SOCIONICAL

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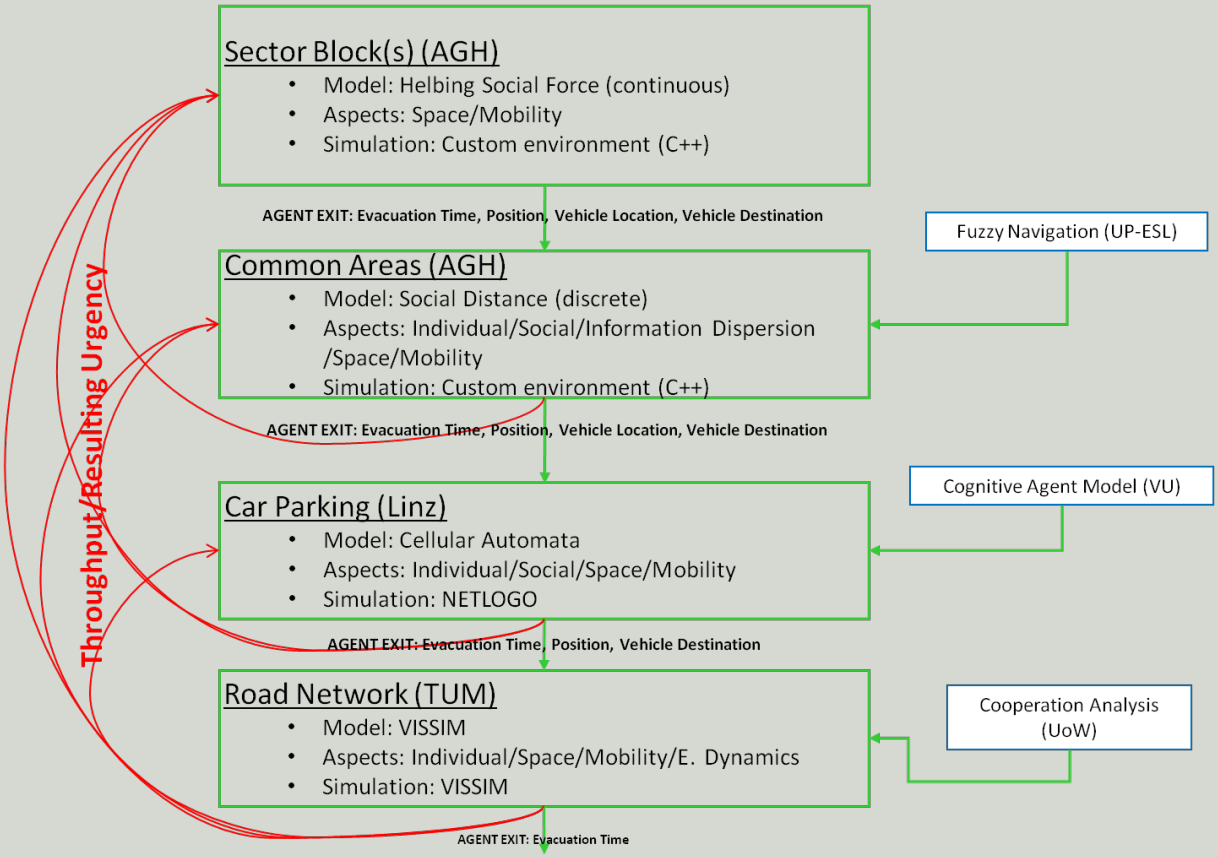
Integrated Simulation effort for the Allianz Arena scenario, Munich, Germany

Matthew Fullerton, Technische Universitaet München
(with contributions from project partners AGH, Linz, UP-ESL, Wurzburg)

SOCIONICAL partners have been building on previous work performed at the Allianz Arena (Munich, Germany) to create a large, multi-scaled simulation of the exit process. Although not an evacuation situation specifically, the end of the game has some similar features, at least in Germany. Unlike in some other European countries (in particular, the UK, where fans linger to celebrate victory), German fans tend to want to leave quickly after the game. The Arena itself, due to its modern design, can be emptied very quickly. However, the local road and subway network cannot absorb all fans without some delays. For those travelling by car, these can be in the order of two hours for some. Through modelling this scenario, we hope to establish what changes in pedestrian movement would be required in order to make traffic flow smoothly. If a critical, break-down mass of vehicles can be avoided, the total emptying time might be reduced.

