

Exchange of Experts 502

October 31st – November 4th

Field Report



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1. Objective of the exchange

Research and exchange of knowledge for the Fire Service is more than ever necessary. Fires and fire development have changed, fire risk for elderly people has increased, fire fighters encounter greater risks during firefighting and occupational health of fire fighters has become an important issue. Fires and fire development have changed due to the use of modern materials such as insulation materials and inventory and the development of new ways of building. Modern materials burn hotter, faster and produce more smoke, while they run out of oxygen faster, causing ventilation controlled, dangerous fires. Sustainable buildings are better isolated, and heat and smoke stay inside the building. Smoke contains more dangerous substances that can cause illnesses for the fire fighters when exposed to fire smoke.

Therefore there is a need for more and better knowledge of modern fires and fire development to prevent and fight fires. Fire fighters have to innovate and change their tactics. Innovation without thorough knowledge is impossible. However, this topic is not on the research agenda in many countries. In some countries research is conducted, but the knowledge is not shared. A research community regarding research for the fire service does not exist.

The objectives of this exchange of experts were fourfold:

1. Establish a first step towards a network of institutes and people who are involved in research for the fire service;
2. Share the mutual research programs in order to find topics to share knowledge and possible cooperation in the future
3. Share knowledge about results of recent research
4. Share knowledge about how to conduct measurements in life fire research

This exchange was considered to be a first step to a pan European network of researchers who are doing practical research for the fire service. The participants were invited because in some way they came into contact with the host organisation recently.

In total 21 experts participated in this exchange, 9 of the participants were sponsored by the Exchange of Experts 502 program.

2. General program

The exchange took four days (from Monday until Friday). The international Fire Safety and Science conference (FSS) of the Netherlands Fire Service Academy (department within the IFV) was integrated within the program of the Exchange of Experts. For the exchange of experts program, all participants were asked to prepare a short presentation of their research program (objective 2) and a presentation about recent results of their research (objective 3 and 4). In the FSS conference even more international speakers were present, so there was a lot of opportunity to network (objective 1). A detailed program of the exchange is presented in chapter 6. Each day ended with a discussion and wrap up about the given presentations. At the closure of the Exchange of Experts a final discussion was held to reflect on the exchange and to identify common topics of interest among the researchers of different countries.



3. Report

1.1 Monday 31-10-2016

After arrival at the Institute of Safety (IFV) participants were welcomed by Wim Beckmann, the manager, and by Ricardo Weewer, professor of Fire Service Science, at the Netherlands Fire Service Academy. After the welcome the participants had a short introduction to get to know each other.



In the afternoon every participant held a short presentation about the research program of their institute:

Robin Zevotek (UL – Fire Safety Research Institute, United States of America)

UL has done a lot of research for the fire service, and especially makes a lot of effort to disseminate knowledge among fire fighters all over the world. They focus on fire, fire development and firefighting techniques and tactics. They perform real scale practical experiments, and are now working on research to make training for fire fighters more realistic.

Anna Figueras (CAT, Spain)

The fire academy of Catalonia is a part of institute of public safety, and they cooperate closely with the fire service of Barcelona and the University of Catalonia.

The topics they work on are directed towards innovation of training for the fire fighters, resilience of civilians to incidents and towards the influence of human factors in command and control. At the moment they work on a project with fire fighters to develop an index for structure fires, in analogy with forest fires.

Jonathan Gray, Tyne & Wear Fire & Rescue Service - (United Kingdom Research and Development Function – (UKR&D))

In the United Kingdom (UK) the Chief Fire Officers Association (CFOA) are currently engaged in implementing a single, collaborative function for Research and Development (R&D); the primary aims of which are, to reduce duplication, improve efficiency and enable the broader sharing of knowledge freely through the sector to improve the implementation of new developments.

