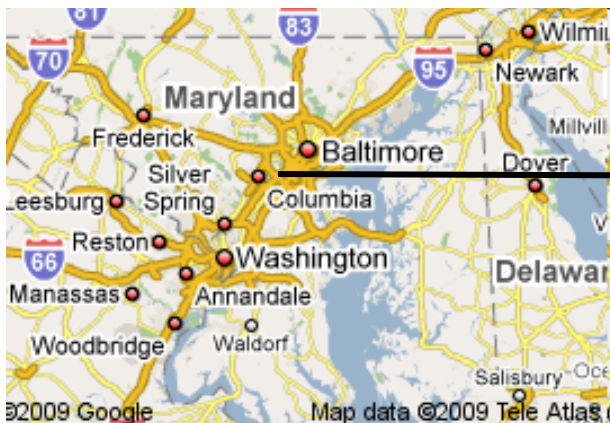


Invention to Market: Commercialization Strategies and Bridging the Valley of Death

Surya Raghu

WIPO EIE Project National Workshop 1

Bangkok, Thailand
June 12-16, 2017



Motivation...

Should the TTO people interested in knowing the path from invention to market?

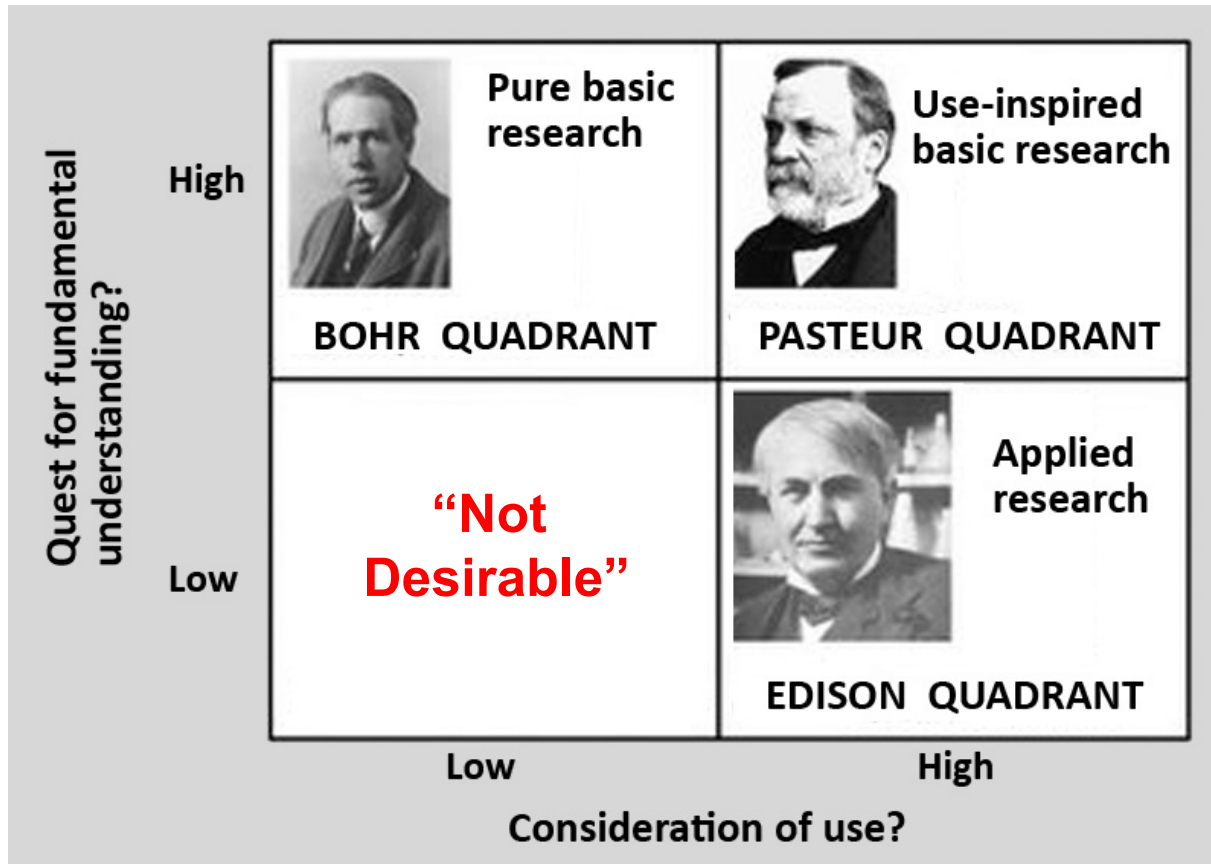
OUTLINE

- 1. Introduction**
- 2. Inventions and Technology Development**
- 3. Invention to Product: Processes (Things To Do) and Timelines**
- 4. Examples of Invention to Products**
- 5. Pitfalls to commercialization**
- 6. Conclusions**

Why do we need inventions and new products?

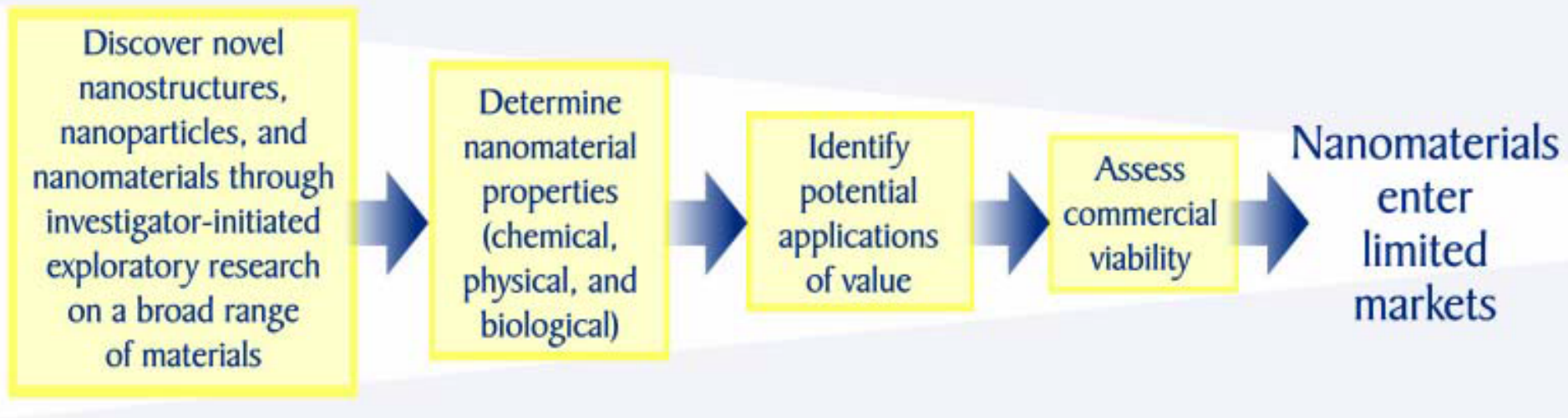
- Improve quality of life – “useful”
- Commercialization for economic benefit – profit, to be more specific.

