



# PROBANT

## Initial feedback from European Research

SRC' 08  
Paris  
29 September 2008



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# Introduction

- (((. This presentation is intended to give a return of experience from the industrial, knowledge institutes and end-user partners on the PASR program PROBANT.
- (((. PROBANT stands for “*People Real-Time Observation in Buildings: Assessment of New Technologies in support of surveillance and intervention operations*”
- (((. The following questions will be answered:
  - Why the partners initially joined to apply for a PASR project?
  - How is the PROBANT project daily life: among partners and with the EU Commission?
  - What is the preliminary outcome of the project?
  - What are the outcomes for the industrial and technical partners?
  - What is the preliminary return of experience from the end users?
  - Which advices can be given ?
- (((. No exhaustive technical details will be presented for security reasons.



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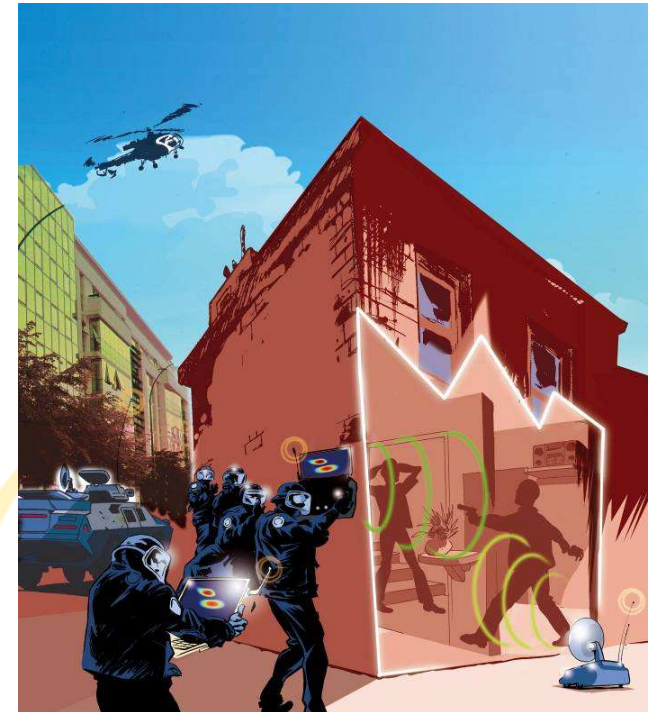


# Objectives of PASR project PROBANT

(((. Development, integration and validation of technologies enabling operators to observe in real time individuals located inside buildings

- Detection of people from a distant, stealthy position
- Localization and tracking of hidden/moving people
- Monitoring and identification using biometric parameters

(((. A state-of-the-art +1 solution for the assistance to decision in crisis situation



# Short presentation of the consortium

(((. An effective partnership for an efficient development of a future product.

End users : Dutch and Belgium Police,  
Special Intervention Units and R&D



Industrial entity & coordinator:  
SATIMO (France)



Knowledge institutes:  
Delft University of Technology (Netherlands)  
Joint Research Center - European Commission (Italy)



(((. Number, size and flexibility of partners allowing for increased value for money with respect to the European Commission

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# Short presentation of the consortium

(((. **End user KLPD**  
(National Police Agency, Netherlands,  
Specialist Criminal Investigations Department - DSRT)



(((. **Mission:** facilitating the Dutch Police, Special Branches and Intelligence Service with high quality and state of the art technological and tactical services and concepts to collect information from very difficult locations.

(((. **Vision:** fulfill the mission by means of technological and tactical concepts and services in the fight against serious and organized crime and terrorism.

(((. **Policy:** develop integrated technological and tactical concepts to facilitate law enforcement customers.

