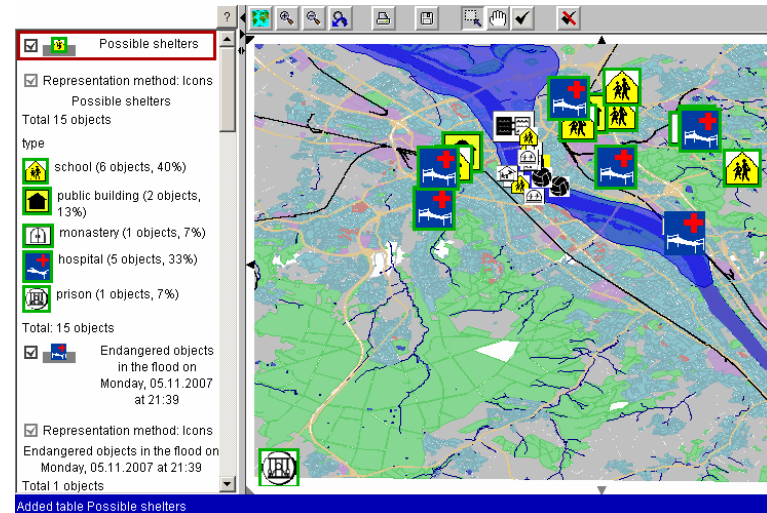
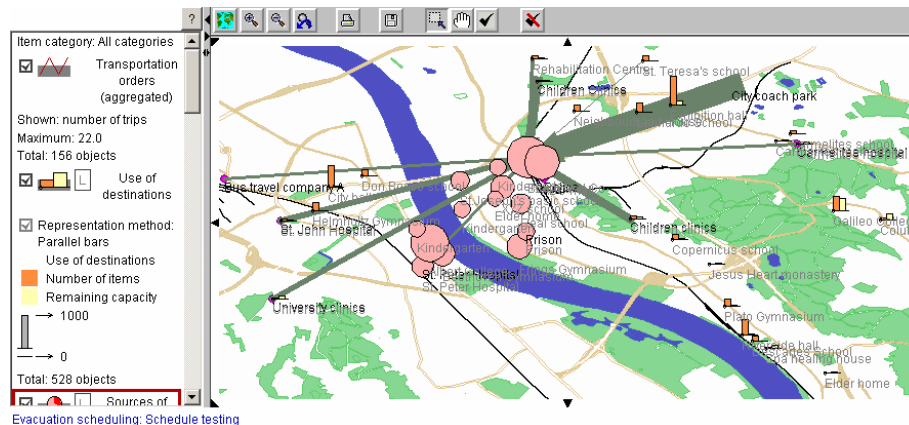


Content

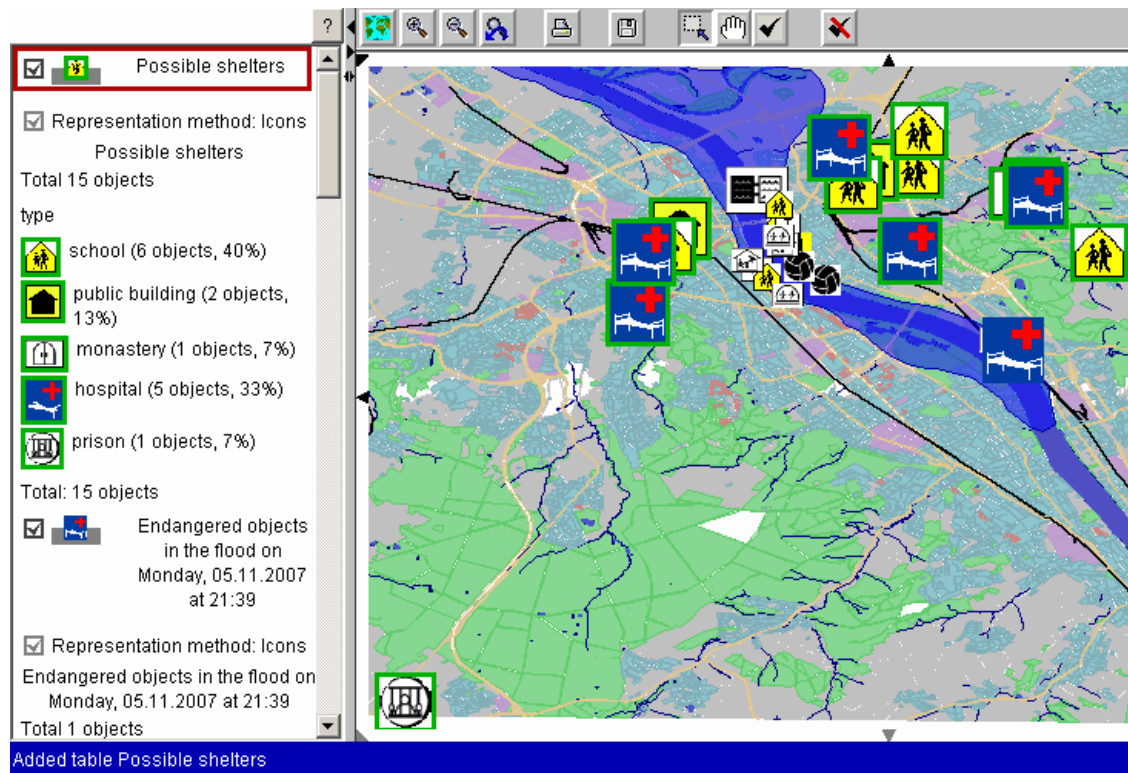
1. Intelligent search tool



2. Automated scheduling of evacuation



1) Intelligent Search



Main Functions

- Search for risk objects (that may cause secondary disastrous events)
- Search for places containing endangered people (animals, valuable items)
- Estimation of the number of population in a crisis-affected area
- Search for places that can be used as shelters for various categories of items



To start the work

Enter information about the current event

- > in a dialog
- > or from a TSO

Required information:
> Type (fire, flood, ...)
> Perimeter of the affected area

Situation manager

Date: 06.09.2006 Wednesday Time: 11:06 Get current date and time

Events Agents Risks Endangered objects Population Shelters

Actual Expected Potential Past

Add event Show on map Change

TSO

Import from file channel not connected Connect Listen

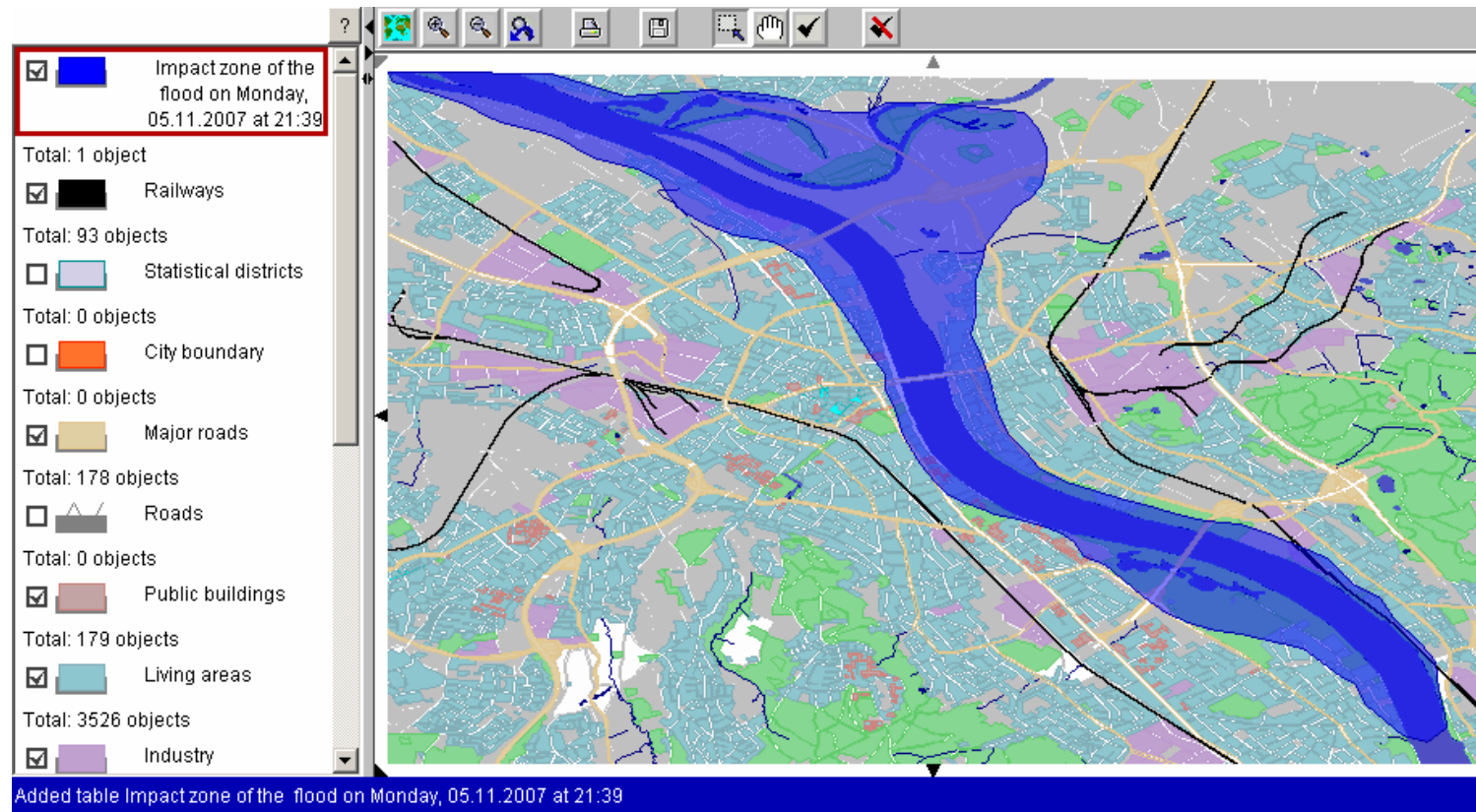
Export to file channel not connected Connect

TSO options

Fetch

Generate presentation Reset Clear map

Example: Flood



After the information about the event has been entered, the event-affected area is shown on an interactive map display

Search for risk objects

Date: 05.11.2007 Monday Time: 21:43 Get current date and time

Events Agents Risks Endangered objects Population Shelters

Find risk objects Load more objects Show on map Remove from map

Date: 05.11.2007 Monday Time: 21:45 Get current date and time

Events Agents Risks Endangered objects Population Shelters

Purification plant Shell

Purification plant
Type: sewerage facilities
State: intact Change
Immediate risk:
Risk of release: release of sewage contained in Purification plant may happen because of the water involved in flood on Monday, 05.11.2007 at 21:39

Load more objects Show on map Remove from map

Import from file channel Export to file chan

Generate presentation

Immediate risks involved in the flood on Monday, 05.11.2007 at 21:39

Representation method: Icons
Immediate risks involved in the flood on Monday, 05.11.2007 at 21:39

Total 1 objects
type
sewerage facilities (1 objects, 100%)

Total: 1 object

Latent risks involved in the flood on Monday, 05.11.2007 at 21:39

Representation method: Icons
Latent risks involved in the flood on Monday, 05.11.2007 at 21:39

Total 1 objects
type
gas station (1 objects, 100%)

Added table Immediate risks involved in the flood on Monday, 05.11.2007 at 21:39

Search for endangered people (may also be animals or other items)

The screenshot displays a GIS application interface with the following components:

- Date/Time Selector:** Date: 05.11.2007, Monday, Time: 21:50, Get current date and time.
- Navigation Tabs:** Events, Agents, Risks, Endangered objects, Population, Shelters.
- Search Bar:** "Find endangered objects" (highlighted with a red circle), "Load more objects".
- Object List:**
 - Spa healing house (selected)
 - St. Joseph's basic school
 - St. Joseph church
 - Stadium
 - Tennis court
 - Einstein school
 - Albert College
 - Beethoven Gymnasium
 - Kindergarten
 - Metropol cinema
- Object Details Panel (for Spa healing house):**
 - Spa healing house (with hospital icon)
 - Type: hospital
 - State: intact (Change button)
 - Endangered items:
 - 1) patients (health condition = sick or disabled)
 - 2) employees
 - Dangers to patients: water involved in flood on Monday, 05.11.2007 at 21:39
 - The employees are exposed to the same dangers as the patients.
 - Show on map, Remove from map buttons.
- Map:** A map showing a flood area in blue. A red arrow points from the search bar to the map, and another red arrow points from the "Spa healing house" entry in the list to a specific icon on the map.
- Summary Panel (bottom left):**
 - Endangered objects in the flood on Monday, 05.11.2007 at 21:39
 - Representation method: Icons
 - Endangered objects in the flood on Monday, 05.11.2007 at 21:39
 - Total 1 objects
 - type: hospital (1 objects, 100%)
 - Total: 1 object
 - Objects that may need care in the flood on Monday, 05.11.2007 at 21:39
 - Representation method: Icons
 - Objects that may need care in the flood on Monday, 05.11.2007 at 21:39
 - Total 13 objects
 - type:
- Map Legend:** Spa healing house ID=40 type hospital
- Status Bar:** Added table Endangered objects in the flood on Monday, 05.11.2007 at 21:39

Estimation of the number of affected population

Date: 05.11.2007 Monday Time: 21:56 Get current date and time

Events Agents Risks Endangered objects Population Shelters

1)

Estimate the number of endangered people

2)

Sources of population data

District boundaries:

- C:\JavaSources\deploy_IDAS\crisis_area\rr_geo.xml
- use another source

Population counts:

- are together with the district boundaries
- use other sources

Explanations of the attributes (field names):

- No explanations available

OK Cancel

3)

Specify which attributes represent the absolute numbers of people of the following categories:

Total population

pTotal confirmed Check/Change

elderly people

the sum of p65-75 and p75-99 confirmed Check/Change

children

the sum of p00-03,p03-06,p06-10, and p10-15 confirmed Check/Change

small children

p00-03 confirmed Check/Change

infants confirmed Check/Change

invalids confirmed Check/Change

prisoners confirmed Check/Change

4)

Date: 05.11.2007 Monday Time: 21:57 Get current date and time

Events Agents Risks Endangered objects Population Shelters Cancel

Total population: 20962
elderly people: 3605
children: 2584
small children: 577

Re-estimate the number of endangered people



Search for possible shelters

The screenshot shows a GIS application interface for searching for possible shelters. The main window displays a map with various icons representing different types of buildings and facilities. A legend on the right side of the map provides a breakdown of the search results:

- Possible shelters:**
 - Representation method: Icons
 - Total 15 objects
 - type:
 - school (6 objects, 40%)
 - public building (2 objects, 13%)
 - monastery (1 objects, 7%)
 - hospital (5 objects, 33%)
 - prison (1 objects, 7%)
 - Total: 15 objects
- Endangered objects in the flood on Monday, 05.11.2007 at 21:39:**
 - Representation method: Icons
 - Total 1 objects

At the bottom of the map window, a status bar indicates: "Added table Possible shelters".