The Pasteur's Quadrant



Donald Stokes - Pasteur's Quadrant: Basic Science and Technological Innovation

The Tradition – Basic Research



Ref.: Chemical Industry Vision 2020
Technology Partnership Energetics, Incorporated,
2003

The New Model

FUTURE: Application-Based Problem Solving

Start with existing needs, problems, or challenges in end-use applications

Design, produce, and scale up nano-based materials with exact properties needed (based on established understanding and methods)

Large numbers of diverse products based on Nanomaterials By Design rapidly enter multiple markets

Ref.: Chemical Industry Vision2020
Technology Partnership Energetics, Incorporated, 2003

HIBAR Research

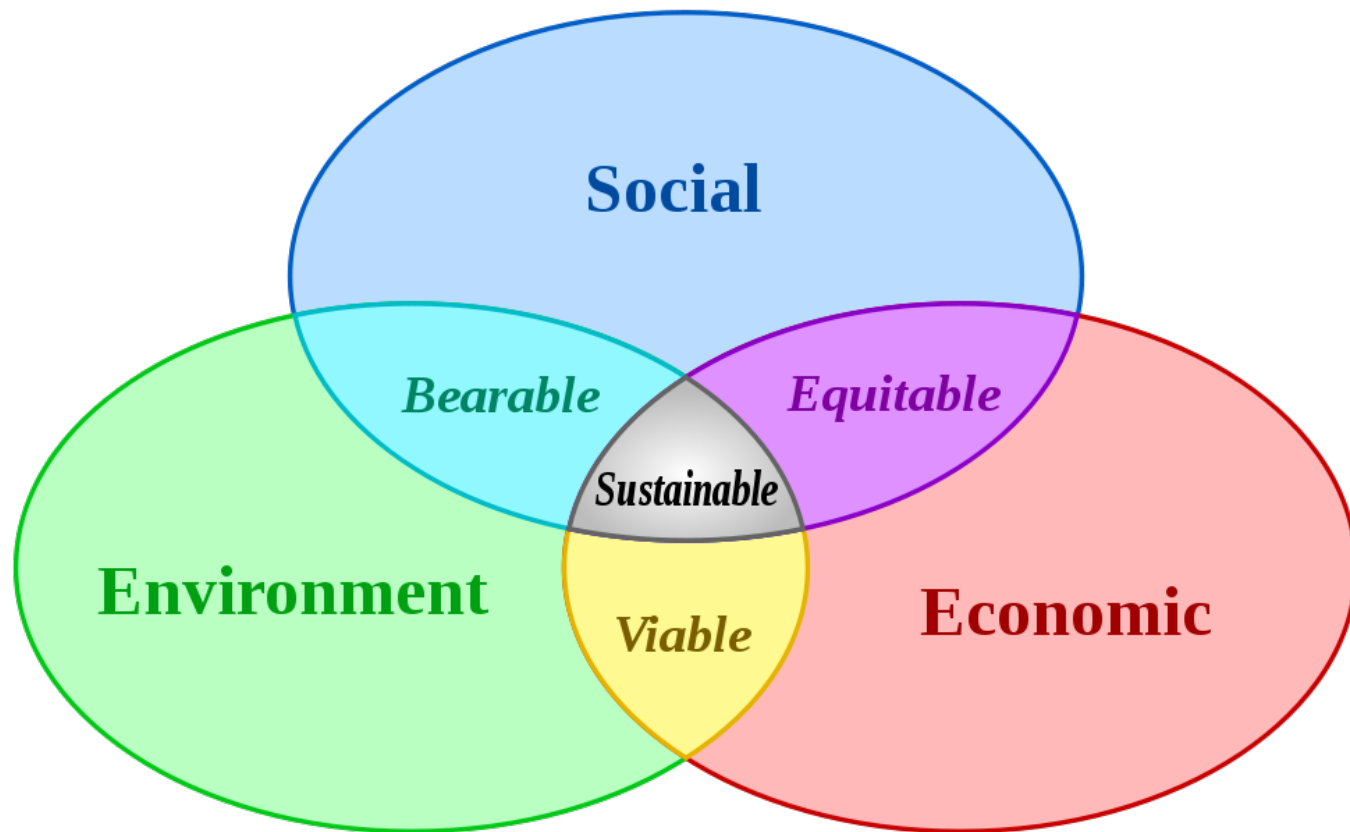
(<http://www.aplu.org>)

Highly Integrative Basic And Responsive (HIBAR) Research

“Embraces the attainment of new knowledge coupled with the solution of important problems;
Combines academic research methods with practical design thinking aimed at application;
Engages the efforts of academic and real-world leading experts; and
Seeks time-to-use less than academic norms (< 15 yr) & more than in direct application (> 3 yr).”

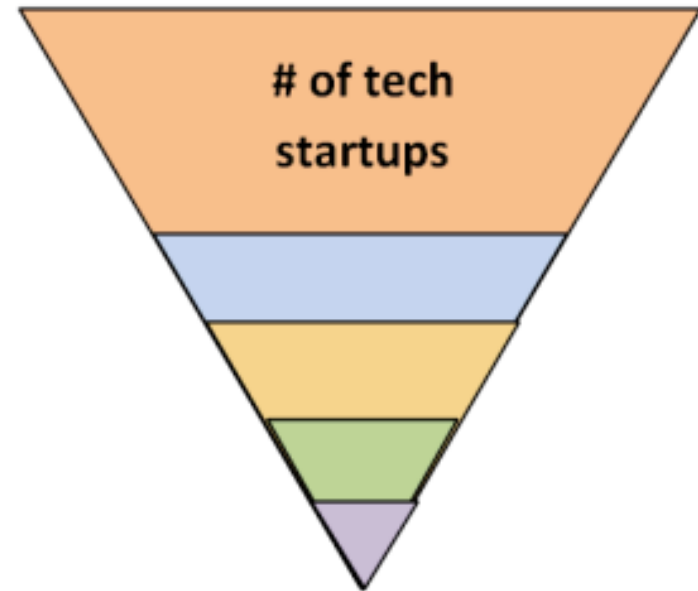
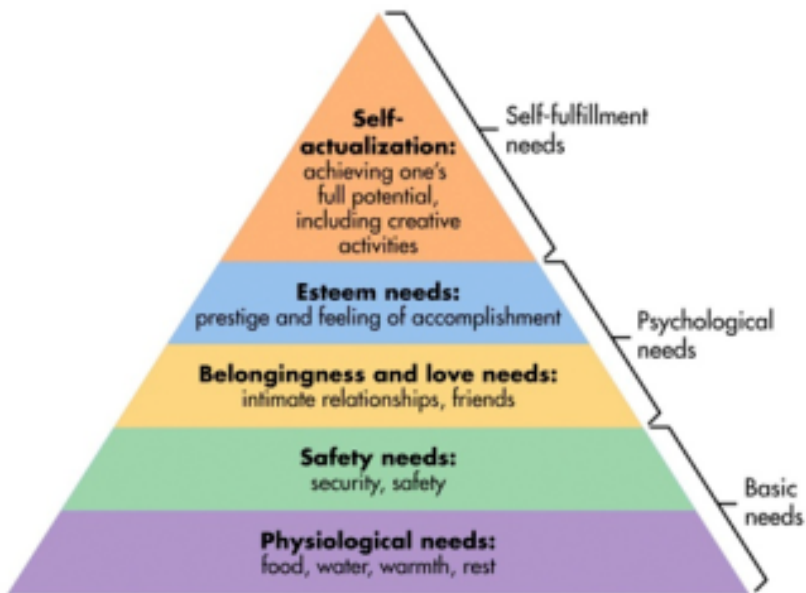
(<http://www.aplu.org>)

