From the Lab is Our World to the World is Our Lab

- *GPCA Research and Innovation Summit*
- *http://gpcaresearch.com/2015/*
- *Dubai, 17.03.2015*

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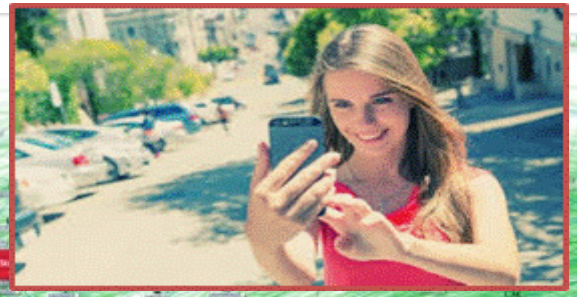
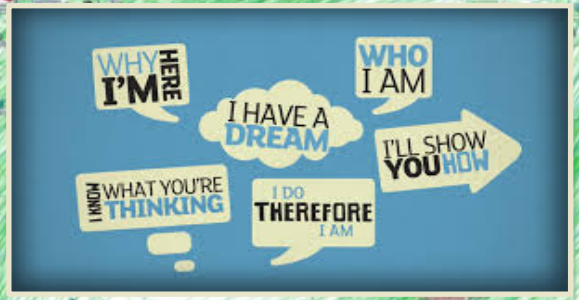
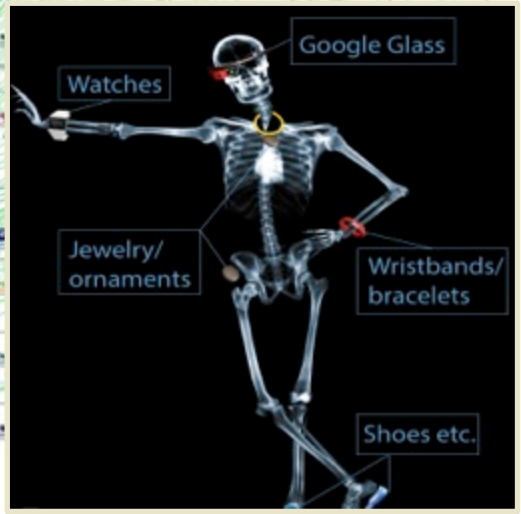
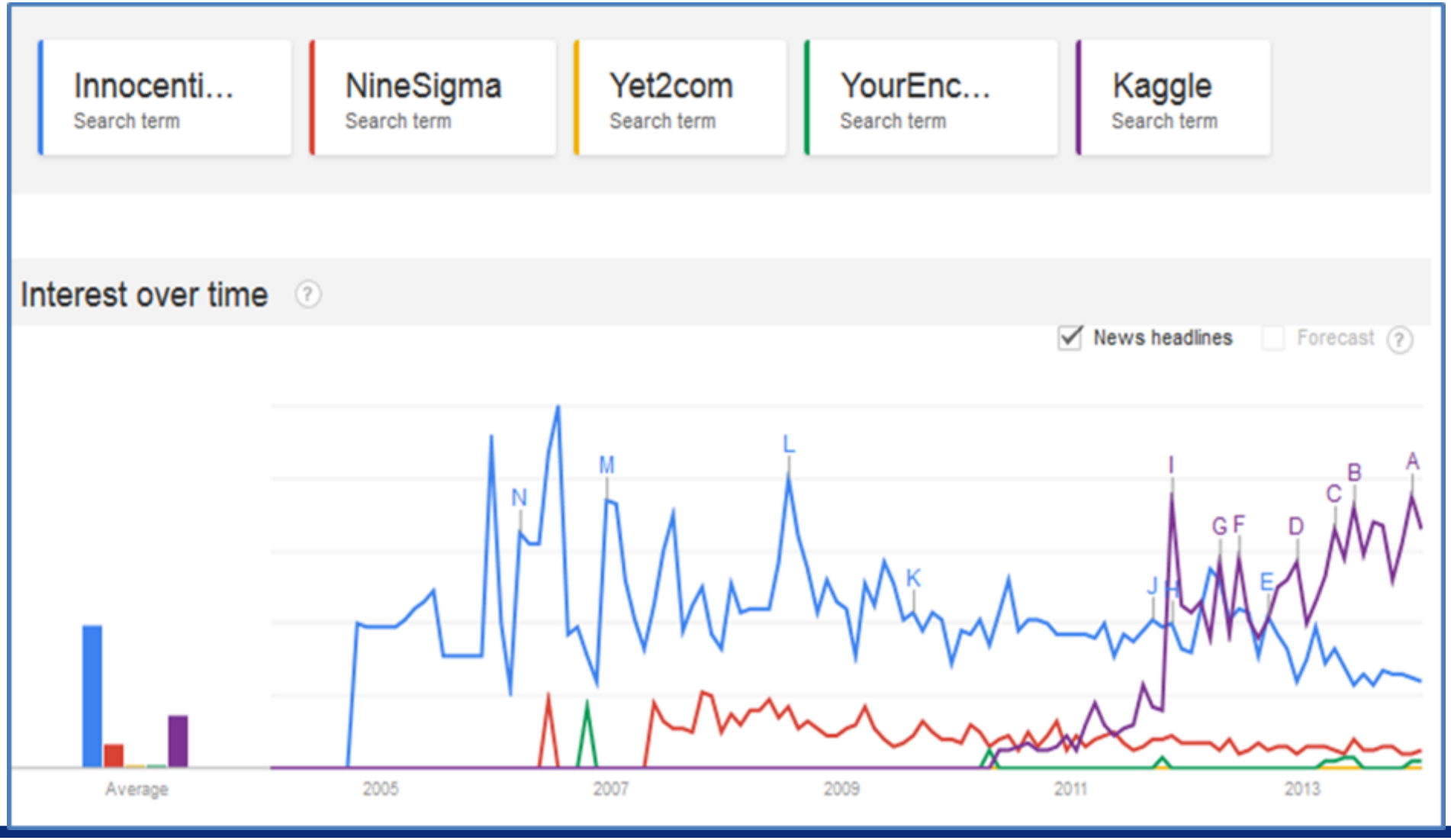
An increasing number of Companies make use of Crowdsourcing Innomediaries to Source Ideas



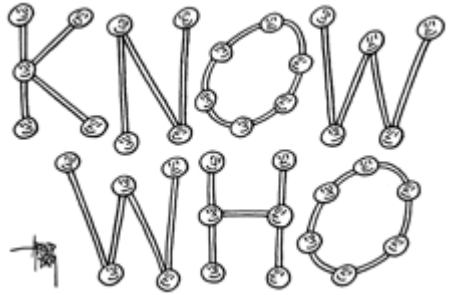




Innocentive having highest interest over time, but with several upcoming competitors



Positive and Negative Experience with Innocentive



When to use?

- Very small, narrow and clearly defined closed questions
- Challenges of confidential character

When not to use

- Never for a big challenge or an open question
- Abstract challenges that are difficult to translate into concrete problem statements or break into smaller tasks

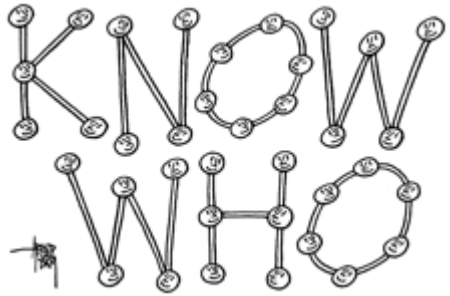
Positive experience

- Low cost
- No resources required from the internal team

Negative points

- Only 25% success arte
- Poor control over total cost – as the success-fee for solutions can vary a lot

Positive and Negative Experience with NineSigma



When to use?

- Small, narrow and clearly defined closed questions
- Challenges requiring expert knowledge from narrowly defined research & product development profiles

When not to use

- Never for a big challenge or an open question
- Challenges requiring broad diversity of backgrounds

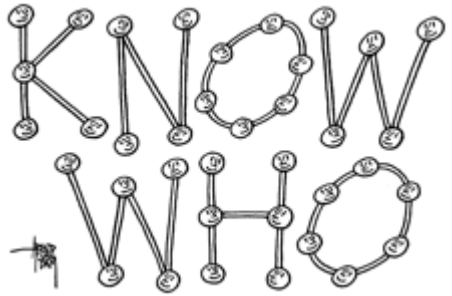
Positive experience

- Strong team that supports the definition of the question; Has more than 200 000 people in the team; Very professional and flexible
- Low cost: 15-25k€ for one single request. If someone has a solution, you need to negotiate the price for this separately
- Similar to Innocentive, but w more services such as accelerating the implementation of the new idea.

Negative points

- There is no 100% score. Many cases lead to no results at all. 2/3rds of the cases give no answers, which is a poor average success rate.
- Poor control over total cost – as the success-fee for solutions can vary a lot – reaching well above 500.000 USD

Positive and Negative Experience with Collaborative University Competitions



When to use?

- Fundamental innovation challenges that require several scientific disciplines to be engaged and cross-fertilised

When not to use

- Small narrow problems that do not have a significant business-impact if solved

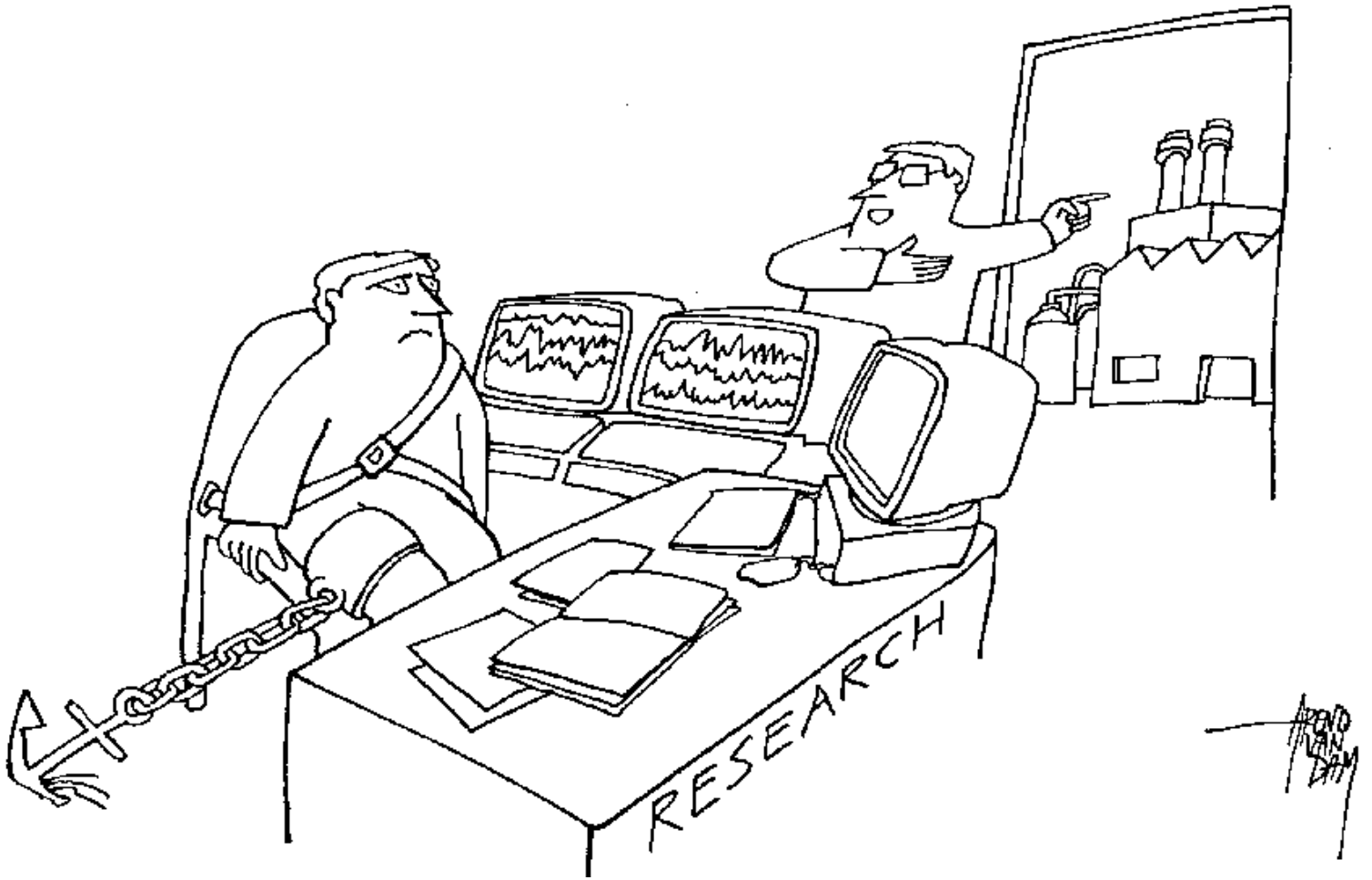
Positive experience

- Possibility to present strategic challenges and solution attempts, including expensive failures, made thanks to very solid NDA and IP-protection
- Human interaction. Meeting the best brains behind the new breakthroughs and seeing them in action at the different joint reviews and at the university-specific kick-off. Possibility to invite the winners to the company for an industrial PhD project.
- Value of seeing the body language adds vital substance to the dialogue, which takes knowledge creation further.