The R&D function will provide a process that considers what Fire and Rescue Services (FRS) and partners require in order to make a difference to the delivery of the services they provide to communities. It will incorporate all aspects of R&D including academic research,

product development, testing and procurement to evaluating the impact that a particular approach or new item of operational equipment has on FRSs, firefighters and their communities.

Once established the function will aim to capture emerging knowledge, technical advances, innovation, advancements of products, techniques and skills, as well as enhancing the understanding of how and why particular approaches work within the fire sector that will ultimately improve firefighter and community safety.

At the current time the UK FRS has a number of research programmes including projects aimed at proving the concept of the R&D function these include;

- Personal Protective Equipment (PPE) Contaminates
- Audibility of Automatic Distress Signal Units (ADSU)
- Real time physiological monitoring of firefighters

In the future the R&D function will seek to:

- Establish a central hub of fire related academic research
- Provide a publicly available list of areas for research or development driven by market analysis
- Lead nationally coordinated product testing
- Reduced duplication of product testing
- Increase the pace at which service improvements can be implemented
- Reduce costs for FRSs and suppliers

The R&D function will seek support from a wide variety of sources and partners to assist in delivery, ensuring that the needs of UK FRSs, other blue light services and partners are incorporated. Furthermore, aspirations are also to work collaboratively with emergency services and partners outside of the UK and build on international relationships where mutual benefit can be identified.

Marko Hassinen (Emergency Services College, Finland)

Marko Hassinen from the Emergency Services College of Finland informs the participants about the coordinating role the 'Pelastusopisto Institute' has regarding research for the fire service in Finland. The specific topics of interest are: emergency services in a dynamic environment and changing society, research into new fire extinguishing agents (agile fire extinguishing), practical field tests of dwelling fires, fire fighter safety and physical burden on fire fighters.



Jim Glockling (Fire Prevention Association, UK)

Projects on which the FPA is working are: understanding of the effectiveness of the Fire Service, assessment of performance and fire prevention. The FPA is sponsored by the insurance companies and at the moment they are doing research into firefighting in marine ships. A lot of knowledge about gas cooling was developed and a new firefighting technique was established. The FPA also worked on the effectiveness of the cold cutting system, and firefighting in old single family dwellings.

Roland Goertz (Univ. Wuppertal, Germany)

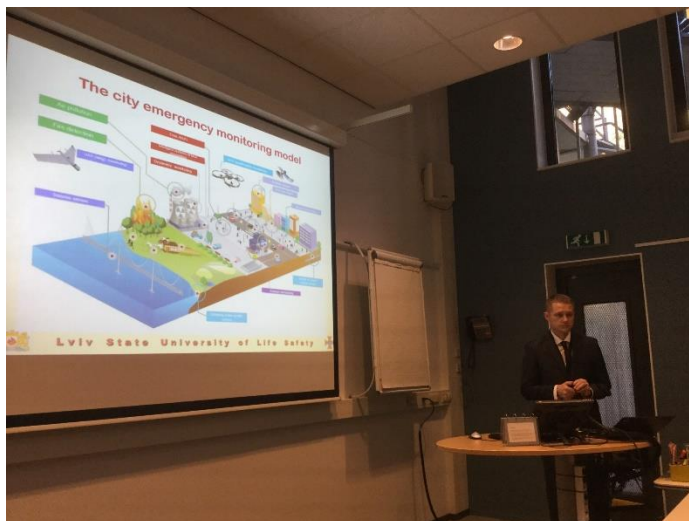
Professor Roland Goertz is doing research into the chemistry (he likes chemistry) of fire and smoke and into fire extinguishing, for example the use of foam. His institute also works on Fire Safety Engineering modelling for tunnels and scrap fires, business continuity and fire service organisation. His special topic is lithium ion batteries.

