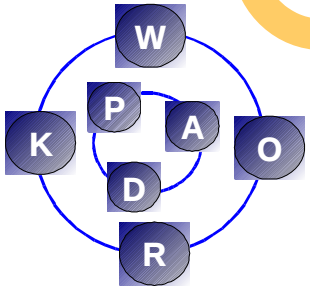


- User Test Methodology
  - Online Pre-Tests
  - Controlled Experiments
  - Cooperative Evaluation
  - Test with External Users
- The WORKPAD Showcases
  - Without and with WORKPAD

User Test Methodology

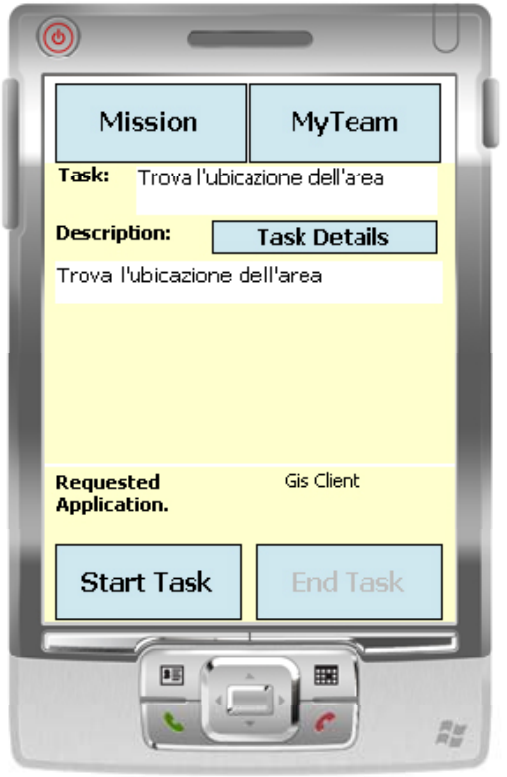


Gradual improvement of the User Interface

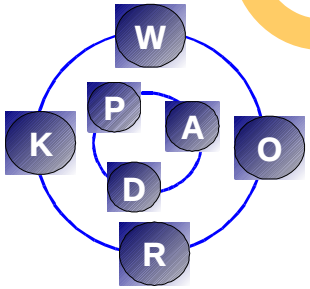


Controlled Experiments

Cooperative Evaluation

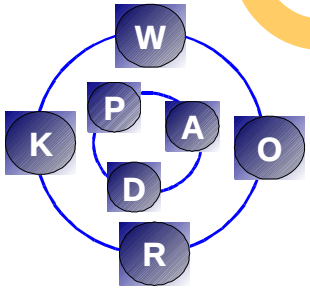


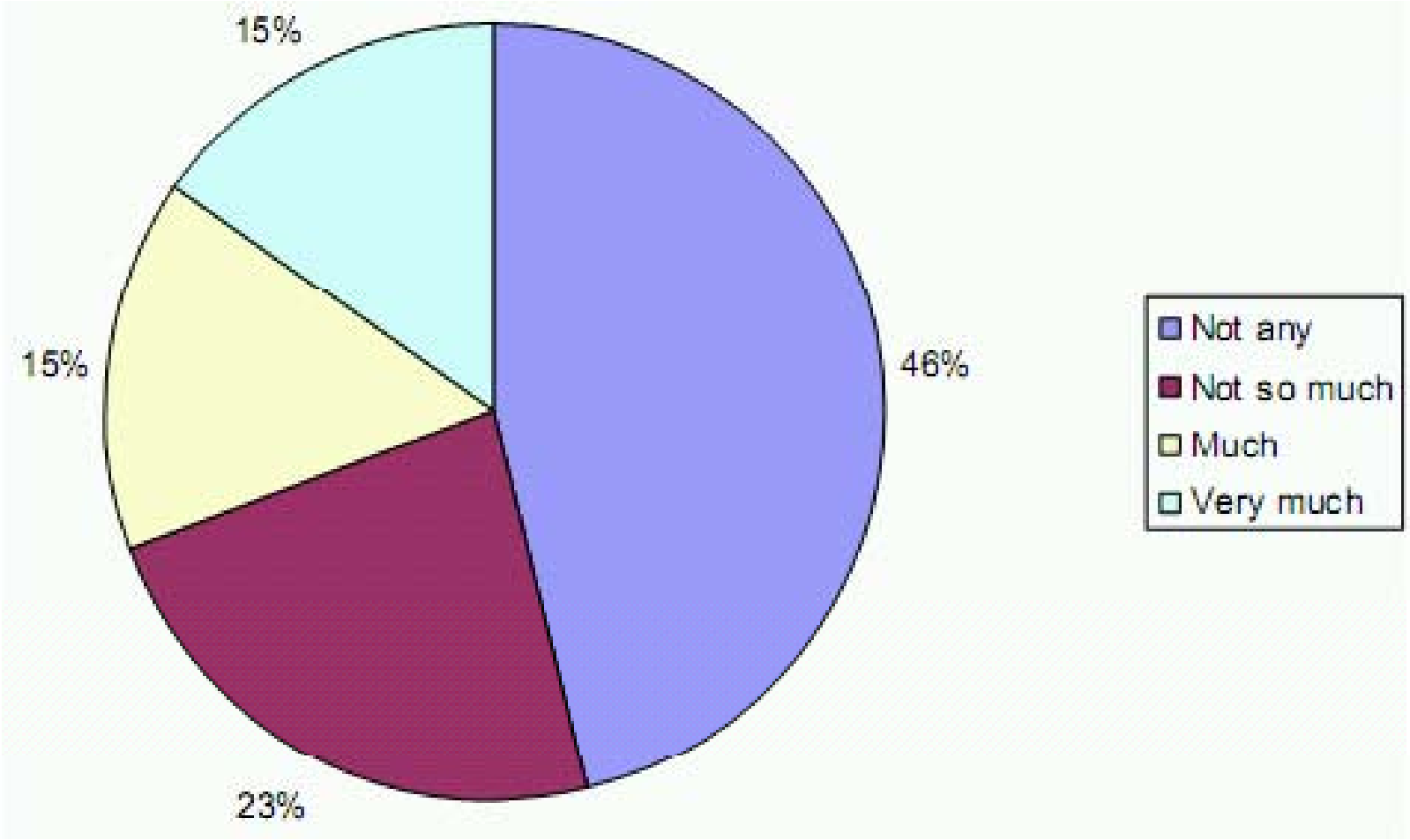
On-line pre-tests



- Mock-ups (Web and Powerpoint) available and ready to be tested with potential users
  - The main goal is to gain a first insight into the level of usability and understandability.
  - Important to get feedback from the users, if the requirements were understood correctly and are adequately met by the system features.
- Questionnaire (Web) : questions about task management, map overview, connection establishment, multimedia and context editor, file sharing
- 13 users (8 male and 6 female) from Calabria region, 3 of age 46-60 and 10 of age 31-45, with different experience with PDA's participated in the test