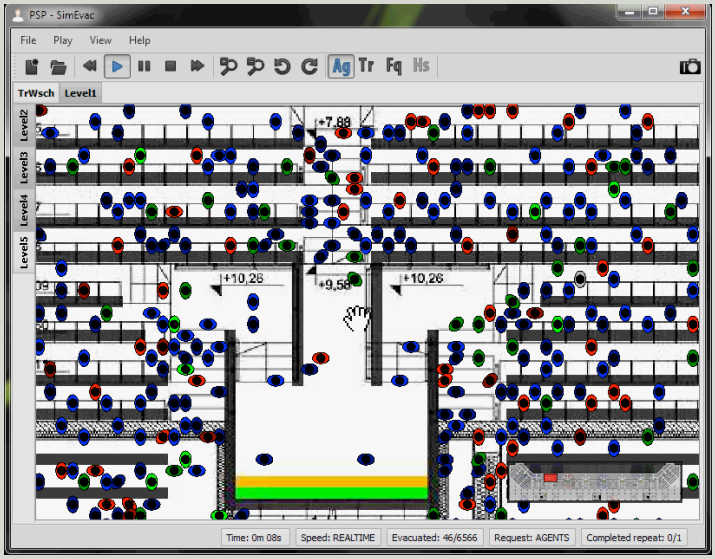
Supporters walking towards the Arena. Photo: Steenbergs/Flickr.

The simulation chain involves coupling instances of a simulation of each sector with a large area pedestrian model. This, in turn, transfers drivers and passengers to cars parked in a model of the three central parking garages. Once drivers reach the exit of the garage, they drive through the local road network to reach the motorway.

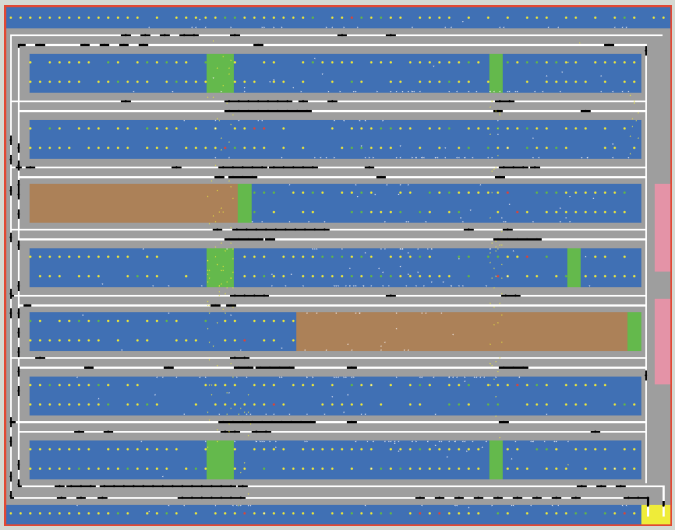


Interactions planned for the combined simulation

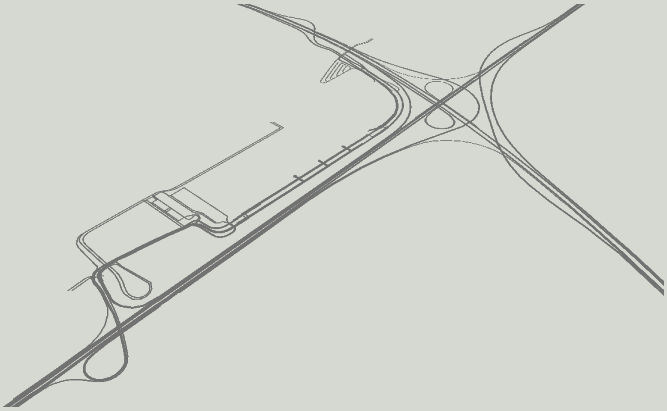
Physically different types of space are modelled by appropriate simulation techniques. For the seating sectors, a space-continuous Helbing Social Force model is used. For the larger pedestrian simulation, a novel modelling technique, the Discrete Social Distance Model, is used. The garages are modelled using a discrete, cellular automata model in the NETLOGO environment. The detailed cooperation and driving behaviours of exiting cars is then modelled in the microscopic simulation tool, VISSIM.



Stadium Simulation environment used by project partner AGH Krakow (Discrete Social Distance Model)



Parking garage environment used by project partner Linz (Cellular Automata within NETLOGO)



Visualisation of stadium road network model

There is also room for optimisation through facilitating AmI-assisted "group driving". In the picture below, it can be seen that many cooperative, yet uncoordinated merges of drivers lead to wasted road capacity.

Cooperation observed at lane-drop in road network

LINZ: Gestural Interaction in Vehicular Interfaces

Gestural interaction is a novel technique said to alleviate driver-vehicle feedback, keep the driver's workload low, and cover the full range of interaction. To gain knowledge about the potential this approach holds in a vehicular setting, two interfaces were developed by the Linz group – the first focusing on precise input from micro-gestures of fingers gathered with a capacitive proximity sensing device and the second employing single/multi finger or whole hand gestures tracked by a RBG-D camera.