The search results are displayed in a table below the map. The table is titled "Possible shelters" and shows the following results:

Item	Type	number of people	capacity
Columbus School	school	300.0	300.0
Leonardo School	school		
Neighbourhood House			
St. Teresa's school			
Carmelites monastery			
Carmelites school			

The search results are grouped by item categories, as indicated by the text on the right side of the image: "The search results are grouped by item categories".

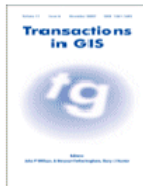
The search results are grouped by item categories

Data used

- A table with various objects (buildings and other places): coordinates, type, name
 - > Search for risk objects
 - > Search for containers of endangered people (animals, other items)
 - > Search for possible shelters
- Census data (population counts by districts)
 - > Estimation of the number of affected population
 - > If not available, the population counting function cannot be used



Transactions in GIS



Transactions in GIS

Volume 11 Issue 6, Pages 889 - 909

Published Online: 30 Dec 2007

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Research Article

Intelligent Visualisation and Information Presentation for Civil Crisis Management

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Abstract



This paper describes an ongoing research work on developing methods for effective visualisation support for situation analysis, decision making, and communication in the course of disaster management. The major goals are to reduce the information load of the analyst, decision maker, or information recipient without omission of anything important and to ensure quick and accurate comprehending of the information. The work embraces the issues of selection of the relevant information and defining the appropriate level of detail, data preparation (aggregation and other transformations), and selection of the appropriate methods for visual representation depending on the user's tasks or communication goals, recipient's profile, and the target presentation medium. A practical outcome from the research will be a knowledge base that can be used to support analysis, decision making, and information communication in emergency situations. A great part of the knowledge, specifically, knowledge on data transformation and representation, is generic and can be used for different applications.

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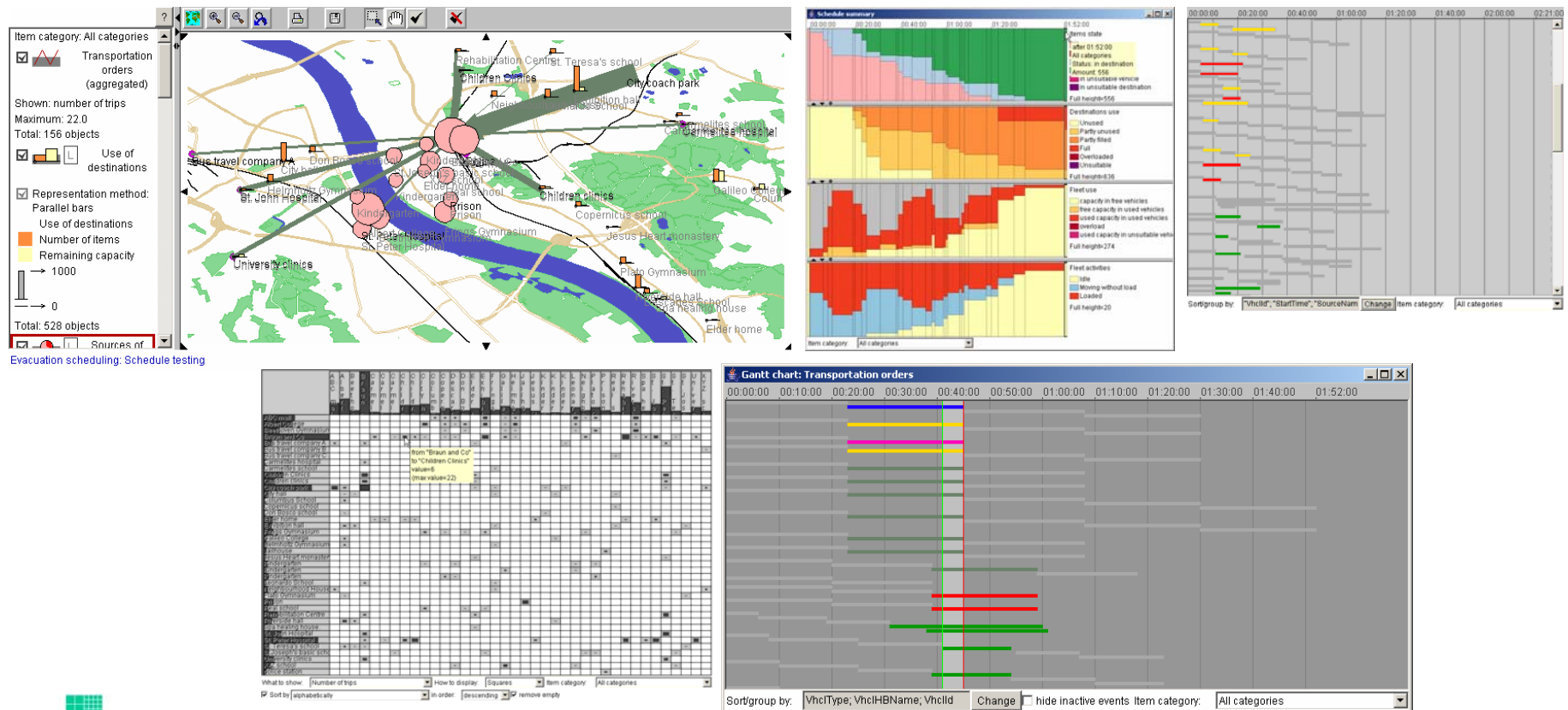
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see also: <http://geoanalytics.net/and/>

2. Automated scheduling of evacuation



2.A. General information

Main functions

- Automatic generation of schedules for the transportation of various items (people, animals, valuable objects) from multiple sources to suitable destinations
 - Difference from business logistics: destinations must be chosen; people or items must be divided into groups or batches fitting in vehicles (in business applications the destination of each item or batch of items is known in advance)
- Interactive visual tools for the preparation of input data
- Interactive visual tools for reviewing of the generated schedules

What is a schedule

- A schedule is a set of *transportation orders*
- A transportation order defines one trip of a vehicle: vehicle ID, source place, destination place, departure time, arrival time, category of items to transport, number of items
- A single schedule may consist of hundreds of transportation orders

Example schedule (fragment)

Vehicle 8

Type: ambulance car (20)

Initial position: Hospital Botosani (hbot); latitude=47.750305; longitude=26.66815

Trip N	Time	Load	Amount	Origin	Identifier	latitude	longitude	Destination	Identifier	latitude	longitude	End time
1	00:00:00	-	0	Hospital Botosani	hbot	47.75031	26.66815	Spitalul comunal	h1	47.76828	27.004	00:24:00
2	00:24:00	invalids who cannot seat	2	Spitalul comunal	h1	47.76828	27.004	Hospital Botosani	hbot	47.75031	26.66815	00:47:00
3	00:47:00	-	0	Hospital Botosani	hbot	47.75031	26.66815	Spitalul comunal	h1	47.76828	27.004	01:10:00
4	01:10:00	invalids who cannot seat	2	Spitalul comunal	h1	47.76828	27.004	Hospital Botosani	hbot	47.75031	26.66815	01:33:00

Vehicle 6

Type: life support ambulance car (21)

Initial position: Spitalul comunal (h1); latitude=47.76828; longitude=27.004

Trip N	Time	Load	Amount	Origin	Identifier	latitude	longitude	Destination	Identifier	latitude	longitude	End time
1	00:00:00	critically sick or injured people	1	Spitalul comunal	h1	47.76828	27.004	Hospital Botosani	hbot	47.75031	26.66815	00:21:00
2	00:21:00	-	0	Hospital Botosani	hbot	47.75031	26.66815	Spitalul comunal	h1	47.76828	27.004	00:41:00
3	00:41:00	critically sick or injured people	1	Spitalul comunal	h1	47.76828	27.004	Hospital Botosani	hbot	47.75031	26.66815	01:01:00

Vehicle 14

Type: autocamion (30)

Initial position: SC Elmar SRL Trusesti (oth5); latitude=47.763; longitude=27.00388

Trip N	Time	Load	Amount	Origin	Identifier	latitude	longitude	Destination	Identifier	latitude	longitude	End time
1	00:00:00	-	0	SC Elmar SRL Trusesti	oth5	47.763	27.00388	City Hall	ch1	47.76963	27.0082	00:08:00
2	00:08:00	general people or children	50	City Hall	ch1	47.76963	27.0082	Scoala cu clasele I-VIII	sch9	47.78289	26.92436	00:29:00
3	00:30:00	-	0	Scoala cu clasele I-VIII	sch9	47.78289	26.92436	Liceul Teoretic Demostene Botez localul I	sch1	47.76384	27.01403	00:52:00
4	00:52:00	general people or children	30	Liceul Teoretic Demostene Botez localul I	sch1	47.76384	27.01403	Scoala cu clasele I-IV	sch53	47.75547	27.06761	01:07:00
5	01:07:00	-	0	Scoala cu clasele I-IV	sch53	47.75547	27.06761	City Hall	ch1	47.76963	27.0082	01:25:00
6	01:25:00	general people or children	40	City Hall	ch1	47.76963	27.0082	Scoala cu clasele I-VIII	sch5	47.73008	26.99129	01:42:00

Static input data

Classes of items to evacuate

id, description
0,LEER
10,general people or children
12,infants
20,invalids who can seat
21,invalids who cannot seat
22,disabled people using wheelchairs
23,critically sick or injured people

Suitability and capacities of the vehicles

vehicle type, item type, capacity

0,0,1
0,23,1
0,21,1
0,20,1
0,22,1
0,10,1
10,10,50
10,20,25
20,21,2
20,20,5
20,22,2
21,23,1
30,10,50
40,10,30

required for technical purposes

Classes of vehicles

id, description, speed_factor
0,virtual,1.0
10,bus,1.0
20,ambulance car,1.3
21,life support ambulance car,1.5
30,autocamion,0.5
40,tractoare cu remorca,0.5

required for technical purposes

Loading times

vehicle type, item type, loading time

10,10,0.5
10,20,1.0
20,21,3.0
20,20,1.0
20,22,5.0
21,23,5.0
30,10,1.0
40,10,1.0

2.B. Obtaining a schedule

Start of the work

- Standalone use:
 - Start scheduler.bat or use a corresponding shortcut
 - Menu “Schedule” > “Start the schedule”
- Use with IDAS:
 - Start IDAS (idas.bat) and specify information about the event (e.g. by importing a TSO)
 - Find endangered objects
 - Find possible shelters
 - In the map window: menu “Schedule” > “Start the schedule”



Use with IDAS

Situation manager

Date: 29.02.2008 Friday Time: 15:35 Get current date and time

Events Agents Risks Endangered objects Population Shelters

Gradinita cu program normal Trusesti
Spitalul comunal Trusesti
City Hall Trusesti
Liceul Teoretic Demostene Botez lo
Scoala cu clasele I-VIII Trusesti

Type: child day care facilities

State: intact Change

Endangered items
1) small children (age = 4 or less)
2) children (age =)
3) employees
Dangers to small children

Load more objects Show on map

TSO

Import from file channel not connected
Export to file channel not connected

TSO options

Generate presentation

Found 5 endangered objects

OASIS Romania

File Schedule Tools Display

- Start the scheduler
- Load a schedule
- Summary view
- Line (Gantt) chart
- Source-destination matrix
- Write orders in text file

Total: 70 objects

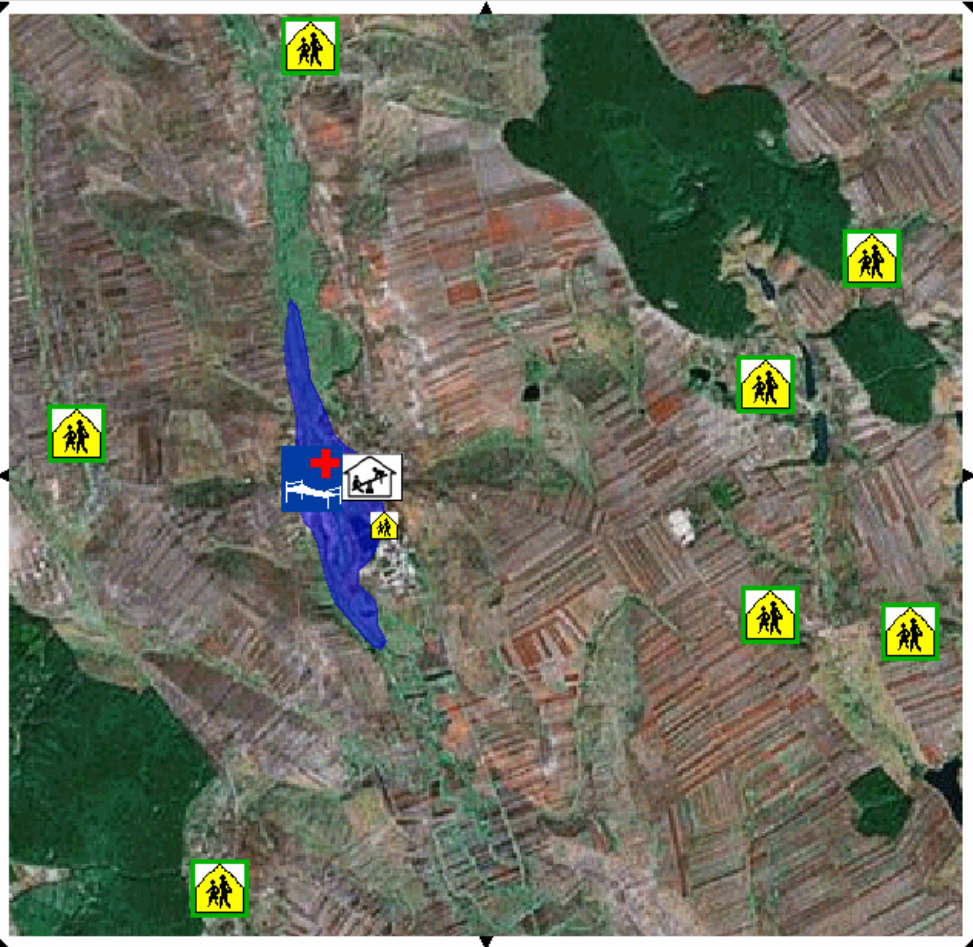
- hall (10 objects, 14%)
- school (60 objects, 86%)

Total: 2 objects

- Kindergarten (1 objects, 50%)
- hospital (1 objects, 50%)

Total: 3 objects

Added table Possible shelters



Specify the sources of the items to evacuate

Received from IDAS

The screenshot shows the OASIS Romania software interface. On the left, a sidebar lists various item sources and shelters. A red box highlights the source 'Endangered objects in the flood on Wednesday, 27.02.2008 at 15:49'. In the center, a map displays several yellow school icons and two red target icons. A 'New site(s)' dialog box is open, showing a list of sites: 'h1 Spitalul comunal Trusesti' and 'kg1 Gradinita cu program normal Trusesti'. The 'h1' site is selected. The dialog also includes options to 'take site(s) from' a specific source or to 'Enter new site(s) by clicking on the map'.

The 'Items in source locations' dialog box displays a table with the following columns: ID, Name, Item category, Number, and Time. Below the table, there is a 'Common time limit (minutes):' field and buttons for 'Add a site', 'Done', 'Add an item category', and 'Remove the site'.

