Market Research, Technology Forecasting and Opportunity Assessment

5th Workshop on Entrepreneurship for Physicists and Engineers from Developing Countries ICTP, Trieste, Italy

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About Me

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

About Advanced Fluidics

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

Outline

Your Inventions and Product Ideas

The Market Need

Looking for opportunities

Evaluating your ideas – feasibility studies

Why do we need inventions and new products?

- •Improve quality of life "useful"
- •Commercialization for economic benefit rewards for inventors and entrepreneurs
- •Economic development of regions and countries

What are you inventing?

New Technology? (Method and Apparatus or Process)

"Technology is a capability that can be used in a product."

Example: Laser

(When lasers were invented in 1960, they were called "a solution looking for a problem")

OR

A New Product? (Apparatus)

"makes use of existing or new technologies"

Optical readers/scanners, laser-based eye surgery systems, laser pointer, measurement systems, golf trainer, laser machining, etc.

A new product has a **customer** and a **market** in mind

An idea is not an invention

An invention is not a product

Not done before \neq **Necessarily useful invention!**

Useful Invention = Successful Product *only* if marketed well

The Market?

Your Idea

Solution to a problem or a solution looking for a problem?

Market Pull and Technology Push

(Market pull - technical solution)









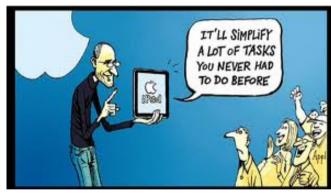
3nethra – An intelligent pre-screening Ophthalmology device http://forushealth.com/forus/products

S. Raghu Opportunity
Assessment

Market Pull and Technology Push

Technology push? (new or changed market))



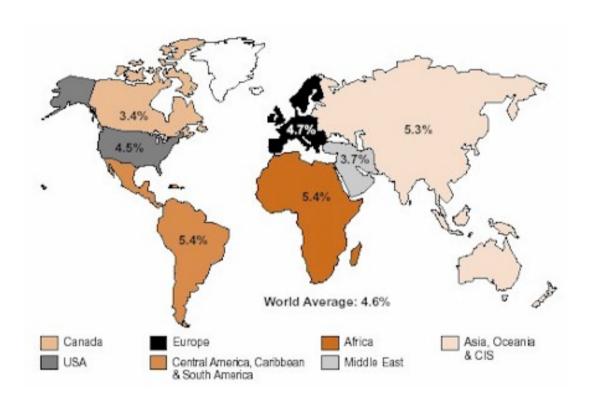




"I'm OK . . . just a little too much 'push' technology."

@ 1997 Mick Stevens from The Cartoon Bank. All rights reserved.

Market Size and Geographical Distribution of Market

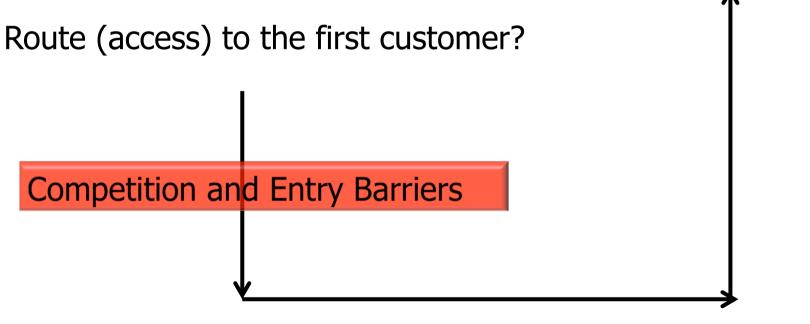


http://www.tc.gc.ca/eng/civilaviation/publications/tp13549-chapter5-2143.htm

The First Customer

First customer / First adopter?





Why New Products Fail

Inadequate Market Analysis	32%
Bad Product	23%
Higher Costs than Anticipated	14%
Weak Marketing Program	13%
Poor Timing	10%
Competition	8%
TOTAL	100%

http://www.bioplanassociates.com/services/newproduct.htm

Summary: The Market?

Your Idea (solution to a problem) --→ Your Product?

Why does the market need this? (Market pull (technical solution) or Technology push? (new or changed market))

Who will buy it (customer profile – age group, profession, field of application, decision levels, geographical distribution...?)

how many people/organizations will buy it? (Market size?)

Market Trends – is this a growing market?

