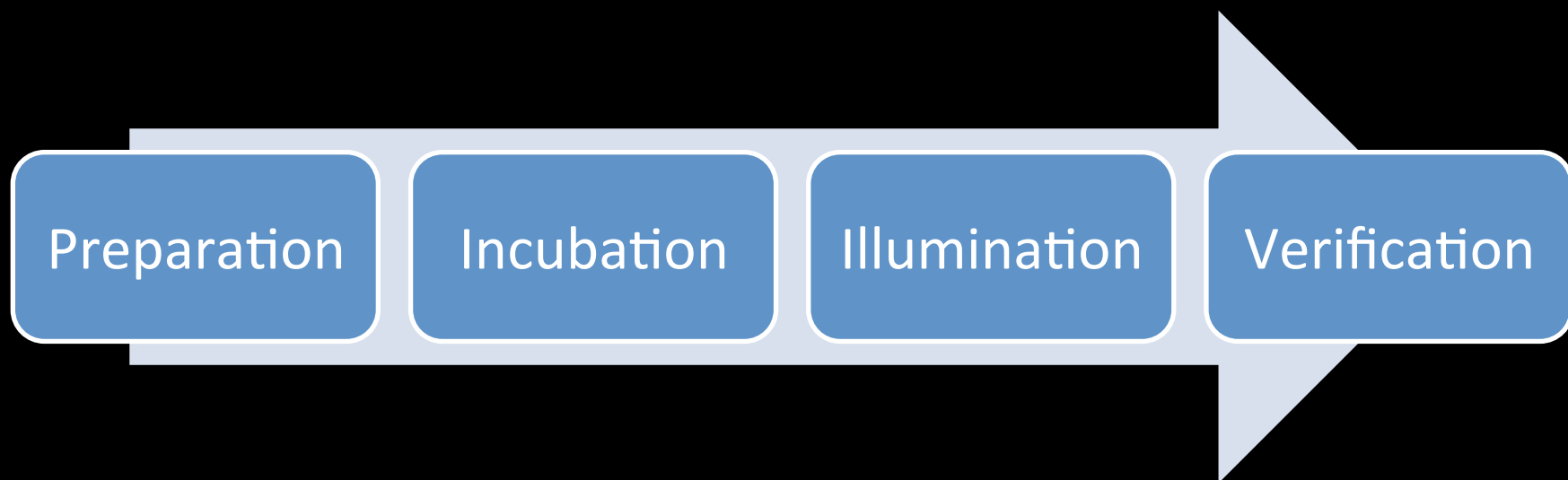




The *ex-nihilo* problem:

“something comes out of nothing”

The Creative Process



[Wallas 1926]

What is the difference between
creativity and innovation?

“...*creativity* implies coming up with ideas, it’s the ‘bringing ideas to life’... that makes *innovation* the distinct undertaking it is.”



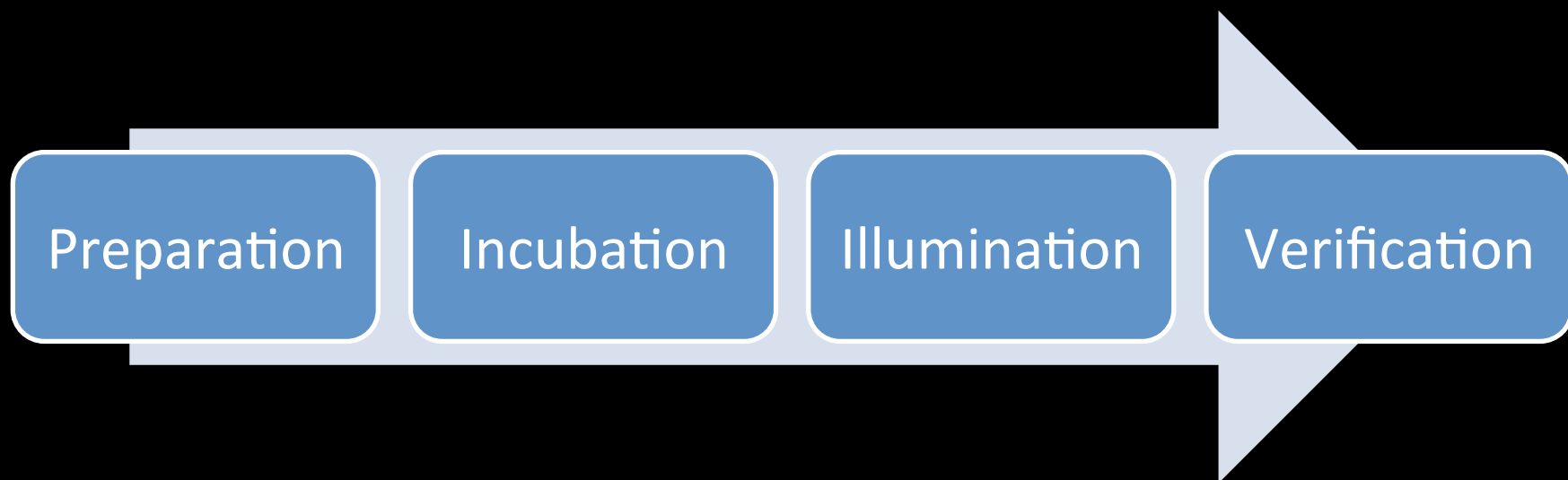
Davila, Epstein and Shelton (2006).