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# Short presentation of the consortium

(((. End user DSU  
(Special Units of Federal Police, Belgium)



(((. Missions:

Assisting the other services of the Belgian Police as

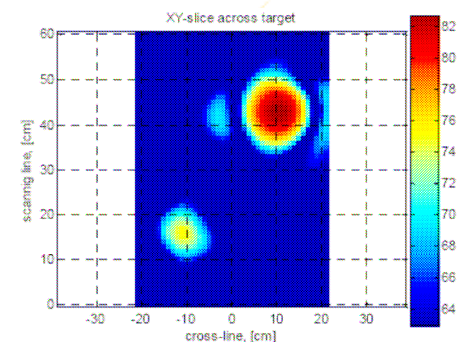
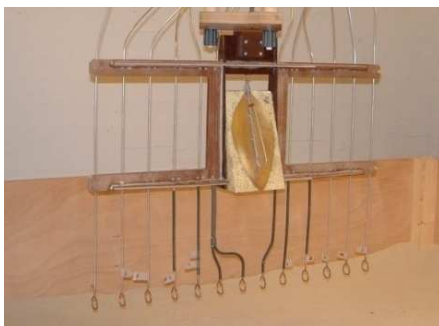
- Counter-terrorism Intervention Unit
- Specialized support in the fight against “High criminality”
- Support Unit solving crisis situations

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# Short presentation of the consortium

- Knowledge Institute - Delft University of Technology, The Netherlands (TUD) International Research Centre for Telecommunications and Radar (IRCTR)
- IRCTR was established in 1994 as institute of excellence in the following fields:
  - radar design, technology and systems;
  - antennas and propagation;
  - microwave remote sensing;
  - telecommunication technologies and systems;
  - wireless and mobile communications;
  - telecommunications networks, architecture and services.
- Developments of Ultra-Wideband (UWB) radar technology for ground inspection:
  - antenna arrays with near-field and far-field digital beamforming;
  - radar electronics (video impulse, frequency modulated continuous wave, stepped frequency);
  - 3-D imaging techniques by synthetic aperture radar and antenna array radar.



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# Short presentation of the consortium



- (()) Knowledge Institute JRC  
(EC DG Joint Research Center, Institute for the Protection and Security of the Citizen, JRC-IPSC, Italy)
- (()) Total staff is currently 430 (250 permanent – 180 temporary contracts)
- (()) IPSC participates in multiple EU projects in the frame of the Security Research Program
- (()) IPSC currently addresses two key objectives:
  - Supporting the development of a European area of Freedom, Security and Justice
  - Contributing to the development of Global Stability and Security
- (()) IPSC maintains and develops its expertise and networks in information, communication, space and engineering technologies in support of its mission

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# Short presentation of the consortium

Industrial company: SATIMO, France

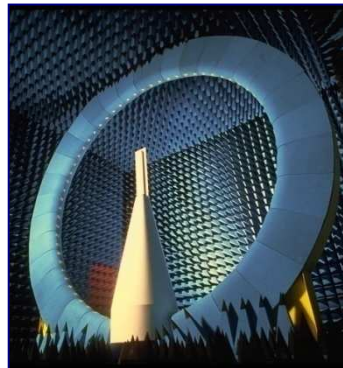
SME founded in 1986, 120 persons with global presence (Paris, Brest, Rome, Goteborg, Atlanta, Hong-Kong, Tokyo).

Innovative products recognized world wide

- Multi-sensors and real time systems for antenna measurements
- Non destructive systems for continuous quality control of materials
- Systems of imagery for medical and security applications



