



GE105

Introduction to Engineering Design

College of Engineering

King Saud University

Lecture 8.

Creativity: Thinking Outside the Box

SPRING 2016

Before We Start

“The best way to have a good idea is to have **a lot of ideas.**”

Linus Pauling (Nobel Laureate)



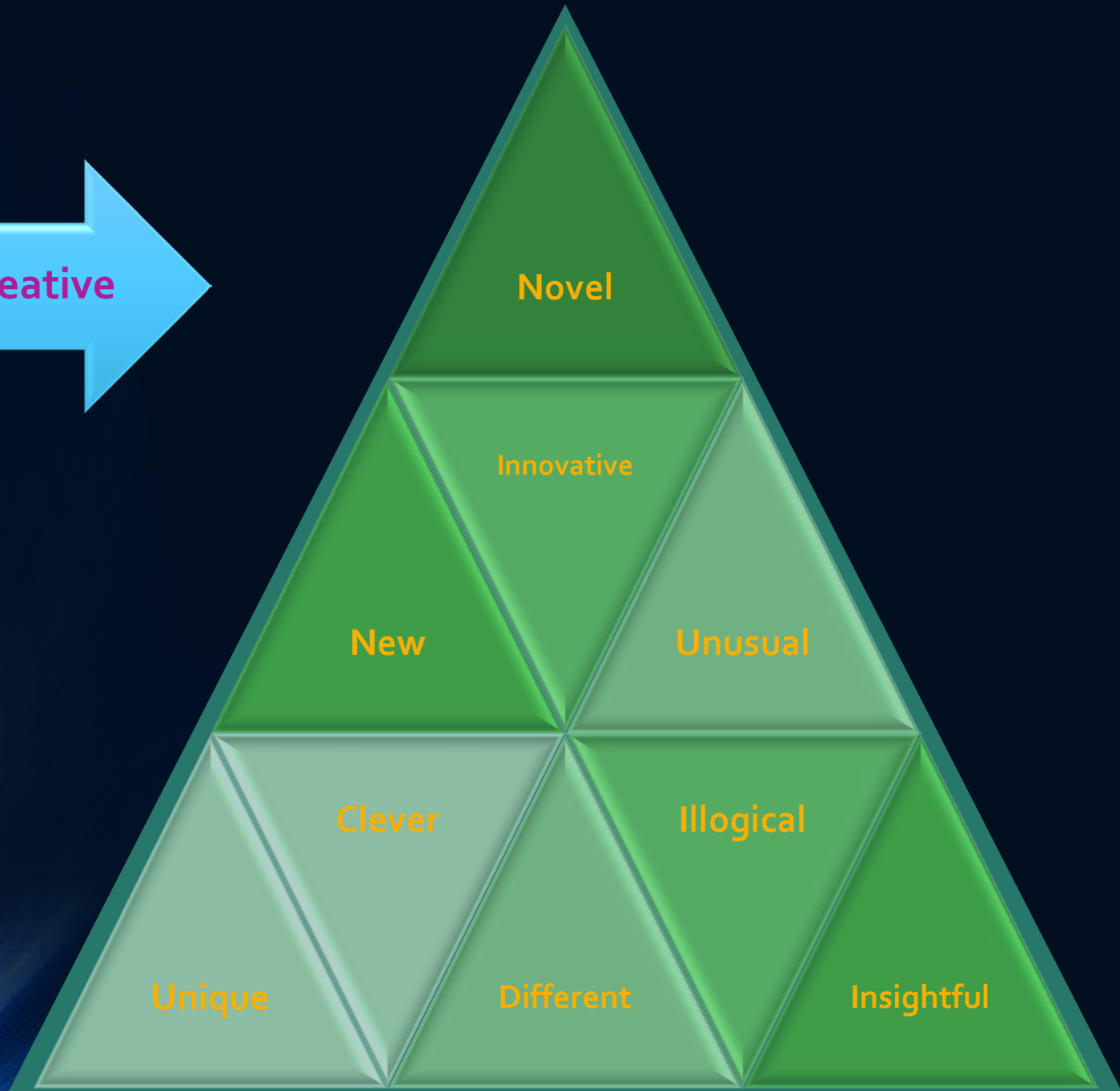
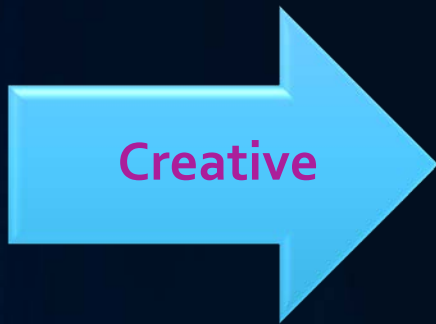
“Nothing is more dangerous than an idea when it is the **only one** you have.”

