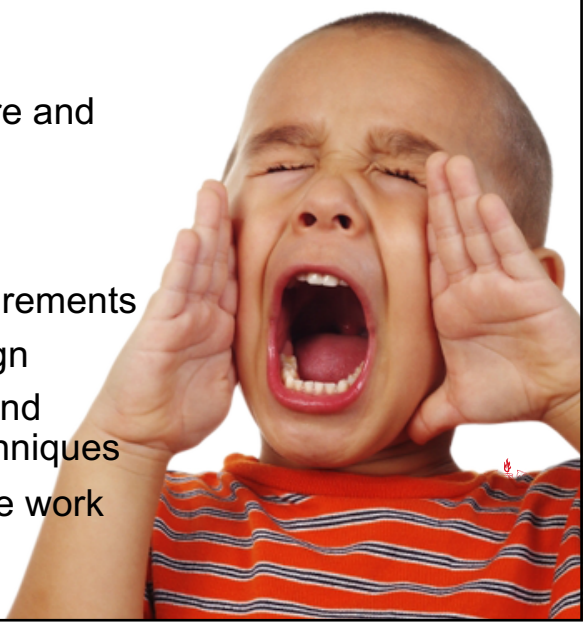


1

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Talking About..

- Changes to software and software products
- New challenges for requirements work
- Creativity and requirements
- Creativity and design
- Coupling creative and design thinking techniques
- Challenging how we work



2


These Are The Days of Miracle and Wonder…
The Age of Creativity and Innovation in Software and Products

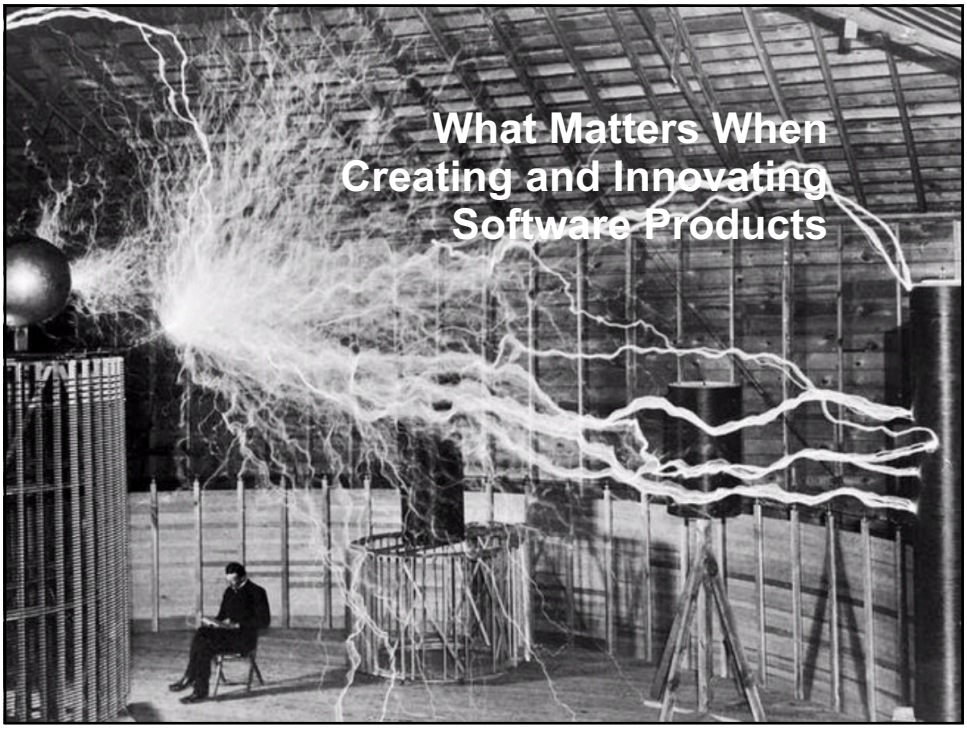
3


Software Products in the 1980s
Well-defined problem spaces and solution spaces
Most software products were specified and implemented

