



INTERNATIONAL ASSOCIATION  
FOR HYDROGEN SAFETY

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President,  
Intern'l Association for Hydrogen Safety - HySafe**

## The European FP6 Network of Excellence...



...became the International Association HySafe,  
a not-for-profit AISBL under Belgian Law

# How it all began.....

## NoE HySafe - Integration of the EU Hydrogen Safety Research

### Consortium

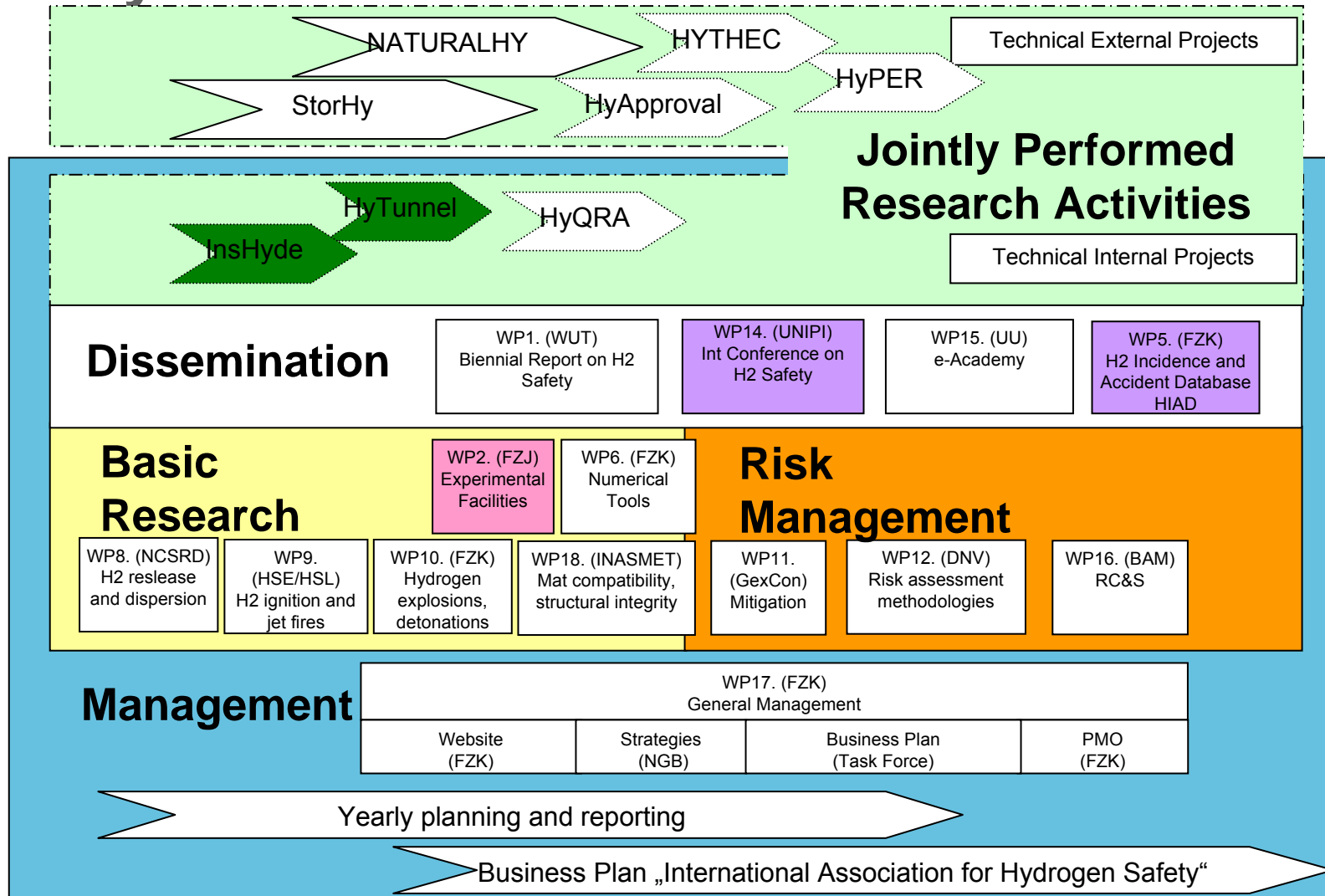
- 23 Partners from 12 European Countries  
+ Kurchatov Institute, Russia + University of Calgary, Canada
- 13 Research Institutes, 7 Industry Partners, 5 Universities
- ~150 Scientists actively involved