Example Results: Experiences with PDA's





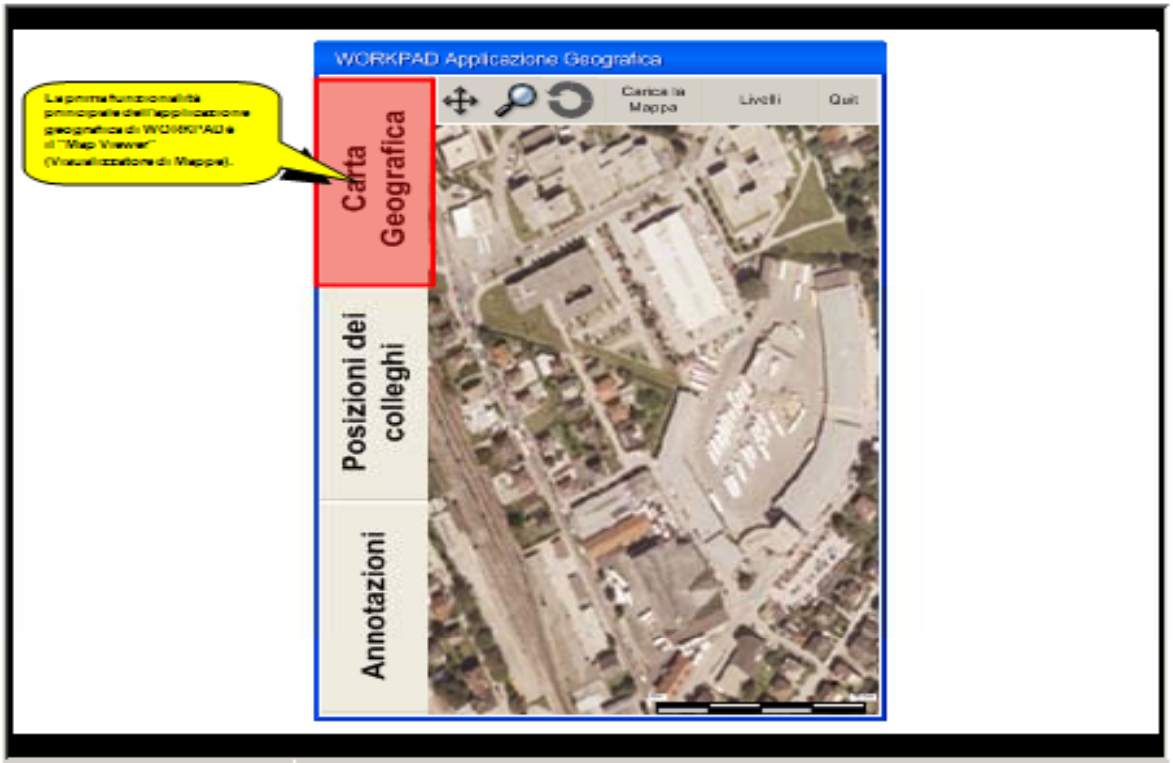
MAP OVERVIEW

Imagine you work for the fire brigades and are currently at the emergency area where your task is to first of all rescue people out of the debris. A young women needs your help! You are not able to help her on your own and therefore want to know where the other team members currently are. With the help of the map overview you can locate them in the area and call them for help.

The **map overview** provides:

- geographic information of the affected area
- position information about team members that are present in the emergency area
- map interaction functionalities
- functionalities for transferring geographic information to other team members

Please go carefully through the following graphics and descriptions of the map overview and answer the questions then!
Start the presentation with a mouse click at the link "presentation" (see: down to the right)



If the presentation does not work well, please use the following link:

http://www.salzburgresearch.at/~rstein/srfg/mockup.ppt

11. Would a digital map be helpful for your daily work?

For your information:
If your answer is "no", you will move automatically to the next section of the questionnaire!

- ○ yes
- ○ No

12. Is the map view interface understandable and intuitive for you?

- ○ Yes
- ○ No
- ○ If no, please mention why:

13. How attractive is the map screen design for you?

Very attractive	attractive	less attractive	Not attractive
○	○	○	○

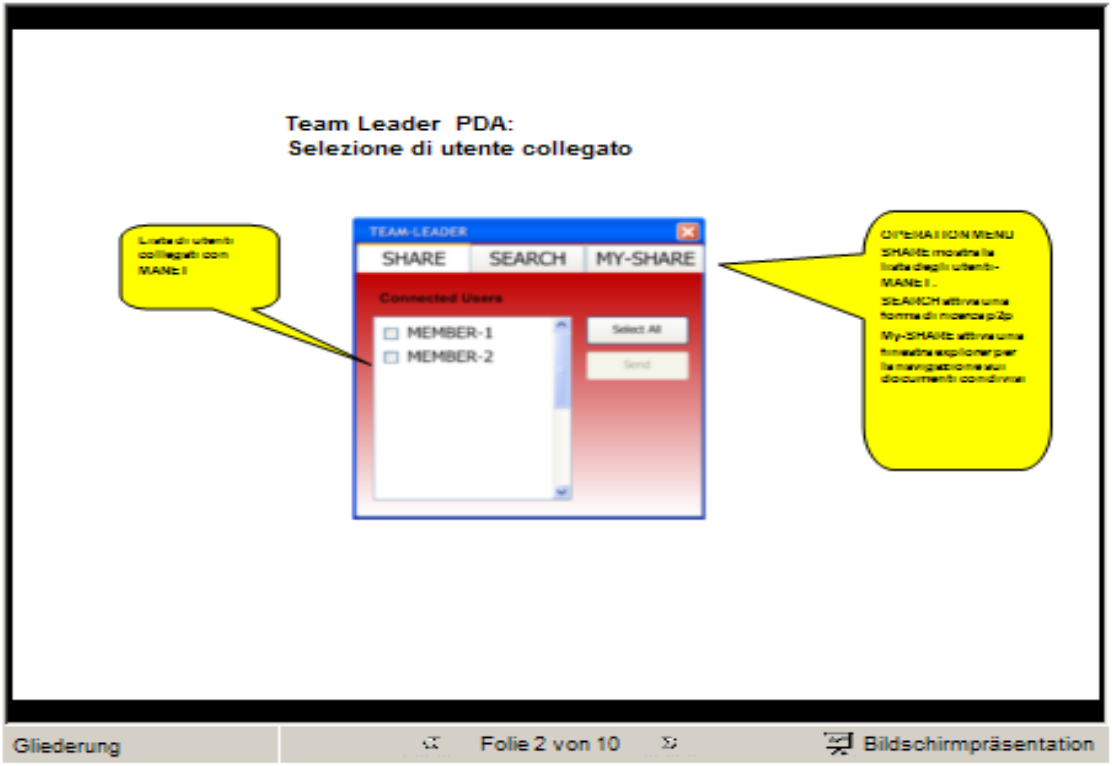
14. Do you consider the "Team Member's Position" functionality as useful?

○ very useful ○ Useful ○ Not so useful ○ useless

FILE SHARE

Think of a situation out in the emergency area where you want to share actual damage documentation of a bridge with your team partner over your handheld device. The **file share** component makes this possible! You can send files from one device to another device.

Please go carefully through the file share presentation and then answer the questions!
Start the presentation with a mouse click at the link "presentation" (see: down to the right)!



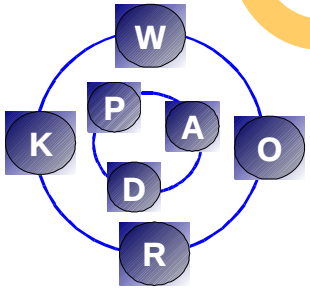
If the presentation does not work well, please use the following link:

http://www.salzburgresearch.at/~rstein/tor/mockup.ppt

33. Did you understand the presentation about the file share component?

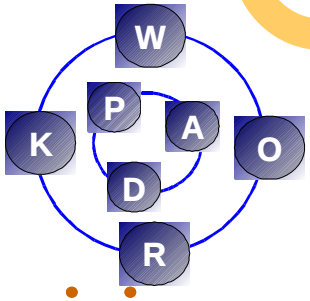
- ○ Yes
- ○ No

Controlled Experiments



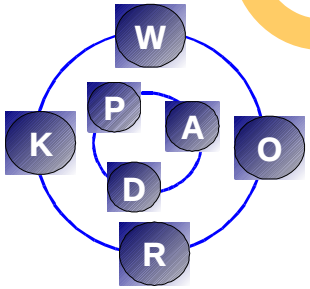
- Lab environments under controlled conditions.
- Bilateral meeting with end users.
- Direct feedback gained by the technical team of WORKPAD.
- It is very useful to analyze carefully the systems currently used by end users.
- E.g., end users showed us the current-day GIS systems they use, thus giving us useful hints into the most valuable data they are interested in having access.
- These tests are intended to observe users when use the system and to discover open issues and areas of improvement.
- Special focus was given to the communication and the integration of the different components: users should feel the impression to work with a single system rather than with different components.

Controlled Experiments



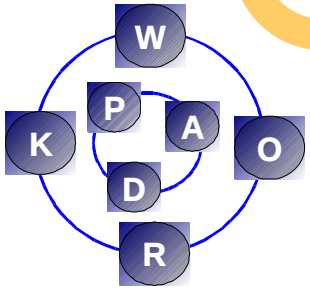
- After this phase, we were able to envision several improvements:
  - It is very important that the user interface of the WORKPAD system is easily understandable and easily usable: the emergency operators are in critical conditions (stress, sometimes dangerous, ...) while facing an emergency.
  - The different components needs to be fully integrated so that they look like one system, rather than different systems.
  - Concerning the Task-list Handler the users mentioned that it will be very helpful and save them time in case of an emergency.

Cooperative Evaluation

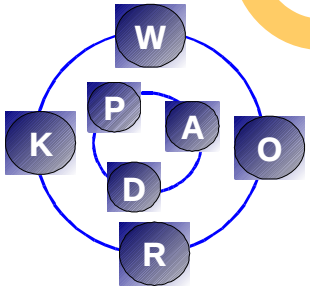


- First real user tests with prototypes on mobile devices in the real-world context.
  - Thus ensuring a "usable" interface
- These tests are an useful and necessary step towards the final showcase.

