The REFIRE project

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With the financial support of the Prevention, Preparedness and Consequence Management of Terrorism and other Security related Risks Programme European Commission – Directorate General Home Affairs

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REFIRE Facts

- **Reference implementation** of **interoperable indoor location & communication systems** for First Responders
- With the financial support of the Prevention, Preparedness and Consequence Management of Terrorism and other Security related Risks Programme European Commission – Directorate General Home Affairs
- Lifetime: 01/01/2012 - 31/12/2013
- Funding: 312,081.76 EUR

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REFIRE: the constituency

- IES Solutions (coordinator)
- Italian National Corps of Firemen
- CAMPUS BIOMEDICO University
- BECAR (Beghelli Group)
- INDICOD-ECR Servizi
- RadioLabs

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REFIRE Aims and goals

- Specify and design an interoperable indoor location & communication systems for First Responders…
- … based on RFID and wireless technologies…
- …built on an standard(s)…
- … implemented as a reference implementation and an industrial implementation…
- …and tested in a realistic environment

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REFIRE: the wish list

- A System "as performant as reasonably achievable"
- Affordable and scalable
- Based on reliable technologies
- Based on open standards
- Not requiring dedicated actions or time to set up during an intervention

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REFIRE: the concept

- A dense network of passive RFID tags pre-installed in buildings
- RFID Tag reader worn by the rescuer
- Hybridisation with proprioceptive sensors
- Predictor-corrector filter using the tags for re-calibration
- Radio communication with the outdoor for location data

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REFIRE: the approach

- Lab tests for basic performances of tag/readers
- Definition of standard protocol between tag and reader
- Localization algorithm
- Lab implementation as proof of concept
- Industrial implementation for real applicability
- Field tests

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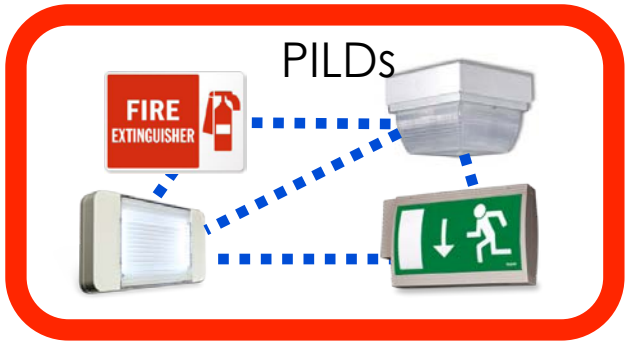
REFIRE: Pre-Installed Location Devices

- The Pre-Installed Location Devices (PILDs) are the core component of REFIRE
- The RFID tags are embedded in or coupled to emergency lights / signposts
- This reduces the cost of creating the location infrastructure
- They communicate via an open standard protocol



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REFIRE: 5 levels

- Once installed, configured and activated, the PILDs can provide any reader with its location and, possibly, ancillary data (e.g. maps and hazards)
- Building on them REFIRE has identified 5 increasing level of service (and performance)
- Any vendor will have room for its product, provided that the open protocol is used.
- Proprietary fields are possible, but the minimum set of data defined by the protocol are mandatory

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REFIRE: Components

- Passive Tag
- Active readers (carried by the rescuer)
- Mobile terminal (carried by the rescuer)
- Indoor Communication Network (not provided by REFIRE)
- Outdoor Terminal (e.g. Control room)