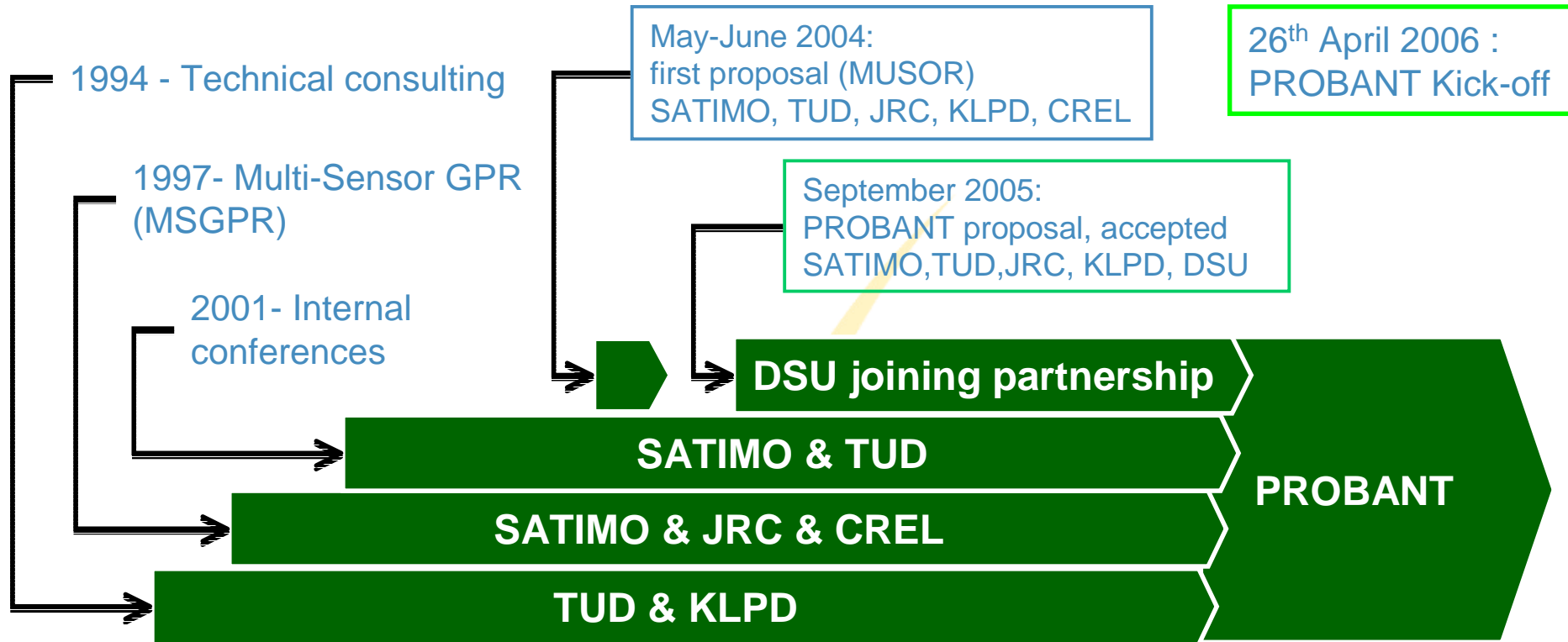
Prestigious customers (Nokia, Sony Ericsson, General Motors, Motorola, DGA, CEA, CNES, ESA, Thales, Renault, Peugeot, Airbus, etc)