Select appropriate sites from the list

They are marked on the map

After pressing OK, you will be asked about the categories of items in each of the selected sites:

The 'Add a site' dialog box shows details for a selected site. The 'Site ID' is 'h1', the 'Site name' is 'Spitalul comunal Trusesti', and the 'Site type' is 'hospital'. Under 'Item categories', the following options are listed with checkboxes: 'critically sick or injured people' (checked), 'infants' (unchecked), 'invalids who cannot seat' (checked), 'invalids who can seat' (unchecked), 'disabled people using wheelchairs' (unchecked), and 'general people or children' (unchecked). The 'invalids who can seat' option is highlighted with a mouse cursor.

Selected sites and corresponding item categories appear in the window:

Items in source locations

Items in the source sites and their time limits, in minutes

ID	Name	Item category	Number	Time
<input type="radio"/> h1	Spitalul comunal Trusesti	critically sick or injured people	0	
		invalids who cannot seat	0	
		invalids who can seat	0	
		disabled people using wheelchairs	0	
<input checked="" type="radio"/> kg1	Gradinita cu program normal Trusesti	general people or children	0	

Common time limit (minutes):

Current site:

Press this button to add more sites

New site(s)

take site(s) from

ch1 City Hall Trusesti
 sch1 Liceul Teoretic Demostene Botez localul I Trusesti
 sch4 Scoala cu clasele I-VIII Trusesti

take site(s) from

Enter new site(s) by clicking on the map

Received from IDAS

Display

Item sources
 Total: 2 objects

Possible shelters
 Total: 0 objects, 14%

Representation method: Icons

Possible shelters
 Total: 1 (60 objects, 86%)

Endangered objects in the flood on Wednesday, 27.02.2008 at 15:49

Representation method: Icons

Endangered objects in the flood on Wednesday, 27.02.2008 at 15:49

Total: 2 objects

type

- Kindergarten (1 objects, 50%)
- hospital (1 objects, 50%)

Total: 2 objects

Objects that may need care in the flood on Wednesday, 27.02.2008 at 15:49

Representation method: Icons

Objects that may need care in the flood on Wednesday, 27.02.2008 at 15:49

Loaded 7 records from C:\JavaSources\deploy_IDAS\Botosani\static_data\item_classes.csv

Selected sites and corresponding item categories are added to the list of the source sites:

ID	Name	Item category	Number	Time
<input checked="" type="radio"/> h1	Spitalul comunal Trusesti	critically sick or injured people	0	0
		invalids who cannot seat	0	0
		invalids who can seat	0	0
		disabled people using wheelchairs	0	0
<input type="radio"/> kg1	Gradinita cu program normal Trusesti	general people or children	0	0
<input type="radio"/> ch1	City Hall Trusesti	general people or children	0	
<input type="radio"/> sch1	Liceul Teoretic Demostene Botez localul I Trusesti	general people or children	0	
<input type="radio"/> sch4	Scoala cu clasele I-VIII Trusesti	general people or children	0	

Common time limit (minutes):

Current site:

Press this button if you wish to add more sites

take site(s) from

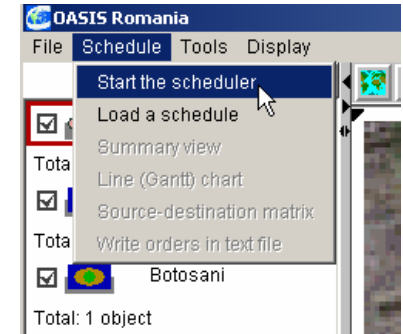
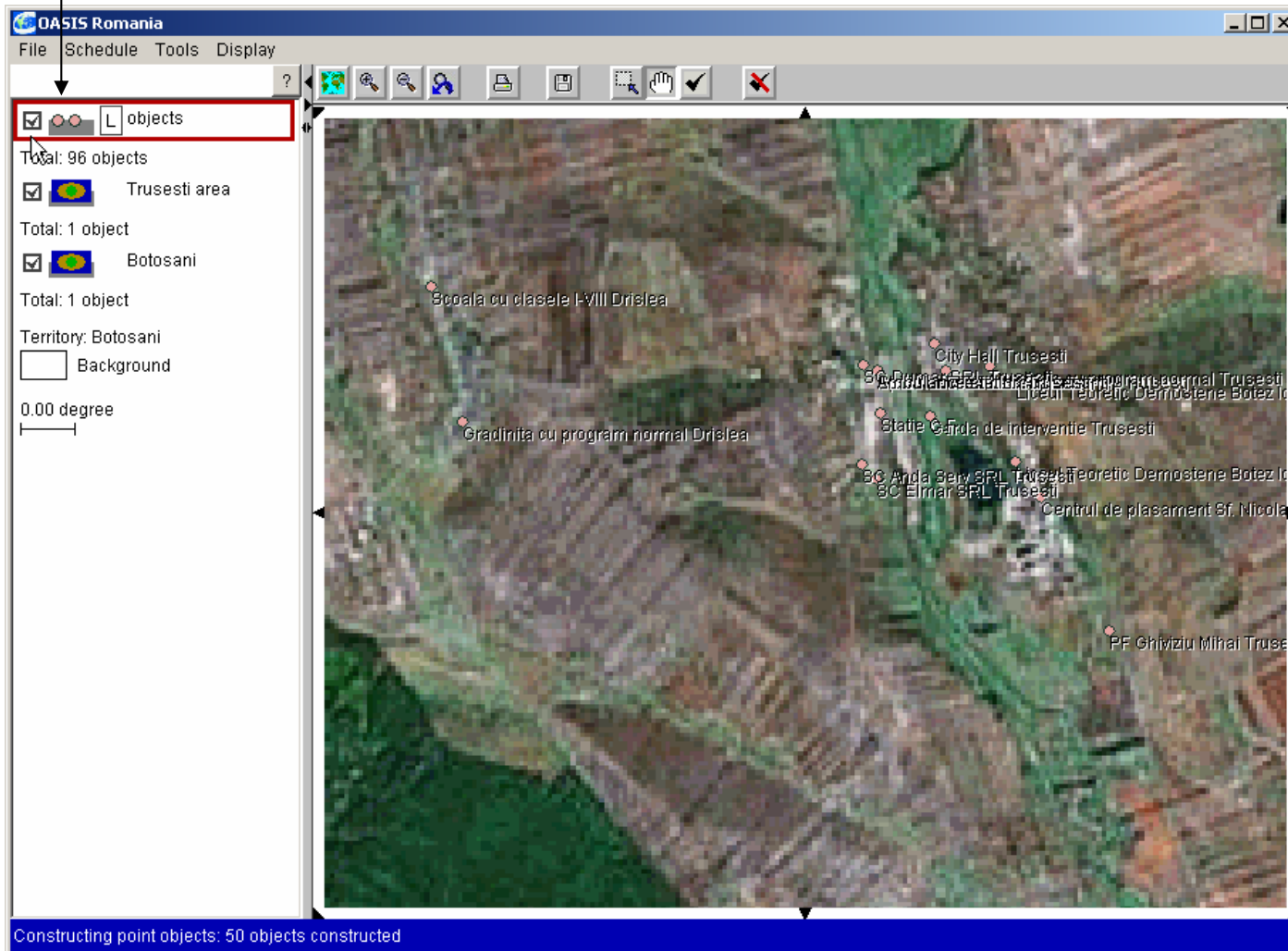
Enter new site(s) by clicking on the map

- You can select sites from existing map layers
- Or enter new sites by clicking on the map

Use without IDAS

Ensure that the layer with the objects is loaded

Select the menu item "Start the scheduler"



- You can select sites from existing map layers such as "objects"
- Or enter new sites by clicking on the map



Specify the numbers of the items and the time limits (maximum time before departure)

Items in source locations

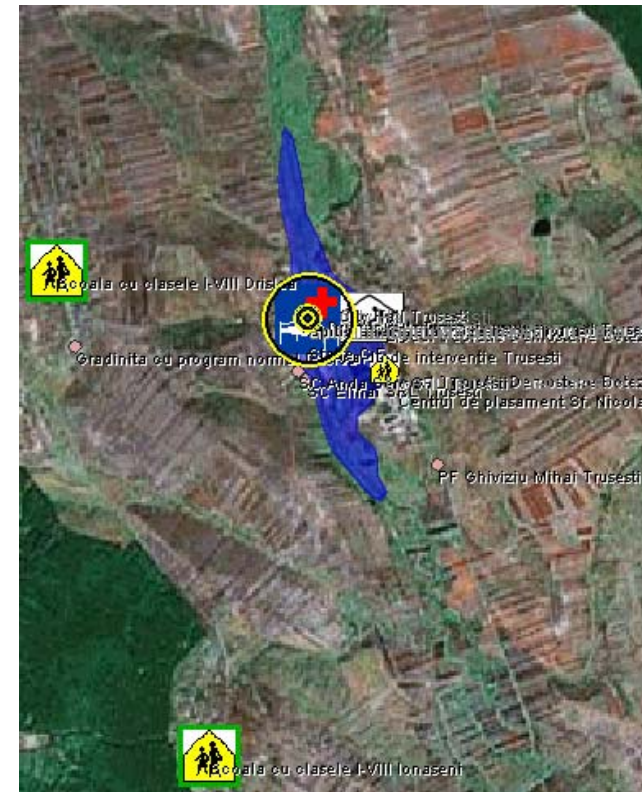
Items in the source sites and their time limits, in minutes

ID	Name	Item category	Number	Time
<input checked="" type="radio"/> h1	Spitalul comunal Trusesti	critically sick or injured people	7	90
		invalids who cannot seat	18	0
		invalids who can seat	0	0
		disabled people using wheelchairs	0	0
<input type="radio"/> kg1	Gradinita cu program normal Trusesti	general people or children	0	0
<input type="radio"/> ch1	City Hall Trusesti	general people or children	0	
<input type="radio"/> sch1	Liceul Teoretic Demostene Botez localul I Trusesti	general people or children	0	
<input type="radio"/> sch4	Scoala cu clasele I-VIII Trusesti	general people or children	0	

Common time limit (minutes):

Current site:

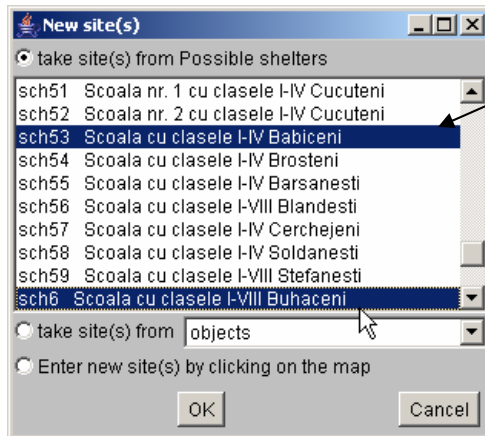
Currently selected site is highlighted on the map



Enter a common time limit in this field and press "Enter". The value will be inserted in the fields where the time limits are not specified yet.

Press "Done" when all data are specified.

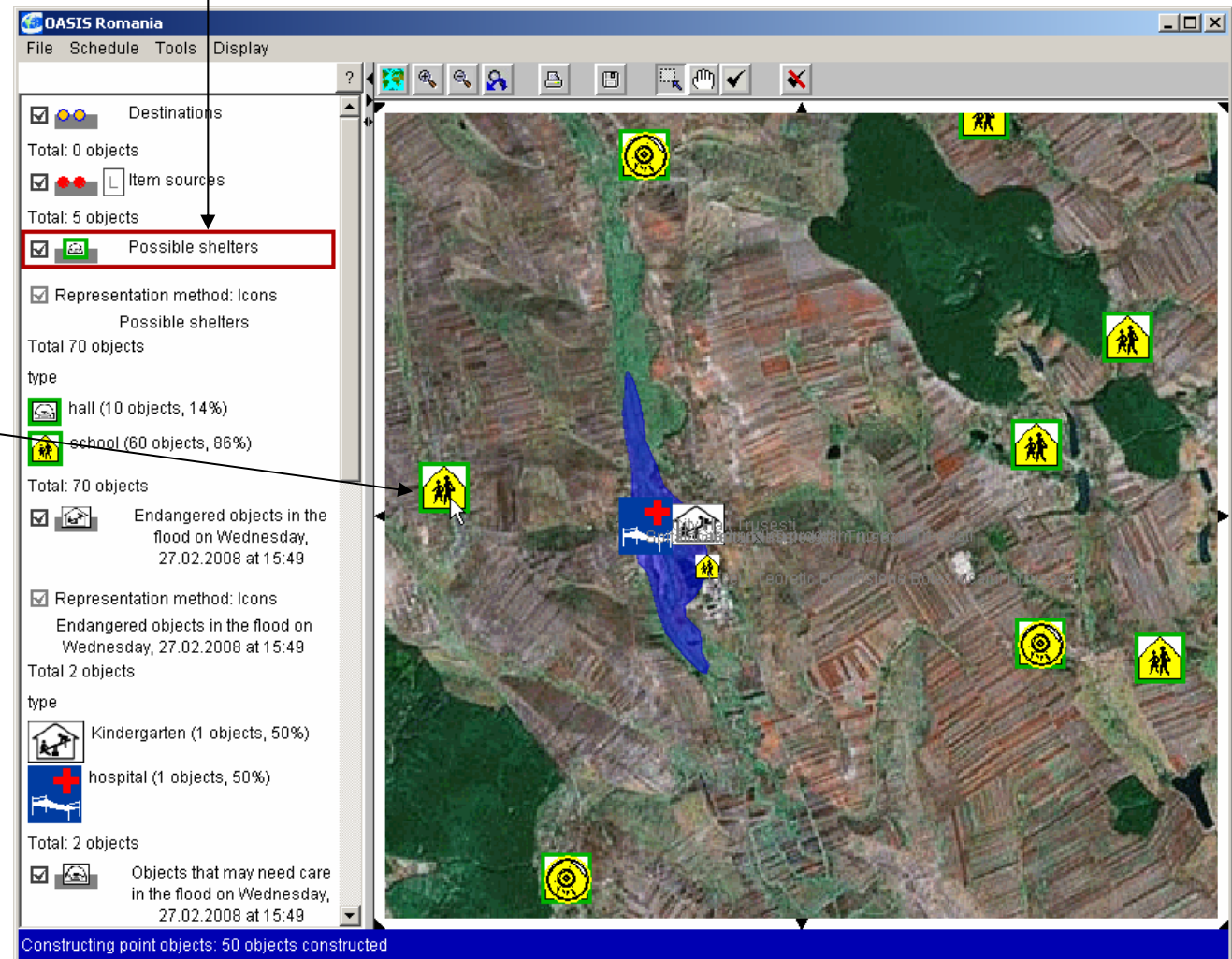
Specify the destinations for the items



In case of use with IDAS, you will be suggested to select sites from the list of possible shelters found by IDAS.

You can select sites by clicking on their positions on the map.

If IDAS is not used, you can select sites from available map layers or enter new sites by clicking on the map.



