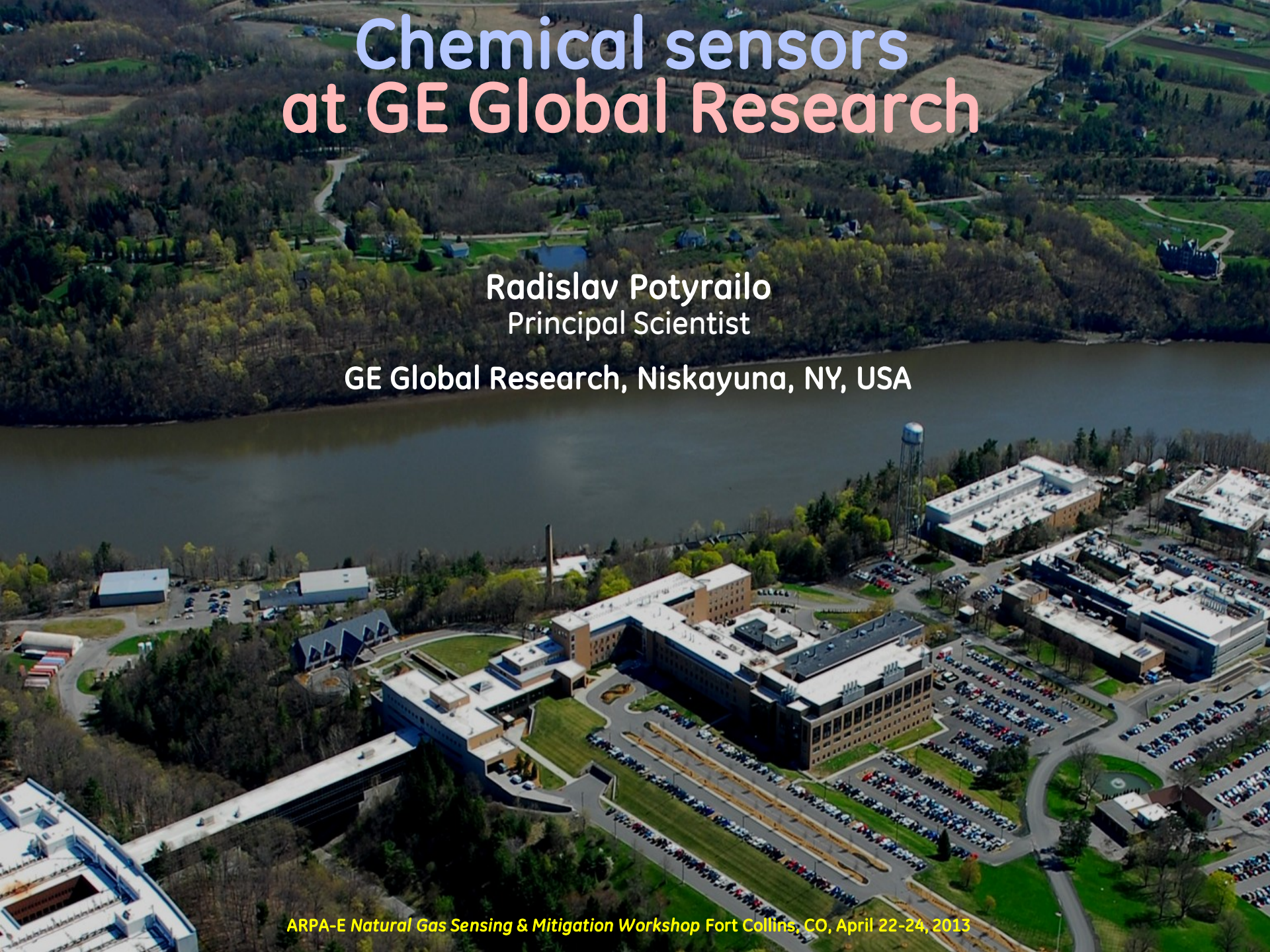
Chemical sensors at GE Global Research

Radislav Potyrailo
Principal Scientist

GE Global Research, Niskayuna, NY, USA

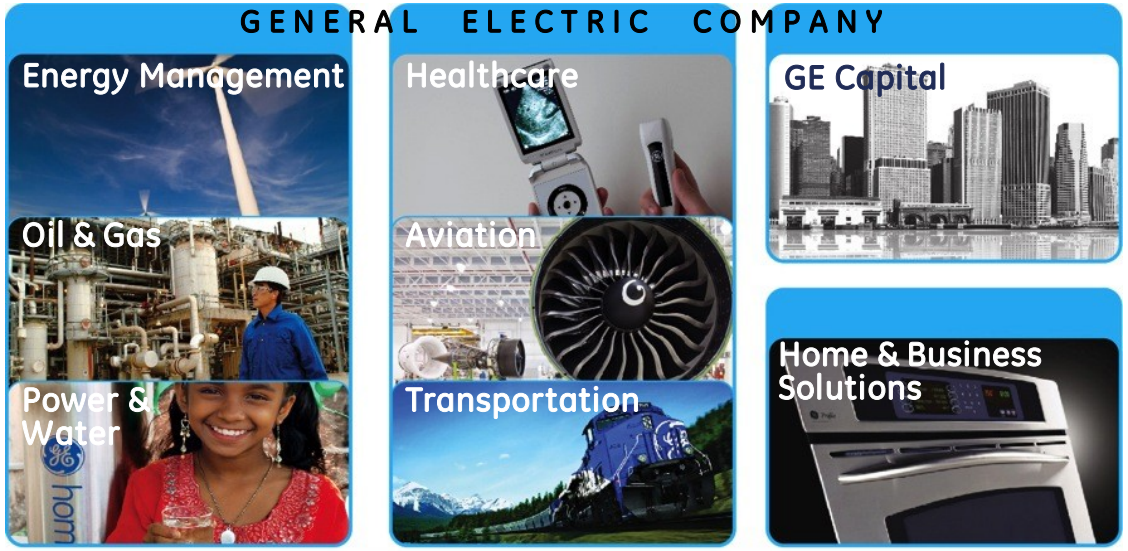


ARPA-E *Natural Gas Sensing & Mitigation Workshop* Fort Collins, CO, April 22-24, 2013

Technology driver: New performance requirements

- Dynamic range
- Initial cost
- Long-term stability
- Operation cost
- Power consumption
- Response speed
- Robustness
- Selectivity
- Sensitivity
- Size

Potyrailo *Angew. Chem. Int. Ed.* **2006**
Potyrailo, Mirsky *Chem. Rev.* **2008**
Potyrailo, et al. *Chem. Rev.* **2011**
Potyrailo, Naik *Ann. Rev. Mater. Sci.* **2013**



Diversity of sensor designs to meet specific application requirements

Adapting COTS monitoring solutions for demanding applications

Steps in adapting COTS monitoring solutions

- Identify key requirements
- Qualitatively analyze options
- Establish test facility
- Collect and evaluate data