4


Software Products now and in the 2020s
Much larger problem spaces and solution spaces
Many software-based products were invented, discovered and designed…

5


What Matters When Creating and Innovating Software Products

6

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Creativity is Now Strategic

Macro-economic need

– The dominant economic activity, replacing focus on information
[Nomura 2001]

World Economic Forum for 2020+

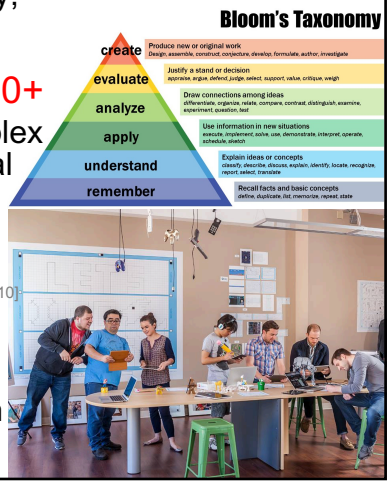
– Ranks creativity 3rd, after complex problem solving (1st) and critical thinking (2nd)

Key need for business success

– According to +1500 CEOs [IBM 2010]

Drives innovation

– Creative capitalism based on knowledge and talent to design
[Martin Prosperity Institute 2015]



7

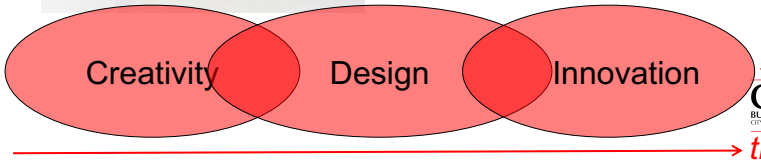
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Creativity Underpins (Product) Design



UK Design Council

– Design shapes ideas to become practical and attractive propositions for users or customers. Design may be described as creativity deployed to a specific end



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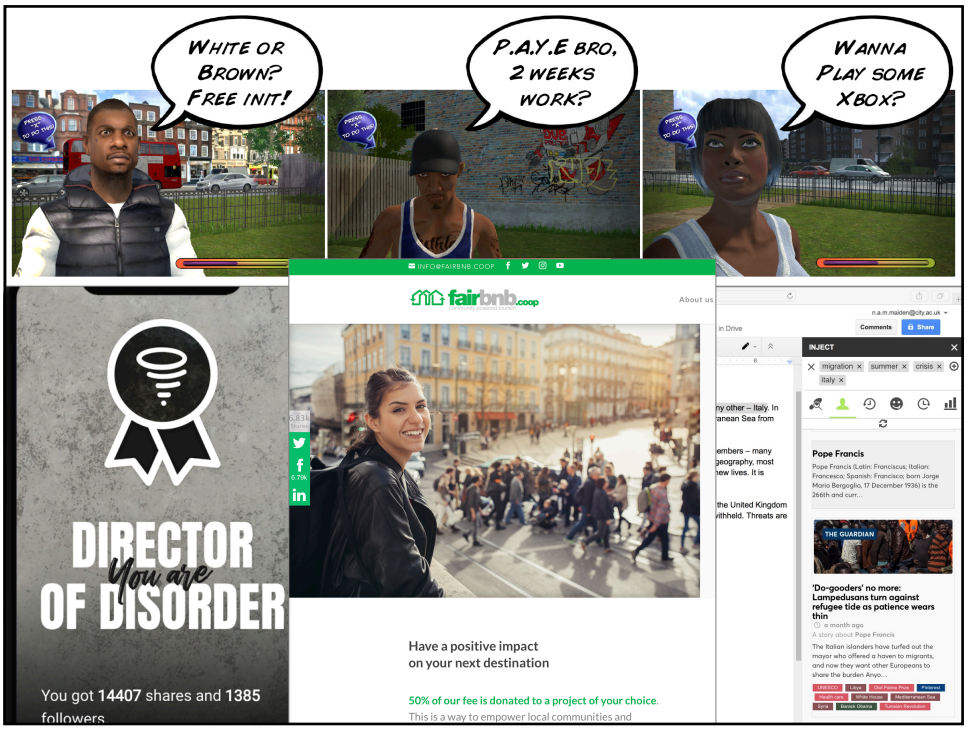
8


Dieter Rams and Good Design
Good design is innovative
It is creative

9


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PhotoMath
Were its requirements creative?
Is it innovative?