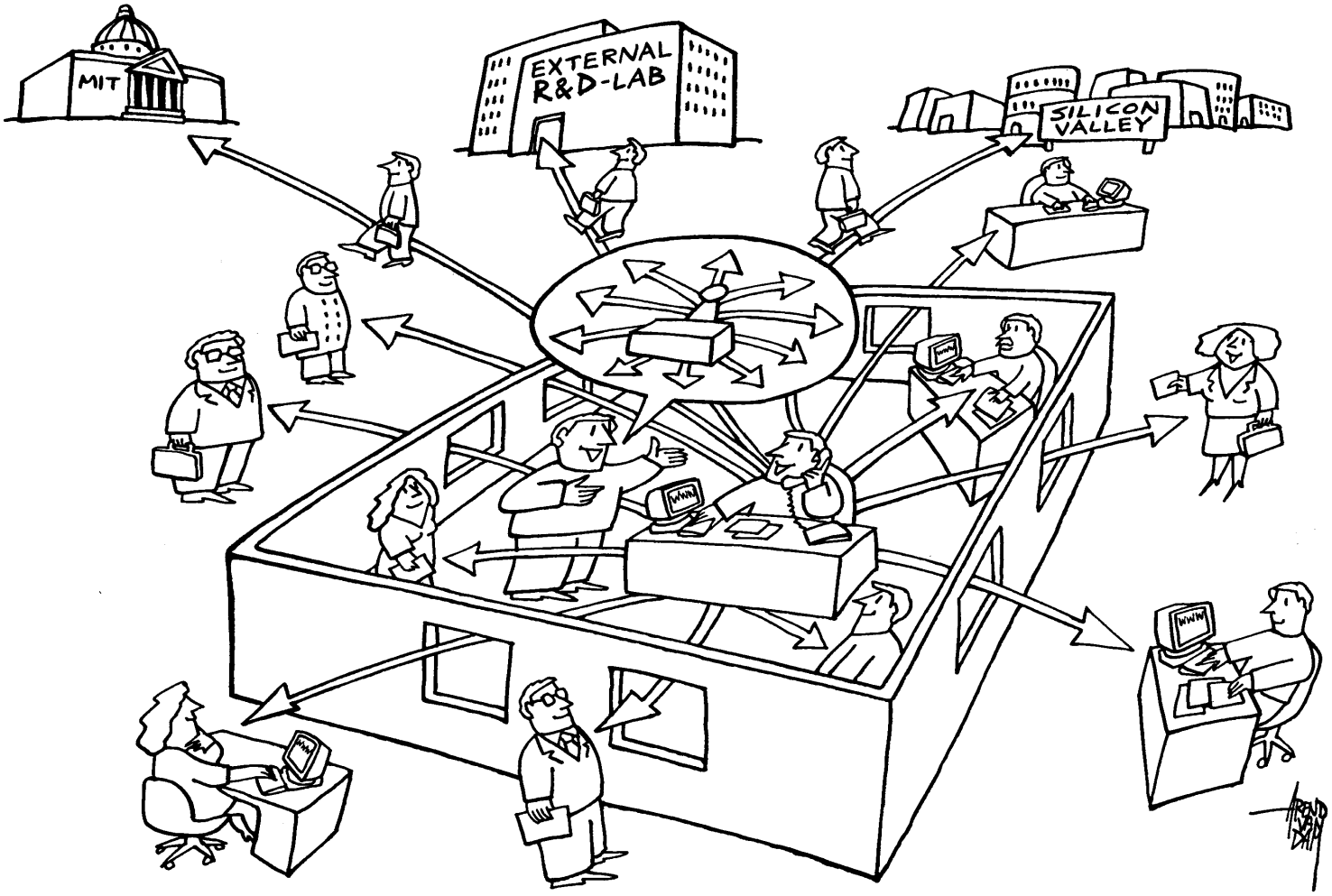
Negative points

- Costs 10 times higher than standard broadcasting on innomediaries. However, full cost-control from the start. No additional fees to be negotiated upon completion.
- Works mainly in countries with open IP legislation – referred to as the ”Teacher’s exemption law” – which makes immediate IP ownership by the Client possible

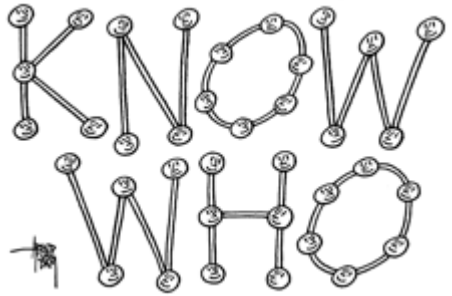
Our approach is about breaking old patterns of R&D people who think that “the Lab is their World” …



… to Realising that ”THE WORLD IS THEIR LAB”



Broadcasting on Innomediaries versus running a Collaborative University Competition – Quotes from Interviewees



Broadcasting on Innomediaries

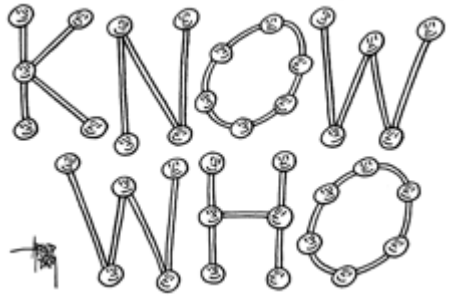
- *Broadcasting a problem is easy, does not require lots of preparation and can certainly lead to some unexpected insights. But it is a bit loose and nothing more than a wild try.*
- *Broadcasting to solve a specific challenge is not useful.*
- *Even when broadcasting anonymous problems, there is quite a bit of sensitivity when going outside regarding company identity and what can be shared and what not.*
- **Failures from the past are not shared**

Opinions of Interviewees

Collaborative Competition with Selected Team

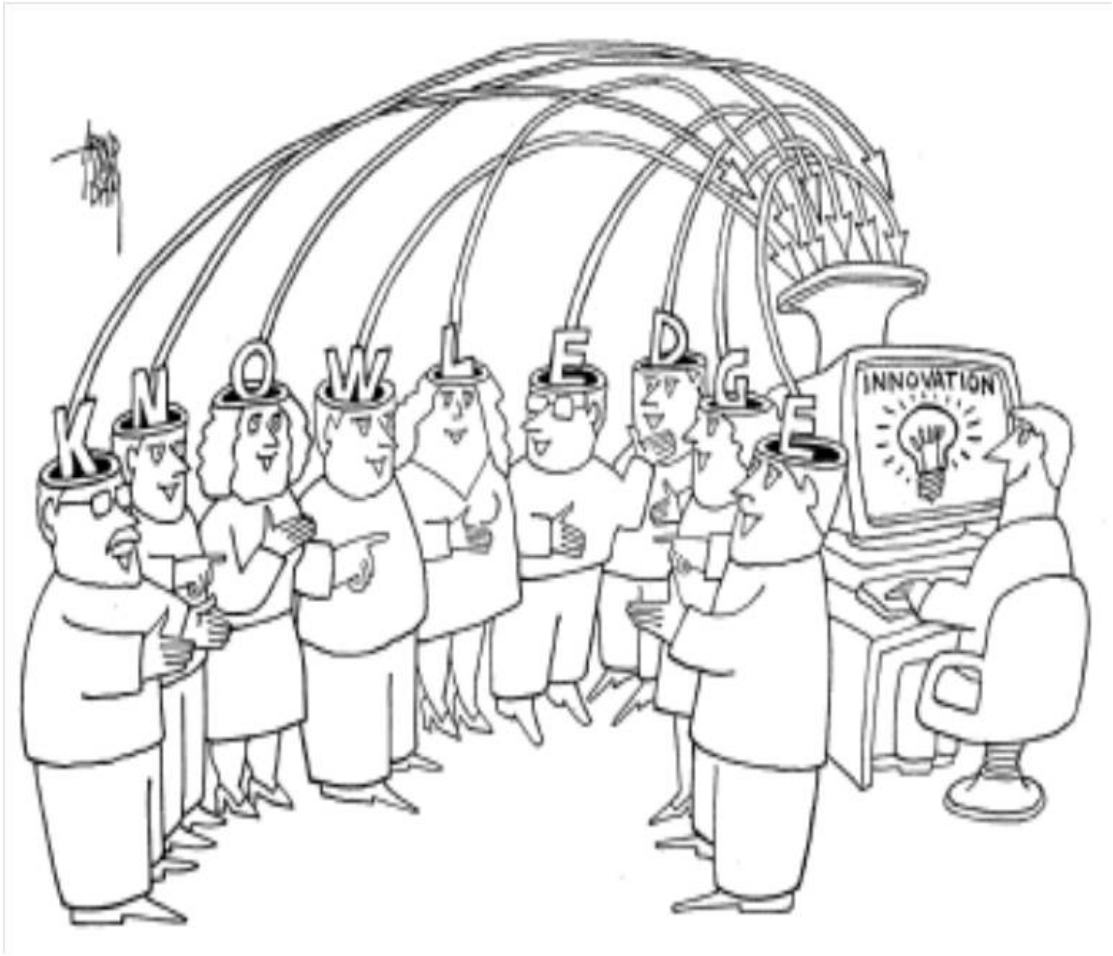
- *A Collaborative Competition comes very close to the perfect **co-creation of solving serious challenge**s, whereas problem broadcasting in my view can only lead to new insights.*
- *An NDA and IP-protected Collaborative University Competition – run with carefully selected teams – makes open collaboration much easier and **we feel confident in sharing our true challenges** including everything we did so for to solve them.*
- *Moreover, a **crystal clear collaboration agreement that clarifies IP ownership by the Client** and a forceful spirit of "we are all in the same boat – sinking with all of us, or taking us to new oceans of insight"*

Main Insight: Where Internet Fails – Human Relationships Win – Sharing Tacit Knowledge



- One of the reasons why knowledge-creation is more powerful in the context of direct human interaction is that **you can see the respective individuals' body language and sense nuances that are not transferrable over the internet**.

- In other words, while internet-based approaches have a natural limitation to explicit knowledge – **human interaction-based approaches allow you to also tap into the wealth of tacit knowledge.**



Twenty Breakthrough Innovations made with some of the World's Industry Leaders – more details on www.iknow-who.com

Anoto

• Setting a new standard for digital writing (2003)

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.