Emile Chartier (French Philosopher)

Creativity

- A mental process involving the generation of new ideas or concepts, or new relations between existing ideas or concepts
- It is both: an *art* and a *science*
- It is doing things in a “non-normal” way





Creativity

Innovation

Invention

Creativity is the capability or act of conceiving something original or unusual.

Innovation is the implementation of something new.

Invention is the creation of something that has never been made before and is recognized as the product of some unique insight.

Creativity is a skill; innovation is a process

Thinking Outside the Box

A “box” confines and **restricts thinking**.
A creative person is not confined to a box,
but sees opportunities outside the box.



Creative thinking (Lateral)

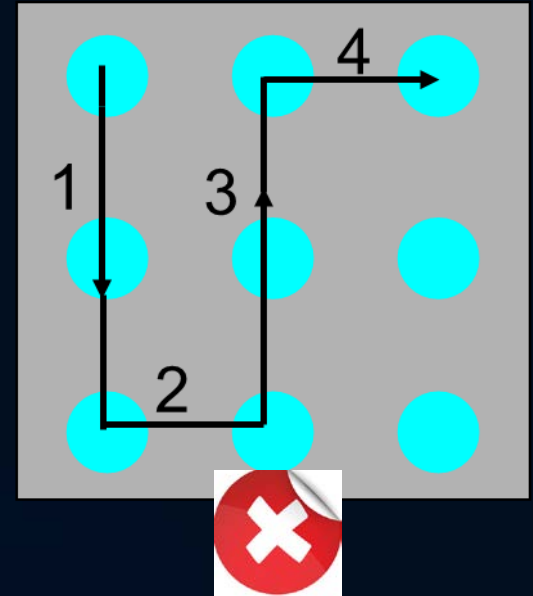
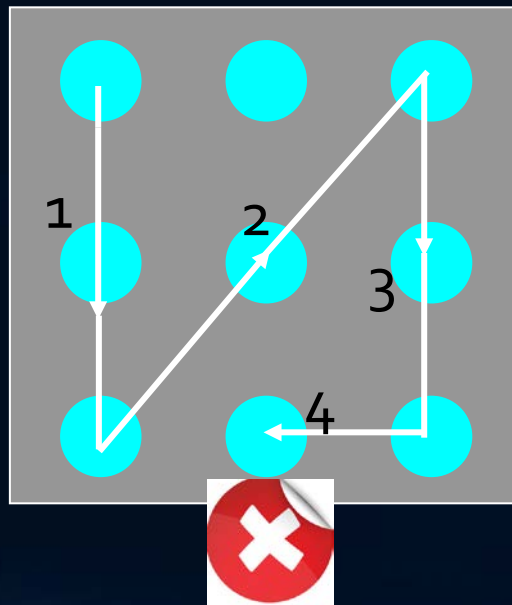
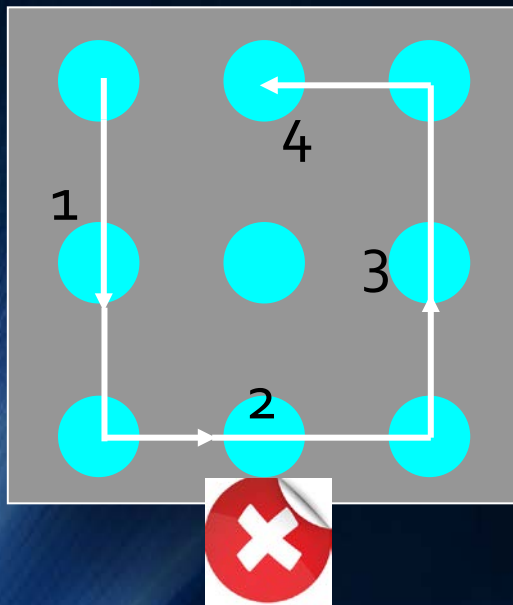
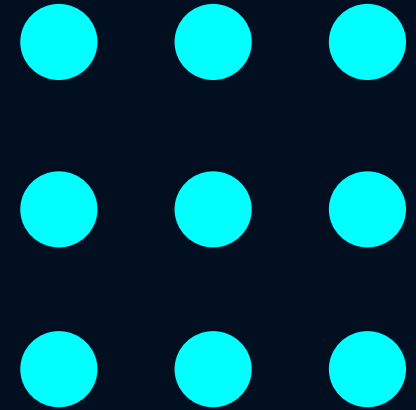
- Divergent
- Right brain (global, parallel, emotional, subjective)
- Synthesis

