co-funded by EC under the ICT-PSP programme

ICE-WISH

Demonstrating through **I**ntelligent **C**ontrol, **E**nergy and **W**ater wastage reductions **I**n European **S**ocial **H**ousing

Alain Lusardi, Phd Architect - Consorzio Nazionale CasaQualità, Italy
ICE WISH Coordination team

Grant agreement n° 270898

Challenges for ICE-WISH

SAVE THE PLANET

Tackle climate change by improving energy efficiency and reducing carbon emission by 20% by 2020 (EU energy action plan) and water scarsity.

IMPROVE QUALITY OF LIFE

Tackle Fuel and Water poverty

Reduce the "second rent/loan"

main factors used for motivating consumers

1) reduction of bill cost / 2) environmental concerns. / 3) better comfort (**ICE-WISH survey**)

ICE-WISH Objectives

- Provide a “user-friendly” and widely accessible ICT-based resource use service to engage individual households as active players in **developing resource conservation practices, without compromising their living environment** ;

- Provide social housing inhabitants and housing organisations with **customised information, accessible via home TV, in quasi real-time on resource consumption and environmental comfort and feedback on energy system and building management**;

- Pilot and monitor the **impact of ICE-WISH service on inhabitants’ resource use behavior**;

- Provide social housing organisations, local, regional and national public decision-makers with real-life information to encourage them to implement **environmental-energy-related policy actions, incentives or/and investments decisions at public and private level.**

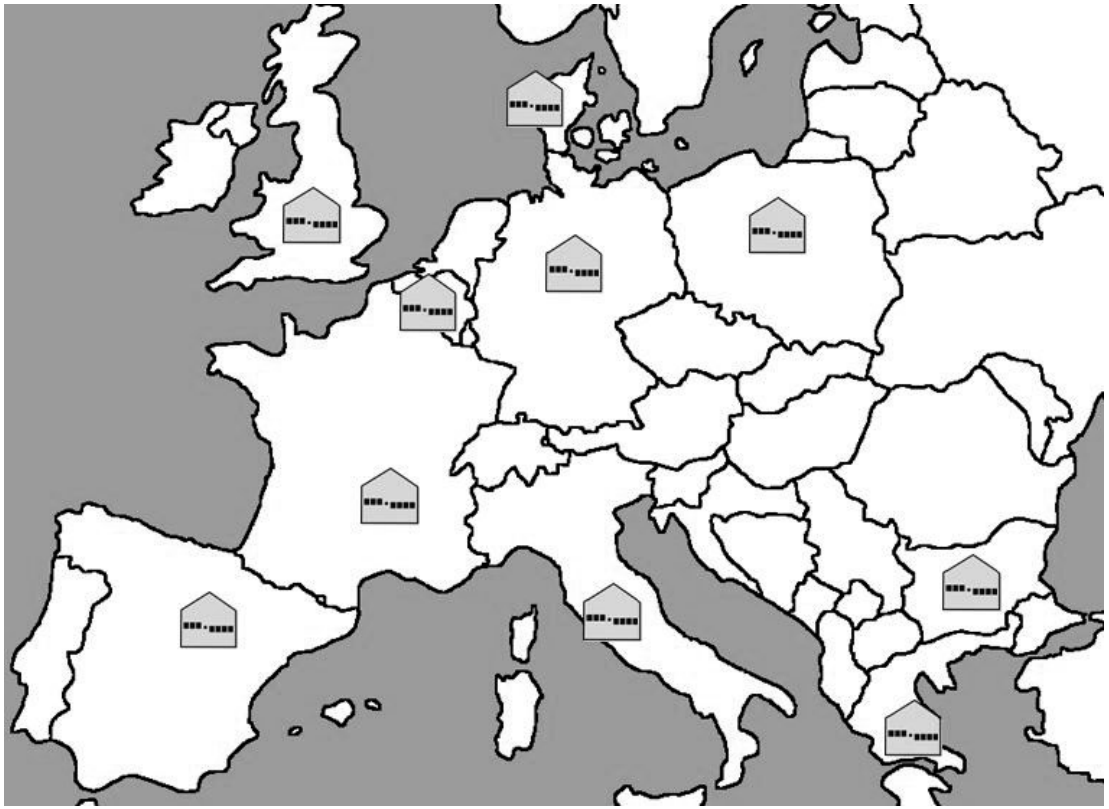
- ✓ More than **600 tenants in 10 European countries** are accessing the ICE-WISH ICT-based service.
- ✓ **15%** expected resource consumption reduction.
- ✓ **Business Plan** including Guidelines for ICE-WISH service deployment avalaible to the European Social Housing sector (over 25 M. dwellings).
- ✓ A **wider roll-out and use** of mature ICT-based solutions to improve energy & water efficiency in Europe.