• Cutting ammonia emissions by 95% (2008)

PHILIPS

• Rare-earth material Replacement (2012)

InnoVentum
power to the people

• The World's first carbon negative wooden towers for small scale wind turbines (2006-09)
• The World's first hybrid wind and PV solution in renewable materials (2012-13)

• Solving the Locking-Pin Challenge (2006)
• Developing revolutionizing Downstream Equipment at half COGS (2007)

PROTECTS WHAT'S GOOD™
Tetra Pak

BANG & OLUFSEN

• The new ICEpower conversion module for audio applications (1999) cutting energy consumption by 90%

Nestlé

• Breakthroughs in Functional Foods (2001)

BOMBARDIER

• Enhancing lifetime of the carbon strips (2010)
• Inductive Contactless Power Transmission (2009)
• Business model innovation to Commercialize the Inductive Primove Technology (2011)

AkzoNobel
Tomorrow's Answers Today

• Breakthrough Polymer Paint without any emissions – No VOC (2012)

BMW

• Crowdsourcing System VIA (2004-2006): http://www.bmwgroup.com/e/0_0_www_bmwgroup_com/forschung_entwicklung/ein_blicke_in_die_entwicklung/via/via.html

• Porsche's Ceramic Brake System (2001)
• New manufacturing method for Porsche's lightweight carbon-reinforced body parts (2004)
•Project insights published in Harvard Business Review: http://hbr.org/2005/12/bringing-the-college-inside/ar/pr

PORSCHE

KGHM
POLSKA MIEDŹ S.A.
• Cutting Energy Consumption and CO_2 Emissions by 50% (2013-ongoing)

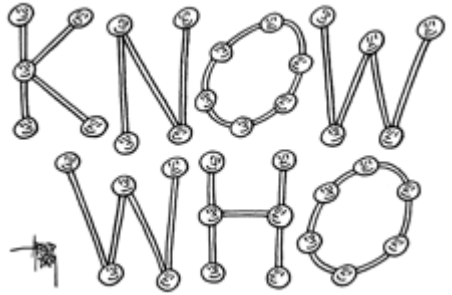
Duni

• Developing a new napkin folding machine (2008-10)

Dental Ceramics Company

• Doubling both flexural strength and fracture toughness while enhancing translucency (2011)

Collaborative University Competitions – Why and How



Why do Companies Engage?

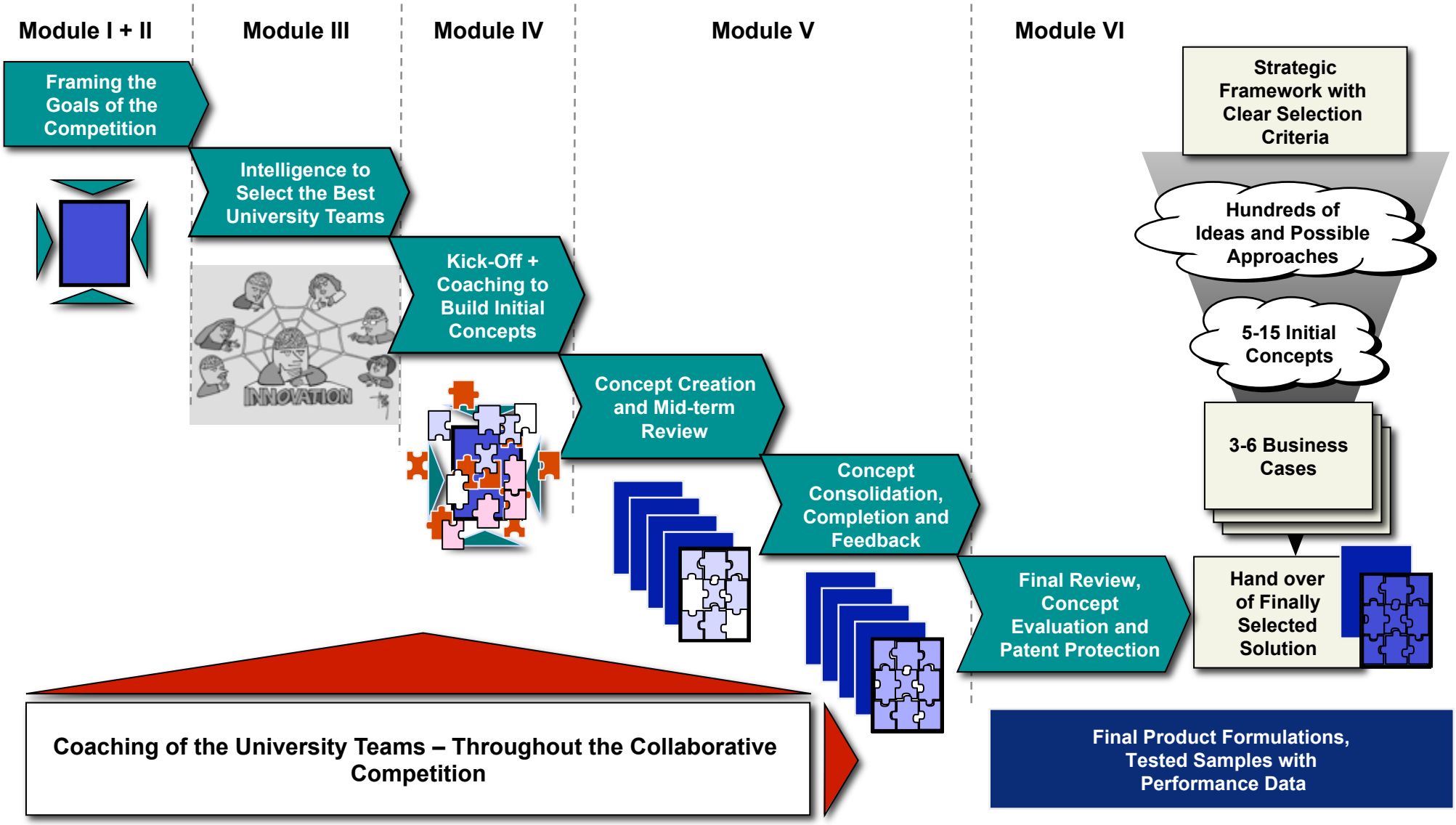
1. Find **new solutions** to a major R&D/Innovation Challenge – unsolved so far;
2. Learn how to take a fundamentally **new approach** to engaging several university partners in *collaborative competitions*;
3. Develop a fundamentally **new network** of academic partners – who can be involved repeatedly to solve new challenges;
4. **Break down the Not Invented Here** (NIH) that still exists in some companies;

Approach and Deliverables:

1. Making a very **clear description** of the R&D/Innovation Challenge – unsolved so far;
2. Identifying the **best suited (not just the best) researchers** across the Globe to attack the challenge;
3. Development of a **clear collaboration agreement** – providing right and fair incentives for the researchers while securing IP ownership by the Partner Company;
4. **Facilitating collaboration** through open communication and joint performance reviews;
5. Developing **patent applications** with researchers and inventors and Partner Company as owner;
6. **Rewarding the winners + contributors** and assisting the Partner Company for **accelerated implementation** of the solutions.

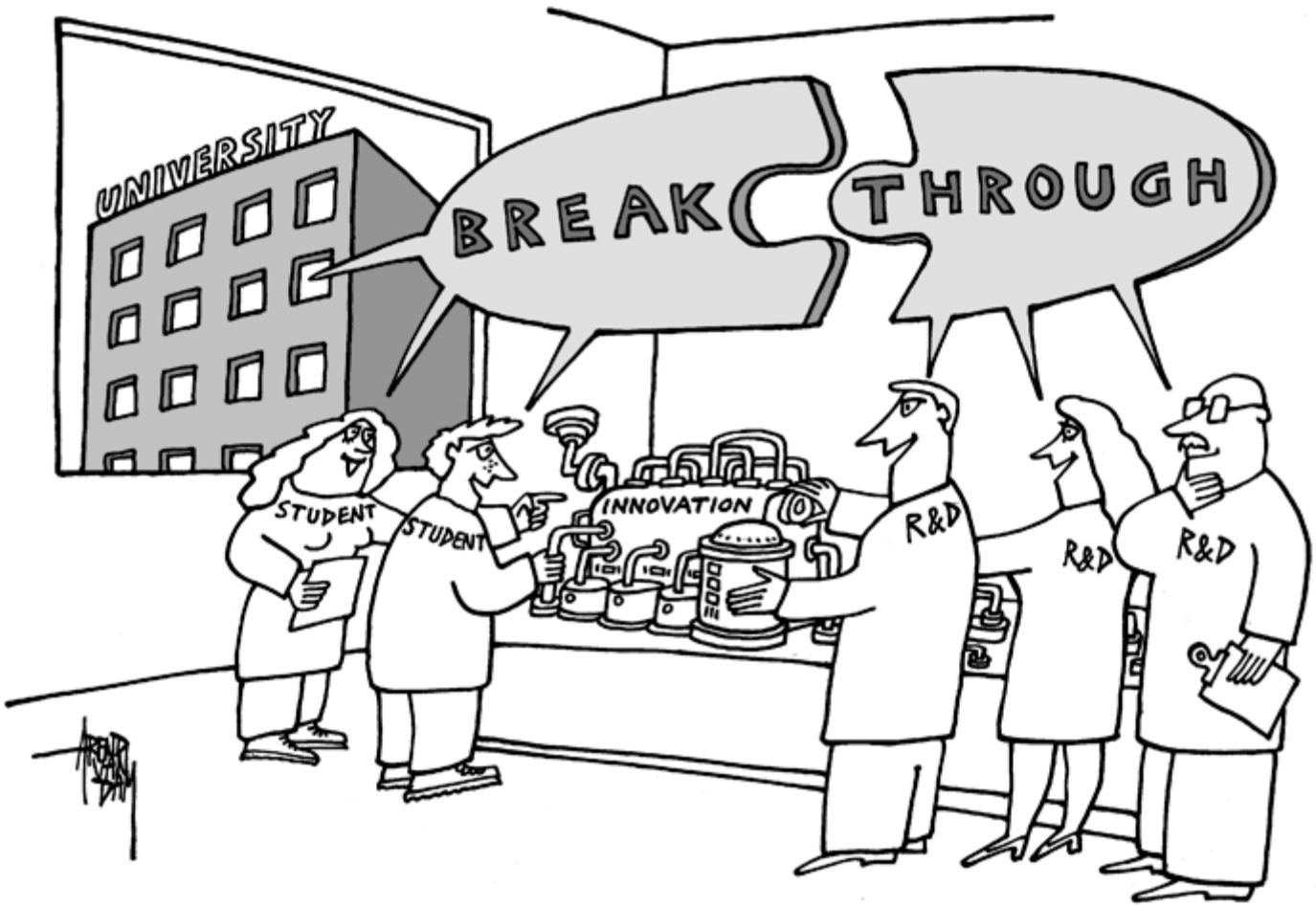
Typical Steps in a Collaborative University Competition