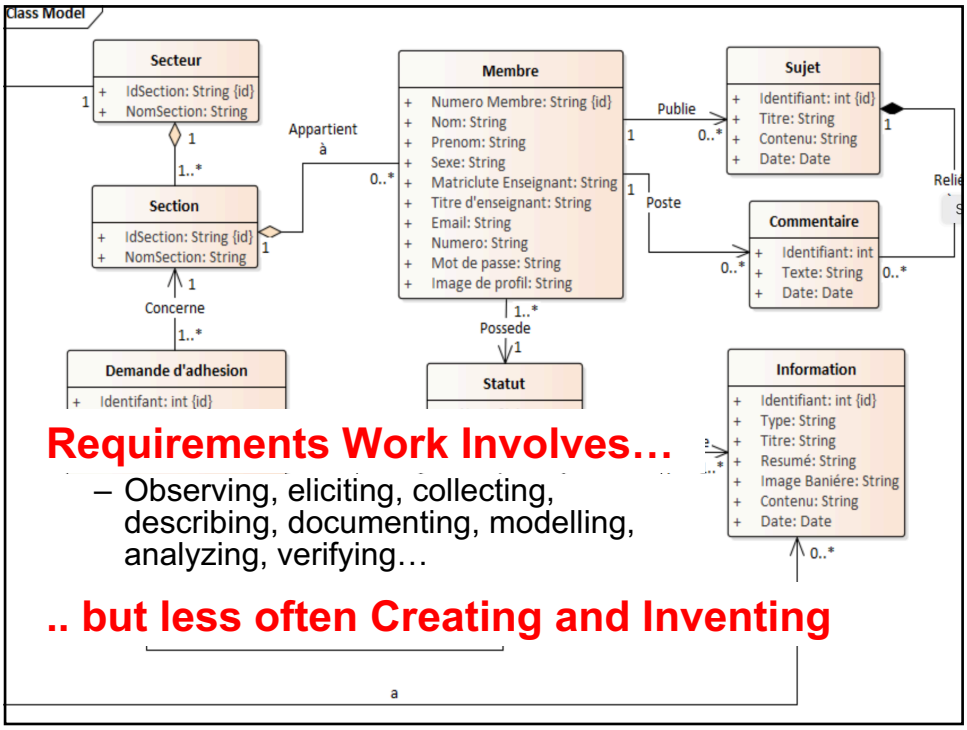
10


WHITE OR BROWN? FREE INIT!
P.A.Y.E BRO, 2 WEEKS WORK?
WANNA PLAY SOME XBOX?
DIRECTOR OF DISORDER
You are
You got 14407 shares and 1385 followers
fairbnb.coop
About us
Have a positive impact on your next destination
50% of our fee is donated to a project of your choice.
INJECT
migration
summer
crisis
italy
Pope Francis
THE GUARDIAN
'Do-gooders' no more: Lampedusans turn against refugee tide as patience wears thin

11


Requirements and Creativity

12



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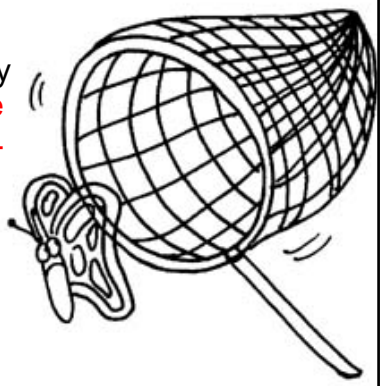
Key Insights [Maiden 2013]

In requirements practices

- Elicited requirements limited by perceptions of what is possible
- Customers are frequently rear-view mirrors [Forrester Research]

