hSITE Research Progress

Theme 3

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NSERC Strategic Research Network

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Enabling Networks and Technologies

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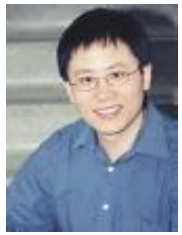
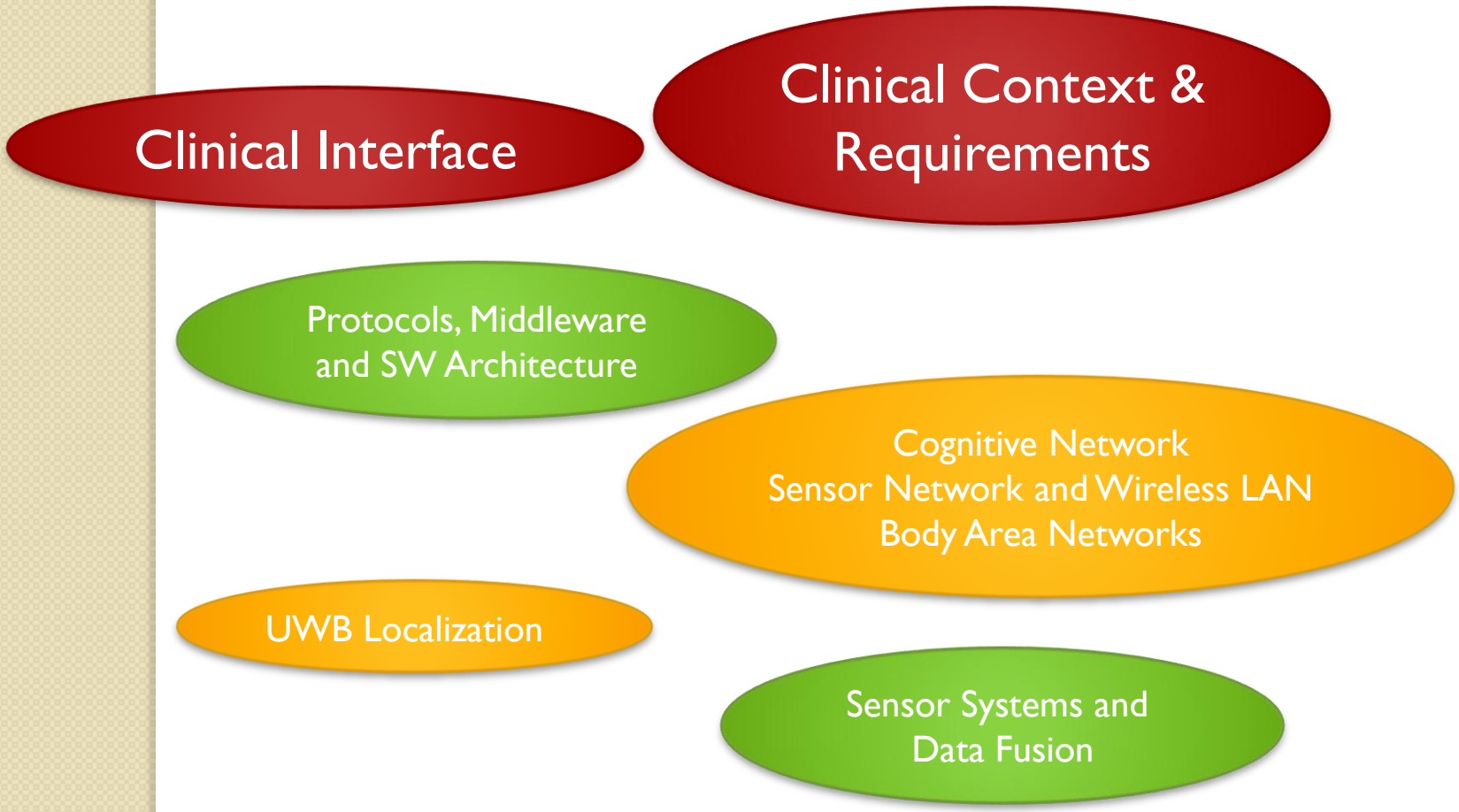