Martin Thomsen (DEMA, Denmark) / Mikkel Boehm (Univ. Roskilde, Denmark)

Martin Thomsen is the acting head of the Emergency Services College, at the Danish Emergency Management Agency (DEMA). Mikkel Boehm is Ph.D. Fellow at the Roskilde University and a senior lecturer at the Metropolitan University College. At the moment, Mikkel Boehm is working on a Ph.D. project regarding human factors and command and control for fire officers. In this respect, he has stepped into a working relationship with DEMAs Emergency Services College, currently working on a joint article regarding leadership identity and the cross section between training and action.

Michael Först / Lotta Vylund (FIRST – First responders of tomorrow, Sweden)

SP Fire Research is now named RISE and has done research into gas cooling (spray distribution) and water mist. Also they are working on a project called FIST: responders of tomorrow a platform between research and practical fire research. Other topics they are active in involve tunnels and underground building, transport and electrical vehicles, modern buildings, fuel storages and incident command.



Marcus Runefors (Lund University, Sweden)

Marcus is a lecturer at Lund University and is a specialist in Fire Protection Engineering, which is also a subject of interest of the Lund University. Furthermore Lund University is working on improving tactics and techniques for the fire service. Their research areas are fire dynamics, human behaviour, performance based design, fire modelling, suppression and rescue services. An example of a present project is the research into water mist for application in dwellings.

Dmytro Chalyy (Lviv State University of Life Safety, Ukraine)

Dmytro Chalyy is associate professor at the University of Lviv. His topic of interest is fire safety at nuclear power plants and at objects with increased levels of ionizing radiation. His University is working on a lot of topics: simulations of evacuation of public buildings, radiation-resistant optical temperature sensors, forest fires and innovations like extinguishing fires by using shock waves and acoustics. They are also working on GIS systems in order to develop a city emergency monitoring model.

1.2 Tuesday 01-11-2016

Today the program was partially combined with a masterclass for teachers and researchers of the Fire Service Academy. The participants held a presentation about recent results of their research.

Marcus Runefors (Lund University, Sweden)

Marcus shared the preliminary results of his research project into the effect of the Q-Fog system on fires in the domestic environment. This has relationships with fire modelling and fires in the home, as well as fire gas cooling, smoke composition and improving the opportunities to escape from a home fire by persons with impaired mobility. He also explained how they designed their practical experiments and how the measurement of data was carried out.

Marko Hassinen (Emergency Services College, Finland)

Marko shared the results of the real scale fire experiments into agile firefighting. The main conclusion is that mobile extinguishers can be used with ratio.

Jim Glockling (FPA, United Kingdom)

James shared the results on firefighting tactics in naval ships. A series of real scale experiments were carried out to find out the best way to use hoses and use less water, while in the meantime improving fire fighter safety on ships.



Michael Försth (FIRST – First responders of tomorrow, Sweden)

Michael presented recent research about spray distribution and fire gas cooling. SP Fire Research combined practical experiments with modelling. Innovation is gas cooling with a high voltage on the nozzle.

Ricardo Weewer and René Hagen (NL Fire Service Academy, Netherlands)

Ricardo is professor of Fire Service science and René is professor of Fire Prevention at the Fire Service Academy. They are doing practical participative research for the fire service, Topics of interest are firefighting tactics, fire causes and fire development, fire fighter safety and improving fire safety in the home.



Presentation “Li-ion batteries” by Goertz (Univ. Wuppertal, Germany)

Roland did a keynote presentation about the research on the “runaway” behaviour of different types of Li-ion batteries and shared with us in depth the chemistry of the vent gasses of different types of lithium ion batteries, as well as the best way to extinguish them; by using lots of water.

Presentation “Live Fire Training” by Zevotek (UL - FSRI, United States of America)

Fire fighters all over the world are nowadays trained in concrete buildings and steel containers using wood piles as a fire source. But these are not real fires that fire fighters probably encounter. UL is quantifying the training fire environment as it compares to the fire environment firefighters experience on a daily basis. The project will begin to bridge the gap between the experience of live fire training and the fires experienced on a daily basis by firefighters around the world. The purpose of this is improving fire fighter safety and tactics.