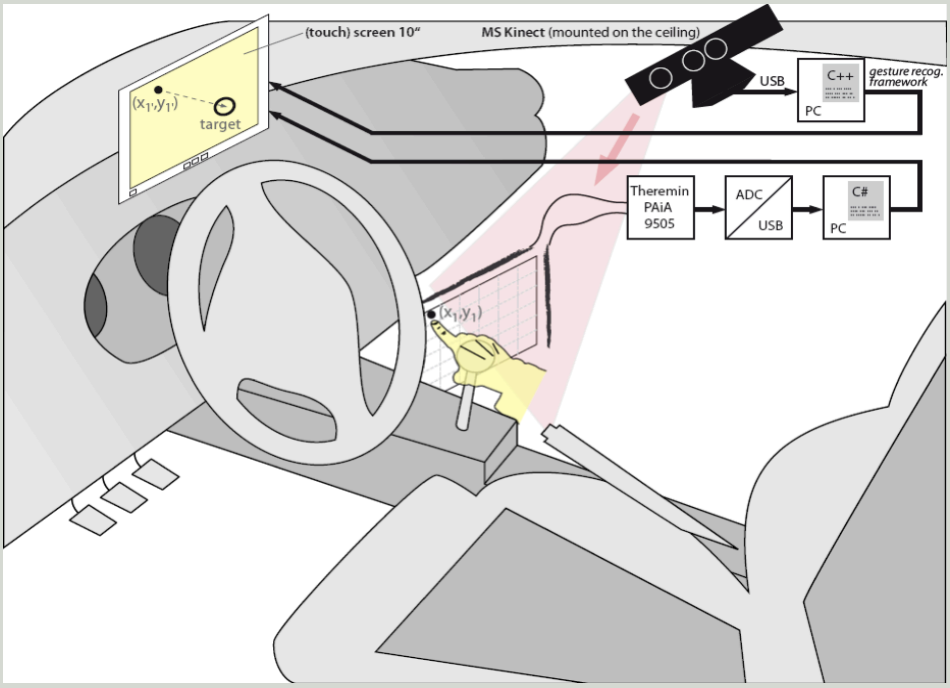


Figure 1: Proximity sensing device tracking finger movements and RGBD camera recognising static/dynamic gestures.

Beside a easy understandable assignment of a gesture and the function it should control, further aspects have to be accounted in order to end up with an accepted, usable interface. These are, for example, the traffic situation considered or the target audience addressed. The aim of our research was to substantiate that we have the technology to recognise gestures of different complexity in the gearshift area and to show with our studies that gestures are promising modes of providing input to an in-car system/computer. The whole design cycle for the two cases investigated, i.e., selecting the application/ service to be controlled, designing the interface, testing its applicability, reviewing the results, etc. is published in [1], [2], [3].

Both approaches showed promising results in terms of recognition rates, intuitiveness of use, and susceptibility on other more important tasks (driving). As the interfaces do not interfere with each other, parallel operation of both would be feasible as well.

[1] A. Riener, M. Rossbory, and A. Ferscha, "Natural DVI based on intuitive hand gestures," in Workshop User Experience in Cars, Interact 2011. Adjunct proceedings, September 5th 2011, p. 5.

[2] A. Riener and P. Wintersberger, "Natural, Intuitive Finger-based Input as a Means of In-Vehicle Information System Operation?" in 3rd International Conference on Automotive User Interfaces and Interactive Vehicular Applications AutomotiveUI 2011), November 30-December 2, Salzburg, Austria. ACM, December 2011, p. 8.

[3] A. Riener, "Using easy understandable hand poses/gestures for application control while driving," in Proceedings of the 2012 IEEE Intelligent Vehicles Symposium, Alcala de Henares, Spain. IEEE, June 3–7 2012, p. 6, under review.

Problem of Limited Cognitive Abilities and Bounded Attention of a Driver.

Andreas Riener, JKU Linz, Austria

Problem of Limited Cognitive Abilities and Bounded Attention of a Driver.

Andreas Riener, JKU Linz, Austria

On November 30th, 2011, the International Workshop on “Subliminal Perception in Cars“ (http://www.pervasive.jku.at/AutoUI_subliminal/) was held as part of the AutomotiveUI 2011 conference in Salzburg, Austria. The workshop was co-organised by a number of international experts in the field (Joseph Fellner, AUDIO MOBIL Elektronik GmbH, Austria; Myounghoon Jeon, Sonification Lab, Georgia Institute of Technology, USA, Andreas Riener, Institute for Pervasive Computing, University of Linz (SOCIONICAL partner), Manfred Tscheligi, ICT&S Center, University of Salzburg) and was co-chaired by Andreas Riener and Myounghoon Jeon.

The aim of the workshop was to discuss the potential and possible application of subliminal techniques employed to counteract the problem of limited cognitive abilities and bounded attention of a driver. To alleviate the cognitive load associated with the interaction with the variety of emerging IVIS/ADAS in addition to the driving task, we assume that subliminal techniques offer high potential to significantly reduce the amount of information to be processed simultaneously. These cues should be provided using appropriate modalities (visual, auditory, tactile/haptic, olfactory, etc.), following the specific nature of the task to fulfill, and according to a driver's abilities. As research and discussion on subliminal techniques would benefit from a significant collaborative effort from a range of disciplines like engineering, neuroscience, computer science, psychophysiology, we invite researchers from these fields to submit their position paper and participate in the workshop. We are sure that the approach provides exciting challenges, which will significantly impact on society at large, making significant contributions toward a more natural, convenient, and even a relaxing future style of driving.