Tho Le-Ngoc

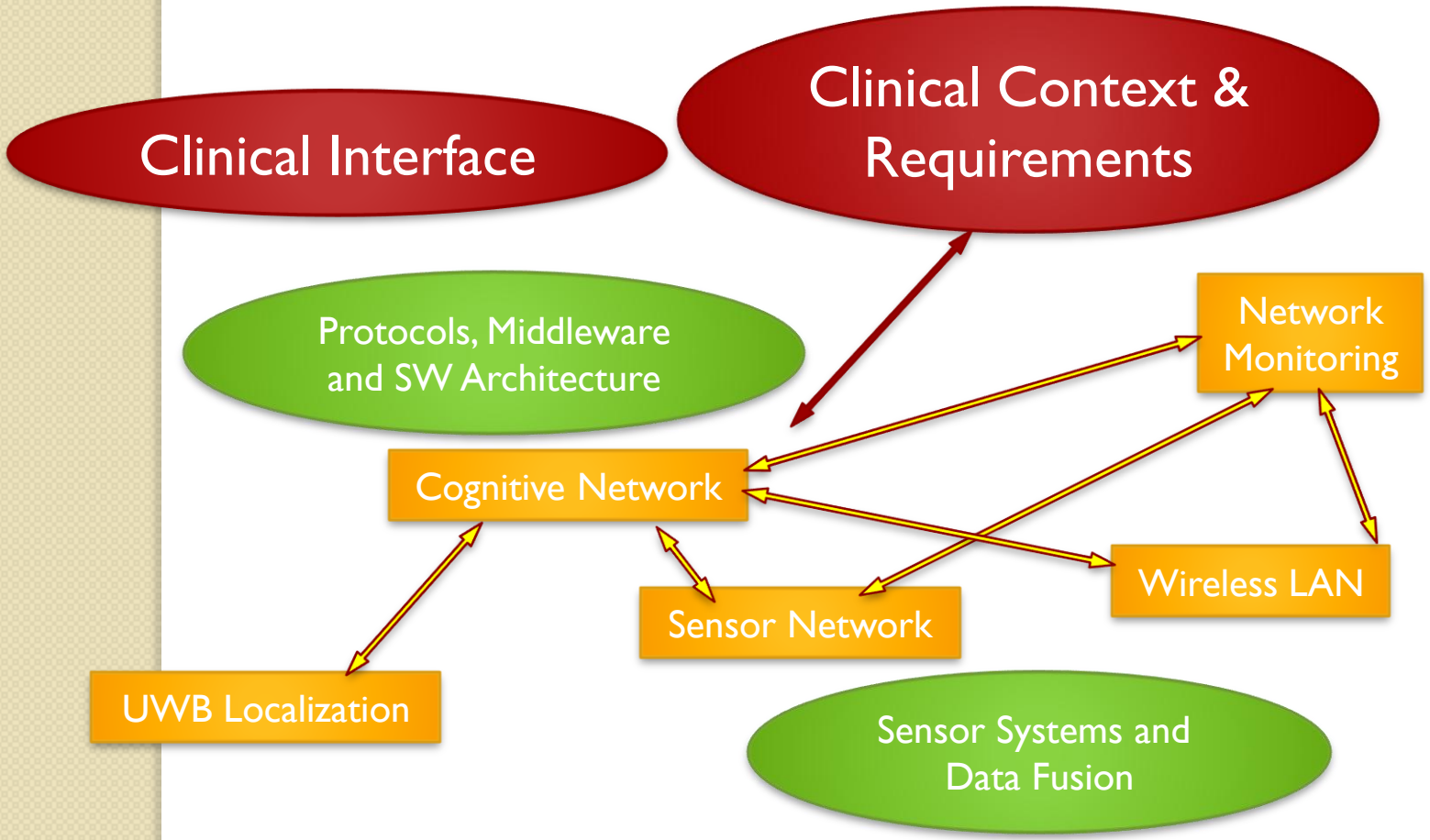
Ramesh Abhari


hSITE Overview: Theme 3



- Theme 1
- Theme 2
- Theme 3

hSITE Overview: Theme 3



Theme 1
Theme 2
Theme 3

Main Objectives

- Theme 3 conducts research into advanced networks, and transmission and location technologies.
- Theme 3 focuses on the following research topics
  - Network Architecture and Monitoring
    - Cognitive Networks (Coates)
    - Sensor and Wireless Access Networks (Le Ngoc)
    - Body Area Networks (Abhari and Rusch)
  - Wireless Systems
    - Cooperative and EMI-Aware Transmission (Le Ngoc)
    - Ultrawideband Communication (Rusch)
  - Precise Location Identification
    - Ultrawideband Localization (Plant)
    - Powerline Localization (Rusch)
    - Radio-frequency Tomography (Coates)
    - RFID Systems and Tracking (Le Ngoc)

hSITE Research Progress

Mark Coates