Cooperative Evaluation



- Then users were asked to interact with the system in order to complete a specific task.
- Evaluators guided the users through the test and continuously interacted with them in order to gather information on user satisfaction.
- These tests were recorded by cameras in order to analyze the level of the usability of the system off-line and look for recurrent usage patterns that possibly could be speeded up.


W
P
A
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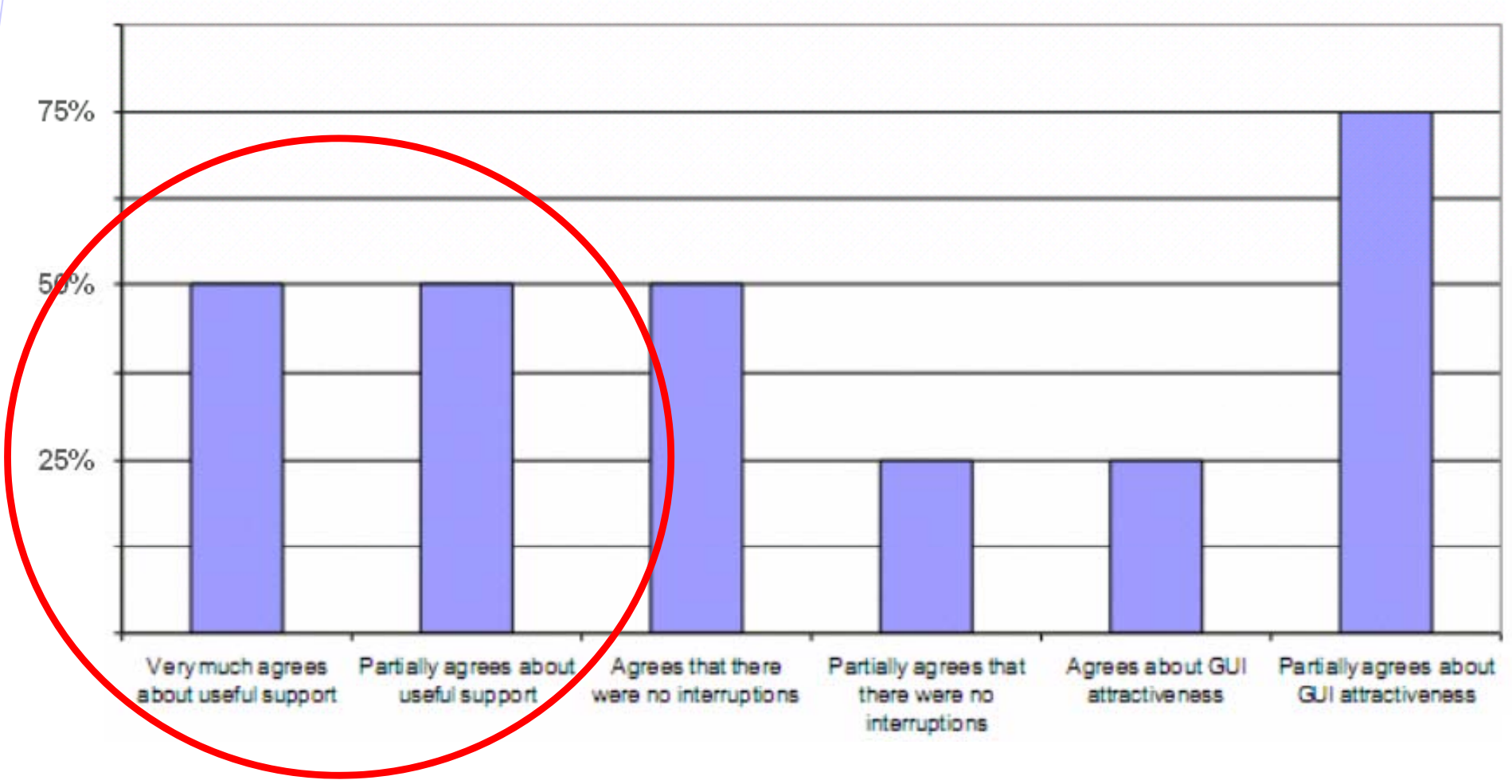
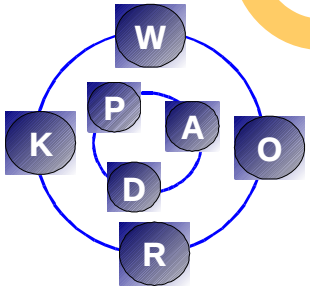
O
D
R

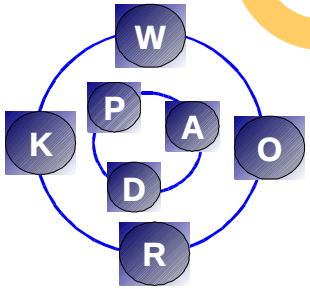

75%
50%
25%
Very much agrees about useful support
Partially agrees about useful support
Agrees that there were no interruptions
Partially agrees that there were no interruptions
Agrees about GUI attractiveness
Partially agrees about GUI attractiveness

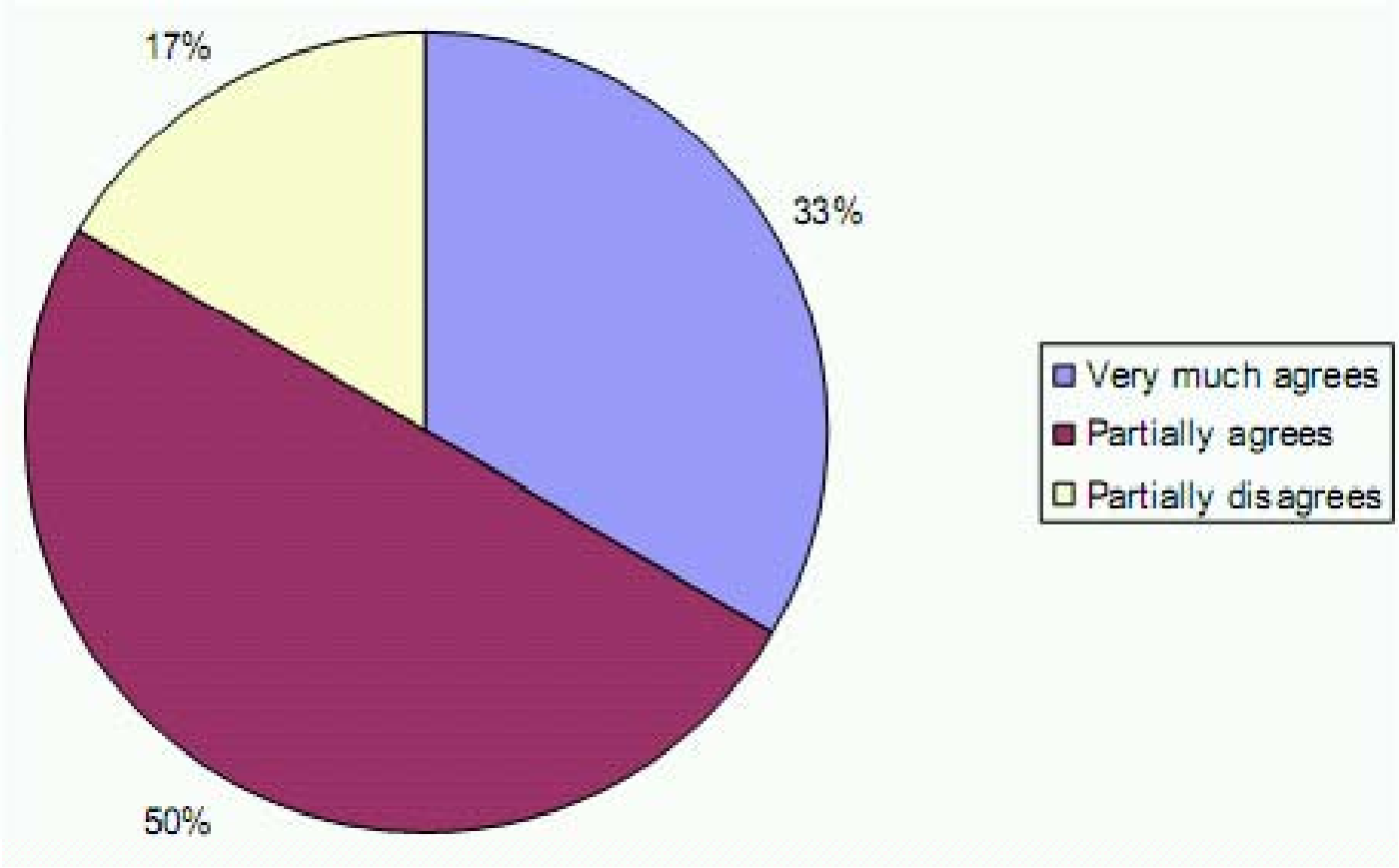
Test with External Users

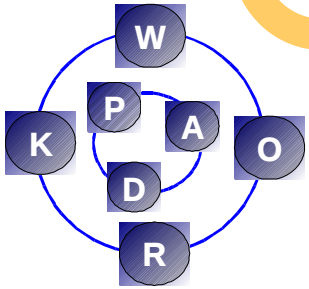


- External users are those who are inexpert of emergency management but showing comparable technological skills.
- Executed by each technical partner
  - ⇨ 4-6 users per software component

