



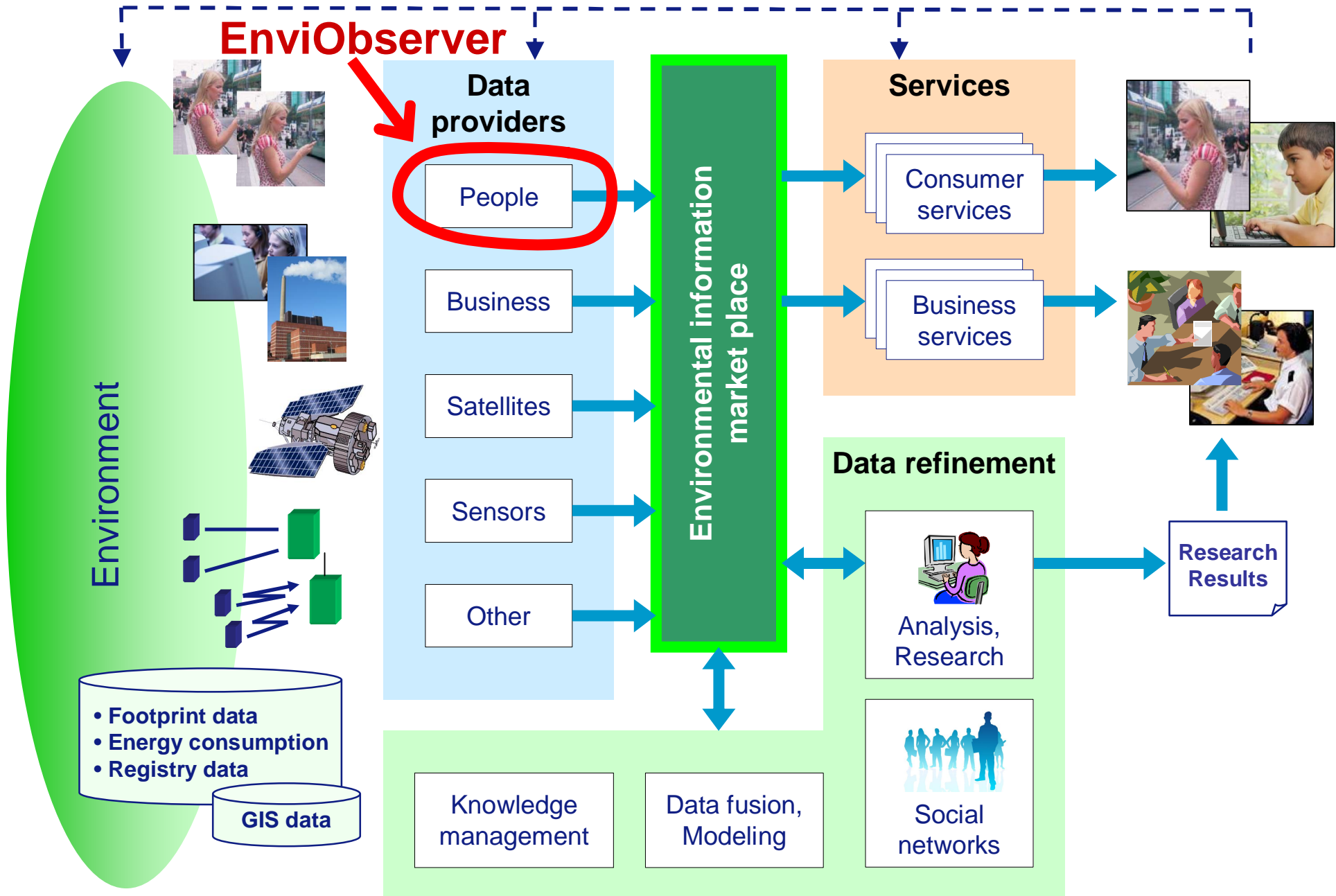
Business from technology

EnviObserver – people as sensors

EnviTori concluding seminar, 13 October 2010

Renne Tergujeff

VTT Technical Research Centre of Finland



EnviObserver – introduction

- EnviObserver is about **participatory sensing**
 - Empowering people as sensors in the world
- **EnviObserver** encompasses...
 - **mobile application** for providing user observations
 - **interfaces** for collecting observations and accessing the data
 - **data model and database** for storing the data
 - **visualisation** of data
 - **alert services** for changes in water/alga situation
- Tested in **user pilots** within the EnviTori project

