Opportunities to Create Solutions

Surya Raghu
Advanced Fluidics
& ET Cube International

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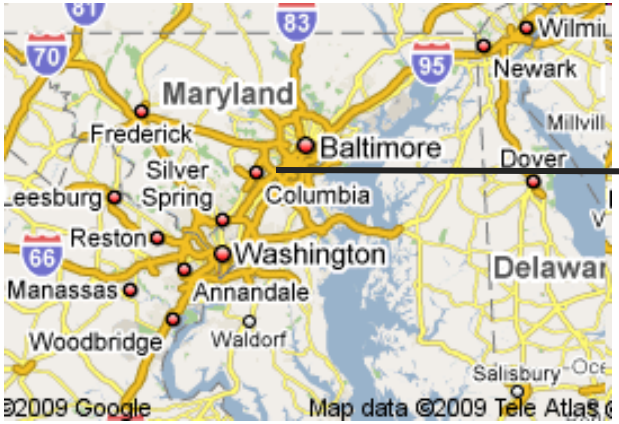


About Me

Ph.D. Mechanical Engineering – Yale University
Academics – State University of New York, Stony Brook
Industrial Scientist – Automotive and Consumer Products
>20 inventions
14 issued US and International patents
6 Products: Invention to commercialization
Entrepreneur: Started Advanced Fluidics (Small Company) in 2001

Training: ET^3 International (Non-Profit Organization)

About ET^3 International and Advanced Fluidics

ET^3 International
Entrepreneurship and Research Commercialization Training and Consulting ~ 20 countries

Advanced Fluidics LLC
Research and Product Development in
1. Aerospace Sciences – Aerodynamics, combustion
2. Micro/Nanofluidics/nanotech-based biosensors
3. Medical Instrumentation
4. Technology Roadmap Development and Training

Motivation for today's talk….

Given your scientific and technical strengths - how to look for opportunities to contribute to the needs of the society/market

OUTLINE

Fitting the invention into a big picture

- Technology Road Maps
- Technology Mind Maps
- Technology Intersect Maps
- Technology Horizon Scanning

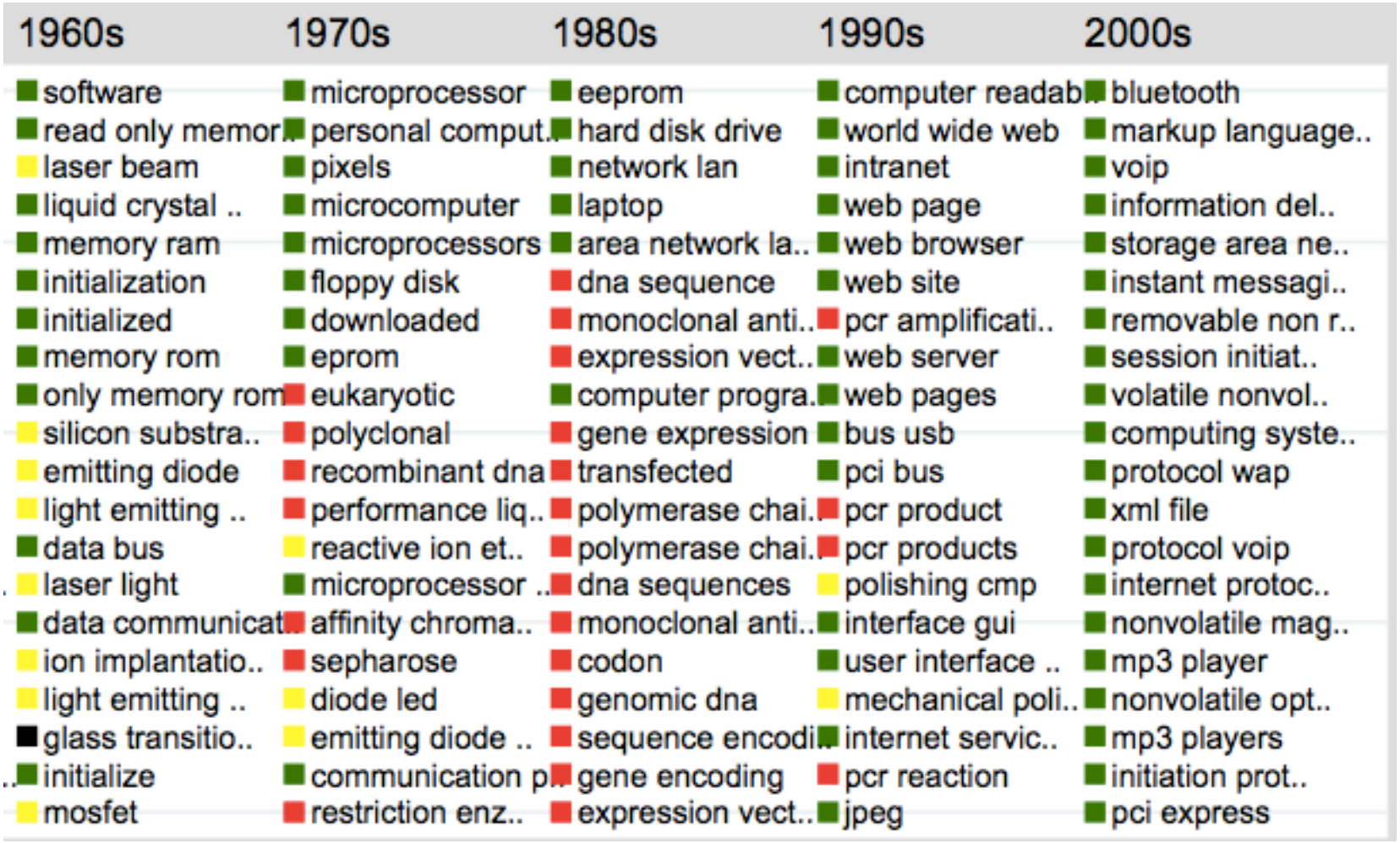
Assessment and Feasibility Analysis

(Filtering your ideas for commercialization potential)

Conclusions

Practice exercise (Group Work)

Top 20 Inventions in each decade



Chemical | Computers & Communications | Drugs & Medical | Electrical & Electronics | Mechanical | Others

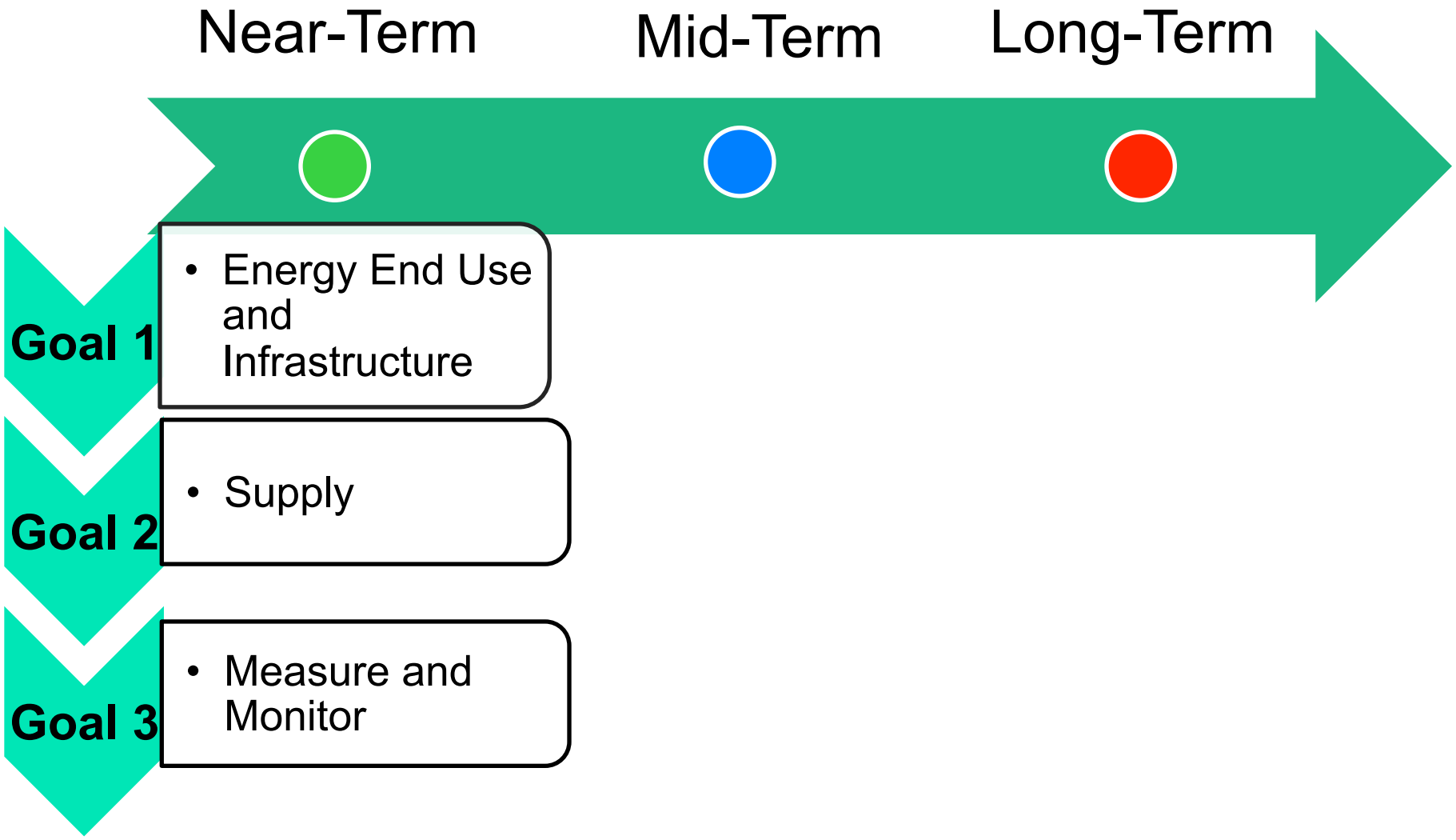
Related Industry?