Example Result



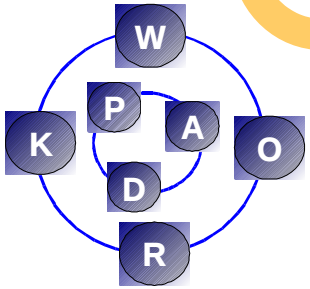




The WORKPAD Showcases

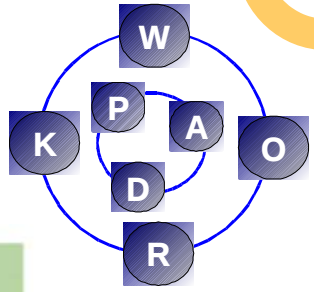
Pentidattilo, Calabria, Italy

First Showcase without WORKPAD

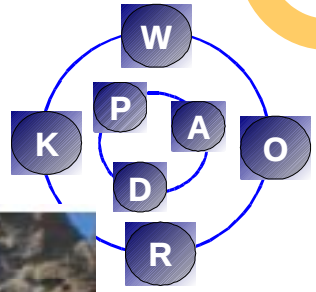


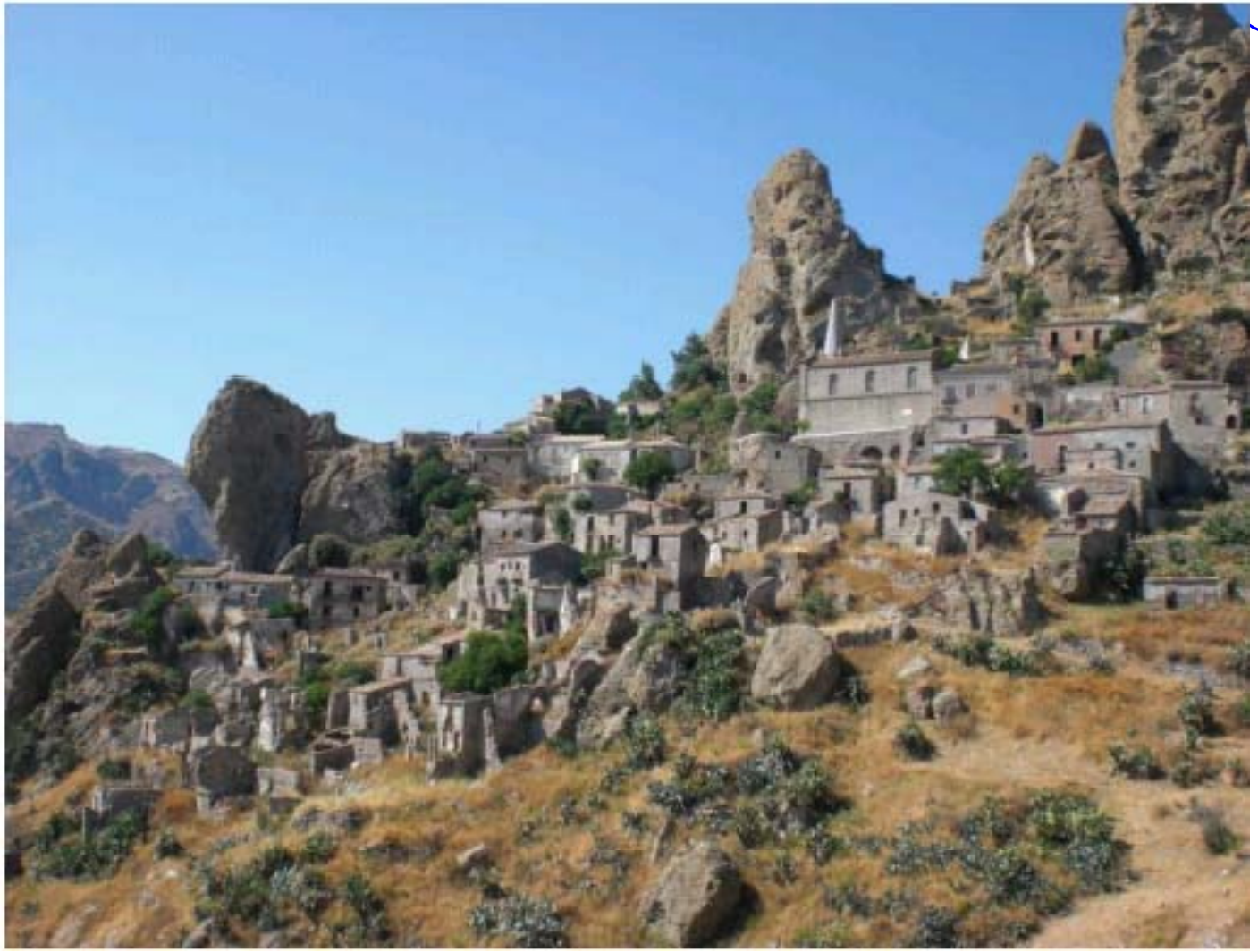
- **Intention of the WORKPAD team:**
  - A better understanding of real world activities.
  - Verifying if storyboards are feasible and realistic.
  - Become familiar with the showcase site Pentidattilo.

Where is Pentidattilo?

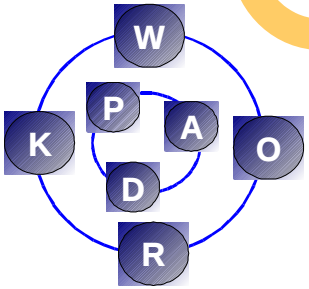


Some Impressions…

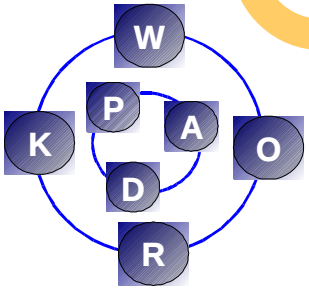




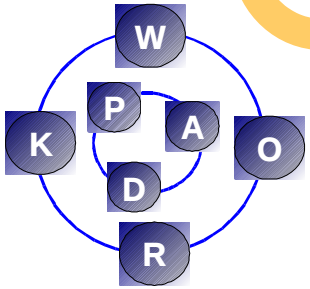
Some Impressions…



Some Impressions…

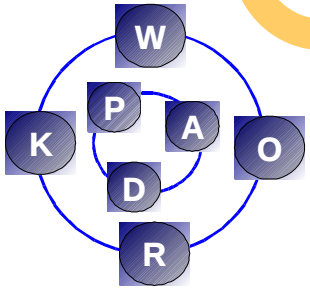


Interviews



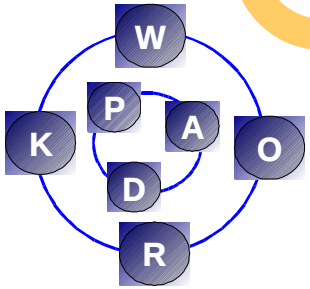
- After the execution of the storyboards we interviewed three people involved to get feedback for the final (small) improvements before the showcase with the WORKPAD system.
- We interviewed the following people:
  - 1 volunteer of civil protection
  - 1 member of the dog unit
  - 1 person supporting the dog unit

End-user comments after the interviews



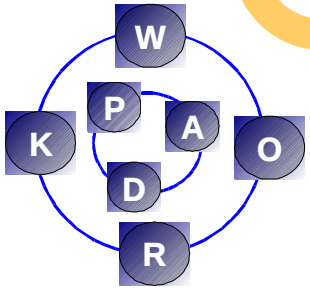
- Currently the different emergency organisations mostly use radio communication in order to talk with their colleagues.
- Appreciation to have a GIS system on PDAs so as to be able to move around and be informed about the current situation on the display at a quick glance.
- Reasonable to switch to digital transmission technology.
- Nowadays, they receive additional information (e.g., about weather) by voice communication, but it would be helpful to have this information constantly updated