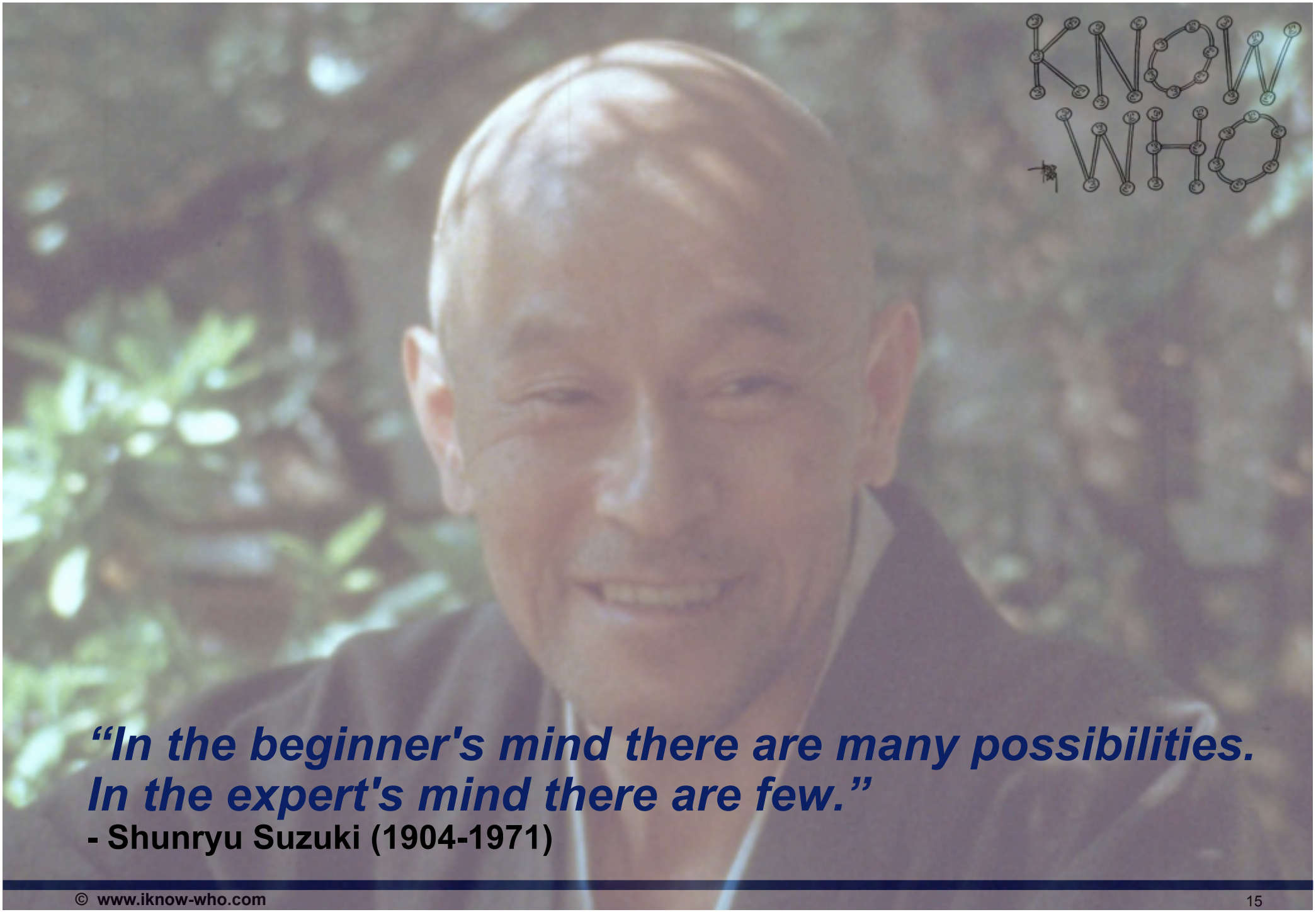
– *Timeline 6-8 months depending on complexity and university schedules*



Example of a University Team participating in a Collaborative University Competition (Glass Ceramic Example)

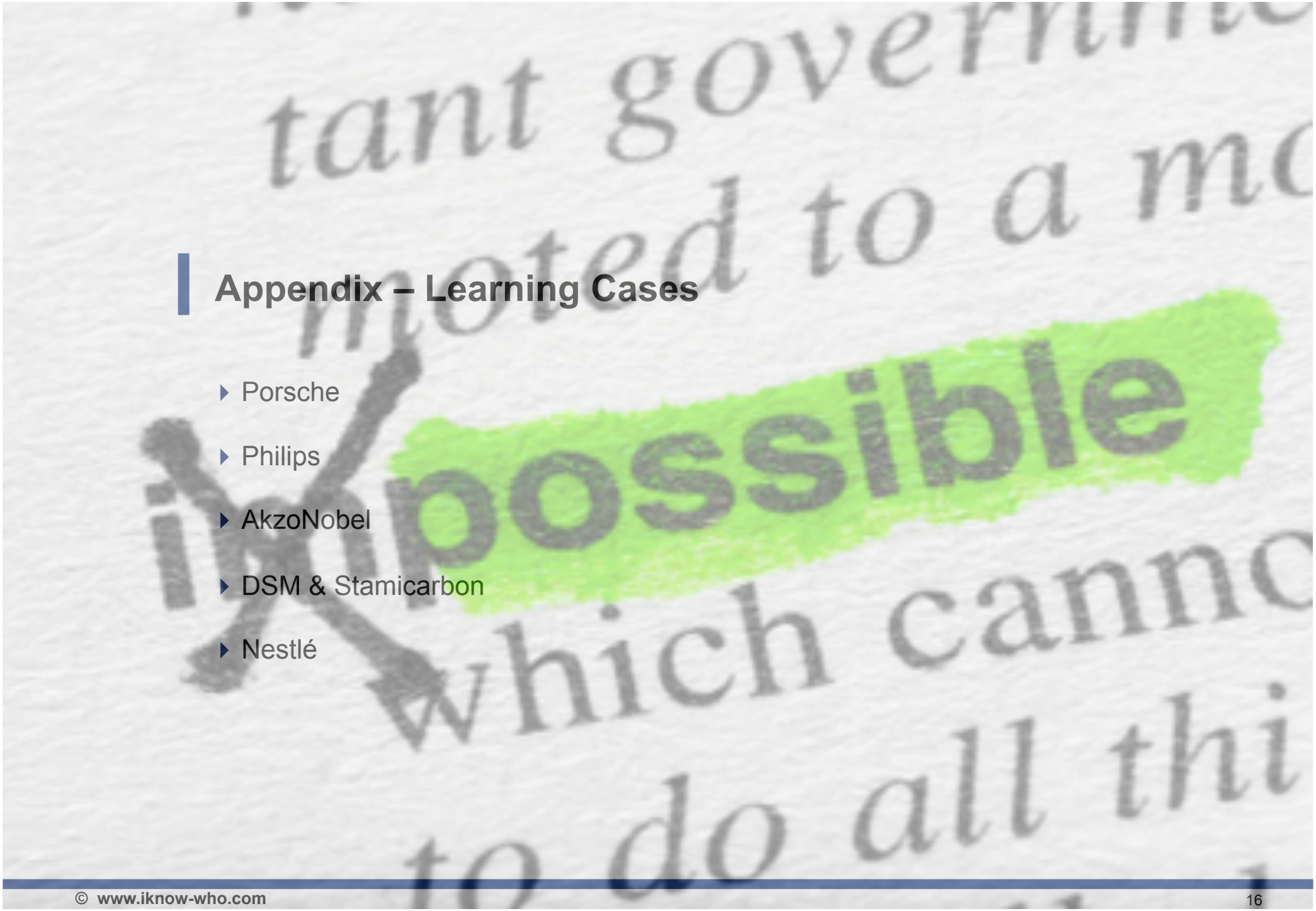
- One Professor focused on Advanced Materials
- One Associate Professor focused on Material Science
- Two PhD students
- Eight Master Students doing their final year project work, who take the opportunity to focus their project on Challenge – while getting intensive coaching from the Professors and the iknow-who.com coaches





“In the beginner's mind there are many possibilities. In the expert's mind there are few.”

- Shunryu Suzuki (1904-1971)



Appendix – Learning Cases

- Porsche
- Philips
- AkzoNobel
- DSM & Stamicarbon
- Nestlé

Company Profile

- Porsche is a unique company with strong ideals. Their values and philosophies permeate through everything they do to ensure that they always remain true to their principles. They constantly meet their own high demands and have a definite idea about who they are and how they approach things. As a result, despite what others may be doing, Porsche actively seek to stretch boundaries and are committed to continual improvement.

Innovation Challenge

- Through Porsche's clear strategy to promote breakthrough ideas, Wendelin Wiedeking (CEO) wanted Porsche to be the first to commercialize ceramic brakes for street cars *and* with the strict deadline of the Carrera GT launch in 2002.

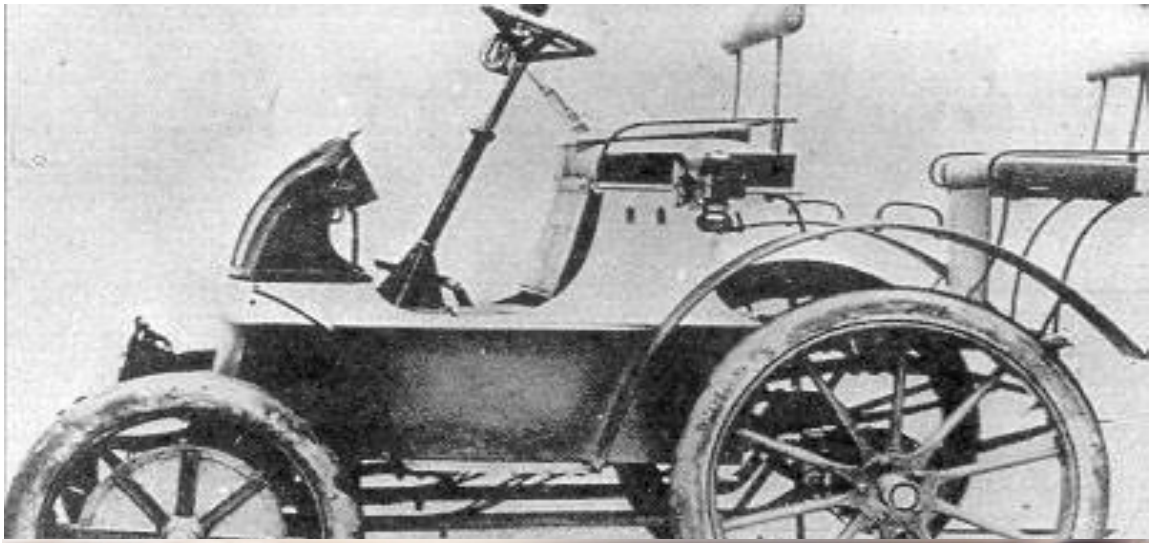
Outcome (2001) – World's First Ceramic Disc Brake

- Porsche Ceramic Composite Brake (PCCB) – the World's first commercially available ceramic disc brake with performance only found on Formula 1 cars: incomparable longevity, heat resistance and braking distance, 50% weight reduction, immediate brake contact and no fading.

- Porsche beat both BMW and Mercedes who had a half year head start, they license the technology to competing car manufacturers and have even applied the technology to clutches.

Brief introduction to Porsche: 100 years of Innovation Leadership

- 1902: Ferdinand Porsche and Jakob Lohner introduced first hybrid petro-electric automobile
  - Electricity supply by the motor generator under the hood to DC motors in front wheels
  - Based on Mercedes gasoline car technology
  - Essentially contributing to the uprising of hybrid vehicles