**Budget Total** ~ 14 M€ ; EC grant ~ 7 M€

**Time frame:** 03/2004 – 02/2009



# Activities & Services built on the success of HySafe NoE



# HySafe NoE

## Cluster Research Integration of Experimental Facilities

### MISTRA

*cylindrical steel vessel*

*originally designed as 1/10<sup>th</sup> in linear scale of Pressurized Water Reactor containment*

*studies of H<sub>2</sub> (simulated by He) release and distribution in a confined geometry*



### REKO-2

*pressure vessel*

*medium scale*

*Flame Acceleration Pad (FAP)*



## Open access online catalogue at

<http://www.hysafe.net/download/1464/WP2-D96-V1.pdf>

*large scale*



**GexCon 168 m<sup>3</sup> open geometry with internal obstructions**

*explosion vessel*

*large scale (168 m<sup>3</sup>)*

*studies on explosions in open, congested geometries*



**A1 Vessel**

*cylindrical vessel*

*full or large scale*

*studies on turbulent combustion and detonations, vented explosions, hydrogen distribution, integrity of mechanical structures under high pressure load*

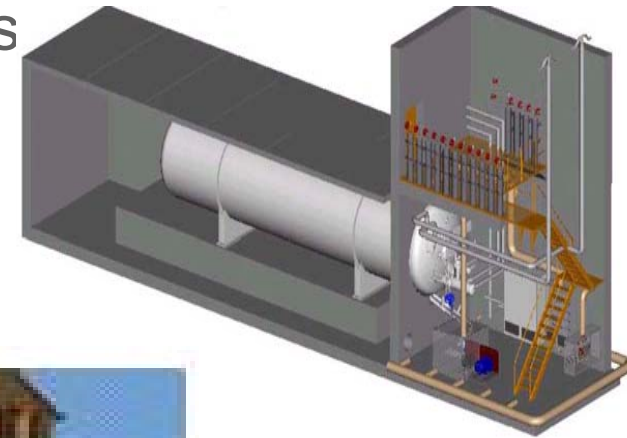


# HySafe NoE

## Internal Project InsHyde

### Addressing the Priorities

- Investigation of realistic non-catastrophic releases in (partially) confined areas
- Determination of permeation and release limits
- Systematic assessment of mitigation (including detection) measures (sensors + venting + recombiner...)
- Simulations and experiments for critical releases
- Deriving „Recommendations“



# Accident Database HIAD

## Collecting Experience



**ie** Hydrogen Incidents & Accidents Database (HIAD)

**> 250 Hydrogen Safety Related Events**

Help

Main menu

- Home
- Contact us
- Help
- News
- H.I.A.D. events
- Enter my...
- Log out
- Administrator

### HySafe - Hydrogen Incident and Accident Database (HIAD)

Welcome to the H.I.A.D. BETA version!!!



Courtesy of Holmefjord:  
Livorno Hydrogen Refuelling Station



Courtesy of Gerd Petra Haugom:  
Beijing Hydrogen Refuelling Station



Courtesy of Gerd Petra Haugom:  
Beijing Hydrogen Refuelling Station

Over the last few months JRC and DNV have been working on HIAD application. As you know, the previous-version of the Data Entry Module (DEM) - on Graphical User Interface (GUI) - was available for comments the last few months. The developed carried out has mainly been related to integrating a new