Healthcare
Agriculture
Aquaculture
Automotive
Bio-Instrumentation
Aerospace
Consumer Electronics
Others??

Technology Roadmap

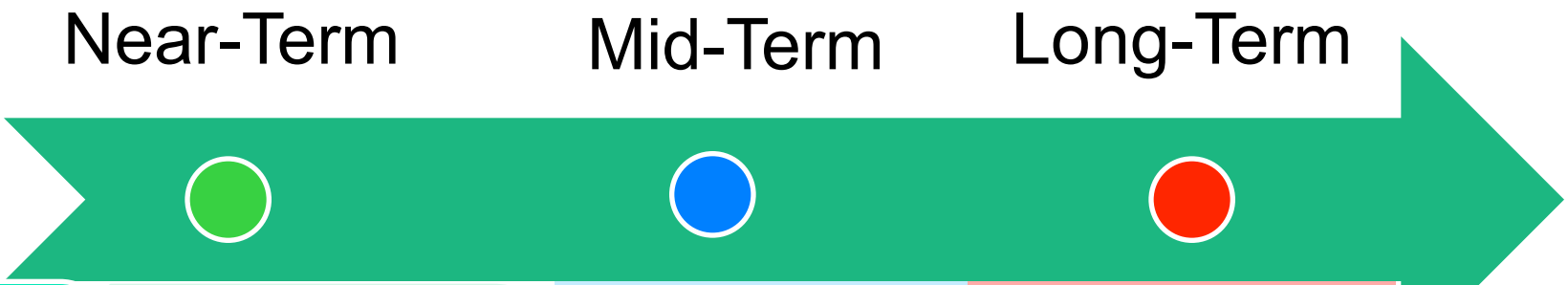
Shows where the invention fits in the “big picture”

Technology Road Map –Climate Change



Technology Road Map

http://www.climatetechnology.gov/library/2006/testimony20sep2006.htm



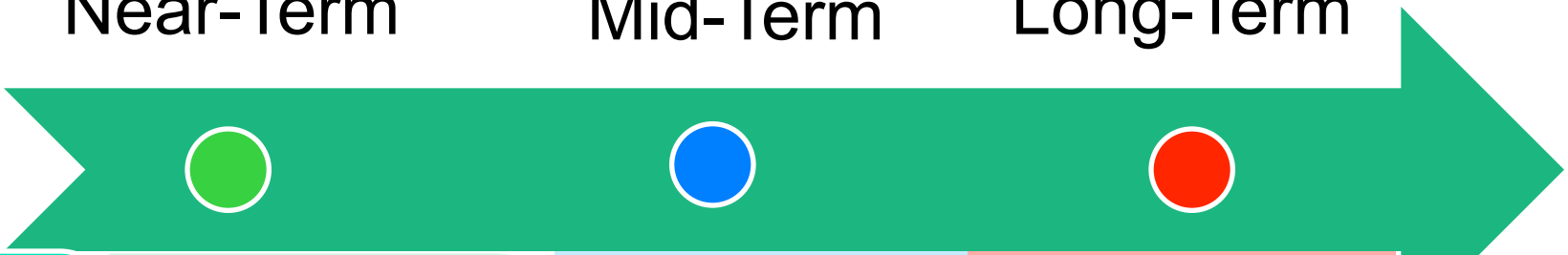
GOAL 1
Energy End Use and Infrastructure

Near-Term	Mid-Term	Long-Term
• Hybrid Vehicles • Plug-ins • Hi-Performance integrated homes • High-efficiency appliances • High-efficiency boilers and combustion systems • High-temperature superconductivity demonstrations	•Fuel cell vehicles and hydrogen fuels •Low emission aircraft •Solid-State lighting •Ultra-efficient HVACR •Smart buildings •Transformational technologies for energy-intensive industries •Energy storage for load leveling	•Widespread use of engineered urban design and regional planning • Energy managed communities •Integration of industrial heat, power, process and techniques • Superconducting transmission and equipment

Your invention?

Technology Road Map

http://www.climatetechnology.gov/library/2006/testimony20sep2006.htm



GOAL 4
Capture, storage and sequestration

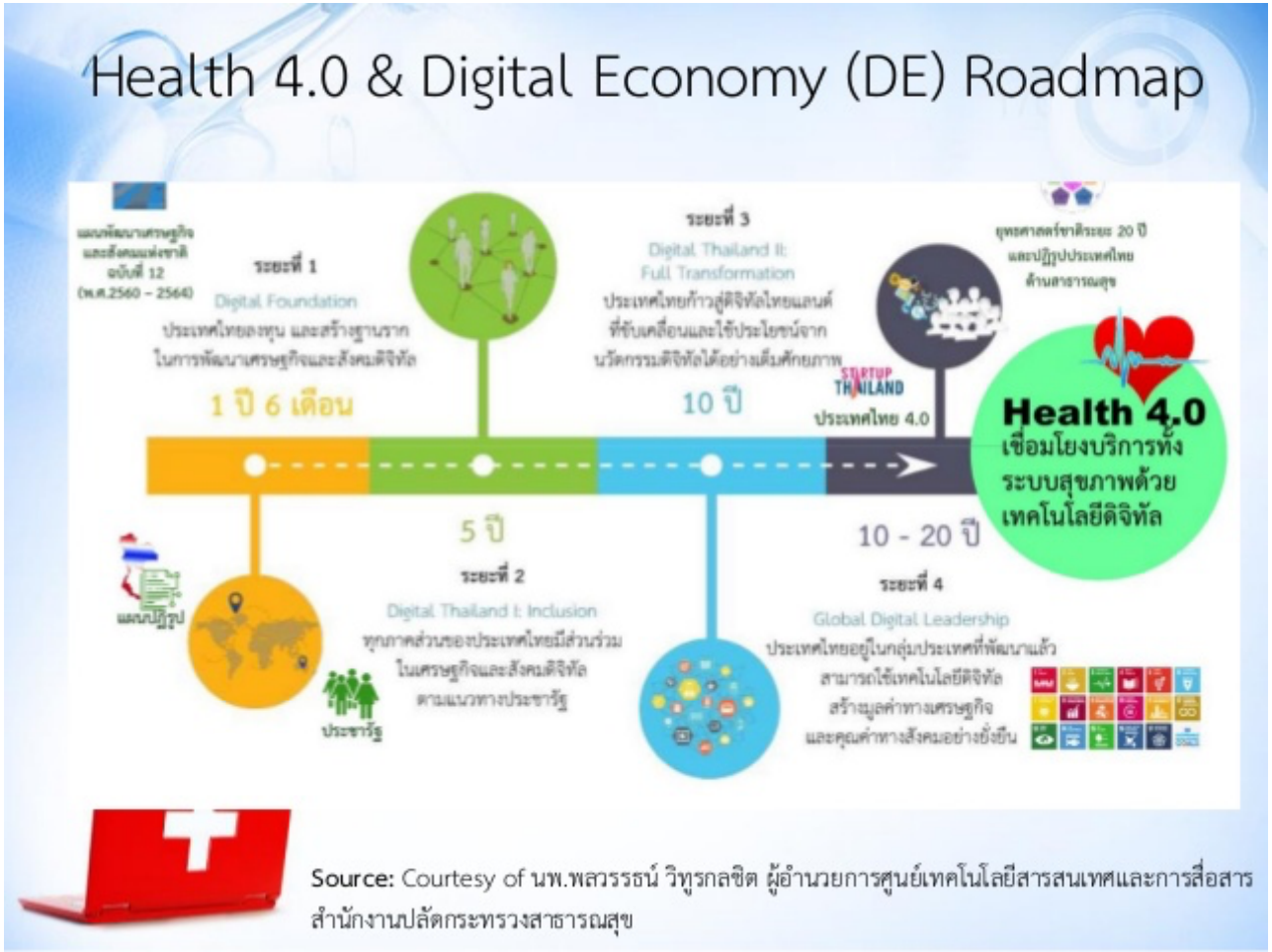
- Post-combustion capture
- Oxy-fuel combustion
- Enhanced Hydrocarbon recovery
- Geologic reservoir characterization
- Soils Conservation