Critical thinking (Logical)

- Convergent
- Left brain (analytic, serial, logical, objective)
- Evaluation

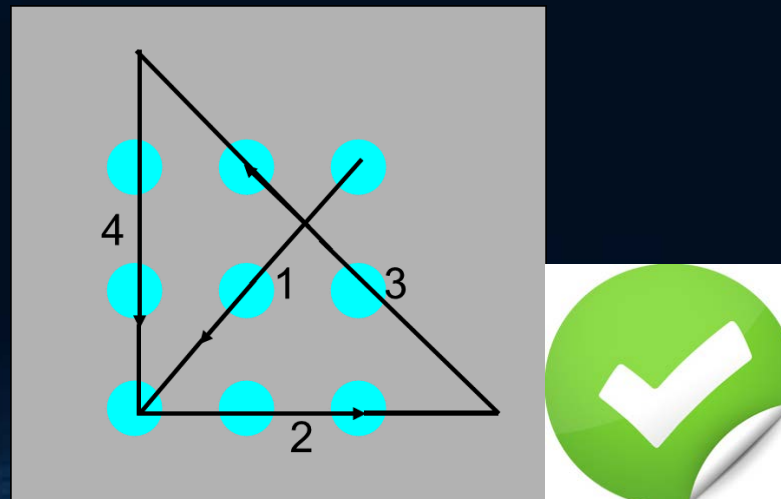
Lateral Thinking Example

- Without lifting your pencil from the paper, draw four and only four straight lines that connect all nine dots



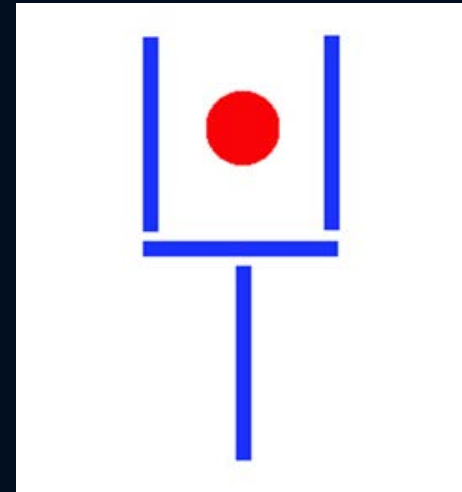
If you did not get the correct answer that is because:

- **You used logic ; you did not think outside the box**
- **You may have assumed that you needed to stay within the boundaries**
- **You made false assumptions in order to fit the problem to your previous experience**

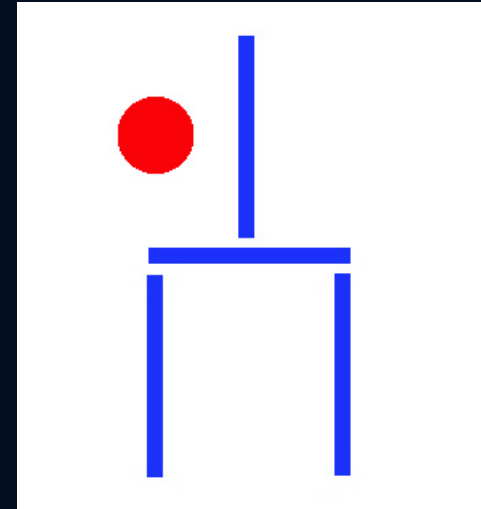
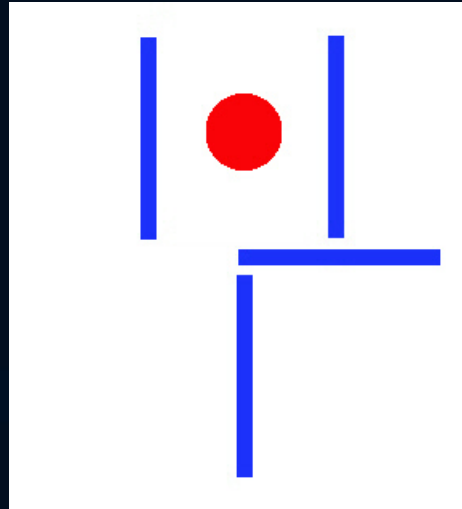
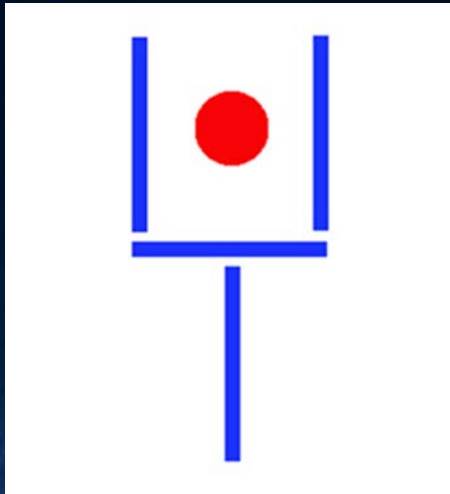