Looking for Opportunities

Technology Road Maps
Technology Mind Maps
Technology Intersect Maps
Technology Extrapulation

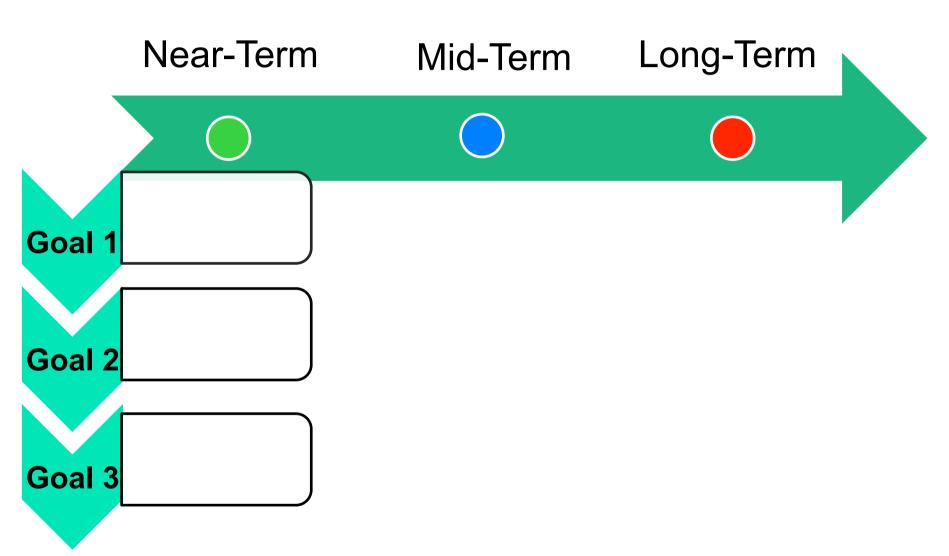
Finding Opportunities

Technology Roadmaps

Technology Roadmap

- shows us opportunity for inventions in selected fields.

Technology Road Map



Technology Roadmap Example: Climate Change

Near-Term Mid-Term Long-Term · Hybrid & Plug-In Hybrid Electric . Fuel Cell Vehicles and H. Fuels · Widespread Use of Engineered Urban Designs & Regional Planning Low Emission Aircraft **Energy End-Use** · Solid-State Lighting Energy Managed Communities Engineered Urban Designs & Infrastructure · Ultra-Efficient HVACR High-Performance Integrated Homes · Integration of Industrial Heat, Power, High Efficiency Appliances "Smart" Buildings Process, and Techniques · High Efficiency Bollers & · Transformational Technologies for · Superconducting Transmission and Combustion Systems Energy-Intensive Industries Equipment · Energy Storage for Load Leveling High-Temperature Superconductivity Demonstrations Your Goal #2 IGCC Commercialization · FutureGen Scale-Up Zero-Emission Fossil Energy · Stationary H. Fuel Cells · H. Co.Production from Coal Biomass · H. & Electric Economy Energy Cost-Competitive Solar PV Low Wind Speed Turbines · Widespread Renewable Energy Supply niche? Demonstrations of Cellulosic Advanced Biorefineries · Bio-Inspired Energy & Fuels Ethanol · Community-Scale Solar · Widespread Nuclear Power Distributed Electric Generation Gen IV Nuclear Plants · Fusion Power Plants Fusion Pilot Plant Demonstration Advanced Fission Reactor and Fuel Cycle Technology Goal #3 · Track Record of Successful CO, Storage · CSLF & CSRP Geologic Storage Proven Safe · Post Combustion Capture · CO. Transport Infrastructure Experience Capture, · Soils Uptake & Land Use · Large-Scale Sequestration Oxy-Fuel Combustion Storage & . Carbon & CO, Based Products & Materials Enhanced Hydrocarbon Recovery · Ocean CO, Biological Impacts equestration Geologic Reservoir Characterization Addressed · Safe Long-Term Ocean Storage Soils Conservation · Dilution of Direct Injected CO. Advanced Landfill Gas Utilization Goal #4 Methane to Markets · Integrated Waste Management System with Soil Microbial Processes · Precision Agriculture Automated Sorting, Processing & Recycle Other Gases · Substitutes for SF, Advanced Refrigeration Zero-Emission Agriculture · Catalysts That Reduce N₂O to Technologies · Solid-State Refrigeration/AC Systems · PM Control Technologies for **Elemental Nitrogen in Diesel Engines** Vehicles · Large Scale, Secure Data Storage . Fully Operational Integrated MM Systems. Goal #5 Low-Cost Sensors and System Architecture (Sensors, Indicators, Data Communications Measure & Monitor · Direct Measurement to Replace Visualization and Storage, Models) Proxies and Estimators