Specify what categories of items may be sheltered in each selected destination

New site(s)

- take site(s) from Possible shelters
 - sch58 Scoala cu clasele I-IV Soldanesti
 - sch59 Scoala cu clasele I-VIII Stefanesti
 - sch6 Scoala cu clasele I-VIII Buhaceni**
 - sch60 Scoala cu clasele I-VIII Stanca
 - sch61 Scoala cu clasele I-VIII Stanca
 - sch62 Scoala cu clasele I-IV Badiuti
 - sch63 Scoala cu clasele I-VIII Bobulesti
 - sch7 Scoala cu clasele I-VIII Drislea
 - sch8 Scoala cu clasele I-VIII Gorbanesti
 - sch9 Scoala cu clasele I-VIII Socrujeni
- take site(s) from objects
- Enter new site(s) by clicking on the map

Add a site

Site ID: sch5
 Site name: Scoala cu clasele I-VIII Ionasei
 Site type: school

Item categories:

- critically sick or injured people
- invalids who cannot seat
- invalids who can seat
- disabled people using wheelchairs
- general people or children

In the resulting list of the selected destinations, fill the capacities of the destinations:

Destinations for the items to evacuate

Items to evacuate:

Item category	Number of items	Available capacity
critically sick or injured people	7	0
invalids who cannot seat	18	0
invalids who can seat	45	0
disabled people using wheelchairs	6	0
general people or children	480	0

Possible destinations and their capacities

ID	Name	Item category	Capacity
<input type="radio"/> sch5	Scoala cu clasele I-VIII Ionasei	general people or children	0
<input type="radio"/> sch53	Scoala cu clasele I-IV Babiceni	general people or children	0
<input type="radio"/> sch6	Scoala cu clasele I-VIII Buhaceni	general people or children	0
<input type="radio"/> sch7	Scoala cu clasele I-VIII Drislea	general people or children	0
<input checked="" type="radio"/> sch9	Scoala cu clasele I-VIII Socrujeni	general people or children	0

Current site:

Destinations for the items to evacuate

Items to evacuate:

Item category	Number of items	Available capacity
critically sick or injured people	7	0
invalids who cannot seat	18	0
invalids who can seat	45	0
disabled people using wheelchairs	6	0
general people or children	480	560

Possible destinations and their capacities

ID	Name	Item category	Capacity
<input type="radio"/> sch5	Scoala cu clasele I-VIII Ionaseni	general people or children	120
<input type="radio"/> sch53	Scoala cu clasele I-IV Babiceni	general people or children	80
<input type="radio"/> sch6	Scoala cu clasele I-VIII Buhaceni	general people or children	130
<input type="radio"/> sch7	Scoala cu clasele I-VIII Drislea	general people or children	110
<input checked="" type="radio"/> sch9	Scoala cu clasele I-VIII Socrujeni	general people or children	120

Current site:

There are no capacities suitable for the hospital patients!

There are no suitable types of objects among the possible shelters received from IDAS!

OASIS Romania

File Schedule Tools Display

Destinations

Total: 5 objects

Item sources

Total: 5 objects

Possible shelters

Representation method: Icons

Possible shelters

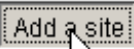
Total 70 objects

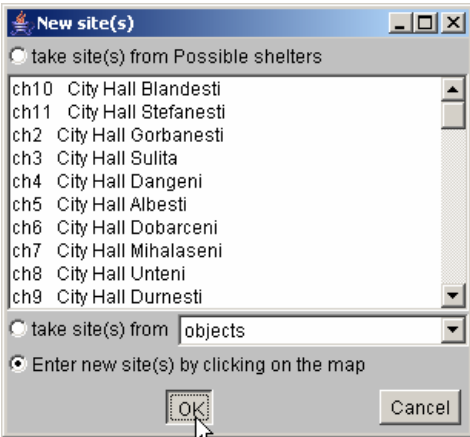
type

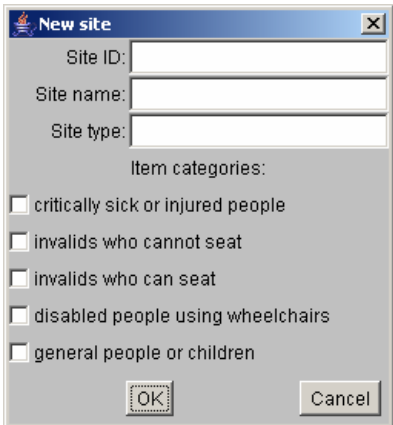
- hall (10 objects, 14%)
- school (60 objects, 86%)

Total: 70 objects

Endangered objects in the flood on Wednesday, 27.02.2008 at 15:49

1) 

2) 
 A dialog box titled "New site(s)" with a list of possible shelters (ch10 to ch9) and options to take sites from objects or enter new sites by clicking on the map. The "Enter new site(s) by clicking on the map" option is selected.

4) 
 A dialog box titled "New site" with fields for Site ID, Site name, and Site type. Below are item categories with checkboxes.


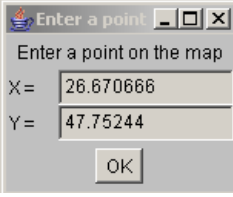
<input type="checkbox"/>	critically sick or injured people
<input type="checkbox"/>	invalids who cannot seat
<input type="checkbox"/>	invalids who can seat
<input type="checkbox"/>	disabled people using wheelchairs
<input type="checkbox"/>	general people or children

 An arrow points to the right, where the same dialog box is shown with the following values:

Site ID:	hbot
Site name:	Hospital Botosani
Site type:	hospital

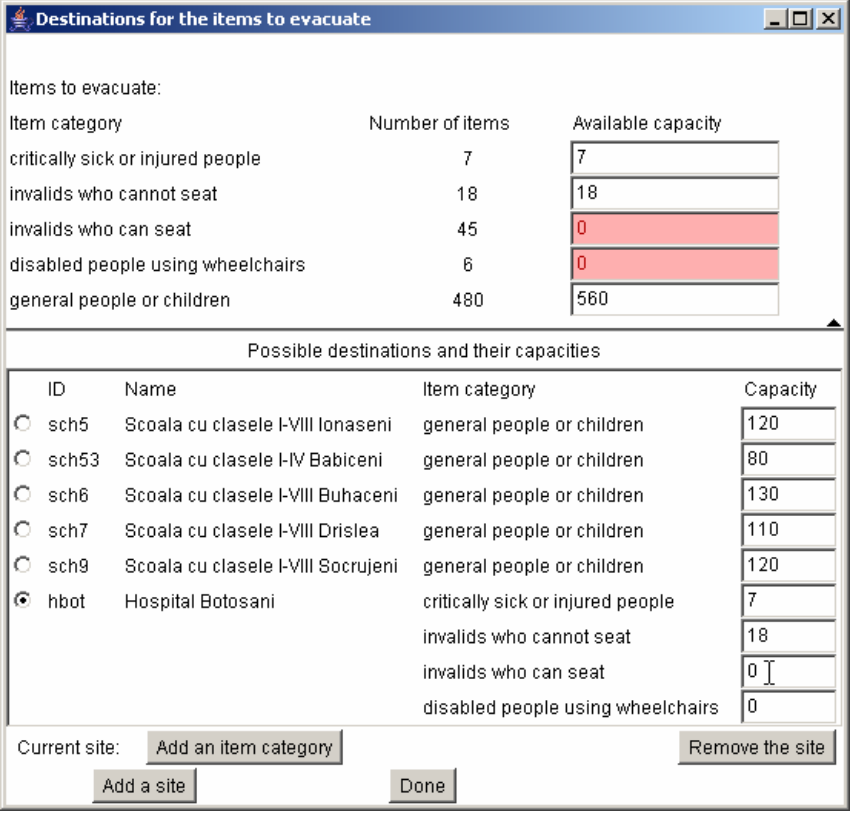
 The item categories are:

<input checked="" type="checkbox"/>	critically sick or injured people
<input checked="" type="checkbox"/>	invalids who cannot seat
<input checked="" type="checkbox"/>	invalids who can seat
<input checked="" type="checkbox"/>	disabled people using wheelchairs
<input type="checkbox"/>	general people or children

3) 
 A satellite map showing the town of Botoșani. A yellow cross marks a location. Four yellow icons with black silhouettes of people are placed on the map.
 
 A dialog box titled "Enter a point" with input fields for X and Y coordinates.

X =	26.670666
Y =	47.75244

Press OK after the position is marked by the cross

5) 
 A dialog box titled "Destinations for the items to evacuate" showing a table of items to evacuate and a list of possible destinations.

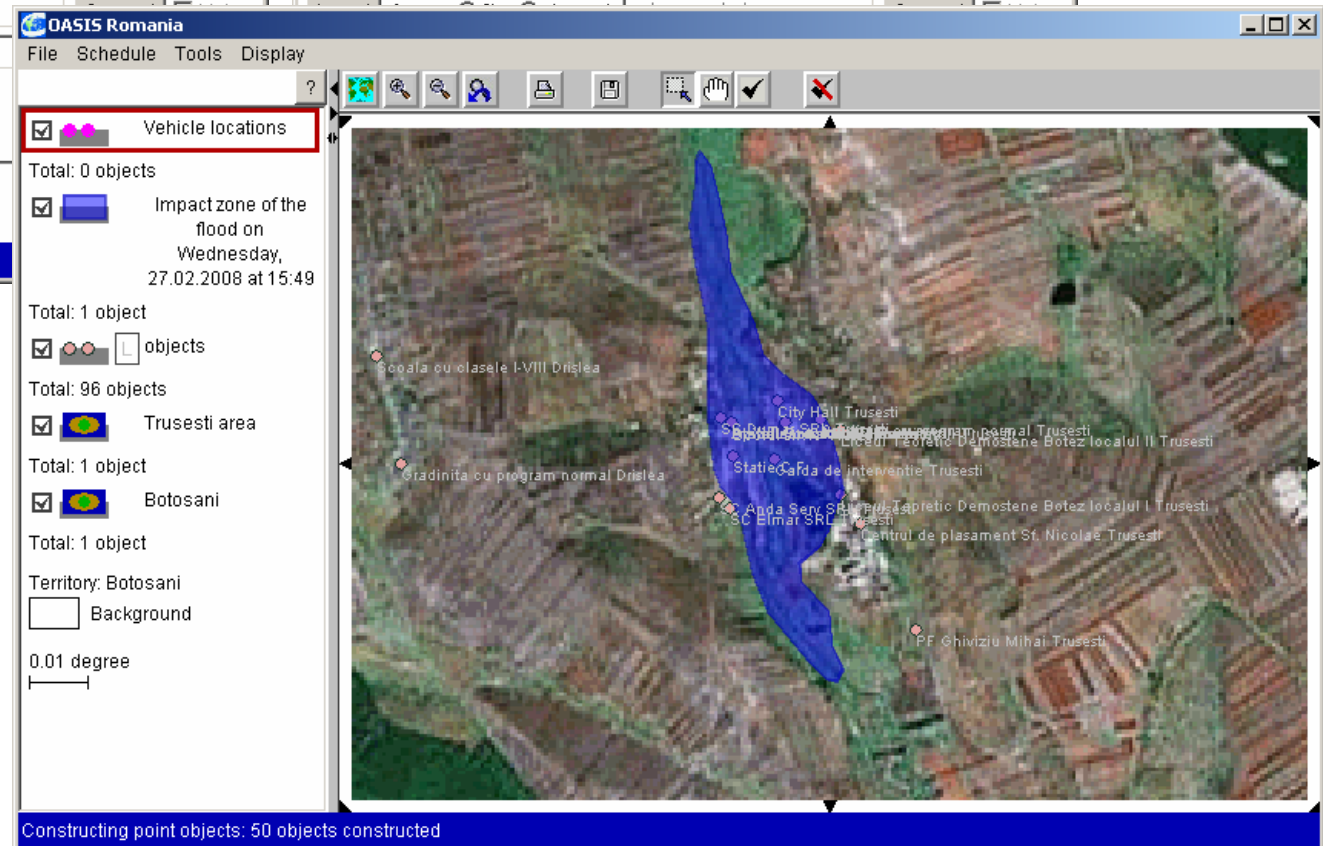
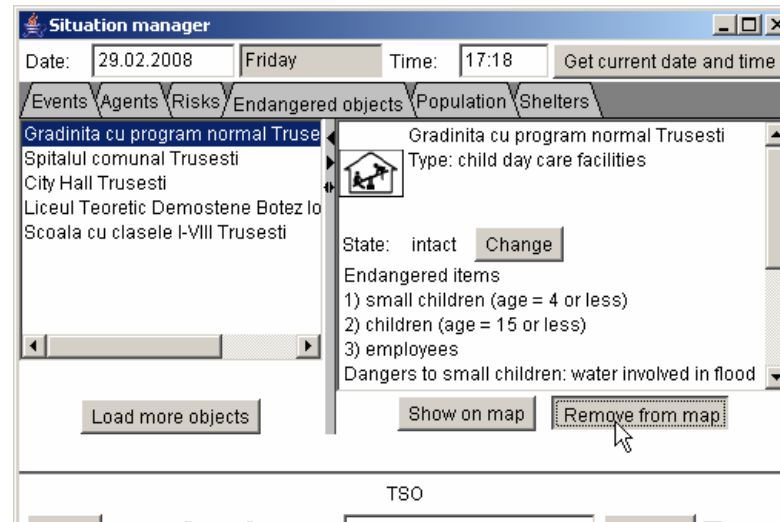
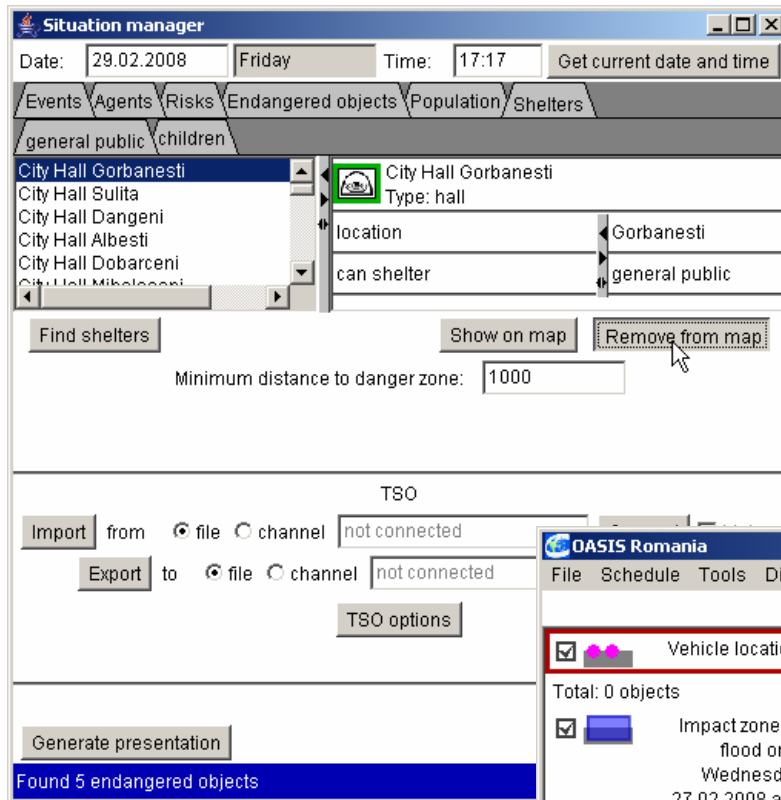
Item category	Number of items	Available capacity
critically sick or injured people	7	7
invalids who cannot seat	18	18
invalids who can seat	45	0
disabled people using wheelchairs	6	0
general people or children	480	560

 Below is a table of possible destinations:

ID	Name	Item category	Capacity	
<input type="radio"/>	sch5	Scoala cu clasele I-VIII Ionaseni	general people or children	120
<input type="radio"/>	sch53	Scoala cu clasele I-IV Babiceni	general people or children	80
<input type="radio"/>	sch6	Scoala cu clasele I-VIII Buhaceni	general people or children	130
<input type="radio"/>	sch7	Scoala cu clasele I-VIII Drislea	general people or children	110
<input type="radio"/>	sch9	Scoala cu clasele I-VIII Socrujeni	general people or children	120
<input checked="" type="radio"/>	hbot	Hospital Botosani	critically sick or injured people	7
			invalids who cannot seat	18
			invalids who can seat	0
			disabled people using wheelchairs	0

 At the bottom, there are buttons for "Add a site", "Done", and "Remove the site".