Another Example

Think of this as a shovel with a coin inside. Move just **two sticks** so that the coin is no longer inside, but there is still a shovel.

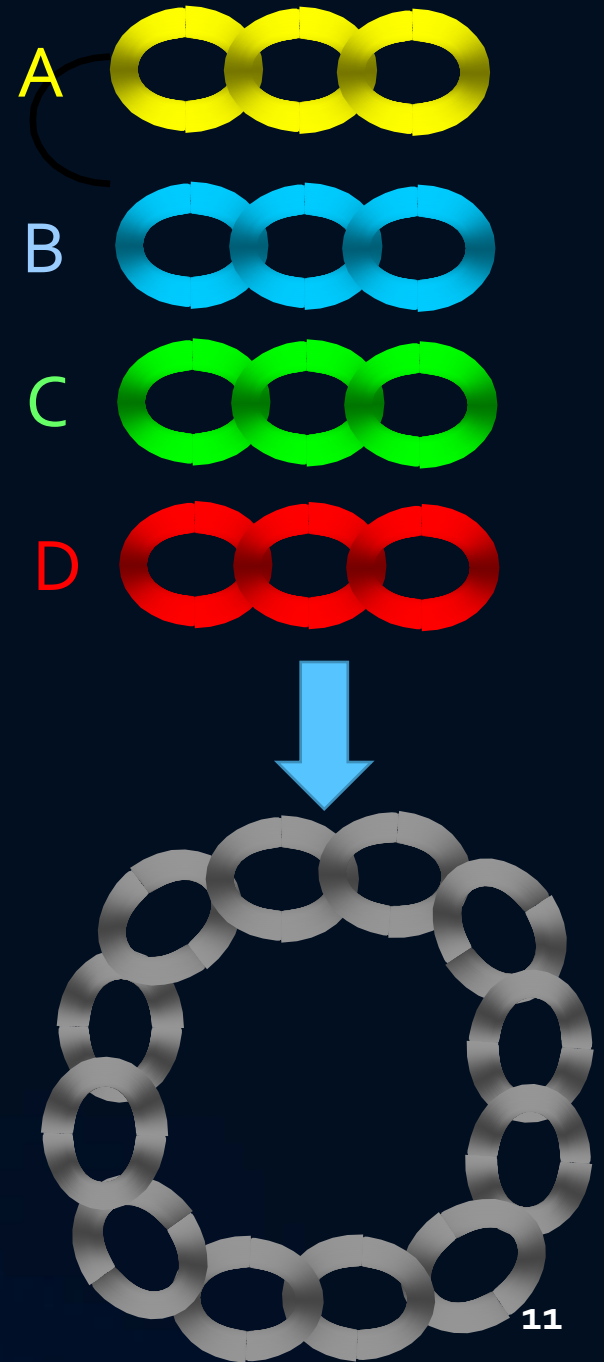


Using **lateral thinking** and thinking **outside the box**, you should get:



A Final Example

- You are given 4 separate pieces of chain that are 3 links in length, each
- It costs **SR100** to open a link and **SR150** to close a link
- All links are closed at the beginning of the problem
- Your goal is to join all 12 links of chain into a single circle
- Your total budget for forming the single circle is **SR750**.