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

Technology Road Map

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

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

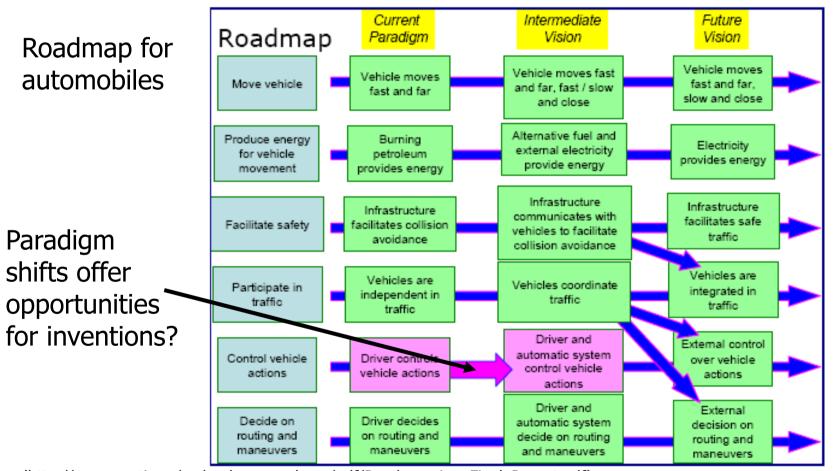
Your niche?

