بسم الله الرحمن الرحیم

در مسیر کارآفرینی دانش بنیان

جلسه ی سوم: تفکر طراحی

رضا لطفی

استاد گروه مهندسی برق دانشگاه فردوسی مشهد

و رییس بنیاد نخبگان خراسان رضوی

۲۱ تیر ۱۴۰۰


إِنَّ اللَّـهَ لَا يُغَيِّرُ مَا بِقَوْمٍ حَتَّىٰ يُغَيِّرُوا مَا بِأَنفُسِهِمْ
سوره رعد
خدا حال هیچ قومی را دگرگون نخواهد کرد
تا زمانی که خود آن قوم حالشان را تغییر دهند

هدف از برگزاری این نشست ها

- هم می توانیم و هم باید «بیشتر» ارزش آفرین باشیم.
- مهمترین ضعف ما در این مسیر، عدم آشنایی کافی ما با «طرز فکر کارآفرین» و «مسیر کارآفرینی دانش بنیان» هست.

- تغییر چیزی نیست که همراه با یک چک لیست بیاید. در دنیایی زندگی می کنیم که بادها و دریا دائما در حال تغییر هستند و گنج دو بار در یک مکان پنهان نمی شود. در عوض، آنچه ما در اختیار داریم، یک قطب نما است.
- وظیفه ی ما ایجاد طرز فکر، فرهنگ و روابطی است تا انسانهای داخل سیستممان به گونه ای توانمند شوند که بخواهند و بتوانند که بادبانها را در هر شرایط آب و هوایی در جهت جدید و صحیح تنظیم کنند.

از مقدمه ی ناشر در کتاب
The Innovator's Mindset

Work on Your Innovation Mindset

- As human's brain is designed to develop new circuitry, rewire itself based on new thoughts and behaviors, here is how to get started:
  - 1. Find quiet time every day for reflecting on what you are thinking and why.
  - 2. When you find yourself in a fixed mindset, ask if it is coming from discomfort with change or fear of making a mistake.
  - 3. Make it a priority to learn or try something new every day.
  - 4. Ask questions more often than you give answers.
  - 5. Do something that stretches you beyond your current capabilities at least one time per week.

from the University of Virginia's Darden School of Business,
Design Thinking *in Business Innovation Program*

سرفصل مطالب این هشت جلسه ان شاء الله

1. طرز فکر و طرز فکر رشد
2. نوآفرینی و طرز فکر نوآفرینی
3. Design thinking
4. از ایده شروع کنیم یا از مساله؟ چه مسائلی ارزش حل کردن دارند؟
5. بوم کسب و کار و بوم نوآفرینی
6. خلاقیت و حل خلاقانه ی مسائل
7. ویژگی های یک تیم خوب / هنر جذب سرمایه
8. فرهنگ کار / آنچه در دانشگاه نمی آموزیم

سرفصل مطالب

- ضرورت «تفکر طراحی»
- «تفکر طراحی» چیست؟
- مثالهایی از «تفکر طراحی»
- چرا «تفکر طراحی» برای دانشجوها سودمند است؟
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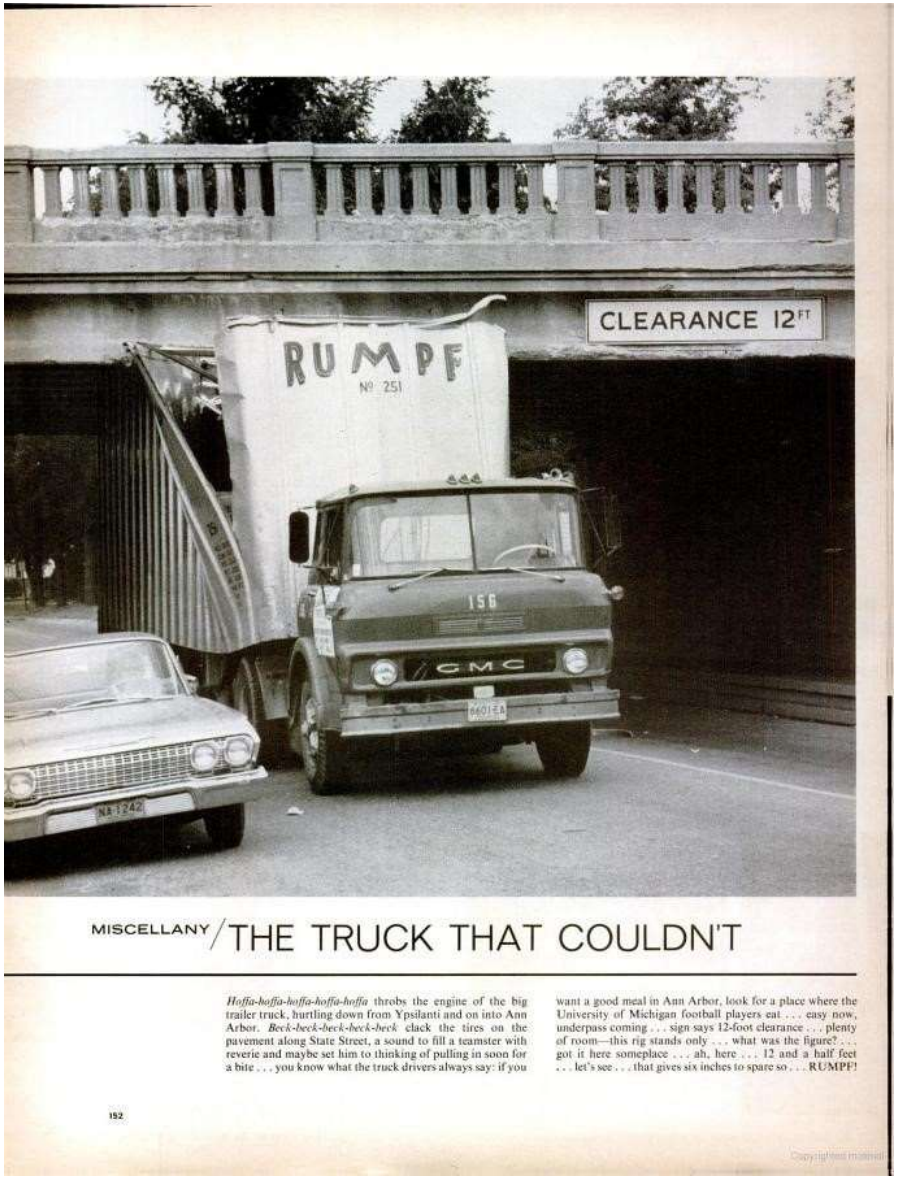
- چند توصیه و جمع بندی

Motivation

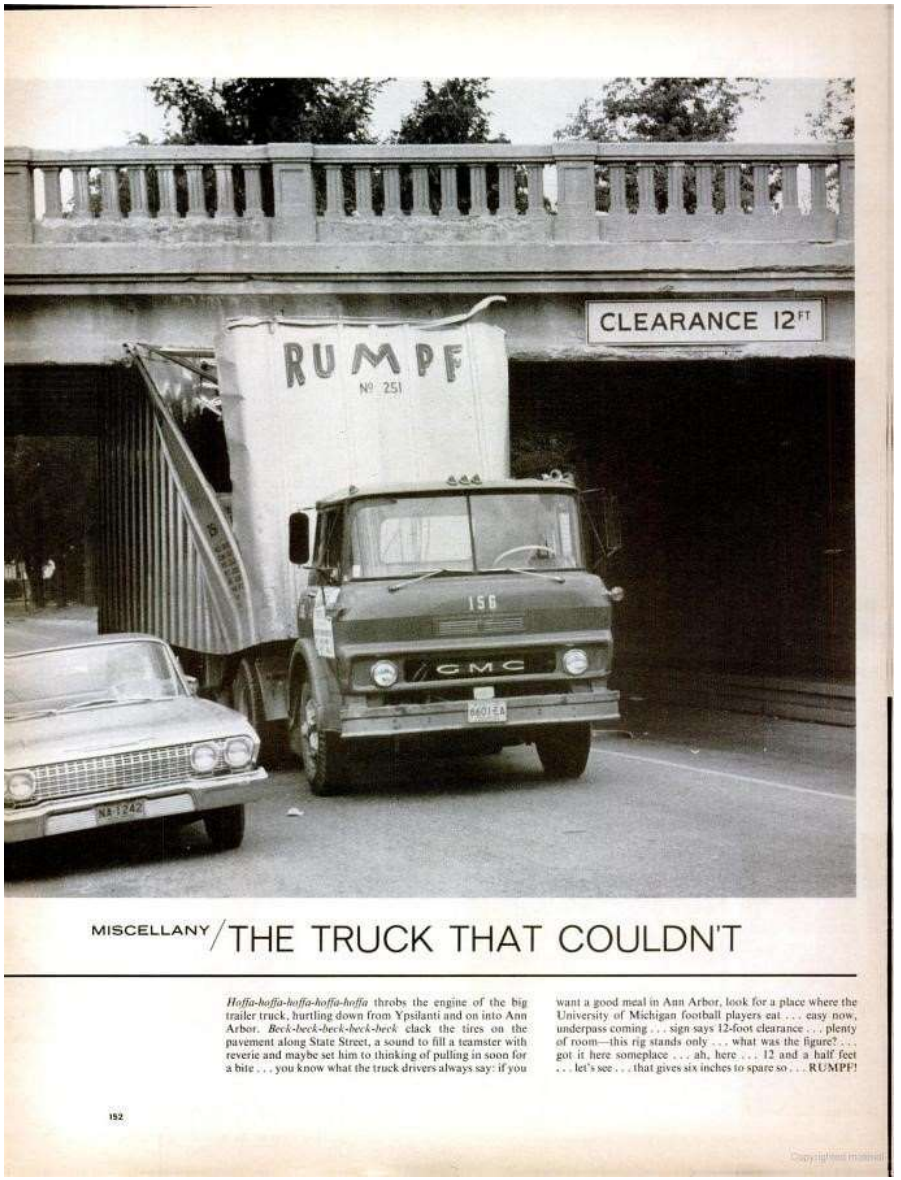
- A truck driver tried to pass under a low bridge. But he failed, and the truck was lodged firmly under the bridge. The driver was unable to continue driving through or reverse out.
  - massive traffic problems
    - emergency personnel
    - engineers
    - firefighters
    - truck drivers
- How to dislodge the trapped vehicle?



https://www.interaction-design.org/literature/article/what-is-design-thinking-and-why-is-it-so-popular

Motivation

- How to dislodge the trapped vehicle?
  - To dismantle parts of the truck?
  - To chip away at parts of the bridge.
- Each spoke of a solution which fitted within his or her respective level of expertise.