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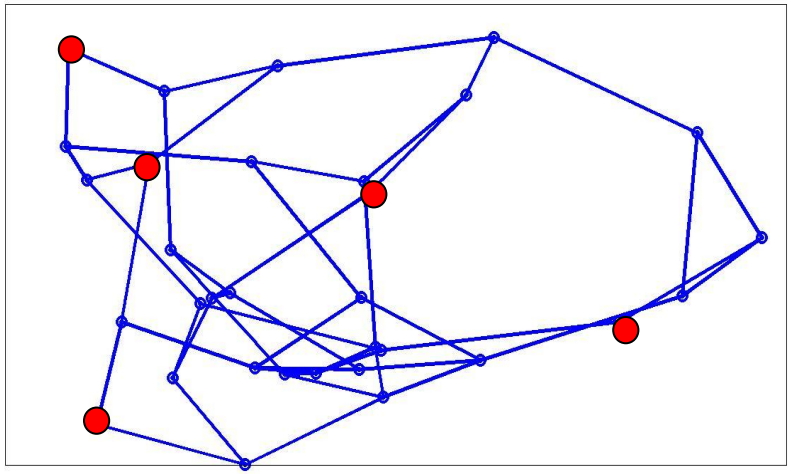
Research Activities

- Cognitive Networking
  - Available Bandwidth Estimation
  - Opportunistic Communication through Social Interactions
- Localization: Radio-Frequency Tomography
- Microwave-based Breast Cancer Detection

Available Bandwidth Estimation

- Estimate max. traffic rates on paths
  - such that there is low probability of interfering with other traffic sources
- PlanetLab validation
  - 8 nodes, 56 paths
  - Measure every 2s
  - Few kb/second
  - Accurate tracking

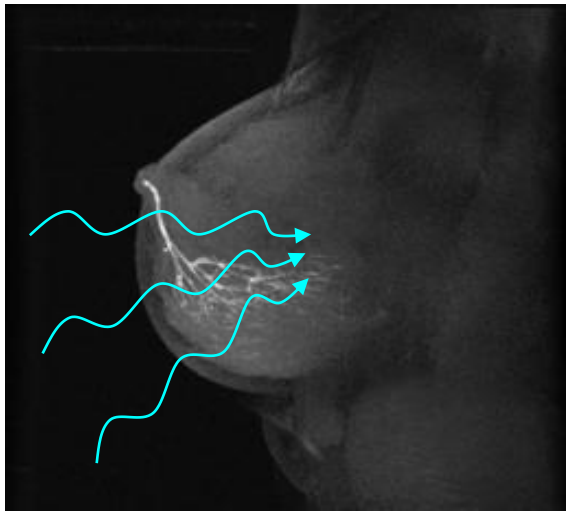


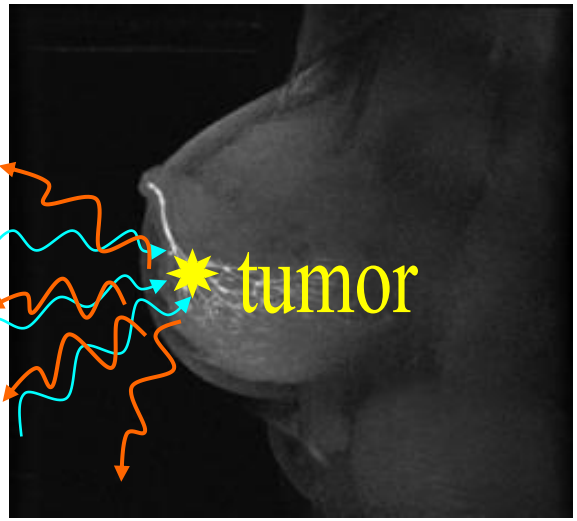
Passive Localization

- Detect and track individuals based on interference they cause to wireless signals
- Particle filtering algorithm to track single targets
- Novel random set filter for multiple targets
- Successful outdoor and indoor experiments

