

Research Methodology

MTech (CSE) – Aug-Dec 2022

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R versus D versus M

■ Research:

- *... is the process of going up alleys to see if they are blind*
- infinite number of problems but only finite resources
- challenge is to say no

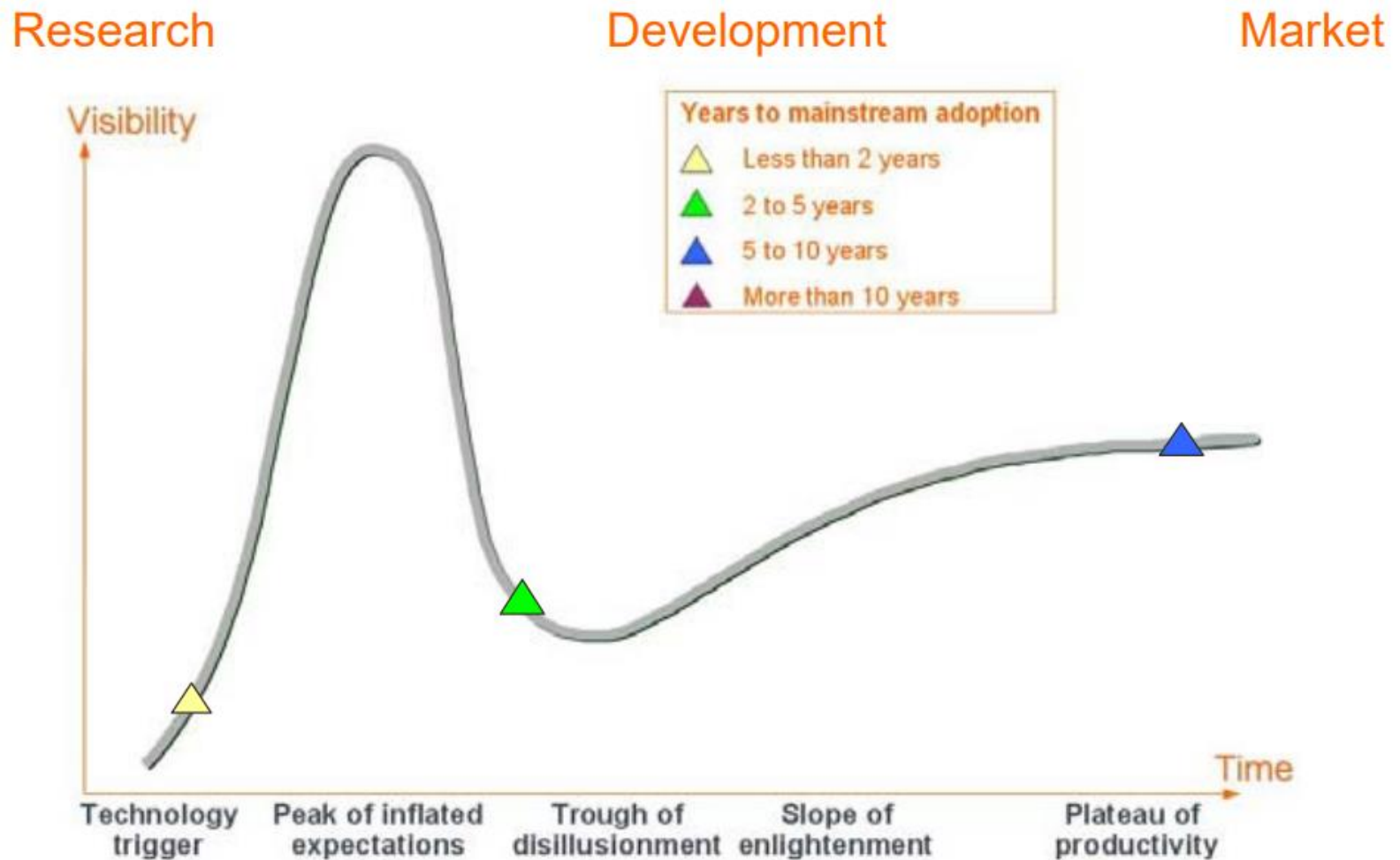
■ Development:

- *... is too boring for research and never sufficiently fast for marketing*
- Murphy's law loves development as the devil lies in the detail
- challenge is to deliver

■ Market:

- *... is to make people buy things they don't actually need*
- marketing has much more in common with research than with development
- challenge is to predict