Is creativity important in engineering? Why or why not?

“Creativity... is an indispensable quality for engineering, and given the growing scope of the challenges ahead and the complexity and diversity of the technologies of the 21st century, creativity will grow in importance.”

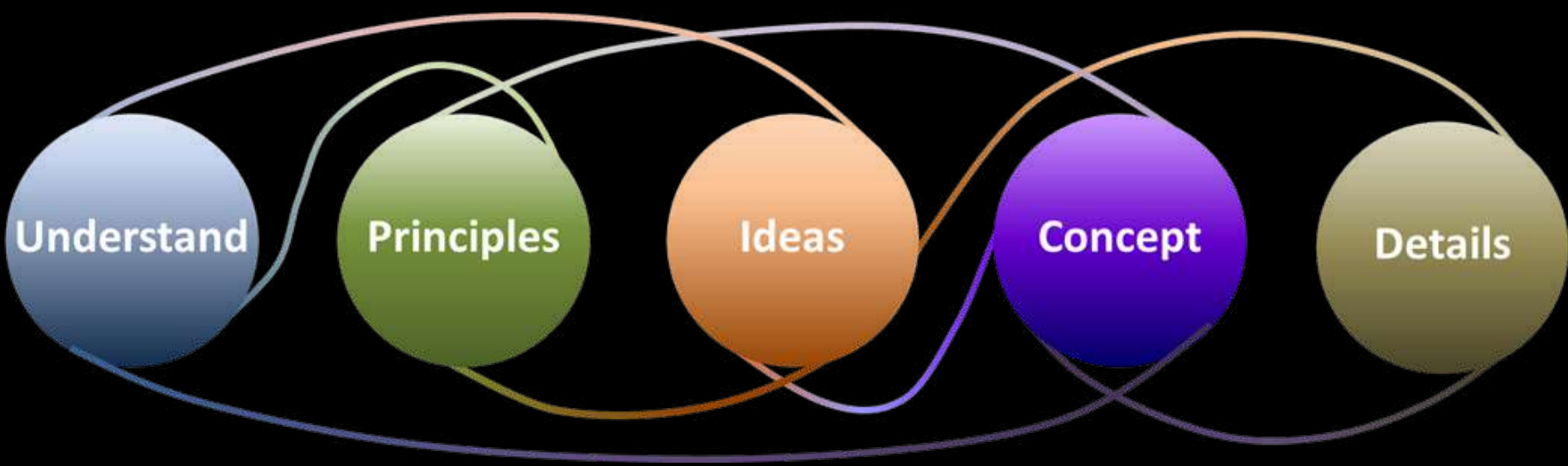
[The National Academy of Engineering 2004]

The Creative Process



[Wallas 1926]

Innovative Engineering Design Process



[Lau 2013]