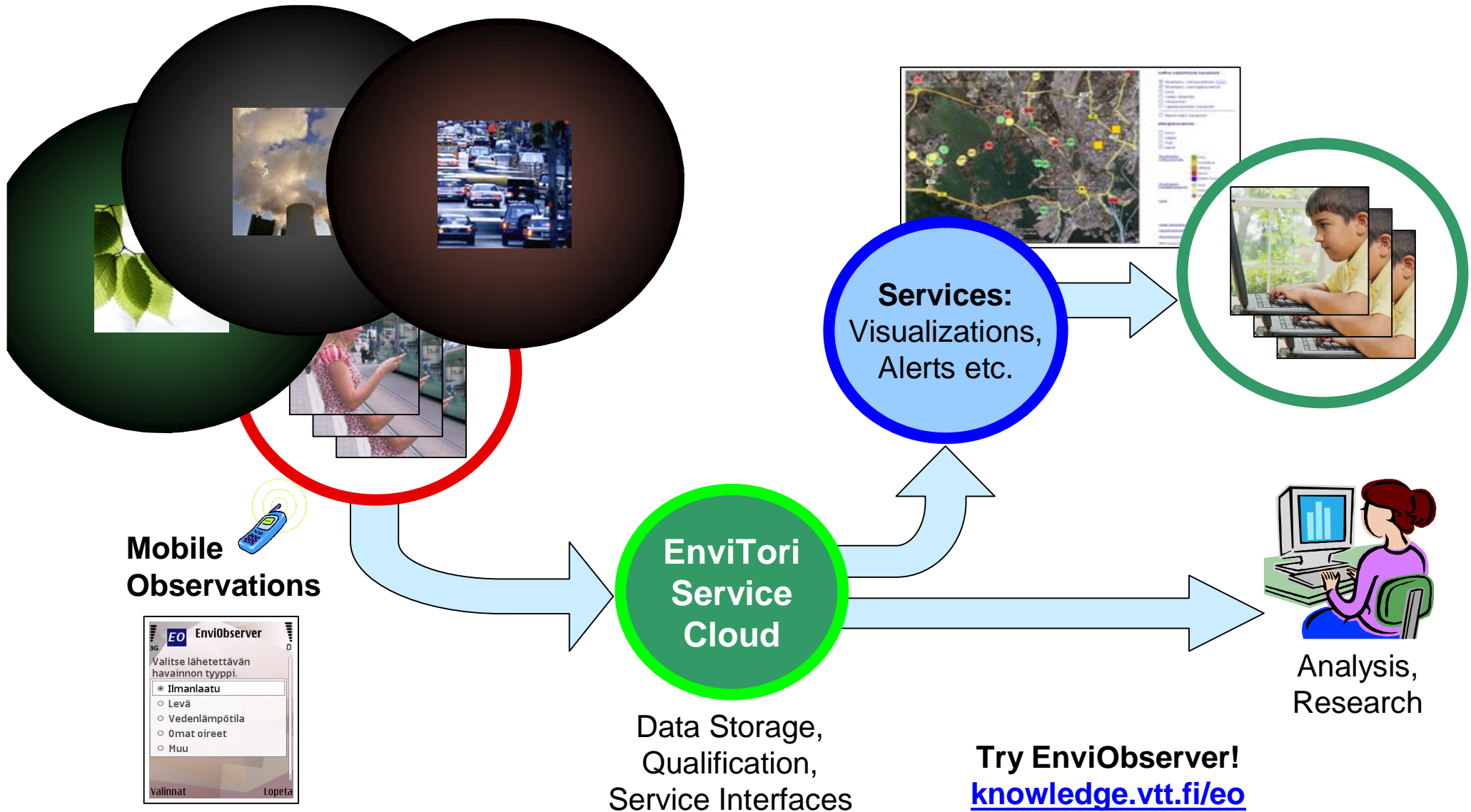


Participatory sensing

- **Sensors** are needed essentially to improve our quality of life
 - We measure various parameters of the world
 - We adjust things that affect those parameters, to our liking
- **People make good sensors** – why?
 - humans are **sensitive** to changes in their environment
 - humans are **everywhere** (no need to install them)
 - humans carry **mobile devices** with software & network access
- **Case example:**
 - *“Many people allergic to birch now report pollen symptoms in Turku.”*
 - *“I’m going to Turku and I’m allergic to birch too – seems like a good time to start my antihistamines.”*