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# History of the project



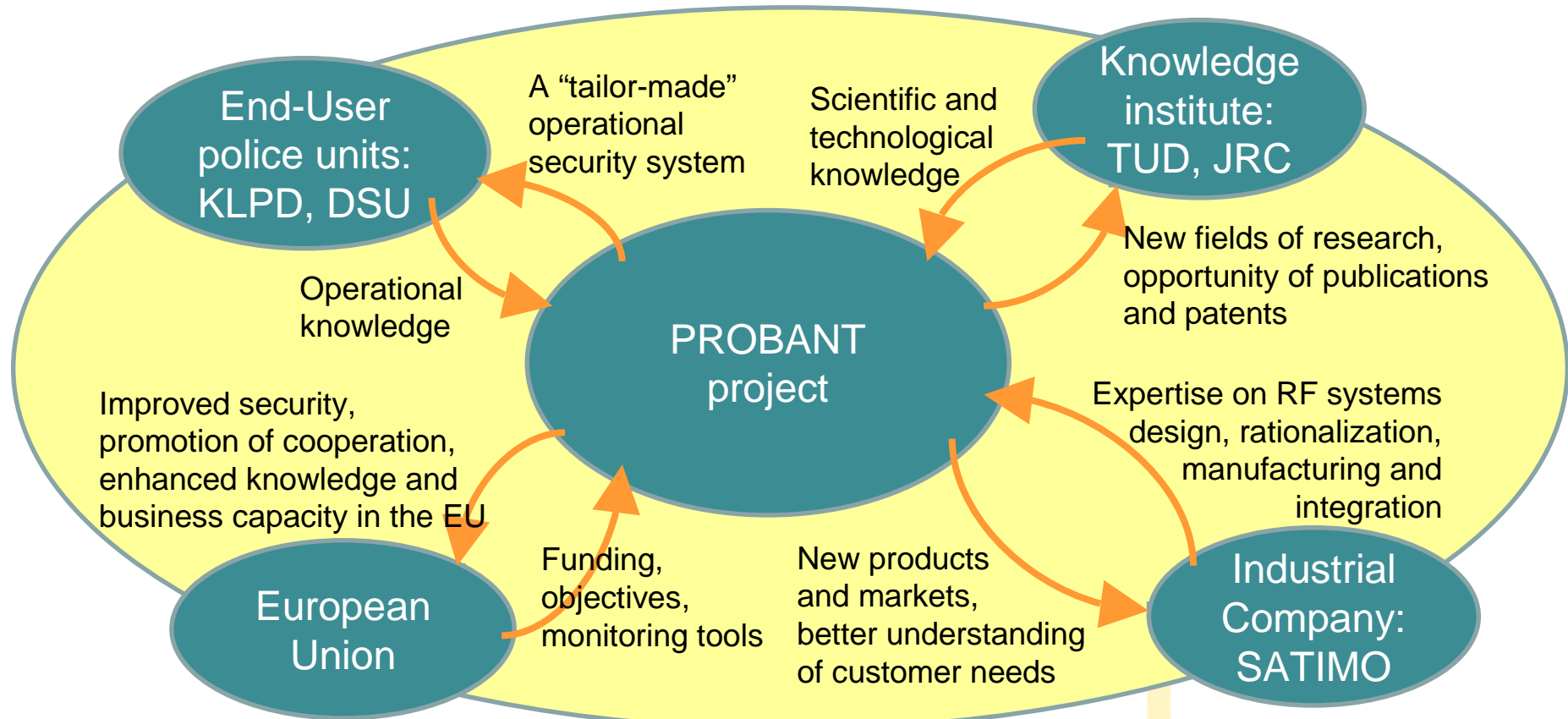
- (((. Fruitful relationship between the partners prior to the project
- (((. Long-term involvement