S. Raghu

Technology Roadmap Example: Intelligent Vehicles

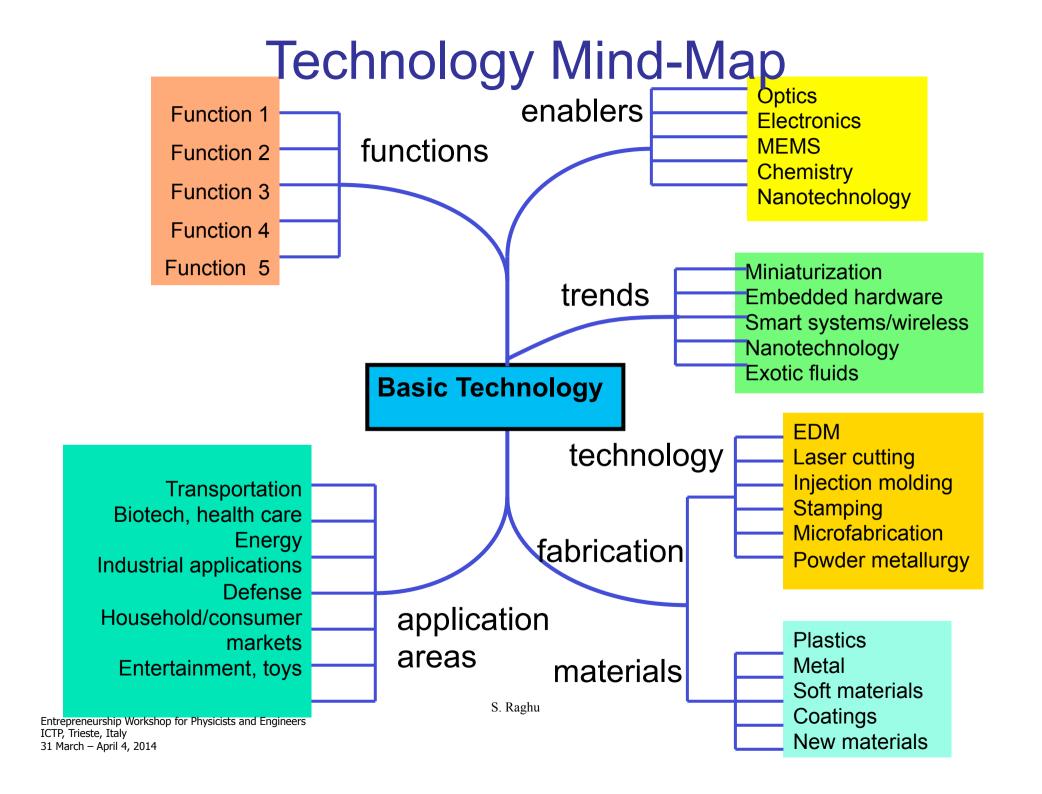


Technology Roadmaps

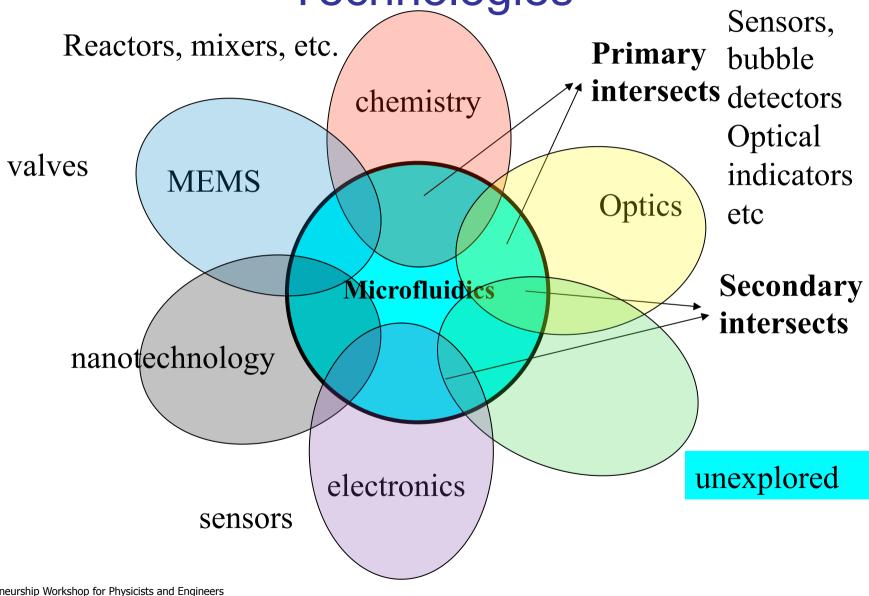


Your niche?

(http://www.ceeti.org/technology_roadmap/pdf/Roadmapping_Final_Report.pdf)



Technology Intersects with Emerging Technologies



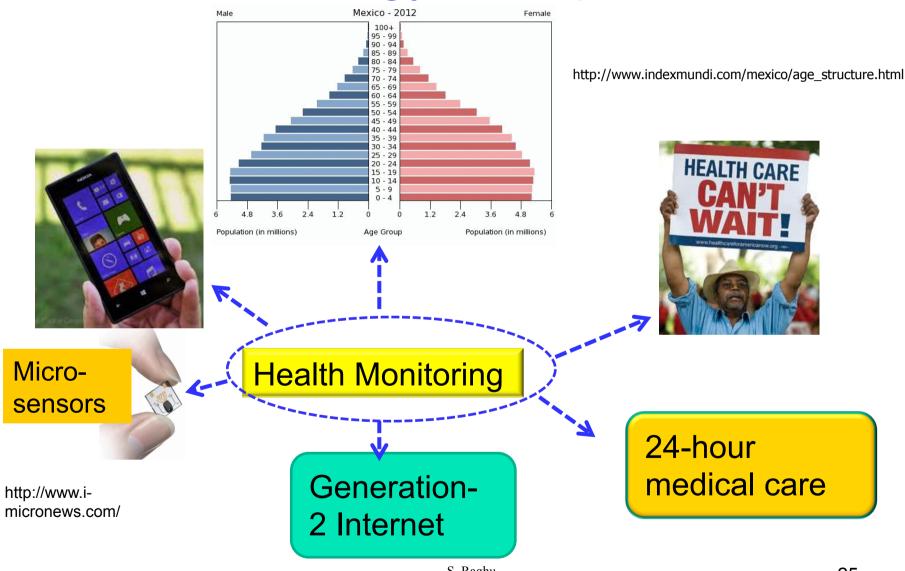
Technology Extrapulation

Points to consider for forecasting

- Observing/Studying Trends
- Economic factors
- Societal factors
- Technological Advances
- Political Action/Regulatory statutes



Technology Extrapulation



Healthcare companies

MyLiveley

GlowCap

Qualcom Life

GE-Care Innovations

Optical fiber mat

4 Different Methods of Finding Opportunities

Next.....