Participatory sensing



EnviObserver – Mobile application

- **For reporting observations about people's environment:**
 - Air Quality - Ilmanlaatu
 - Alga - Levä
 - Water temperature - Veden lämpötila
 - Water turbidity - Veden sameus
 - Depth of visibility - Veden näkösyvyys
 - Pollen symptoms - Siitepölyoireet
 - Freeform (image + text) - Vapaamuotoiset havainnot

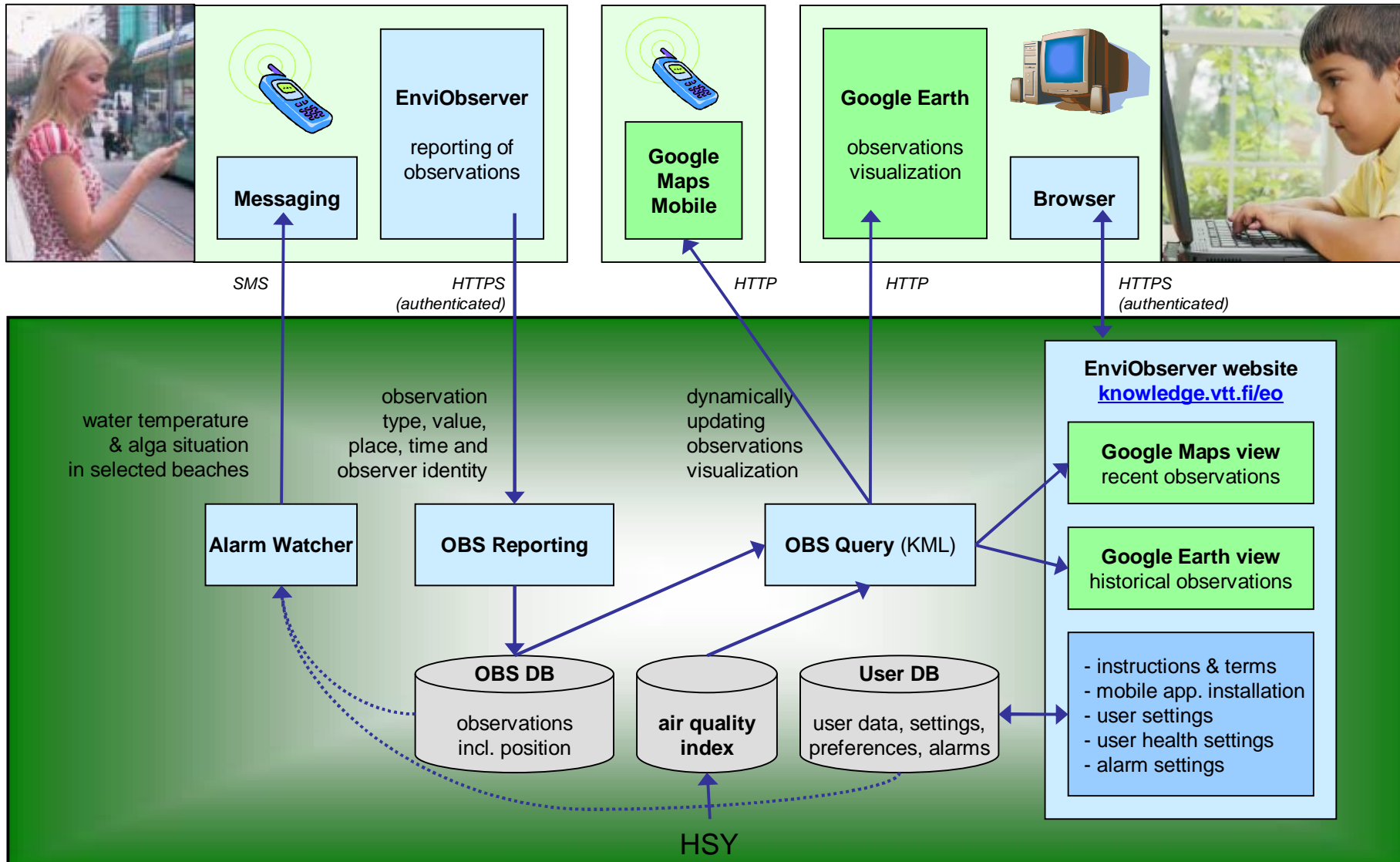
- **User's position is determined automatically**
 - Beaches of Helsinki area available as presets for alga and water temperature observations