Press "Done" when ready



For your convenience, you can now let IDAS remove the icons from the map. Use the buttons “Remove from map” in the tabs “Risks”, “Endangered objects”, and “Shelters”.

Specify the locations of the vehicles

Select the sites where vehicles are available from appropriate map layers, which may include, among others, item sources and destinations. Additional locations may be entered by clicking on the map.

For each selected site specify the types of vehicles it contains

Enter data about the numbers of the vehicles in each site

ID	Name	Type of vehicle	Number	Ready time
<input type="radio"/> h1	Spitalul comunal Trusesti	ambulance car	0	0
<input type="radio"/> hbot	Hospital Botosani	life support ambulance car	0	0
<input type="radio"/> oth5	SC Elmar SRL Trusesti	autocamion	0	
<input type="radio"/> oth6	SC Dumar SRL Trusesti	autocamion	0	
<input type="radio"/> oth7	SC Anda Serv SRL Trusesti	tractoare cu remorca	0	
<input checked="" type="radio"/> oth8	PF Ghiviziu Mihai Trusesti	tractoare cu remorca	0	

You need to specify "Ready time" only when vehicles will not be available yet at the time when the evacuation begins.

You can open the section “Items to evacuate”...

ID	Name	Type of vehicle	Number	Ready time
<input type="radio"/> h1	Spitalul comunal Trusesti	ambulance car	6	0
		life support ambulance car	2	0
<input type="radio"/> hbot	Hospital Botosani	ambulance car	4	0
		life support ambulance car	2	0
<input type="radio"/> oth5	SC Elmar SRL Trusesti	autocamion	1	
<input type="radio"/> oth6	SC Dumar SRL Trusesti	autocamion	1	
<input type="radio"/> oth7	SC Anda Serv SRL Trusesti	tractoare cu remorca	2	
<input checked="" type="radio"/> oth8	PF Ghiviziu Mihai Trusesti	tractoare cu remorca	2	

Current site:

... and check if there are suitable vehicles for each category of items:

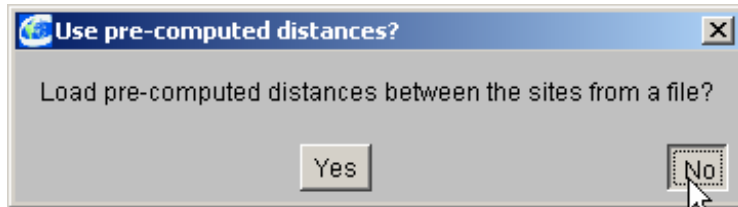
Item category	Number of items	Sum of capacities
critically sick or injured people	7	4
invalids who cannot seat	18	20
invalids who can seat	45	50
disabled people using wheelchairs	6	20
general people or children	480	220

ID	Name	Type of vehicle	Number	Ready time
<input type="radio"/> h1	Spitalul comunal Trusesti	ambulance car	6	0
		life support ambulance car	2	0
<input type="radio"/> hbot	Hospital Botosani	ambulance car	4	0
		life support ambulance car	2	0
<input type="radio"/> oth5	SC Elmar SRL Trusesti	autocamion	1	
<input type="radio"/> oth6	SC Dumar SRL Trusesti	autocamion	1	
<input type="radio"/> oth7	SC Anda Serv SRL Trusesti	tractoare cu remorca	2	
<input checked="" type="radio"/> oth8	PF Ghiviziu Mihai Trusesti	tractoare cu remorca	2	

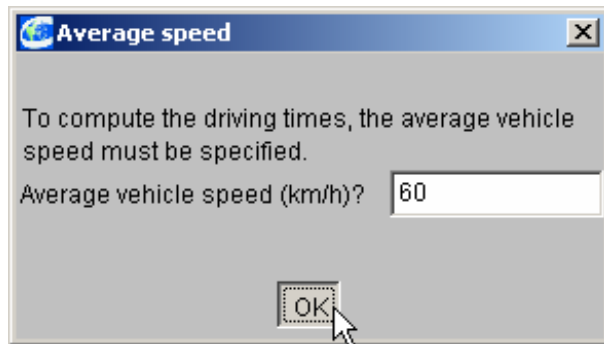
Current site:

Press “Done” when ready

Distances between the sites

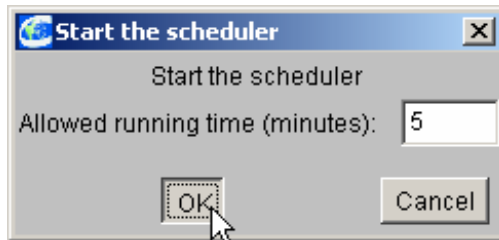


Press “Yes” if you have a file with distances and times of trips between the sites. If you press “No”, the system will estimate the distances on the basis of the coordinates of the sites (no data about roads are used).



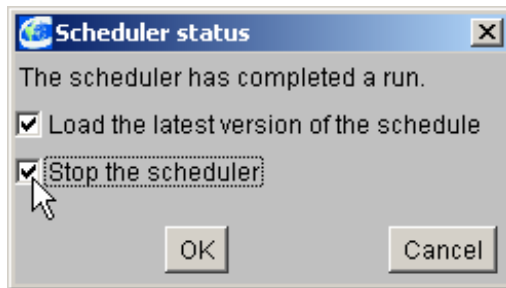
For the automatic estimation of the times enter the average speed of movement of a vehicle with the speed factor 1 (in our example data, this corresponds to a bus).

Start the scheduler



When the specified time passes before the scheduler finishes a run, you will receive a message and decide whether to wait more or stop the schedule.

It is desirable to wait for a result even if it takes a bit more time.



When the scheduler has completed a run and produced a version of a schedule, you can immediately stop the schedule or allow it to make another run.

It is not guaranteed that the next version of a schedule will be better. However, if you have enough time, you can allow the schedule to make several runs and then select the best variant from the produced schedules.

2.C. Reviewing a schedule

Visual tools for reviewing a schedule

- When the produced schedule is loaded in the system, summarised information is immediately shown in the visual form
 - On the map
 - On a summary display of the evacuation progress
- Additionally, the user may open
 - A line (Gantt) chart display
 - A transportation matrix display
 - A table display of the transportation orders
- The orders may also be written into a text file in a tab-separated values format



Evacuation progress summary view

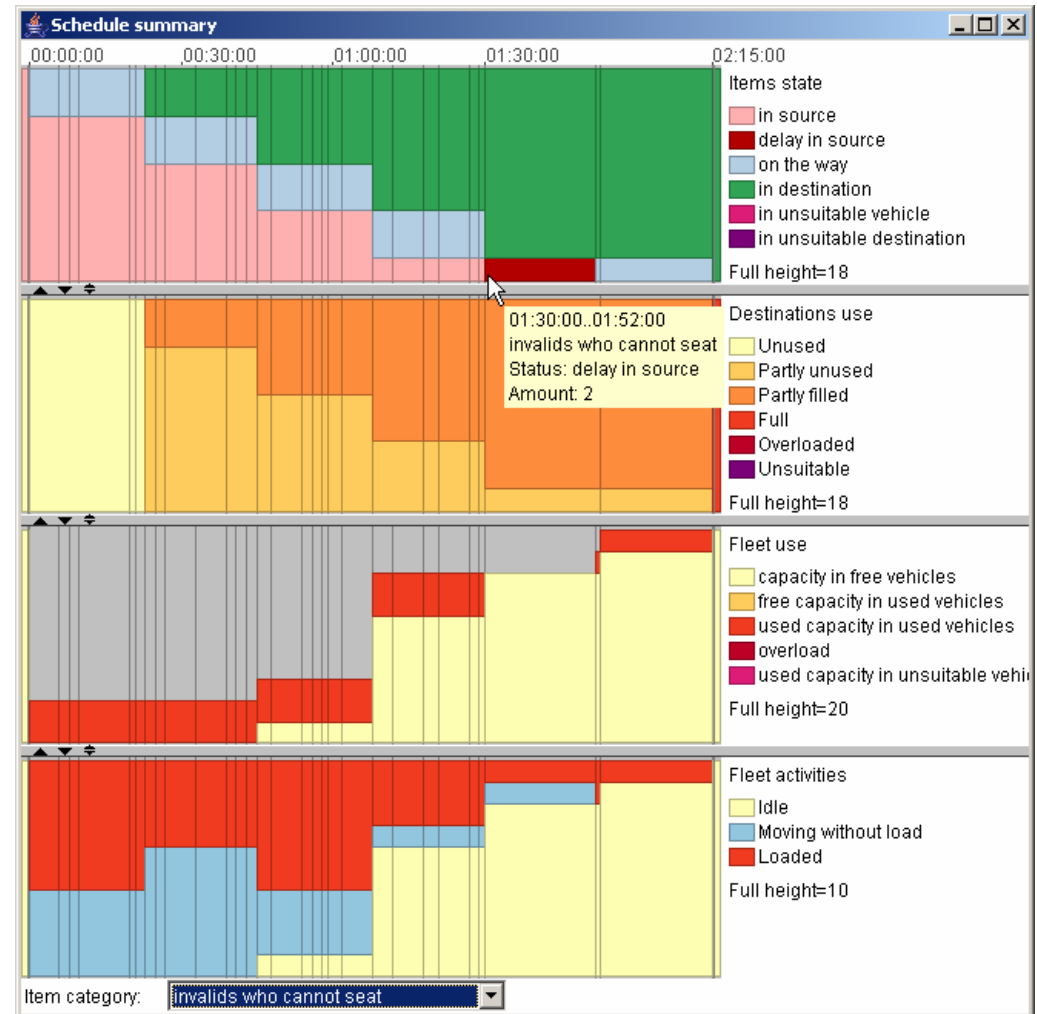
States of the items over time: how many items are in the sources, on the way, in the destinations
Red: delay (time limits exceeded)

Use of the capacities in the destinations over time: free, partly filled, full

Use of the capacities in the vehicles over time: free, partly filled, full

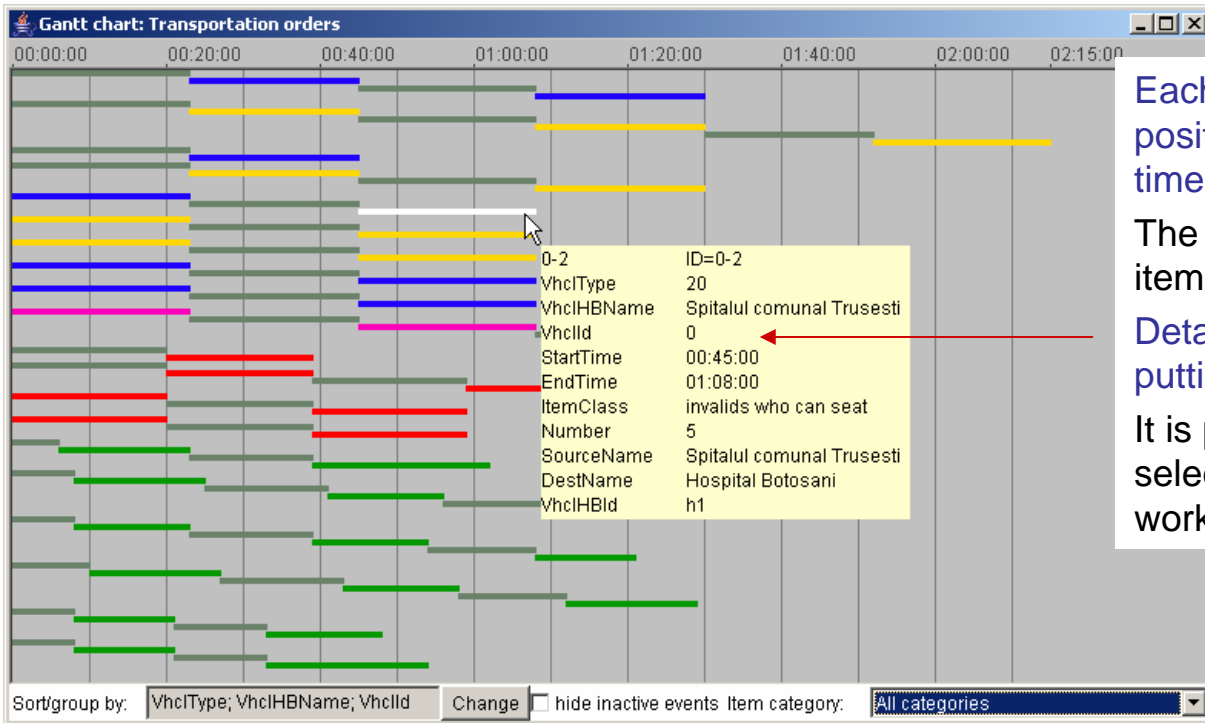
Activities of the vehicles over time: idle, moving without load, moving with load

Evacuation time



The user may choose different item categories and look at each category separately

Line (Gantt) chart

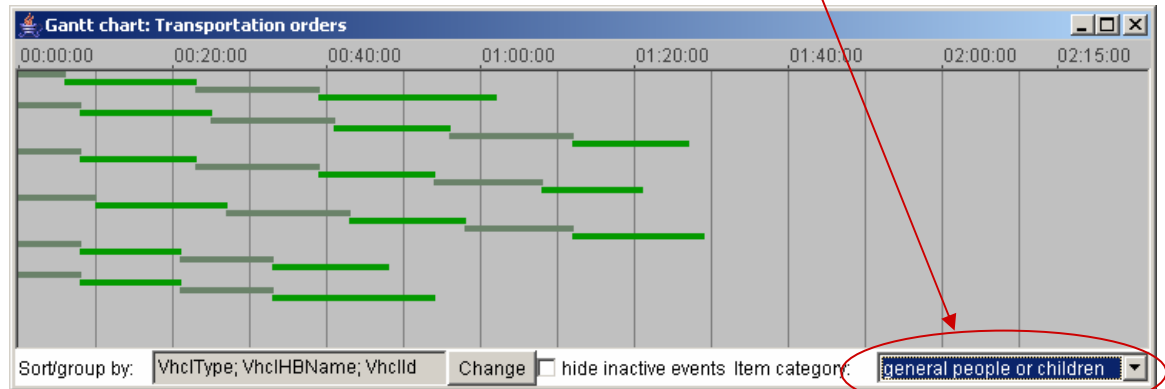


Each trip is represented by a line positioned according to the start and end times