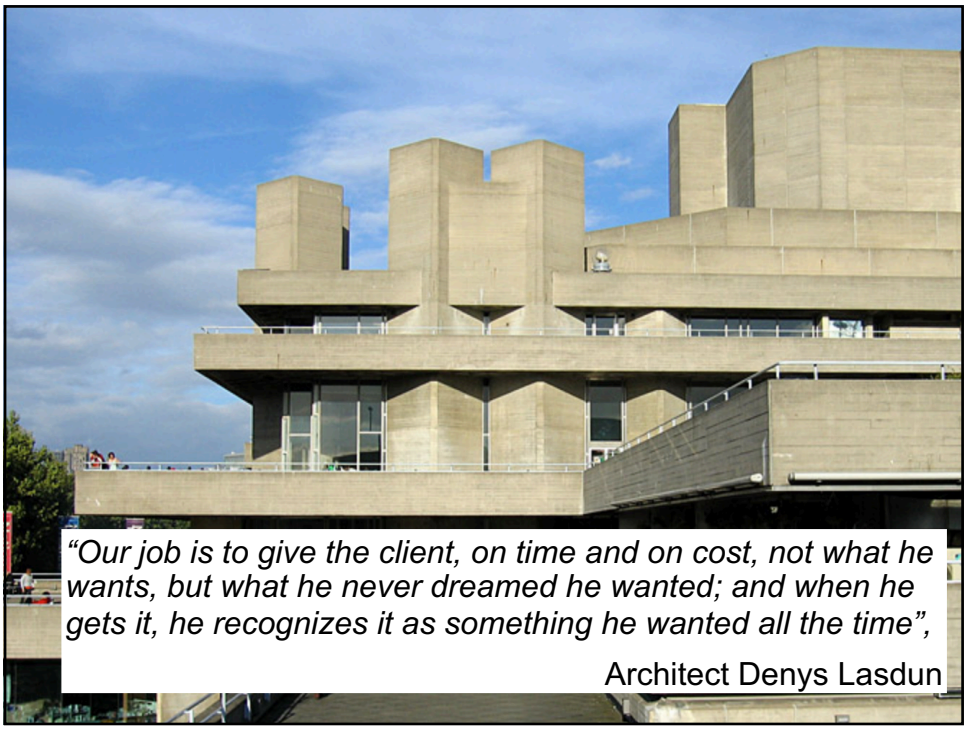
Requirements encapsulate creative thought

- Stakeholders already thinking about future
- Interviews often capture end-process of stakeholder creative thinking



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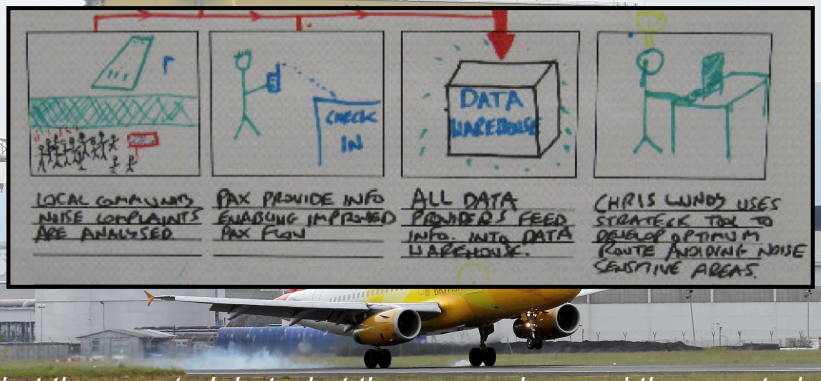
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Imagining Requirements

Removed key constraint: weather variability

Steam catapults; glided approaches; weather-adapted approach routes



.. not what they wanted, but what they never dreamed they wanted..