Execution: 3 years and 6 months
From 01/04/2011 to 31/09/2014
Budget: 4.9 M €. – 50% EC co-funded

Ten pilot sites

300 dwellings in 10 countries

30 dwellings / country

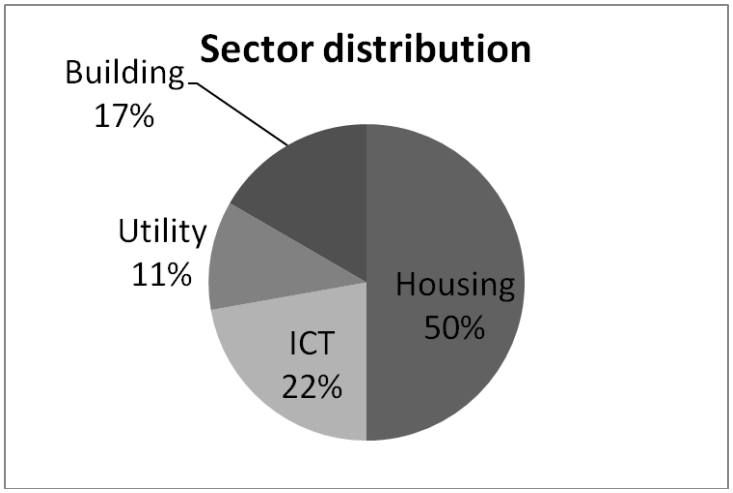


Climatic diversity

B
BG
D
DK
ES
EL
F
I
PL
UK

ICE-WISH comunity
more than 600 users in Europe

ICE-WISH consortium



Team of Social Housing practitioners with the support of ICT/Building experts and utilities providers.

19 Partners

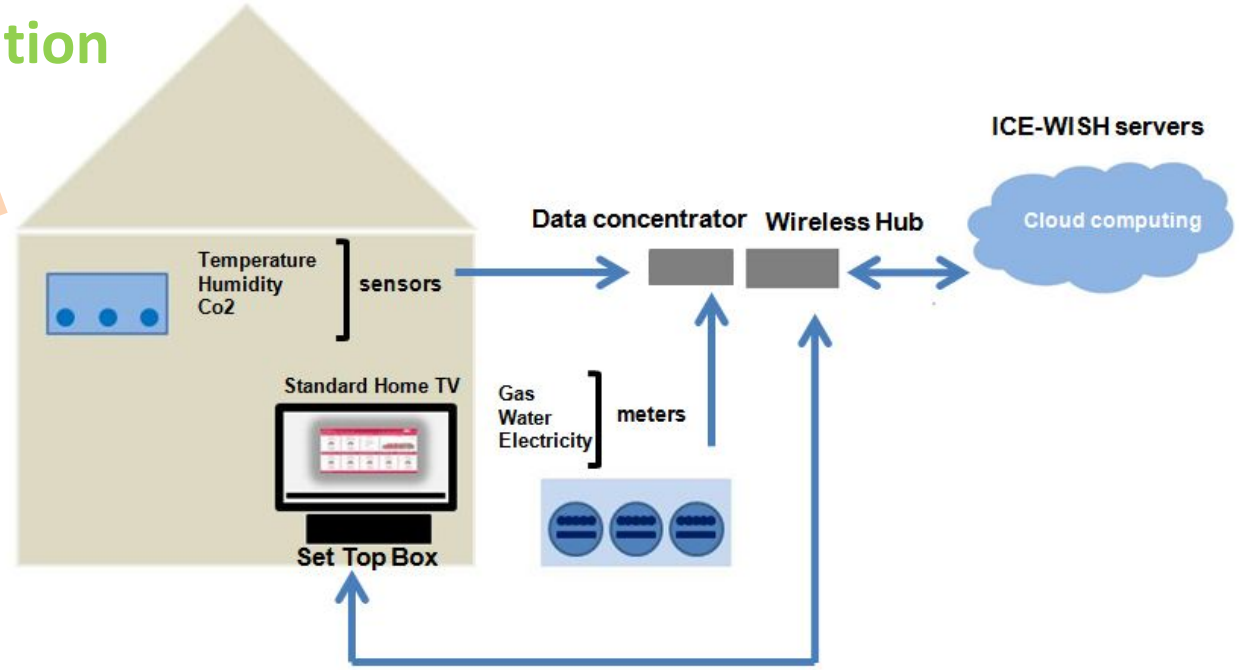
Participant No.	Participant Full name	Participant Short name	Country
1	CONSORZIO CASAQUALITA SCARL	CasaQualita	Italy
2	VLAAMSE MAATSCHAPPIJ VOOR SOCIAAL WONEN NV	VMSW	Belgium
3	Union of Homeowners Associations	CAC	Bulgaria
4	FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V	Fraunhofer	Germany
5	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS	NKUA	Greece
6	OFFICE PUBLIC D'AMENAGEMENT ET DE CONSTRUCTION DE L'ISERE	OPAC38	France
7	PHILIPS CONSUMER LIFESTYLE B.V.	PCL	Nederland
8	BUILDING RESEARCH ESTABLISHMENT LTD	BRE	UK
9	University of Glamorgan	UOG	UK
10	UTILITY PARTNERSHIP LIMITED	UPL	UK
11	Bournemouth Borough Council	BCC	UK
12	Narodowa Agencje Poszanowania Energii SA	NAPE	Poland
13	VIVIENDAS MUNICIPALES DE BILBAO OAL - BILBOKO UDALETXEBIZITZAK TOKIKO ERAKUNDE AUTONOMOA	BILBAO-VIVIENDAS	Spain
14	OIKISTIKES ANAPTYKSEIS	OIKAN	Greece
15	Boligforeningen Ringgarden	RING	Denmark
16	Water Supply and Sewerage Municipal Enterprise of Larissa	DEYAL	Greece
17	JOSEPH-STIFTUNG, KIRCHLICHES WOHNUNGSUNTERNEHMEN	JOSEPH-STIFTUNG	Germany
18	Miasto Stoleczne Warszawa	WARSAW	Poland
19	Vattenfall Heat Poland S.A.	VATTENFALL	Poland