Second Showcase *with* WORKPAD



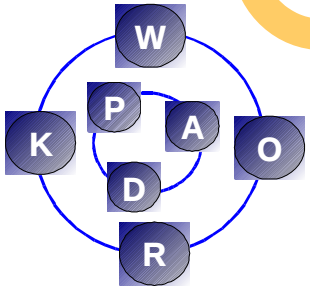
- Goal:
  - ⇨ Show and evaluate the prototypical implementation of the reference architecture proposed in the project WORKPAD
- Taken place in Mid of June
- One week of showcase
- Six end-user organisations
- Four storyboards

The Showcase Week



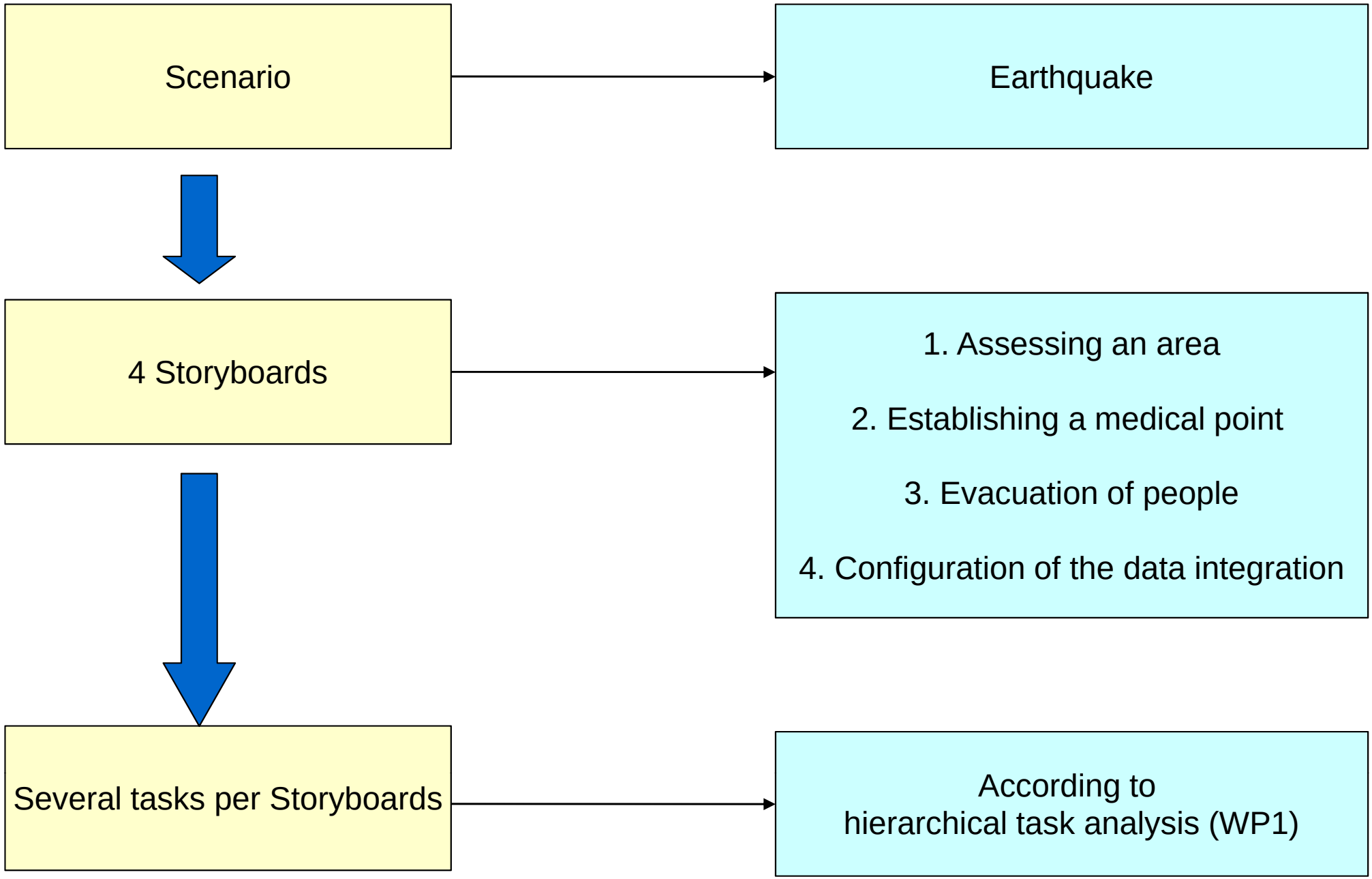
- Day 1:
  - Arrival and first test runs
- Day 2:
  - On-site tests in Pentidattilo
- Day 3:
  - User training
- Day 4:
  - Execution of SB1, 2, 4, and 3
- Day 5:
  - Dissemination event and showcase reflection meeting

User Organisations

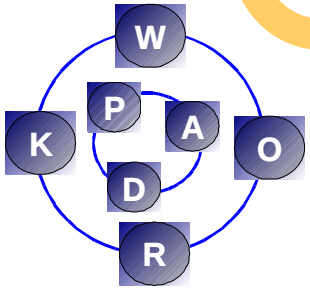


- Carpo Nazionale dei Vigili del Fuoco (VVF)
  - The Fire Brigade Provincial Headquarters
- Corpo Nazionale Soccorso Alpino e Speleologico (CNSAS)
  - Alpine Aid and Speleologic National Body
- Servizio di Urgenza ed Emergenza Medica (SUEM)
  - Service of Urgency and Medical Emergency
- Croce Rossa Italiana (CRI)
  - Italian Red Cross
- Europa Unita (EU)
  - Voluntary organisation
- Confraternita Misericordia (CM)
  - Voluntary organisation

Second Showcase *with* WORKPAD



The 4 Storyboards



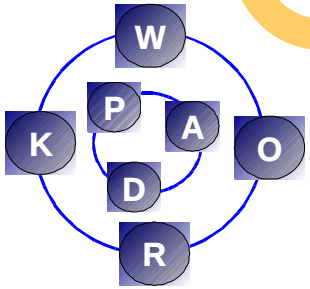
SB1: Assessing an area

SB2: Establishing a medical point

SB3: Evacuation of people

SB4: Configuration of the data integration

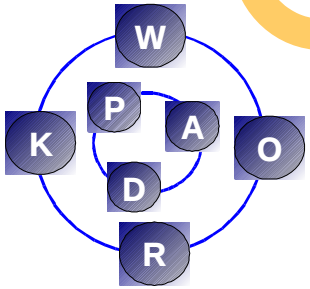
Components Invoked per User



- Example Storyboard 1

	Process Management	Task-list Handler	Context Monitoring	Context Editor	Multimedia Editor	GIS Client	Lightweight Storage	BE Access
Member 1 /Leader	X	X				X		X
Member 2	X	X	X	X	X		X	X
Member 3	X	X	X	X	X		X	X
Member 4	X	X	X	X	X		X	X
Member 5	X	X	X	X				X
Member 6	X	X						X
Member 7	X	X						X
Member 8	X	X						X

