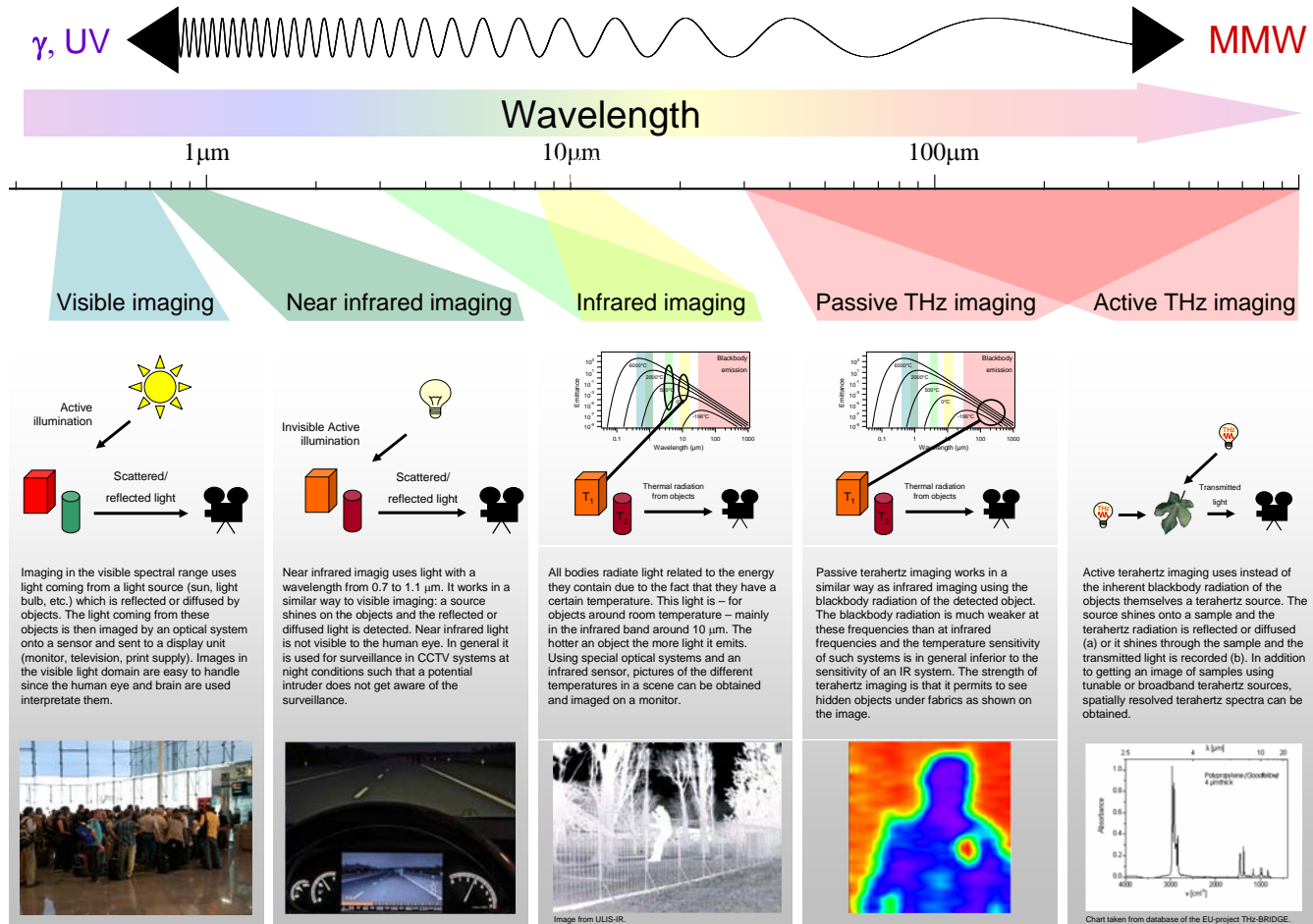


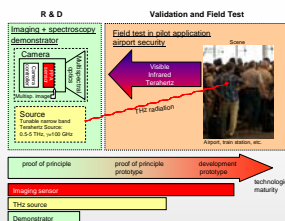
MUSIS is a specific targeted research project (STREP), which started in May 2008, co-funded by the European Commission under the strategic objective "Photonic Components and Subsystems" of the framework 7 ICT program. MUSIS will develop photonic components for multispectral imaging applications in security, safety, medical, and production technology.

### Background and basics

Imaging in different parts of the electromagnetic spectrum



### Challenges



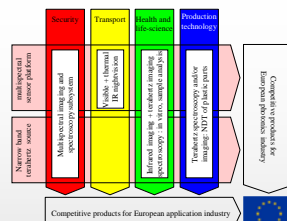
Key information on the MUSIS project:

- MUSIS will develop photonic components for multispectral imaging applications in security, safety, medical, and production technology.
- Benefit by combining the advantages of different spectral detection bands in a unique system.
- Pilot application will be in airport security with use of classic CCTV detection combined with scanning persons for hidden objects as weapons and explosives (terahertz part) and body temperature detection for detecting infectious diseases or excitement (IR part)

MUSIS will address the following challenges:

- Development of a monolithic multispectral terahertz, infrared, and visible focal plane array detector based on a CMOS substrate working at room-temperature. This objective is the most challenging of the project since it includes two world premieres: on the one hand to date no two-dimensional terahertz detection array exists and a tri spectral monolithic detector has never been demonstrated before.
- Development of a room temperature high power, small band tunable terahertz source. The terahertz source to be developed has a very small band and is tunable over a wide range of frequencies from 0.5-5 THz.
- Design of a subsystem capable of doing passive visible, infrared, and terahertz imaging as well as active stand off terahertz spectroscopy. To date no such system exists in the market or in research labs.

### Applications



The following new photonics based applications are conceivable using the components developed during the project:

- Security technology:**
  - Security check in at airports
  - Monitoring in railway or underground stations
  - Access control to mass events
  - Access control to sensitive infrastructure (nuclear power plants, etc.)
- Safety:**
  - Combination of near infrared (NIR, 0.7-1  $\mu$ m) and long-wave infrared (LWIR, 8-12  $\mu$ m) for advanced night vision systems: detection of living objects using LWIR and of non-living objects as lost load with active NIR imaging.
- Health and life-science:**
  - Skin cancer detection using terahertz and infrared detection
  - Mapping of biological activity through spectral mapping in terahertz frequency range and infrared imaging
- Production technology:**
  - Online production monitoring of plastic parts (air inclusion/cracks)
  - Chemical composition and packaging monitoring in pharmaceuticals industry

### Consortium



The MUSIS consortium involves six partners from academia, industry and end users from France, Germany, Italy and Switzerland:

- CEA-LETI in Grenoble – France will be in charge of the detector design and the detector fabrication
- FBK in Trento – Italy will design the read out electronic circuit of the multispectral detector
- Rainbow Photonics and ETHZ, both in Zurich – Switzerland will make the design of the terahertz source and build up the demonstrator prototype of the source.
- Robert Bosch GmbH - Germany will design the multispectral optics and build up the system demonstrator. Bosch will furthermore coordinate the consortium work.
- Zurich airport will coordinate the field test of the demonstrator system and its evaluation.

Further administrative project data:

- Project started on May 1, 2008 and will have duration of 40 months (ending August 2011)
- Cost of the project is 4.64 M€ with an EU contribution of 3.2 M€