The lines are coloured according to the item categories (grey means empty trips)

Detailed data about a trip can be seen by putting the mouse on the line

It is possible to view only trips relevant to a selected item category (the selection works simultaneously for all displays)



Transportation matrix

Trip destinations

Trip sources

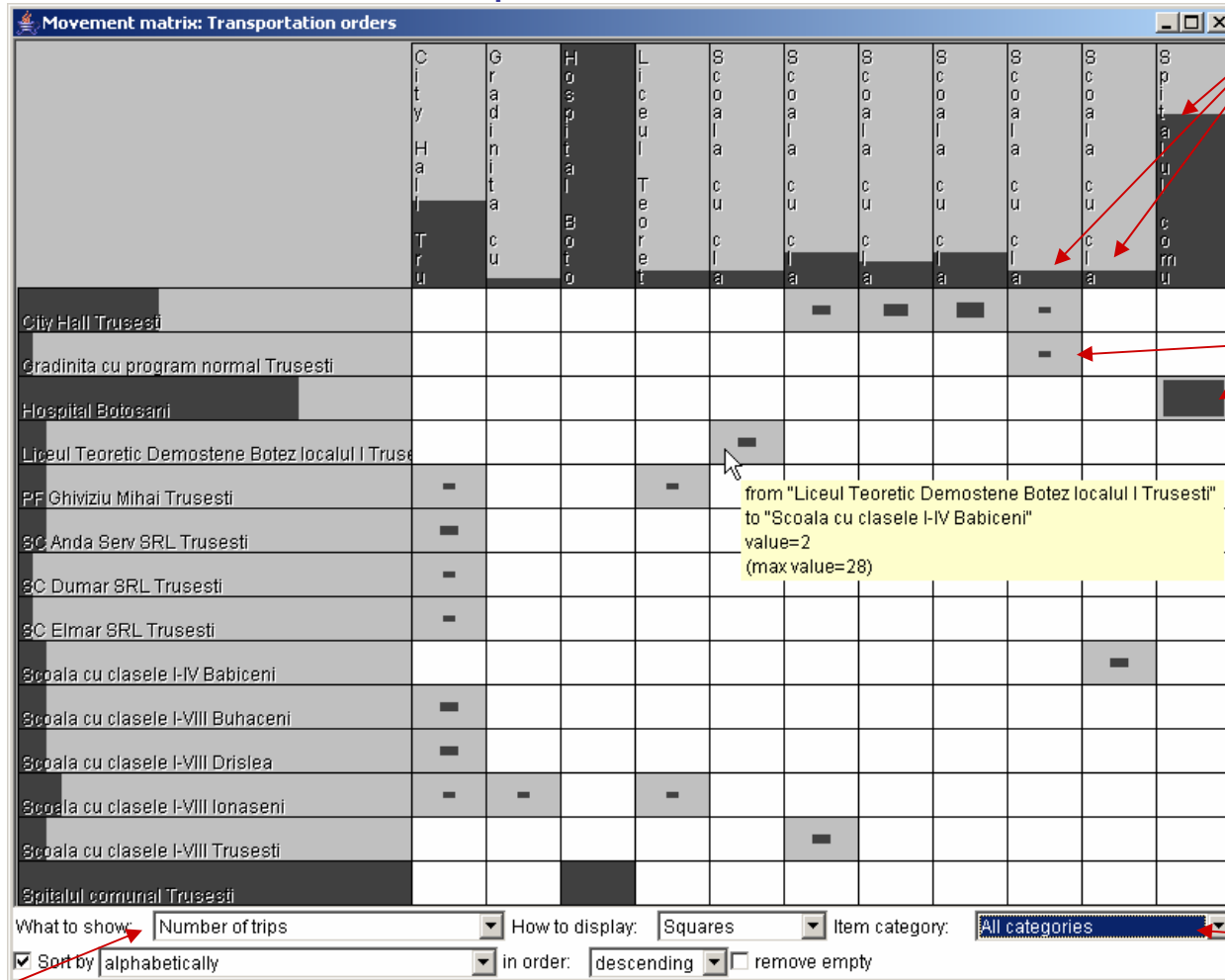
Total numbers of trips to these sites

Numbers of trips from the corresponding sources to the corresponding destinations

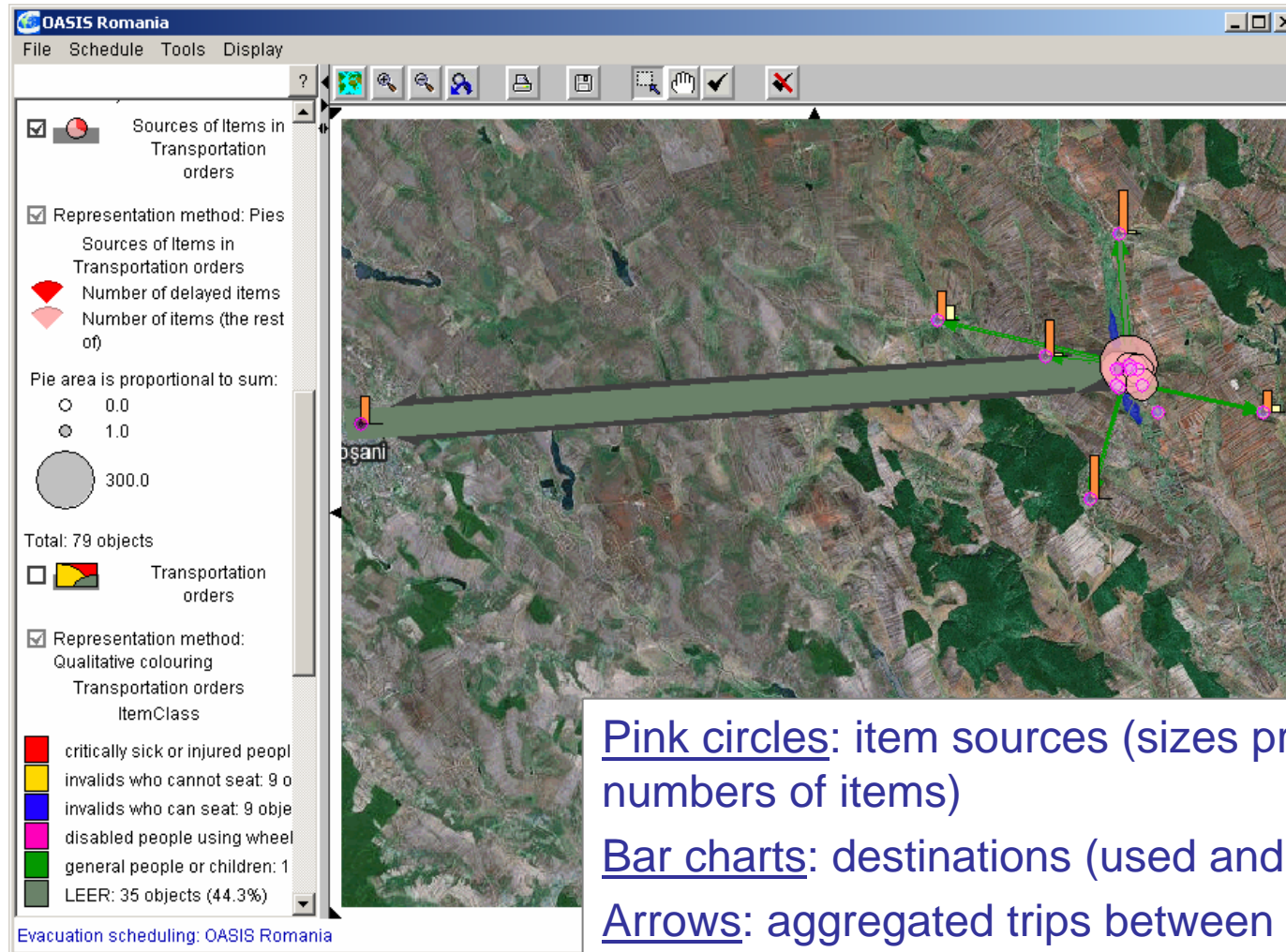
Total numbers of trips from these sites

Choice: item category

Choice: number of trips, number of people, number of trips with load, ...



Map view



Pink circles: item sources (sizes proportional to numbers of items)

Bar charts: destinations (used and remaining capacities)

Arrows: aggregated trips between the sites (thickness proportional to the number of trips; colours indicate item categories; grey means empty; dark grey means several item categories)

Manipulation of the transportation matrix and how this affects the map

Movement matrix: Transportation orders

	S c o a l a	S c o a l a	S c o a l a	S c o a l a	S c o a l a
City Hall Trusesti					
Gradinita cu program normal Trusesti					
Liceul Teoretic Demostene Botez localul I Trusesti					
Scoala cu clasele I-VIII Trusesti					

from "City Hall Trusesti" to "Scoala cu clasele I-VIII Socrujen" value=60 (max value=120)

The thickness of an arrow on the map is proportional to the number of people of the selected category transported between the two corresponding sites

Selected category

Currently shown information

What to show: Number of people How to display: Squares Item category: Sort by: alphabetically in order: descending remove empty

Rows and columns consisting of empty cells are hidden

OASIS Romania

File Schedule Tools Display

Item category: general people or children

Transportation orders (aggregated)

Shown: Number of people for active trips
Maximum: 120.0
Total: 23 objects

Positions of vehicles

Representation method: Unclassified shading
Vehicles (aggregated)
Current number of vehicles

0.000 5.000

Total: 15 objects

Use of destinations

Representation method: Parallel bars
Use of destinations

Number of items
Remaining capacity
→ 130.0
→ 0.0

Total: 86 objects

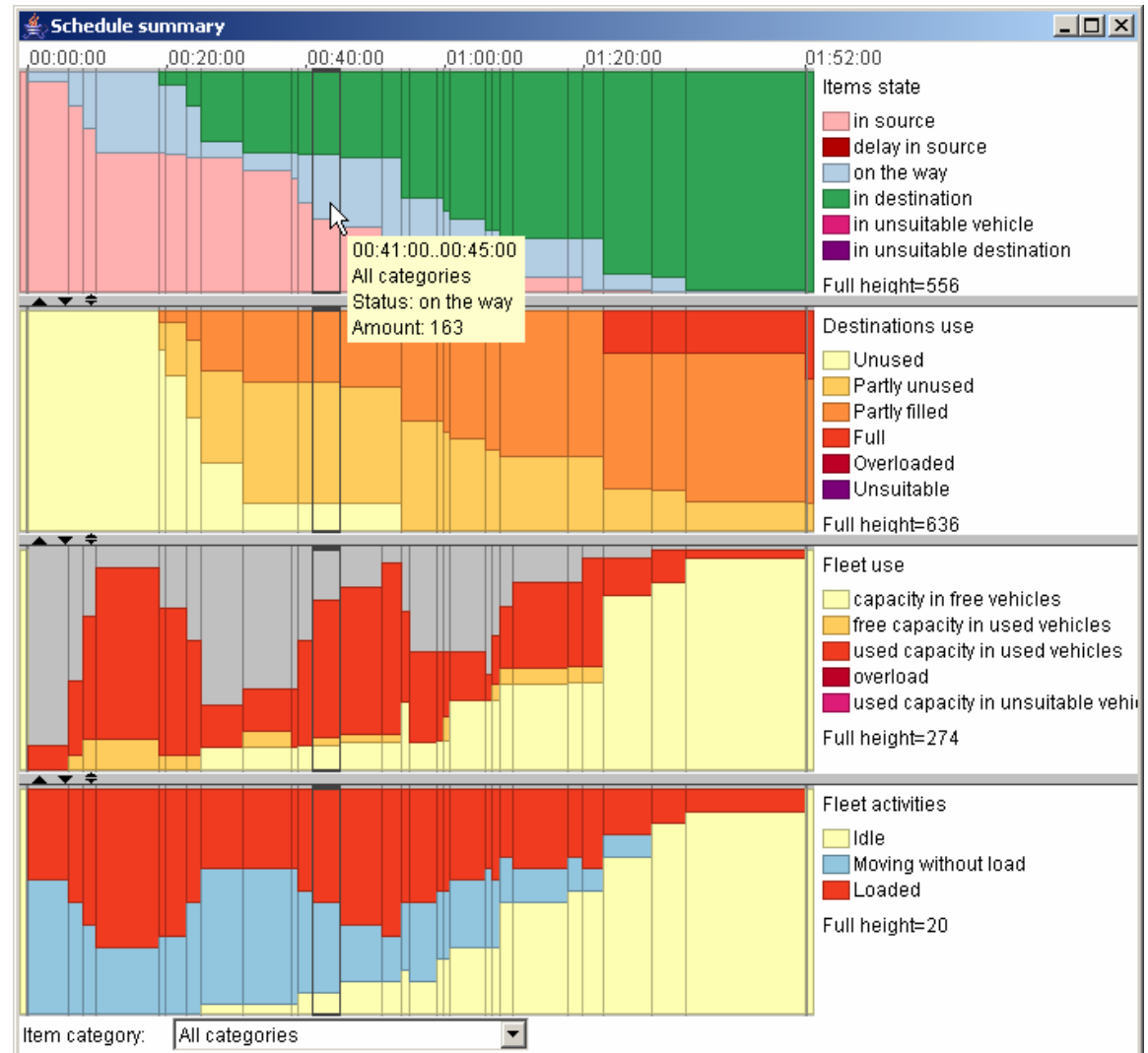
Evacuation scheduling: OASIS Romania

Time filter

Clicking on a bar in the evacuation progress summary view activates the time filter:

- > The corresponding time interval is selected
- > Only data relevant to this interval are shown on the map
- > The transportation matrix summarises only trips from this interval
- > The selected interval is indicated on the line (Gantt) chart display; the lines that do not fit in or cross this interval become inactive

A double-click cancels the selection



The effect of the time filter (example)

Item category: All categories
 Time interval: from 00:41:00 till 00:45:00

Transportation orders (aggregated)

Shown: Number of people for active trips
 Maximum: 40.0
 Total: 23 objects

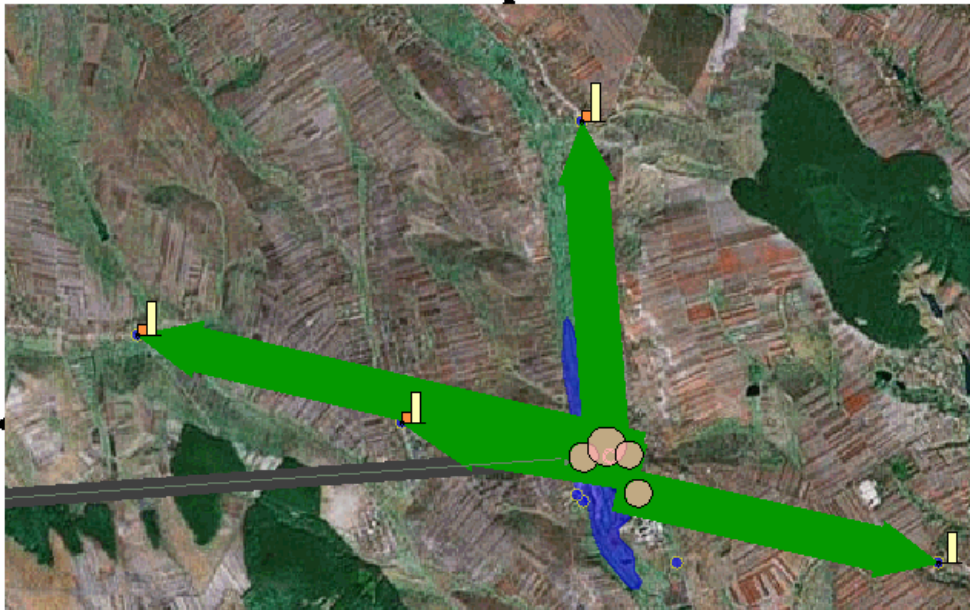
Positions of vehicles

Representation method:
 Unclassified shading
 Vehicles (aggregated)
 Current number of vehicles

0.000 1.000
 Total: 15 objects

Use of destinations

Representation method:



City Hall Trusesti
 Gradinita cu program normal Trusesti
 Liceul Teoretic Demostene Botez localul I Trusesti
 Scoala cu clasele I-VIII Trusesti
 Spitalul comunal Trusesti

Hospit...
 Scoala...
 Scoala...
 Scoala...
 Scoala...