- Geologic storage proven safe
- CO_2 transport infrastructure
- Soils uptake and land use
- Ocean CO_2 biological impacts

- Track-record of successful CO_2 storage experience
- Large-scale sequestration
- Carbon and CO_2-based materials
- Safe long-term ocean storage

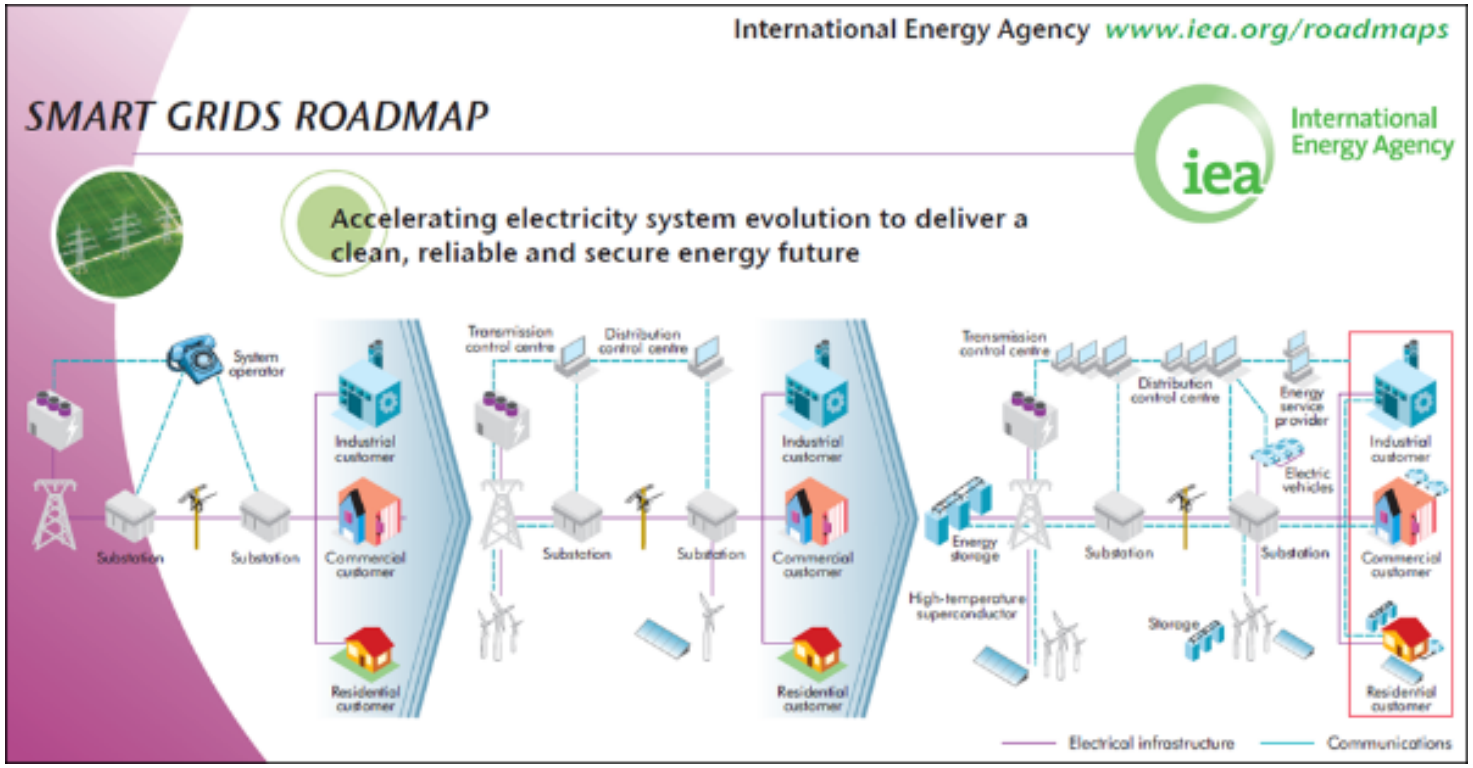
Your invention?

Thailand Health 4.0

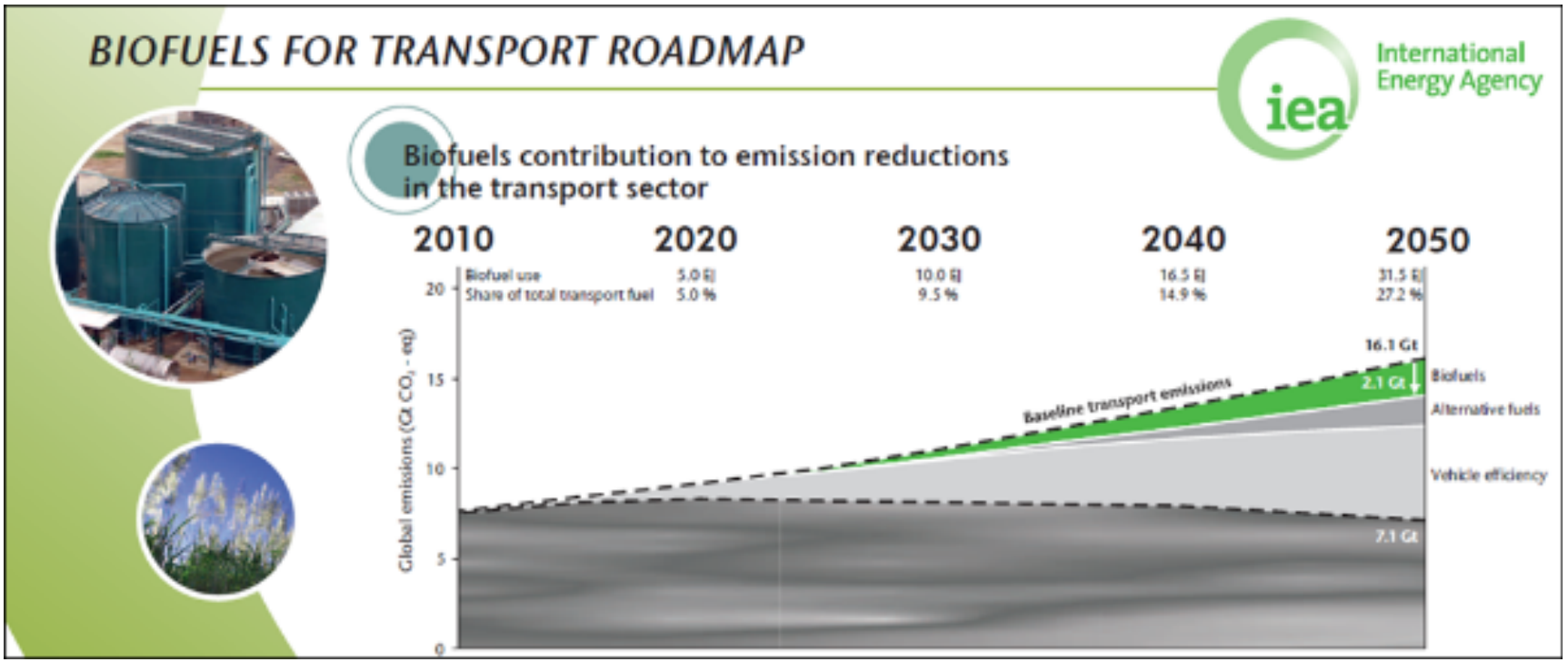


Source: Courtesy of นพ.พลวรรธน์ วิทูรกลชิต ผู้อำนวยการศูนย์เทคโนโลยีสารสนเทศและการสื่อสาร สำนักงานปลัดกระทรวงสาธารณสุข