An example: air quality observation



EnviObserver architecture



Data access and visualisation

- **Several output channels** for the observation data were made available
 - low-level PHP interface supporting all of them
 - **On a website**
 - Google Maps view: lightweight and familiar – for realtime view
 - Google Earth plugin, incl. time dimension – for historical analysis
 - **KML interface**
 - for programmatic use, in business or research
 - for applications supporting KML, such as Google Earth
 - **Mobile devices**
 - Google Maps mobile version (limited implementation)
- Google map products were convenient
 - other options also possible, such as OpenStreetMap & OpenLayers



Ympäristön havainnointipalvelu

EnviObserver

KÄYTTÄJÄ: RENNE

[KIRJAUDU ULOS](#)

[Etusivu](#) [Palvelun kuvaus](#) [Mobiilisovellus](#) [Palaute](#) [EnviTori-projekti](#) [Omat tiedot](#) [Hälytykset](#)



helimien
:en juuri



Valitse näytettävät havainnot:

- Ilmanlaatu, mittausasemat (HSY)
- Ilmanlaatu, käyttäjähavainnot
- Levä
- Veden lämpötila
- Veden sameus
- Näkösyvyys
- Uimarannat
- Vapaamuotoiset havainnot
- Siitepölyhavainnot

Näytä kaikki havainnot

- | | |
|--|--------------------------|
| <u>Ilmanlaadun mittausasemat:</u> | Hyvä |
| | Tyydyttävä |
| | Välttävä |
| | Huono |
| | Erittäin huono |
| <u>Ilmanlaadun käyttäjähavainnot:</u> | Hyvä |
| | Keskinkertainen |
| | Huono |
| <u>Levä:</u> | Ei levää |
| | Vähän levää |
| | Runsaasti levää |
| | Erittäin runsaasti levää |
| <u>Veden sameuden käyttäjähavainnot:</u> | Tavallista kirkaampi |
| | Normaal |
| | Tavallista sameampi |
| <u>Veden näkösyvyyden käyttäjähavainnot (m):</u> | |
| <u>Veden lämpötila (°C):</u> | |
| <u>Vapaamuotoiset havainnot:</u> | |
| <u>Siitepölyhavainnot:</u> | |



User pilots

- **Summer 2009: air quality**
 - about 100 registered users
 - the concept was proved feasible and working
 - experience gained: motivation support for observers needed

- **Summer 2010: water quality**
 - collaboration with "Järvien vedenlaatupalvelu" (JVP) project
 - water quality observations piloted at Vesijärvi, Lahti
 - press release, news reports