Assessment and Feasibility Analysis

Assessing the idea

Technology feasible?

Is there a market?

Is there a business opportunity?

Feasibility Analysis

Feasibility Analysis: The process to determine if an idea is viable and worth pursuing for commercialization

Product/service feasibility analysis

Customer interest, desirability and purchase interest

Industry/market feasibility

Industry attractiveness

Market timeliness example: (Handwash tissues)

Identification of niche market

Feasibility Analysis

Organizational feasibility

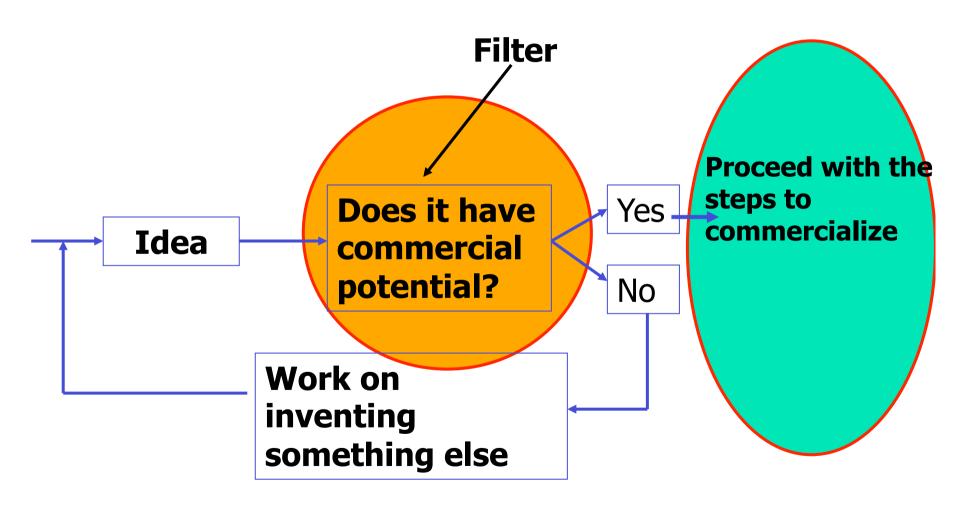
Sufficient management expertise, organizational competence & resources to successfully launch a business

- Management ability
- Resource sufficiency

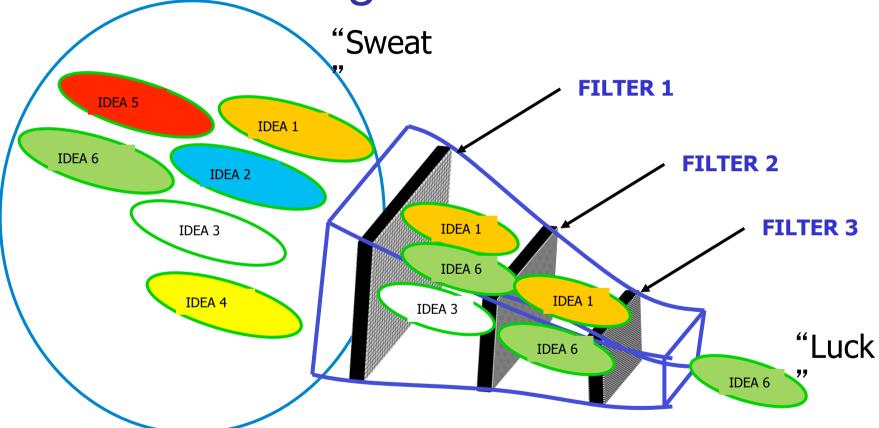
Financial feasibility

Total start-up cash needed (example)
Financial performance of similar businesses
Overall Financial Attractiveness of the proposed
venture

Filtering Your Ideas



Filtering of Technical Ideas



Just one idea at a time at the end helps focus

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. Do you have the background to proceed with this 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?

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

Summary

- Market analysis
- Finding Opportunities

Technology Forecasting

Technology mapping (Roadmaps,

Mind-map, Intersects)

Assessment and Feasibility analysis
 Filtering your ideas

THANK YOU

Points to consider

- 1. Talk to some local entrepreneurs if they used such techniques (assessment and filters) for developing their products/services. What would they do if they were to do it all over again?
- 2. Prepare a roadmap for the technology you are developing for your project?
- 3. Prepare a set of filters for evaluating your project idea

Opportunities Based on Extending Existing Technologies