Wide variety of addressed issues

- 10 Social Housing Organisations from 10 Countries with diverse administration, without EC project experience and/or ICT-based experience.
- Different Building Typologies - brick , concrete, etc.
- Different Building Age
- Different Building Property status (rented/owned)
- Different technical installations of different age and technical standard
- Different tenants – young people used to IT, old people with no IT knowledge - workmen – unemployed, retained, butchers and hairdressers , etc.

Standard ICE-WISH solution

Using mature ICT components. without reinventing the wheel



ONE common ICT solution for all 300 dwellings

- **Data concentrator** (€.349) acts as the **data collection and storage hub** for each dwelling
  - enables near real time capture and display of consumption data (every 15 mins)
  - storage of data locally in case of faults (3 months)
  - reduces communication costs – one sim per household
  - enables use of existing metering equipment with pulsed outputs, thereby reducing costs.

- **Low cost Android-based Set top box** (€. 120), able to be connected to any home TV (HDMI - R/L(AUDIO) - R/L to Scart).

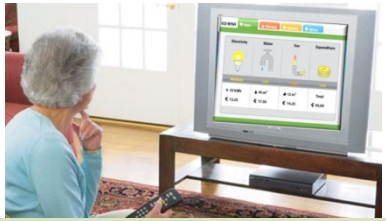
Country solution tailored to local needs and expectations

Wider variety data collection devices

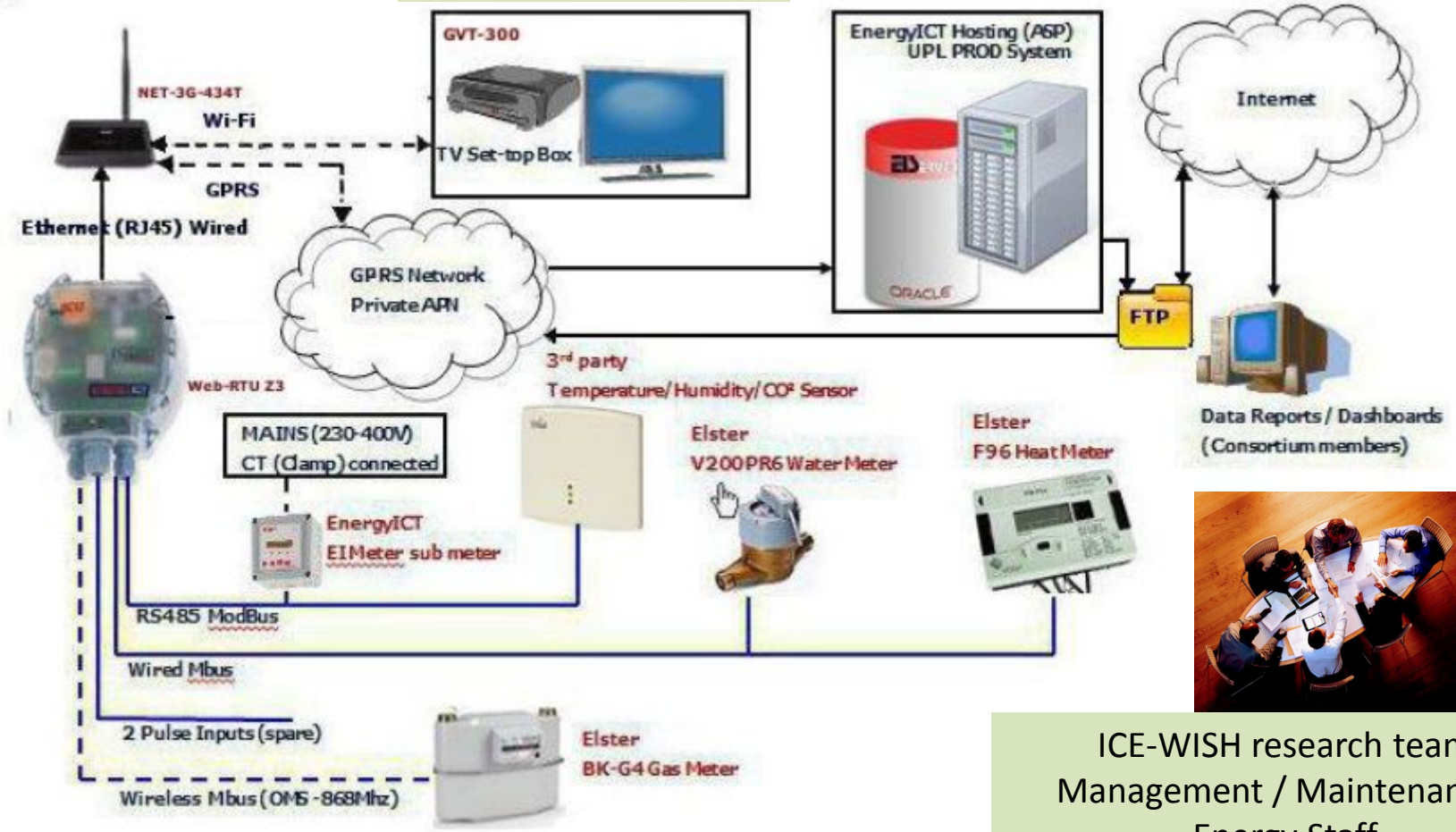
- Feedback at EC review criticised technical solution for “one size fits all” approach
- UPL conducted site visits to inspect properties and gain understanding of what tenants would prefer to see (or not) in their living space
- Result was an expansion of the options of data collection devices (see opposite) to reflect user preferences:
  - Wireless
  - Existing meters
  - Aesthetically pleasing
  - Multiple sources of energy
  - Multiple use of water
  - Specific location (outside of living space)
  - Minimal damage to property