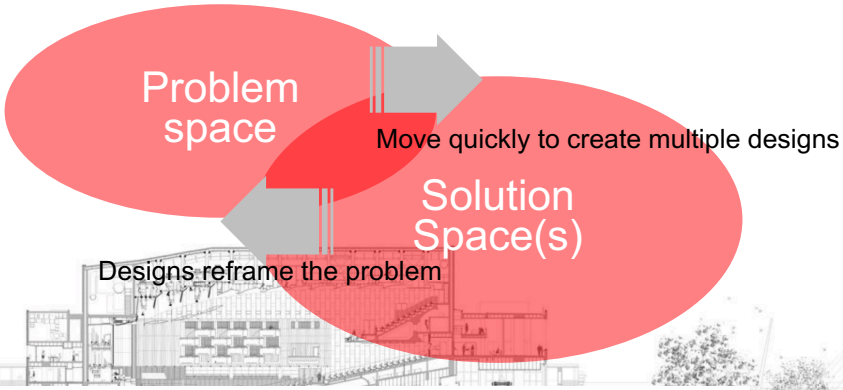
16



17

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How Experts Design Client Dreams [Cross 2004]



Often using sketches and making, for visual thinking

Creating and designing, problems and solutions, are intertwined tightly

18



19

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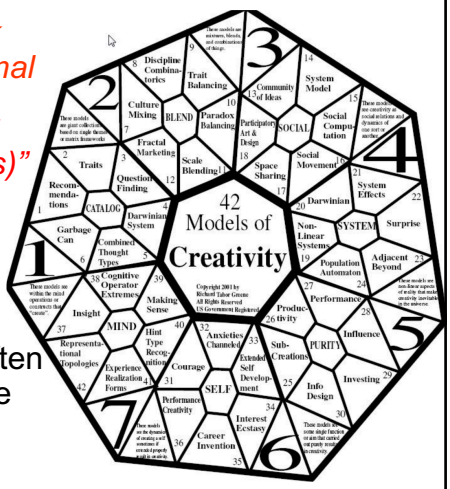
A Working Definition of Creativity

Sternberg and Lubart [1999]

- *"the ability to produce work that is both novel (i.e. original and unexpected) and appropriate (i.e. useful and adaptive to task constraints)"*

Different Categories

- Big-C: clear-cut eminent contributions to society
- little-C: everyday (work) activities of non-experts, often not perceived to be creative
- Pro-C: professional-level expertise [Kauffman & Beghetto 2009]

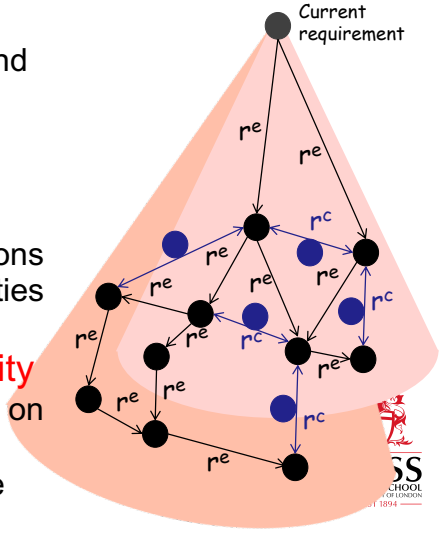


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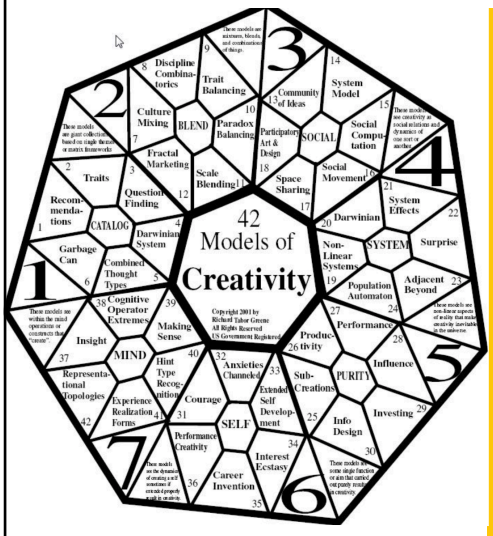
Information Processing Categories [Boden 1990]