# Education and Training



Home Page	Potential Students	Current Students	Staff Resources	Campus Information
<b>Potential Students</b>				
Thinking of Applying? Apply Now Our Courses How Much Does It Cost? Student Support Life at Campus One	<b>PGCert Hydrogen Safety Engineering</b>			
Already Applied? Newsletter Check Status Browser Tune-Up	<b>Introduction</b>			
Accepted on a Course? What Happens Next?	The Postgraduate Certificate programme in Hydrogen Safety Engineering offered at the University of Ulster is the only such programme in the UK and worldwide, giving graduates the opportunity to specialise in a new field. The programme comprises of two 30 CATS point modules, namely, one on "Principles of Hydrogen Safety" and one on "Applied Hydrogen Safety".			
Latest Campus News FAQs	The topical content of the modules complies with the International Curriculum on Hydrogen Safety <a href="http://www.hysafe.org/index.php?ID=68">http://www.hysafe.org/index.php?ID=68</a> There is a growing need for specialists in hydrogen safety engineering. Graduates with a PGCert in Hydrogen Safety Engineering will be suitably qualified for employment opportunities at various industrial corporations, governmental bodies, research organisations, and educational institutions.			
Contact Us	<b>Quick Facts</b>			
<b>Current Students</b>	<b>Course Name</b>			
<b>Staff</b>	PGCert Hydrogen Safety Engineering			
	<b>Faculty</b>			
	Engineering			
	<b>Course Code(s)</b>			
	PGCert: C514PJ			
	<b>Duration</b>			
	PGCert: One year (two semesters)			

## European Summer School on Hydrogen Safety



**Progress in Hydrogen Safety**  
*International short course series*

### Hydrogen and fuel cell technologies: **Safety issues**

29 September - 3 October 2008, Belfast, UK



Early booking recommended for all courses!

**Further courses in 2008/2009 series**

- Hydrogen regulation, codes and standards  
January 2009
- Safety of hydrogen fuelled vehicles  
April 2009
- The hydrogen and fuel cell infrastructure  
June 2009

Supported by



Organised by **HySAFER**  
Hydrogen Safety Engineering and Research, University of Ulster

MSc-HSE@ulster.ac.uk



## The ,Unique' Conference



## 3rd International Conference on Hydrogen Safety (ICHS 3), September 16-18, 2009, Ajaccio (France)

- 200 Attendees from 22 Countries
- Large International Attendance
- IEA Task 19 Meeting
- ISO Workshop
- NaturalHY Workshop and Closing Session
- 4th European Summer School



# Vision, Mission and Objectives



## Vision

Hydrogen will be introduced globally as a safe and sustainable energy carrier.

## Mission

The International Association for Hydrogen Safety (IA HySafe) will be the international focal point for hydrogen safety research, education and training.

## Objectives

- Facilitate the maintenance and continued development of competitive and innovative infrastructure for hydrogen safety research
- Initiate and promote coordinated research in the field of hydrogen safety
- Provide support to FCH-JU, EC, RC&S bodies, etc., with respect to hydrogen safety issues
- Provide or facilitate education/training frameworks for academic and technical stakeholders
- Dissemination of knowledge via communication/information platforms to all stakeholders

