



**University of Stuttgart**  
Stuttgart Wind Energy (SWE)  
@ Institute of Aircraft Design

## Research Is Formalized Curiosity (Zora Neale Hurston)

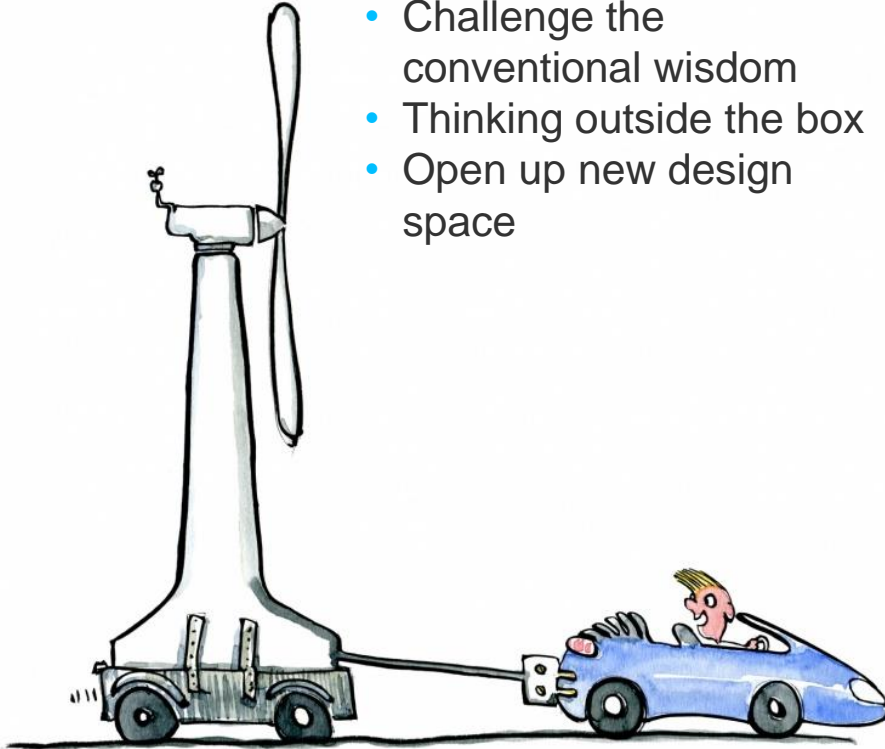
How We Measure Success of Research  
Programs

Po Wen Cheng



# Successful Research Programs are Bold

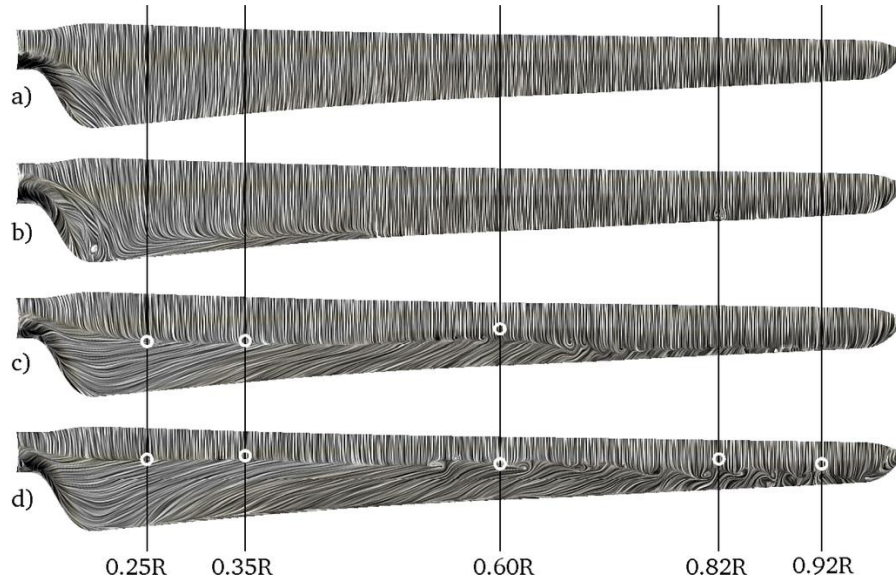
- Challenge the conventional wisdom
- Thinking outside the box
- Open up new design space



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# Successful Research Programs are Balanced

The need to balance long-term fundamental research that enhances the physical understanding of the energy conversion process



With applied research on engineering design challenges that can lower the cost of energy





