HOliDes
HOLISTIC HUMAN FACTORS AND SYSTEM DESIGN OF ADAPTIVE COOPERATIVE HUMAN-MACHINE SYSTEMS

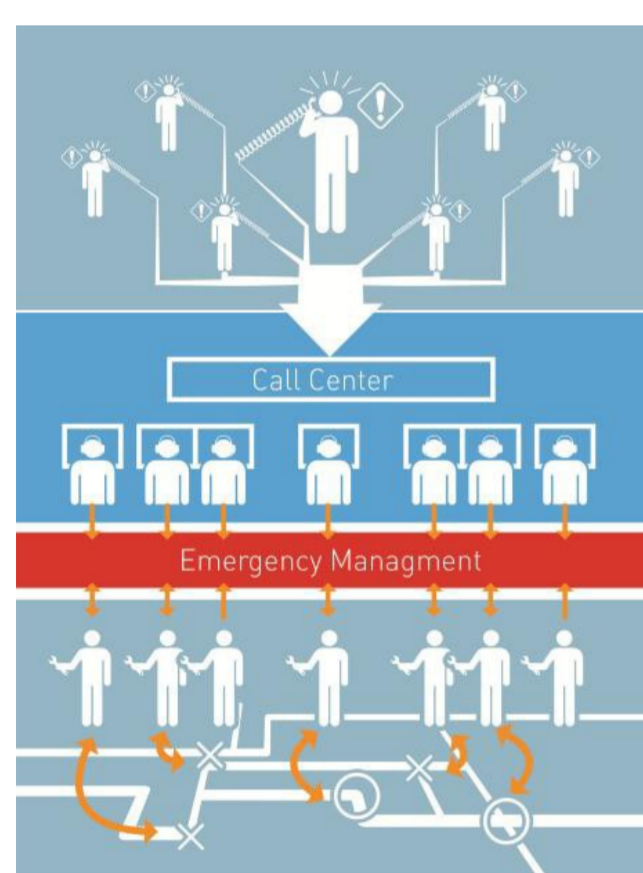# WP8: Control Room Domain Energy Control Room

ARTEMIS

Domain

Motivation

The Control Room of IRN collects energy emergency requests and assigns the interventions to the technicians in the field.

As regulated by the Italian Energy Authority for the gas service, IRN must ensure a Service Level Agreement (SLA) for the gas: a technician must reach the place of the intervention in 1 hour (in 95% of the calls).

At present, the communication between the Control Room operators and the technicians takes place only via **phone calls** (very time-demanding) and **IRN does not use any adaptive system** to allocate tasks: the allocation is based on static criteria (i.e. each technician is associated to a specific zone).

Applied MTTs

WP2 / WP3 / WP1 HF-RTP / Focus Group / Empirical Evaluation methods / Great SPN / HF-TA tool / WP5 / WP4

Evaluation

The aim of the AdCoS developed in HoliDes was to support the operators in the selection of the most suitable technician for the gas service (i.e. the most critical service), in order to:

1. **Minimize the time to reach the place of the intervention**

2. **Reduce the number of times the operator selects the wrong technician** (i.e. when the selected technician is busy and/or too far from the intervention and then he rejects the assignment and passes it to another technician)

3. **Minimize the out of SLA** (i.e. % of times the technician does not reached the place of the intervention in 1 hour)

4. **Increase usability and acceptability** (and, as a consequence, the trust in the solution)

We conducted a **5-day experiment with real operators and technicians** to monitor **18 real emergency calls** and use the corresponding data to measure 4 objective performance indicators (PIs) of the Control Room with and without the AdCoS (i.e. baseline). We also asked the operators and technicians involved in the experiment to answer a **questionnaire (i.e. SUS)** to measure the usability of the overall system (i.e. a subjective performance indicator).

Performance Indicator (PI)	Baseline	AdCoS
Average time to reach the place of the intervention	**38 minutes**	**24 minutes** (reduction of 36%)
# of times the operator selected a wrong technician	**5 out of 18** (27.8%)	**0 of out 18** (0%) The AdCoS always selected the technician that actually performed the intervention
% of out of SLA	**1 out of 18** (5.6%) The Italian Energy Authority regulates it must not exceed 5%!	**0 of out 18** (0%) With the AdCoS, the Control Room could always guarantee the SLA with the Italian Energy Authority.
Usability and acceptability (SUS score from 0 to 100)	**32,5** (out of 100) The existing system (i.e. the baseline) was considered as not usable.	**76,5** (out of 100) The improvement on usability was great!

These PIs highlight the benefits of the HoliDes approach for the Control Room. By developing a new **adaptive system** (i.e. the AdCoS) that takes into consideration the **real position of the technicians** as well as their **actual activities in the field**, we could achieve relevant (measurable) benefits for the Control Room, mainly in terms of **efficiency of the Control Room** and **safety for the general public** that notified the gas emergency (due to the reduction of time for the critical interventions).