Science and Engineering for Sustainable Development



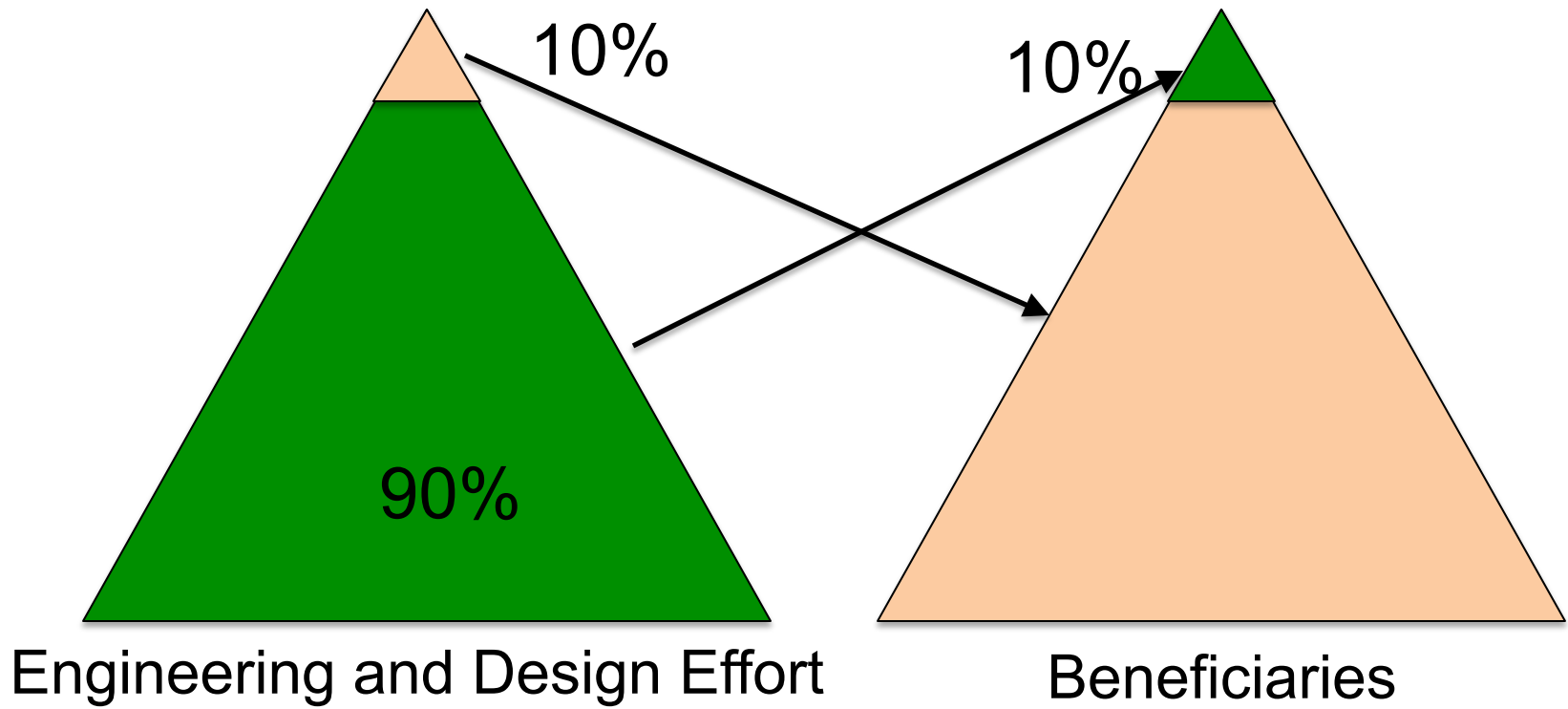
<http://www.humansandnature.org/>

The Neglected Bottom of the Pyramid



(<https://orghacking.com/2014/11/24/the-hole-at-the-bottom-of-the-pyramid/>)

The Neglected Bottom 90%



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

What are you inventing?

New Technology? (Method and Apparatus or Process)

“Technology is a capability that can be used in a product.”

Example: Laser – Ted Maiman (1960)

"a solution looking for a problem?"



(<http://spie.org/x39920.xml>)

OR

A New Product? (Apparatus)

“makes use of existing or new technologies”

Optical readers, scanners, laser pointer, laser-based eye surgery systems, golf trainer, laser machining,