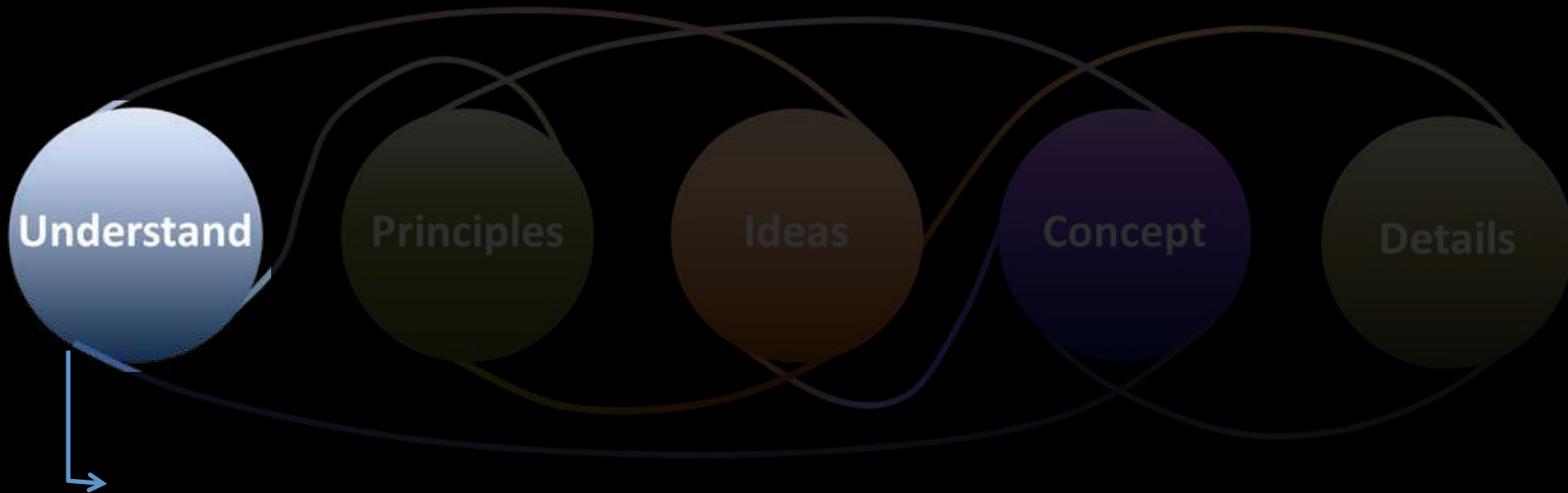
5 steps to help you be more creative

1. Spend time *understanding* the problem
2. Look at the problem from different perspectives
3. Spend time learning about the world around you
4. Work in an inter- or multi- disciplinary team
5. Work in a creative environment

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Spend time understanding the problem



- Ask both what ask why!
- Use ethnographic methods
 - Observations
 - Interviews
 - Data Analysis
 - Need vs. Want

Engineering Innovative Design Process

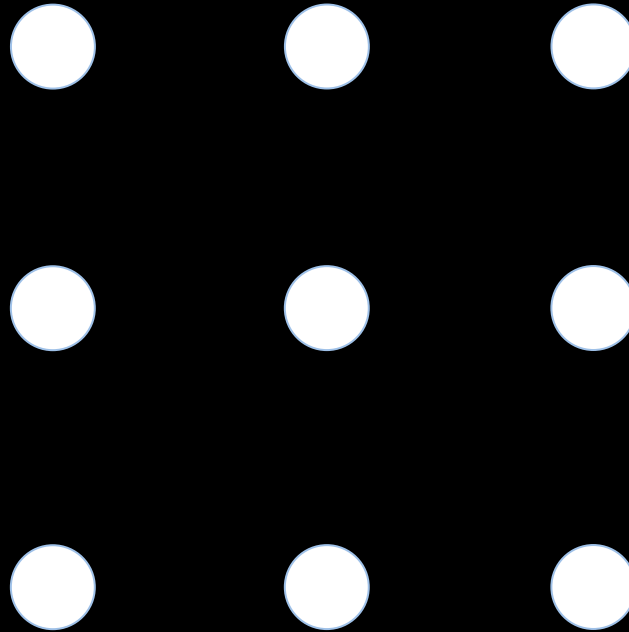
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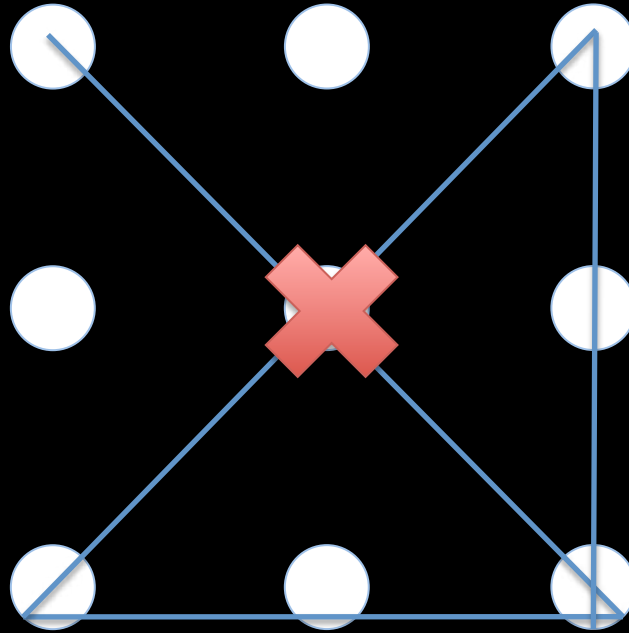
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2. Look at the problem from different perspectives

