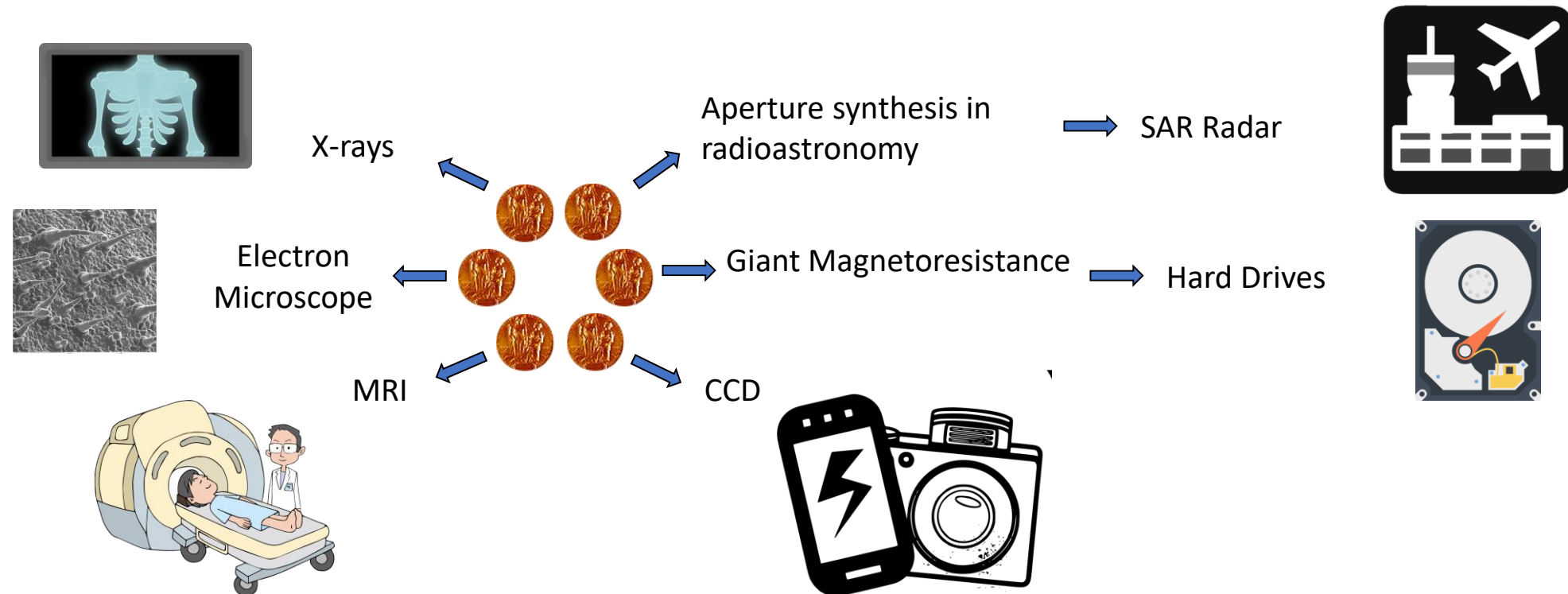


# Disruptive consequences of new sensors

Sensors and clocks are enabling systemic capabilities with large economic impact

- Historic examples based on sensor-related Nobel Prizes



**Challenge: the largest value is in the application, not the sensors themselves!!!**

# Roadmap for Magnetic Sensor Applications

## Business Advantage through Quantum Magnetometry



Oil and Mineral  
Exploration



Quantum  
Magnetoencephalography



Routine Clinical  
Diagnostics

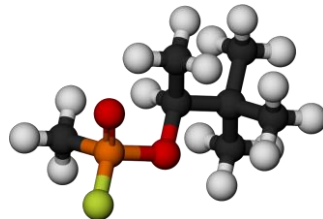


Gaming

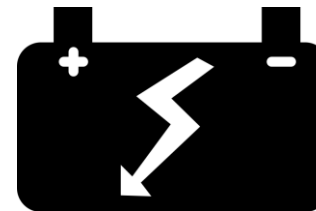
2020

2030

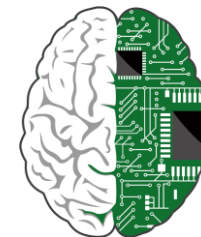
2040



Microsample  
Chemical Analysis



Battery diagnostics



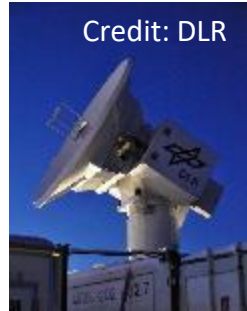
Brain Machine  
Interfaces

# Roadmap for Optical Clock Applications

## Business Advantage through Quantum Timing



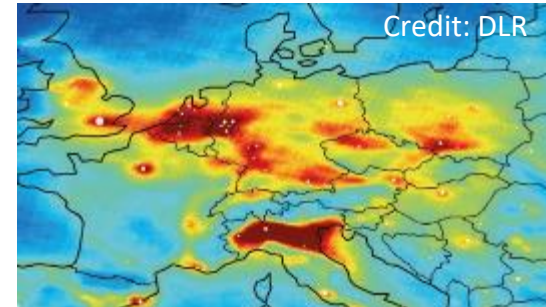
Next generation  
GNSS



Long distance  
3d imaging radar



Urban airspace  
control

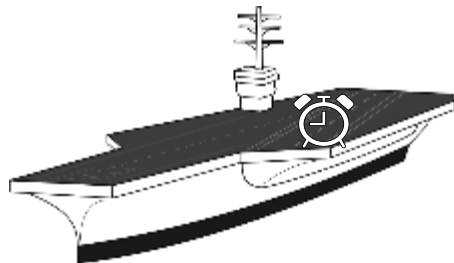


mm-level global height  
reference system

2030

2040

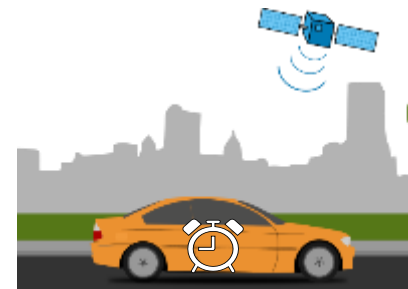
2050



GNSS resilient operation



High bandwidth  
communication



Autonomous vehicles