MISCELLANY/THE TRUCK THAT COULDN'T

Hoffa-hoffa-hoffa-hoffa-hoffa throbs the engine of the big trailer truck, hurtling down from Ypsilanti and on into Ann Arbor. *Beck-beck-beck-beck-beck* clack the tires on the pavement along State Street, a sound to fill a teamster with reverie and maybe set him to thinking of pulling in soon for a bite . . . you know what the truck drivers always say: if you want a good meal in Ann Arbor, look for a place where the University of Michigan football players eat . . . easy now, underpass coming . . . sign says 12-foot clearance . . . plenty of room—this rig stands only . . . what was the figure? . . . got it here someplace . . . ah, here . . . 12 and a half feet . . . let's see . . . that gives six inches to spare so . . . RUMPF!

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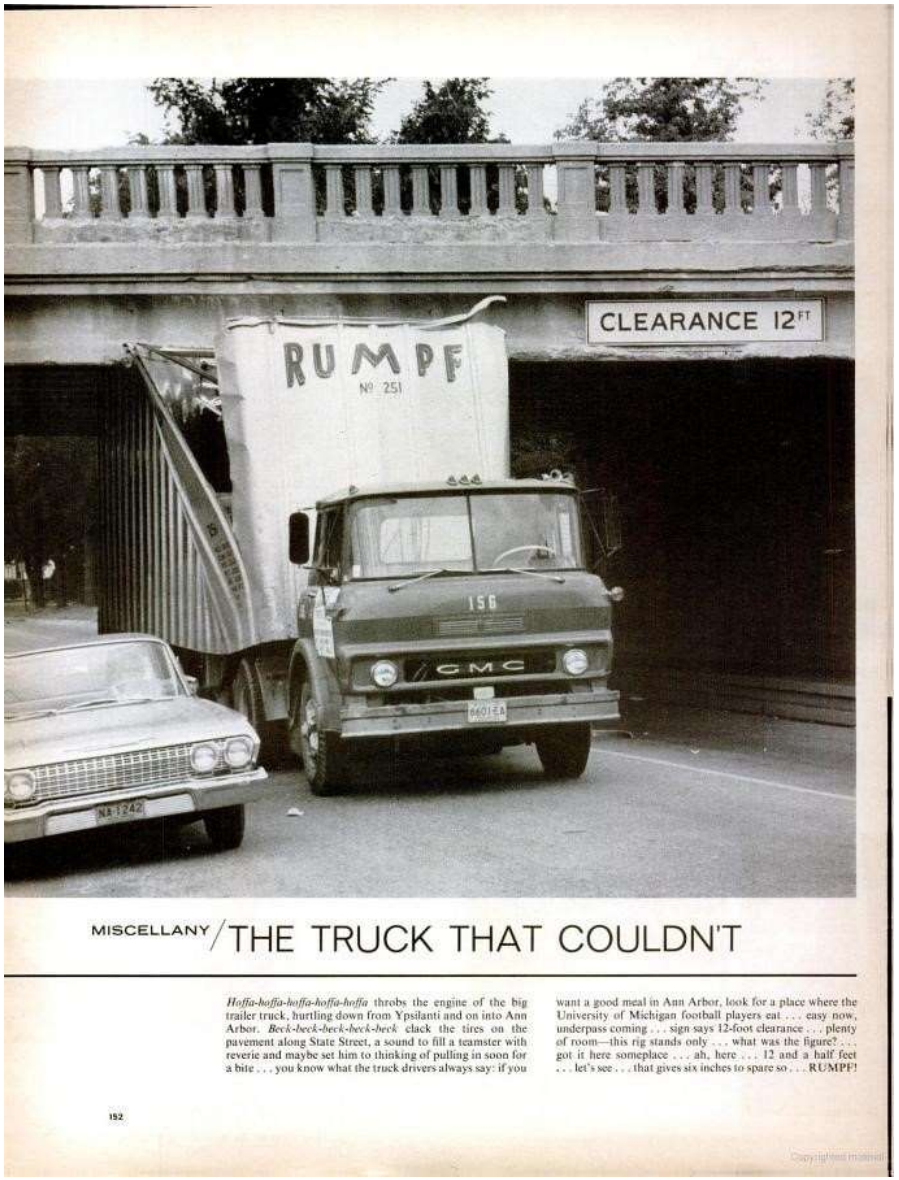
Motivation

- A boy walking by and witnessing the intense debate looked at the truck, at the bridge, then looked at the road and said nonchalantly, "Why not just let the air out of the tires?" to the absolute amazement of all the specialists and experts trying to unpick the problem.
- When the solution was tested, the truck was able to drive free with ease, having suffered only the damage caused by its initial attempt to pass underneath the bridge.



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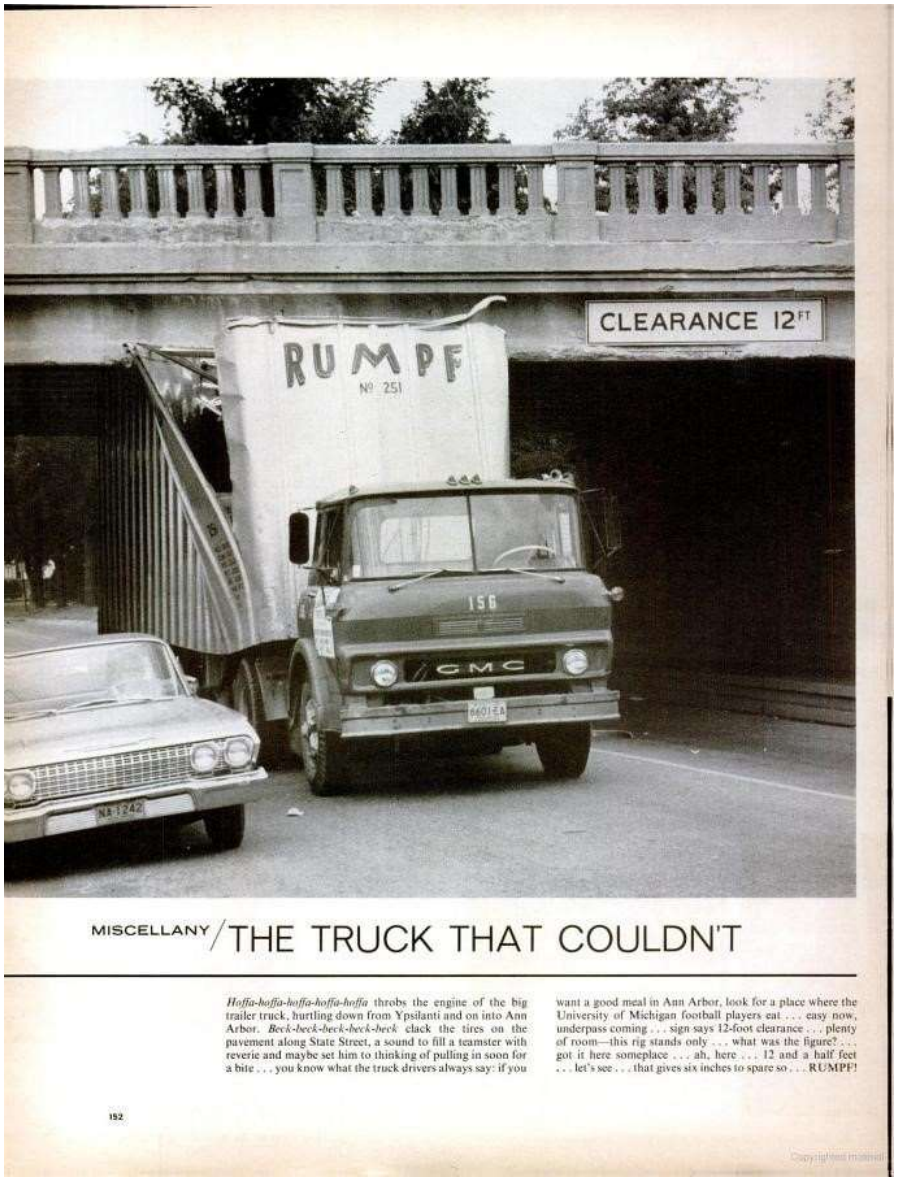
Motivation

- The story symbolizes the struggles we face where oftentimes the most obvious solutions are the ones hardest to come by ***because of the self-imposed constraints we work within.***



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Motivation

- While we know a lot about practices that stimulate new ideas, innovation teams often struggle to apply them. Why?
  - Because people's biases and entrenched behaviors get in the way.
- However, design thinking
  - helps people overcome this problem and unleash their creativity.
  - profoundly reshapes the experiences of the innovators themselves.

Jeane Liedtka,
Strategist and Professor,
Darden School,
University of Virginia

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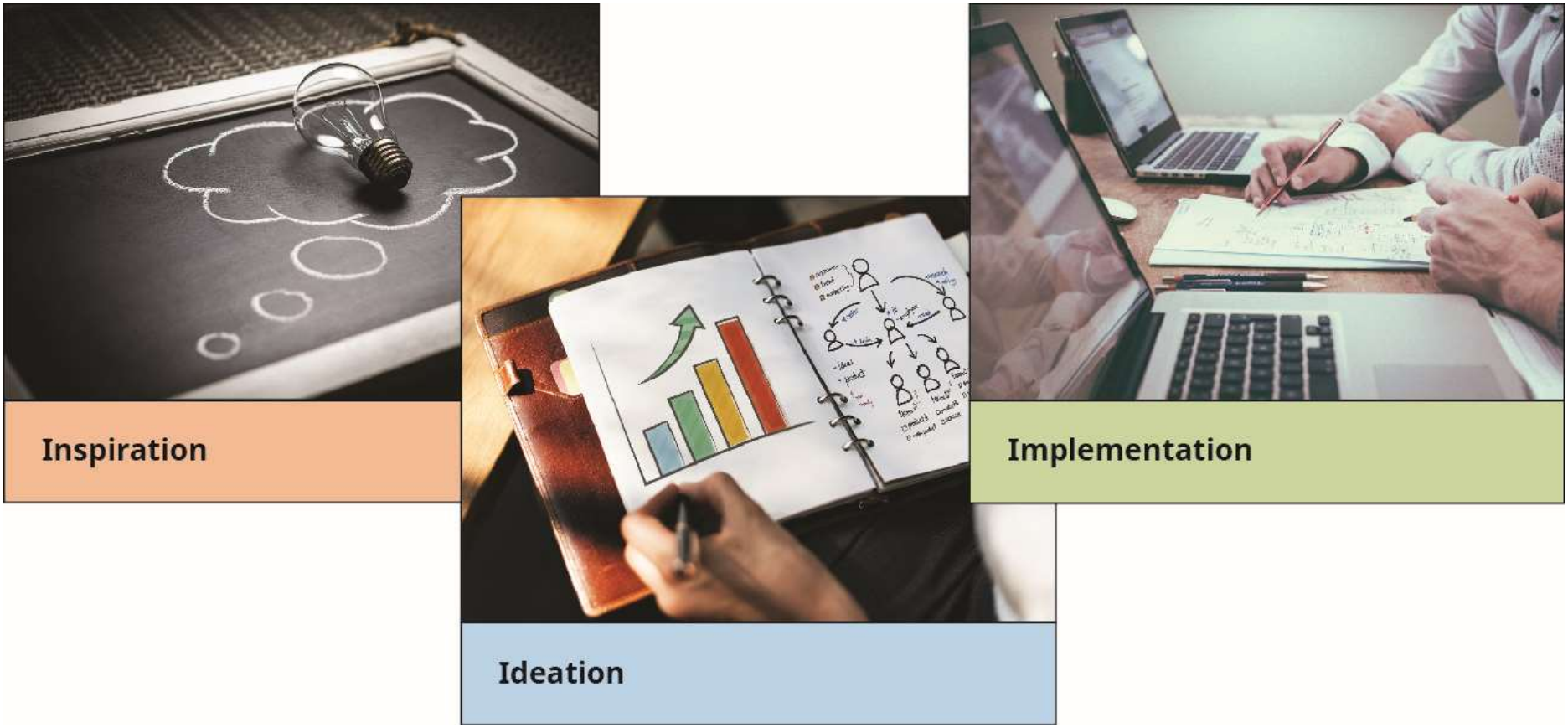
What is design thinking?