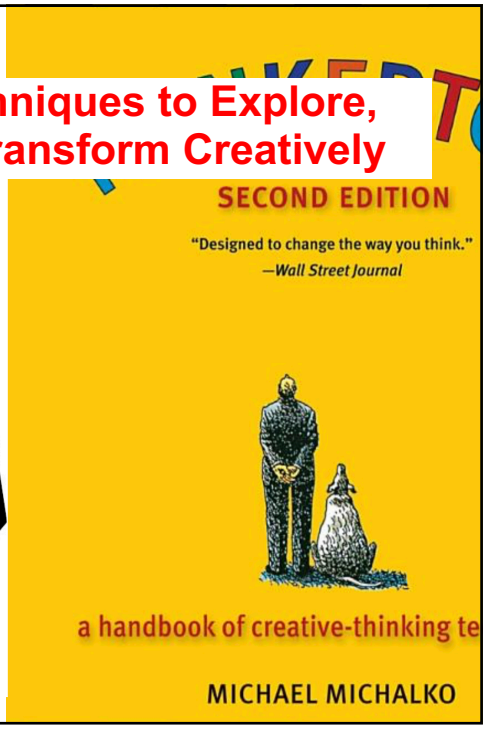
1. Exploratory creativity
   - Search space of partial and complete possibilities
   - Rules exist to enable traversal of search space
2. Combinational creativity
   - Make unfamiliar connections between familiar possibilities in the search space
3. Transformational creativity
   - Challenge the constraints on the search space
   - Enlarge space of possible ideas to explore



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Numerous Techniques to Explore, Combine and Transform Creatively





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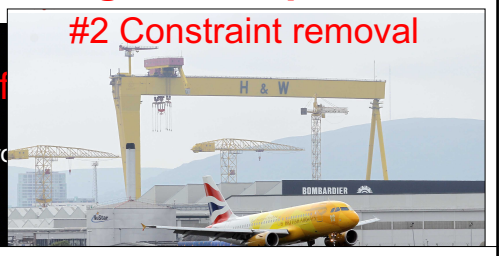
Applied Creative Thinking Techniques