Smart Grids Roadmap



Roadmap for Biofuels

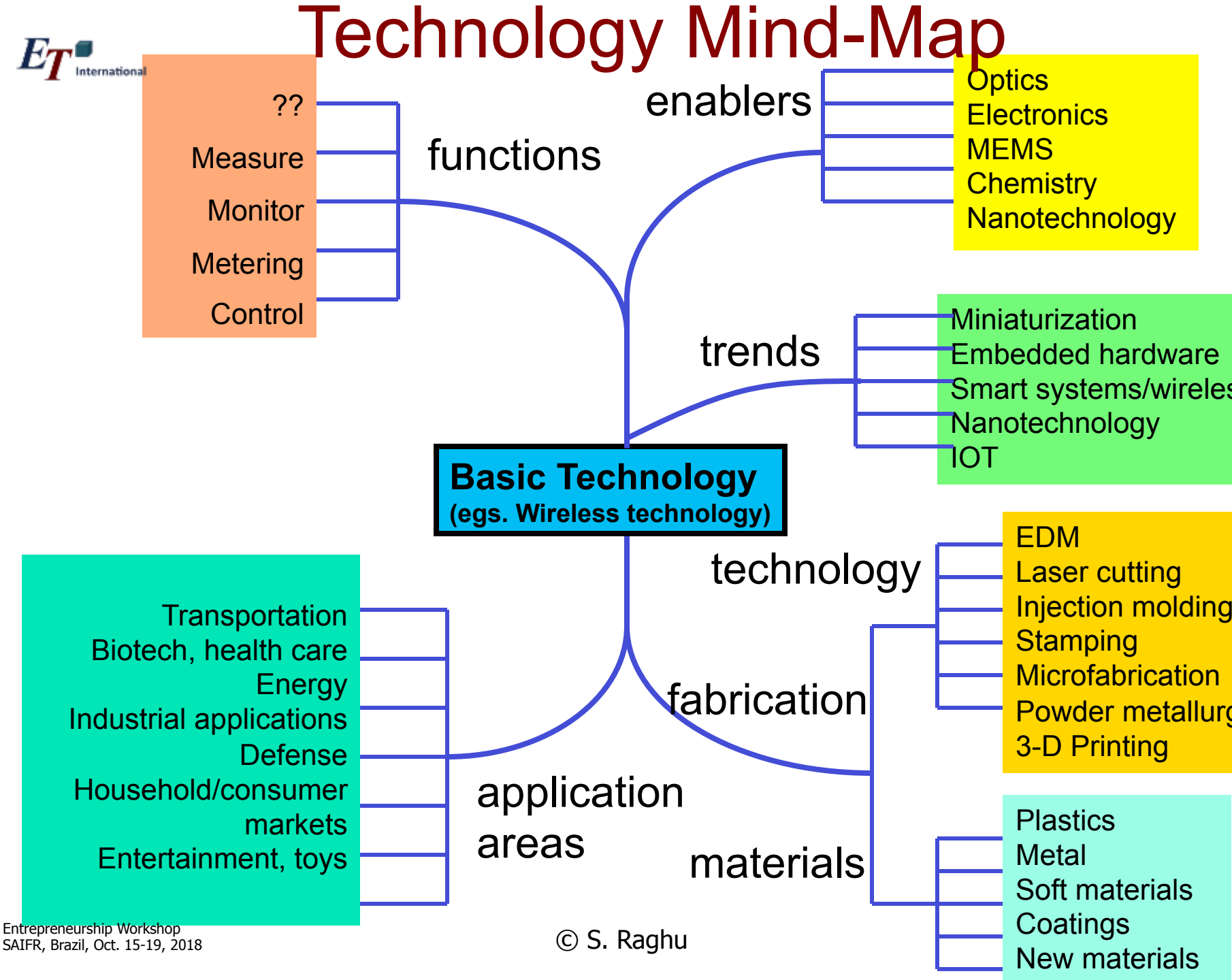


Technology Roadmaps in your home countries?

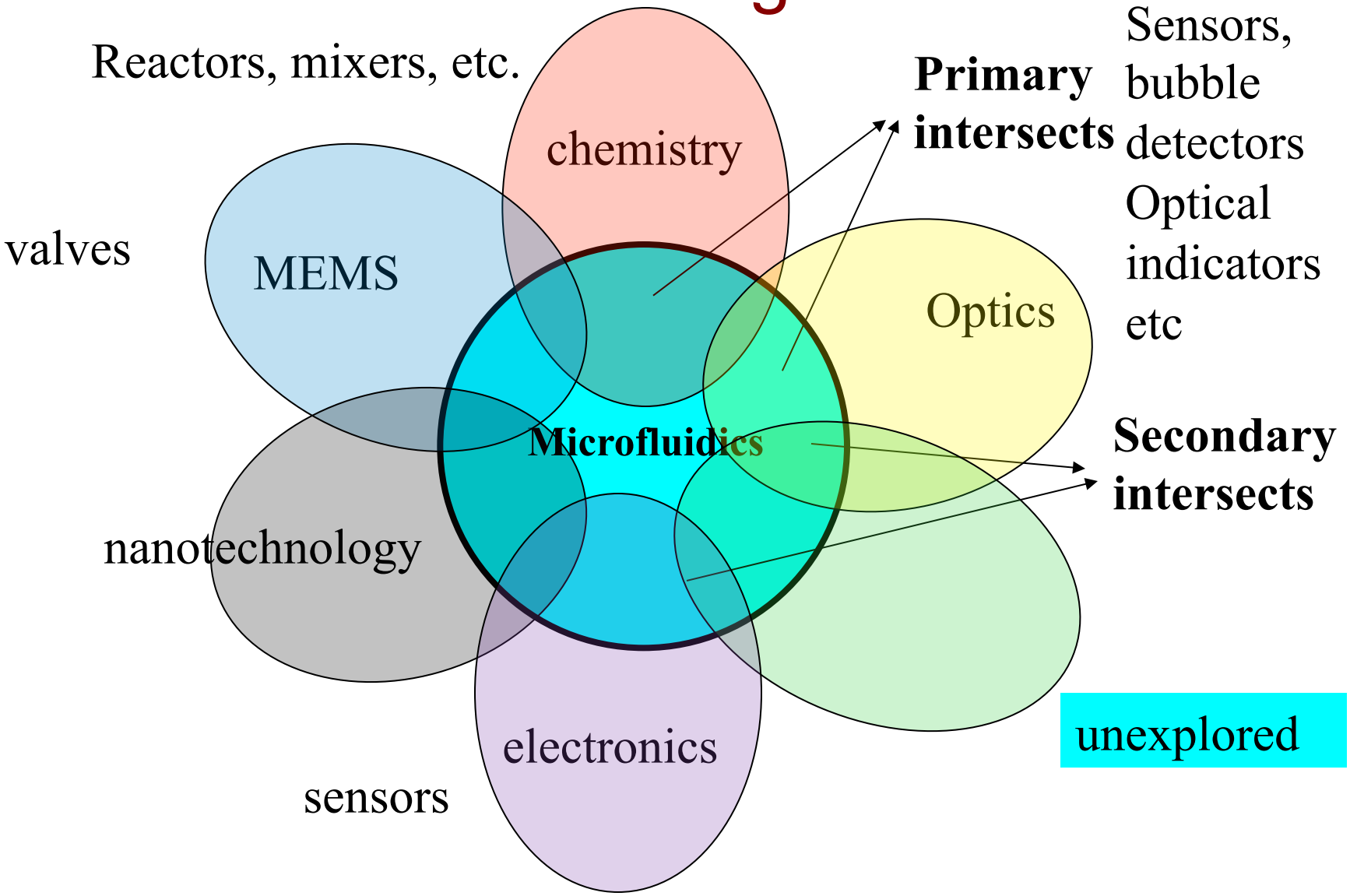
Healthcare?
Energy?
Water and Sanitation?
Agriculture?
Aquaculture
Food Security?