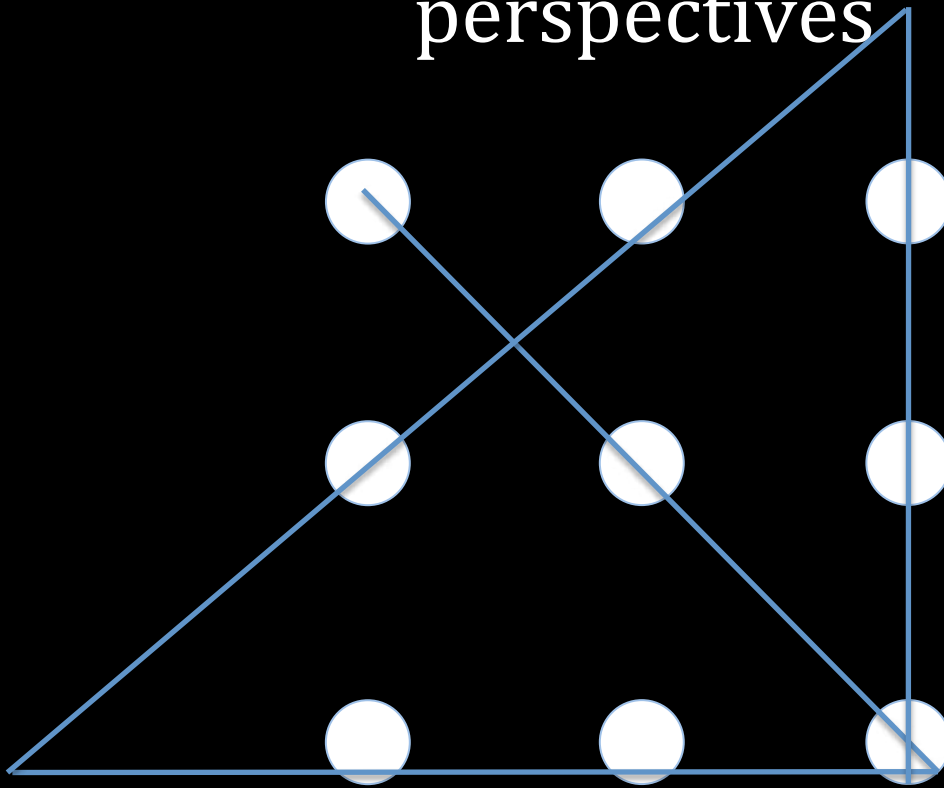


Connect the 9 dots drawing four straight, continuous lines that pass through each of the nine dots, and never lifting the pencil from the paper

2. Look at the problem from different perspectives



2. Look at the problem from different perspectives



Think outside the box!

Design fixation: a **blind** adherence to a set of ideas or concepts limiting the output of conceptual design

[Jansson and Smith, 1991]

2. Look at the problem from different perspectives

- Use a **variety** of Creativity Techniques to encourage 'out of the box' thinking:

Examples:

Brainstorming

C-Sketch

TRIZ

Scamper

6-3-5

5 steps to help you be more creative

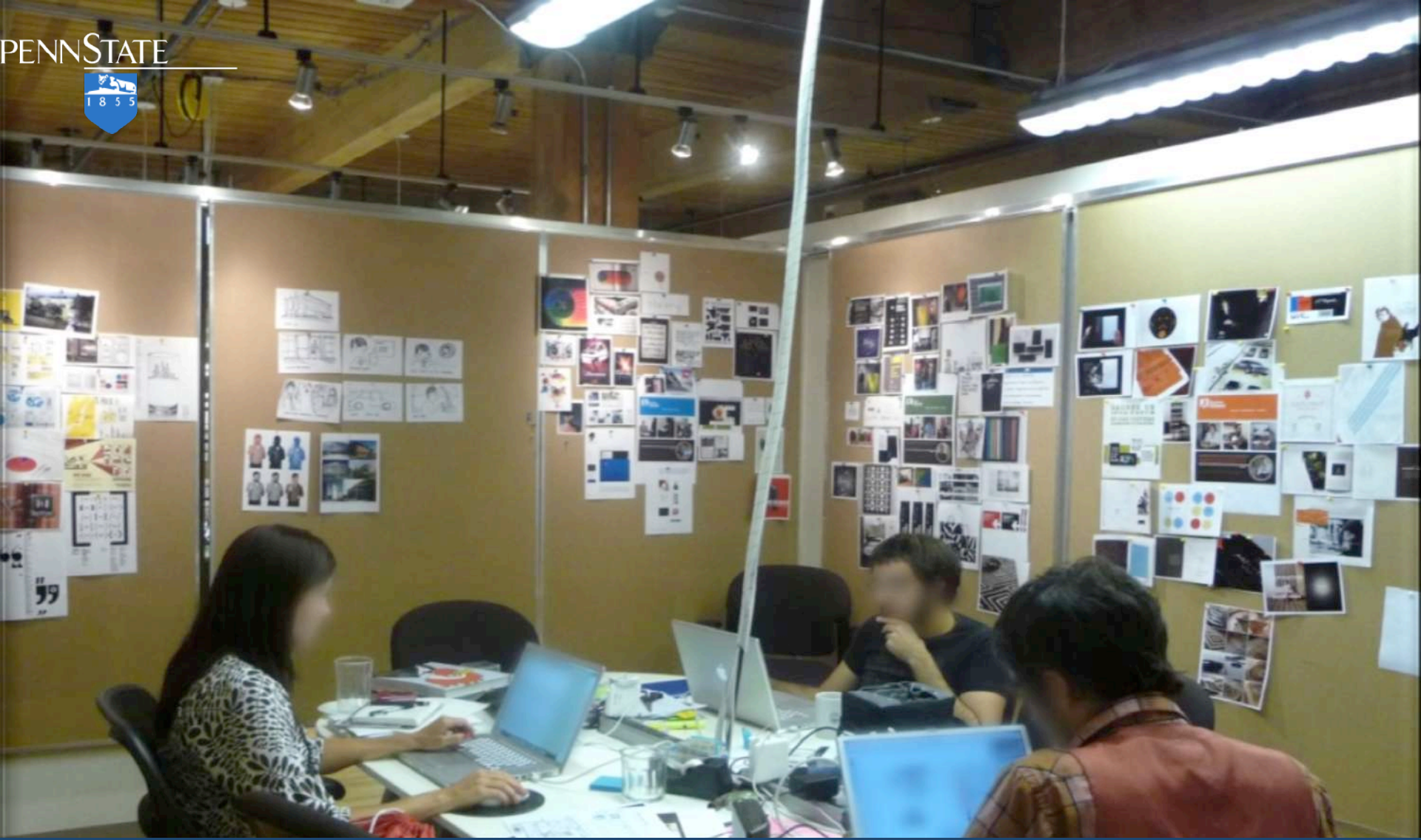
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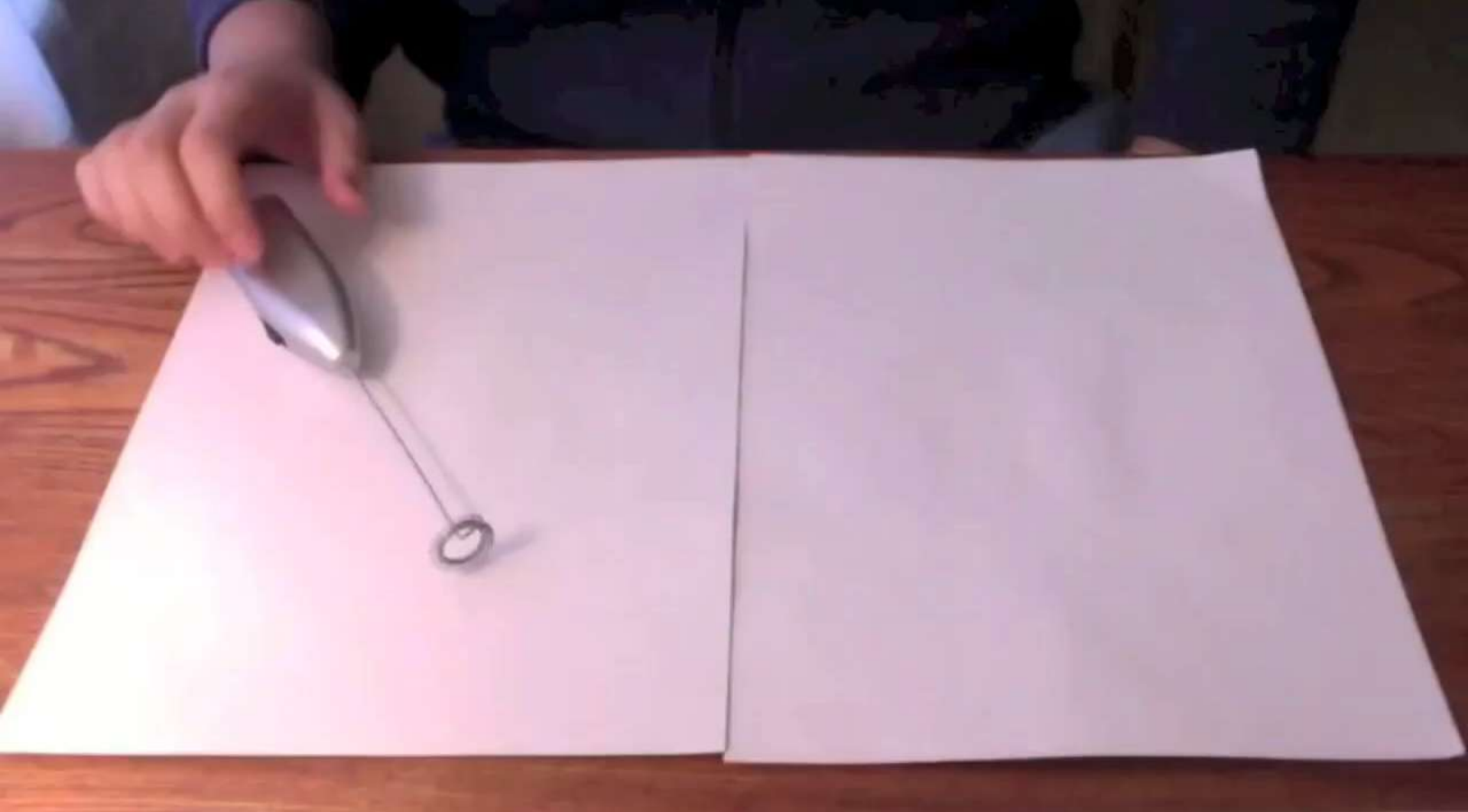
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“Too often, the obsession is with ‘inventing’ something totally **unique**, rather than extracting value from the creative understanding of what is already known.”