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# Constructive interests of the partners

- European Union: interest in the development of a new technology increasing cooperation, knowledge, and security level in Europe

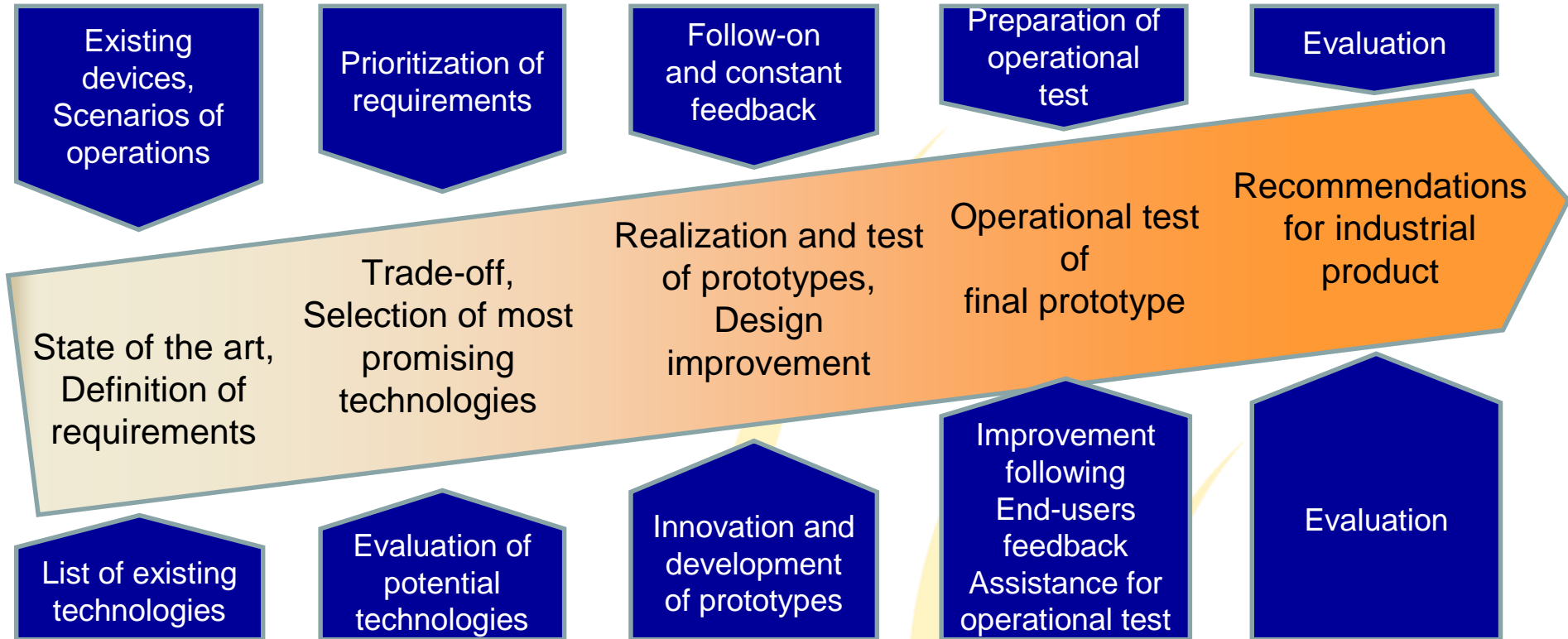


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# Main phases of the PROBANT project: from the study to the product