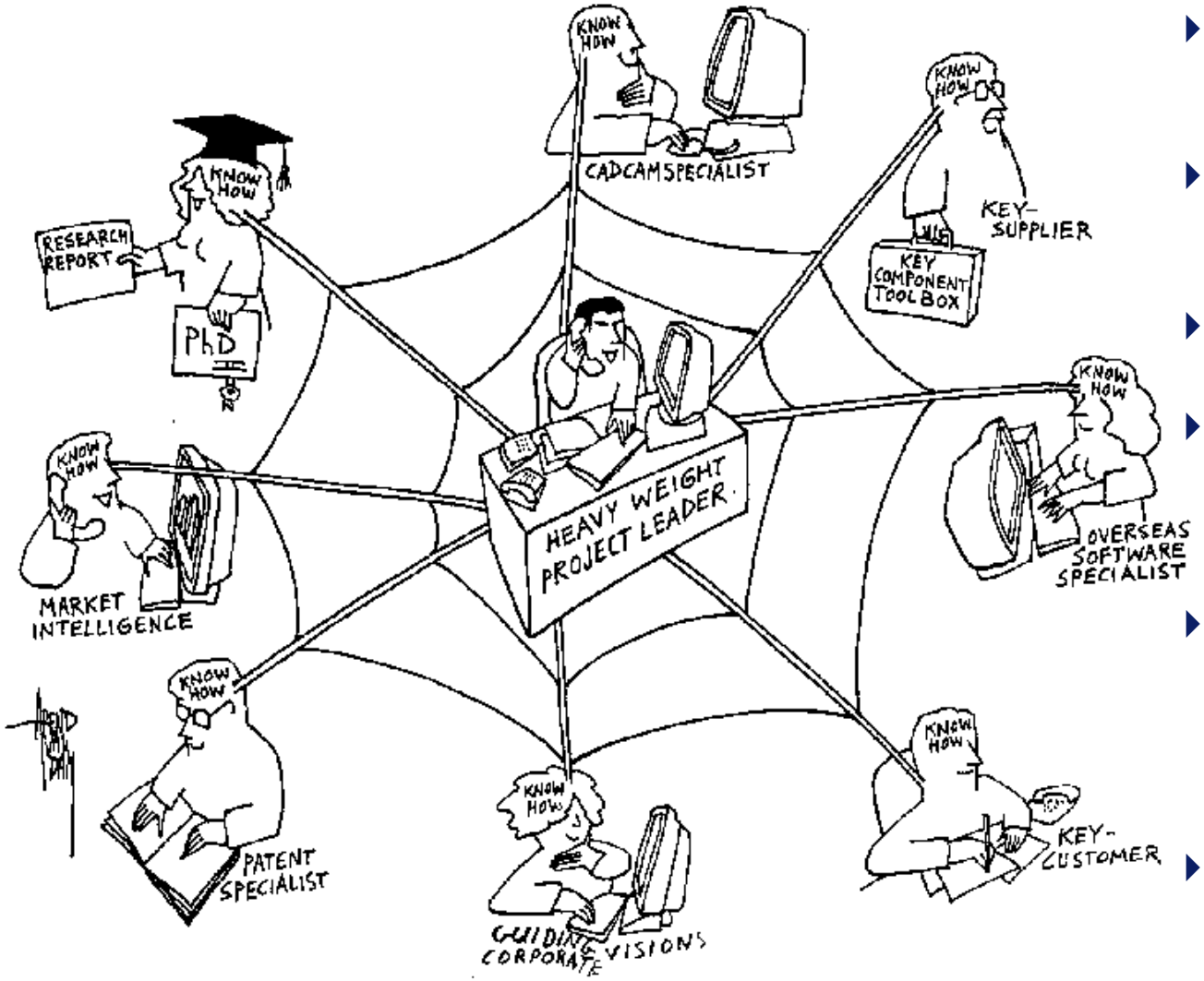


- 2002: Introduced the World's first commercial ceramic brake system

Porsche's effort was driven by a clear Performance Criteria and a strict Deadline – the launch of Carrera GT

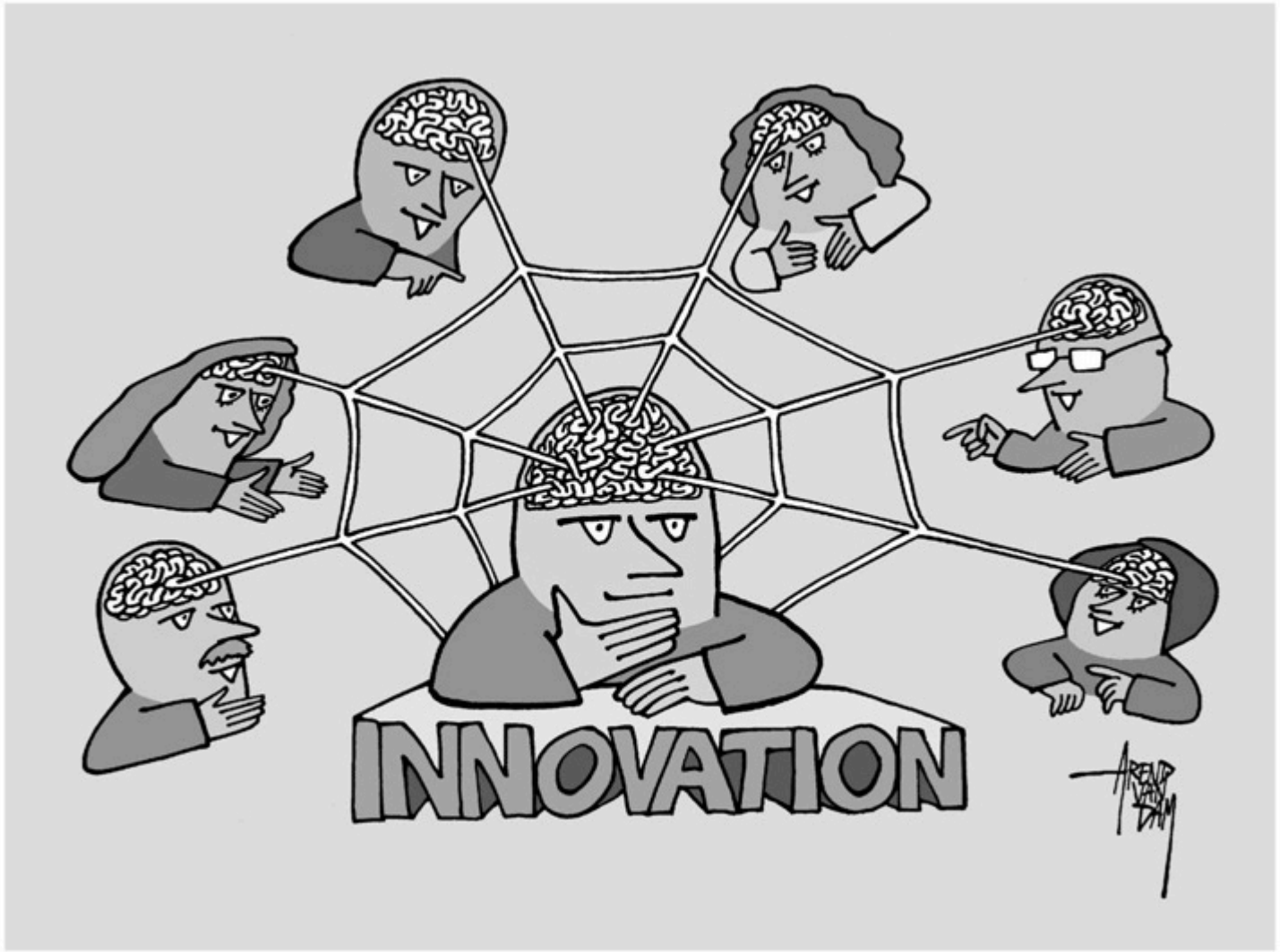
- CEO Wiedeking put 2002 as deadline for the new Carrera GT
- 300'000 km – as opposed to 1'000 km of F1 brakes
- Heat resistance above 1'000 ºC required – as opposed to the 700 ºC limit of cast iron
- No internal resources in Ceramics

We raised a University Collaboration, which also included additional Know-How Partners –



- Research competition between two leading universities
- Carbon Composite Institutes in Scandinavia and Australia
- Deutsche Luft und Raumfahrt
- SGL – leader in Carbon Composite Materials, but no experience in automotive
- This supplier needed extensive training by Porsche – but also gave access to unique technology
- Offered greater flexibility and a new partnership – as opposed to using Brembo

We also made extensive use of open seminars and strategic intelligence to gain time and new Know-How

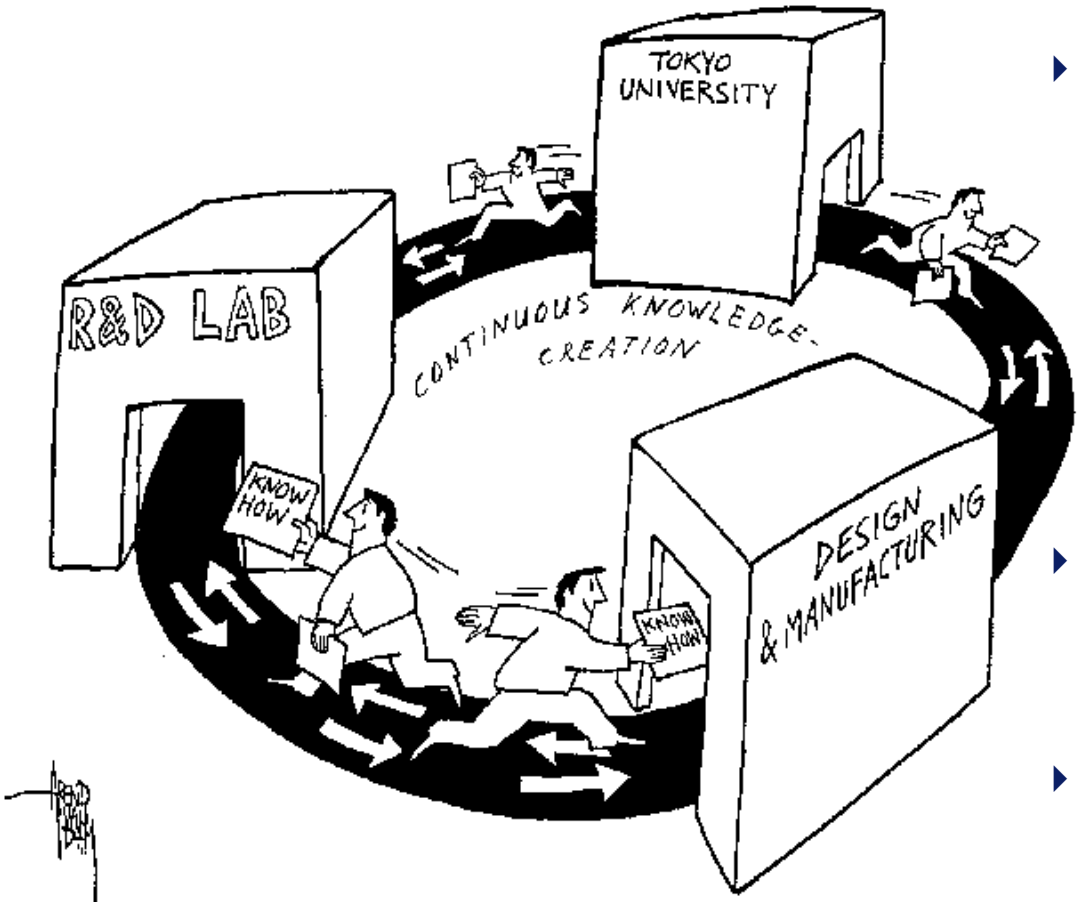


- We invited leading research institutes and experts from the whole world to open seminars
- Mr. Brainpower was identified and recruited from Mercedes into one of the institutes
- The specialized supplier of the American F16 Fighters was identified and visited by Spiderman

The “Brake-Through” captures a significant price premium – and licensing revenues

- Immediate “brake-contact” through finer tolerances
- Weight reduction of 60 per cent, or 5 kg per wheel
- No fading, shorter braking distance and zero corrosion
- Two leading car manufacturers are already licensing the new technology from Porsche
- Technology transfer within Porsche for ceramic clutches and a new turbo-charger

Porsche brings in 600 students per year to conduct well-defined tasks in R&D and D&M – the KSF is in "well-defined"



- The projects they are asked to drive are highly strategic issues:
  - **Reprogramming the transmission software** of the Cayenne to give is a "softer ride" required for the US market
  - Finding **new sources for Titanium**
  - Exploring **new lightweight manufacturing methods**
- A total of **600** Master Students per year in addition to the **2000** internal engineers
  - One master student costs 10% of one employee
- At the end, less than **10%** of the **600** annual students receive a formal job offer from the company
  - Contacts with the remaining students are systematically maintained through bi-annual meetings of alumnus – **to build up a growing network for Technology Intelligence**

- **Further Reading about Porsche's Approach:**
  - **Harryson, S. and Lorange, P. (2005) "Bringing the College Inside", *Harvard Business Review,* December 2005**

PHILIPS
Healthcare

Company Profile

- Philips Research is a global organization that helps Philips introduce meaningful innovations that improve people's lives. They provide options in the area of health and well-being for both developed and emerging markets.

Innovation Challenge

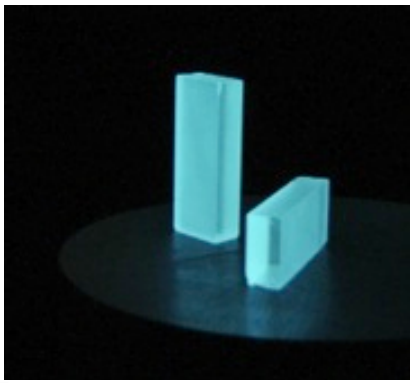
- The Innovation Challenge was concerned with the replacement of a rare-earth based material.
- A great number of industries struggle with the scarcity of the rare-earth elements, which has made prices high, volatile and supplies uncertain in a market where demand has generally been increasing.