# Where are still the Knowledge Gaps.....?

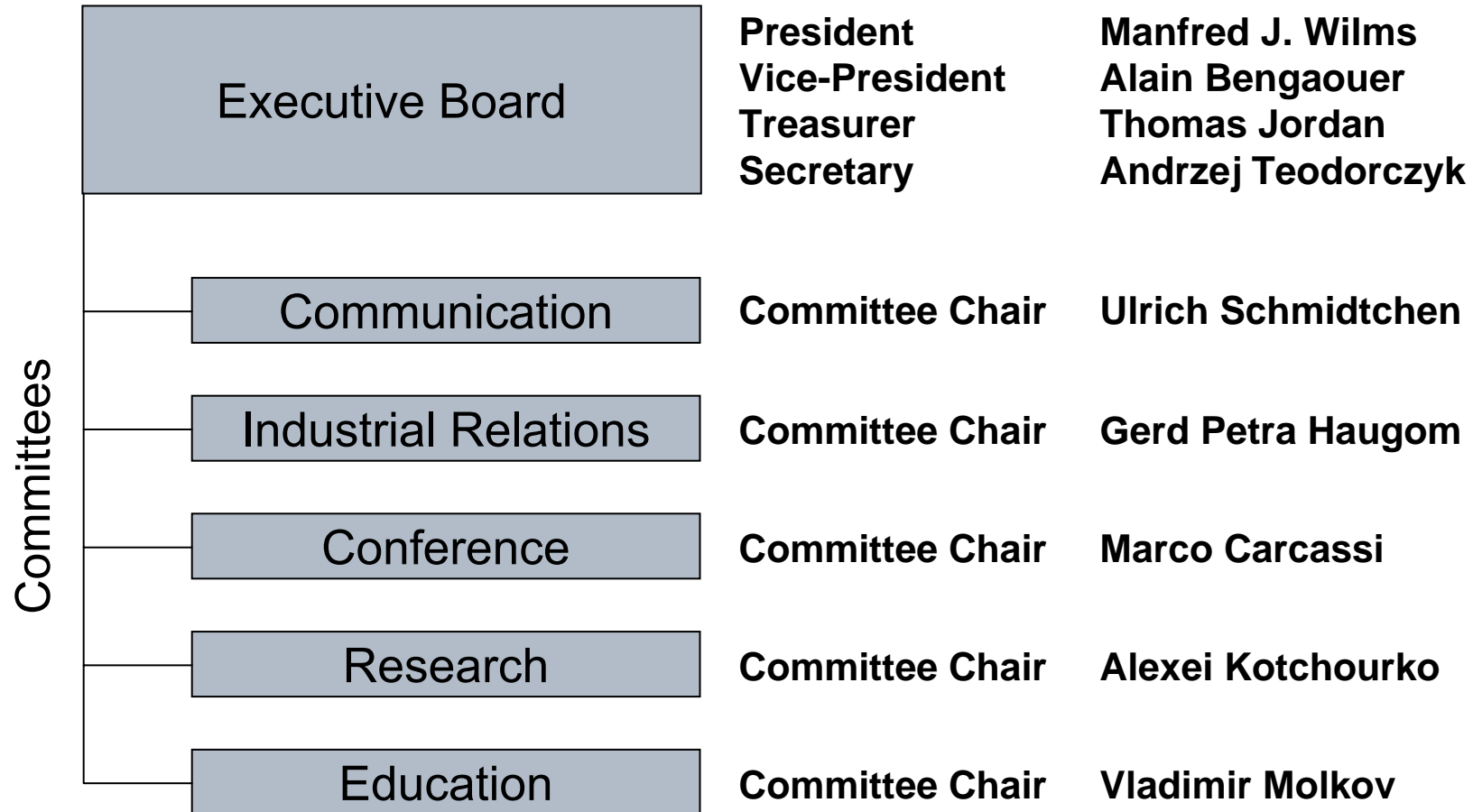
- Hydrogen Releases
  - Jet fires, Wall Effects on Jet Fires, Spill of Liquid Hydrogen, Ignition Phenomena
- Hydrogen Fires
  - Effects of Water, Fire Control Techniques
- Hydrogen Explosions
  - Combustion Phenomena, Effects of Water Sprays
- Mitigation
  - Design of Flame-Arresters
- Tools
  - Safety Engineering and Quantitative Risk Assessment Methodologies
- Application based Standards
  - Requirements for the Use of Hydrogen Vehicles in Confined Spaces
  - Hydrogen Release Strategies for Accidental Scenarios

# Activities & Services

The IA HySafe will achieve its objectives through provision of activities and services such as:

- Support for Hydrogen Safety Issues
- Knowledge Sharing and Dissemination through, for example:
  - International Conference on Hydrogen Safety (ICHHS)
  - Biennial Report on Hydrogen Safety
  - Education and training activities on hydrogen safety (ESSHS,...)
  - Hydrogen Incidents and Accidents Database (HIAD)
- Networking Opportunities
- Promoting and Initiating Coordinated Research
- Provision of Infrastructure for Hydrogen Safety Research