**End Users: Police Units KLPD and DSU**

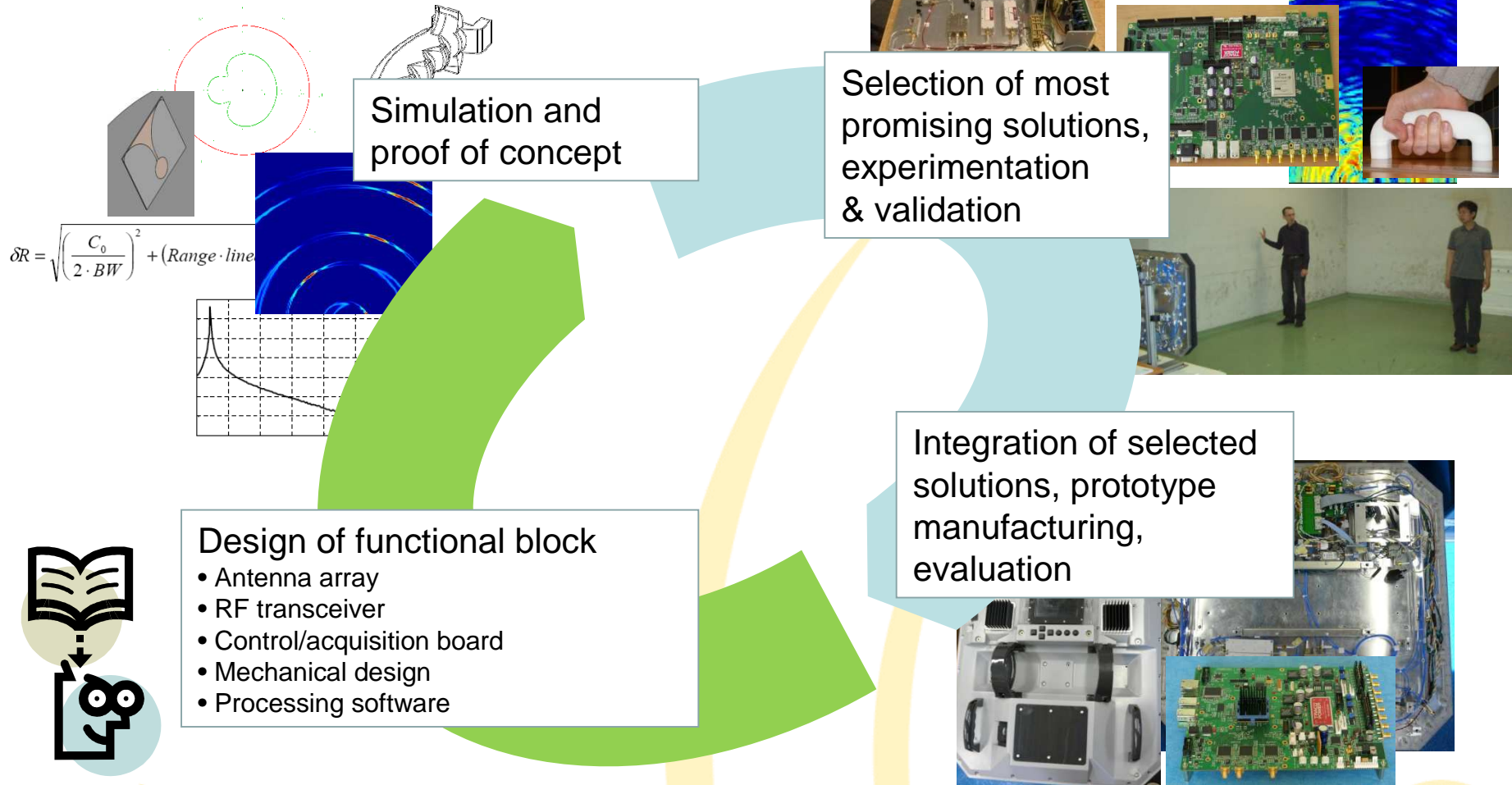


**Technological and Industrial partners: TUD, JRC, SATIMO**

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# Daily life of the project



$$\delta R = \sqrt{\left(\frac{C_0}{2 \cdot BW}\right)^2 + (Range \cdot line)}$$



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# Daily life of the project

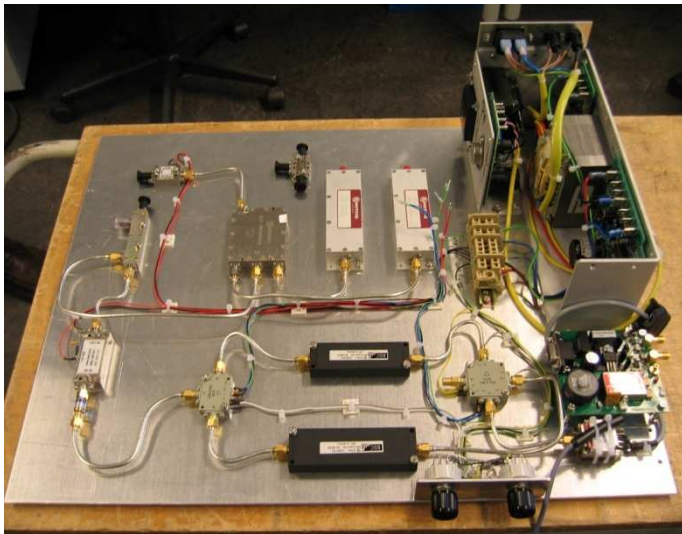
- (()) **11 Working meeting were organized to draw the situation of the project, perform trade off discussions and define the actions to take**
- (()) **7 Steering committee meeting were organized periodically and when important decision were required**
- (()) **Every partner in the consortium had a specific role. The end user role was substantial and the requirements were codified without pre-knowledge of the technological possibilities.**
- (()) **Several trade off discussions have been performed in the usergroup:**
  - the original requirements, to define the project targets;
  - the technology to be used, finally FMCW;
  - the commercial aspects of the final product, price and market;
  - the mechanical set up of the device, carrying and monitoring;
  - the user interface for the operator, what will be visible.

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# First results

- Frequency modulated continuous wave (FMCW) technology has been extended to UWB radar for through-wall imaging
- Radar electronics with low transmitted power, high dynamic range, high sweeping rate and programmable selection of operational frequency band has been developed and tested



Demonstrator of radar electronics as a proof of concept:

- less than 1 W for transmission
- more than 70 dB of natural dynamic range
- ultra fast sweeping rate allowing high refresh rate