Time-to-Market

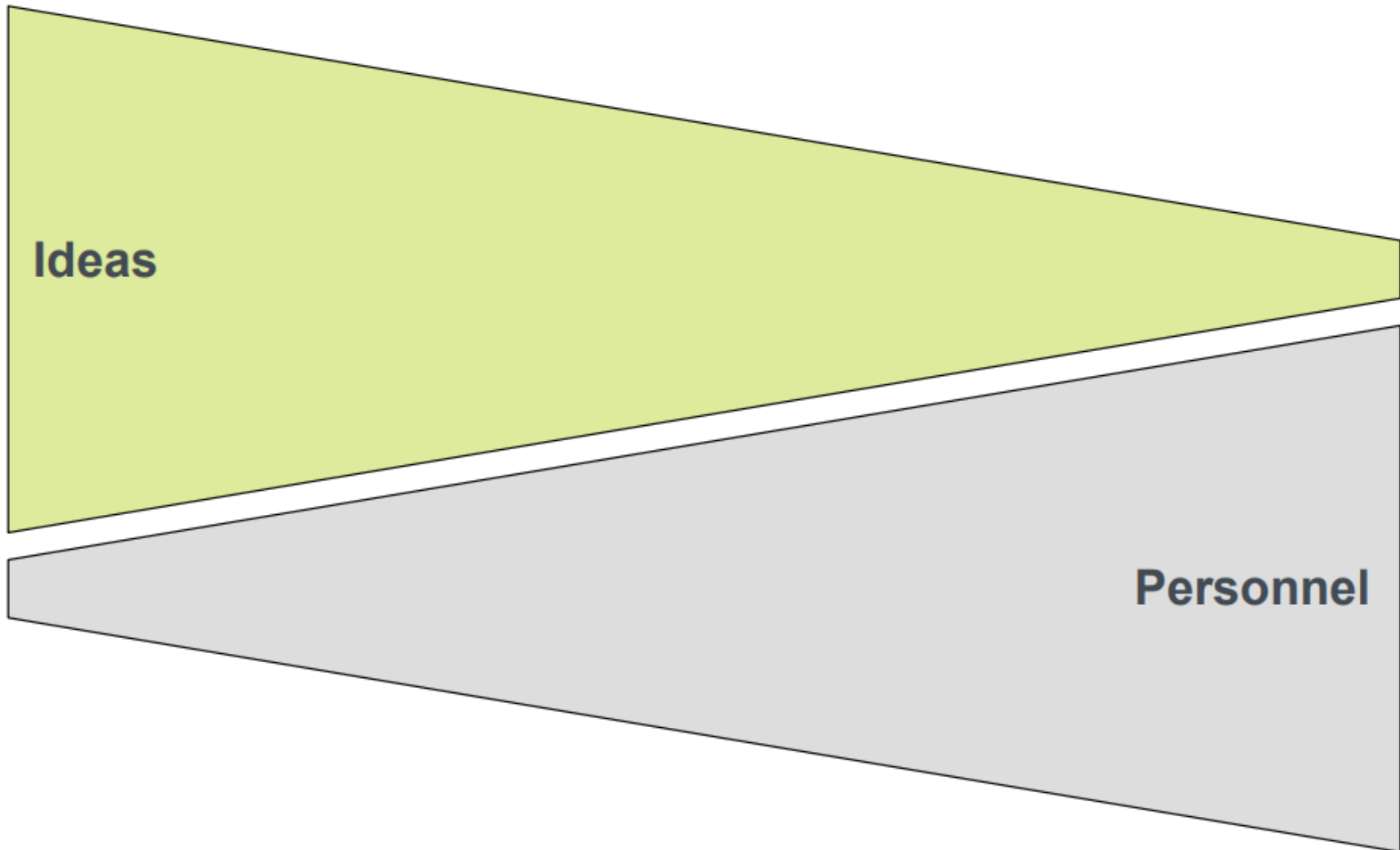


The Ideas Pyramid

Research

Development

Market



Problems First, Please! [1/5]

■ Problems in Mathematics:

- Hilbert presented 23 unsolved problems at Mathematician conference in 1900
- 4 remain unsolved (proof to Riemann's Hypothesis is currently being examined)
- Mathematics poses problem first and then tries to find solution

■ Solutions in Engineering:

- Engineering often tries to find a solution to a problem which is not yet known
- as per David Goodman, we would gain rethinking this typical approach
- leads to hype as solutions are hoped to fit all problems

■ Example issues understood but yet still researched/hyped:

- ad hoc networks
- ultra-wideband systems
- cognitive radios and networks
- green communications

Problems First, Please! [2/5]

■ Ad Hoc Networks:

- 40 years of research has not yielded any mass market application
- infinite degrees of freedom, hence infinite research
- research efforts would be better of elsewhere



Green Communications

- ICT sector is responsible for about 2% of green house gases
 - telecom sector probably accounts for a small percentage of these 2%
- Reshaping focus:
- mobilizing ICT sector to save energy is a great idea
 - however, it would be better off being a facilitator
 - e.g., help decreasing consumption of transportation, even if ICT increases

Peer Review

- **Peer review**, sometimes referred to as **refereeing**, is the process of evaluating submissions to an academic journal. Using strict criteria, a panel of reviewers in the same subject area decides whether to accept each submission for publication.
- **peer assessment** is a process where your peers provide you with feedback on something you've written, based on a set of criteria or benchmarks

Autonomous Car: A new kind of transportation

- make personal transportation safer, cleaner, and more enjoyable—for everyone
- mobility-as-a-service
- handle the driving, charging, maintenance, and upgrades for their fleet of vehicles

ZOOX: Built for Riders, Not Drivers



Safety →



Communicates with sound and light

More

- Durability test video
- Technology readiness
- Insurance and Society inputs
- Accident scenarios ??? (autonomous car behaviour v/s human driven cars)