Now ........... for something completely different

• Common Interest:
  • Bicycles & cycling
  • Netherlands are the #1 bicycle & cycling country (DNA)
• Common Goal:
  • Academic “Bicycle” chair & professorship for “Cycling Science”
  • Embedded relationship industry/products ←→ university/science
  • Applied Research (versus fundamental research)
• Common Obligation:
  • Societal importance, relevance and urgency
Introduction

- 25 years bike industry experience
- 15 years experience with E-bikes and Pedelecs
- Last position: Director Product Development Giant Europe & Giant Inc. (Asia)
  - Asia (Taiwan & China) are the world’s workshop for bicycle production
  - Obligation: help trainees and graduate students
  - “Contract” Research
  - No embedded applied research
  - Poor results
- Symptomatic for Dutch / European / Global bicycle industry
- Food for thoughts
Which Direction is the Market for Mobility going to Grow?

- Mobility remains one of the most important Basic Needs for mankind
- A Living Condition, as is food
- People will never give up consuming mobility
- Will not accept any governmental intervention
- However …
- Consumption of traditional mobility has reached it’s limits
- And will rapidly change …

- For rational and at least as many irrational reasons
ROLE MODELS
- Netherlands & Japan have a cycling culture
- Amsterdam is a role model and guiding example for other metropolitan areas.
- Process is already on its way (e.g. Paris, London, Montreal, Chicago, Tokyo).
The Future of Two Wheeled Mobility

Netherlands 2009

- 16 million inhabitants
- **1,3 million bicycles** sold annually
  - of which 200,000 electric bicycles (16%)
- 18 million total bicycle park
- **400,000 cars**
- **40,000 GPT’s** (gas powered two wheelers)
Netherlands 2009

- Dutch Mobility System about to implode
  - Freeways
  - Public Transport
- > 75% of all Dutch people live in urban areas
- > 75% of all traffic movements in urban areas is < 5 km.
- In some cities (a.o. Amsterdam) modal split shows new increase for bicycle mobility
- > 50% of all traffic movements
- Mental Maps define consumer’s rationale for consumption of mobility:
  - Within urban area LEV 2-wheeler will become preferred means of transport
- Huge new & additional potential for LEV-mobility (2-wheels)
- In the end amount of LEV sales will largely compromise the sales of bicycles
EU 27 2009

- 500 million inhabitants
- 20 million bicycles sold annually
  - of which 700,000 electric bicycles (3%)
- 250 million total bicycle park

- 20 million cars
- 1.5 million GPT’s (gas powered two wheelers)
Japan 2009

- 120 million inhabitants
- **9 million bicycles** sold annually
  - of which 500,000 electric bicycles (6%)
- 70 million total bicycle park
- **6 million cars**
- **400,000 GPT’s** (gas powered two wheelers)
MOBILITY IS ABOUT TO CHANGE DRASTICALLY

Irrational Component
• FUN mobility
• CONVENIENCE mobility
• COMFORT mobility
• HIP & TRENDY mobility

Rational Component
• Clean mobility
• Efficient mobility
• Door-to-Door mobility
• Flexible mobility
• Distance adjusted mobility
• Smart mobility
• Compact mobility
MOBILITY TREND
• Compact Mobility →
  • Micro Mobility →
    • 2-Wheel Mobility →
      • Eco-Mobility →
        • E-Mobility →

LEV-MOBILITY
• Personal / Individual
• Very Light
• Agile and flexible
• Electric
• Vehicles (2-Wheels)
• Automotive styling
What does the Consumer really want?

- In densely populated areas > 75% of all traffic movements < 5 km.
- Qualitative consumer market research in Netherlands, Germany, Japan
- Therefore smart, modern, demanding consumers look for:
  - Personal & compact mobility
  - Clean mobility, that is at the same time:
    - highly functional (door to door transport)
    - fun to ride
    - “No-Sweat” fitness & exercise
  - Electric mobility
  - Modern styling (automotive)
  - Light weight (< 30 kg.)
  - Easy to manoeuvre
  - Easy to handle
  - Easy to park
  - Easy to lift
  - Easy and flexible to use
  - Dedicated, adjusted to the distance to be covered
What does the Consumer really want?

PHYSICAL SPECS

- Footprint ≤ 1 m²
- Weight ≤ 30 kg. (handling / manoeuvrability)
- Door to door flexibility (parking / lifting)
- Range ≥ 40 km. (sufficient for 1 full day trips)
- Max. speed less important (25 ~ 30 km./h.)
- Max. torque more ≥ 40 Nm.
- Max. power ≥ 250 Watt

- → LEV 2-Wheelers
75% of all traffic movements in metropolitan areas is within a range of 5 to 10 km. Consumers will clearly and massively opt for Light Electric 2-Wheelers in 3 overlapping categories:

1. **Pedelecs**
   - Pedal Assist, < 25 km./h., < 250 Watt

2. **Power-On-Demand E-bikes**
   - Pedal & Throttle Assist, < 32 km./h., < 500 Watt

3. **Light Electric Scooters**
   - Throttle Assist, < 35 km./h., < 1 KWatt
Consumer related Future Developments for LEV’s

1. PEDELECS = Pedal Assist, < 25 km./h., < 250 Watt
Consumer related Future Developments for LEV’s

2. POWER-ON-DEMAND E-BIKES = Pedal & Throttle Assist, < 32 km./h., < 500 Watt
Consumer related Future Developments for LEV’s

3. LIGHT ELECTRIC SCOOTERS = Throttle Assist only, < 35 km./h., < 1KWatt
Europe’s (EU 27) long term potential for LEV’s

LONG TERM 2020 – 2025

- Smart consumer use: “distance dedicated” type of mobility consumption
  - 15 million bicycles annually sold (mainly trip < 5 km.)
  - 15 million 2-Wheel LEV’s annually sold (mainly trip < 15 km.)
  - 15 million cars annually sold (mainly trip > 15 km.)

*** General increase cycling and 2-wheeler usage included!!!
*** Consumers changing over from Gas Powered 2-wheelers to LEV-2-Wheelers included!!!
Societal Relevance & Urgency

WORK IN PROGRESS

• Drive Train systems
• Smart & elegant frame constructions (compact, foldable)
• Energy technology & storage
• Consumer Interfacing & Fuzzy Logic
• Traffic Safety & Infrastructure (parking)
• Bike sharing and/or battery sharing systems
EMBEDDED APPLIED RESEARCH

- Italian Universities’ close cooperation with Italian Motorcycle Industry
- University of Padova: V. Cossalter
- Politecnico di Milano: S. Savaresi
THESIS

• Hen & Egg (no questions, no offerings)
  • academic "Bicycle" chair would be an incentive
• Lack of real bike industry in Western World
• Success rate is very low
• Bicycles are "low tech" and NOT sexy to research
• Incremental product development, what is there to break through?
THANK YOU FOR YOUR TIME & ATTENTION