A new product has a customer and a market in mind



**Laser
Cutting & Engraving**



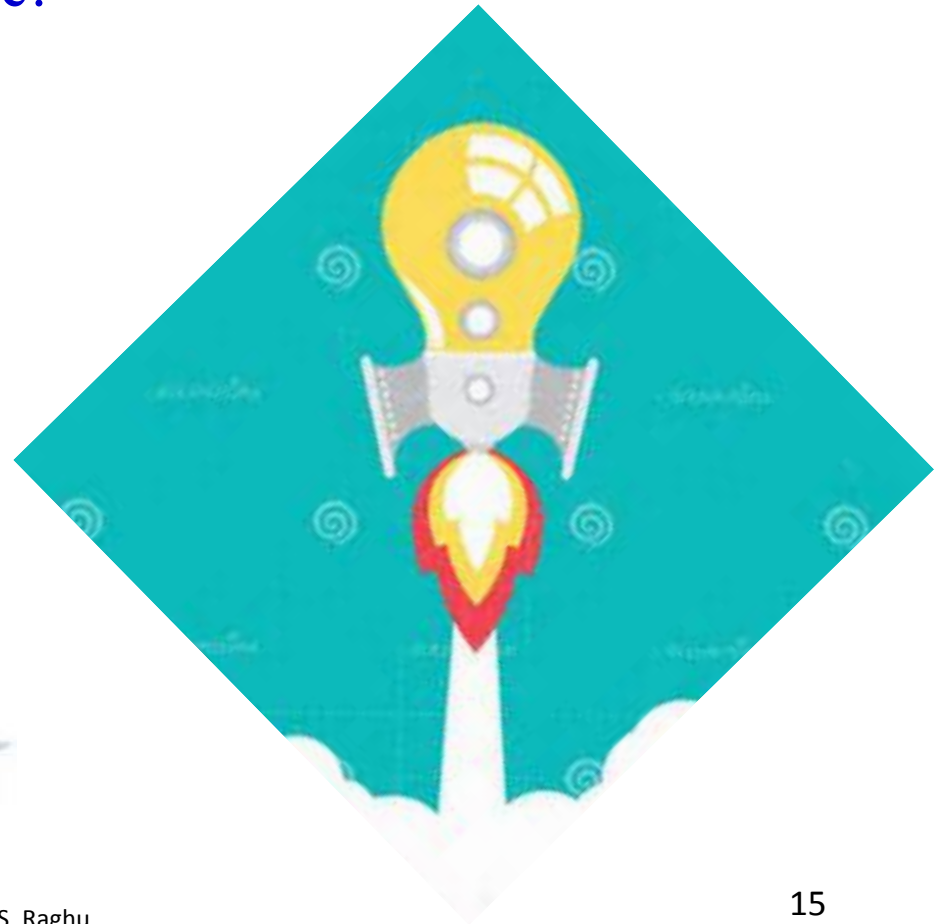
The path from invention to a product

6 aspects of taking an invention to a product

1. Technology Development
2. Securing Intellectual Property
3. Manufacturing Process development
4. Financials
5. Business Development
6. Company set-up and management

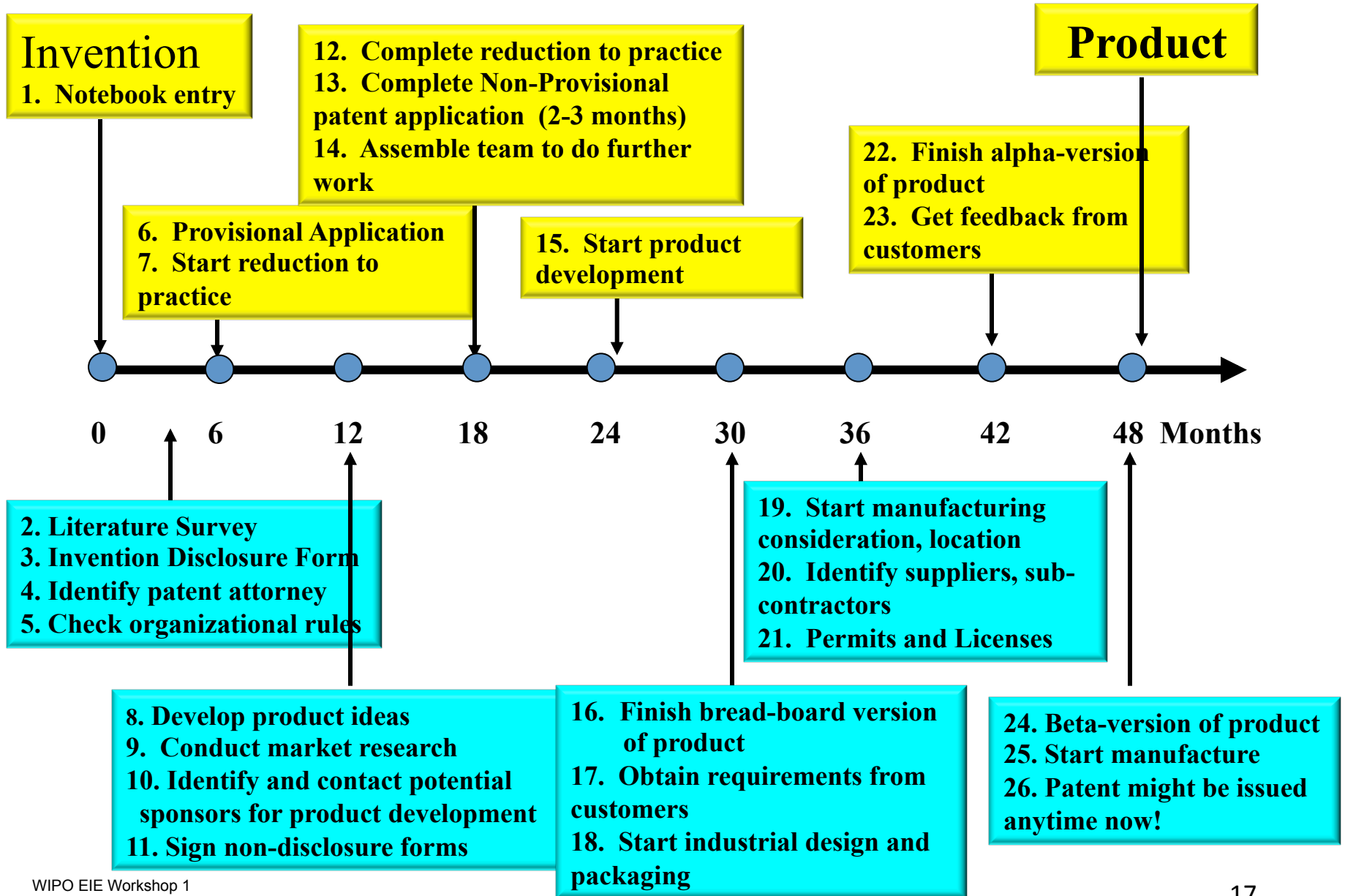
The path from invention to a product

It is important to understand that there are **quite a few things to be done** in taking an invention to a product – and **it takes some time** to accomplish all these!