"Designers...don't try to search for a solution until they have determined the real problem, and even then, instead of solving that problem, they stop to consider a wide range of potential solutions. Only then will they finally converge upon their proposal. This process is called 'design thinking.'"

Don Norman

What is design thinking?



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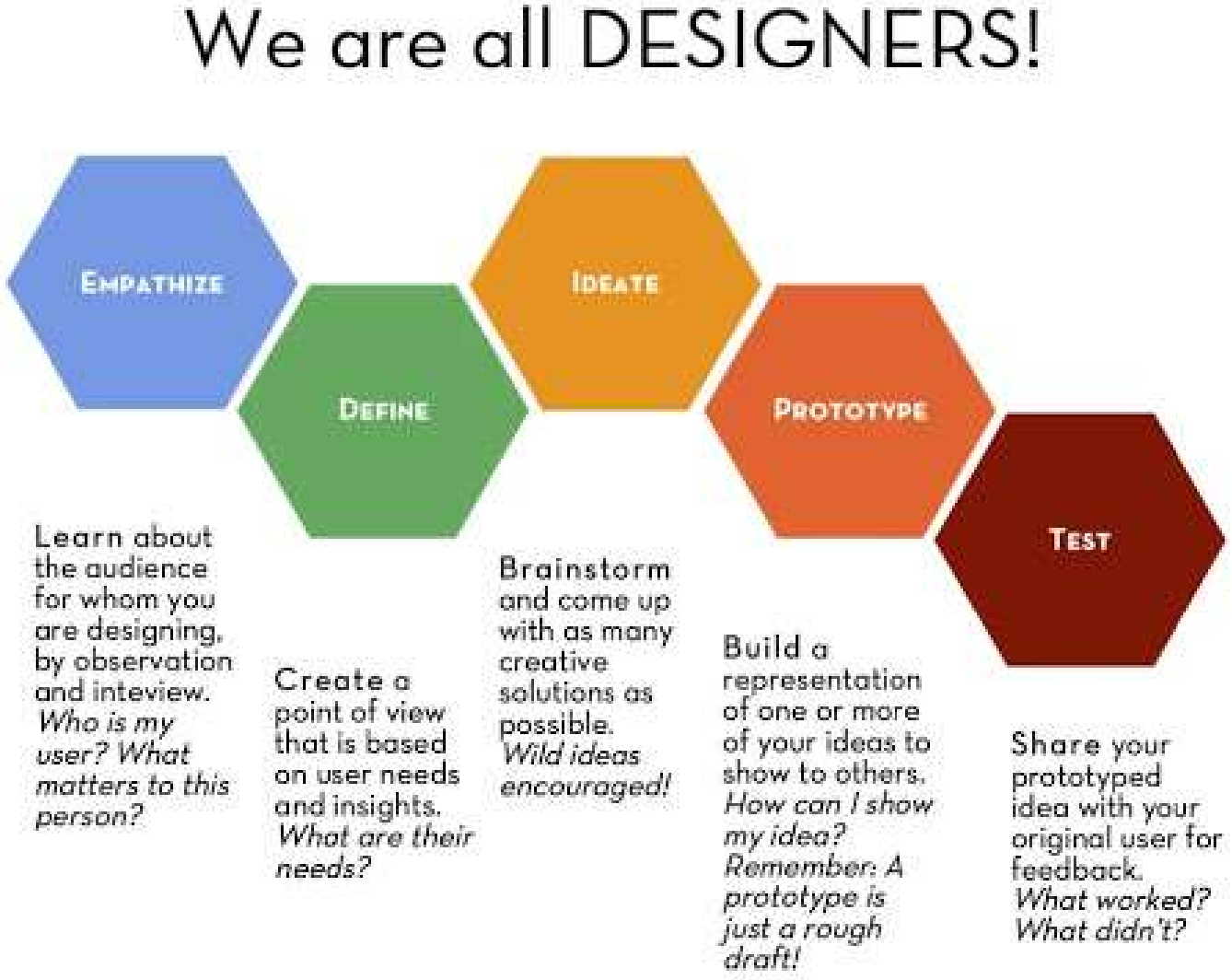

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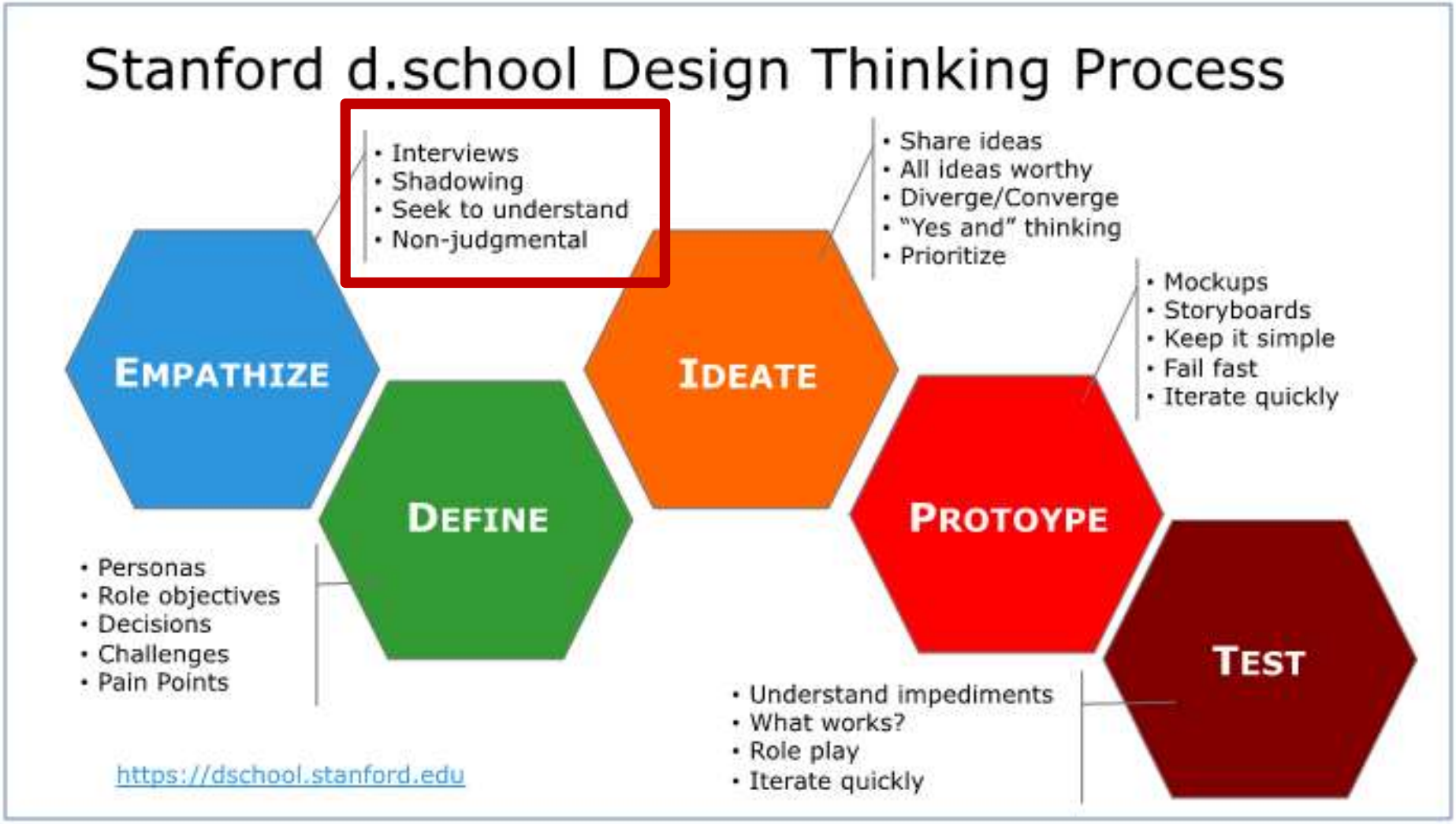