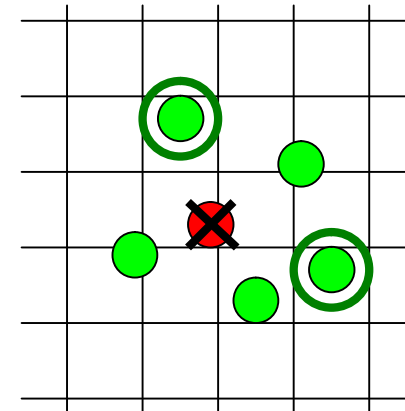
Conclusions

- Reporting observations needs to be **simple, easy and fast**
 - minimize startup effort, offer easy setup
 - do not require registration for basic features
 - offer slick mobile UI

- People need **incentive** for the observation work:
 - **reward:** recognition / status / contribution visibility / information / service value / money / ...
 - **social aspect:** involve people, let people connect
 - **participation:** let users feel part of a big common effort, offer background info and motivation
 - **reminders:** ask people for certain types of observations in limited areas; offer motivation

Research interests

- Need to identify between **reliable and faulty observations**
 - Only trust groups of similar observations
 - Discard outlier observations
 - Build trust in unique (registered) observers
 - Utilise peer review
- Observations are **subjective**
 - Design observation tasks with this in mind
- Correlation between user observations and true circumstances
- Validation of pollen forecast (FMI/UTU)
- Modelling risk for health symptoms
 - based on personal health profiles and air quality and pollen forecast