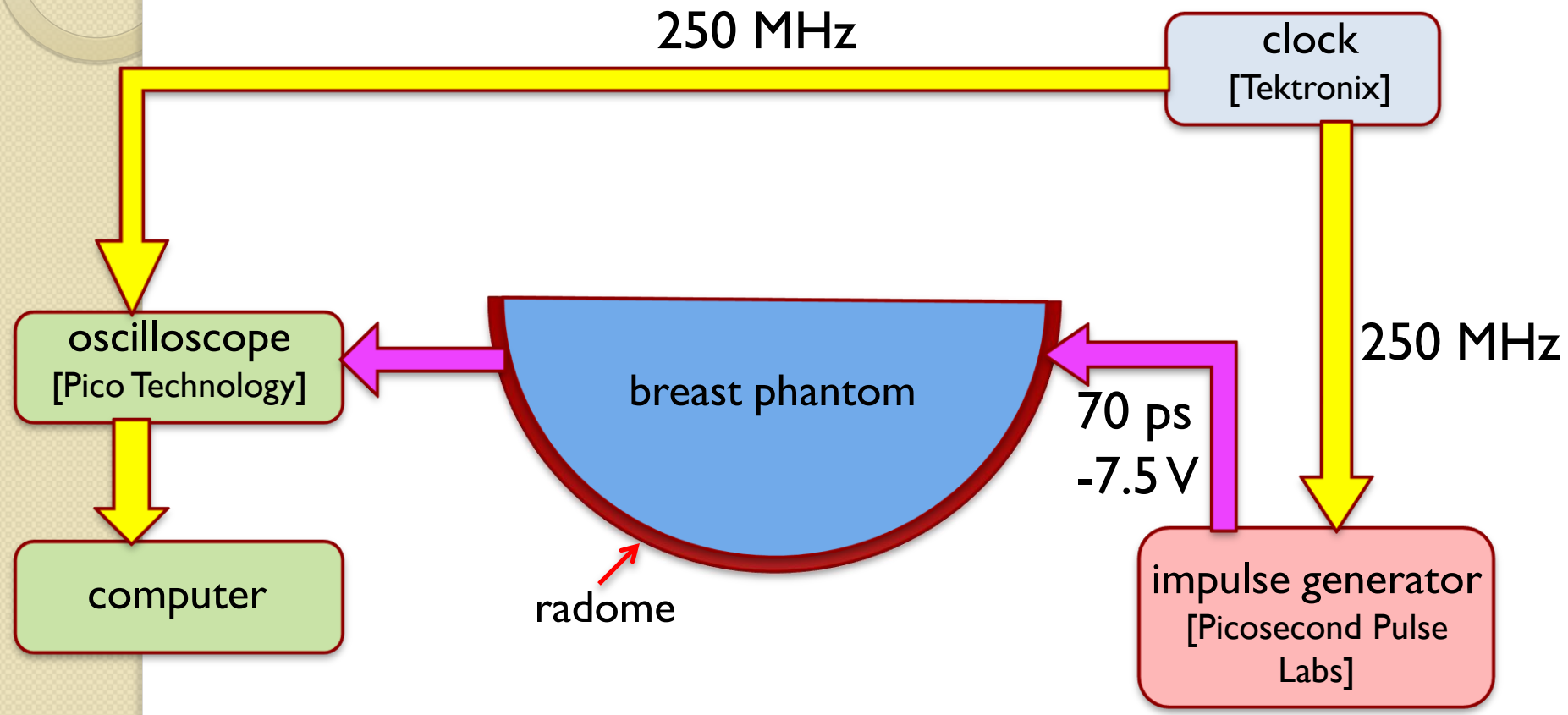
Microwave-based Breast Cancer Detection

- Complementary modality
  - Non-invasive
  - No ionizing radiation
  - No pain or discomfort
  - Cost-effective
- Goal: low-cost device that can be used regularly at home or in local clinics