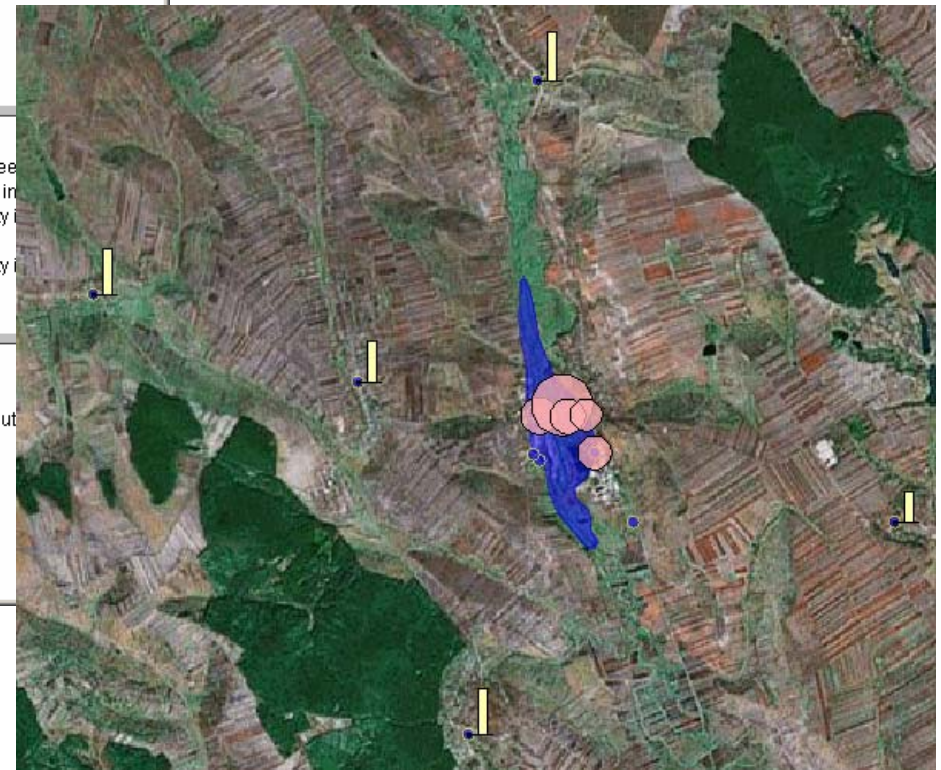
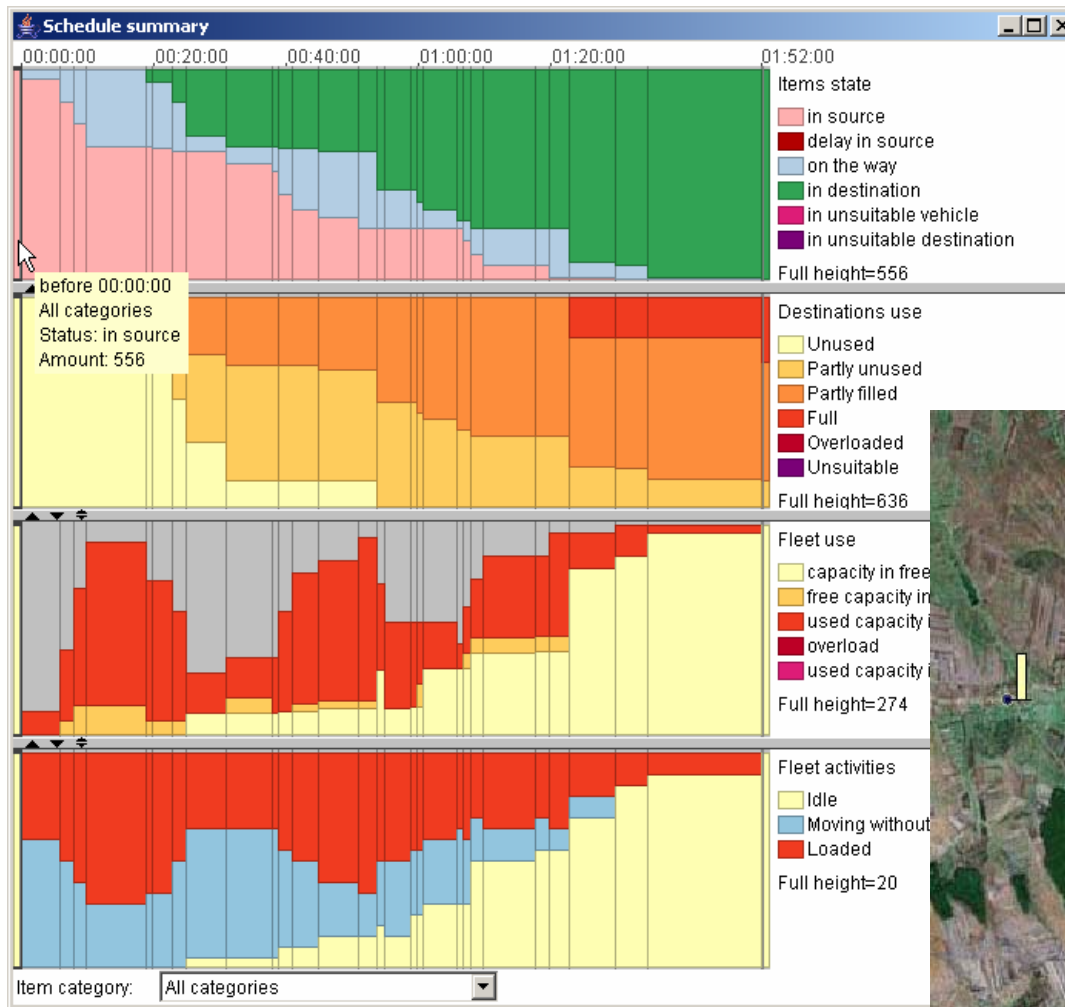
Gantt chart: Transportation orders
 00:00:00 00:10:00 00:20:00 00:30:00 00:40:00 00:50:00 01:00:00 01:10:00 01:20:00 01:30:00 01:40:00 01:52:00

Sort/group by: VhcIType; VhcIHBName; VhcId Change hide inactive events Item category: All categories

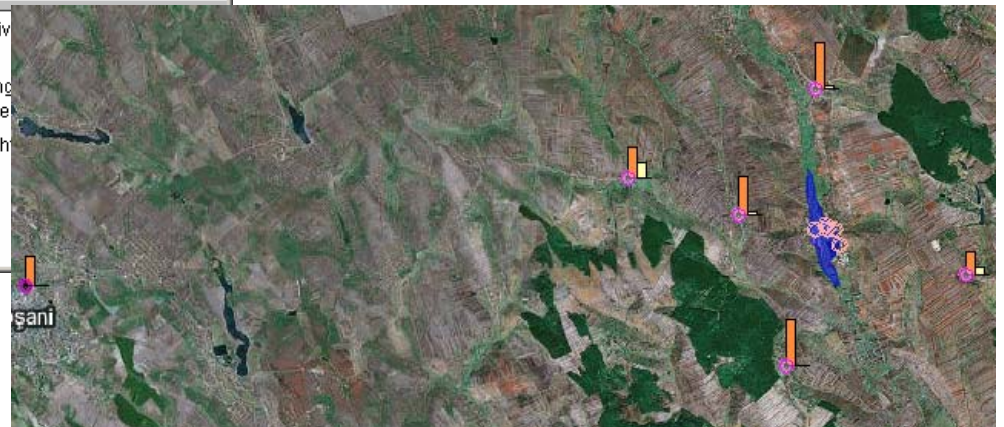
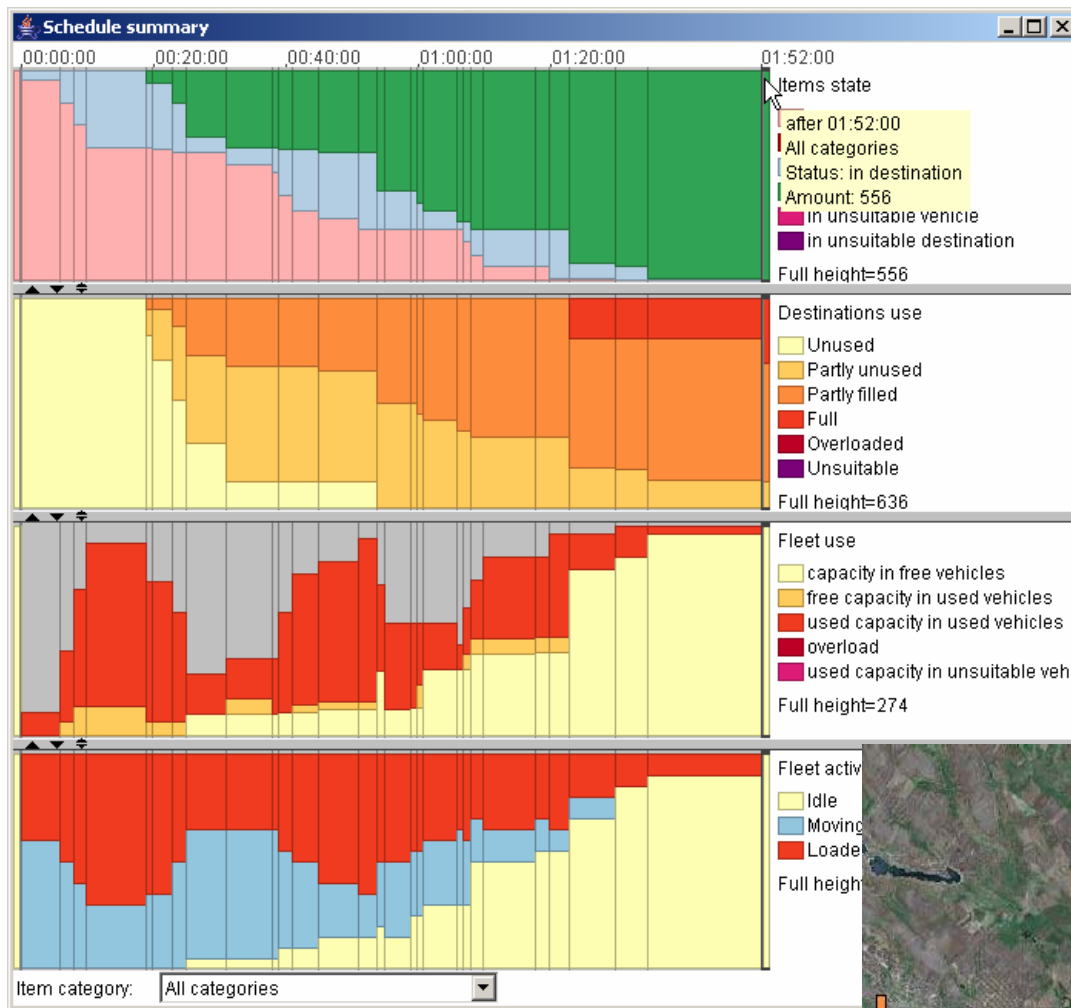
What to show: Number of people How to display: Squares Item category: All categories

Sort by alphabetically in order: descending remove empty

Time filter: viewing the initial situation



Time filter: viewing the final situation



Filtering by source

	A B C	A l b e r t	B e r n a r d	B r a u n	C a r m e l	C a r m e l	C h i l d	C i t y	C o l u m b	C o p e r n	D e s c a r	D o n B o	E l d e r	E x h i	F r i n g	G a l i l	H e l m h	J a e s u	J i n d e	K i n d e	K i n d e	L e o n a	N e i g h	P l a t o	P r i s o	R e a l	R e h a b	R i v e r	S p a	S t . J o	S t . J o	S t . J o	U n i v e	X Y Z			
ABC mall																																					
Albert College																																					
Beethoven Gymnasium																																					
Braun and Co																																					
Bus travel company A																																					
Bus travel company B																																					
Bus travel company C																																					
Carmelites hospital																																					
Carmelites school																																					
Children Clinics																																					
Children clinics																																					
City coach park																																					
City hall																																					
Columbus School																																					
Copernicus school																																					
Don Bosco school																																					
Elder home																																					
Exhibition hall																																					
Fringes Gymnasium																																					
Galileo College																																					
Helmholtz Gymnasium																																					
Jailhouse																																					
Jesus Heart monastery																																					
Kindergarten																																					
Kindergarten																																					
Kindergarten																																					
Leonardo School																																					
Neighbourhood House																																					
Plato Gymnasium																																					
Prison																																					
Real school																																					
Rehabilitation Centre																																					
Riverside hall																																					
Spa healing house																																					
St. John Hospital																																					
St. Peter Hospital																																					
St. Teresa's school																																					
St. Joseph's basic school																																					
University clinics																																					
XZ school																																					
Police station																																					

Clicking here
cancels the filter

Clicking on source's name in the transportation matrix activates the data filter by source.