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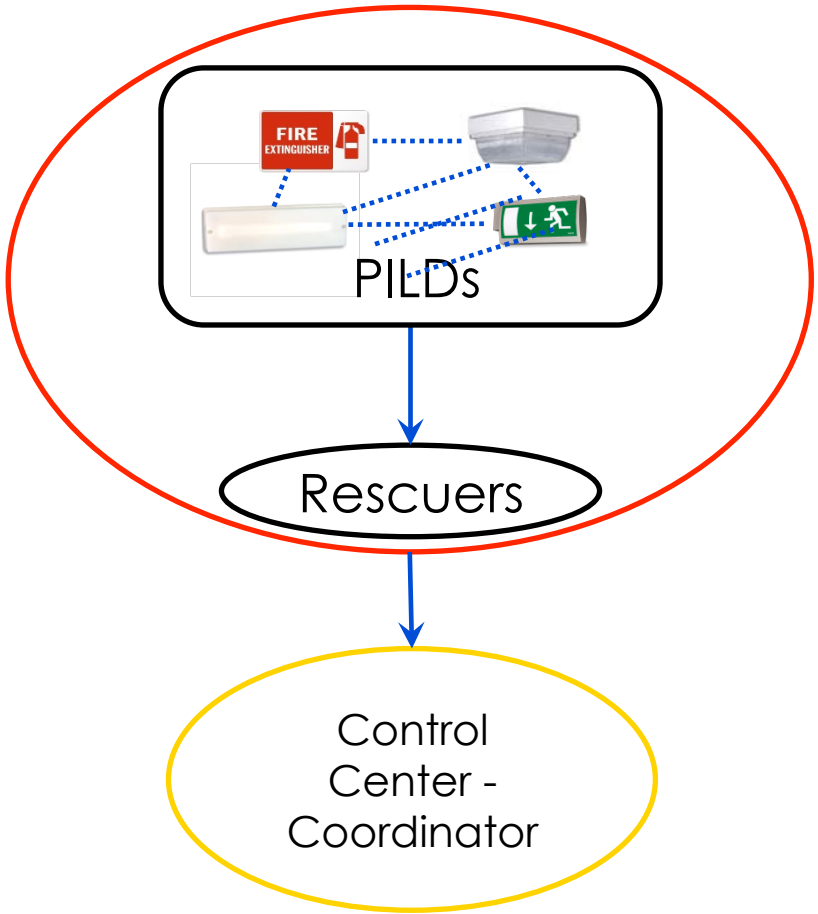
REFIRE: Level 0

- PILDs are used as proximity sensors for localization
- The Mobile Terminal updates its position estimate by using a Calibration Message from the RFID tags
- In this level, only a rough estimate of the position of the rescuers can be computed, by using trivial datafusion approaches.



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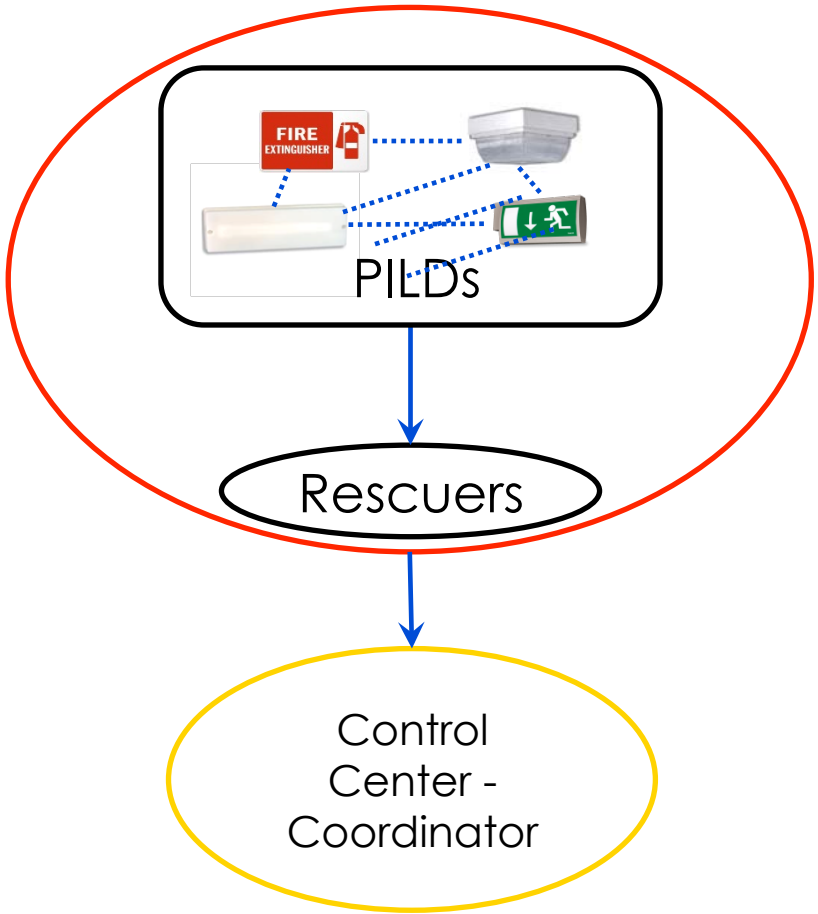
REFIRE: Level 1

- Prediction-correction algorithm with proprioceptive sensors
- PILDs help in refining the estimate by providing a Calibration Message
- the information quality is enhanced and areas not covered by RFID tags (e.g. because of a partial collapse) do to stop the system workflow