For Rwanda: refer to http://www.mininfra.gov.rw

Technology Mind-Map



Technology Intersects with Emerging Technologies



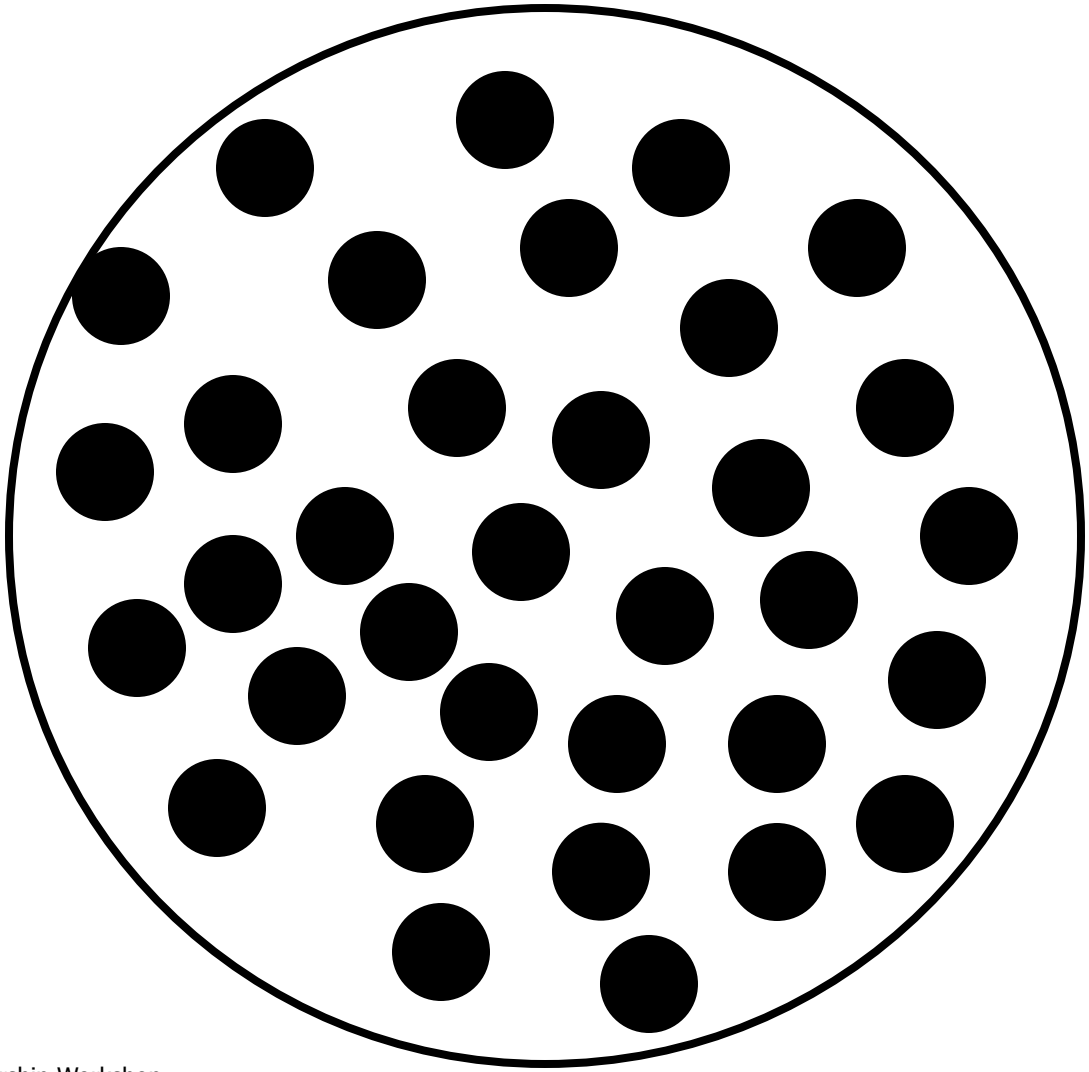
Horizon Scanning

Points to consider for forecasting

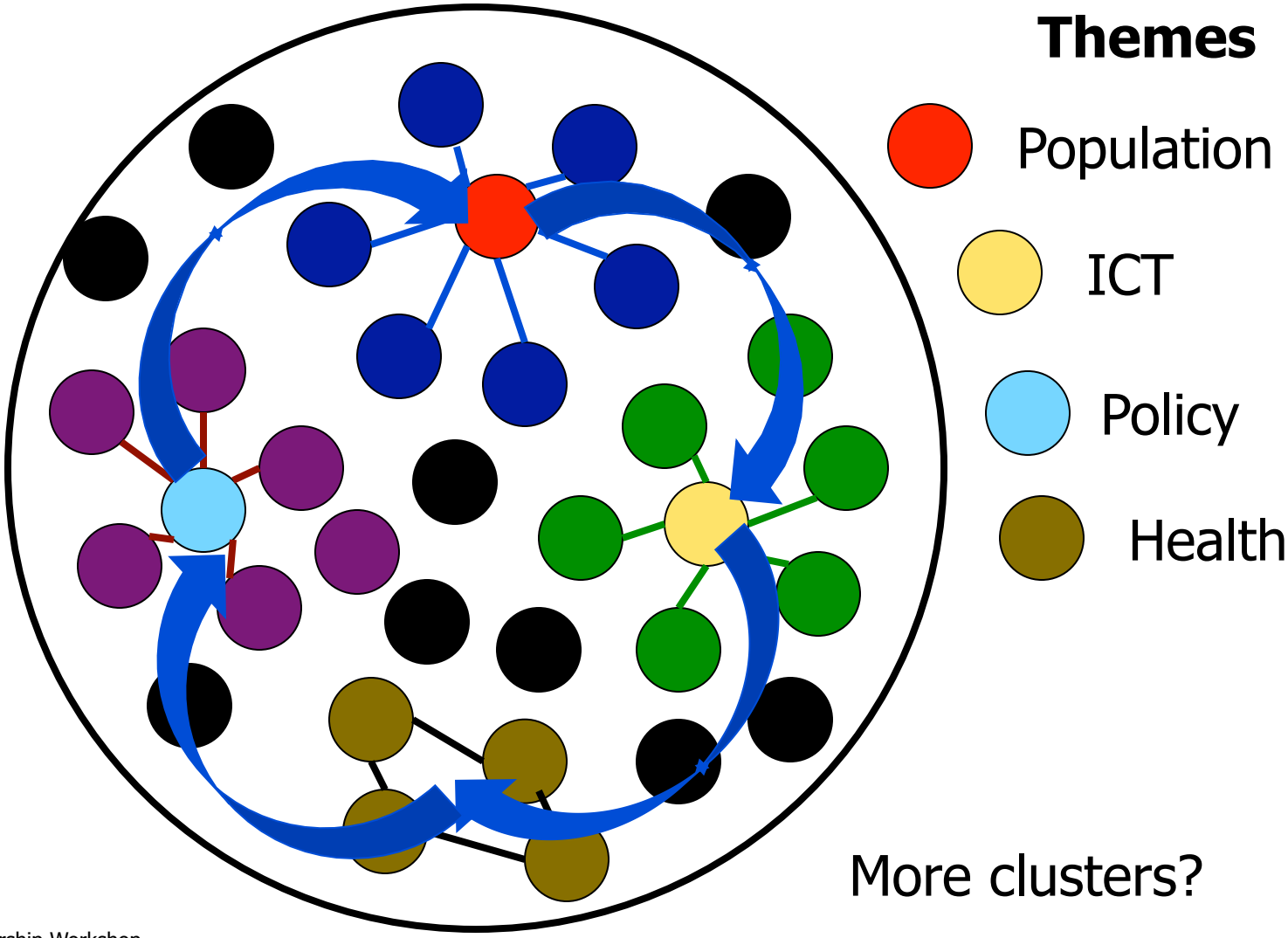
- Observing/Studying Trends (weak signals in high noise)
- Economic factors
- Societal factors
- Technological Advances
- Political Action/Regulatory statutes
- Disruptive Market Models