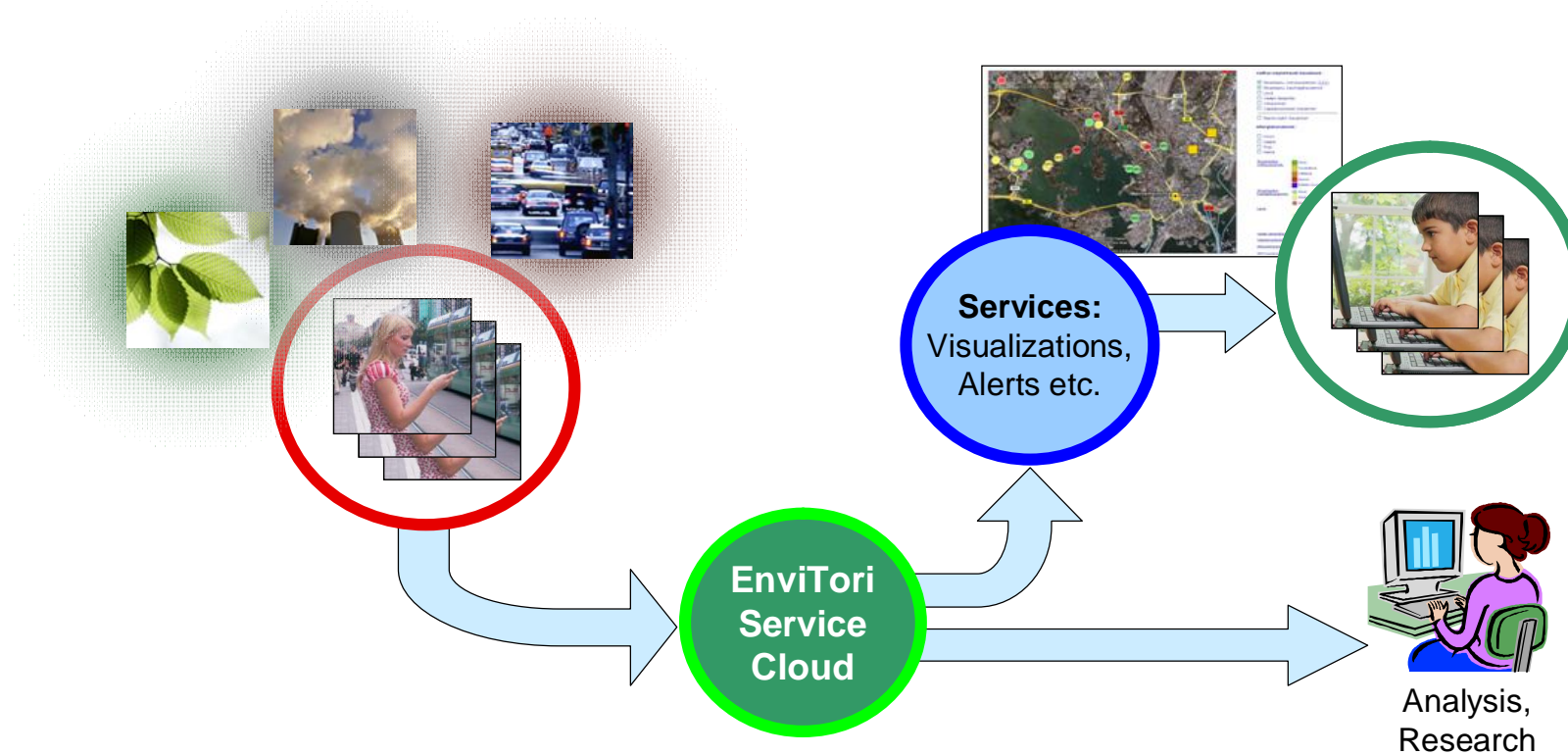
Future directions for EnviObserver

- **Further development:**
 - enhancing user interface, feedback for user, dynamic questions etc.
- **Potential new targets for observations include...**
 - Forest fire smoke
 - Alga at sea
 - Medusas
 - Flora and fauna in general
 - Cut electric lines
 - Forest biomass ([Social Forest Planning](#) project)
 - Built environment
 - Floods
 - Storms
 -!



Thank you!

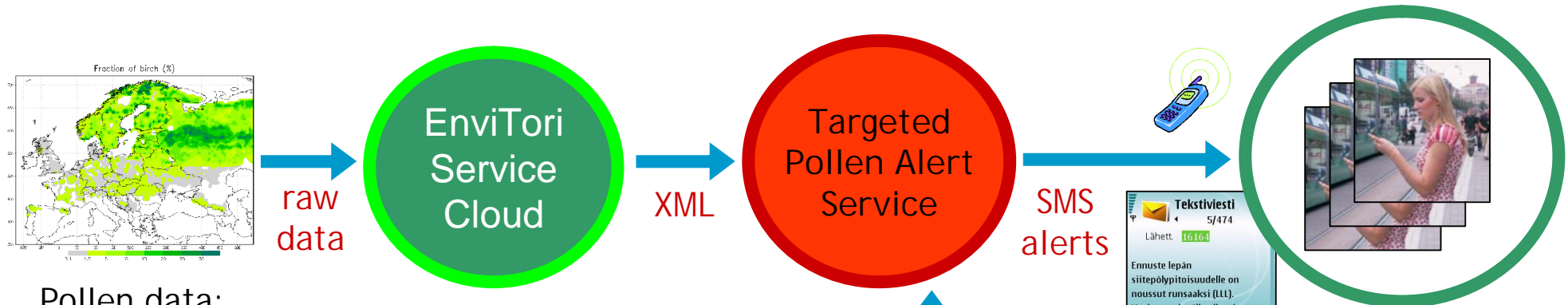
- For enquiries about EnviObserver please contact:
 - Renne.Tergujeff@vtt.fi
+358 20 722 6019
 - Ville.Kotovirta@vtt.fi
+358 20 722 6058





**VTT creates business from
technology**

Targeted alerts to allergics



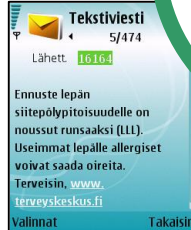
Pollen data: measurements and forecasts

Data Storage, Service Interfaces

Targeted Pollen Alert Service

SMS alerts

Personal Health Profiles



Trial period in Helsinki and Turku regions during spring/summer 2010, with ~150 users. Based on pollen data and forecast by University of Turku, Aerobiology Unit. In user survey 93% of respondents considered the service useful and 62 % it affected the treatment of their allergy.

Future R&D: integration of air quality data; deeper health modelling; utilizing participatory sensing; etc.

terveyskeskus.fi/siitepoly

Alerts from the 2010 trial (alder)