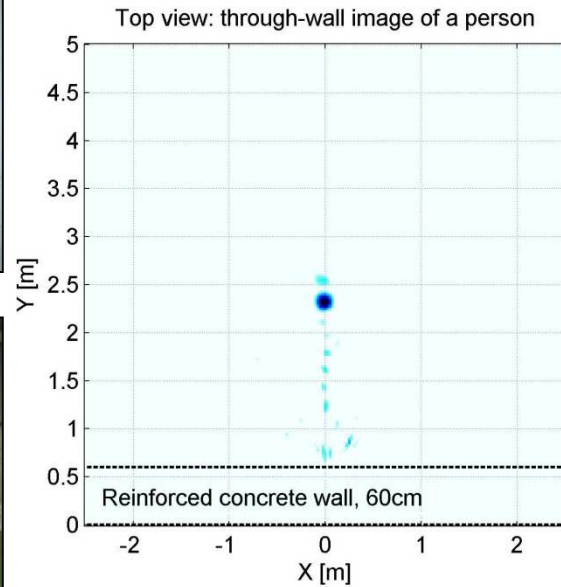
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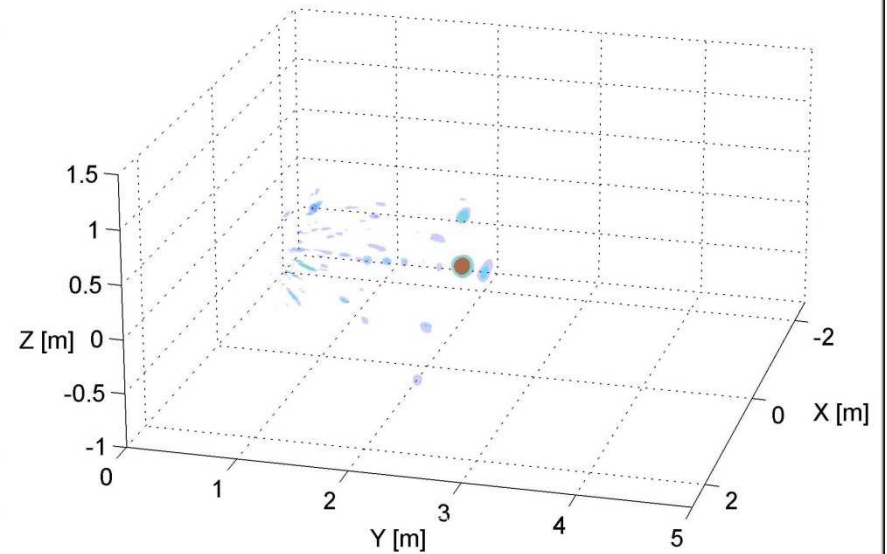


# First results

PROBANT obtained first radar images of a person through a 65 cm thick concrete reinforced wall



3-D view: through-wall image of a person



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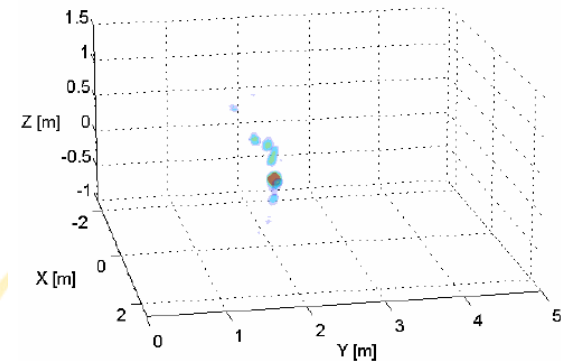


# First results

(((. A first prototype was designed and manufactured.



(((. Measurements have been performed showing promising performances with the selected technology.



(((. A software interface has been developed, helping the fusion of data and assistance to decision.

(((. Based on the preliminary results, a 2<sup>nd</sup> prototype is being designed for manufacturing, functional testing and operational evaluation by the end-users.

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# Industrial, economical and technical outcomes

((( Start of a new market in imagery devices for security

➔ New strategic sector of expansion for SATIMO

((( SATIMO set up a team of 6 people working full time on the project with multiple competences: RF, Numerical electronics, signal processing and software

➔ Creation of 3 permanent positions for new R&D engineers

➔ Increased competences and knowledge of R&D team

((( Development of transversal technical building block for future products in other markets

➔ Example: FPGA board will also serve for MIMO measurement systems

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# End users return of experience



((( End user are satisfied of the co-operation between partners

((( End users have the real possibility to influence the project

- Freedom to formulate their remarks and wishes
- Fruitful trade off discussions
- Participation to the decision taking

((( End user are expecting the project to end with an operational and useful product

((( The project coordination is fair and open-minded

((( Each partner has opportunity to give its opinion on any aspect of the project with equal consideration for decision



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# Conclusion

- (((. Development of a very innovative system for security applications. Validation of its functional capabilities is on going
- (((. State of the art +1 through efficient cooperation between partners
- (((. Project in process of finalizing the radar operational prototype to prepare a series of final tests which will be evaluated by End users



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