Horizon Scanning

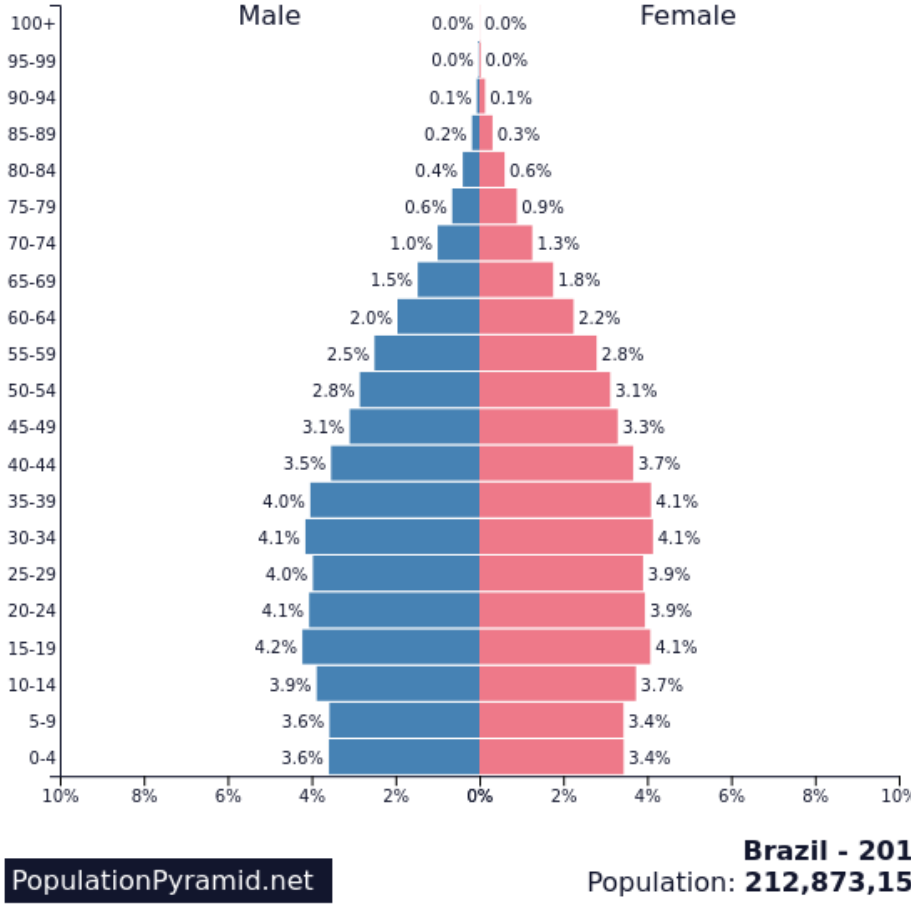
Random factors

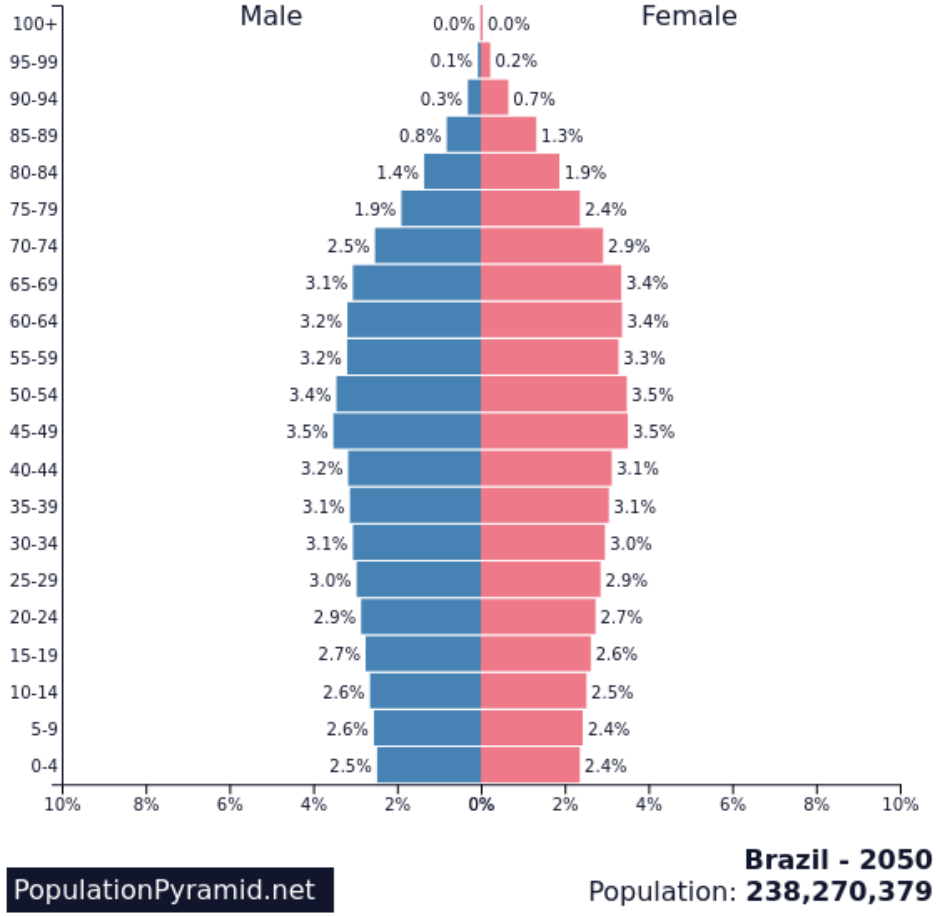


Horizon Scanning



Brazil Demographic Trends

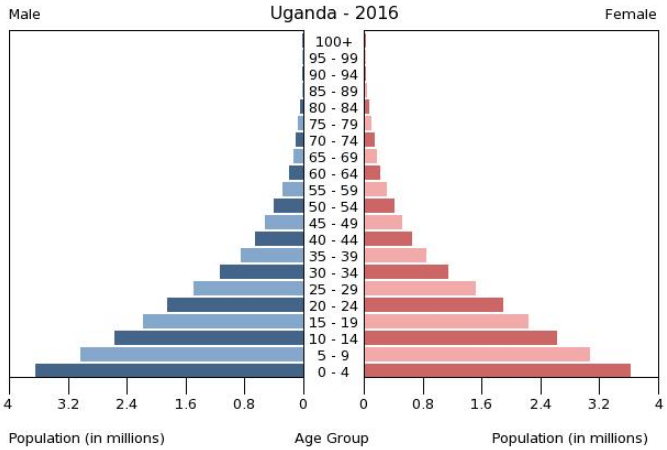




Population Projections

https://i.imgur.com/b5aepOU.mp4

Technology Forecasting



Micro-sensors

http://www.i-micronews.com/

Health Monitoring

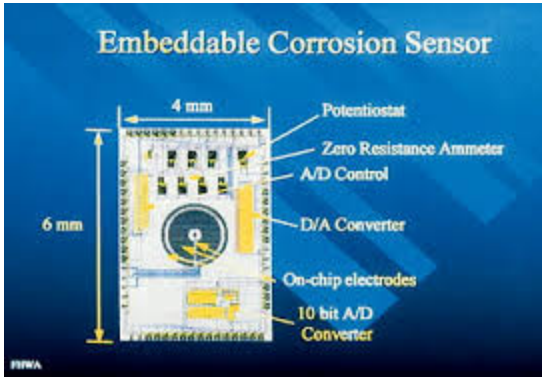
Generation-4 Internet

24-hour medical care

Infrastructure Health Monitoring

Drones

Wireless Sensors



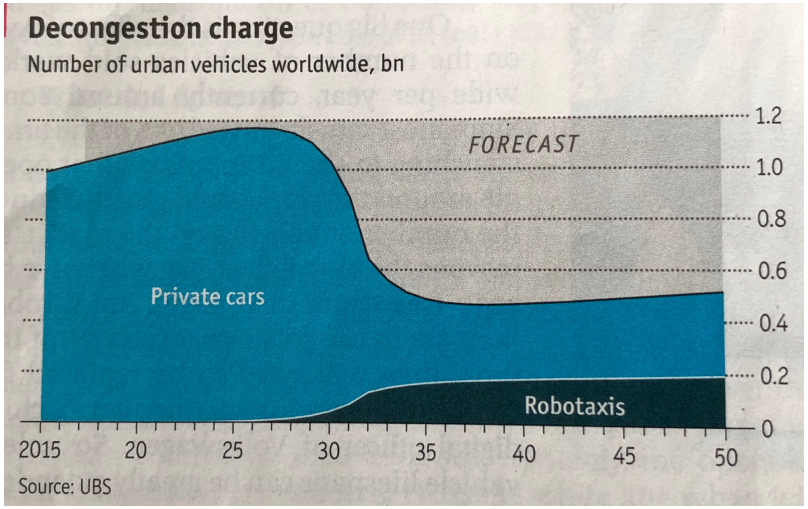
Continuous Monitoring

Generation-3 Internet

Urban Trends

Cities for people, not cars

(The Economist – March 3-9, 2018)



We saw different methods of fitting your inventions into the "big picture"

This should be considered in the patenting strategy by TTOs

Design Thinking

From "What is"

to "What if"

to "What wows"

to "What works"

Assessing the idea

Technology feasible?

(Unique vs. Advantageous)

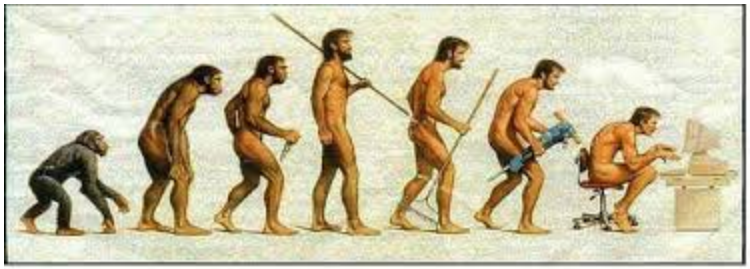
Is there a market?