Components per User



	Process Management	Task-list Handler	Context Monitoring	Context Editor	Multimedia Editor	GIS Client	Lightweight Storage	BE Access
Member 1 /Leader	X	X				X		X
Member								
Member								
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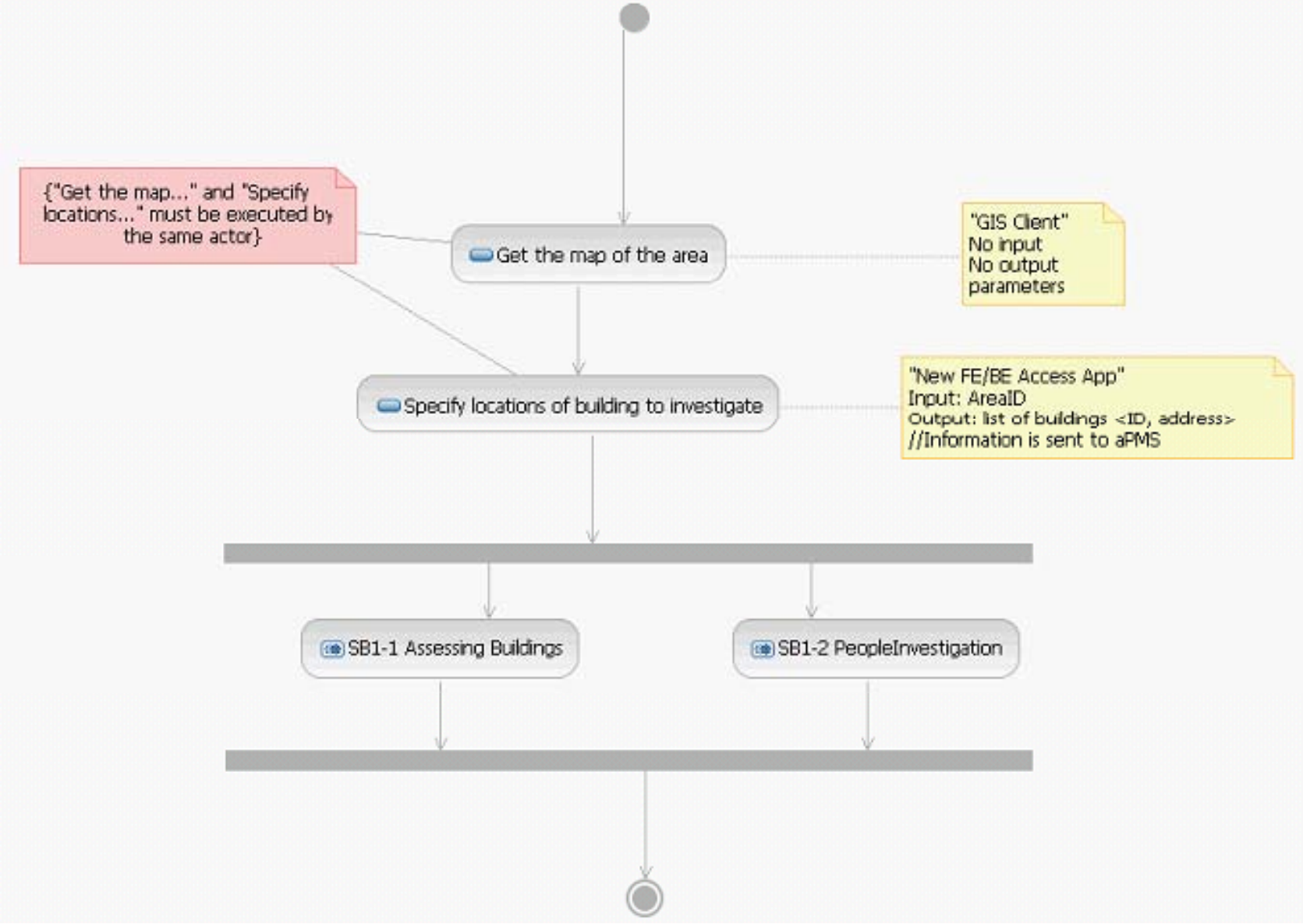
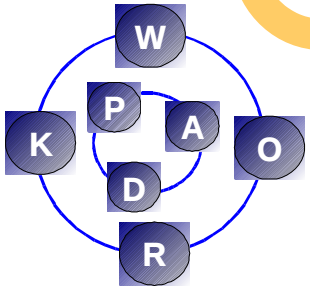
Member								

	Process Management	Task-list Handler	Context Monitoring	Context Editor	Multimedia Editor	GIS Client	Lightweight Storage	BE Access
Member 1 /Leader	X	X				X		X
Member 2	X	X				X		X
Member 3	X	X				X		X
Member 4	X	X				X		X
Member 5	X	X				X		X

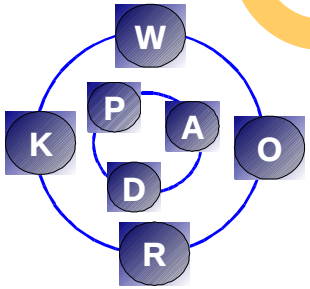
SB1:
On-Site Documentation



Documentation



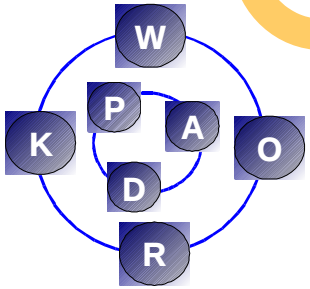
- Task execution forms
- Interview questionnaires
- Video recording, Action Cam



MOVIE of the SHOWCASE

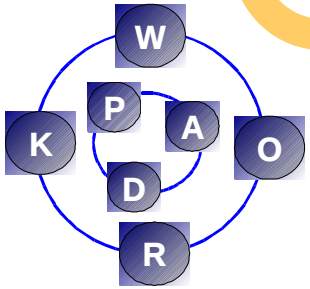
http://www.youtube.com/watch?v=48Hs5Qwg0ho

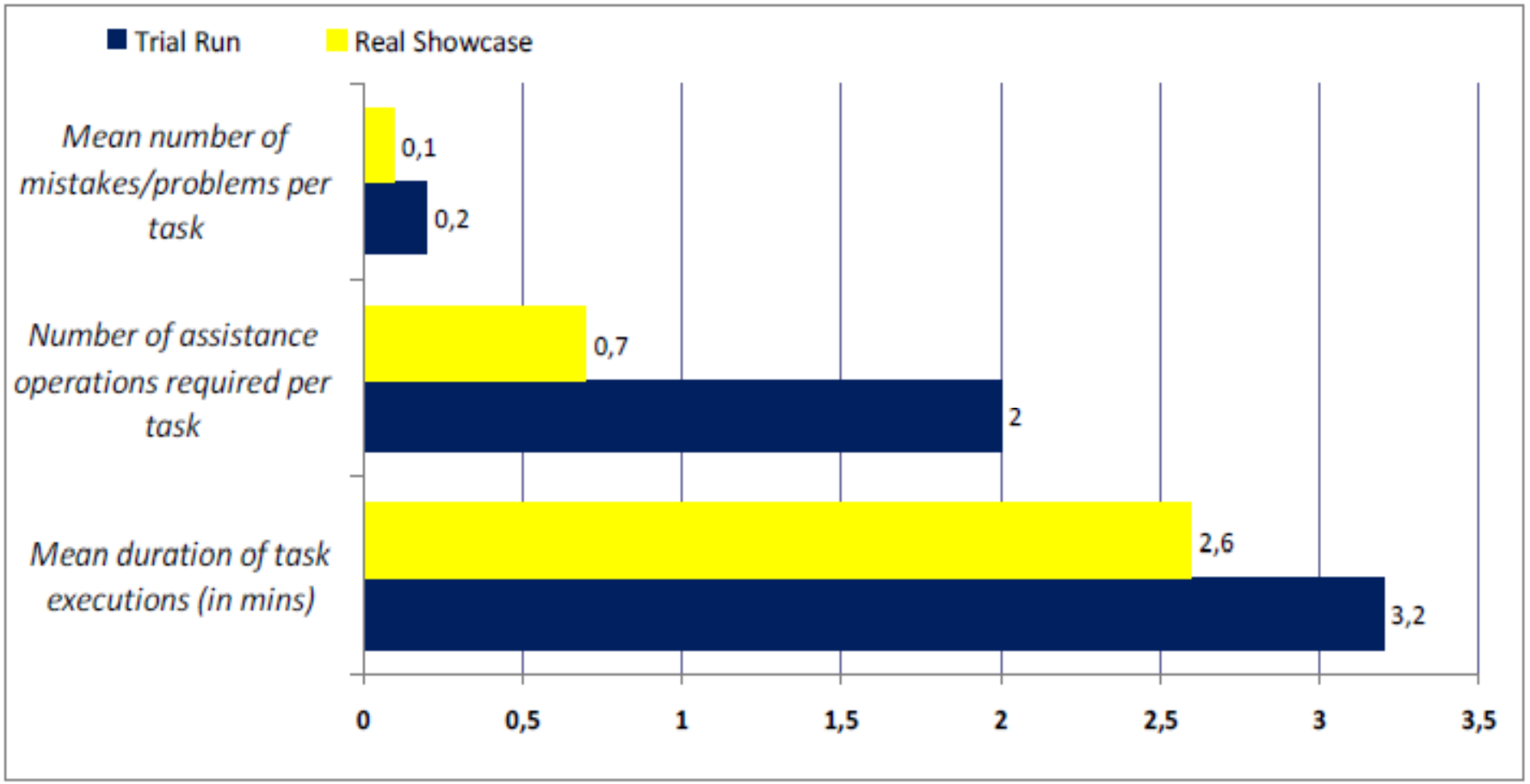
Selected Analysis Results



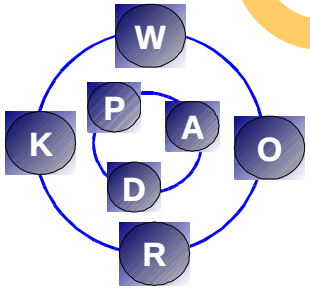
- Metrics
  - ⇨ Time span, number of required assists, correct task outcome, number of errors
- Evaluation is based on task execution forms and interviews
- Trial and "real" execution
  - ⇨ For interesting conclusions: all mean values dropped meaning that users accustomed quickly