—Bill Buxton



Examples are frequently used in design practice



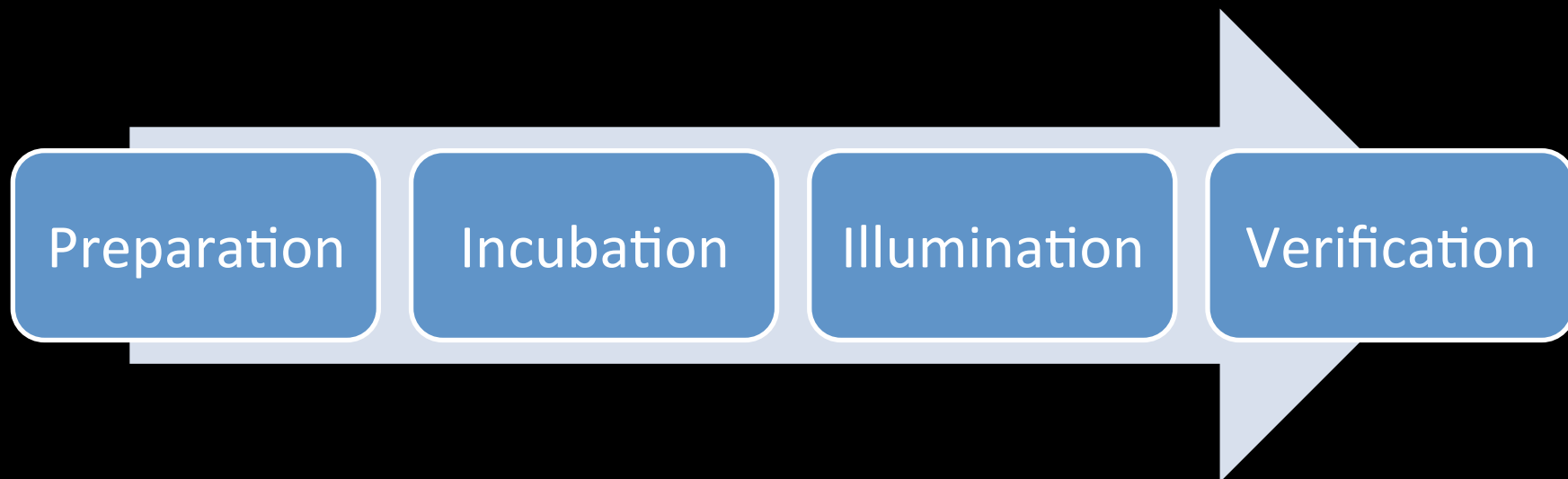
Product Dissection

... helps students understand the product and its properties

[Wood, 2001; Lamancusa & Gardner, 1999; Grantham et al., 2010]



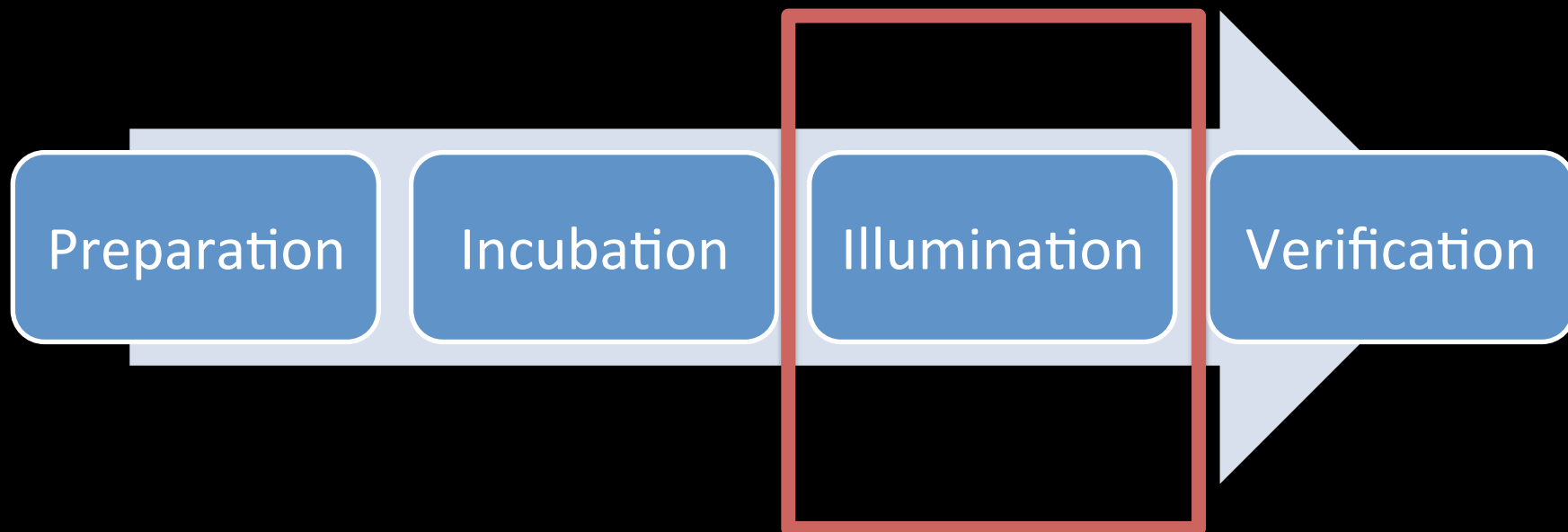
3. Spend Time Learning About the World Around you