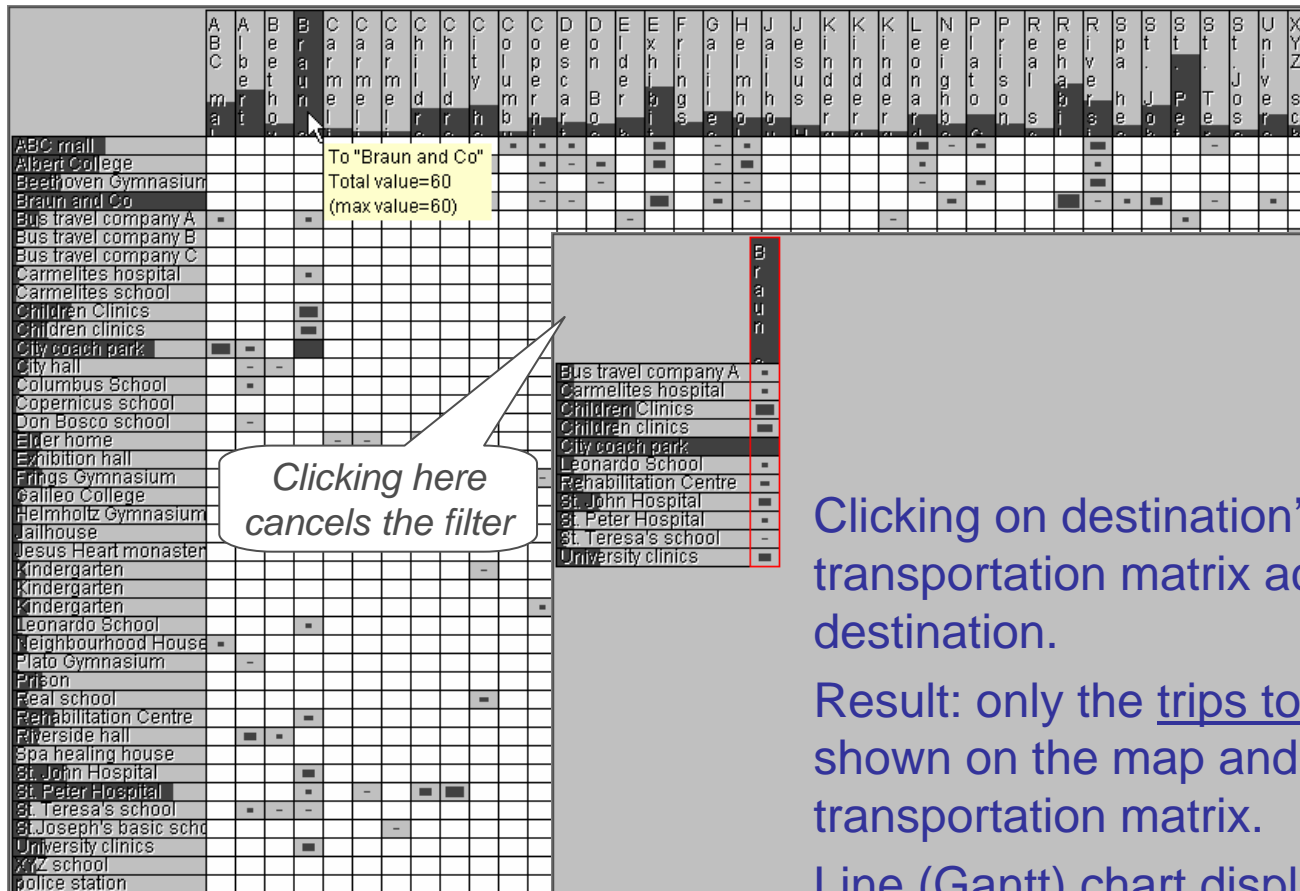
Result: only the trips from this source are shown on the map and summarised in the transportation matrix.

Line (Gantt) chart display: only the lines corresponding to these trips remain active (coloured and mouse-sensitive).

What to show: Number of trips How
 Sort by alphabetically in order

What to show: Number of trips How to display: Squares Item category: All categories
 Sort by alphabetically in order: descending remove empty

Filtering by destination



Clicking here
cancels the filter

Braun
Bus travel company A
Carmelites hospital
Children Clinics
Children clinics
City coach park
Leonardo School
Rehabilitation Centre
St. John Hospital
St. Peter Hospital
St. Teresa's school
University clinics

Clicking on destination's name in the transportation matrix activates the data filter by destination.

Result: only the trips to this destination are shown on the map and summarised in the transportation matrix.

Line (Gantt) chart display: as in case of filtering by source.

What to show: Number of trips How
 Sort by alphabetically in order

What to show: Number of trips How to display: Squares Item category: All categories
 Sort by alphabetically in order: descending remove empty

Filtering by source and destination

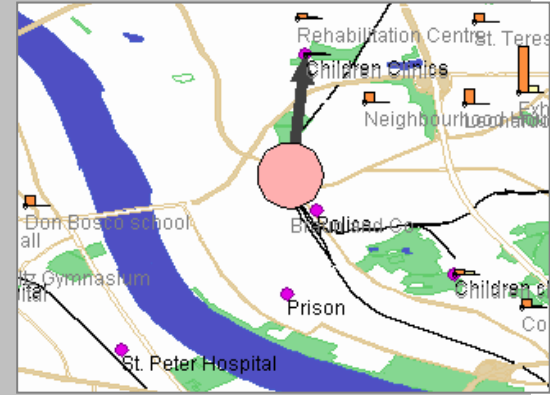
	A B C	A l b e r t	B e e t h o v e n	B r a u n a n d C o	C a r m e l l i t e s	C a r m e l l i t e s	C h i l d r e n	C h i l d r e n	C o l u m b u s	C o p e r n i c u s	D o n B o s c o	D o n B o s c o	E l d e r	E x h i b i t i o n	F r i n g e	G a l i l e o	H e l m h o l t z	J e s u s	K i n d e r g a r t e n	K i n d e r g a r t e n	K i n d e r g a r t e n	L e o n a r d o	N e i g h b o u r h o o d	P l a t o	P r i s o n	R e a l	R e h a b i l i t a t i o n	R i v e r s i d e	S p a	S t J o h n	S t J o s e p h	S t J o s e p h	U n i v e r s i t y	X Y Z			
ABC mall																																					
Albert College																																					
Beethoven Gymnasium																																					
Braun and Co																																					
Bus travel company A																																					
Bus travel company B																																					
Bus travel company C																																					
Carmelites hospital																																					
Carmelites school																																					
Children Clinics																																					
Children clinics																																					
City coach park																																					
City hall																																					
Columbus School																																					
Copernicus school																																					
Don Bosco school																																					
Elder home																																					
Exhibition hall																																					
Frings Gymnasium																																					
Galileo College																																					
Helmholtz Gymnasium																																					
Jailhouse																																					
Jesus Heart monastery																																					
Kindergarten																																					
Kindergarten																																					
Kindergarten																																					
Leonardo School																																					
Neighbourhood House																																					
Plato Gymnasium																																					
Prison																																					
Real school																																					
Rehabilitation Centre																																					
Riverside hall																																					
Spa healing house																																					
St. John Hospital																																					
St. Peter Hospital																																					
St. Teresa's school																																					
St. Joseph's basic school																																					
University clinics																																					
XYZ school																																					
Police station																																					

from "Braun and Co" to "Children Clinics" value=6 (max value=22)

Clicking here cancels the filter

Clicking on a cell in the transportation matrix activates the data filter by source and destination. Result: only the trips from the corresponding source to the corresponding destination are shown on the map and in the transportation matrix.

Line (Gantt) chart display: like in the previous cases



What to show: Number of trips How to display: Squares
 Sort by alphabetically in order: descending

What to show: Number of trips How to display: Squares Item category: All categories
 Sort by alphabetically in order: descending remove empty

Combination of filters

3 types of filter

- by item category
- by time interval
- by source and/or destination

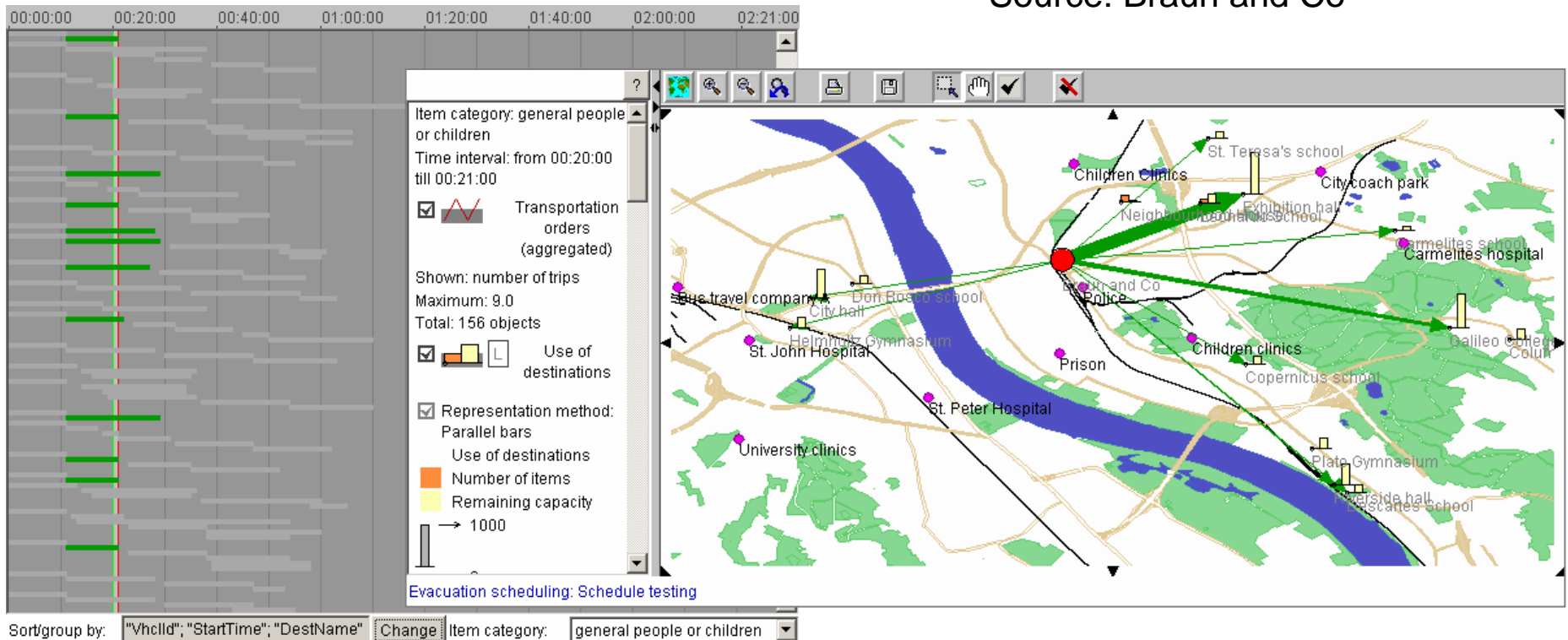
may be combined

Example

Item category: general people or children

Time interval: from 0:20 till 0:21

Source: Braun and Co



Re-starting of the scheduler

- When you wish to start the scheduler again, the input preparation wizard will re-use the last input data prepared for the scheduler.
- However, you will be able to change the data wherever necessary.

Destinations for the items to evacuate

Items to evacuate:

Item category	Number of items	Available capacity
critically sick or injured people	7	7
invalids who cannot seat	18	18
invalids who can seat	45	45
disabled people using wheelchairs	6	6
general people or children	480	560

Possible destinations and their capacities

ID	Name	Item category	Capacity
<input type="radio"/> sch5	Scoala cu clasele I-VIII Ionaseni	general people or children	120
<input type="radio"/> sch53	Scoala cu clasele I-IV Babiceni	general people or children	80
<input type="radio"/> sch6	Scoala cu clasele I-VIII Buhaceni	general people or children	130
<input type="radio"/> sch7	Scoala cu clasele I-VIII Drislea	general people or children	110
<input type="radio"/> sch9	Scoala cu clasele I-VIII Socrujeni	general people or children	120
<input type="radio"/> hbot	Hospital Botosani	critically sick or injured people	7
		invalids who cannot seat	18
		invalids who can seat	45
		disabled people using wheelchairs	6

Current site:

Items in source locations

Items in the source sites and their time limits, in minutes

ID	Name	Item category	Number	Time
<input type="radio"/> h1	Spitalul comunal Trusesti	critically sick or injured people	7	90
		invalids who cannot seat	18	90
		invalids who can seat	45	90
		disabled people using wheelchairs	6	90
<input type="radio"/> kg1	Gradinita cu program normal Trusesti	general people or children	50	90
<input type="radio"/> ch1	City Hall Trusesti	general people or children	300	90
<input type="radio"/> sch1	Liceul Teoretic Demostene Botez localul I Trusesti	general people or children	60	90
<input type="radio"/> sch4	Scoala cu clasele I-VIII Trusesti	general people or children	70	90

Common time limit (minutes):

Current site:

Vehicles suitable for the evacuation

Items to evacuate:

Available vehicles and their locations

ID	Name	Type of vehicle	Number	Ready time
<input type="radio"/> h1	Spitalul comunal Trusesti	ambulance car	6	1
		life support ambulance car	2	1
<input type="radio"/> hbot	Hospital Botosani	ambulance car	4	1
		life support ambulance car	2	1
<input type="radio"/> oth5	SC Elmar SRL Trusesti	autocamion	1	1
<input type="radio"/> oth6	SC Dumar SRL Trusesti	autocamion	1	1
<input type="radio"/> oth7	SC Anda Serv SRL Trusesti	tractoare cu remorca	2	1
<input type="radio"/> oth8	PF Ghiviziu Mihai Trusesti	tractoare cu remorca	2	1

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Article

Information Visualization (2008) 7, 89–103; doi:10.1057/palgrave.ivs.9500174

Visual analytics approach to user-controlled evacuation scheduling



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* This paper extends our paper presented at the IEEE VAST 2007 Conference.

Received 1 December 2007; Accepted 5 January 2008; Published online 28 February 2008.

Abstract

Top

Application of the ideas of visual analytics is a promising approach to supporting decision making, in particular, where the problems have geographic (or spatial) and temporal aspects. Visual analytics may be especially helpful in time-critical applications, which pose hard challenges to decision support. We have designed a suite of tools to support transportation-planning tasks such as emergency evacuation of people from a disaster-affected area. The suite combines a tool for automated scheduling based on a genetic algorithm with visual analytics techniques allowing the user to evaluate tool results and direct its work. A transportation schedule, which is generated by the tool, is a complex construct involving geographical space, time, and heterogeneous objects (people and vehicles) with states and positions varying in time. We apply task-analytical approach to design techniques that could effectively support a human planner in the analysis of this complex information.

Keywords: Geovisualization, Transportation planning, Vehicle scheduling, Task-centered design, Coordinated multiple views

see also: <http://geoanalytics.net/and/>

ABSTRACT

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Abstract

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Trials

- Decision support modules have been successfully used by firemen in two trials, in Czech republic and in Romania

The screenshot displays the OASIS Romania software interface, which is used for evacuation scheduling. The main window shows a satellite map of a region with various objects and routes marked. The interface includes several panels and menus:

- Situation manager:** Shows the date (14.08.2008), time (18:26), and a list of events and risks. The selected event is "Skolka Nemnice" (nursery) with endangered items including infants, small children, and employees.
- OASIS Romania:** The main application window with a menu bar (File, Schedule, Tools, Display) and a toolbar. The "Write orders in text file" option is highlighted in the menu.
- Map:** A satellite map showing a river and surrounding areas. A red star indicates a source location, and various icons represent different types of objects and risks.
- Data Panels:** Several panels provide summary information:
 - Endangered objects in the flood Thursday, 14.08.2008, 15:16:** Total 4 objects: hospital (2 objects, 50%), elder home (2 objects, 50%).
 - Objects that may need care in the flood Thursday, 14.08.2008, 15:16:** Total 3 objects: infant school (2 objects, 67%), chemical factory (1 object, 33%).
 - Risks involved in the flood Thursday, 14.08.2008, 15:16:** Total 2 objects.
- Summary:** Total: 14 objects, 14.00. Total: 71 objects; active: 31.