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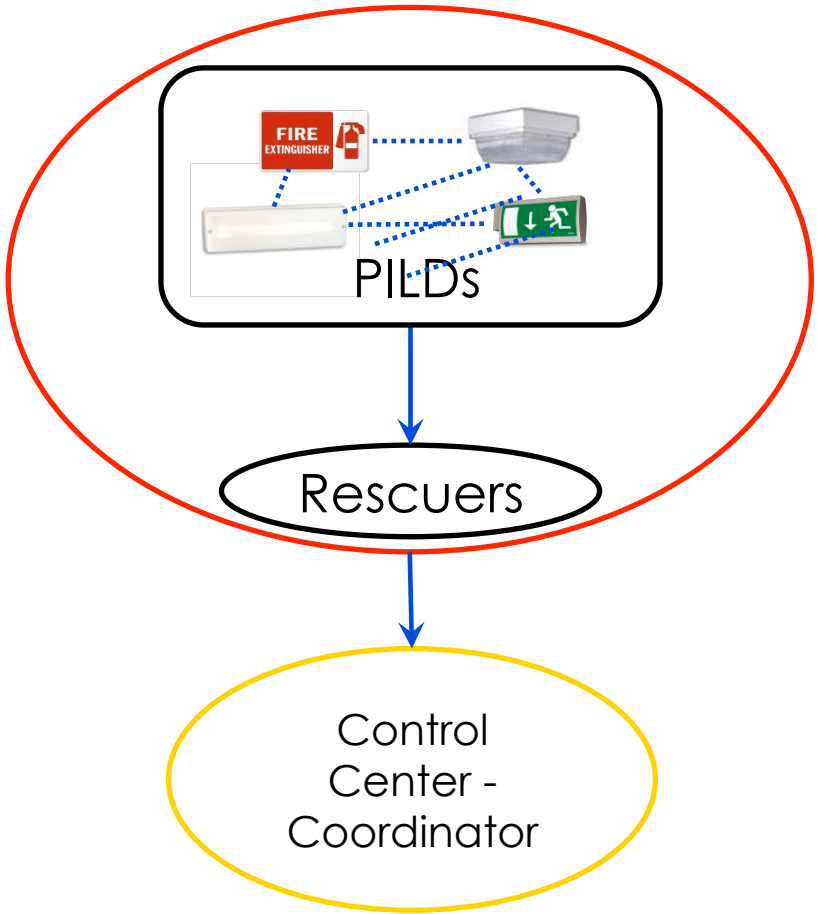
REFIRE: Level 2

- PILDs are able to provide massive ancillary data
- In addition to level 1, the position of the rescuer can be presented on a map even if such map was not available beforehand
- The PILDs may also inform about specific hazards in the area or valuable objects in the surroundings



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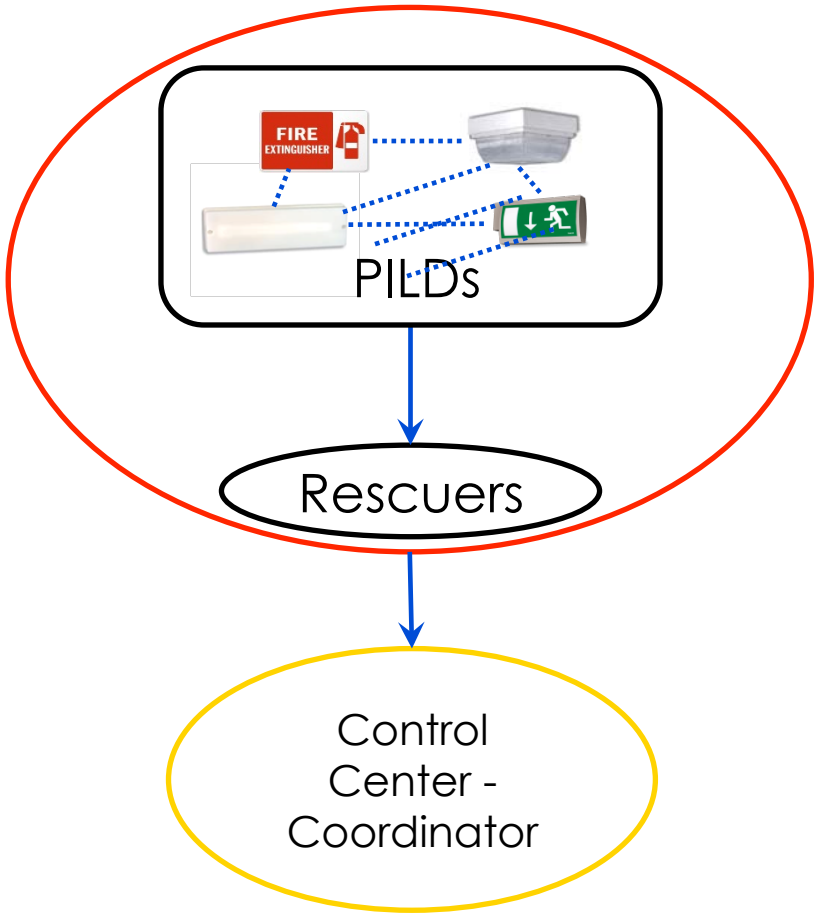
REFIRE: Level 3