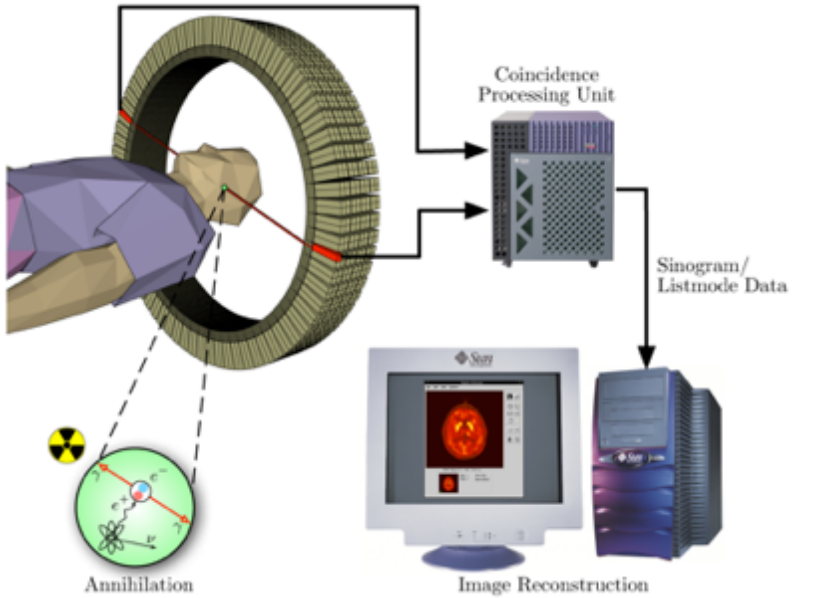
Outcome (2012) – Potential Rare-earth material Replacement

- Apart from carrying out an invaluable amount of research in the area, the winning team discovered a material with strong potential to replace all the rare-earth material.
- Three Invention Disclosures submitted upon final review with full patent applications in process since early 2013 and the core PCT now approved.

Comments on the Winning Solution

- *"Taking this concept into the world of solid state physics will allow us to distinguish timing from energy resolution, which will be a major breakthrough with fundamental implications for PET."*
- *"The nano solution has exceptionally high density, which makes it a particularly valuable candidate for PET"*
- *"The solution does not require cooling, which will reduce the noise level of the equipment"*
- *"Making transparent AAA with BBB is absolutely new, which makes this the solution with the highest patentability"*
  - *See more at www.iknow-who.com*





Company Profile

- AkzoNobel is the largest global paints and coatings company and is a leading producer of specialty chemicals.

Innovation Challenge

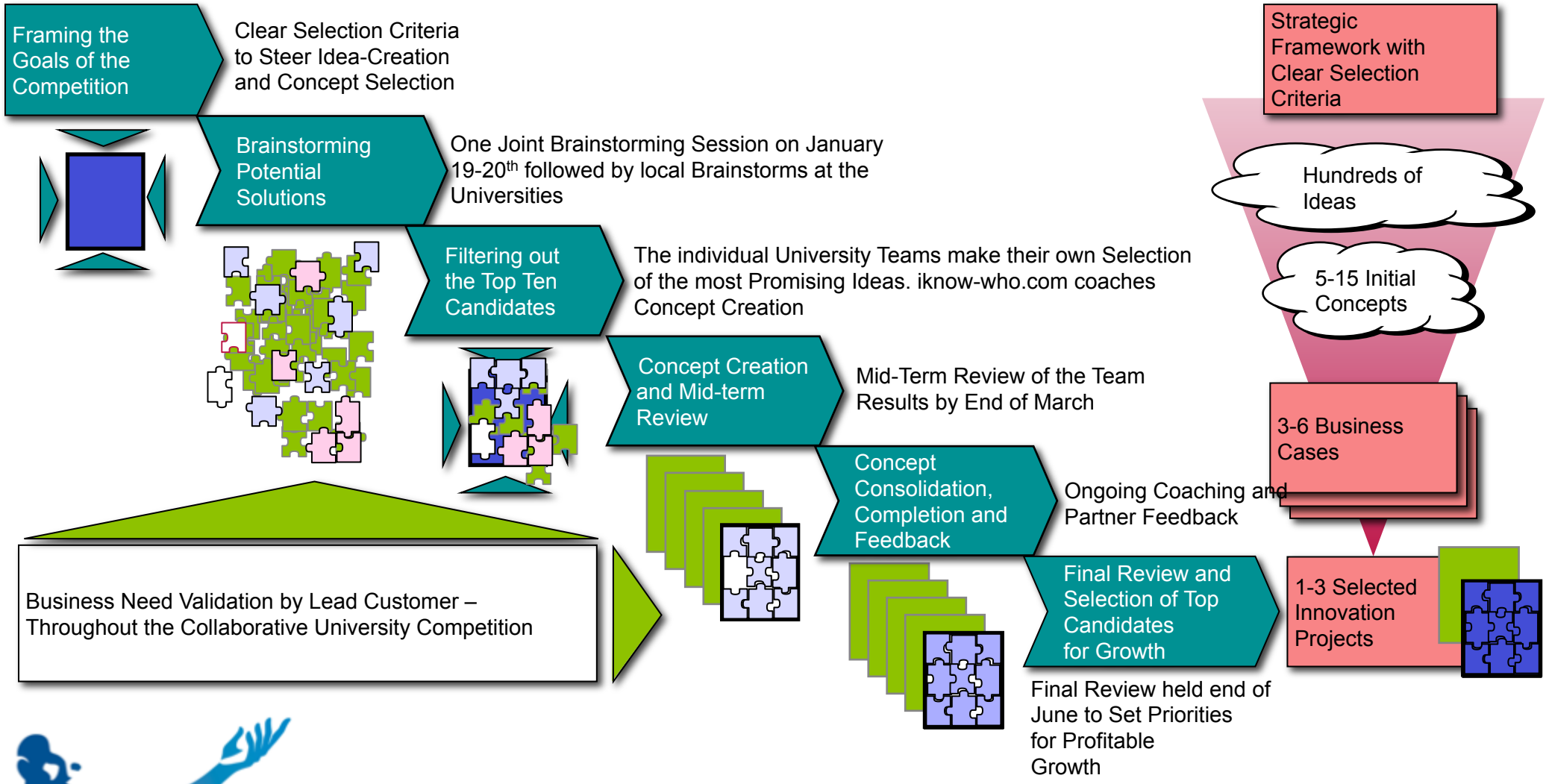
- The Emission Challenge was concerned with the discovery of a method to make state-of-the-art decorative paints environmentally friendly beyond any current industry standard.
- Paint Industry has focused on reducing unwanted compounds in paint formulations for over 20 years.

Outcome (2012) – Breakthrough Polymer

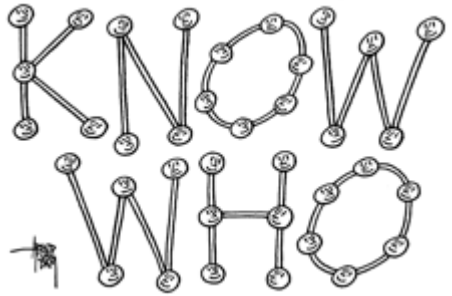
- A new breakthrough technology was unlocked, which has the potential to revolutionize the way decorative paints are formulated *AND* set new standards for the decorative paints market worldwide.

AkzoNobel
Tomorrow's Answers Today

Collaborative competition – the process



Overall Project Schedule



- **Kick-off**
  - Date: January 19+20th 2012
  - Location: Sassenheim, Holland
- **Local Brainstorms**
  - Team Lund, January 31st
  - Team Naples, February 8th
  - Team Eindhoven, February 15th
  - Team Nanjing, March 3rd
- **Mid-term Review**
  - Preview session: March 21st (iknow-who.com and AkzoNobel only)
  - Date: March 21-23rd
  - Location: The iknow-who.com Seminar 'Senoren', Karlskrona (Sweden)
- **Final Review**
  - Preview Session: July 9th (iknow-who.com and AkzoNobel only)
  - Date: July 9-11th (University Teams arrive on the evening of July 9th)
  - Location: The iknow-who.com Seminar 'Senoren', Karlskrona (Sweden)
- **Sample Deadline: May 18th (NB! Samples dispatched no later than May 18th)**
- **Presentation Iteration Deadline: June 18th (Presentations submitted for feedback iteration by AkzoNobel and iknow-who before the final submission deadline)**
- **Final Presentation Deadline: July 2nd (All teams submit their final presentation)**

Challenge introduction

16th of December 2008

Ammonia Abatement Challenge

Stamicarbon
pure knowledge

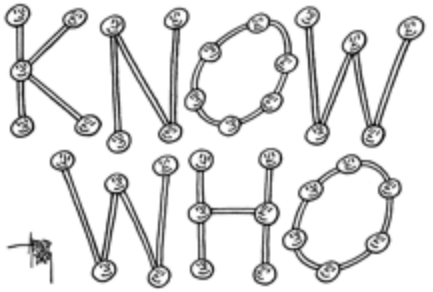
Proposal

Requested are proposals for technologies that fulfill the required ammonia concentration

Constraints:

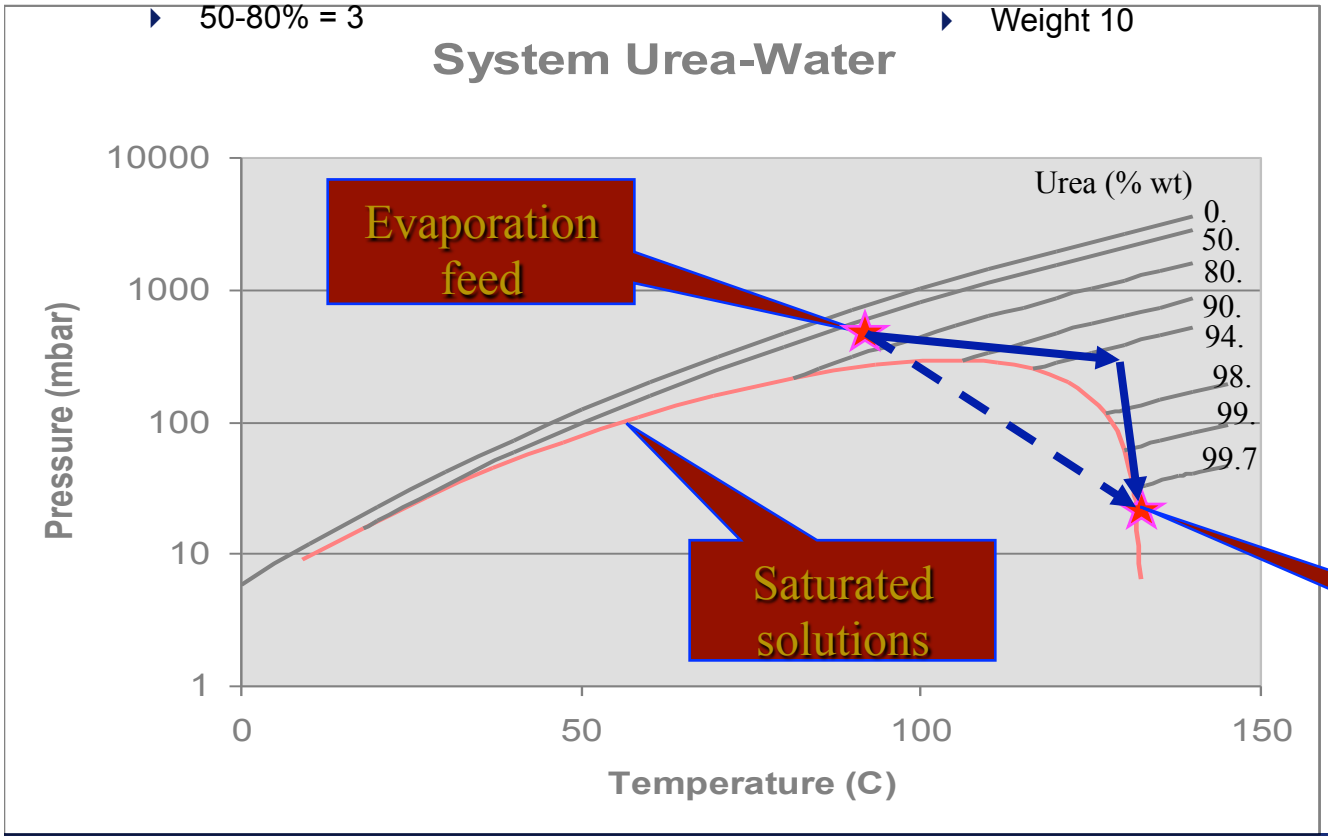
1. The proposed solution should be **economically viable**.
2. The technology proposed does **not produce another polluting stream** (nor gaseous, nor liquid, nor solid).
3. **Contamination** of the aqueous urea solution recycle flow from the urea dust scrubbers to the urea melt plant **is not acceptable** (unless it is indicated how this contamination is handled in the urea melt plant).