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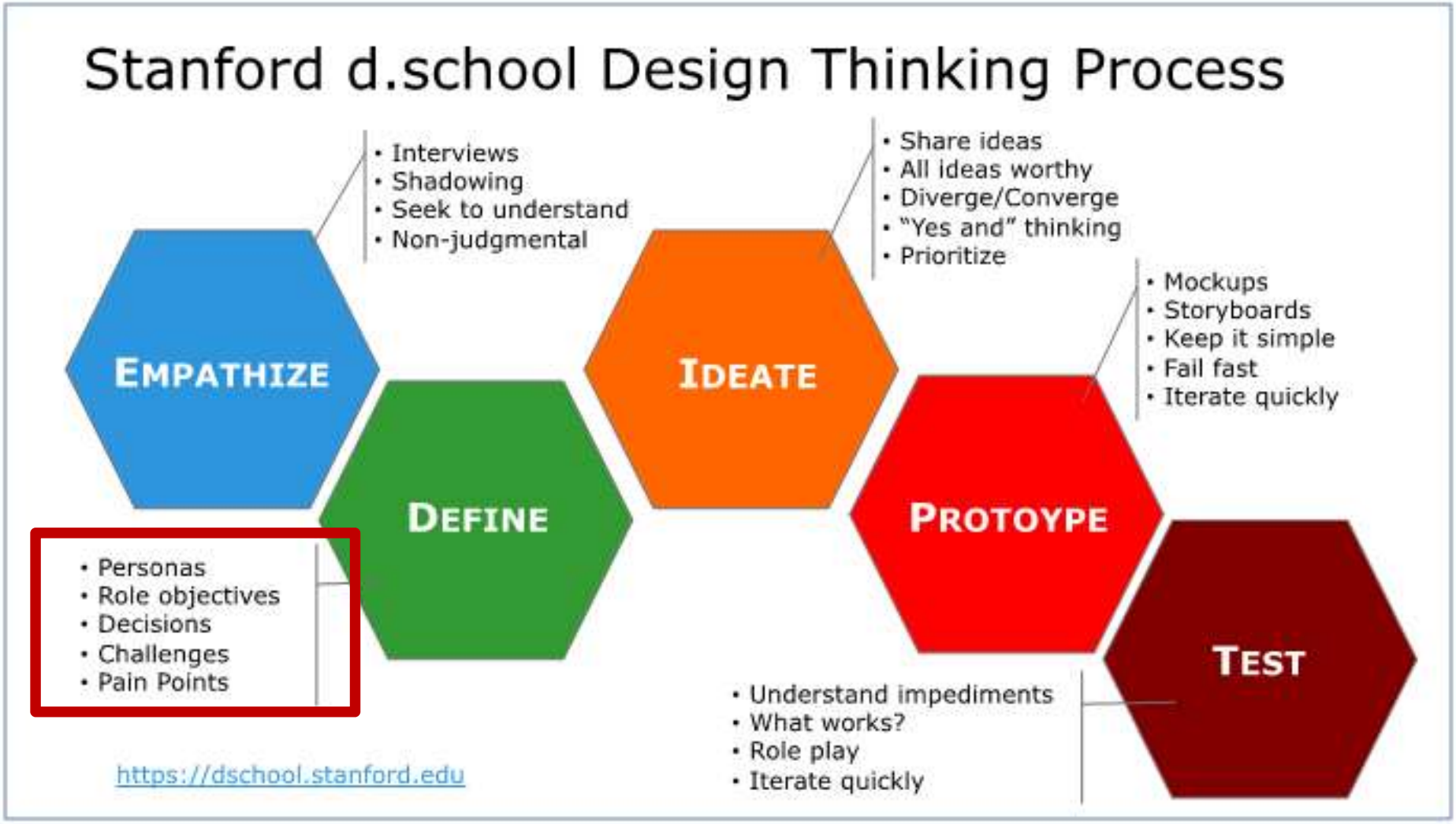

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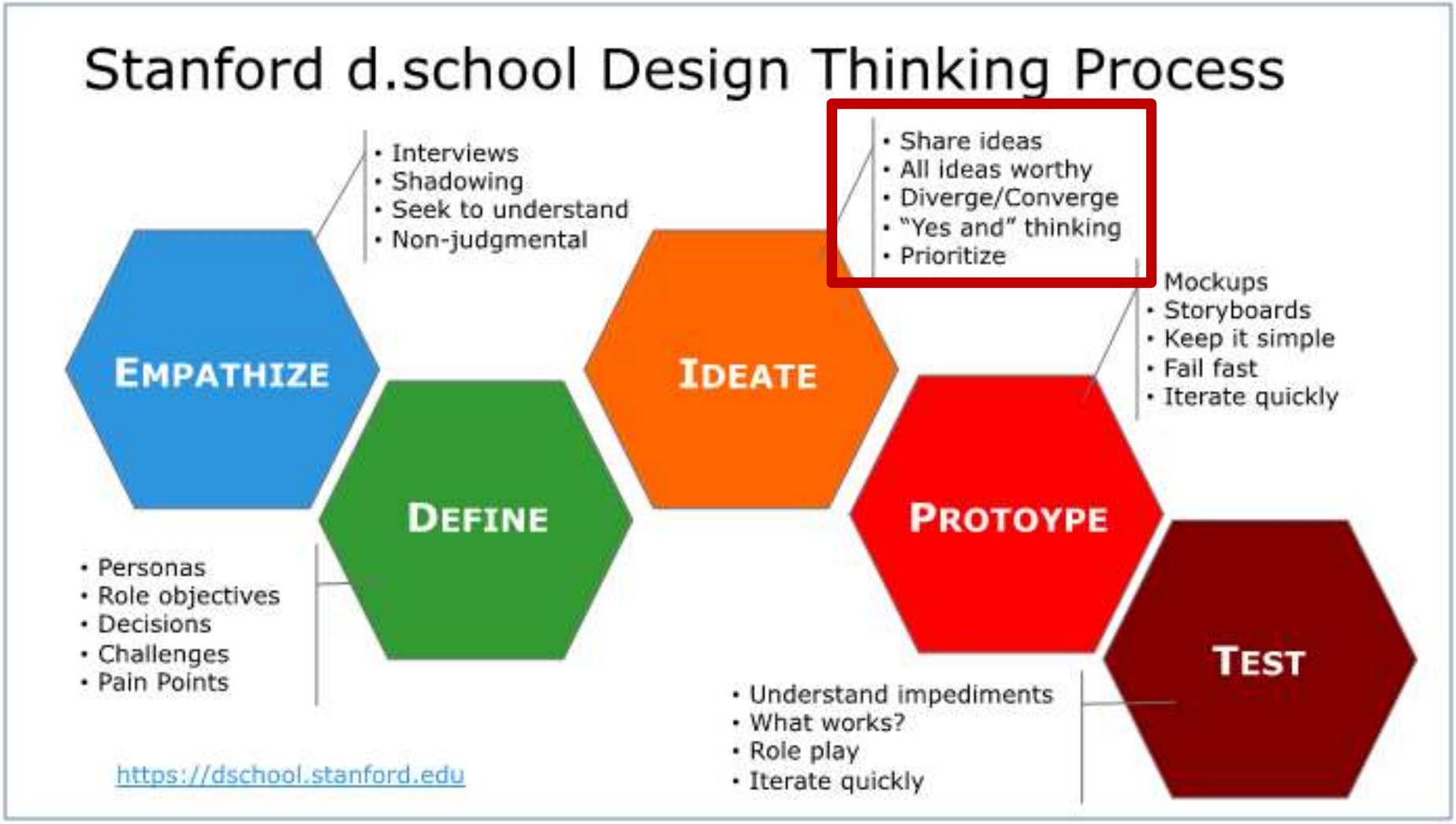

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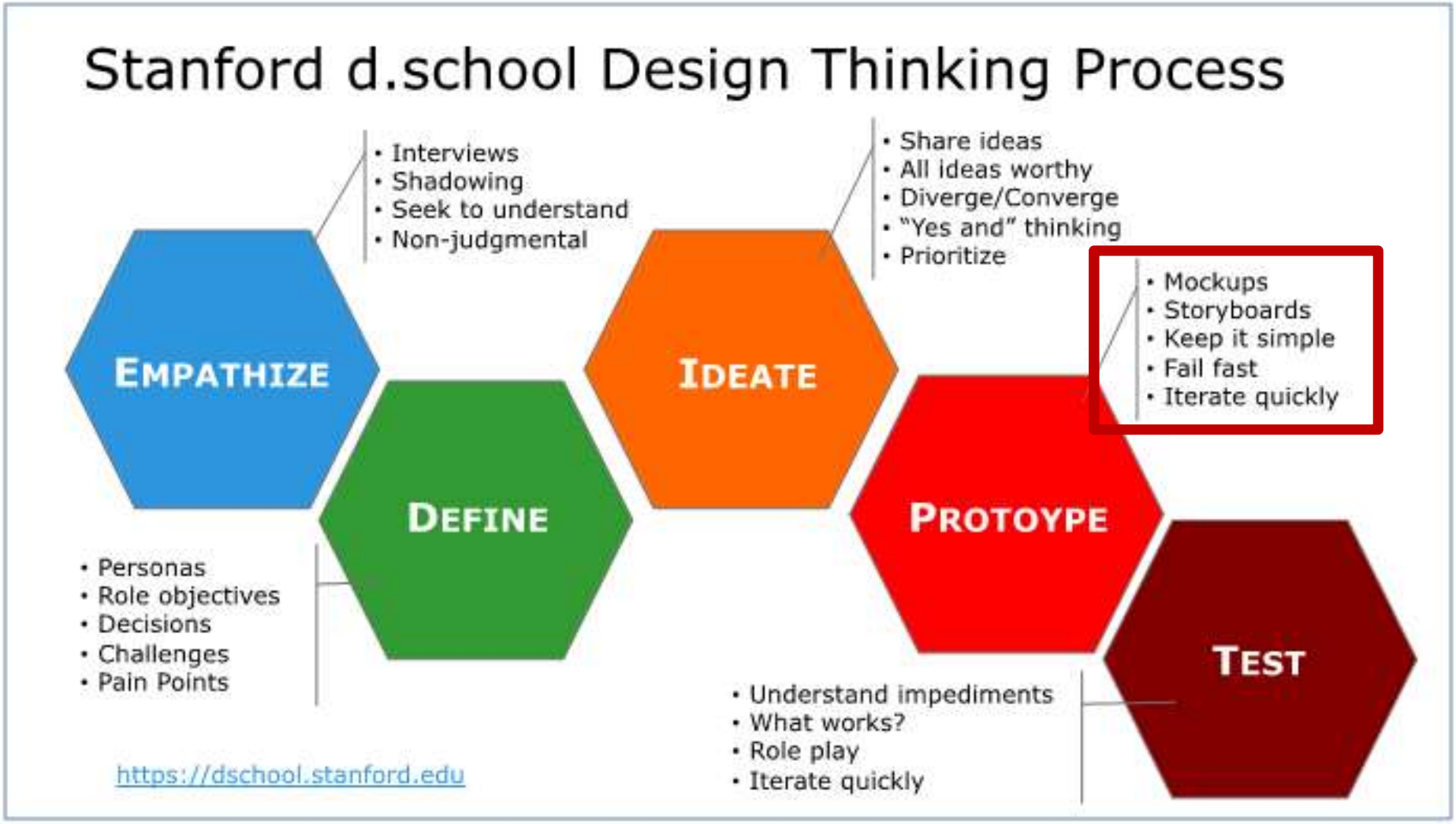