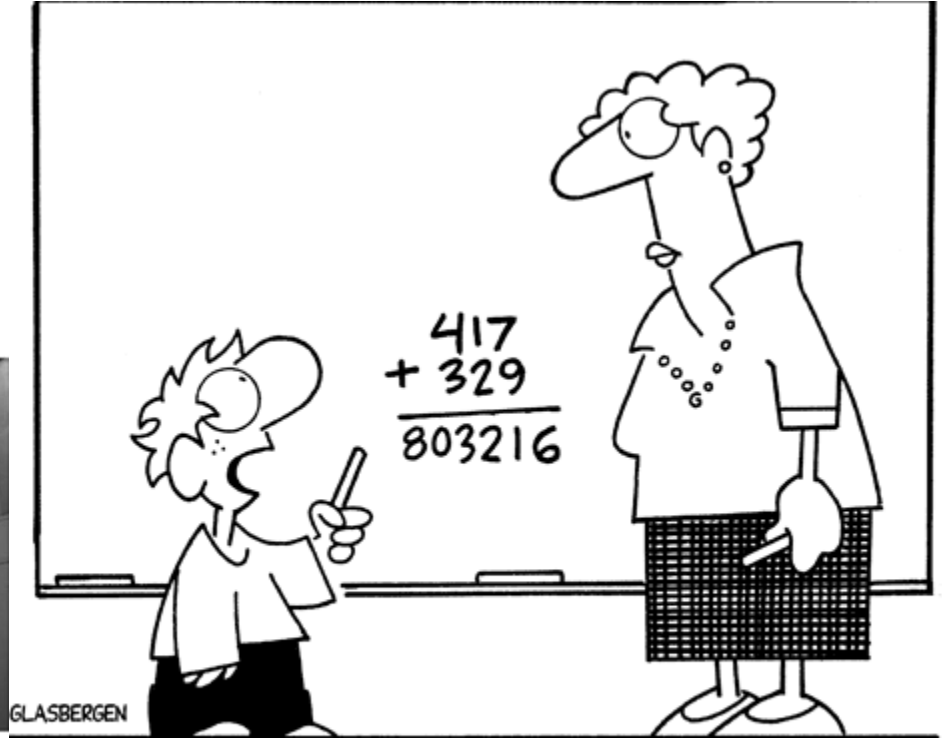
# Successful Research Programs show

## Persistence

Persistence is not stubbornness.

Persistence is about sticking to the right thing and keep on insisting until it succeeds

## Open Jet Facility Wind Tunnel



**“My dad says persistence is the key to success. So I’m going to keep giving you the same wrong answer until it becomes the right answer!”**

# Successful Research Programs are

## Flexible

Research programs and facilities need to adapt to the need of the research community, industry and policies in order to advance the technology. Flexibility is not research without a clear aim but the ability to adapt to the changing environment

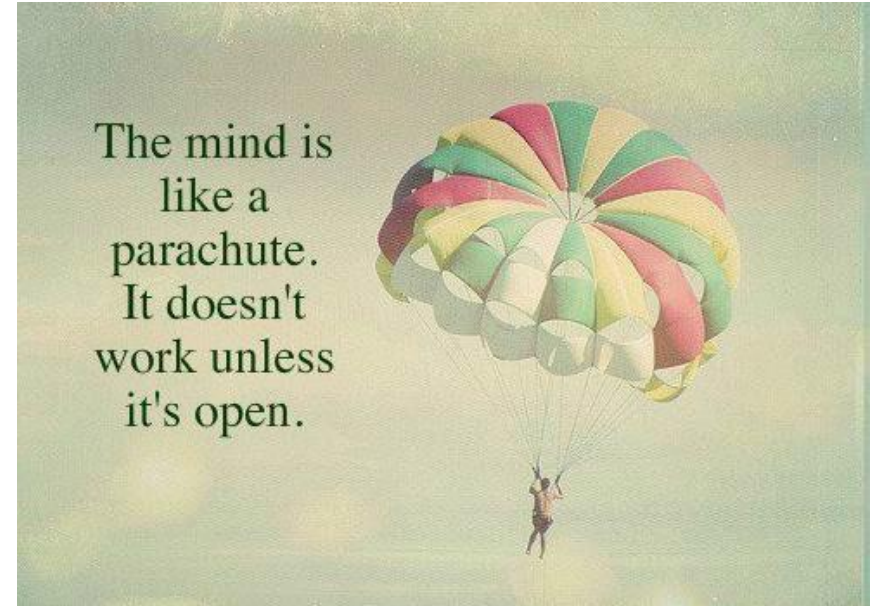




# Successful Research Programs embrace Openness and Diversity



Diversity is not just different appearances but different ways of thinking, different perspectives, different disciplines



Openness to different opinions, to different ideas, to different experiences

**We need to put the focus both on the technical and human aspects**

To Engineer is Human (to err also)

“We could virtually end all risk of failure by simply declaring a moratorium on innovation, change, and progress.”

“The computer is both a blessing and curse for it makes possible calculations once beyond the reach of human endurance while at the same time also making them virtually beyond the hope of human verification.”



## **A Side Note:**

### **The Forgotten Beginning of the Offshore Wind Energy:**

**WE-10 Hütter Algaier  
Wind Turbine  
Installed  
on an Oil Platform at  
the Gulf of Mexico by  
the former US  
company 'Automatic  
Power Inc.', Houston**