Solution (not creative/**not correct**)



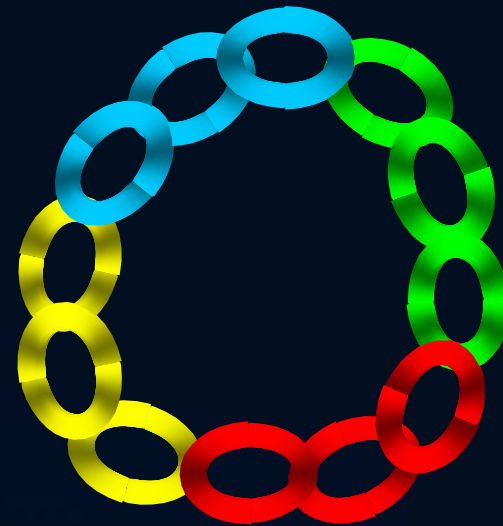
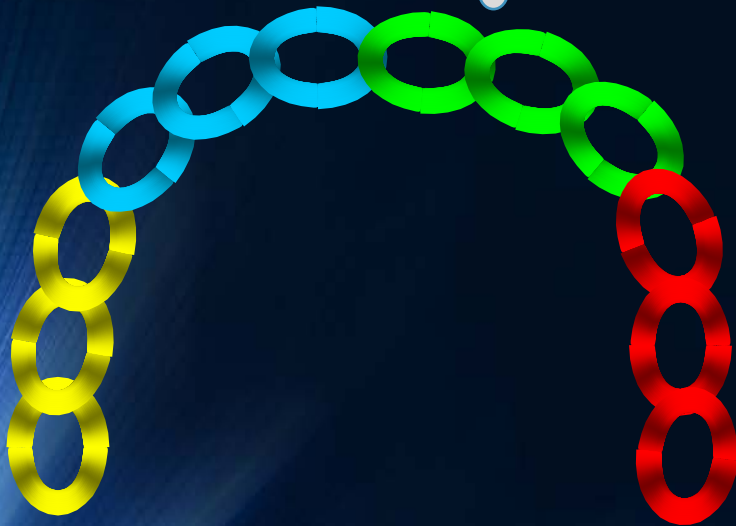
Open link of A SR100



Add B (close) (A+B) SR150



Open A + B SR100



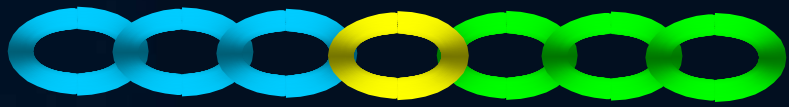
TOTAL SR1000!


Not 750

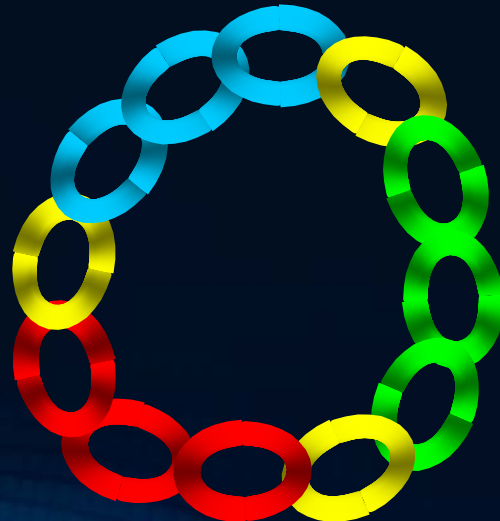
Creative Solution

Break the assumption that when you open a link, you are limited to inserting only one link into the opening

Step 1:  Open all links in A → SR300

Step 2:  Use A to combine B+C → SR150

Step 3:  Use A to combine D → SR150

Step 4:  Use final link to combine chain SR150

Your assumption eliminated the solution



TOTAL
\$750!!!

Outside the Box Thinking

To be creative you need to be able to view things from **different perspectives**; you must have **flexibility** and a **tolerance** of ambiguity!

