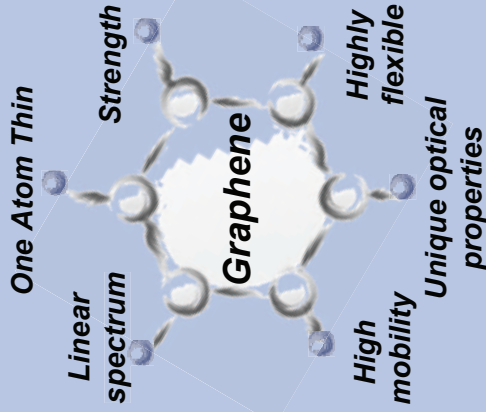
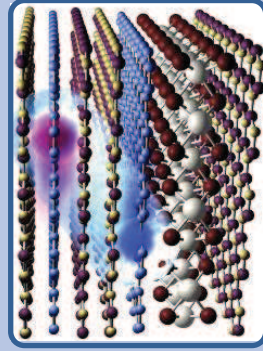


Platform



Hybrid 2d structures



Industrial
Academic

2013

Industrial workshare
Academic workshare



System Integration

- Flexible electronic communication
- Superfast optical electronics
- Ultrafast low-power electronics
- Self-powered devices
- Automotive
- ...



Components

- Transistors
- Spin valves
- Flexible displays
- RF tags
- Ultra-light batteries
- Solar cells
- Ultrafast lasers
- Composite materials
- Prostheses
- Sensors
- ...



Production techniques

- Large scale synthesis
- On demand growth
- Nanoribbons
- Growth on flexible substrates
- Links
- Interfaces
- Doping
- Superstructures
- Toxicology
- ...



Industrial workshare
Academic workshare

2016

Vision beyond 2023

ICT

- Faster
- Cheaper
- Flexible

Energy storage and conversion

- Efficient
- Cost effective
- Renewable
- Sustainable

Health

- Cost effective
- Bio compatible

- Societal benefits
- Jobs
- Education

2023

2013

2016

2023

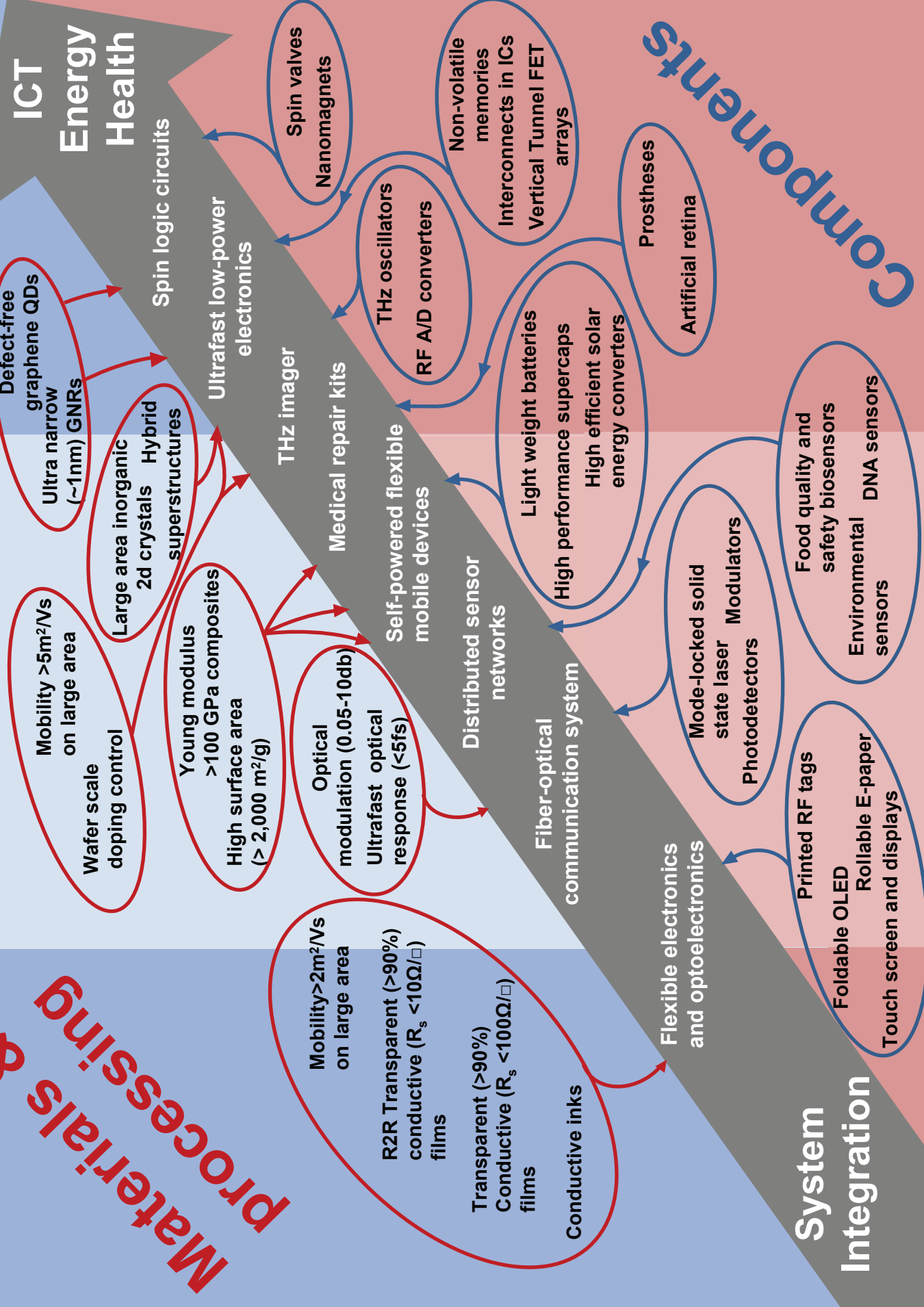
2033

Materials & processing

- Mobility >2m²/Vs on large area
- R2R Transparent (>90%) conductive (R_s <100Ω/□) films
- Transparent (>90%) Conductive (R_s <1000Ω/□) films
- Conductive inks

- Wafer scale doping control
- Mobility >5m²/Vs on large area
- Young modulus >100 GPa composites
- High surface area (> 2,000 m²/g)
- Optical modulation (0.05-10db)
- Ultrafast optical response (<5fs)

- Defect-free graphene QDs
- Ultra narrow (~1nm) GNRs
- Large area inorganic 2d crystals
- Hybrid superstructures



ICT Energy Health

Spin logic circuits

Ultrafast low-power electronics

THz imager

Medical repair kits

Self-powered flexible mobile devices

Distributed sensor networks

Fiber-optical communication system

Flexible electronics and optoelectronics

System Integration

Spin valves
Nanomagnets

THz oscillators
RF A/D converters

Non-volatile memories
Interconnects in ICs
Vertical Tunnel FET arrays

Light weight batteries
High performance supercaps
High efficient solar energy converters

Prostheses
Artificial retina

Mode-locked solid state laser
Photodetectors

Printed RF tags
Foldable OLED
Rollable E-paper
Touch screen and displays

Food quality and safety biosensors
Environmental sensors
DNA sensors

Components