All criteria were weighted and calibrated to support unbiased scoring of the different solutions



Ammonia Emission Reduction (compared to today's emissions):

- 100% (complete elimination) = 5
- 90% or more = 4
- 50-80% = 3
- 40-50% = 2
- Less than 40% = 1
- Weight 10



Implementation time:

- 1 year or less = 5
- From 2 to 3 years = 3
- 5 years or more = 1
- Weight 3

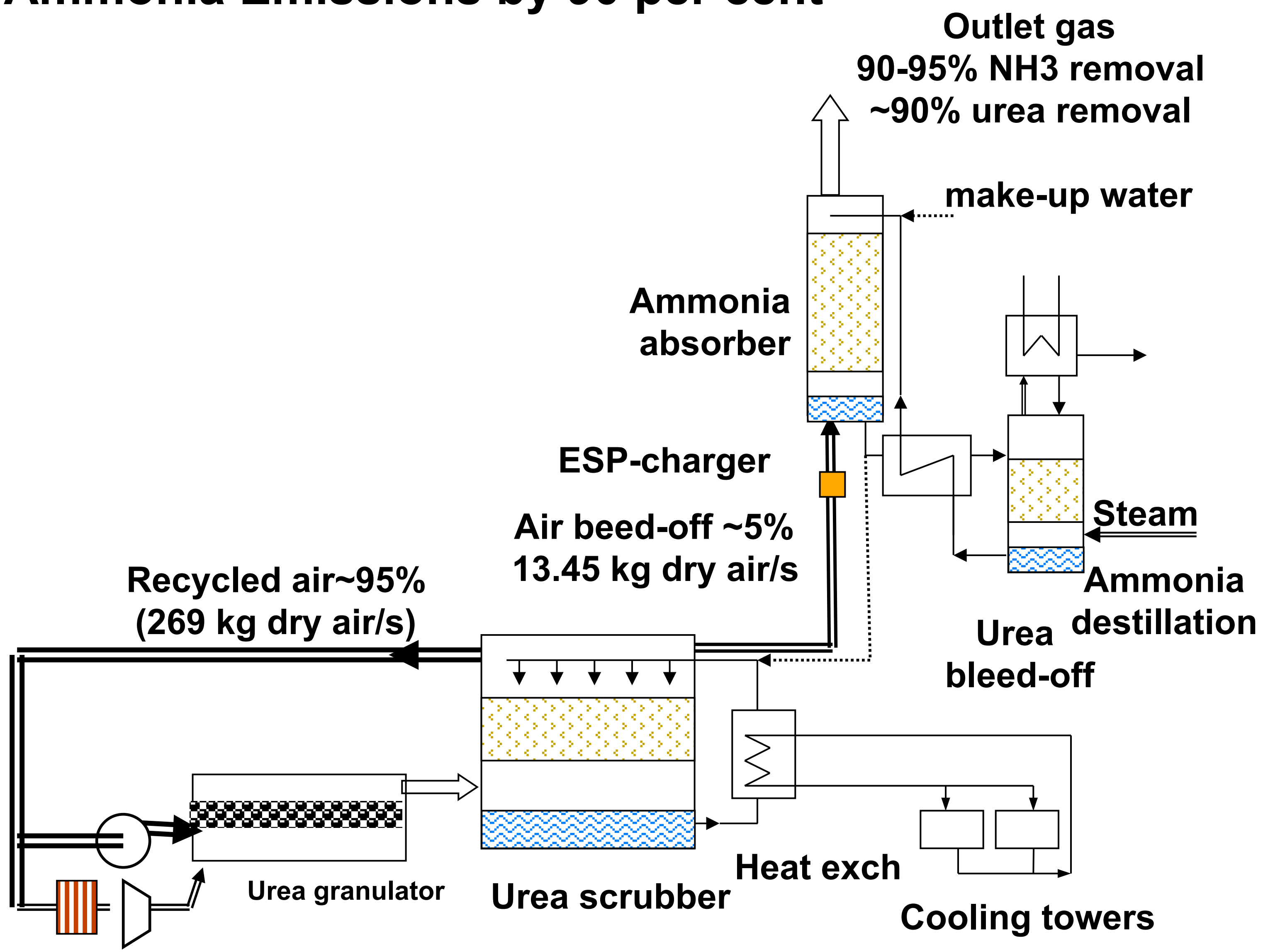
Implementation cost:

- €0.5mio or less = 5
- €1.5mio = 3
- €2.5mio or more = 1
- Weight 8

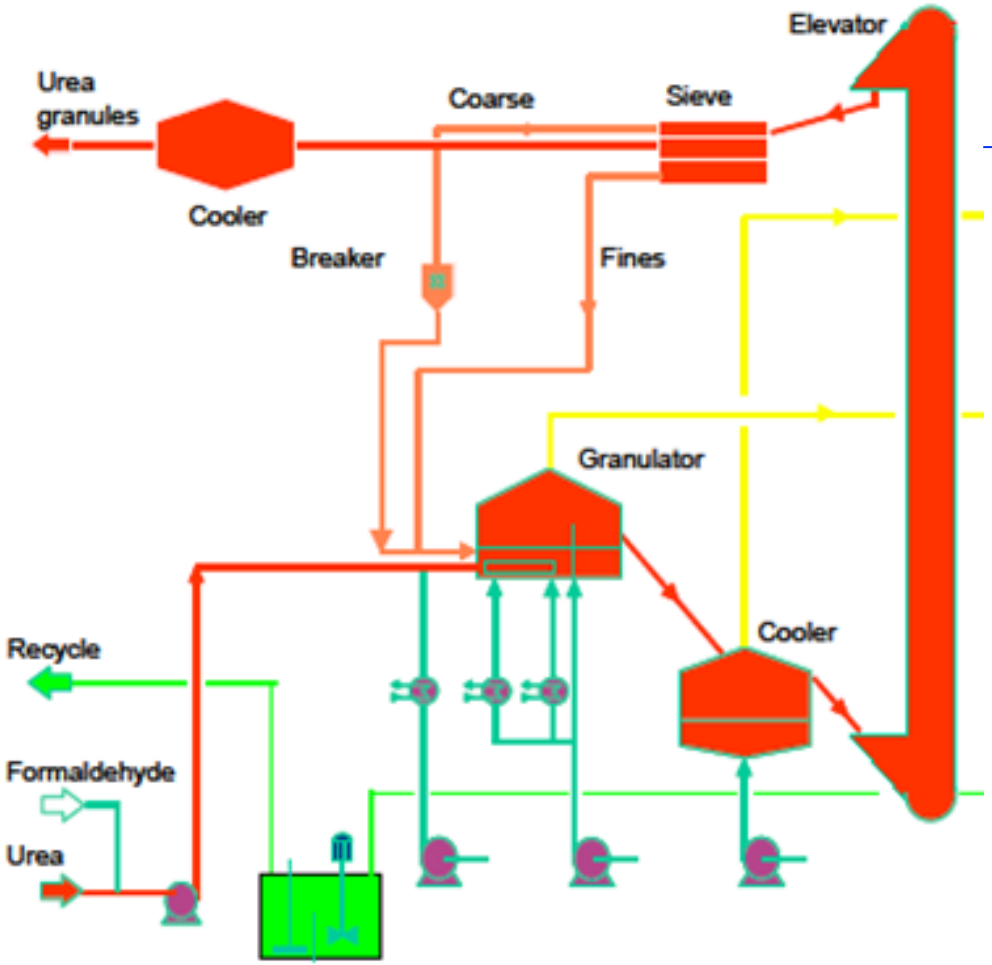
Patentability:

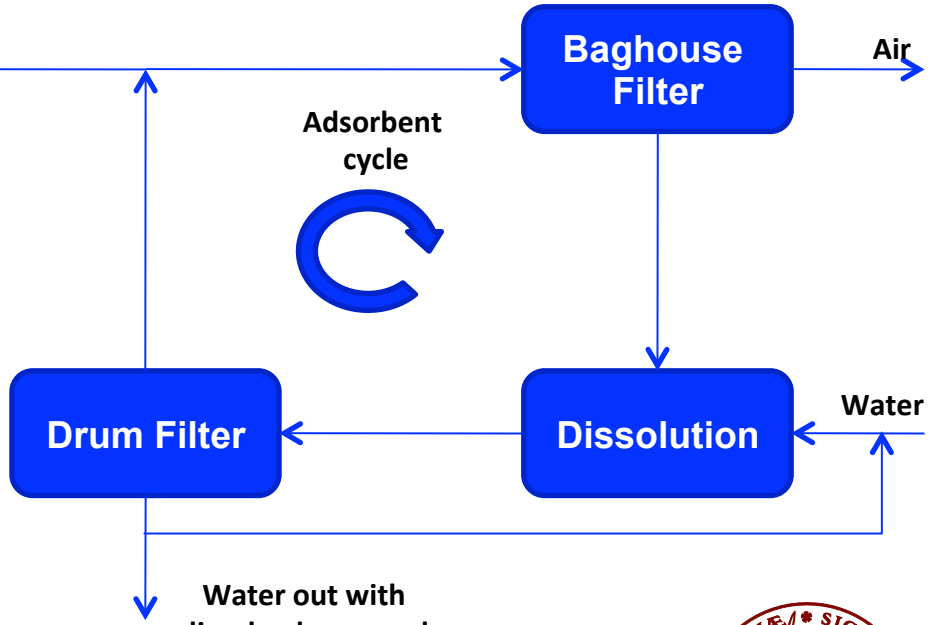
- Certain = 5
- Likely = 3
- Unlikely = 1
- Weight 4

The KTH solution – a Scrubber that reduces the Ammonia Emissions by 90 per cent

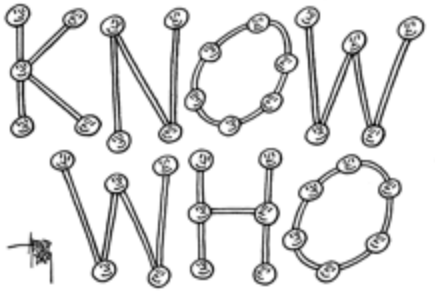


The winning solution reduces Ammonia Emissions by as much as 95 per cent – while recycling the ammonia back into the process





Sharing of IP



- Client as Applicant and Owner
- Whole University Team as Applicant and Inventor
  - Free license back for areas of application beyond urea manufacturing
- Client pays all costs related to patenting
  - Significant input required by the University Team
  - Good for University Team to get an international patent

0-6	Receiving Office (specified by the applicant)	Netherlands Patent Office (RO/NL)
0-7	Applicant's or agent's file reference	P90818PC00
I	Title of invention	REMOVAL OF AMMONIA IN UREA FINISHING
II	Applicant	
II-1	This person is	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	STAMICARBON B.V.
II-5	Address	Mercator 2 6135 KW Sittard Netherlands
II-6	State of nationality	NL
II-7	State of residence	NL
III-1	Applicant and/or inventor	
III-1-1	This person is	applicant and inventor
III-1-2	Applicant for	
III-1-4	Name (LAST, First)	KARLSSON, Hans T.
III-1-5	Address	C/o Dept. of Chemical Engineering Lund University SE-221 00 Lund Sweden
III-1-6	State of nationality	SE
III-1-7	State of residence	SE

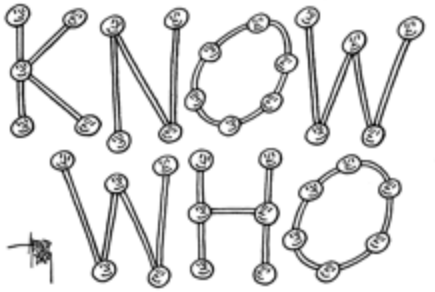
Acknowledgement of receipt

We hereby acknowledge receipt of your request for the processing of an internatio
to the Patent Cooperation Treaty as follows:

Submission number	500029953
PCT application number	PCT/NL2010/050069
Date of receipt	12 February 2010
Receiving Office	Netherlands Patent Office, Rijswijk

Name and Address

ELIASSON, Johanna
ERIKSSON, Ylva
Holmstrom David
Hulteberg, P. Christian
Nilsson Filip
Ojala, Frida
VAN DEN TILLAART, Johan, Albert, Arno



How could the Breakthroughs be accomplished?