Medium	Communication Type	Country									
Device		BE	BU	DE	FR	GE	GR	IT	PO	SP	UK
Electricity (kWh)											
EICT EI Meter	Modbus	✔	✔	✔	✔	✔	✔	✔		✔	
Landis & Gyr 5258K	Pulse										✔
EC3	Pulse								✔		
Cold Water (m3)											
Itron Aquadis+	Wired M-bus		✔	✔	✔		✔	✔	✔	✔	✔
Elster V100	Pulse	✔									
Elster V200 (Wired)	Wired M-bus										
Elster V200 (Wireless)	Wireless M-bus										
ABB MODULMETER	Pulse										
Englemann	Wireless M-bus					✔					
Hot Water (m3)											
Itron Aquadis+	Wired M-bus								✔		
Elster V100	Pulse										
Elster V200 (Wired)	Wired M-bus										
Elster V200 (Wireless)	Wireless M-bus										
ABB MODULMETER	Pulse			✔							
Englemann	Wireless M-bus					✔					
Heat (kWh)											
Itron CF ECHO II	Wired M-bus			✔		✔	✔		✔		
Danfoss Sonometer	Wired M-bus										✔
EICT EI Meter	Modbus									✔	
Gas (m3)											
BK-G4 (IN-Z62)	Pulse	✔									
BK-G4 (AE2+ACM)	Wired M-bus						✔	✔			
Temperature (°C)											
Syxthsense HDH-AL3	Modbus	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
CO2 (ppm)											
Syxthsense HDH-AL3	Modbus	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Humidity (%)											
Syxthsense HDH-AL3	Modbus	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Communication structure



ICE-WISH user



ICE-WISH research team
Management / Maintenance/
Energy Staff

Monitoring/ Analysis/ Benchmarking/ Action/ Performance

ICE-WISH app-lication

Standard home TV becomes smart

A potential way for deploying others services…

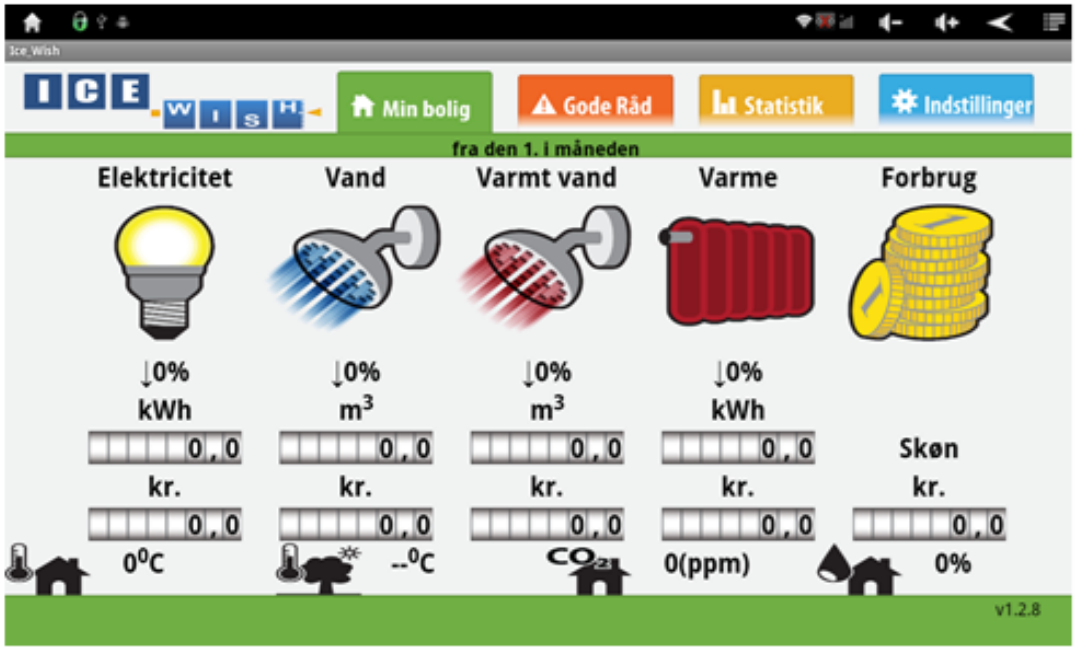
<u>Additional project effort</u>: To develop set-top box integration from scratch in lieu of the NetTV system