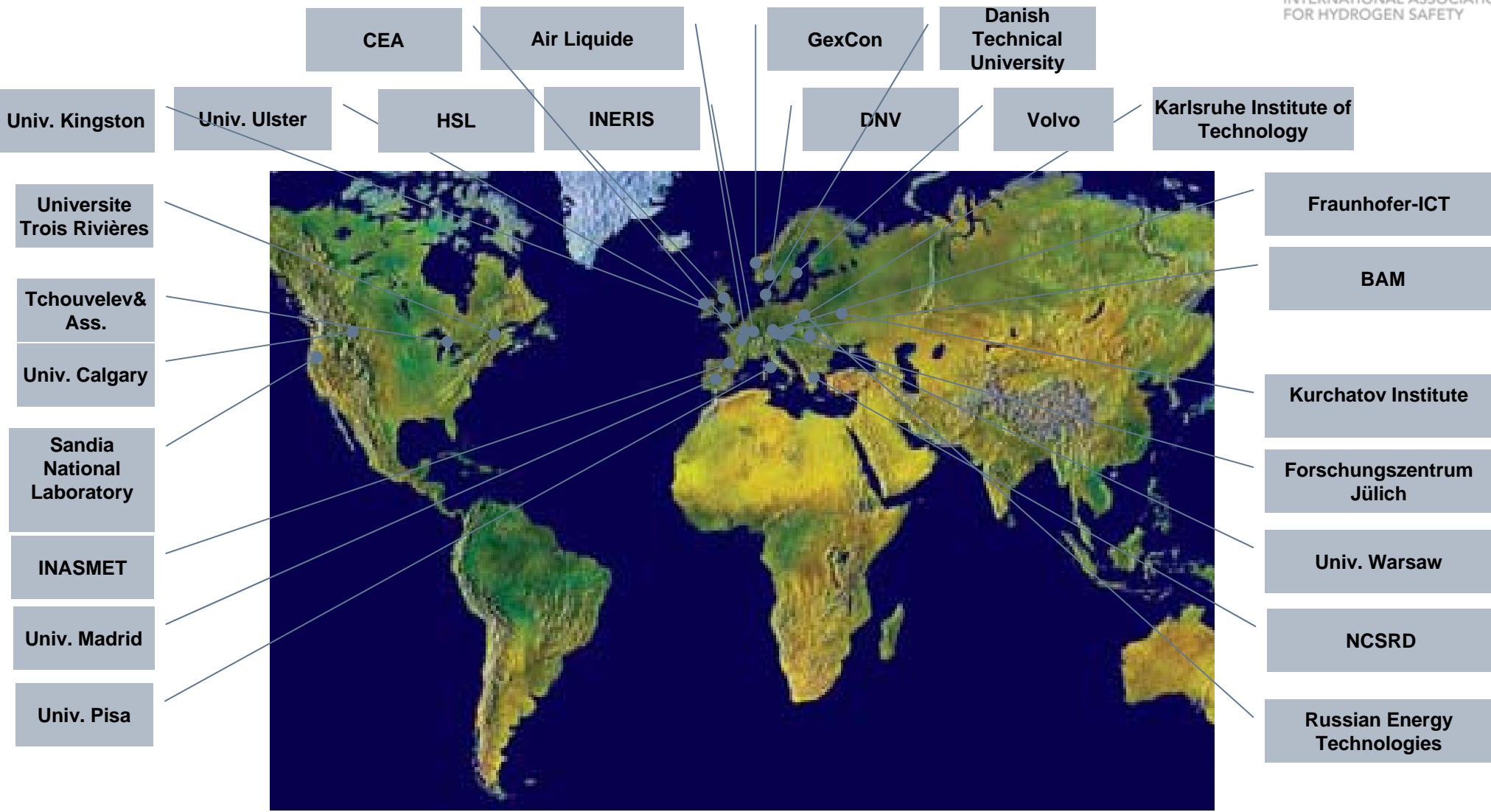
# Structure



# 25 Members

- Air Liquide, France
- Andrei Tchouvelev & Associates, Canada
- Bundesanstalt für Materialforschung und -prüfung (BAM), Germany
- Commissariat à l'énergie Atomique (CEA), France
- Danish Technical University DTU, Denmark
- Det Norske Veritas AS (DNV), Norway
- Fraunhofer-Gesellschaft (Fh-ICT), Germany
- Forschungszentrum Jülich GmbH (FZJ), Germany
- Karlsruhe Institute of Technology (formerly Forschungszentrum Karlsruhe GmbH (FZK)), Germany
- GexCon AS, Norway
- Health and Safety Laboratory (HSL), United Kingdom
- Fundacion INASMET, Spain
- Institut National de l'Environnement Industriel et des Risques, France
- Kingston University, United Kingdom
- Kurchatov Institute, Russia
- National Center for Scientific Research Demokritos (NCSR), Greece
- Russian Energy Technologies, Russia
- Sandia National Laboratories, USA
- University of Calgary, Canada
- Università di Pisa, Italy
- Université du Québec à Trois Rivières, Canada
- Universidad Politécnica de Madrid, Spain
- University of Ulster, Northern Ireland, United Kingdom
- Volvo Technology, Sweden
- Warsaw University of Technology (WUT), Poland

# 25 Members from 14 countries



# International Cooperation

International support and cooperation is vital to

- Contribute to the closure of knowledge gaps
- Facilitate harmonisation of legal requirements and standards

IA HySafe will support this through

- International Conference on Hydrogen Safety
- Links to IEA Activities on Hydrogen Safety
- Links to the International Partnership for the Hydrogen Economy (IPHE)
- Support to Bodies developing Legal Requirements and Standards (RCS)
- Hydrogen Incidents and Accidents Database (HIAD) for continued learning and knowledge development from hydrogen incidents and accidents