Raphael Esteban: QR39 (CAT, Spain)

Raphael did a workshop on the innovative idea of putting QR codes on all the equipment that fire fighters use. Behind the QR code is a movie of 39 seconds without sound. The movies are to fresh up fire fighters knowledge or to practise the equipment. This idea was suggested by fire fighters, and the Fire Academy of Catalonia is now making these movies and intends to set up a database which can be internationally used.

Network event: posters session

During the poster session participants could get acquainted with the fire research in the Netherlands, network, meet researchers and students and have discussions about the different topics.



1.3 Wednesday 02-11-2016

In the morning the meeting was combined with the FSS conference held at the IFV in Arnhem, the Netherlands.

Keynote by Bixby (Univ. Edinburgh, United Kingdom)

Luke Bixby went into the subject of fire resistance. His statement is that fire resistance like we commonly use is of no use. It is only a measure. We should look at fire resilience of the entire building instead of just parts of a building. He related this subject to innovative and modern buildings, like buildings made of wood.



Keynote by Zevotek (UL – FSRI, United States of America)

Robin Zevotek presented the results of the most recent research into firefighting using different kinds of nozzles and nozzle techniques. These are real scale experiments of interest for the fire service since together with the water stream also air is drawn into the fire. The gas cooling capabilities of various techniques are also of interest for the European fire services.

In the afternoon there were presentations about recent or on-going research projects of the participants.

Dmytro Chalyy (Lviv State University of Life Safety, Ukraine)

Dmytro showed us more in depth some of the research projects that his University is working on. It contains innovative topics as well as some experimental topics like fire causes from electrical grids and evacuation modelling. His institute is also working on modelling using FSE simulation models.

Mikkel Boehm (Univ. Roskilde, Denmark) / Martin Thomsen (DEMA, Denmark)

Mikkel is doing his PhD-thesis on command and control in the Danish fire service. Generally, command and control education in Denmark is multidisciplinary, together with other rescue services. He uses helmet cameras to study fire officers in real incidents, to see if there is a gap between how they are educated and trained, and how they perform in practice. The NL Fire Service Academy also finished a research into this subject. Remarks during the presentation stated that this topic is a common area of interest. It is interesting to know whether the results can be duplicated and conclusions can be made stronger, making this topic amongst the 8 topics of mutual interest



Serhii Pozdieiev (Cherkassy Institute of Fire Safety, Ukraine)

Sergei presented the topics Cherkassy Institute of Fire Safety is working on. A lot of research within their program is conducted into modelling and calculations of reinforced concrete.

1.4 Thursday 03-11-2016

Today the meeting is partially combined with the FSS conference held at the IFV in Arnhem, the Netherlands.

Serhii Pozdieiev (Cherkassy Institute of Fire Safety, Ukraine)

Sergei presented more in depth the results of some modelling using calculations and simulations for different constructions made of reinforced concrete.

Keynote: Ricardo Weewer (NL Fire Service Academy, Netherlands)

Ricardo gave a review of the recent research in the Netherlands. It contains a lot of practical research but all in combination with Fire Safety Engineering modelling, case studies and data. He was able to make an interim review of the research and made a synthesis of the research into the "Theory of the predictable outcome" which can be used by fire prevention advisors, fire fighters and fire officers to predict the outcome of fires.



Keynote: Anna Figueras (CAT, Spain)

In her keynote Anna gives an overview of research in Catalonia. She went into the subject of developing an index for dwelling fires, in cooperation with the fire service of Barcelona. She also gave information about the research of ISPC in human factors and in fire science.



4. Conclusions

At the end of the exchange the group drew conclusions regarding the exchange.