The authors of accepted workshop papers (including a paper of a SOCIONICAL partner) have shown very diverse approaches of how to implement or apply subliminal persuasion and perception in driver-vehicle interaction. We believe that this cross-section of research projects and industry interests in the broader field of subliminal perception in cars illustrates the potential application of subliminal techniques holds to improve driver-vehicle interaction or driving experience. Nevertheless, it also highlights that there are still technical difficulties and unresolved problems limiting a broader deployment in the near future.

Overall, nearly 20 people participated in the workshop. Inspired by the manifold presentations, a number of relevant questions have been brought up and discussed during the workshop.

During the workshop a poster summarising workshop contribution was produced and presented at the poster session of the main conference. As a follow up, it is planned to publish extended versions of selected papers in a journal (a special issue call is in preparation) and follow up workshops are already in the planning stage.

Figure 2: Workshop “Subliminal Perception in Cars“ co-organised by Linz within the SOCIONICAL framework.

SOCIONICAL iPhone App (S-app) deployed during the 6th Notte Bianca Festival in Valletta, Malta and the Lord Mayor's Show London, UK in 2011.

Martin Wirz, ETH Zurich

Project partners in close collaboration with the organisers of two city-wide festivals have developed a mobile phone app for iPhones. The SOCIONICAL app is designed to enhance a festival attendee's experience by offering information about nearby places of interest and background information about the event taking place. Additionally, people who choose to use the app contributed to valuable research to help us to understand the complex dynamics of the movement of people during such events.

The app was tested for the first time during the 6th annual Notte Bianca Festival in Valletta, Malta, which took place in Valletta on Saturday, 1 October 2011 and attracted thousands of people to visit historical buildings and museums.

A second trial was conducted during the Lord Mayor's Show 2011 in London on Saturday, 12 November. The Lord Mayor's Show is a street parade in the heart of London with about half a million spectators. It is one of the city's longest established and best known annual events. The app was featured as the event's official iPhone app. Thanks to more than a thousand people using it, we received very valuable information to help in developing effective evacuation strategies and exploring how everyday devices such as smart phones can provide essential information during an emergency.

Minister, Director of CPD and first responders at Notte Bianca Festival 2011, Malta

SOCIONICAL iPhone app (S-app) - Implications for Policy Makers.

Prof. Eve Mitleton-Kelly, Director, Complexity Research Group, London School of Economics

One of the features of the Socionical app (S-app) is that it enables the creation of a visualisation of the density, movement and direction of a crowd at an event. This is displayed as a heat map superimposed on a Google map. Individuals using the S-app appear as blue circles (we do not have access to any individual's ID), and as they join others using the app and congregate the colour changes from blue to green, to yellow and finally red to indicate the relative density of the crowd.

The Socionical team was represented at the Lord Mayor's Show control centre in London on 12 November 2011. The crowd density and movement derived from the S-app was displayed on a laptop screen. This was checked against CCTV camera displays at the control centre and verbal reports from marshals on the ground. These confirmed that the visualisation generated by the S app was accurate.

The Lord Mayor's Show procession goes to the Law Courts and then returns to Mansion House and as the crowd followed the procession through the City, the visualisation showed that movement very clearly. We were delighted with the results but not greatly surprised. A real surprise and unexpected benefit was illustrated later in the day during the firework display. That happened at 5.00 p.m. when it was dark and it was the first time that the organisers had an accurate picture of the locations of greatest crowd density, as CCTV cameras do not function so well in the dark. Once the fireworks were over, it was also clear which routes people were taking to reach the different tube and rail stations and which stations they favoured.

At the end of the Show we had a surprise in that Stephen Fry (actor and broadcaster) arrived at the control centre with a camera crew to interview the Socionical team for a TV programme on the City to be shown in the autumn of 2012. Stephen has a particular interest in apps and was fascinated by the visualisation.

Stephen Fry with the SOCIONICAL team

The visualisation can be seen at www.lse.ac.uk/complexity. It shows the use of the app at timed intervals and it will be used to plan the position of barriers, loos, St John's Ambulance stations, etc., for the Lord Mayor's Show in 2012.

The S-app can be of benefit not only to event organisers for planning, but also to users. It shows major landmarks, historic buildings, museums and galleries within the area of the event. A survey and telephone interviews following the Show showed that most users used the app to visit museums, historic buildings, etc., between the end of the procession and the start of the fireworks.