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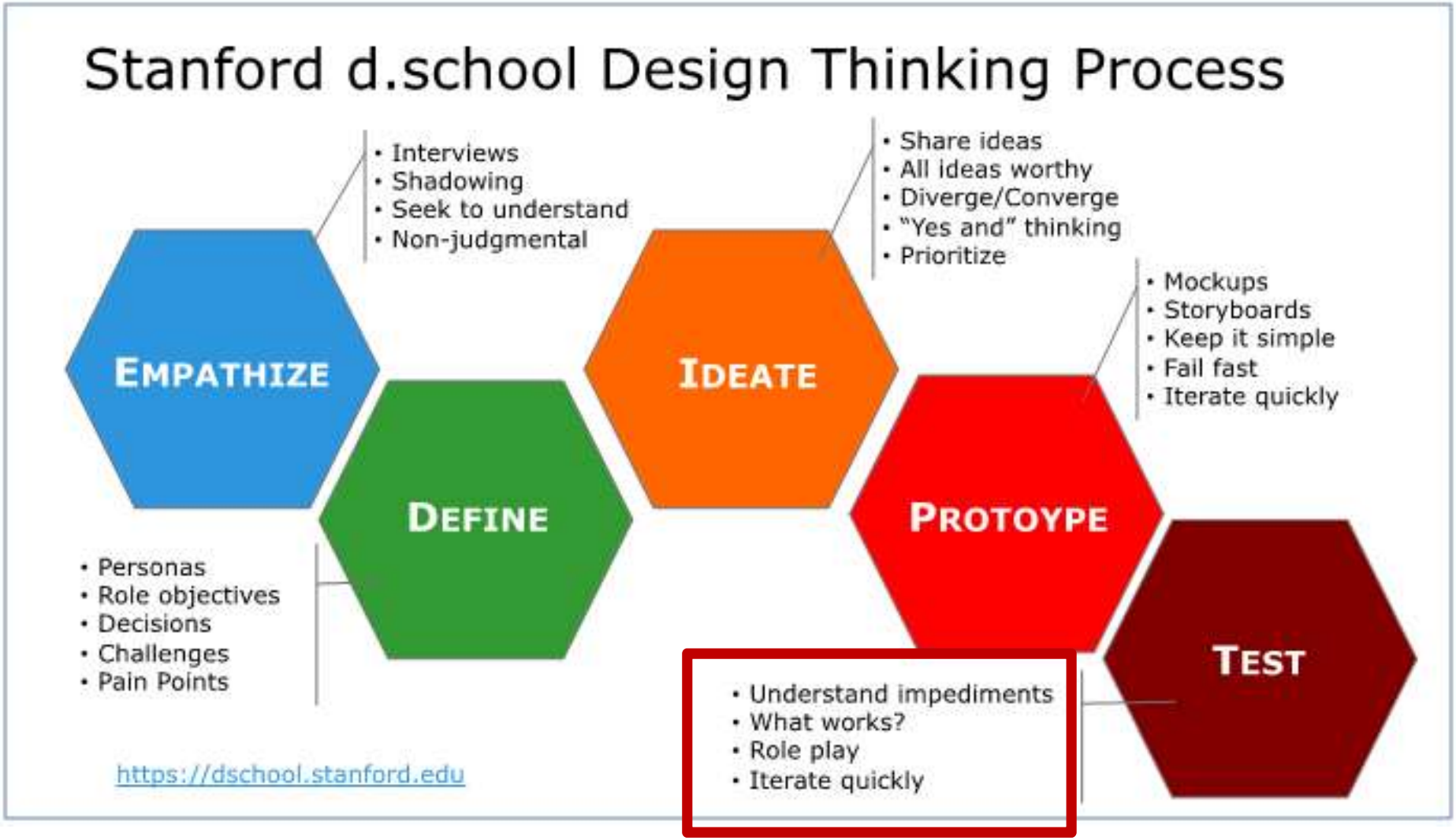
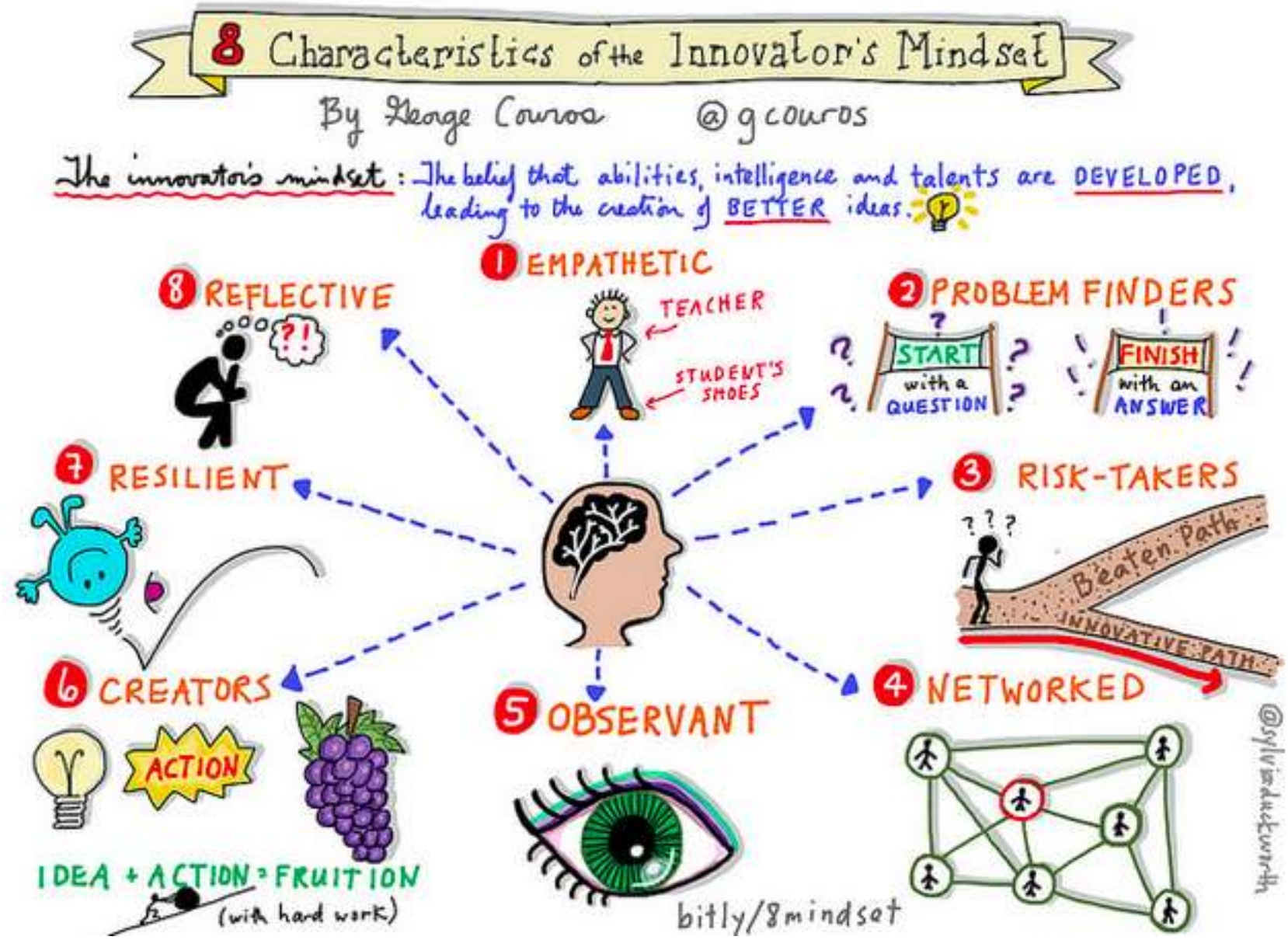



The INNOVATOR'S Mindset
Empower Learning, Unleash Talent, and Lead a Culture of Creativity
George Couros