- PILDs are can also work as communication Nodes
- They may be able to establish a data network even after a heavy damage in the building/structure
- They may also send out area information (e.g. how many mobile terminals or tags are within reach)



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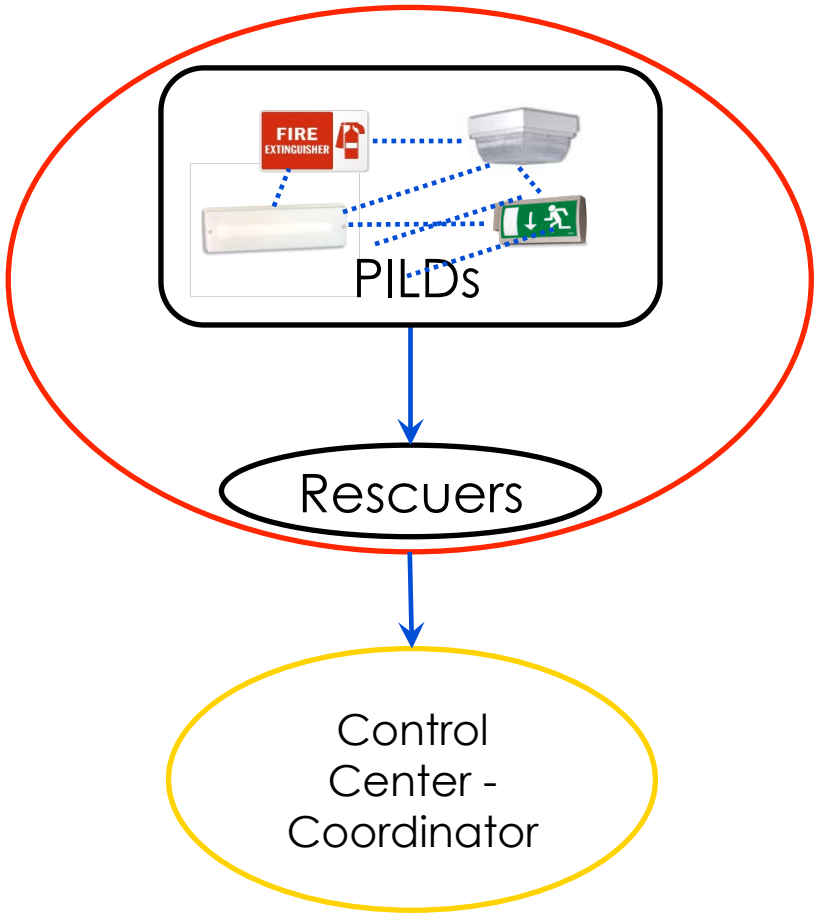
REFIRE: Level 4

- Mobile terminals use the data network established by level-3 PILDs
- Communication to Control centers is improved



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REFIRE: the standard

- A primary goal is the define how tags and reader communicate and which minimum set of data should be exchanged.
- With such standard agreed, manufacturers and supplier will have a fair ground to play on
- Regulatory and safety bodies (e.g. CNVVF) will bale to test, compare and enforce such a solution without choosing a vendor
- The cost of installation is affordable by building managers

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REFIRE: the status

- Lab tests completed
- REFIRE Standard internally approved
- Lab implementation completed (Level 0)
- Lab implementation partially tested (Level 1)
- Industrial implementation of the PILD
- Installation procedures defined
- Project disseminated with 200+ professionals across Europe

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REFIRE: the workshop

- The REFIRE use-case (CNVVF)
- The REFIRE standard (Indicod-ECR)
- The REFIRE location algorithm (CAMPUS)
- The REFIRE prototype (RADIOLABS)
- The REFIRE industrial implementation (BECAR)
- User interface for the proof of concept (IES)
- Open session with Questions and Answers

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Many thanks for your interest in REFIRE

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