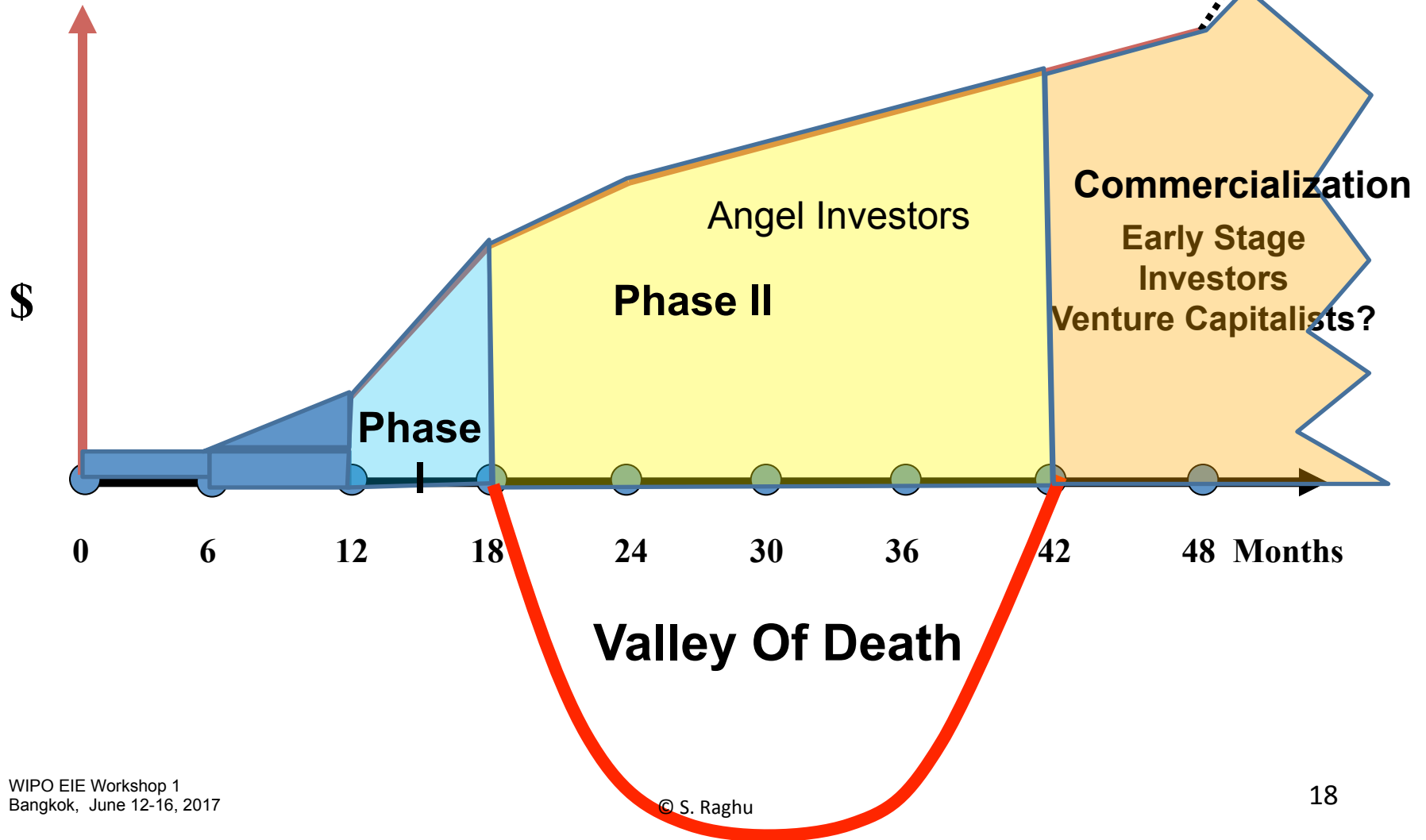


How long does it take to take the
idea to market?
(what is your estimate?)

Invention to Product: Steps and Time-Line

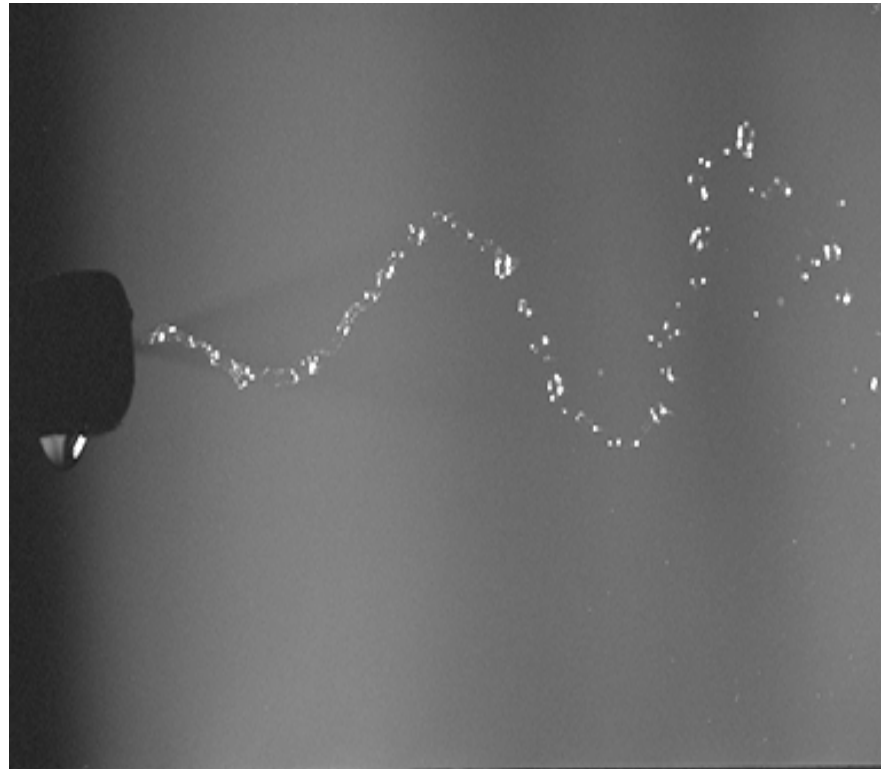


Cost of Taking the Product to Market



Examples of Timelines for Products

Oscillating jet (spray) generated by the device



Can I patent this idea?

Example: Windshield washer nozzles based on hydrodynamic instabilities (market pull)