Final development

Development of a **fully functional prototype** that automates the selection of the most appropriate technicians for each intervention and facilitate the communication bet-ween the Control Room operators and the technicians in the field.
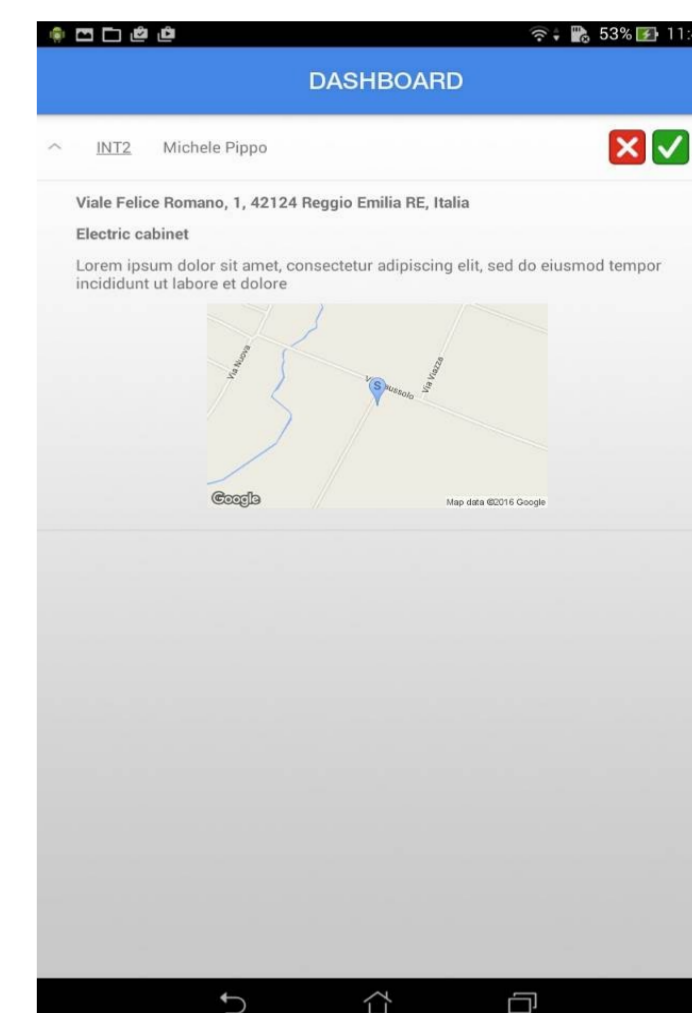
The AdCoS **adapts in real-time to the context** (real position of the technicians, assignment of other interventions, etc.) in order to optimize the allocation of the resources and improve the efficiency.