8 Characteristics of the Innovator's Mindset
By George Couros @gcouros
The innovator's mindset: The belief that abilities, intelligence and talents are DEVELOPED, leading to the creation of BETTER ideas.
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STUDENT'S SHOES
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START with a QUESTION
FINISH with an ANSWER
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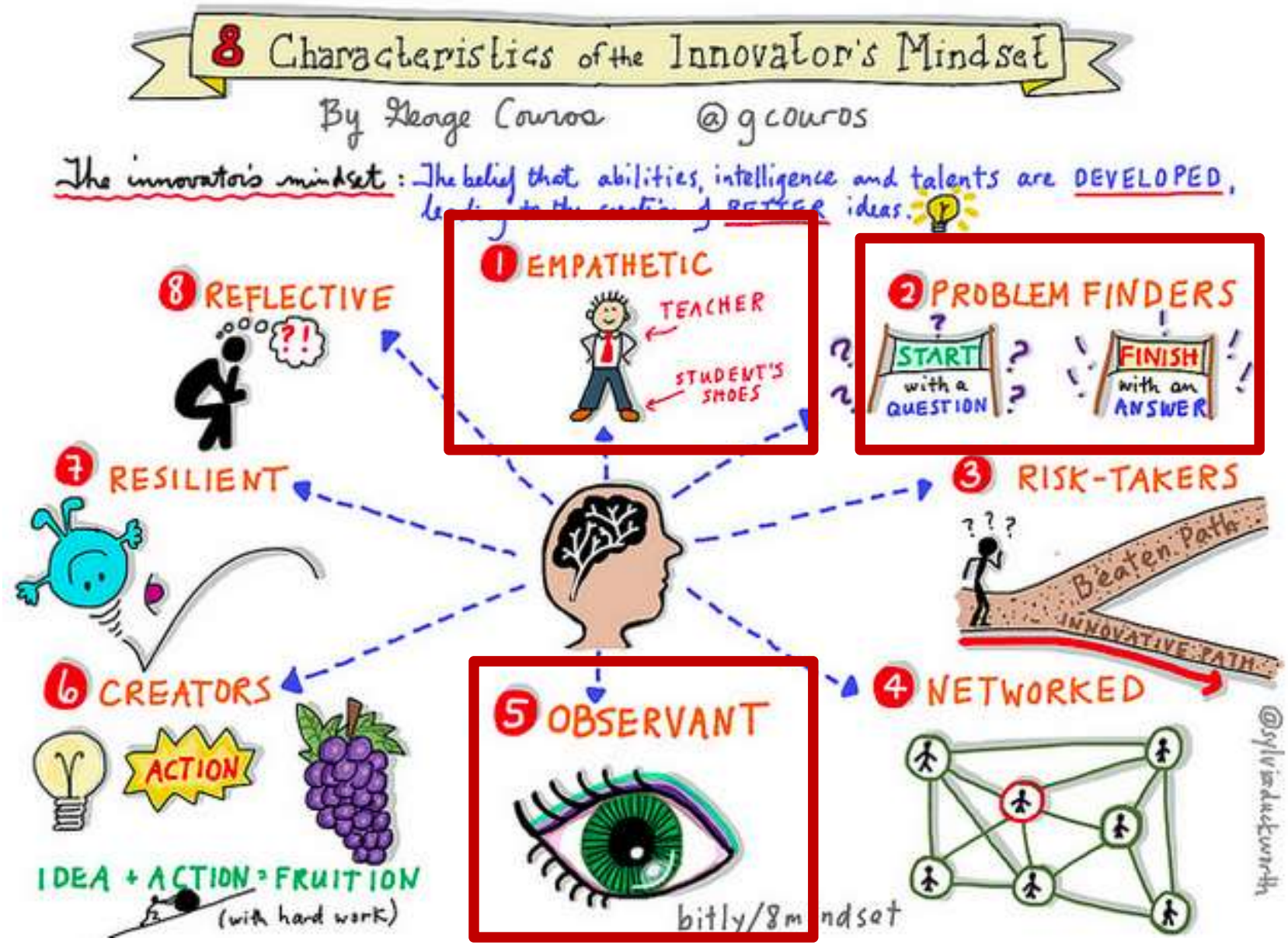
Beaten Path
INNOVATIVE PATH
4 NETWORKED
5 OBSERVANT
6 CREATORS
ACTION
IDEA + ACTION = FRUITION
(with hard work)
7 RESILIENT
8 REFLECTIVE
bitly/8mindset
@sylviaduckworth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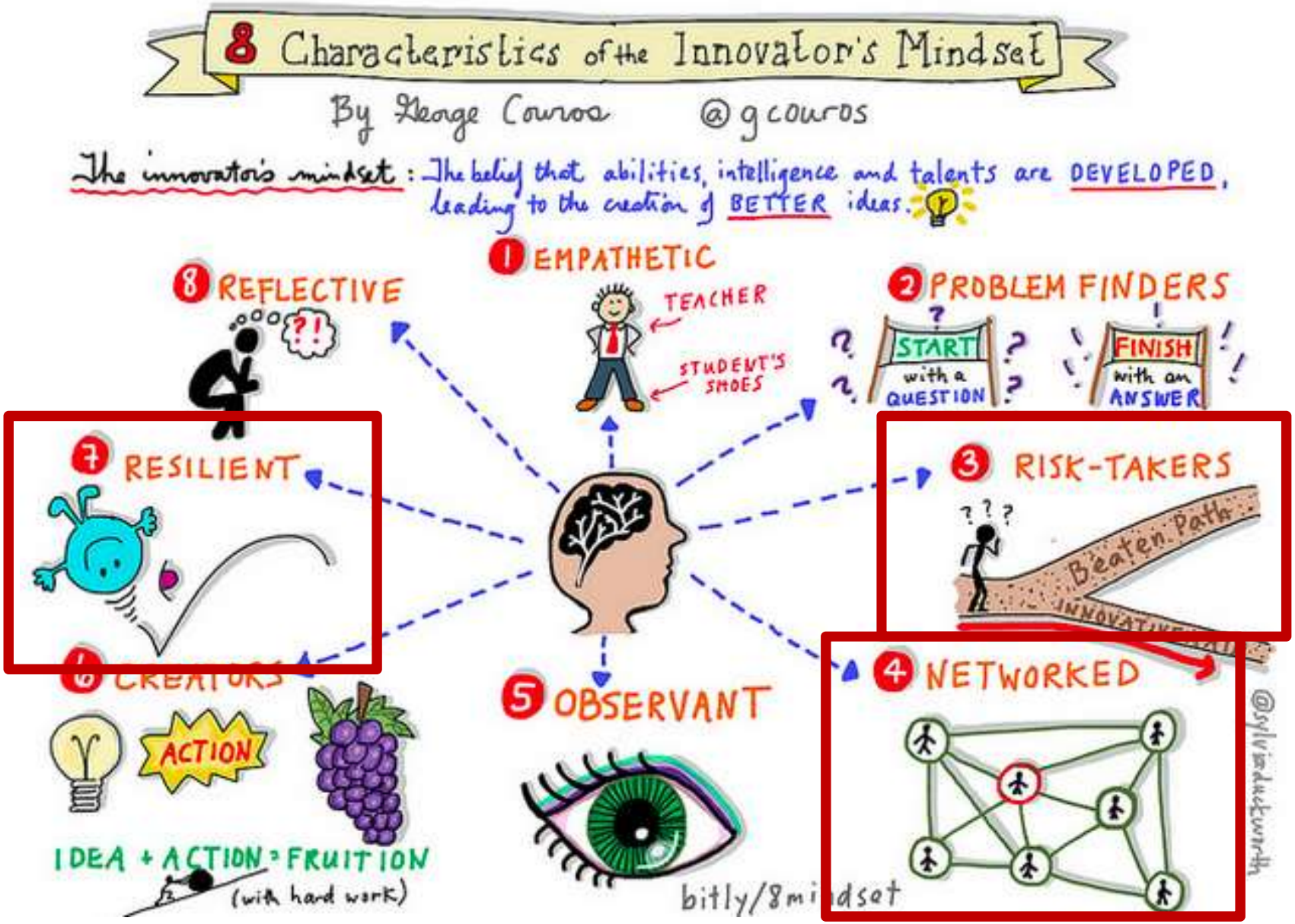
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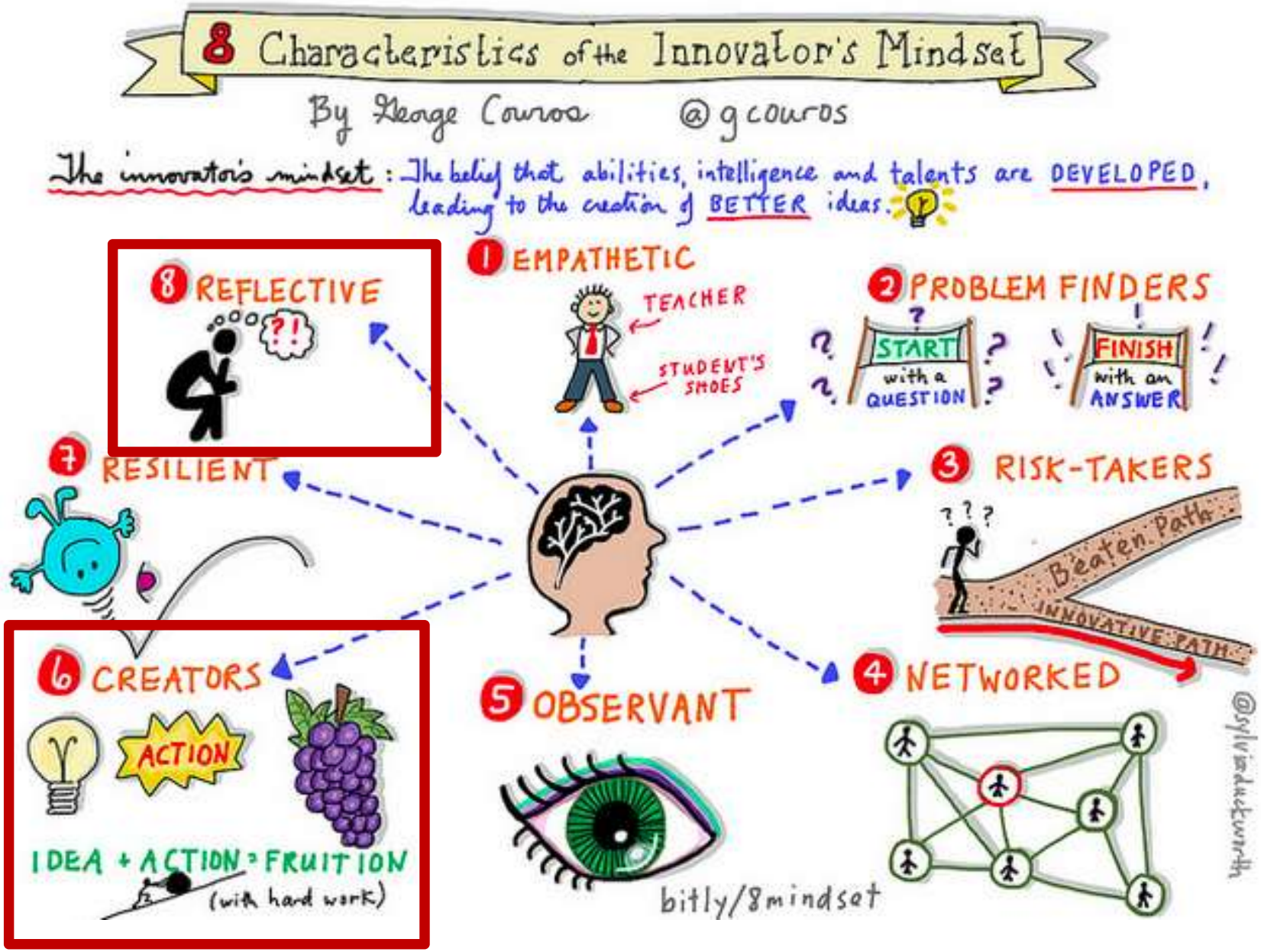
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A few examples

1. Braun/Oral B Electric Toothbrush

In 2016, Braun and Oral B recruited the expertise of designers Kim Colin and Sam Hecht, to create a smarter electric toothbrush.
When they initially partnered with Braun and Oral B, the manufacturers suggested Colin and Hecht design an electric toothbrush with a variety of sophisticated data-tracking features including

- a music player,
- ways to sense how well the user's were brushing every single tooth,
- and even how sensitive their gums were.