Inventor: Surya Raghu, USA

Invention process: August-October 1998

US Provisional application: October 1998

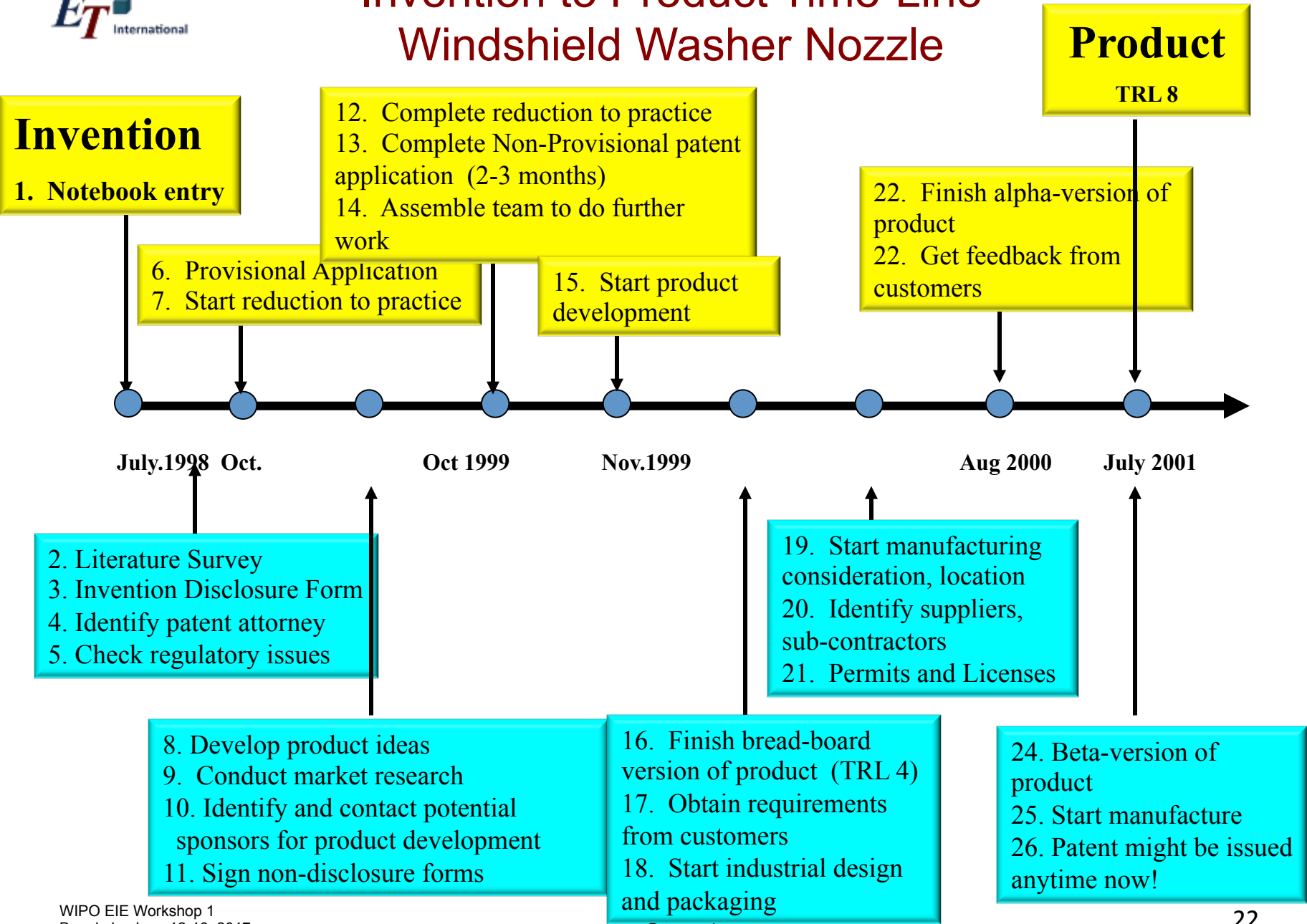
Non-Provisional Application: October 1999

Patent issued: July 2001

Development:

Currently an automotive product in use from 2001

Invention to Product Time-Line Windshield Washer Nozzle



Example: Wireless Corrosion Health Monitor

Inventors: Guy Davis, Chester Dacres and Lorrie Krebs
(DaccoSci Inc)

Date Applied for patent: August 1999

Date Issued: Dec. 2001

Date product development began: Oct. 2005

(DaccoSci, Advanced Fluidics and Virginia Technologies)

Current status: Marketed by Electrawatch

The Issued Patent



US006328878B1

(12) **United States Patent**
Davis et al.

(10) **Patent No.:** US 6,328,878 B1
(45) **Date of Patent:** Dec. 11, 2001

(54) **ADHESIVE TAPE SENSOR FOR DETECTING AND EVALUATING COATING AND SUBSTRATE DEGRADATION UTILIZING ELECTROCHEMICAL PROCESSES**

Primary Examiner—Robert J. Warden, Sr.
Assistant Examiner—Kaj K. Olsen

(57) **ABSTRACT**

(75) **Inventors:** Guy D. Davis, Baltimore; Chester M. Daeres, Columbia; Lorrie A. Krebs, Baltimore, all of MD (US)

A portable and nondestructive adhesive tape corrosion sensor which is utilized under actual field or laboratory conditions in detecting coating and substrate degradation using Electrochemical Impedance Spectroscopy (EIS) of coated or uncoated metal structures has been developed. The invention allows for broad applicability, flexibility in utilizing the sensor in various environments without structural compromise and the ability to inspect and evaluate corrosion of the actual structure, regardless of the size, shape, composition, or orientation of the structure. The electrodes may be removed once a measurement is made or remain in the original fixed position so that subsequent measurements may be made with the same electrodes. The nondestructive sensor apparatus is comprised of a pressure-sensitive adhesive tape that consists of a conductive film or foil and conductive adhesive overlapping another pressure-sensitive adhesive tape that consists of a conductive film or foil and non-conductive adhesive. The conductive tape serves as the sensing element of device. The non-conductive tape serves as the lead between the sensing element and the point of measurement. In an alternative configuration, the tape with the conductive adhesive may be used alone, acting as both sensor electrodes and the lead to the point of measurement. The metal structure or other substrate being sensed or evaluated for degradation serves as the working electrode. This two electrode sensing device is responsive to water uptake, incubation, and corrosion by measuring differences in impedance spectra. The invention can readily detect, quantify and monitor coating and metal degradation from its earliest stages, well before any visual indication of corrosion appears, under both laboratory and field conditions.

(73) **Assignee:** Dacoco Sci. Inc., Columbia, MD (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** 09/372,074

(22) **Filed:** Aug. 11, 1999

(51) **Int. Cl. 7** G01N 17/04; G01R 27/02

(52) **U.S. Cl.** 205/776.5; 205/791.5; 324/71.2; 324/693; 324/700; 304/404

(58) **Field of Search** 324/693, 700, 324/707, 713, 722, 71.2; 205/776.5, 777, 791.5; 204/404; 422/53

(56) **References Cited**

U.S. PATENT DOCUMENTS

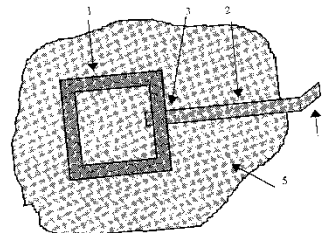
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OTHER PUBLICATIONS

Simpson et al "Evaluation of the effects of acidic deposition on coated steel substrates", Prog. Org. Coatings, 20 pp. 199-216, month unavail. 1992.*

* cited by examiner

2 Claims, 2 Drawing Sheets



Green Aviation

April 22, 2015

NASA Tail Technology Could Someday Reduce Airplane Fuel Use





NEWS

News, features & press releases

MISSIONS

Current, future, past missions & launch dates

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Nov. 14, 2013

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News Releases

RELEASE 13-340

NASA, Boeing Finish Tests of 757 Vertical Tail With Advanced Technology

“The flow control on the 757 vertical tail model comes from **sweeping jet actuators**, which are devices that essentially blow air in a sweeping motion along the span of the tail”

“NASA’s goal for the AFC project is to increase sideforce 20% on demand, and shrink the vertical tail by 17% to reduce aircraft fuel burn by 1-2%.”