Our economic and social coordinates

Krzysztof Kulakowski, AGH Cracow

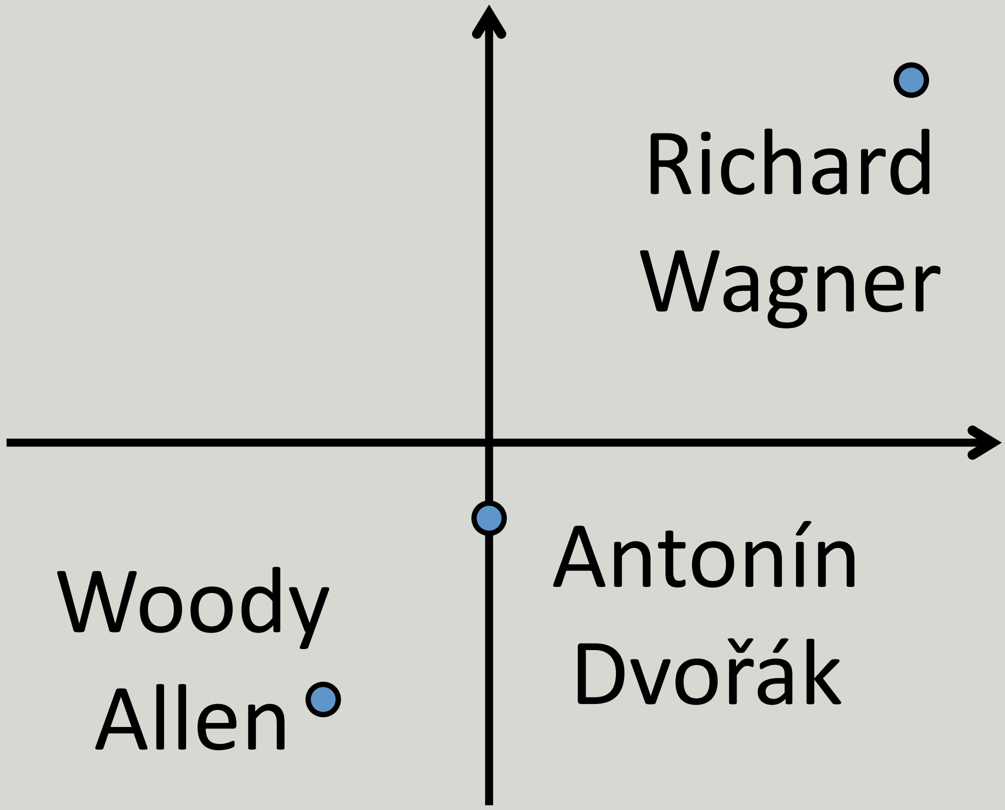
How can physics contribute to sociology? The relation cause-effect is at the core of all natural sciences. In contrast to this determinism, social sciences are based on description, interpretation and understanding. Positivism is banned by Max Weber and “determinism is dead” is a binding catchphrase of today [1]. The difference is not even in the facts, but in the scientists’ relationship towards them. At the end of February Krzysztof Kułakowski - a physicist - gave a talk at the friendly Faculty of Humanities, AGH – UST in Cracow. There, some mathematical ideas were examined in a humanistic context. For the purposes of this short note, we can limit the list of these ideas to one: the coordinate system.

Suppose that, as we often see, opinions of two human beings are different. If these opinions are presented as points in space, we can think that the distance between them represents the difference between their views. We should select some issues which we are interested in, then the axes of the space coordinates can represent those issues. Some people claim that what is basic are economic and social issues and the only important aspects of any opinion relate to these two [2]. With these preliminaries, the space between them is two dimensional, i.e. can be limited to one plane.

A similar plane was used to simulate the public receipt of news presented by media [3]. A model human population was subject of a stream of messages, neutral in the average. The messages were represented by points in a square; the neutrality resulted in the number of points to the left and right sides of the square to be more or less equal. The outcome of the simulation was the distribution of opinions, formed by the messages and by communication of the agents. The only model parameter was the mental capacity of the agents, expressed as the distance of a new message from messages accepted previously by an agent. The outcome of the test was the final distribution of opinions. With neutrality, the opinions should be close to the centre of the square. Actually this was the case only for smart agents. The opinions of agents with small capacity were found to be extreme on the left or extreme on the right side of the plane. The take-home-message is that the smarter agents are less driven to extremal opinions [3].

The plane may be used also to represent famous humans - politicians and artists. The procedure is arbitrary, but the results can be amusing. Further, every user of the Internet can find his own position by answering some simple questions on her/his economic and social attitudes [2]. In this way, the author of this note found himself to be neither right nor left and slightly libertarian, close to the Czech Romantic composer Antonín Dvořák. These musical connections cannot be entirely neglected. As remarked by Woody Allen [2], every time he heard Wagner, he was overcome with the urge to invade Poland.

[1] from the priorities of the XVII ISA World Congress of Sociology, Gothenburg, 11-17 July 2010
[2] http://www.politicalcompass.org/
[3] K. Malarz, P. Gronek, K. Kulakowski, *The Zaller-Deffuant model of public opinion,* JASSS 14, Issue 1 (2011)



Ad-hoc estimates of the positions of Dvořák, Wagner and Allen in the economic-social plane.
[For the meaning of the coordinate axes see the text on the previous page.]

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The problem of data sharing, how to deal with it and what the EU offers

Gustavo Mastrobuoni, **SmartCare S.r.l.**
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Usually inefficient and inadequate infrastructures and human behaviour are identified in the aftermath of natural disasters as contributing to loss of life and property.

