Creating a First Responder Training Framework

International Association of Fire and Rescue Services

Summary Presentation
Why?

Alternative Fuel
Widespread Transport Use
Why?
Firefighter and Public Safety

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Firefighter and Public Safety

A. Hydrogen Fueling
   - Fueling Receptacle
   - Check Valve
   - Shutoff Valve
   - Hydrogen Storage Container

B. Hydrogen Storage
   - T/PRD

C. Hydrogen Delivery
   - Regulator

D. Fuel Cell System
   - Flow Controller
   - Fuel Cell
   - Cathode Exhaust
   - Anode Exhaust
   - Air
   - Blower

E. Electric Propulsion Power Management
   - Batteries
   - Super/Ultra Capacitors
   - Electric Power Management
   - Drive Motor Controller & Electric Braking
   - Drive Motor

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Firefighter and Public Safety
Firefighter and Public Safety

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Type 1: All Metal - 150 kg
Type 2: Metal liner with composite structural hoops - 100 kg
Type 3: Metal liner with full composite wrap - 50 kg
Type 4: Full composite wrap with plastic liner - 40 kg

Calculations made for 100 L/200 bar

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Firefighter and Public Safety
Key Elements

European Emergency Response Guide
Training Materials
Virtual reality training
Operational training
e-Laboratory of Hydrogen Safety

Languages:
Czech, Dutch, English, French, German, Italian, Norwegian, Spanish

Framework
Framework not a standard.
Defined expectations for: trainee, trainer and training centre.
Attention to:
Knowledge and awareness of hydrogen
Behaviour and risks (Reading Lectures)
Videos of actual performance
Tactics and their objectives (Videos-VR)
Tactical operations (car-wet & live)
VR reality scenarios (if possible wet & live)
Brief Review

Objectives
Recommend a plan for Pan-European recognition and sustainability

Role Stratification and Learning Expectations

<table>
<thead>
<tr>
<th>Role</th>
<th>EQF Level</th>
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<tbody>
<tr>
<td>First Responder (Firefighter)</td>
<td>EQF 2 Basic knowledge cognitive and practical skills</td>
</tr>
<tr>
<td>Crew Commander</td>
<td>EQF 4 Factual and theoretical knowledge in broad context</td>
</tr>
<tr>
<td>Incident Commander</td>
<td>EQF 5 Comprehensive factual and theoretical knowledge</td>
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<tr>
<td>Specialist</td>
<td>EQF 5 Specialist factual and theoretical knowledge</td>
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</tbody>
</table>

Curriculum and Delivery
Structured, progressive programme, built around modules of defined outcomes
Supported with materials and teaching methods using available technologies and training facilities
Capable of inclusion through adaptation with vocational competence assessments
Specifically recognises volunteer fire and rescue services
Process

Provide input to training and develop recommendations for a route to ensure the training developed in HyResponder is the recognised training framework for first responder training in Hydrogen Safety throughout Europe.

ENSOSP
- Attend Training
- Observe and Capture Issues

Plan
- Consider Delivery options
- Create Solution options
- Evaluate ideas

National Workshops
- Consult seek feedback and observations
- Amend Draft Framework
- Consult Partners

Report
- Consider Sustainability
- Create a Framework for Adoption
- Suggest actions to sustain delivery post project

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ENSOSP Train the Trainers Workshop
ENSOSP Train the Trainers

Capture Issues

Lectures offered significant technical background and scenarios explored tactical considerations.

Discussion highlighted call for simplification and application of science and common templates to set context of scenarios.

Multiple questions and examples around knowledge and practices resulted call for clarity of core 1st response criteria (ERG).

Identified usefulness of “rule of thumb” guides and consolidated online tools to aid risk assessments to assist action prioritisation.
Process Development

Capture Issues
- Lectures offered significant technical background and scenarios explored tactical considerations
- Discussion highlighted call for simplification and application of science and common templates to set context of scenarios
- Multiple questions and examples around knowledge and practices resulted call for clarity of core list response criteria (ERG)
- Identified usefulness of "rule of thumb" guides and consolidated online tools to aid risk assessments to assist action prioritisation

Target Audience
- Firefighter?

Knowledge Skills

Standardisation

Curriculum

Evaluation

Regional National International
## Elements of Design

<table>
<thead>
<tr>
<th>NEXT STEPS</th>
<th>Develop</th>
<th>Common Solutions FRAMEWORK</th>
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<tr>
<td>1</td>
<td>Scope</td>
<td>Code of Practice for Firefighter Training</td>
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<td>2</td>
<td>Hydrogen</td>
<td>Chemical and Physical Properties</td>
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<td>3</td>
<td>Products</td>
<td>Manufacture Use Storage and Transportation</td>
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<td>Risk Assessment</td>
<td>Assessment Tools and Guidance from Research</td>
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<td>First Response</td>
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<td>Tactics</td>
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<td>Evaluation</td>
<td>Assimilation Measures and Parameters</td>
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<td>10</td>
<td>Promotion</td>
<td>Dissemination to Practitioner Networks</td>
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</table>
Features of Framework Design

1. Create a structured, progressive programme, built around defined modules

2. Support this programme with developed materials available on website

3. Recognise the lessons of the Pandemic and application within independent jurisdictions

4. Capture developed work

5. Develop online VR with possible short self-assessment programme

6. Investigate sustainable platform for content and programme

7. Capable of recognition with vocational competence assessments

8. Work with local and national authorities

9. Demonstrate quality through a comparable approach

10. Create a composite programme to help facilitate adoption
Initial firefighter knowledge requires clearest understanding of Hydrogen: the flammability range, non-visual flame, noise of high pressure release by TPRD, cryogenic properties, vaporisation with water, etc.

A network to support trainers (who might require some form of attendance certification).

Establish design criteria for a series of suggested facilities to use with modules framework.
## The Framework

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<th>Description</th>
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<td>Storage</td>
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<td>Compatibility with Materials</td>
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<td>Liquefied Releases</td>
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<td>Threat for people and property</td>
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<td>Ignited Releases and Prevention</td>
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<td>Unignited Releases</td>
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<td>Hazard Distances</td>
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<td>Confined Spaces</td>
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<td>Refuelling Stations A</td>
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<td>Standard Operating Practice</td>
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<td>Fuel Cell Vehicles</td>
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<td>Fuel Cell Buses</td>
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<td>Fuel Cell Trucks</td>
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<td>Fuel Cell Trains</td>
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<td>Refuelling Stations B</td>
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<td>Generation Plant</td>
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