The Energy Control Room AdCoS includes three macro elements:
- a Server with the decision algorithm
- an HMI application for the Control Room operators
- an Android app for the technicians on field, installed on several mobile devices (tablets).
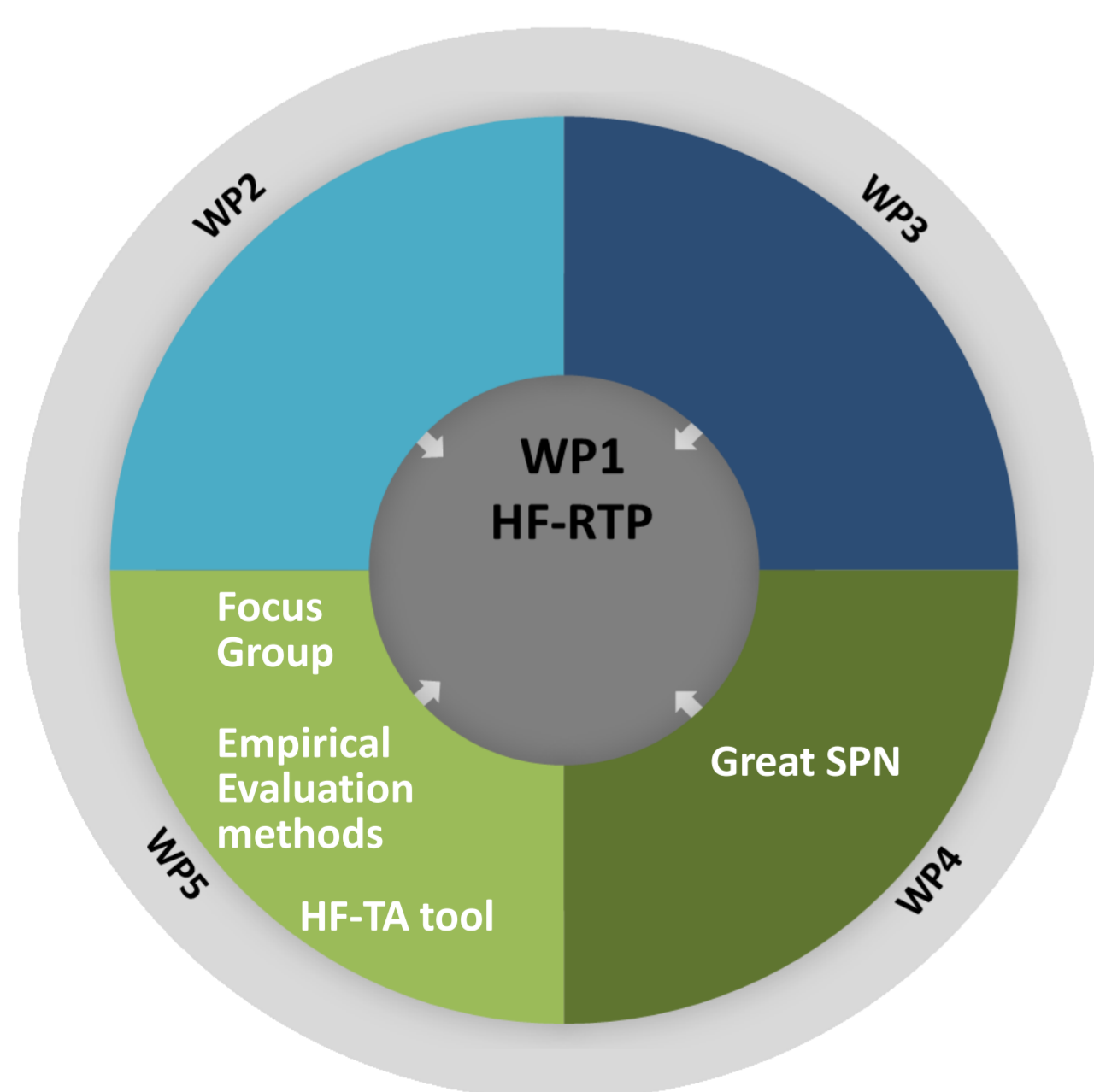
Control Room / Operator / Server / Database / Technicians
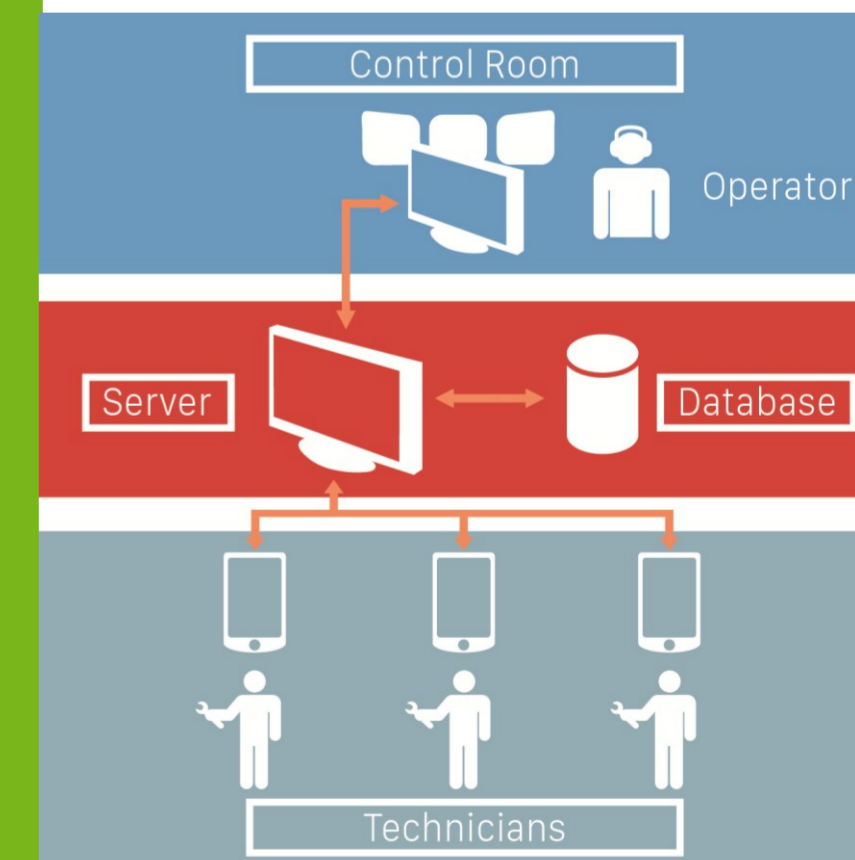
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