There is often lack of availability of, and accessibility to reliable, up-to-date, and accurate historical data and statistics.

The need for such datasets is very important for every stakeholder if one is to successfully react to and to manage a disaster situation. For instance, London reacted differently from New York in the dramatic events that occurred in 2001, and therefore these differences produced different results, at different levels. Some reactions were based on human behaviour (because of lack of training,

for example), some others were based on out of date infrastructures that collapsed (in terms of poor management, for example).

In Socionical we have put a particular emphasis to the data collection (coming directly from the device we are testing) and data sharing (coming from the various stakeholders: Civil Protection in La Valletta (Malta), managing authorities in Allianz Arena (Germany), etc. Because without historical data nobody can compare a situation and determine what went wrong and why, and then how to increase the preparedness and to better serve and protect citizens in future.

For this reason we are always in search of European authorities and policy makers interested, as stakeholders and/or as researchers, available to share data as well as to receive useful suggestions coming from the Socionical project.

"Knowing is not enough: we must apply. Willing is not enough: we must do." - Goethe

For this reason, the Consortium developed an international Non Disclosure Agreement (NDA) in order to interact, whenever possible - inevitably there are some datasets covered by secrecy restrictions - with all stakeholders.

In addition to the several national and central Civil Protection units, rather than the military, we can interact with all the existing international bodies that must be our preferred partners in order to be able interact with single owners of data. We prefer to interact with owners of large volume datasets so that already make comparisons between datasets and have historical datasets to provide to us. Examples include:

- EUR-OPA Major Hazards Agreement was created by the Council of Europe in 1987.
- The European and Mediterranean Major Hazards Agreement (EUR-OPA), a platform for co-operation between European and Southern Mediterranean countries in the field of major natural and technological disasters. Its field of action covers the knowledge of hazards, risk prevention, risk management, post-crisis analysis and rehabilitation.

  For more information, see: http://www.coe.int/t/dg4/majorhazards/Default_en.asp

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EUROMED (Euro-Mediterranean Programme on Civil Protection)

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The importance of a Euro-Mediterranean regional cooperation in the field of Civil Protection, as a political instrument for the reinforcement of relations of trust in the region, was affirmed at the 2006 and 2007 Euro-Mediterranean Conferences of Ministers of Foreign Affairs in Tampere and Lisbon with a clear focus on strengthening the Mediterranean partners' national structures in charge of prevention, preparedness, protection and response to natural and man-made risks.

Civil protection is a key area of cooperation under the Union for the Mediterranean. The Prevention, Preparedness and Response to Natural and Man-made Disasters Programme (PPRD) contributes to the development of stronger prevention, preparedness and response capacities in civil protection at international, national and local level. It also aims at bringing the Mediterranean Partner Countries progressively closer to the European Civil Protection Mechanism.

PPRD South is managed by a consortium led by the Italian Department for Civil Protection and including the UN International Strategy for Disaster Reduction (ISDR) and the Civil Protection Authorities of France, Egypt and Algeria. The Programme's beneficiary countries are Jordan, Lebanon, Morocco, Syria, the Palestinian Authority, Tunisia, Turkey, Israel, Albania, Bosnia and Herzegovina, Croatia and Montenegro. Mauritania and Libya participate as observers.
For more information, see http://www.euromedcp.eu/.

The Euro-Mediterranean University (www.emuni.si) based in Slovenia is one of the six priority areas of the Union for the Mediterranean. It was established as international network of universities (179 members from 38 countries, GA 2010).

SmartCare has already planned a meeting in EMUNI, Slovenia in 2012 to foster the dialogue with Euromed and facilitate the access to their database of disaster statistics. This will be on behalf of the whole Consortium and form a part of dissemination and exploitation activities in Socionical to be performed in 2013.

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Background to contacting Contingency Policy Makers in each country.

Maggie Ellis, Senior Research Fellow, London School of Economics

In the EU several bodies handle topics related to contingencies, civil protection, risk assessment. There are also national and regional organisations which link with these. They include:

- •EU Commission on Humanitarian Aid and Civil Protection,
- •EU Safety, Homeland Security and Critical Infrastructures.

Each EU Member State has an established link with the central system.

There is an annual Civil Protection Programme and in January 2011 the 2011 Work Programme of the Civil Protection Financial Instrument was outlined, with the priorities of the year and some useful guidance on the preparation of proposals and tenders.

The Instrument deals with civil protection and provides funding opportunities for a number of activities such as cooperation projects on prevention and preparedness, exercises, exercises on modules, exchange of experts, in the framework of the EU Mechanism.

Supporting relevant, innovative and cost-effective proposals is essential to allow a successful implementation of policy objectives. In order to ensure that the proposals and tenders comply with the required quality standards and to increase their success rate, the Commission informed potential applicants on the technical and formal administrative (legal, financial, etc.) requirements and criteria applicable.