Is there a business opportunity?

Technology Impact Evaluation

1. **Effects on Society**

   Intended, unintended, direct, indirect, delayed consequences

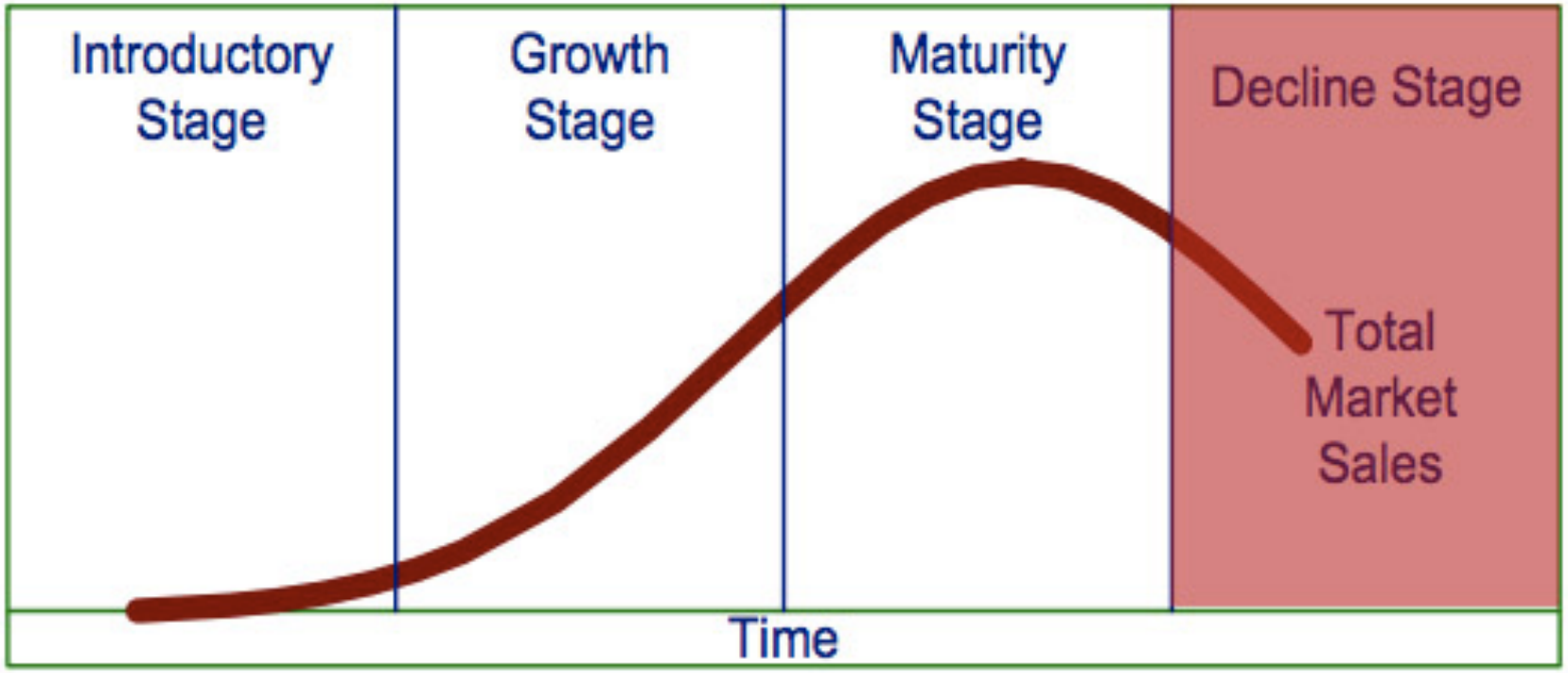


2. **Detect, control and direct technological changes**

   so as to maximize public good and minimize public risks

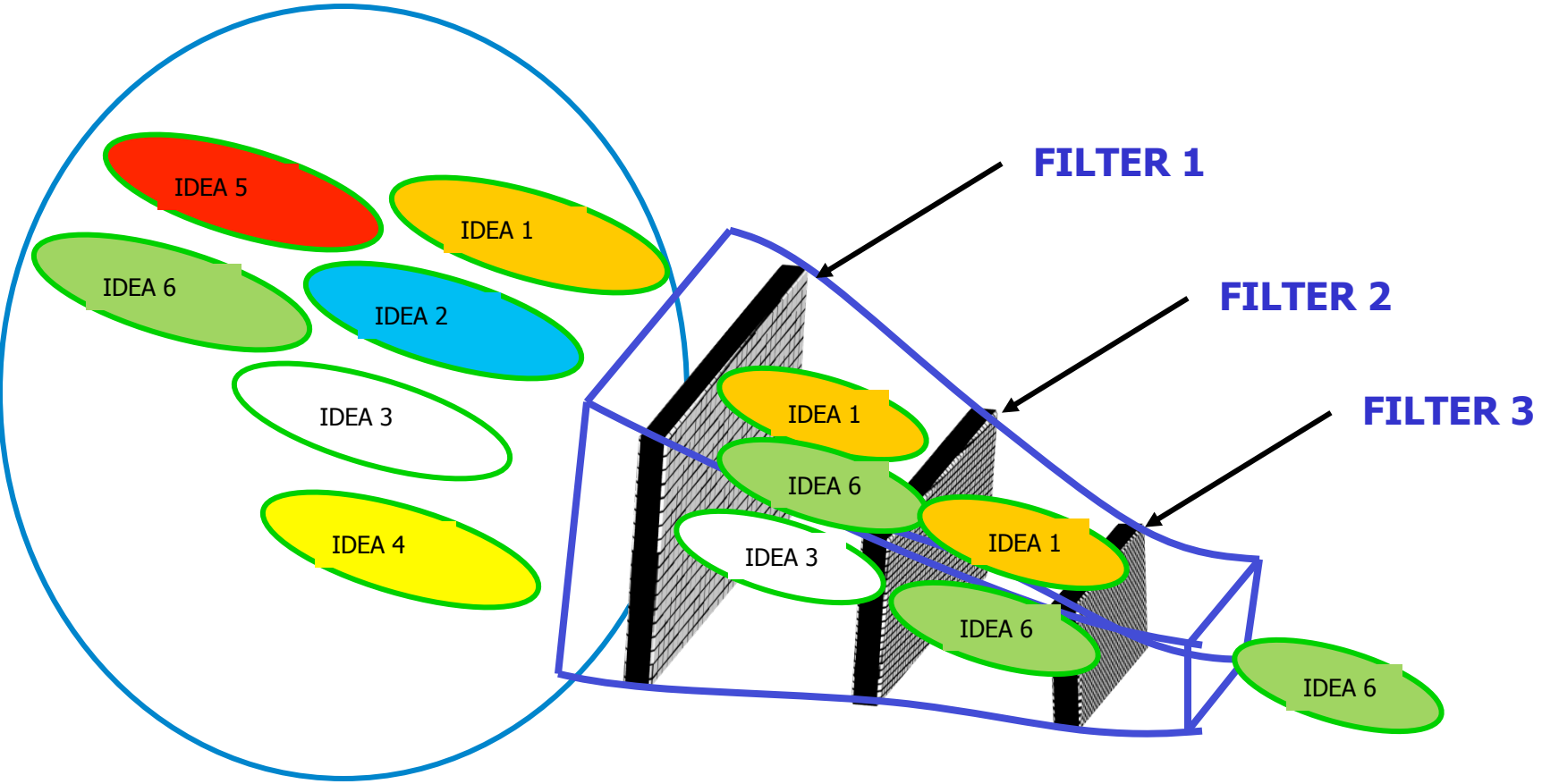
3. **Evaluate alternative technologies?**

Technology Life Cycle Analysis



https://figures.boundless.com/12987/large/-11-03-20at-209.43.18-20am.jpe

Filtering of Technical Ideas



Possible Filters

Cost
Weight
Size
Safety/Health
Speed
Ease of Use
Ease of Production
Durabililty
Repairability
Novelty
Convenience
Social Benefit
Reliability

Saleability
Appearance
Noise
Odor
Trend of Demand
Seasonal Demand
Market penetration
Market size
Competition
Quality
Life cycle

Legality
Obsolescence
Product Liability
Service requirements
Profitability
Learning & unlearning required

Which of these can be determined at the TTO level?