A few examples

1. Braun/Oral B
Electric Toothbrush

However, Hecht and Colin quickly advised them to think more about the customer's experience as opposed to their own vision for the product. They suggested how a few simple additions to the brush could solve many of the frictions their user's were reporting. Hecht and Colin added

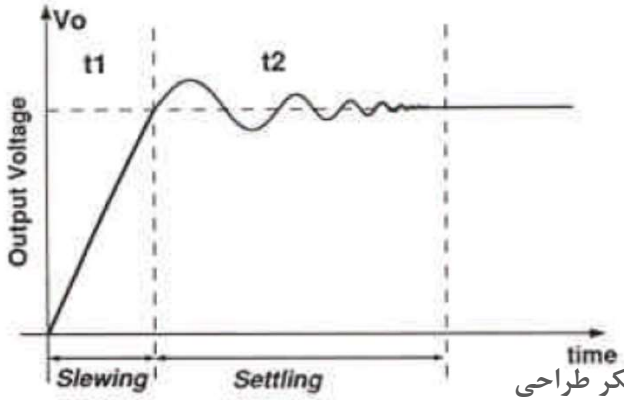
- on-the-go, USB charging and made it easier for user's to order replacement brush heads, ***problems that Braun and Oral B consumers had already expressed.***

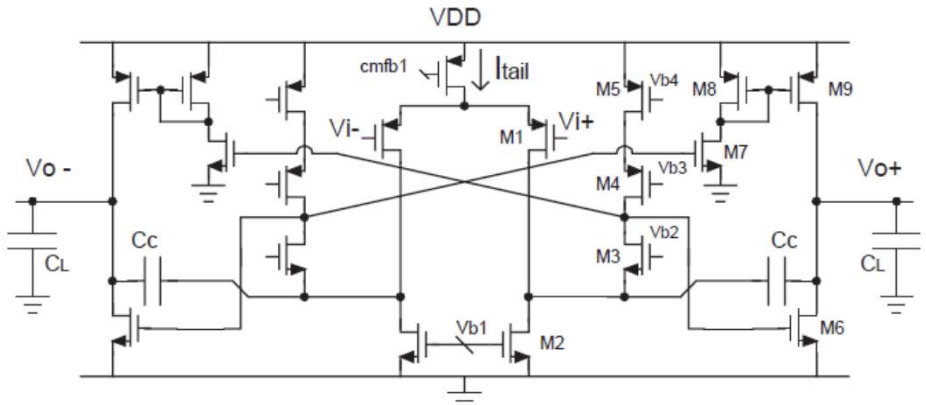
The result was an exceptional product that took user feedback into consideration to boost sales and increase customer loyalty.

A few examples

2. Questioning the status quo by asking “What if” and “Why not?”

Conventionally, when designing an OpAmp, with a given amount for the entire settling time, t_S, the small- and large-signal settling times used to be determined using, e.g., $t_{SS}=2/3.t_S$ and $t_{LS}=1/3.t_S$; both depending on the value for the bias current of the input devices. The designer had to choose the maximum value between the two.





A few examples

2. Questioning the status quo by asking “What if” and “Why not?”

What if we choose t_{SS} and t_{LS} in a way that the bias current for both criteria is the same, leading to smaller value for the bias current?

$$I_i = \frac{1}{2} V_{eff,i} \frac{C_c}{\beta} \frac{\alpha\zeta}{1+2\alpha\zeta^2} \frac{W}{t_{ss}} = C_c \frac{V_{FS}}{t_{\ell s}}.$$

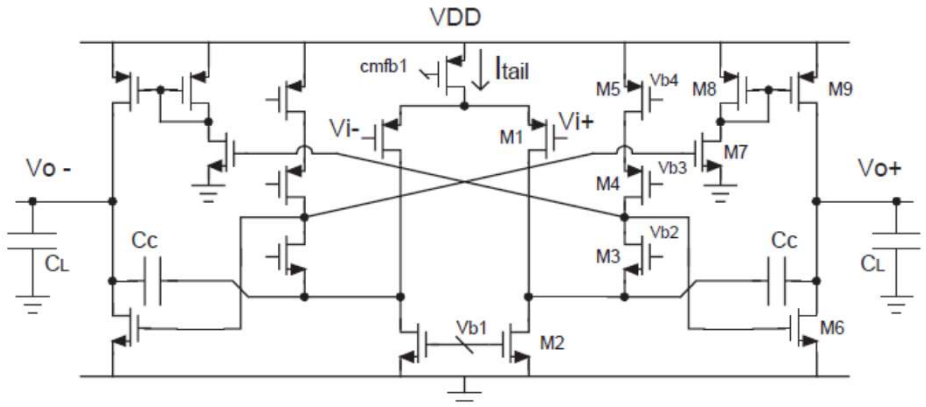
The optimized large-signal settling time is obtained from

$$t_{LS,opt} = \frac{t_S}{1 + (W\alpha\zeta/(1+2\alpha\zeta^2))\,(V_{eff,i}/2\beta V_{FS})},$$

where t_S is the total settling time.

The optimized current is calculated from

$$I_{i,opt} = \frac{V_{FS} C_c}{t_S}\left(1 + \frac{W\alpha\zeta}{(1+2\alpha\zeta^2)} \frac{V_{eff,i}}{2\beta V_{FS}}\right).$$



A few examples

2. Questioning the status quo by asking “What if” and “Why not?”

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INTEGRATION, the VLSI journal 36 (2003) 175–189

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Low-power design techniques for low-voltage fast-settling operational amplifiers in switched-capacitor applications

Reza Lotfi*, Mohammad Taherzadeh-Sani, M. Yaser Azizi, Omid Shoaei

IC-Design Laboratory, ECE Department, University of Tehran, Tehran, Islamic Republic of Iran

A few examples

3. Body-weight support system for CP children

A few examples

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Exercising in a physiotherapy clinic using the body-weight support system

A few examples

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Exercising in a physiotherapy clinic using the body-weight support system

A few examples

3. Body-weight support system for CP children

After 18 sessions of exercising in a physiotherapy clinic using the body-weight support system, the child can walk

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Why is "Design Thinking" useful for students?

1. Many students want to have an impact on the world through entrepreneurship or corporate entrepreneurship.
2. Design Thinking is useful for everybody.
3. Design Thinking provides a structure for your mind and your thesis.

Why is "Design Thinking" useful for students?

Design Thinking provides a structure for your thesis

1. Empathize: Understanding the user and the problems they face through conducting user interviews, creating empathy maps, and listening to user stories.

2. Define: Organizing and analyzing the research information to produce a concise problem statement and possible solution or hypothesis.

- Why (For whom) are you solving this problem?
- Why is it important to solve this problem?
- What exactly is the problem you are trying to solve?
- What is the state-of-the-art? What are the pros and cons for available solutions?

Why is "Design Thinking" useful for students?

Design Thinking provides a structure for your thesis

3. Ideate: The brainstorming phase. Designers think of a wide variety of possible solutions and evaluate each one.

- What is your proposed idea?
- What is your contribution?
- What are the analyses behind your proposed idea?

Why is "Design Thinking" useful for students?

Design Thinking provides a structure for your thesis

4. Prototype: Turning ideas into a physical representation of the product that will solve the user's needs, slowly adding greater detail and complexity as designers move between testing and iteration.

5. Test: Putting the prototype in the hands of the user and determining whether the product has solved the problem at hand and reduced friction or frustration.

- What is the prototype supporting your claims?
- How have you designed and implemented the prototype?
- What are the test results supporting your claims?

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- چند توصیه و جمع بندی

بهره هایی از گنجینه های اسلام

مِنْ أَجْلِ ذَٰلِكَ كَتَبْنَا عَلَىٰ بَنِي إِسْرَائِيلَ أَنَّهُ مَنْ قَتَلَ نَفْسًا بِغَيْرِ نَفْسٍ أَوْ فَسَادٍ فِي الْأَرْضِ فَكَأَنَّمَا قَتَلَ النَّاسَ جَمِيعًا وَمَنْ أَحْيَاهَا فَكَأَنَّمَا أَحْيَا النَّاسَ جَمِيعًا ۚ وَلَقَدْ جَاءَتْهُمْ رُسُلُنَا بِالْبَيِّنَاتِ ثُمَّ إِنَّ كَثِيرًا مِنْهُمْ بَعْدَ ذَٰلِكَ فِي الْأَرْضِ لَمُسْرِفُونَ

- ... و هر کس انسانی را از مرگ برهاند و زنده بدارد، گویی همه انسان ها را زنده داشته است...

بهره هایی از گنجینه های اسلام

پیامبر اسلام ص:

مَن اَصبَحَ وَ لَم یَهتَم بِاُمورِ المُسلِمینَ فَلَیسَ بِمُسلم

هر کس صبح کند و به امور مسلمانان همّت نورزد مسلمان نیست.

اصول کافی ج ۲

بهره هایی از گنجینه های اسلام

حضرت امام صادق (ع):

قال اللهُ عزّوجلِ: أَلخَلقُ عِيالی فَأَحبُّهُمْ إِلی أَلْطَفُهمْ بِهمِ وَ أَسعاهُمْ فی حَوائِجِهِم. «الکافی، ج ۲، ص ۱۹۹»

خدای متعال می فرماید: مردم خانواده من هستند، پس محبوب ترین آنان نزد من کسانی هستند که با مردم مهربان تر و در راه برآوردن نیازهای آنان کوشاتر باشند.

بهره هایی از گنجینه های اسلام

حضرت امام صادق(ع):

«... الماشی فی حاجه اخیه کالساعی بین الصفا و المروه و قاضی حاجته کالمشحط فی سبیل الله یوم بدر و احد...»

... هر که در راستای برآوردن حاجت برادرش گام بردارد، چون کسی باشد که میان صفا و مروه گام برداشته است. و برآورنده حاجت برادر همچون کسی است که در جنگ بدر و احد در راه خدا، به خون خویش آغشته است ...

(تحف العقول، ص ۵۴۰۴- بحار، ج ۷۱، ص ۳۱۳.)

بهره هایی از گنجینه های اسلام

بهره هایی از گنجینه های اسلام

حضرت امام رضا (ع):

«اِنّ لله عبادا فِی الأرضِ یسْعَونَ فی حوائج النّاس، هُم الآمِنونَ یومَ القیامَهِ، وَ مَنْ اَدخَلَ علی مؤمِنٍ سرورا فَرّحَ الله قلبَهُ یوم القیامهِ» (الکافی، ج ۲، ص ۱۹۷، ح ۲)

خداوند در روی زمین، بندگانی دارد که در رفع نیازهای مردم می کوشند. آنان روز قیامت ایمن و آسوده اند. هرکس که بر مؤمنی شادی ببخشد و دل او را خوشحال کند، خداوند در روز قیامت، قلب او را شادمان خواهد ساخت.