Linked to the central EU organisations there are many smaller groups dealing with topic specific material, such as emergency services (fire, police, ambulance), specific infrastructures (transport, roads, power, agriculture) and different professional groups planning EU wide education and training such as medical and paramedical groups. The linkages with these are variable which may complicate how Partners can or should make relevant contact.

SOCIONICAL partners are advised that when they approach their national/regional organisations, policy makers, dealing with these topics that they read about the local structure before making

contact. When actually making the contact they should provide information about our work such as give a short summary about SOCIONICAL, give them a copy of the Website, give a copy of the last Newsletter, Emphasis should be placed on the wide membership in the Partnership, explain a range of work being done across the scene, not just by your country, your partner group. Discussion about how each Partner might contribute to their local and national activity can be highly valuable.

Many publications, regulations guidelines have come from these EU sources. Equal watch is kept on similar activity elsewhere in the developed world, such as USA. One major publication 21.11.2010 COMMISSION STAFF WORKING PAPER Brussels, 21.12.2010 (SEC (2010) 1626 final) Risk Assessment and Mapping Guidelines for Disaster Management, highlighted a simple system for implementation throughout the EU.

Risk assessments, when carried out at national level, are crucial for enhancing disaster prevention and preparedness activities and contribute significantly to planning and capacity building. Specific charts are included to make local interpretation of risk assessment. Recently there has been a shift in the importance and expected relative likelihood of the types of contingencies that the EU expects to occur. Earlier planning concentrated on terrorist attacks, now a greater section of planning concentrates on flooding, freak weather changes.etc.

Other references include:

1) http://ec.europa.eu/echo/civil_protection/civil/index.htm

EU Commission on Humanitarian Aid and Civil Protection
Areas of work includes:
Call for proposals for projects on prevention and preparedness 2011
Call for proposals for projects on prevention and preparedness 2011 is published in the Official Journal of the European Union C 49 on 16 February 2011. Deadline for the submission of summary notes is 18/03/2011.

2) Europarl - Open internet essential for EU homeland security

http://press.ffii.org/Press%20releases/Europarl%20-%20Open%20internet%20essential%20for%20European%20homeland%20security

3) Critical Infrastructure Protection (CIP) and Homeland Security (HS)

TIA Activities

TIA Trade Association Activities Involving Emergency Communications, Communications Network Security and Critical Infrastructure Protection and Assurance

4) http://www.tiaonline.org/standards/technology/ciphs/activities.cfm

EURO ACTIVE network contains info on Critical Infrastructure etc.

5) http://homelandsecuritynewswire.com/eu-leaders-worry-about-critical-infratructure-vulnerability
EU Homeland Security co-ordination across 27 countries.

6)http://www.rand.org/publications/randreview/issues/rr-08-02/infrastructure.html
RAND organisation Objective Analysis, Effective Solutions
The RAND Corporation is a nonprofit institution that helps improve policy and decision making

through research and analysis.

RAND focuses on the issues that matter most such as health, education, national security, international affairs, law and business, the environment, and more. With a research staff consisting of some of the world's preeminent minds, RAND has been expanding the boundaries of human knowledge for more than 60 years.

Critical infrastructure refers to transportation and energy systems, defense installations, banking and financial assets, water supplies, chemical plants, food and agricultural resources, police and fire departments, hospitals and public health systems, government offices, and national symbols. In other words, critical infrastructure refers to those assets, systems, and functions so vital to the nation that their disruption or destruction would have a debilitating effect on our national security, economy, governance, public health and safety, and morale.

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UNIVERSITY OF WÜRZBURG - DRIVING SIMULATOR DESCRIPTION

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ABSTRACT
The University of Würzburg uses several driving simulators of the Institute for Traffic Sciences (WIVW) for its studies in the EU research project “Complex socio-technical system in ambient intelligence” (SOCIONICAL). The document describes the high-end driving simulator with motion system and its appliances.

1 APPLICATIONS

The driving simulators used by the Centre for Traffic Sciences at the University of Würzburg are used for a wide range of research questions. Exemplary research questions are behaviour and performance of drivers while they carry out a secondary task (e.g. talking on mobile phones, using a navigational system), detection and consequences of different driver states (fatigue, anger), or influence of pharmaceuticals, alcohol or drugs on driving. More and more technical devices are also developed using the simulator. This goes from new accelerator pedals, active steering wheels even to very sophisticated driver assistance systems. Another application area is training of drivers, for example emergency driving of policemen and firemen.
There are a lot of advantages of using a driving simulators compared to studies and training in real driving. One of the most important is that there is no danger for the driver even in critical situations. Furthermore, specific traffic scenarios can be set up, controlled, and repeated when necessary and driving parameters (e.g. speed, distance), performance indicators (e.g. position on the lane), and physiological values can be recorded relatively easy.

