

# Thinking out of the box



First Annual Scialog Conference  
Biosphere 2  
Oracle, AZ, 13 October 2010



# Innovation

# Innovation

**exploiting new ideas leading to a new product or method  
(a change in the thought process for doing something)**

# Innovation

**innovation requires whole-brain thinking:**

- **right-brain imagination and creativity**
- **left-brain logic and planning**

# Innovation

**how can we foster/teach innovation?**

# Innovation

Think of something you are good at — something you *know* you do well — and that has played an important role in the advancement of your career.

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*How* did you become good at this?

# Innovation

**Became good at it by:**

- **practicing**
- **doing it**
- **trial and error**
- **getting it wrong at first and learning from mistakes**



# Innovation

**Probably NOT by:**

- **being trained**
- **being taught**
- **listening to experts**
- **reading about it**

# Innovation

**Think of the most exciting research advance (discovery?)  
you have made to date.**

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you have made to date.**

**What were the circumstances that led to this advance?**

# Innovation

**Did you apply for funding (for “transformative” research) *before* this advance/discovery, or afterwards?**

- 1. before**
- 2. afterwards**

# Innovation

**Nobel Prize in Physics 2010**

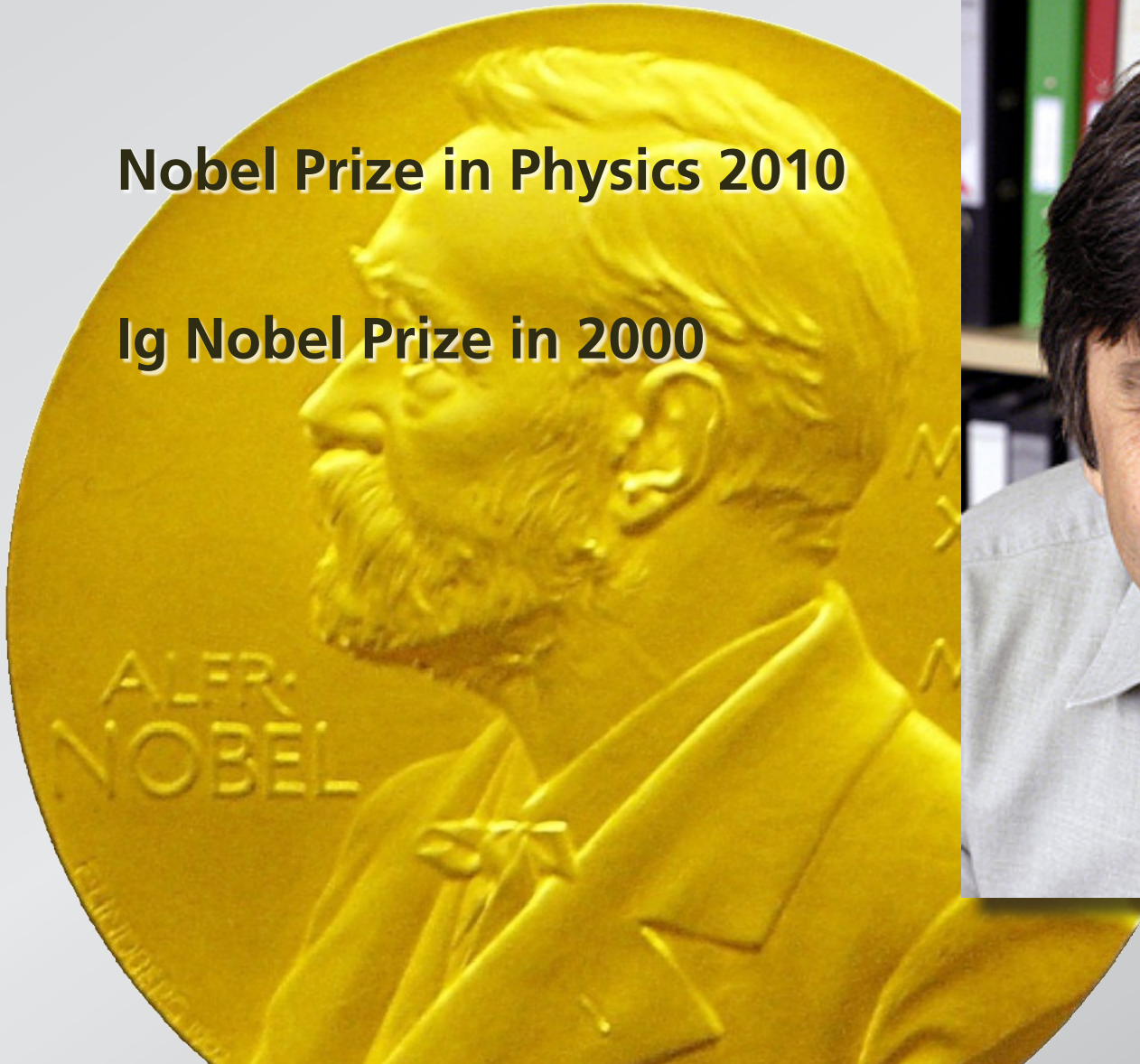




# Innovation

**Nobel Prize in Physics 2010**

**Ig Nobel Prize in 2000**



# Innovation

**“For me it’s very boring to work  
on the same thing year after year...”**



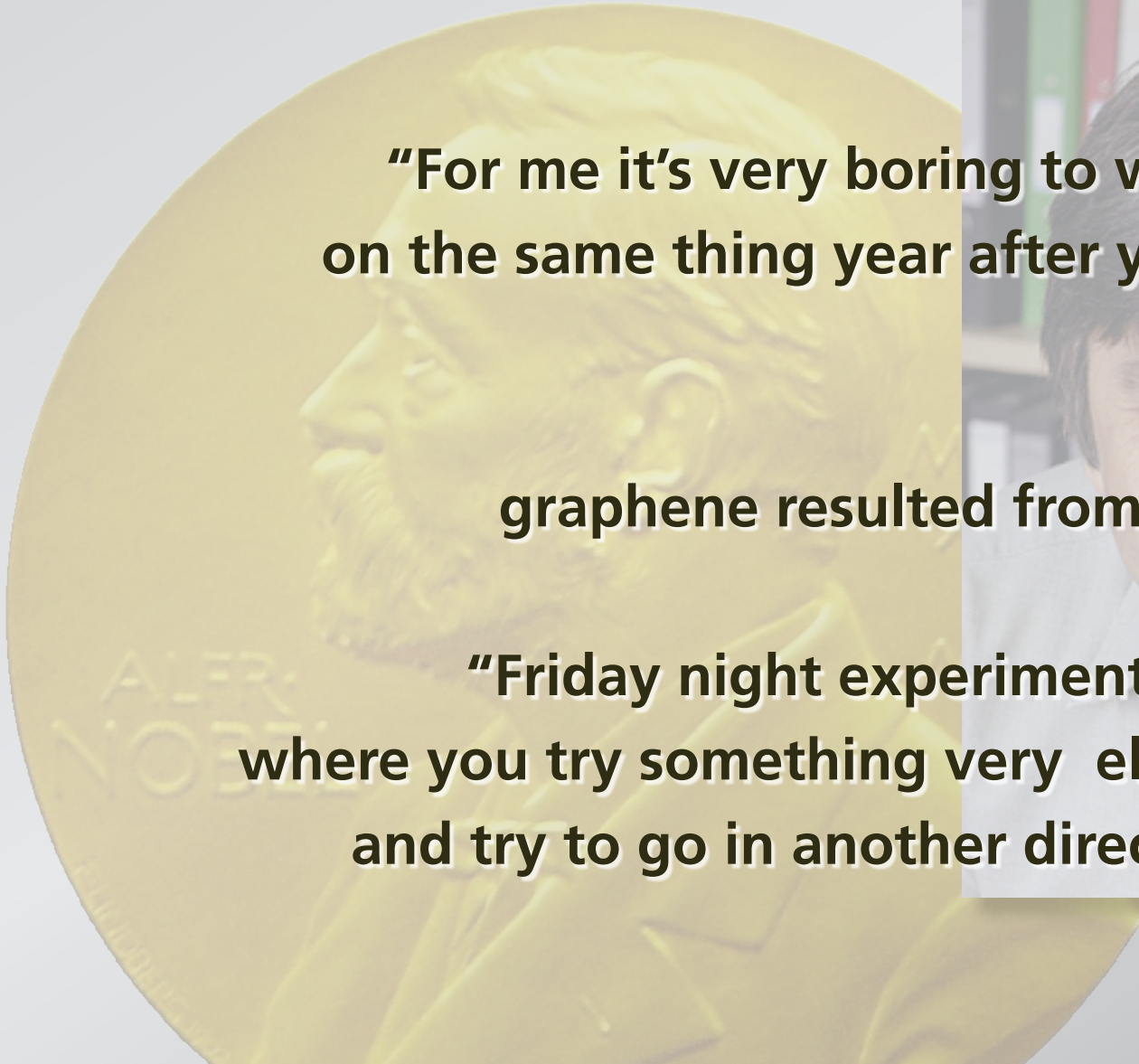
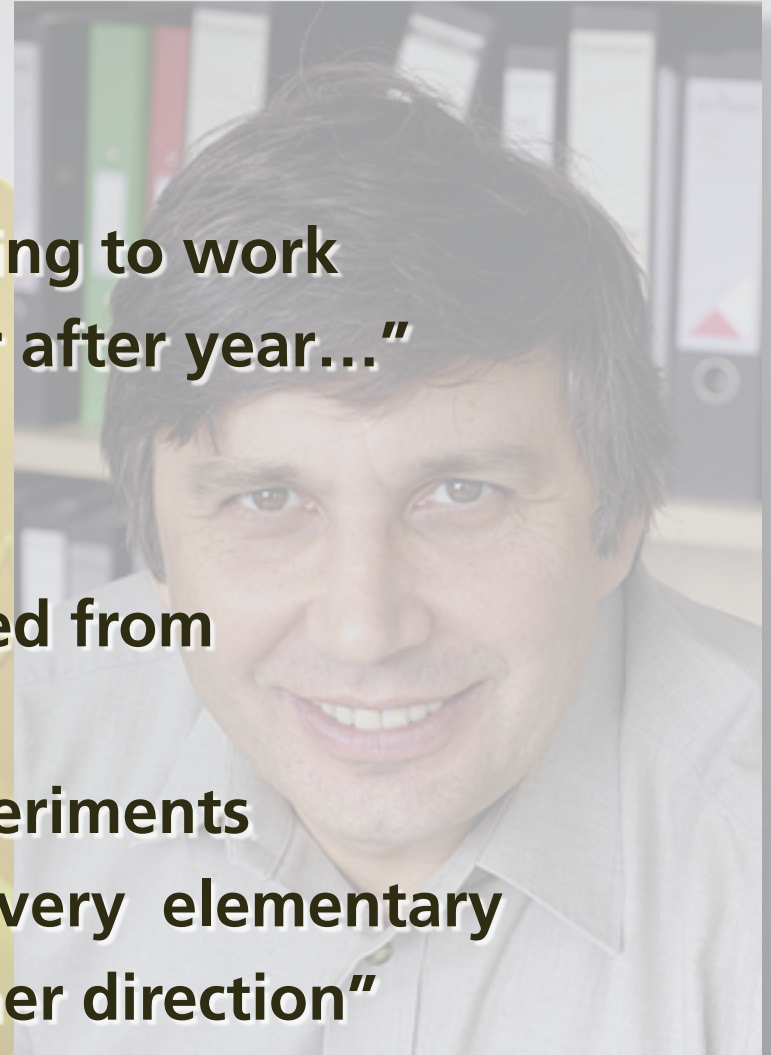


# Innovation

**"For me it's very boring to work  
on the same thing year after year..."**

**graphene resulted from**

**"Friday night experiments  
where you try something very elementary  
and try to go in another direction"**





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