ICE-WISH service

End users will have access to **real time data** for the whole service operation period

They can see (in 15 min intervals):

- Electricity consumption/charges
- Gas consumption/charges
- Energy consumption for heating/charges
- Water consumption/charges
- Hot water consumption/charges
- Indoor environmental monitored parameters (T, H, CO2).
- Ambient Temperature (the latest value from an RSS feed, available from a website for the nearest available city)



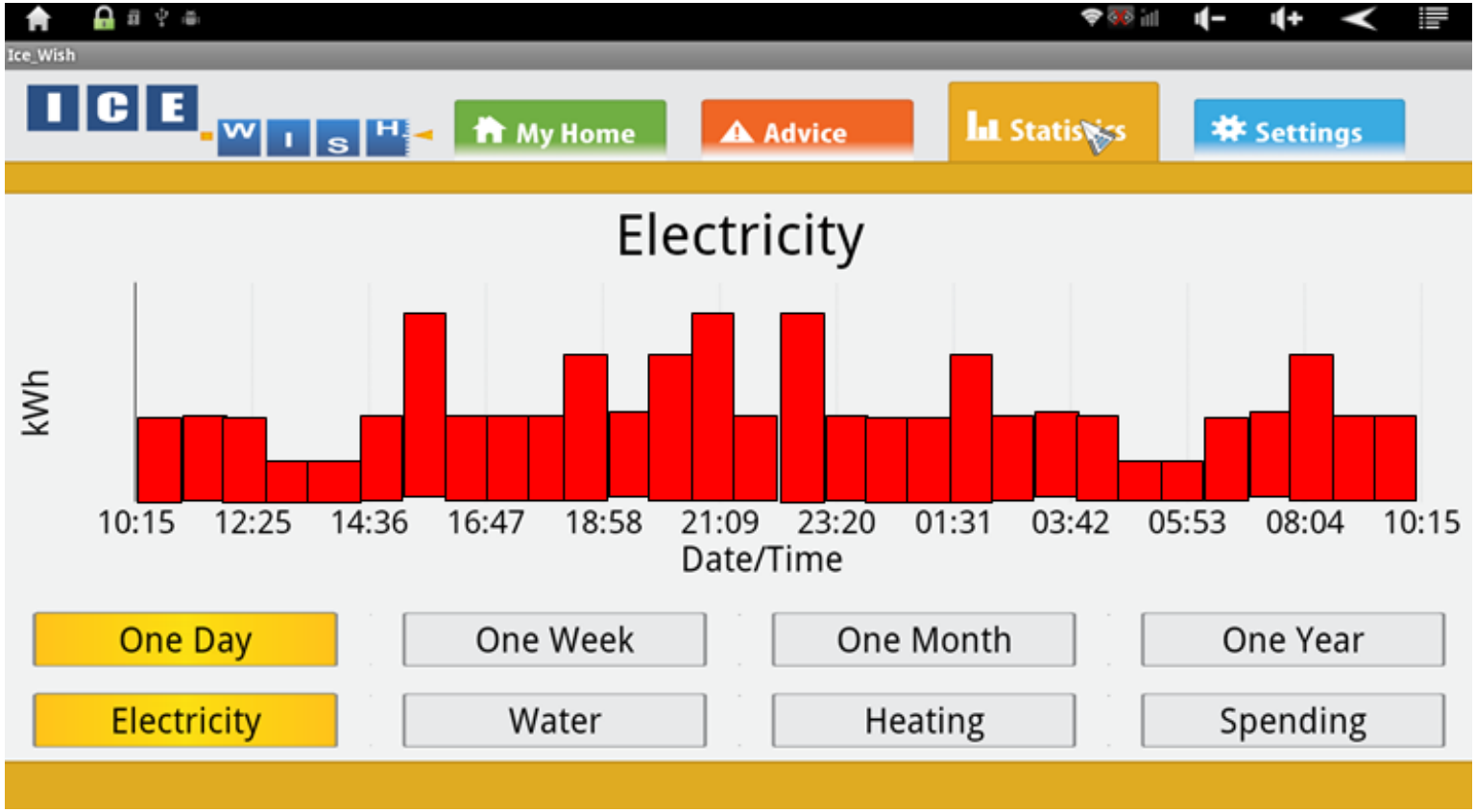
User-centered design for UI (n°5 releases)