http://www.ge-mcs.com

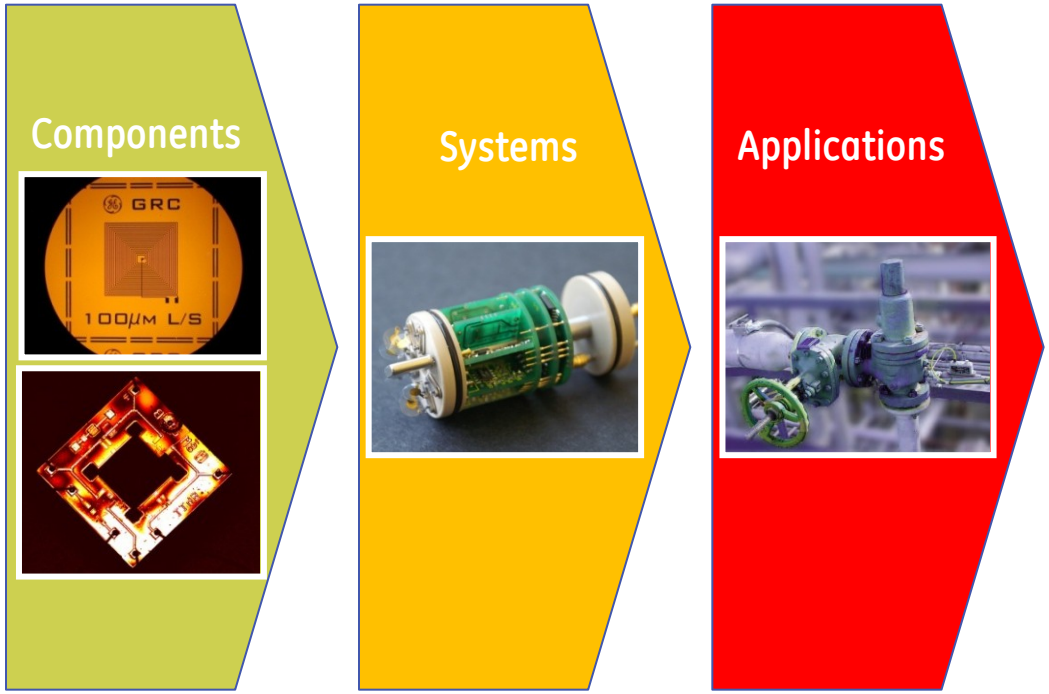
Matching monitoring requirements with capabilities of available sensors

COTS = commercial off-the shelf

Developing advanced monitoring solutions for demanding applications

Steps in developing innovative monitoring solutions

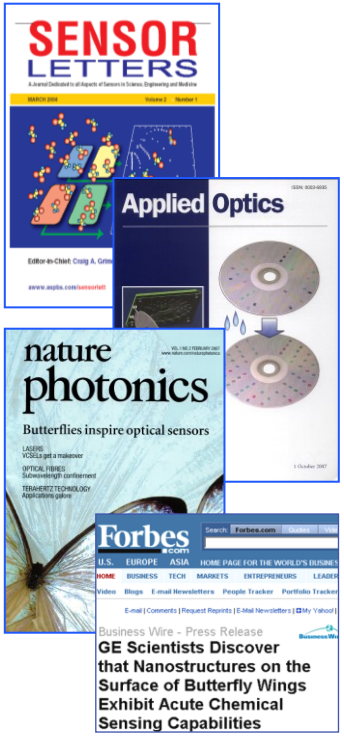
- Identify requirement gaps
- Qualitatively analyze options
- Leverage platform technologies
- Reduce risks with experiments
- Transfer technology
- Develop monitoring roadmap



Solving industrial problems with innovative measurement solutions

Developing advanced monitoring solutions for demanding applications

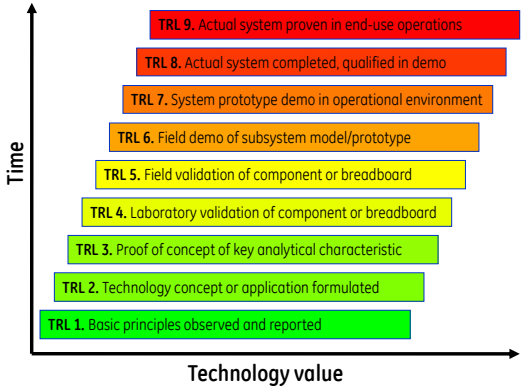
Initial concepts → Lab / field testing → Pilot scale validation → Technology transfer, Commercialization



System demo at DOE site [1]

Roll-to-roll fabrication [2]

TRLs [3]



Role of GE Global Research: TRL 1 → 6-7
MRL 1 → 7-8

[1] Potyrailo *Angew. Chem. Int. Ed.* **2006**
[2] Potyrailo, et al. *Analyst* **2012**
[3] Potyrailo, et al. *Chem. Rev.* **2011**