1. Participants unanimously found that the exchange was successful and very interesting. They all agreed with the statement that the objectives of the exchange were achieved:
 - a. Objective 1: Establish a first step towards a network of institutes and people who are involved in research for the fire service was achieved. The group was very enthusiastic and they founded "The Arnhem Group" and established a Loomio Webpage. During the exchange contacts were tightened.
 - b. Objective 2: Share the mutual research programs in order to find topics and to share knowledge and possible cooperation in the future was achieved. The group defined 8 topics of mutual interest (see bullet number 4). The different participating countries will file a request to organize Expert of Exchange meetings on these specific subjects.
 - c. Objective 3: Share knowledge about results of recent research. This objective was achieved on a general level. More in depth exchange is possible for every topic of mutual interest when the experts of the participating countries / institutes are present.
 - d. Objective 4: Share knowledge about how to conduct measurements in life fire research. This objective is achieved partially. There was this time not enough time to go in depth into how to perform measurements in practical experiments. Therefore it is denoted as one as the topics of mutual interest for a separate EoE meeting.
2. Participants found that this is the first time that such an exchange of knowledge was organized on this specific subject. They agree that this should be continued in de future and that it is necessary to keep on exchanging knowledge.
3. It was decided that next year the group would meet again in Arnhem in combination with the FSS conference. The combination with FSS conference was experienced as a great success.
4. The 8 topics of mutual interest, for which in the next two years EoE meetings will be proposed are:
 1. Exchange results of experiments into fire spread in family dwellings.
 2. How to perform measurements in practical experiments.
 3. The use of drones for size up.
 4. Fire safety engineering, modelling in combination with practical experiments.
 5. The impact of smoke (contaminates and toxins) on firefighters and PPE (occupational health issue).
 6. The Human factor in command and control.
 7. Gas cooling by the fire service (effects, possibilities, measurements) and water mist (effects on fire, application in the home, especially for elderly people).
 8. Foam as an extinguishing medium (use, chemicals and environmental aspects).

Participants want to proceed organizing exchange of experts meetings on the above topics.

5. List of Participants

Participant		Email
Exchange of Experts project 502 - THW		
Anna Figueras	Fire Fighters and civil protection school of Catalonia (ESP)	afigueras@gencat.cat
Jonathan Gray	Tyne & Wear FRS (GBR)	jon.gray@twfire.gov.uk
Marko Hassinen	Emergency Services College (FIN)	Marko.hassinen@pelastusopisto.fi
Jim Glockling	Fire Prevention Agency (GBR)	jglockling@thefpa.co.uk
Roland Goertz	University of Wuppertal (GER)	goertz@uni-wuppertal.de
Martin Thomsen	Danish emergency management agency (DNK)	mth@brs.dk
Michael Försth	FIRST - First responders of tomorrow (SWE)	Michael.forsth@sp.se
Marcus Runefors	Lund University (SWE)	Marcus.runefors@brand.lth.se
Not within EU funding		
Robin Zevotek	UL - Firefighter Safety Research Institute (USA)	Robin.zevotek@ul.com
Raphael Esteban	Fire Fighters and civil protection school of Catalonia (ESP)	rafael.esteban@gencat.cat
Dmytro Chalyy	Lviv State University (UKR)	tactic.lviv@gmail.com
Mikkel Boehm	Roskilde University (DNK)	mibo@phmetropol.dk
Lotta Vylund	FIRST – First responders of tomorrow (SWE)	Lotta.vylund@sp.se
Serhii Pozdieiev	Cherkasy Institute of Fire Safety (UKR)	svp_chipbbk@ukr.net
From the Netherlands		
Ricardo Weewer	Fire Service Academy (NLD)	ricardo.weewer@ifv.nl
Tamo Vogel	Fire Service Academy (NLD)	tamo.vogel@ifv.nl
Lieuwe de Witte	Fire Service Academy (NLD)	lieuwe.dewitte@ifv.nl
Ruud van Herpen	Eindhoven University (NLD)	
Folkert van der Ploeg	Fire Service of Twente (NLD)	
René de Feijter	Efectis (NLD)	
Loek Pfundt	Fire Service Amsterdam-Amstelland (NLD)	

Unfortunately the participant from Belarus and Mr. Chalyy from Lviv did not get permission to participate from his EU project coordinator. Belarus was therefore not able to participate.