ICE-WISH service

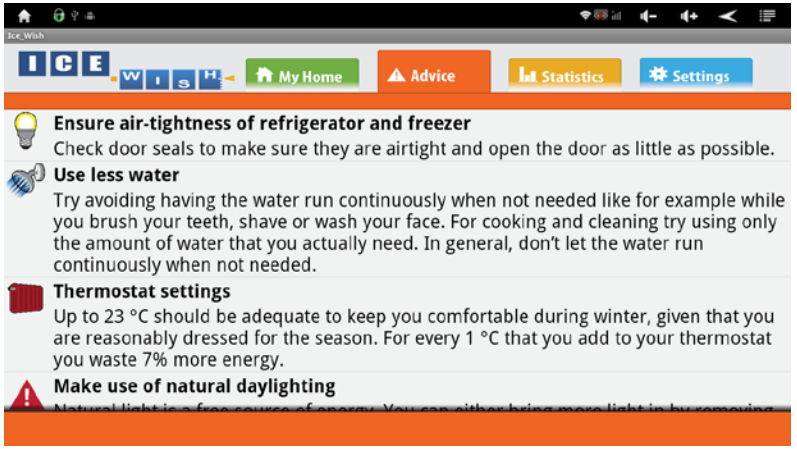
Through the Statistics panel end users will have real time access to detailed information regarding their use of utilities.

The period over which the usage is drawn can be selected by end users between:

- **One Day**
- **One Week**
- **One Month**
- **One Year**



During first 6-months operation, the advice service will have the **form of General Advice Messages**.
The advice panel display categorized advice generated after the daily update of the STB.

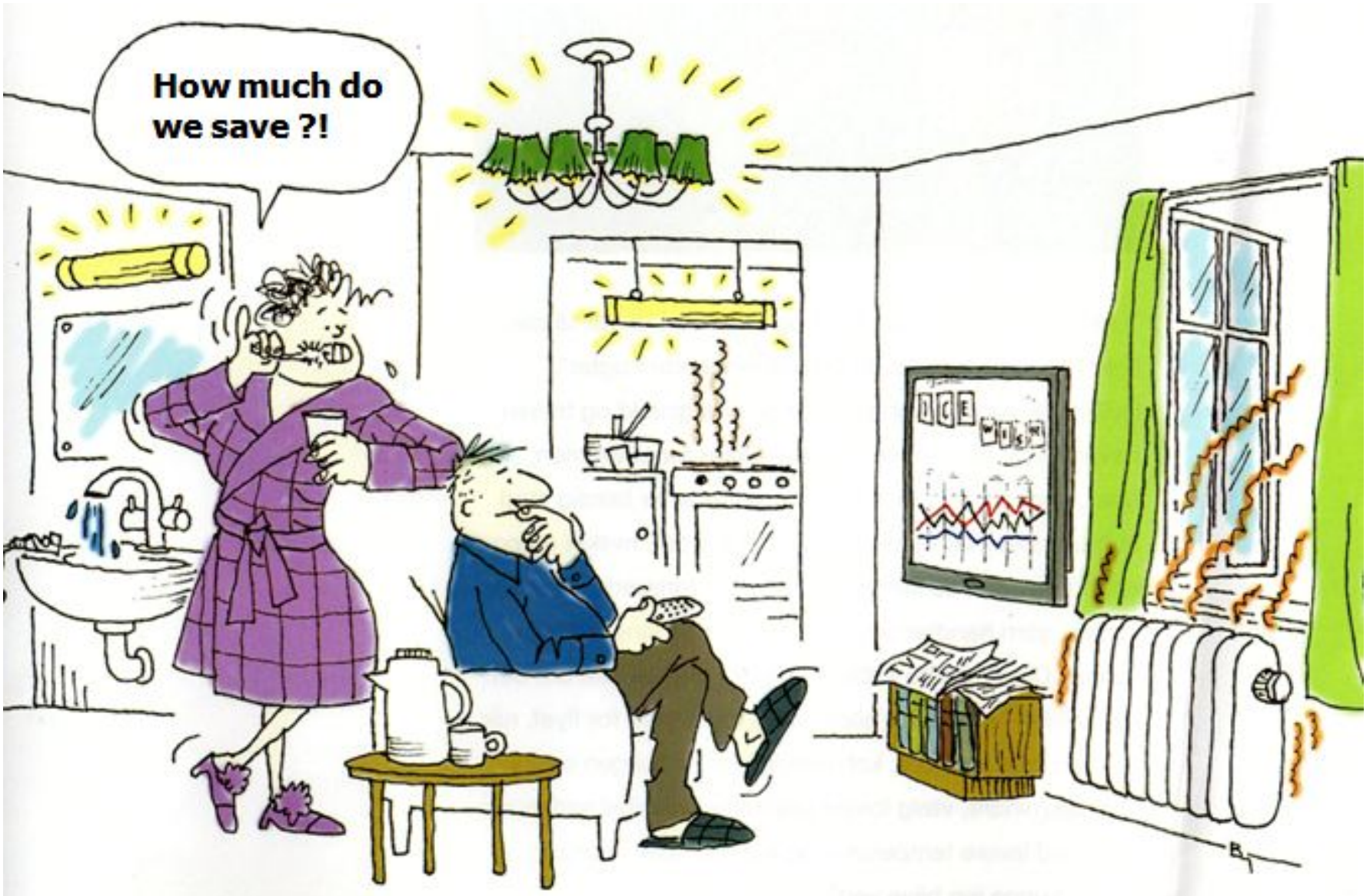


After Mid-term assessment, the STB software will be updated to generate **customized advices** in accordance with individual dwelling consumption trend.