Mental locks



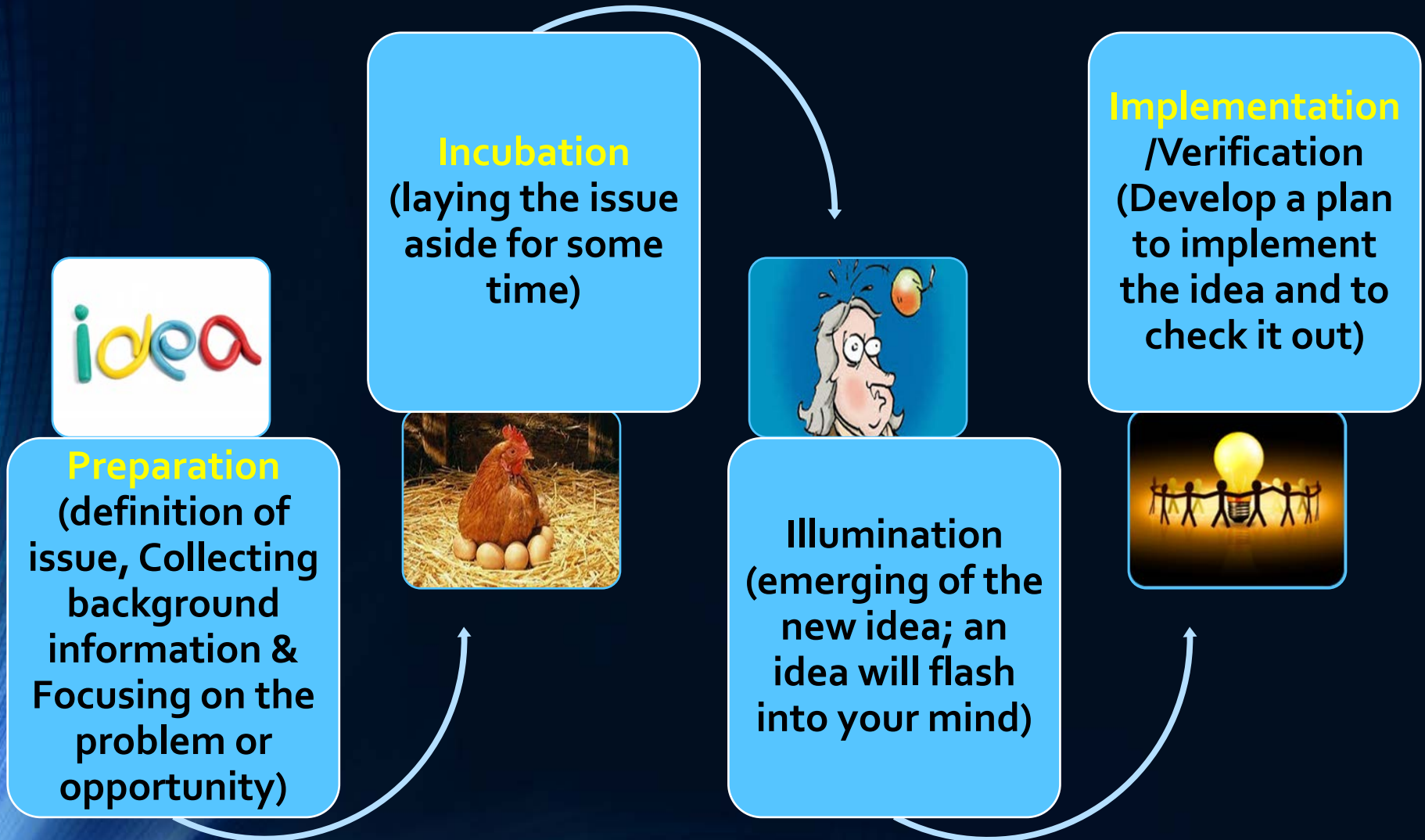
- There is one right answer
- That is not logical
- Follow the rules
- That is not my area
- Don't be foolish
- To err is wrong
- I am not creative
- Premature Judgment

Mental Unlocks



- Think Laterally
- Don't impose assumptions
- Work when your mind is fresh
- Work fast and short periods
- Focus
- Push hard
- Have fun
- No fear

Creativity as a Process



Characteristics of Creative People

Achiever

Flexible

Motivated

Independent

Confident

Knowledgeable

Energetic



Skeptical

Humorous

Adaptable

Tolerant

Open-minded

Dreamer

Persistent

Some Final Thoughts

- Creativity must be experienced, to be understood

Hints to becoming more creative

- Hangout with creative people
- Practice mental drawing
- Keep a journal
- Keep an open mind
- Maintain a positive attitude
- Try new things
- “Think Outside the Box”
- Practice creativity-enhancing exercises
- Stay alert for opportunities