Take-Home Messages

Technology Characterization

1. Inventions to be matched with markets based on:
   - Technology mapping (Roadmaps,
   - Mind-map, Intersects)
   - Horizon scanning for weak signals and correlations
   - Design Thinking

2. Assessment and Feasibility Analysis for IP evaluation and Patenting Strategy

THANK YOU

Questions?

Group Work

1. Get back to your groups

2. Sketch a road map for any of the technologies for 5, 10 and 20 years time scale

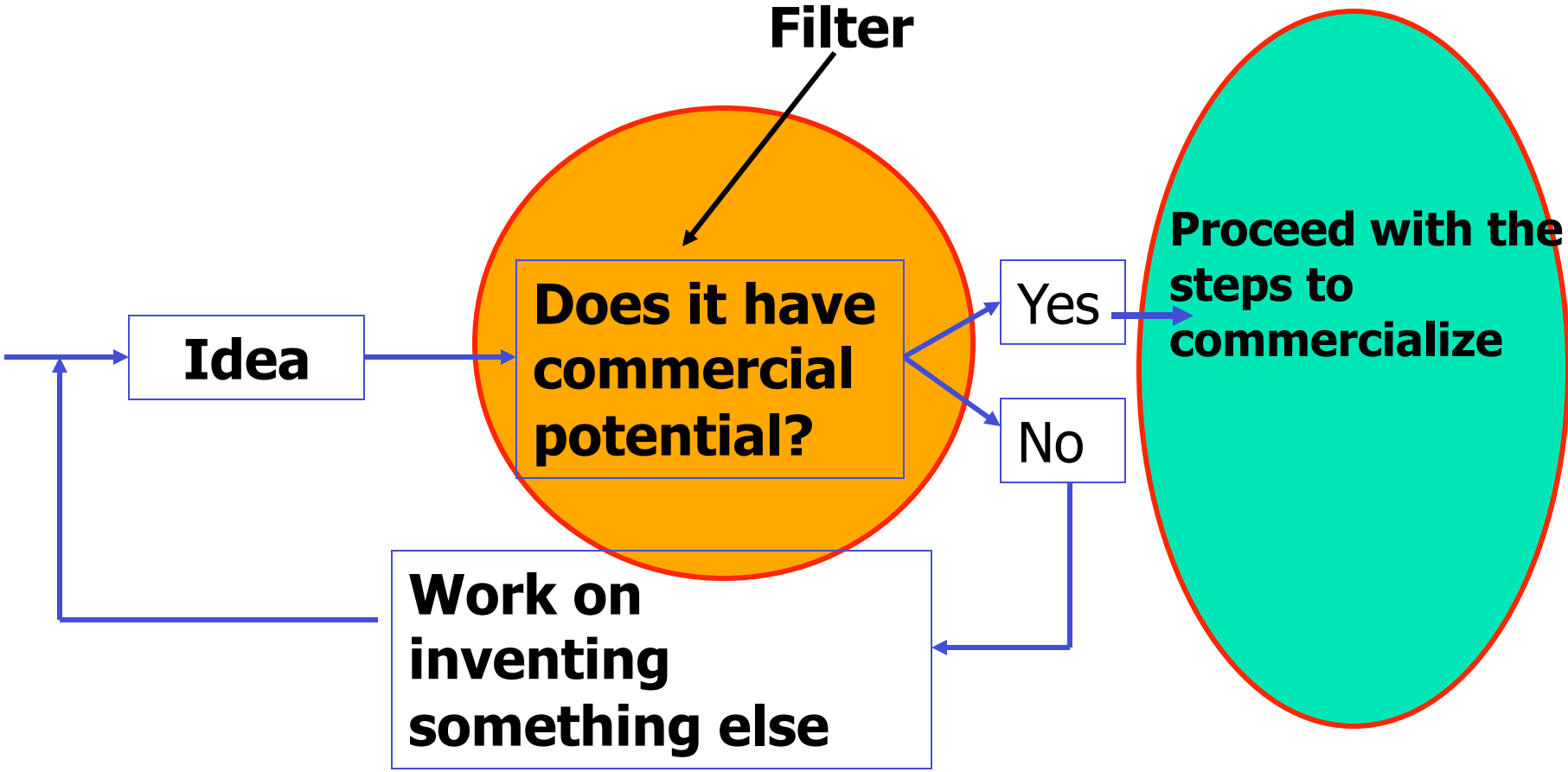
OR

A mindmap for any of the inventions you have

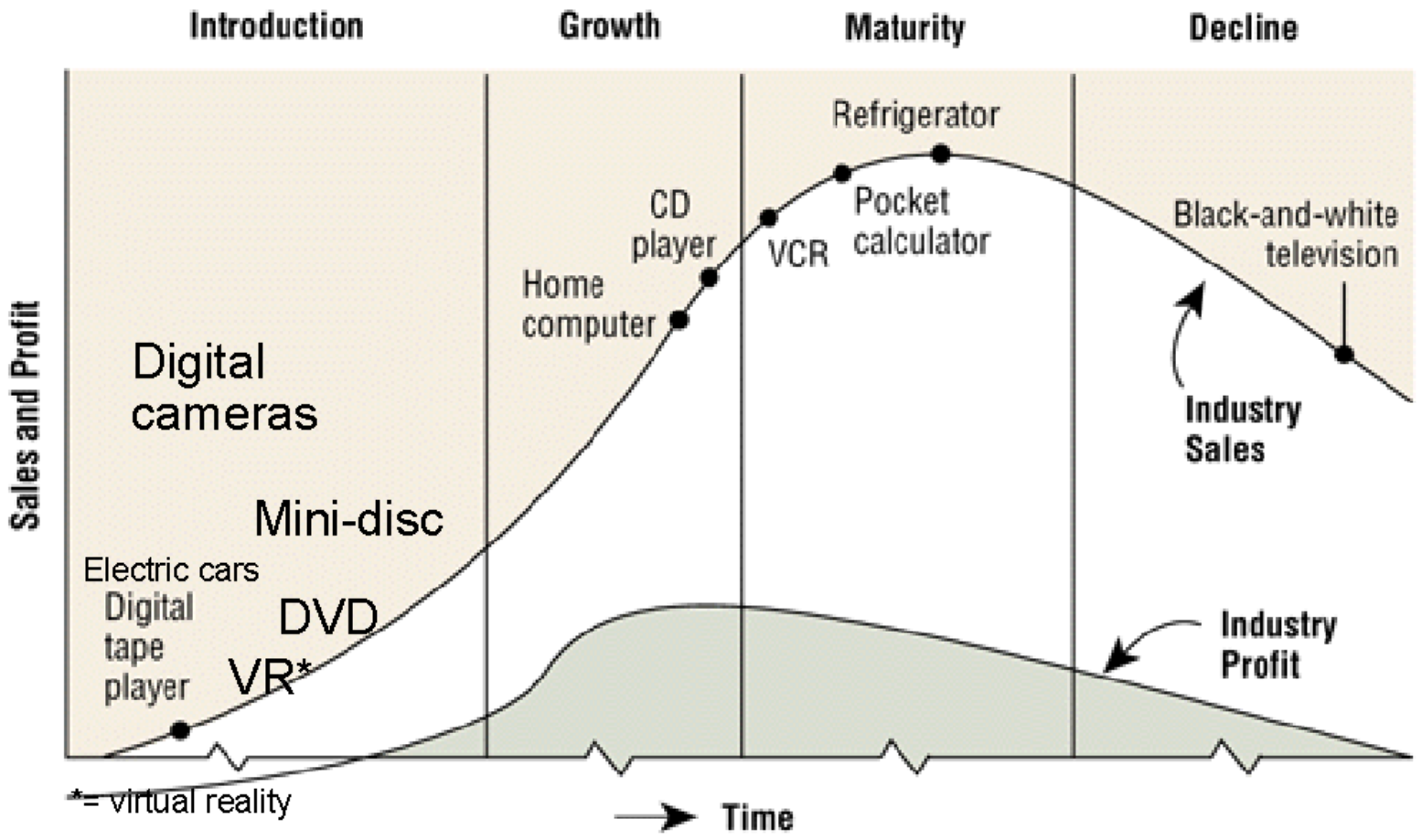
3. Random/volunteer groups to present it to the class

20 minutes time

Filtering the Ideas



Stages in the Product Life Cycle



Filters

Filters: Can be used to sort out feasible ideas right at the very beginning.

Examples of filters:

1. Market Opportunity and Market Attractiveness
2. Who has the right background to take this invention to a product
3. Sustainability of market (seasonal or year-round), time scales of sustainability of market interest and technology. Give examples
4. Regional and international competition

What are the other factors that can be used as filters?