The advices are grouped into 7 possible categories, using the same icons as on the "MyHome" page:

- **Electricity related advice**
- **Water related advice**
- **Hot water related advice**
- **Gas related advice**
- **Heating related advice**
- **Spending related advice**
- **General advice**

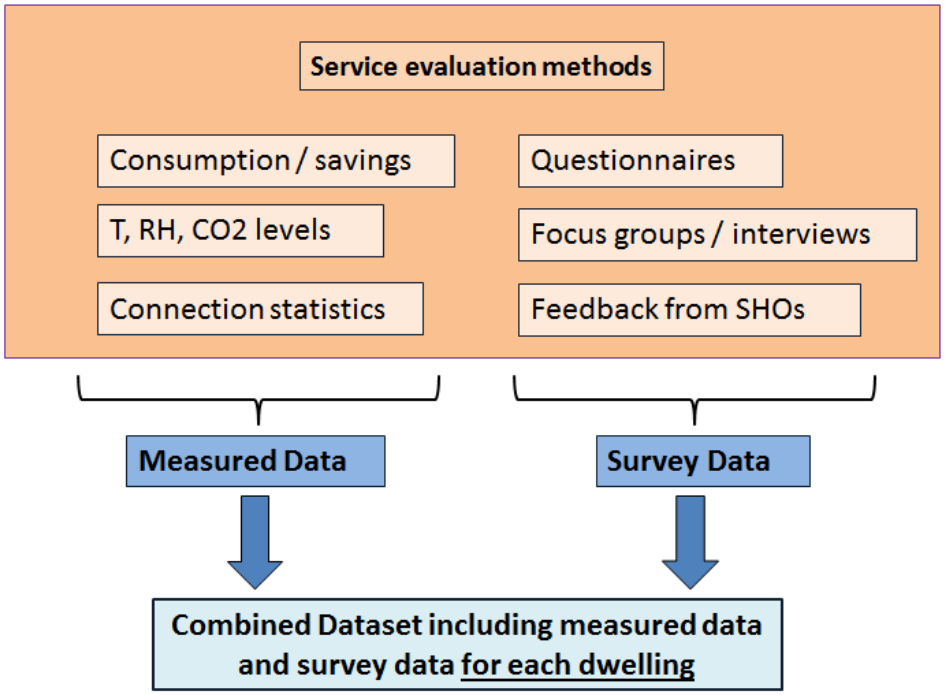
ICE-WISH service evaluation: savings achieved / acceptance

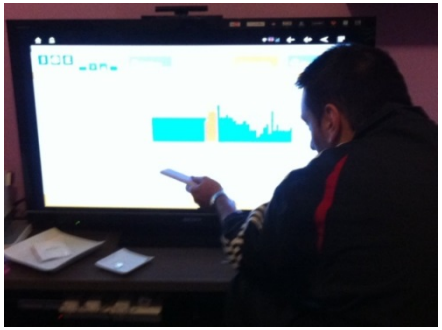


Customised information of your dwelling's energy&water consumption 'performance' at your fingertips on your standard TV

ICE-WISH service evaluation: savings achieved / acceptance

Acceptance built from the service phase….
Acceptance assessment though 3 steps





From preliminary users feedbacks, **ICE-WISH users are satisfied by the service operation**, even if some comms problems raised (WIFI signal) and have been solved.

Main concerns were related to the testing and installation phases (duration/disturbance).

After 6 months :
Mid term assessment
Software application revised

ICE-WISH service evaluation: savings achieved

12-months monitoring not yet finalised (1st October 2014)

- Testing phase extended
- Full installation almost completed on all 10 sites.

Promising preliminary results

- People more receptive to changing habits associated with electricity use then gas use.
- Inputs for LCC analysis
- Emerging issue raised: IT components consumption

Many technical and non - technical challenges raised - many solved

➢ **High level of user' scepticism and user resistance to participation in trials**

Reluctance to innovation

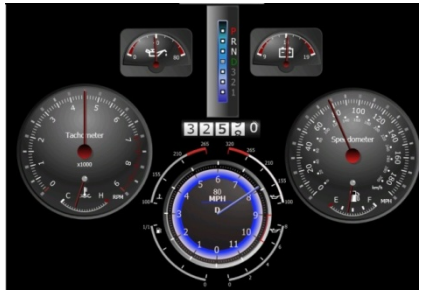
User involvement strategies

Very intense dialogue with users is needed . It has been a *long process*, overall a cultural one, which has required to invest time and efforts to engage users.
Beyond current daily practices and skills !

➢ **Privacy-related issues**

ICT-based service as spying in homes.