سرفصل مطالب

- ضرورت «تفکر طراحی»
- «تفکر طراحی» چیست؟
- مثالهایی از «تفکر طراحی»
- چرا «تفکر طراحی» برای دانشجوها سودمند است؟
- بهره هایی از گنجینه های اسلام
- *چند توصیه و جمع بندی*

Work on Your Innovation Skills

1. Discovery

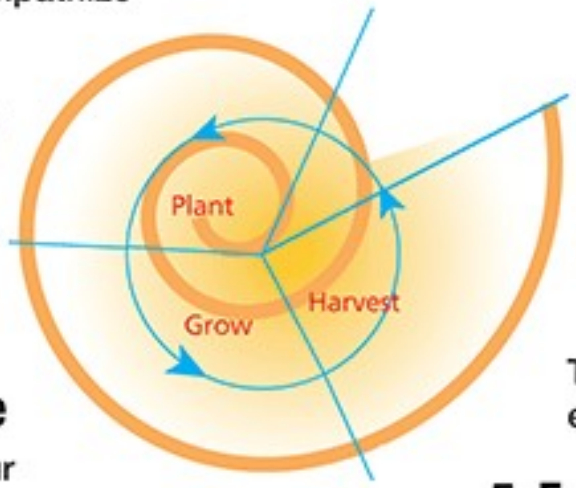
Choose an affirmative, strategic topic. Gather data. Understand & empathize with unmet needs.

2. (Re)Frame opportunity

Look for patterns & insights. Question assumptions. Frame your POV. Define your scope.

3. Incubate

Switch gears. Feed your brain with diverse stimuli. Meditate. Sleep on it.



4. Ideate/ illuminate

Experiment. Explore possibilities. Envision a desired future. Co-create in diverse team. Make your ideas visible.

5. Evaluate/Refine ideas

What is desirable, feasible, viable about your ideas? What are the constraints?

6. Rapid Prototype /test

Think big, act small, fail fast; learn from end-users and refine.

7. Deliver

Final testing, approval and launch.

8. Iterate & Scale

Evaluate. Learn. Create. Innovate.

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Ideas Don't Matter. What I Understand After 20 Years Of Innovation

Hod Fleishman Contributor ⓘ
Leadership Strategy

Not sure how to come up with the next *big business idea?* Don't worry about it. Ideas are not that important. Better to focus on:

1. Constraining the problem you are trying to solve
2. Understanding what technologies are available to help solve the problem
3. Continuously interact with the problem, be brave and pivot if needed
4. Executing really, really, well

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ARTS + DESIGN

How to use design thinking to create a happier life for yourself

Feb 23, 2021 / Bill Burnett

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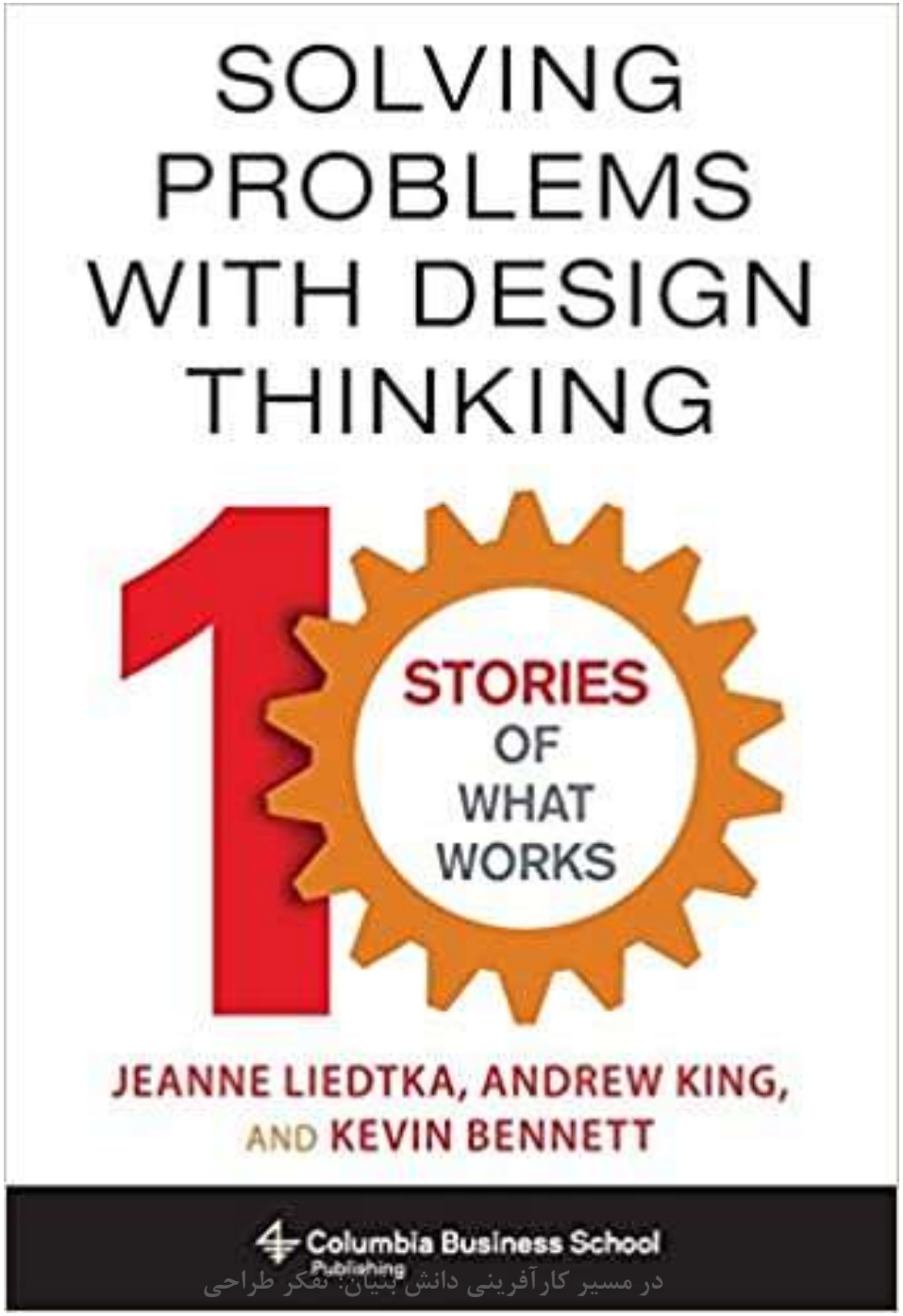
Engage your subconscious mind …

https://augustbirch.medium.com/how-you-can-engage-your-subconscious-mind-to-solve-your-toughest-problems-f81cd7fee89

To Summarize…

- *"Design thinking begins with skills designers have learned over many decades in their quest to match human needs with available technical resources within the practical constraints of business.*
- *By integrating what is desirable from a human point of view with what is technologically feasible and economically viable, designers have been able to create the products we enjoy today.*
- ***Design thinking takes the next step, which is to put these tools into the hands of people who may have never thought of themselves as designers and apply them to a vastly greater range of problems**."*

– Tim Brown, Change by Design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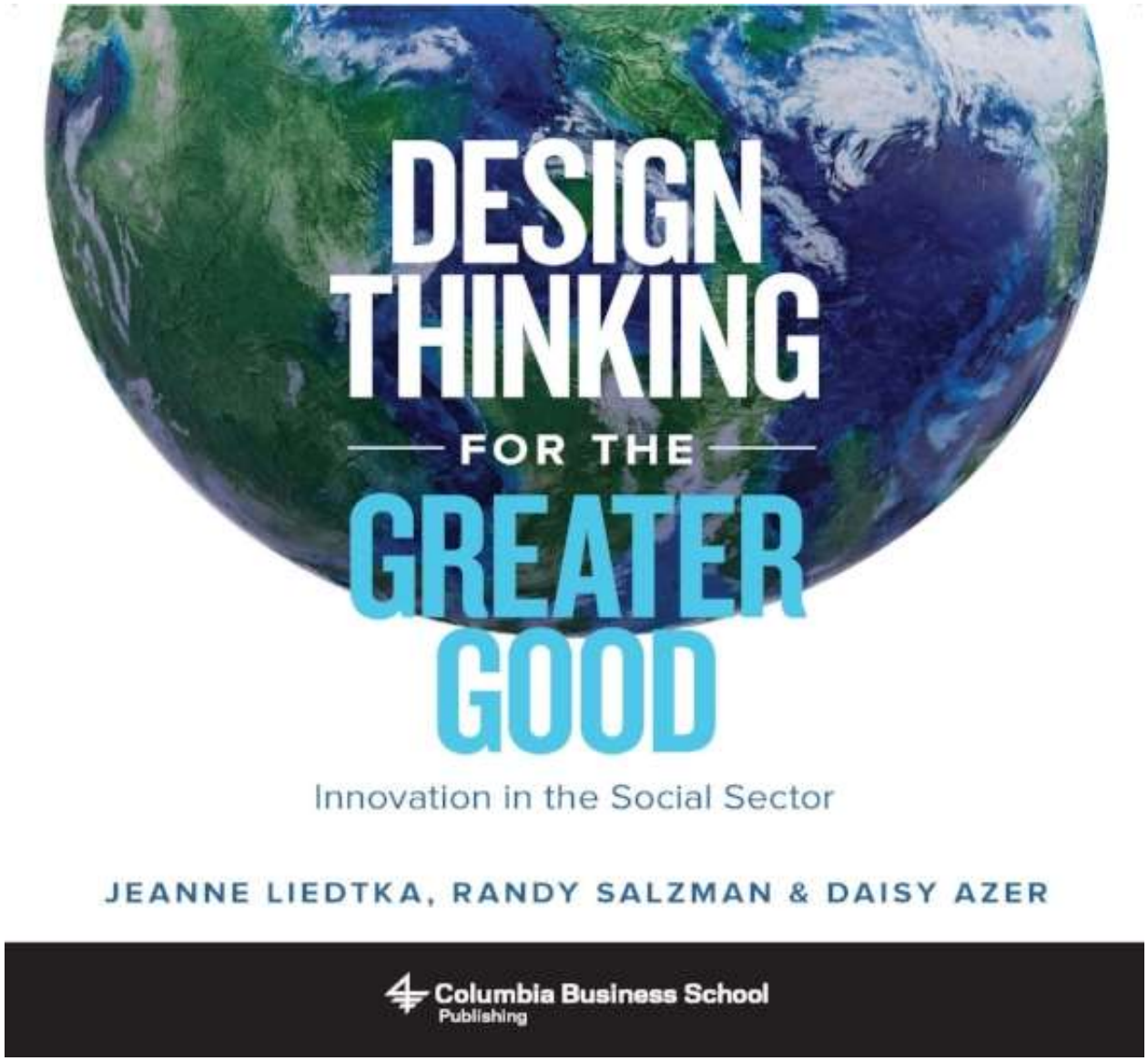
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Many thanks for your attention.
Any questions?