Apart from the participants that were invited through the EU EoE502 program, researchers from the Netherlands and some international researchers joined on their own expenses.



6. Program

Program Monday 31-10-2016

- 13.00 Welcome
- 13.30 Introductions
- 14.00 Sharing Research Programs
 - 14:00 – 14:15 Robin Zevotek (UL)
 - 14:15 – 14:30 Ana Figueras (CAT)
 - 14:30 – 14:45 Jon Gray (Tyne & Wear)
- 14.45- 15.00 Break
- 15:00 Sharing Research Programs
 - 15:00 – 15:15 Hassinen (Finland)
 - 15:15 – 15:30 Glockling (FPA)
 - 15:30 – 15:45 Goertz (Univ. Wuppertal)
 - 15:45 – 16:00 Thomsen / Boehm (Denmark)
 - 16:00 – 16:15 Först / Vyllund (SP)
 - 16:15 – 16:30 Runefors (Univ. Lund)
 - 16:30 – 16:45 Chalyy (Univ. Lviv)
- 17.00 – 17:30 Discussion and wrap up
- 19.00 network event: dinner

Program Tuesday 01-11-2016

- 9.00 start presentations:
 - 09:15 – 09:45 Marcus Runefors (Univ. Lund)
 - 09:45 – 10:15 Marko Hassinen (Finland)
 - 10:30 – 11:00 Jim Glockling (FPA)
 - 11:00 – 11:30 Michael Försth (SP)
- 11.30 start combi with Masterclass
 - 12.00 – 13.00 lunch
 - 13:00 – 13:30 Research program NL Fire Service Academy
 - 13:30 – 14:15 Presentation “Li-ion batteries” by Goertz (Univ. Wuppertal)
 - 14:30 – 15:15 Presentation “Live Fire Training” by Zevotek (UL)
 - 15:15 – 16:00 Presentation “QR39” by Esteban (CAT)
- 16.00 network event: posters session of research by the Netherlands Fire Service Academy presented by researchers and students
- 17.00 – 17:30 discussion and wrap up
- 19.00 network event: dinner

Program Wednesday 02-11-2016

- 09:00 Start day 3
- 10:00 Start of FSS conference in Brauerszaal
 - 10:00 – 10:30 Opening FSS Conference
 - 10:30 – 11:00 Keynote by Bixby (Univ. Edinburgh)
 - 11:30 – 12:15 Keynote by Zevotek (UL)
 - 12:15 – 13:00 Keynote by Goertz (Univ. Wuppertal)
- 13.00 lunch
- 13.45 EoE continues with presentations
 - 13:45 – 14:15 Dmytro Chalyy (Univ. Lviv)
 - 14:15 – 15:00 Boehm & Thomsen (Denmark)
- 15:00 break
- 15:30 – 15:45 Presentation research program Cherkasy (Ukraine)
- 15:45 – 17:30 Discussion about our research programs
- 17.30 network event: dinner with participants FSS conference at IFV

Program Thursday 03-11-2016

- 09:00 – 09:30 Presentation by Cherkasy (Ukraine)
- 9:30 Combi with FSS conference
 - 10:00 – 11:00 Presentation by Weewer (NL Fire Service Academy)
 - 11:30 – 12:15 Presentation by Figueras (CAT)
 - 12:15 – 13:00 Master thesis Research contest
- 13.00 lunch
- 13.45 – 16:00 Network event: Excursion to Arnhem and / or workshop
- 16:00 – 17:00 Closure and wrap up of EoE
- 17.00 – 18:00 Network event: meeting with participants and speakers at FSS conference
- 19.00 network event: Dinner

Program Friday 04-11-2016

- Most participants are leaving or have left on Thursday evening.
- Network event: excursion to Amsterdam