Example Results





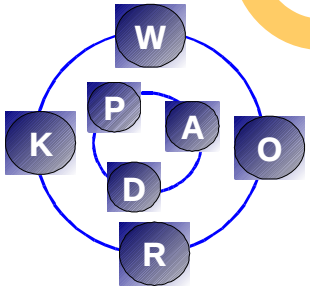
Interviewees

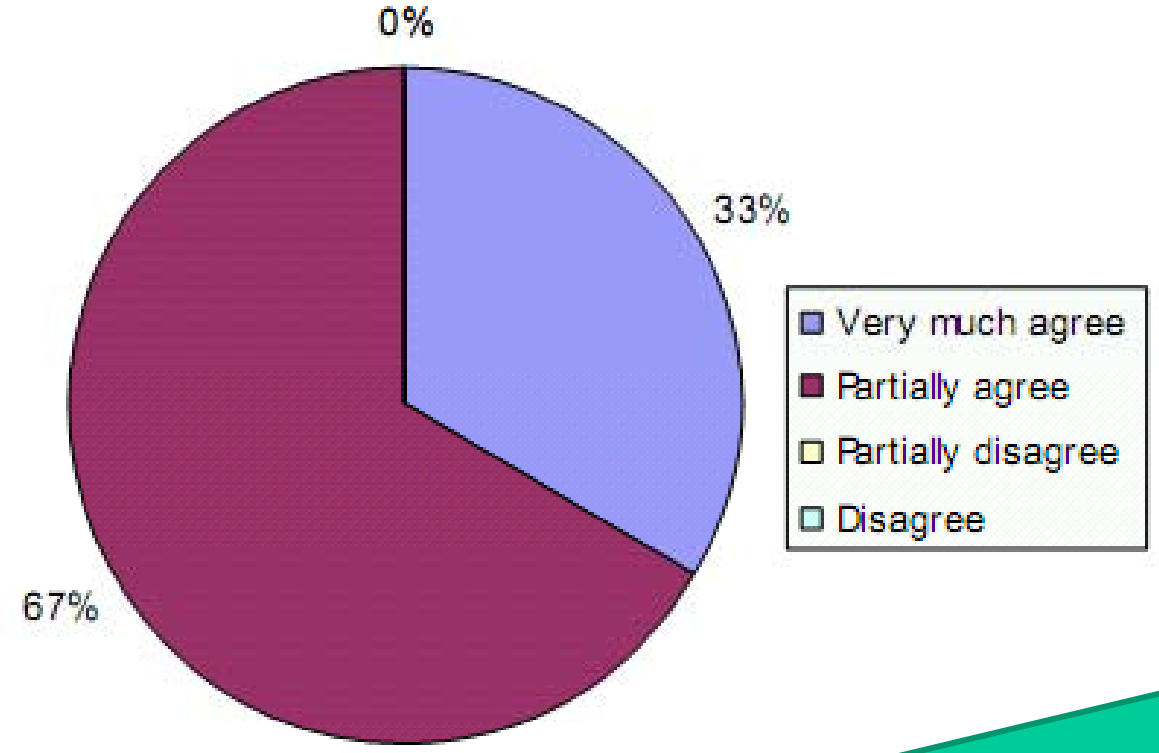


After each storyboard execution, 12 users were interviewed to get information on user satisfaction and to collect proposals for further improvement of WORKPAD.

	First Name	Last Name	Organistion name	Role in the organisation	Tasks in the organisation	Age	gender	Interviewer name
1			Soccorso Alpino	2nd chief in the station Aspromonte	preparing in peace time, instructor, trainer, all rescue tasks	42	M	Matteo
2			Regione Calabria - Unita Operativa Protezione Civile	worker in the department	Management and coordination of associations of volunteers	52	M	Angela
3			Le Pantere Verdi	Volunteer	logistic support in emergency situations, natural hazards, breakdown service	18	M	Matteo
4			Le Pantere Verdi	Volunteer	logistic support in emergency situations, breakdown service	21	F	Angela
5			Soccorso Alpino	Volunteer	Find and rescue lost people in the mountain	24	M	Renate, Angela
6			Civil Protection Calabria	Technical administration	Technician, Administrator	45	M	Allessandro
7			Civil Protection Calabria	Volunteer	Coordinator	25	M	Michele
8			PCRC	Technician		56	M	Massimo
9			Le Pantere Verdi	Administration	Treasurer, Administration, coordination of the logisitics group	43	F	Daniele
10			Soccorso Alpino	Volunteer		35	M	Michele
11			Soccorso Alpino	generic worker	technical assistant of the CNSAS	39	M	Allessandro
12			Le Pantere Verdi	President, coordinator of the organisation at national level	coordination of emergency teams	28	M	Allessandro

Example Results

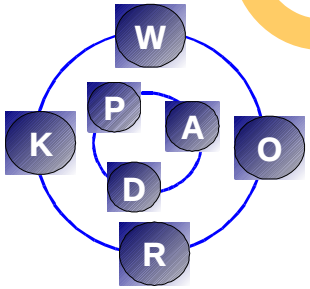


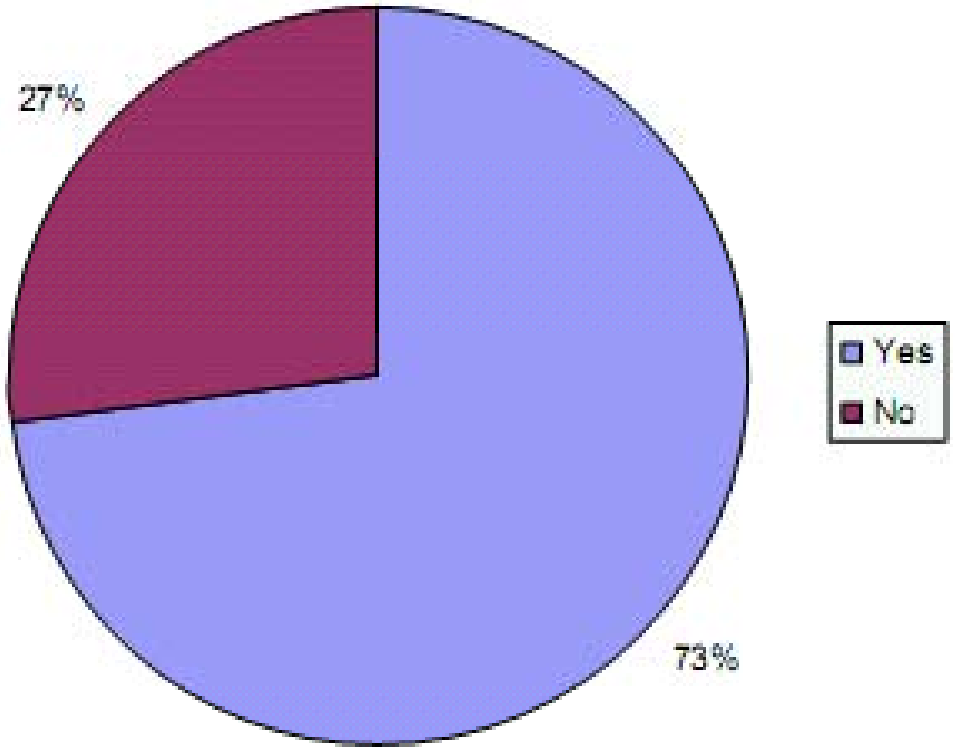


Some users had problems with visibility on the screen in the blazing sun

WORKPAD is easy and intuitive to use.