- Very open communication with Project Owner and R&D
  - 10 no-go solutions shared very openly at the briefing session
- Quantity breeding Quality
  - 6 master students supported by 2 post-docs and 2 professors
- No prior know-how within the University Teams
  - Not blinded by experience
  - Blank sheet of paper approach
  - Tapping any available knowledge
  - Coaches having relevant but not topic-specific knowledge
- Benchmarking into fundamentally new industries
  - Dairy and food processing industry
  - Heat exchangers
- Curiosity
  - Open to fundamentally new solutions
  - Regular Questions & Answers shared by ALL Teams

"Sometimes the key to a creative breakthrough is a good old fashioned whack on the side of the head."

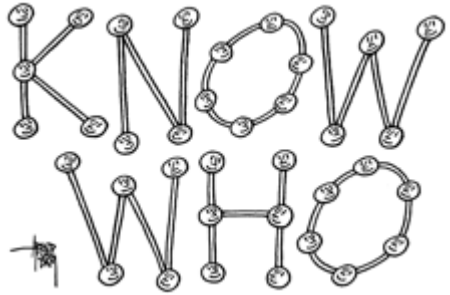
We developed a new product based on natural functional food ingredients, which won an Innovation Competition organized by the CEO

Unique selling points

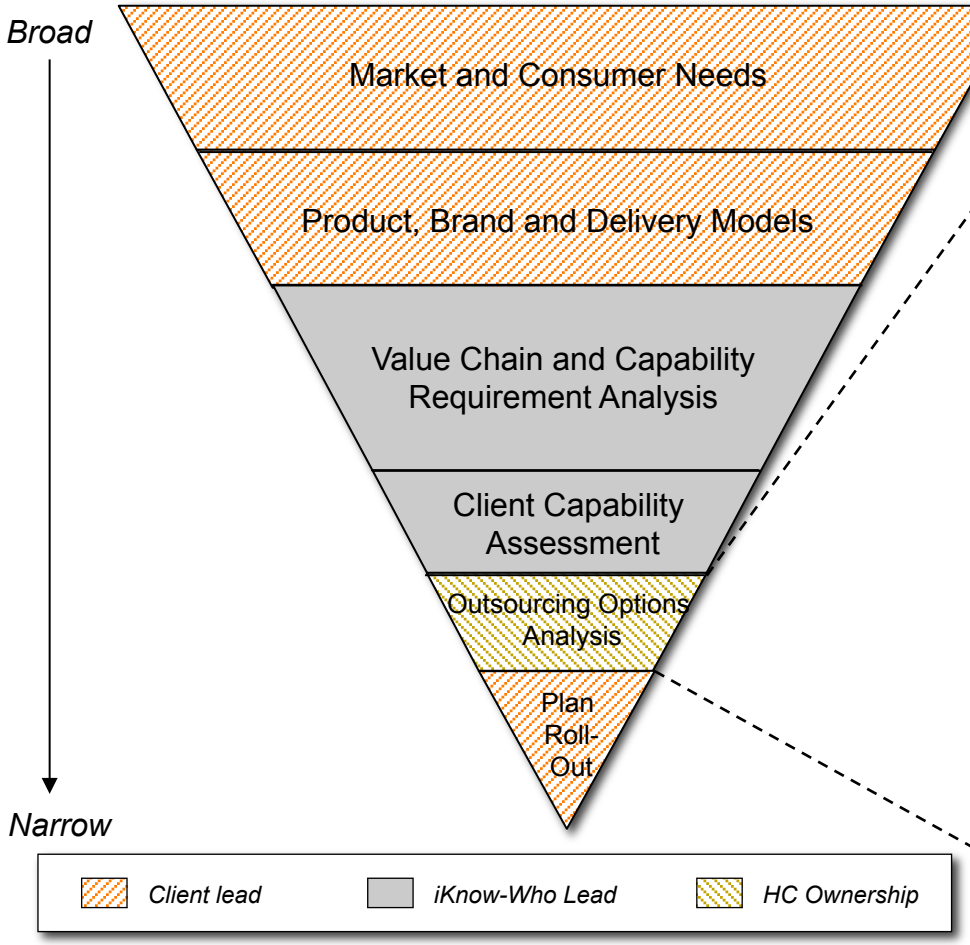
- Addressing the important pet wellness conditions
- Superior performance
  - Short and long term effect
  - Simple and generally understandable claims
  - Natural (as opposed to drugs and pills)
- Simplicity
  - Instantly compelling
  - Easy to understand for vets and pet owners
- Differentiating product format

	Liquid			Powder
	Water	Milk	Gel	
1. Skin and coat		✓		✓
2. Oral and digestive health		✓		✓
3. Increase energy		✓		✓
4. Weight control		✓		✓
5. Joint health		✓		✓

Due to an unexpected NIH reaction, iKnow-Who then took full responsibility for the outsourcing option analysis to identify a new R&D partner



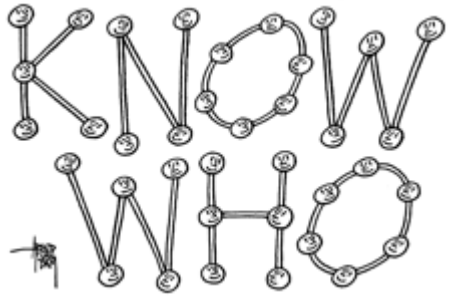
Conceptual Stages



Key Responsibilities

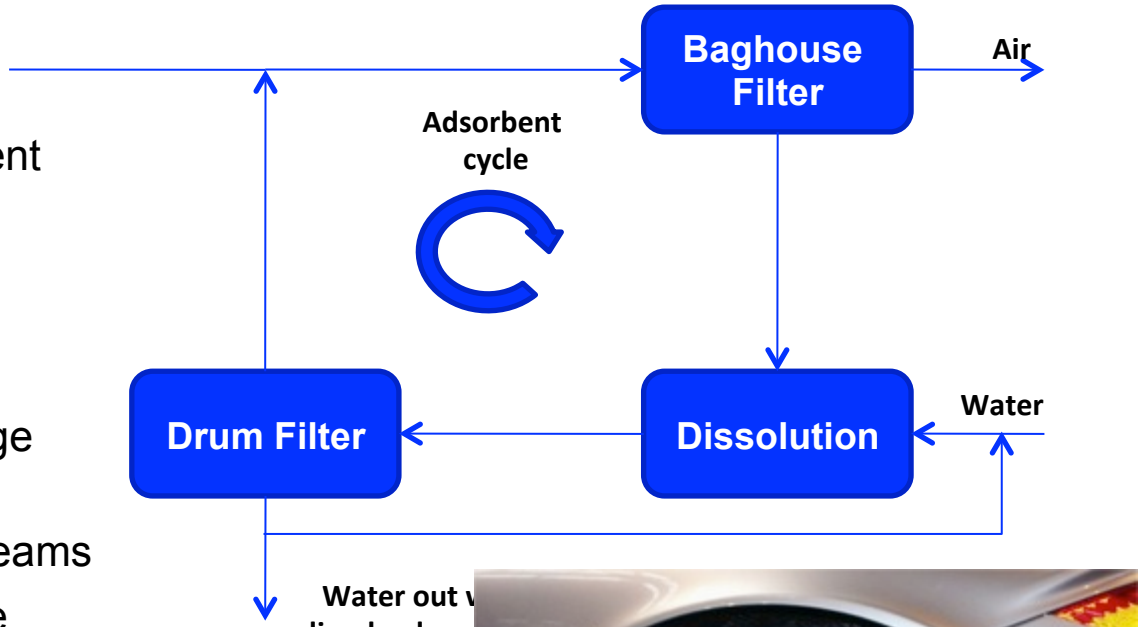
- Internal response: required development time of 24 months at a total cost of €3 million
  - *"By the way, it will never work"*
- Develop a set of screening criteria for each key partnership area
- Gather data on each partner against key criteria, and against a general set of qualifications
- Develop RFPs including full requirements, timings, criteria, and proof of concept
- Approach players with RFPs and begin negotiations
- Facilitate the match making process
- Total development time: 10 months, at the total development cost of €900.000

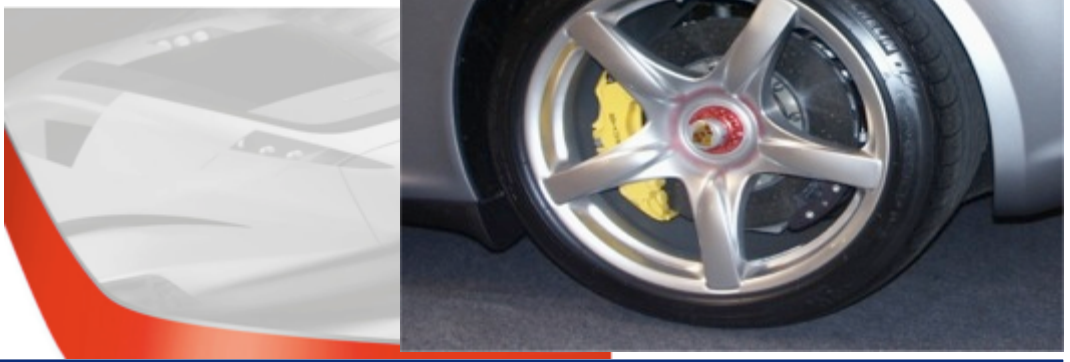
So what is a Perfect Innovation Challenge?



Important Parameters:

- Easy to describe and assess
  - Clarity of description and of goal fulfillment
  - Clear Criteria: Calibrated and Weighted
- Almost impossible to solve
  - Ideally, the company should have spent several years trying to solve the challenge
  - This will raise the speed of learning and cross-fertilization among the university teams
  - Internal employees will not gain the false feeling that their jobs are being outsourced – rather the opposite!
- Bringing the company forward if solved
  - Setting a clear signal of Innovation Leadership that secures profitable growth
  - Ideally making a positive contribution to the Planet when solved





IMPOSSIBLE IS JUST A BIG WORD THROWN AROUND BY SMALL MEN WHO FIND IT EASIER TO LIVE IN THE WORLD THEY'VE BEEN GIVEN, THAN TO EXPLORE THE POWER THEY HAVE TO CHANGE IT. IMPOSSIBLE IS NOT A FACT. IT'S AN OPINION. IMPOSSIBLE IS NOT A DECLARATION. IT'S A DARE. IMPOSSIBLE IS POTENTIAL. IMPOSSIBLE IS TEMPORARY.

IMPOSSIBLE IS NOTHING.