Experimental System



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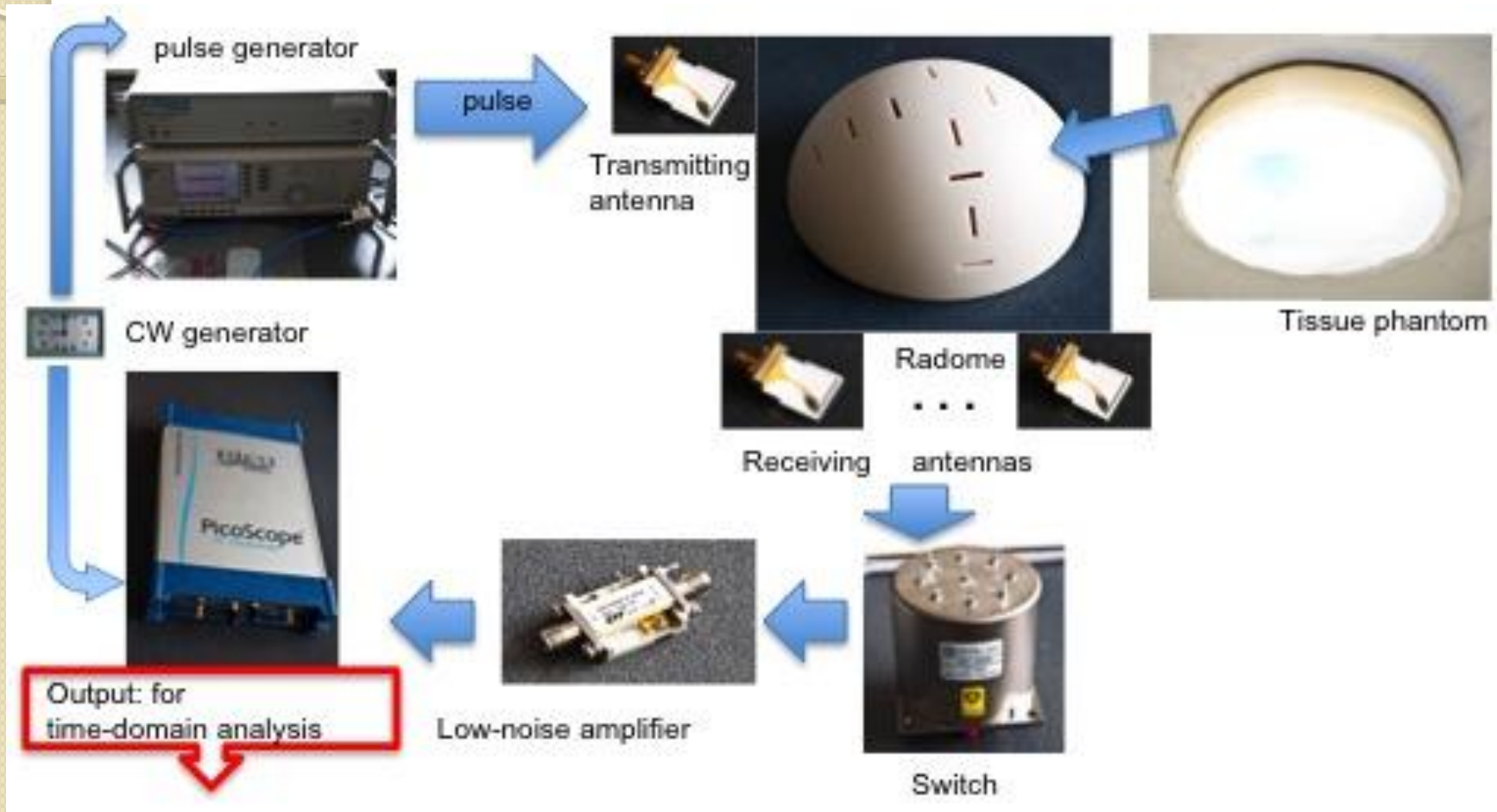

Preliminary Results