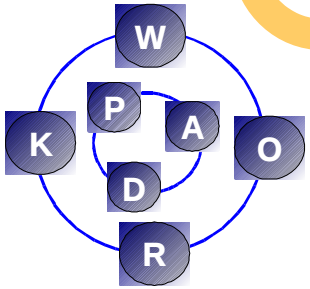
Example Results

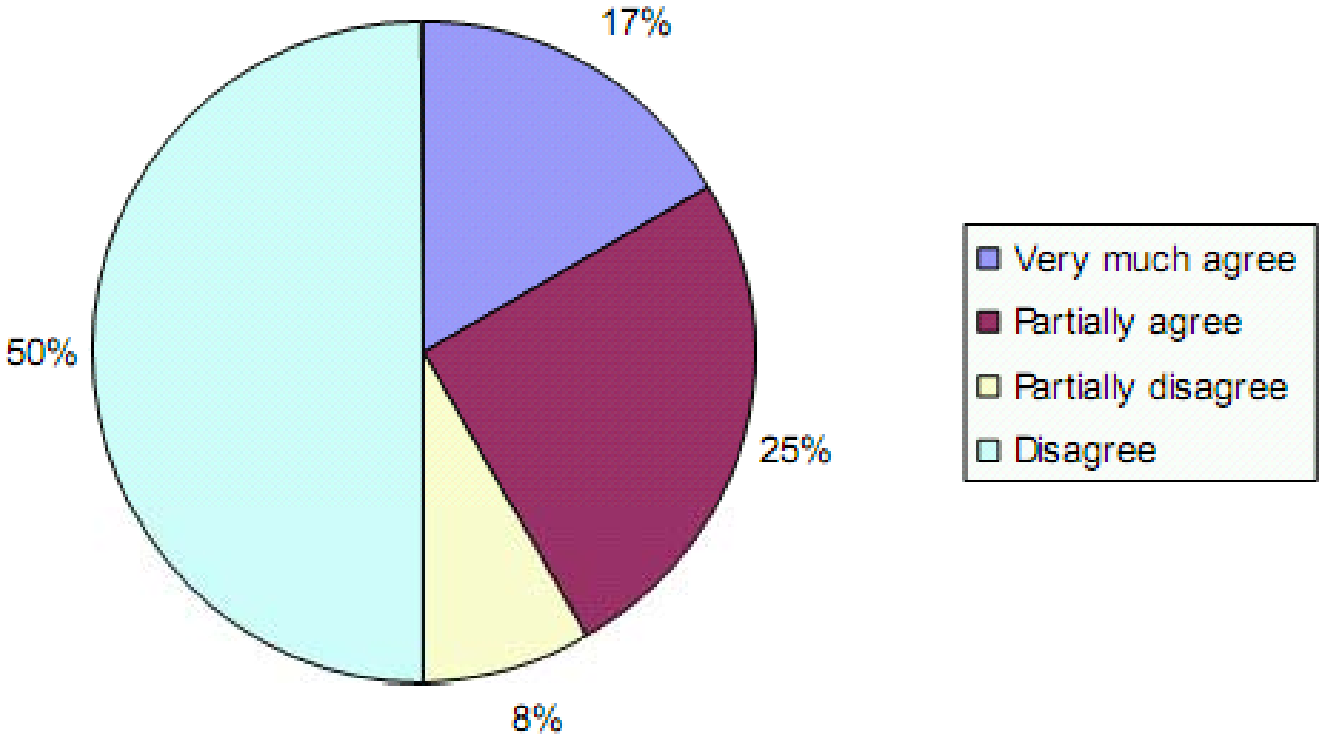




Does the WORKPAD system improve emergency management?

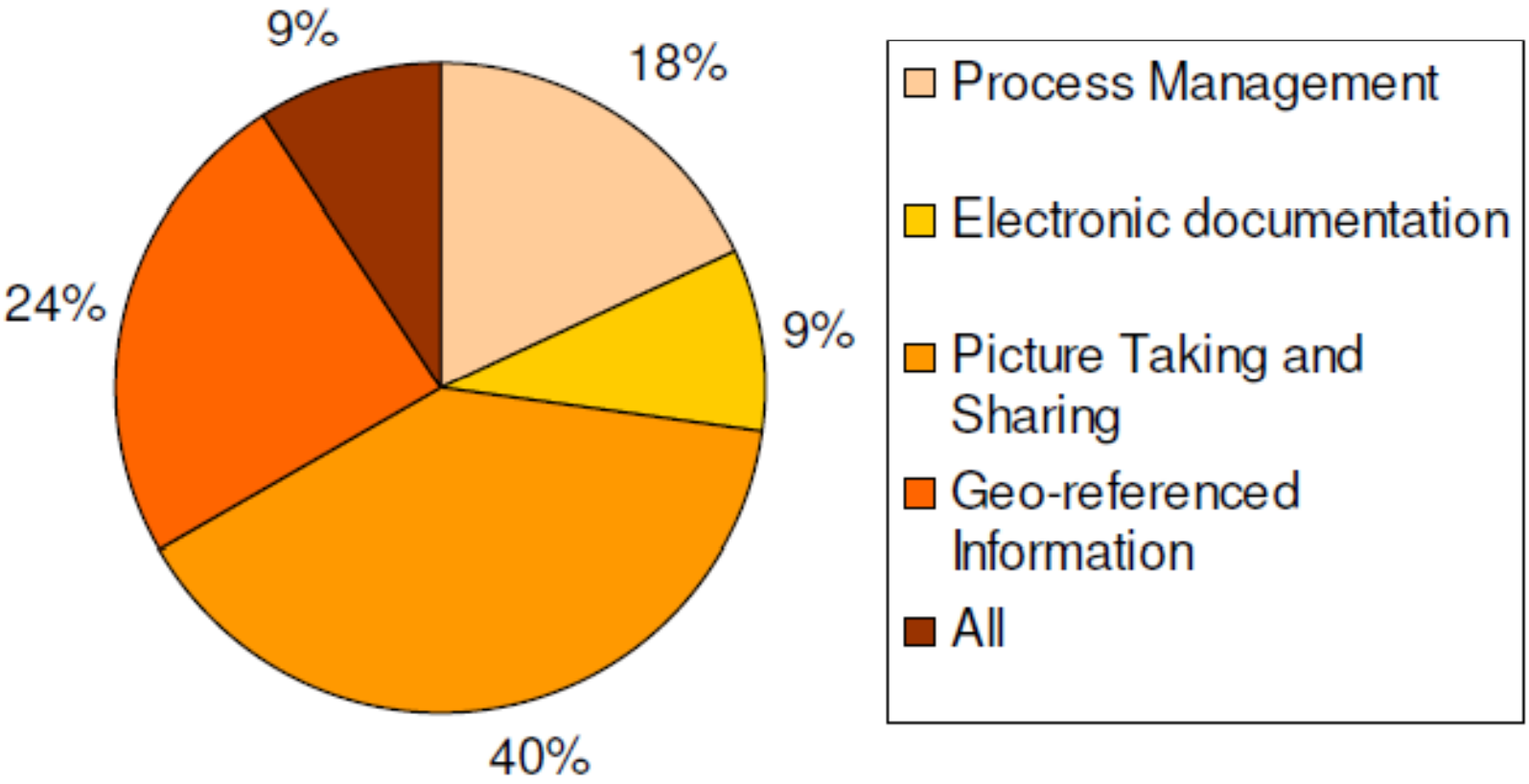
Example Results





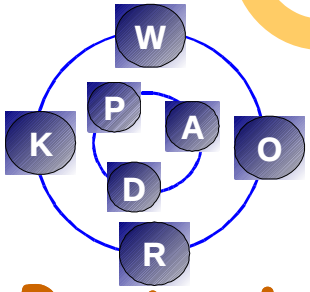
It is difficult for me to navigate in WORKPAD.

Example Results



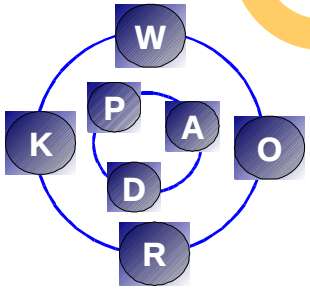
Which aspects do you consider as very useful?

Lessons Learned / 1



- Active and continuous involvement of Protezione Civile both as institution and as individuals
  - Users have always been at the heart of the development through several iterations of the user requirement analysis
  - Users have been always confronting with the intermediate development milestones (ranging from initial paper mockups and intermediate demonstrators to the final prototype)
- Being users always at the center, the final results have been extremely satisfactory, and the system has fully met the user requirements from every perspective

Lessons Learned / 2



- The Human-Machine Approach to the analysis user requirements have been very useful for the end users themselves
- During the initial phases of user-requirement collection, we learned that civil-protection operators did not have clearly in mind the actual procedures and activities that they followed to face against emergencies.
  - That is also typical in many other domains.
- They have been forced to analyze carefully the current-day procedure and, hence, could find any pitfalls.
- Systemizing the procedures followed to manage emergencies guarantee a more systematic emergency management
  - Overall improvement of the response time that is not only motivated by the mere use of the system.