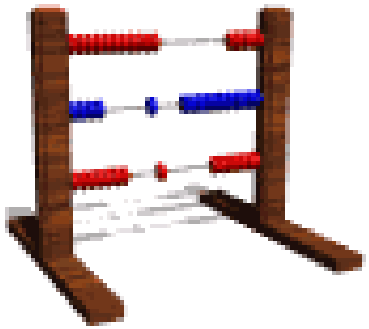
Secured ICT-based service



➢ **User-friendly interaction with ICE-WISH service interface**

Updates of UI thanks to continuous user feedbacks

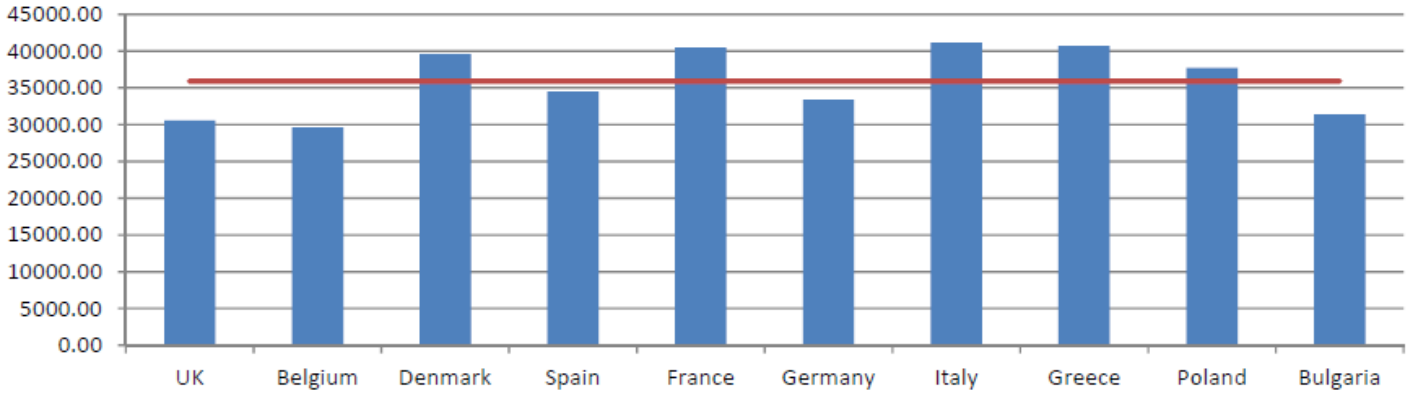
Many technical and non - technical challenges raised - many solved



➢ **Maintain sustainable costs for the multi-utility ICT-based service configuration**

€. 980 to 1.300 per dwelling

Beskope solutions / duplication of existing metering systems / …
Original estimate equipement costs = €. 35.000 per country €. 1.150 per dwelling)



➢ **Installation costs / Process = higher than expected**

€. 400 to 1.000 per dwelling

Unexpected site challenges of installing the equipment, the **lack of skilled installers team locally** and the need to tailor the standard ICT-based solution to the local needs and expectations.

Many technical and non - technical challenges raised - many solved

➢ **Extended site preparation site :** longer process for acquisition of pilot dwellings data and collection of user requirements and existing bills

➢ **Extended installation/testing phase** before pilot operation start to align to ICT-based service to the user's needs/requirements

- ✓ **changes on equipment requirements : wireless vs wired →** further integration tests and checks
- ✓ **Long process for the selection of installation team**
- ✓ **Communication problems of the ICE-WISH system** (stability of the mobile network → WiFi Connection)
- ✓ **Incorrect installation** (Incorrect terminals , Position of Equipment, Router position, Batch numbers mixed, etc)
- ✓ **Users drop out risk**

➢ **Maintain interest of trial users along the whole project duration,** including during the site preparation and before the roll out of the ICT-based service.

Follow-up strategies

Lessons learnt so far

ICT-based service is not just another gadget and can help consumers to make smarters decisions for reducing water and energy wastage

But

ICT solution should be **ease to install , to use and to maintain,**

ICT solution should be **viable technically** and **sustainable financially,**

ICT solution should be *easily* **adaptable** to any building typology and **scalable**

- **User Recruitment** supported by **specific incentives** : Consumers participating in trials are typically volunteers (often technology enthusiasts, green consumers, etc.)
- **Longer testing period needed** (Instable local wireless and GPRS network)
- **Longer operation and training period needed** to obtain more reliable results
- **Skilled installers** are crucial to install and maintain

Lessons learnt so far

Ambitious and challenging project not only technically

- To invest time upfront to engage households early on to maximise the success of engagement later in the project.
- Staff needed to be on hand through the project to resolve any issues and maintain resident engagement in the trial.
- Continuous **bottom up approach by communicating with tenants, empowering them,** since the beginning of the project, during the whole process…:
  - To collect their needs, requirements, improvement proposals.
  - To keep them involved and informed.
  - To motivate them and get their engagement.

Development **energy coaching strategies are a key success factor.**

Improved skills of our housing managers and O&M staff are needed.

Participating Housing organisations are learning and capitalizing this challenging experience to build their future role.
They are aware that they will act not only as providers of homes but also as **providers of services** related to the living on sustainable homes.

ICT-based services such as ICE-WISH solution could be integrated with other services and have key tools for maintreaming the **EPDB implementation** in the building sector.

Social Housing providers are acting as front runners but can't solve all alone. In this (r)evolution, ie. energy providers should also adopt new behaviors.

Thank you for your attention
on behalf of the ICE-WISH Team