Wallas (1926)



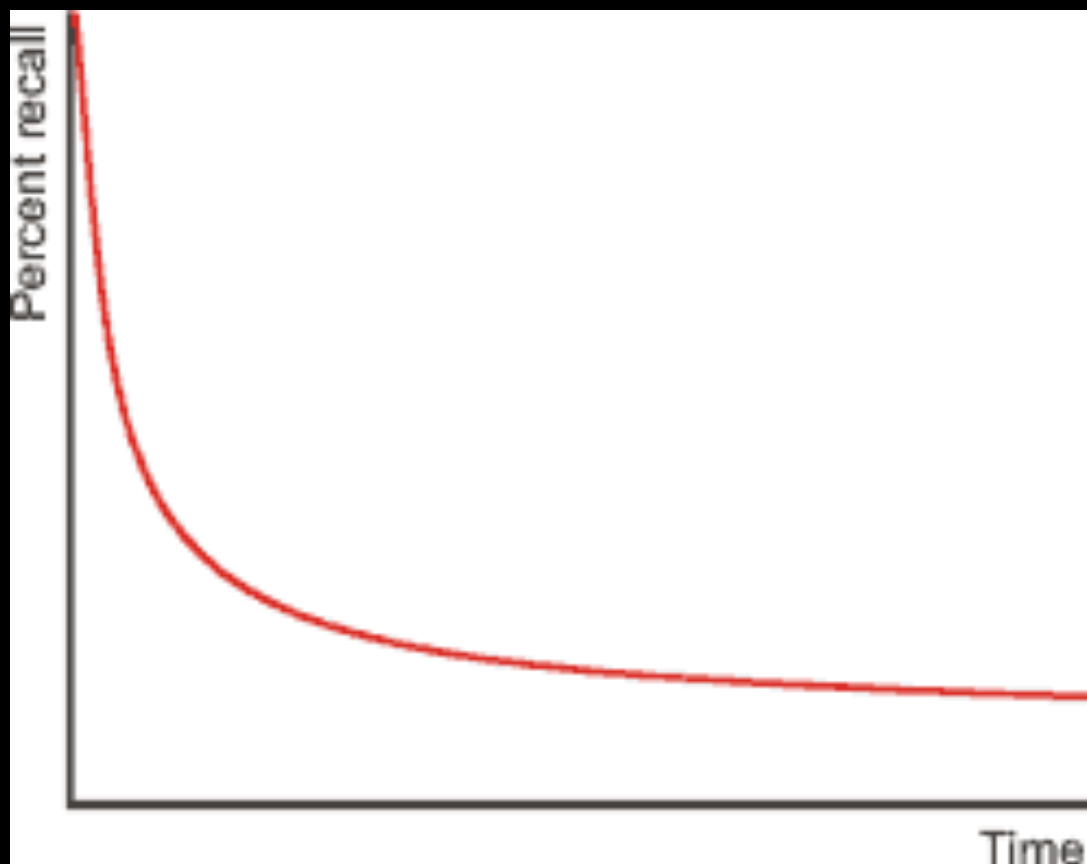
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3. Spend Time Learning About the World Around you



[Ebbinghaus 1885]

5 steps to help you be more creative

1. Spend time *understanding* the problem
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4. Work in an inter- or multi- disciplinary team
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5 steps to help you be more creative

1. Spend time *understanding* the problem
2. Look at the problem from different perspectives
3. Spend time learning about the world around you
4. **Work in an inter- or multi- disciplinary team**
5. Work in a creative environment

4. Work in an inter-disciplinary team

- Spend time understanding the problem
- Look at the design problem from multiple perspectives
- Spend time learning about the world around you