# Future Activities and Perspectives

- Preparation of ICHS4 hosted by Sandia National Laboratory in San Francisco in 2011
- Support for education, i.e. ESSHS5 and Short Courses
- ‘CFD User Club’, continued benchmarking activities
- Newsletter
- Biennial Report on Hydrogen Safety
- Memorandum of Understanding with IEA-HIA for Future Cooperation and Continued Support by IEA-HIA for the Organization of next Conferences on Hydrogen Safety (ICHS)
- Collaboration Agreement with JRC
- Collaboration with JU FCH and EC
- Participation in the Hannover Fair 2010 and the World Hydrogen Energy Conference 2010

# IA HySafe Welcomes New Members (1)



- IA HySafe is open to New Members from around the World.
- Membership of IA HySafe is open to any Company, Institution, Organisation or Person who supports the Purposes of the Association.
- Membership benefits include
  - Access to the password-only Part of the Association's Website and to the Hydrogen Safety Information System (HySafe-IS)
  - An Area to advertise their Services on the IA HySafe Website
  - Reduced Fees for the Association's Activities, including the Conference, Educational/Training Courses and Publications.
  - Partnership with other strategically important Institutions and Associations (like IPHE, IEA, EHA, JTI/N-RGHY, ...).
  - Networking Activities on a Global Scale.

# IA HySafe Welcomes New Members (2)



Annual Membership Fees	Full Member	Associate Member
• Large and medium Industry/Research institution, Associations	3.000 €	1.500 €
• Small Industry/Research Institutions, Universities	1.500 €	750 €
• Private person	-	100 €

For further details & application form see [http://www.hysafe.info/?page\\_id=49](http://www.hysafe.info/?page_id=49).



**Visit our Website at [www.hysafe.info](http://www.hysafe.info)  
or  
Contact us**

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group.secretary@hysafe.net**



**Thank you for your attention.....**