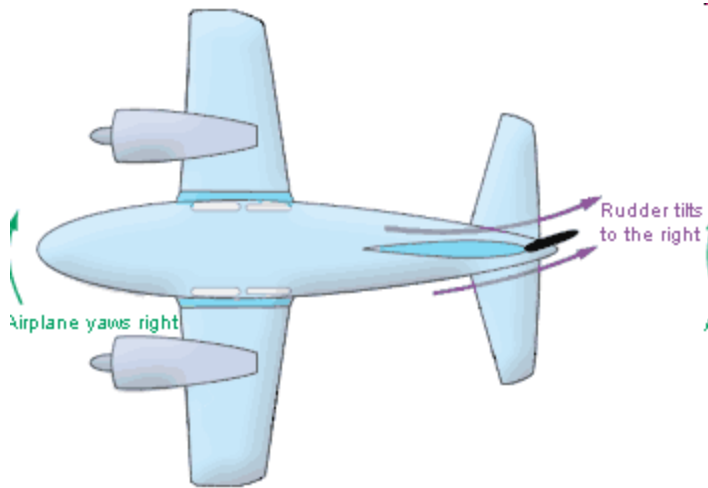
<http://aviationweek.com/awin-featured-story/boeing-nasa-test-active-flow-control-tail>

Workshop 1
Bangkok, June 12-16, 2017

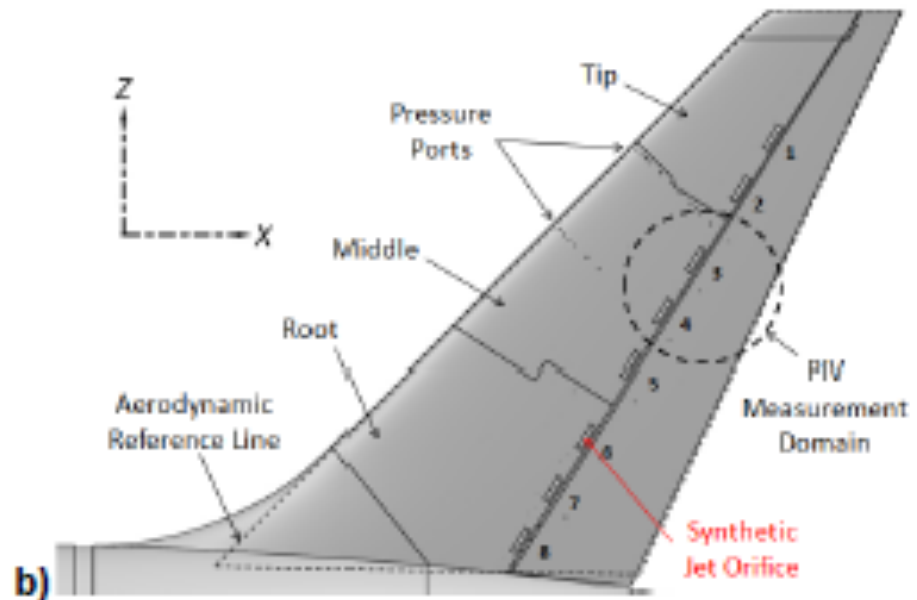
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Aerodynamic Flow Control Devices for Future Airplanes



<http://wingsovermars.arc.nasa.gov/surfaces.html>



Rathay et al, AIAA 2012-0071

Aerodynamic Flow Control Devices for Future Airplanes

Idea: 2006:

Started working in 2008 (Invention)

Provisional Patent application – July 2009

Full US Patent Application in July 2010

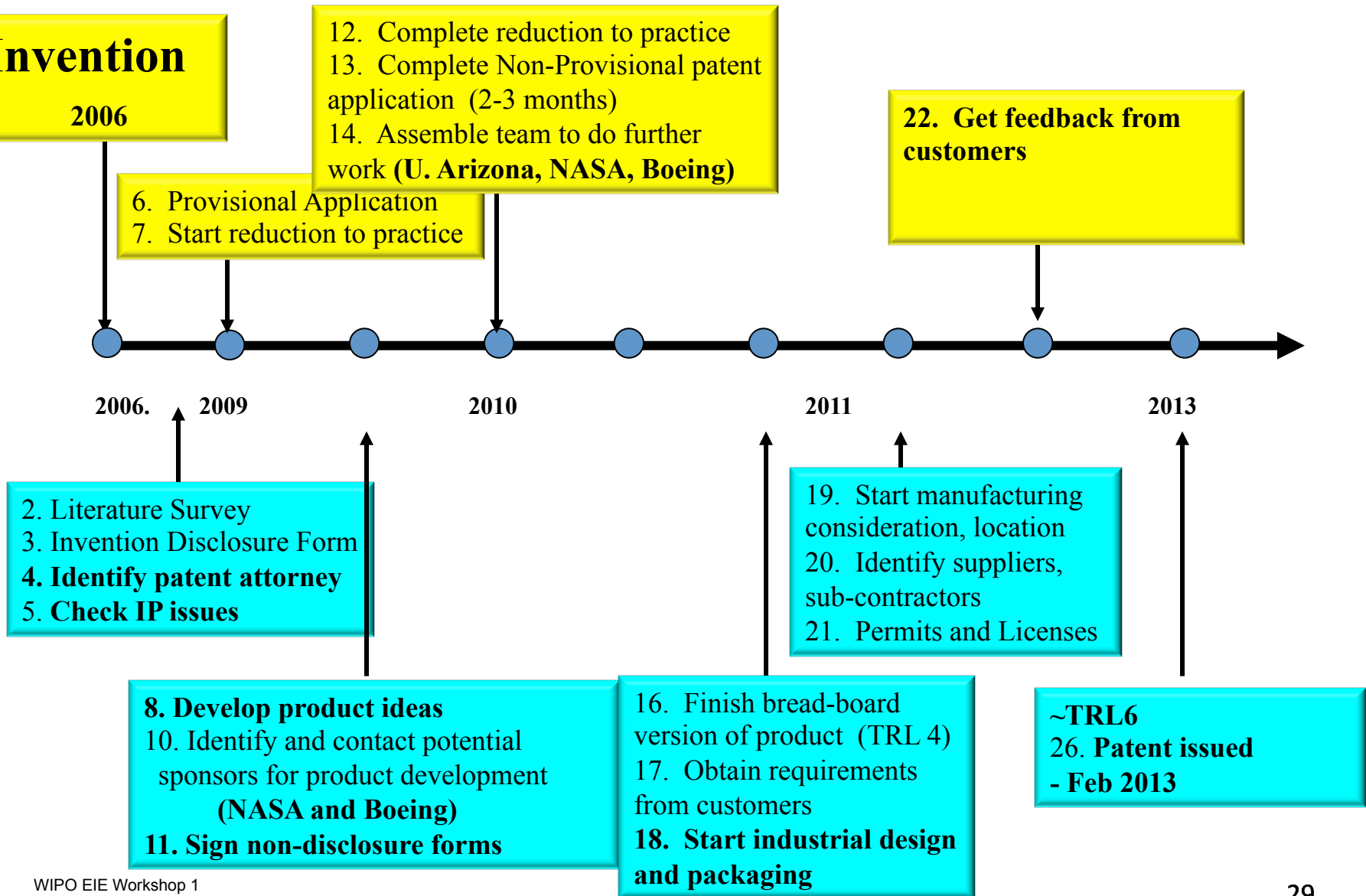
Patent Issued February 2013

Team: Advanced Fluidics + NASA + U. of Arizona +
Boeing

The development cycle is much longer because of
system level requirements and testing

TRL ~ 5 Competition begins!