2 PREPARATION OF A SIMULATOR STUDY

Before a simulator study starts the group of persons has to be identified that are relevant for the study, for example people of specific age, gender and/or driving experience. In order to find the persons that fit into the group, the university has access to a great panel of volunteers that are willing to participate in simulator studies. This panel includes more than 600 persons, ranging from an age of 17 years to an age of 85 years.
The next step is driving simulator training. This is necessary, in order to avoid motion sickness (see [1] and [2]). The simulation ride itself is controlled by the instructor from an operator station.
The University of Würzburg has the option to use different driving simulators for conducting scientific studies. These driving simulators belong to the company WIVW GmbH[1] which closely cooperates with the University of Würzburg. These simulators have already been used in several national and international studies. In the following, the high-end simulator with motion system is described.

3 OPERATOR STATION

The operator station is the room where the instructor briefs the driver before and after a ride. During a simulation ride, the operator station serves as the central control room from where the instructor runs the simulation. This station supports an audio and video connection to the subject and allows to fully control the driving simulator.

Figure 1: Operator station (l), motion system and dome (r)

4 SIMULATOR SPECIFICATION

The simulator consists of a dome that is mounted on a FCS Moog motion system with the following specification:

Parameter	Value	Parameter	Value
payload	4 tons	acc. rotatory	±100°/s^2
stroke	±0.6 m	cut-off-frequency	5 Hz
incline	±10°	response time	< 45ms
acc. linear	±5 m/s^2		

The mockup consists of a real BMW 520i that is cut off behind the B-pillar. Two LCD displays, an eye-tracking system as well as an advanced simulation of steering forces extend the mockup.

Figure 2: Mockup of motion simulator

The front view covers an angle of 180 degrees horizontal and 47 degrees vertical and is presented on a spherical projection screen with a diameter of 6m.
Three mirrors (left, right and rear mirror) are realised via TFT displays that replace the real mirrors.
The sound system consists of 8 sound channels including subwoofer and shaker. 6 speakers are attached inside the mockup and two are attached outside.
For presenting a driving scenario 14 computers are available that are connected via 100MBit Ethernet connection. The update frequency of the visual system is guaranteed to be 60Hz at minimum.

5 SIMULATOR SOFTWARE SPECIFICATION

The software of the simulator is called SILAB and was developed by WIVW GmbH. SILAB is a high-end driving simulation software that creates a realistic impression of driving which includes a complex simulation of vehicle dynamics, a modern image generation for urban, highway and rural scenarios, day and night simulation and an eight channel sound simulation. SILAB supports Windows as well as Linux as operating systems.

Figure 3: Screenshots of the simulation software SILAB

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[2] Hoffmann, S., Krüger, H.-P. & Buld, S. (2003). *Vermeidung von Simulator Sickness anhand eines Trainings zur Gewöhnung an die Fahrsimulation*. In VDI-Gesellschaft Fahrzeug- und Verkehrstechnik (Hrsg.), *Simulation und Simulatoren - Mobilität virtuell gestalten* (VDI-Berichte, Nr. 1745, S. 385-404). Düsseldorf: VDI-Verlag.

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SOCIONICAL focuses on the specific example of Ambient Intelligence (AmI) based smart environments. A key component of such environments is the ability to monitor user actions and to adjust its configuration and functionality accordingly. Thus, the system reacts to human behaviour while at the same influencing it. This creates a feedback loop and leads to a tight entanglement between the human and the technical system. At the same time there is dynamic, heterogeneous human-human, human-technology, and technology-technology communication leading to ad-hoc coupling between components and different feedback loops. The project will study global properties and emergent phenomena that arise in AmI based socio-technical systems from such local feedback loops and their coupling on two concrete scenarios: transportation and emergency/disaster.

SOCIONICAL takes a parallel, multi facetted research approach. Thus, it will address analytical methods, complex networks based representations, and agent based models. The advances in modelling and prediction will be verified by large scale, distributed simulation driven by real life data.

Partners and background

The project has assembled an interdisciplinary consortium encompassing Computer Science, Electrical Engineering, Mathematics, Physics, Sociology, Psychology, and Transportation Technology. Such an interdisciplinary consortium allows us to investigate global properties and emergent phenomena in socio-technical systems from different angles and to include in our investigation all relevant technological, social and psychological factors. It also allows SOCIONICAL to address and integrate a broad range of modelling, simulation and prediction approaches. The consortium also contains companies and public bodies (e.g. strategic planning department of the Italian fire fighters, SmartCare, SICE dealing with monitoring, management and control of large transport facilities, London School of Economics) that can provide realistic scenarios and ensure that the results of the project will influence policy and strategy in relevant areas.

Each partner in the consortium has a well defined role, with some key competences being held my multiple partners. The partners in the consortium can be divided into 4 groups. The largest group of partners come from different areas of Complexity Science and closely related fields. As socio-technical systems per definition involve social/psychological issues and the understanding of the technology each of those topics has a group of partners devoted to it. Finally we have partners who are directly involved with applications related to the SOCIONICAL case studies who will be in charge of providing scenarios, real life data sets, and ensuring that the results of the project lead to relevant guidelines and recommendations for policy makers and industrial decision makers.

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