4. Work in an inter-disciplinary team



5 steps to help you be more creative

1. Spend time *understanding* the problem
2. Look at the problem from different perspectives
3. Spend time learning about the world around you
4. **Work in an inter- or multi- disciplinary team**
5. Work in a creative environment

5 steps to help you be more creative

1. Spend time *understanding* the problem
2. Look at the problem from different perspectives
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4. Work in an inter- or multi- disciplinary team
5. **Work in a creative environment**

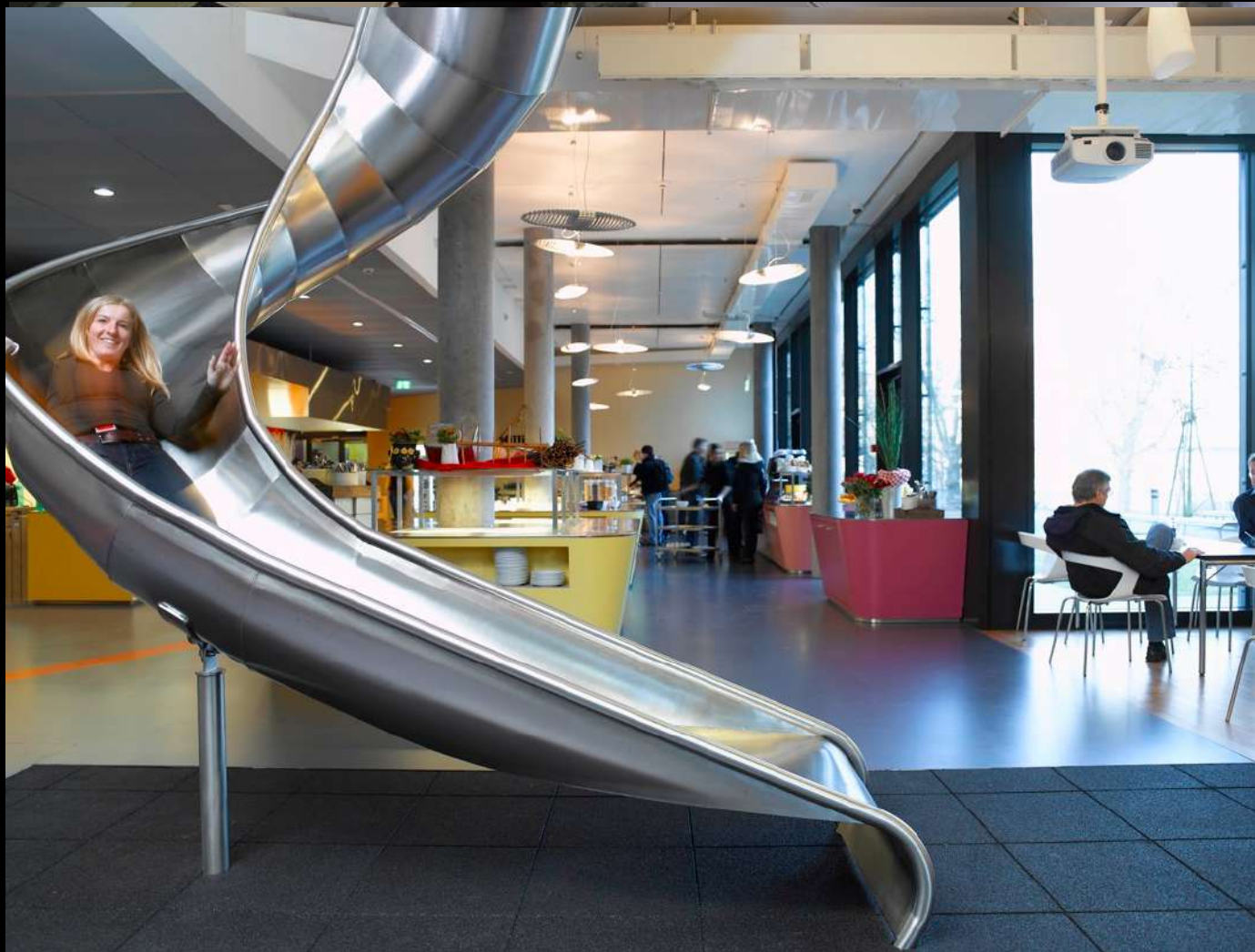
5. Work in a creative environment



The creative *space*!



5. Work in a creative environment



The creative *space*!



5. Work in a creative environment



The creative space!



5. Work in a creative environment



The creative atmosphere!



5 steps to help you be more creative

1. Spend time *understanding* the problem
2. Look at the problem from different perspectives
3. Spend time learning about the world around you
4. Work in an inter- or multi- disciplinary team
5. Work in a creative environment

References and Resources

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Hardboiled hat:

<http://www.halslamppost.com/Miscellaneous%20Mining%20Items/slides/Bullard%20Hard%20Boiled%20Hat%20Ad%201931%20Hendrie%20&%20Bolthoff%20Catalog.htm>

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