Aerodynamic Flow Control Devices



Challenges of dealing with “crazy ideas” or “unwanted” inventions

What not to do? (“less-useful” patents)

<http://www.freepatentsonline.com/crazy.html>

“PITFALLS IN COMMERCIALIZATION”

Products successful only for a while or technology outdated

Fountain Pens



Typewriters



Pay Phones

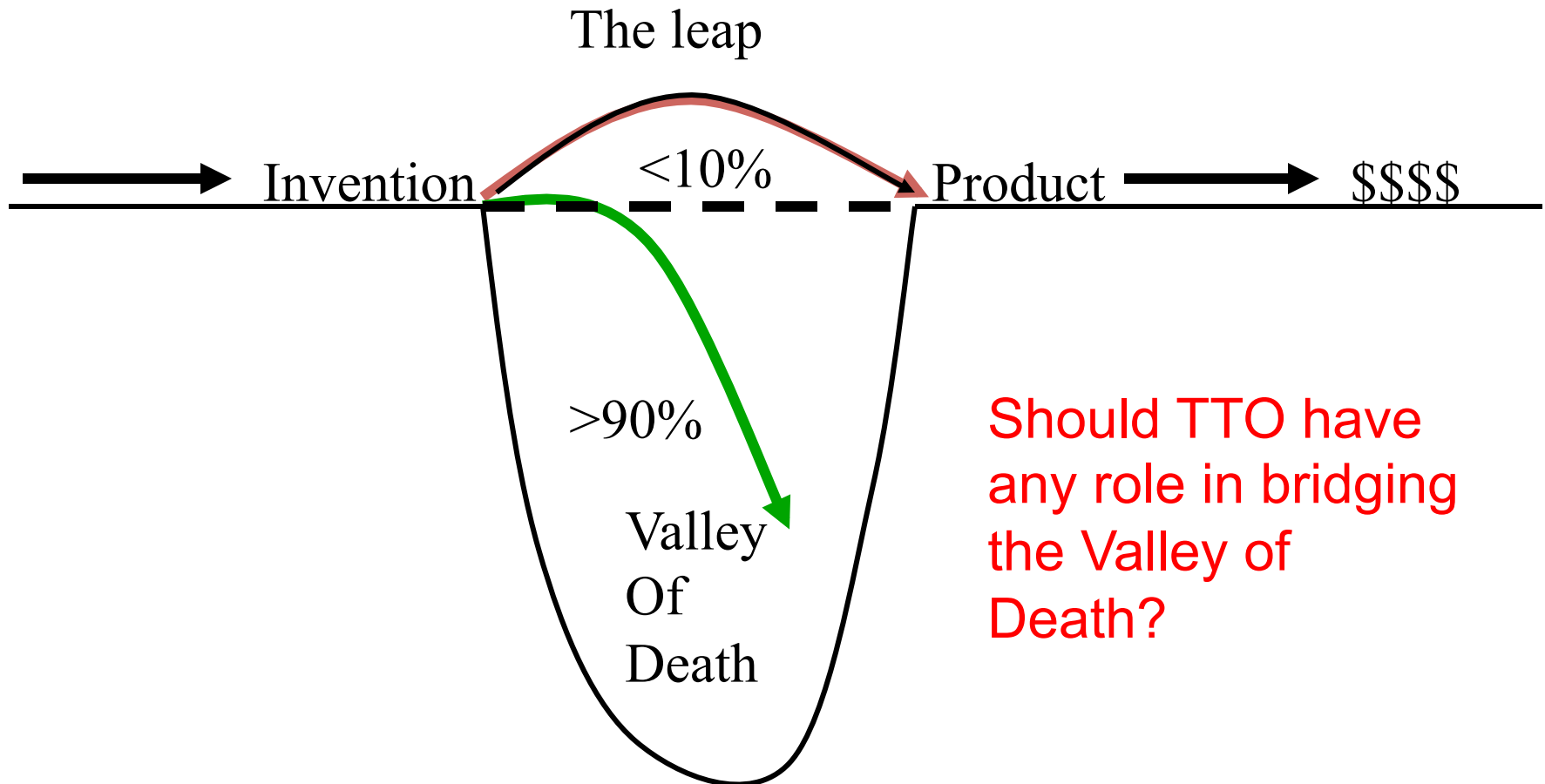
Landline phones

Carburetors

Internal Combustion Engines?



Bridge or Leap??



Minimize “Time to Market”

Cost

Competition - do not ignore weak signals

Window of Opportunity

New Trends in Tech Transfer

Pro-active Tech Transfer

Intellectual Property as an active catalyst
for transformation of local economies

Transformative Regional Engagement
(TRE) – Tech Transfer Office must be
actively connected to the Ecosystem

CONCLUSIONS

Invention to a Product involves quite a few steps and processes

CONCLUSIONS

Watch out for pitfalls!

Exercise

The plan for this session

You are given a new idea and you are required to tell us what steps you (as TTO) will take to transition it into a commercially successful product

Exercise Schedule

10 minutes to introduce the idea and assign the work

20 minutes group work

20 minutes of group presentations (3 minutes/group of presentation)

15 minutes discussion and wrap up.

Idea

Scenario:

Idea generated by a professor and student at the University

Taking a new idea generated in the University to the market

8 Groups - 8 different functions

You will only **IDENTIFY THE TASKS** that you will have to do in your role – **NOT** actually solve all the problems.

Taking a new idea generated in the University to the market

Group 1: IP protection

What are the different aspects of the invention you will protect by patents, copyrights, trade secrets, etc.

Group 2: IP Licensing and related legal agreements and documents

Which companies will you be approaching and what type of agreements/documents will you be signing?

Taking a new idea generated in the University to the market

Group 3: Market Research and Market Estimates

Taking a new idea generated in the University to the market

Group 4,5: Technology Roadmaps & Product fit in the Roadmap

Group 6,7: Technology Mindmap

Group 8: Competition Analysis

GROUP TASK ASSIGNMENT

Group	Function
1	IP Protection
2	IP Licensing
3	Market Research
4,5	Technology Roadmap
6,7	Technology Mindmap
8	Competition Analysis

Group member roles

Every group should work on a laptop to show in on the screen!

NEXT

Group formation, assembling
into groups and start work!

THANK YOU