#1 Hall of f

How would
approach the pro

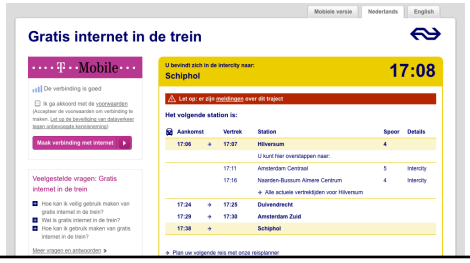
#2 Constraint removal



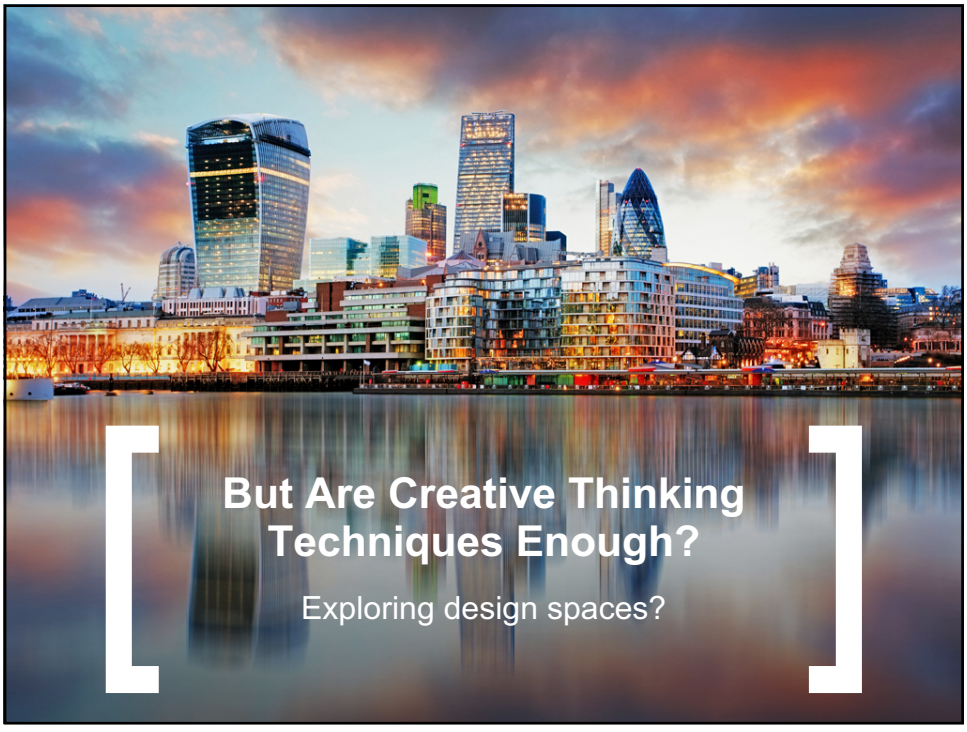
4 Desktop Walkthroughs



Creativity Triggers



23



24

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Design Thinking: Twenty-Five Years On

Human-centred innovation

- Collaborating early, learning quickly, visualizing ideas, and low-fidelity prototyping rapidly



Case studies reveal effectiveness

- Barclays, O2, Virgin Atlantic, Speedo ….

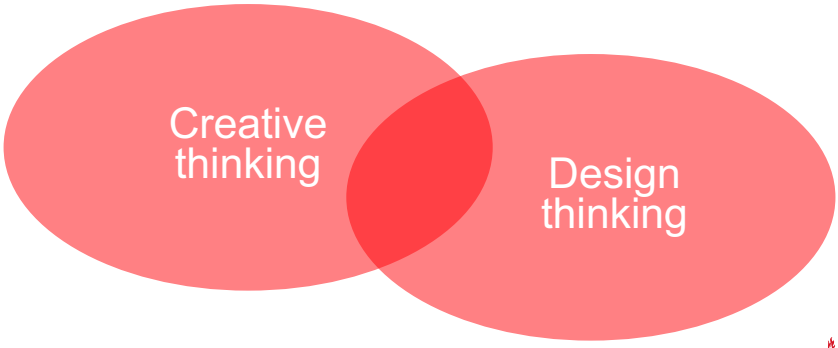
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The Gap Reveals Opportunities for Developing Software Products



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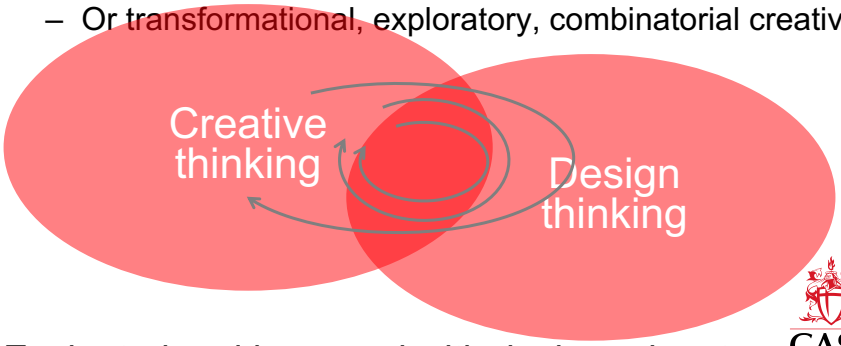
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Integrate Creative and Design Thinking

Situated process chunks [Ralyte & Rolland 2001]

- Combine technique and artefact affordances
- Each supports divergent or convergent creativity
- Or transformational, exploratory, combinatorial creativity



Evaluated and improved with designer inputs

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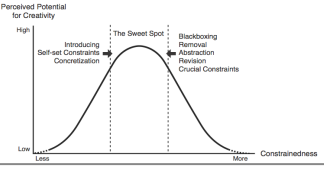
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Transformational Creativity

Removing constraints [Onarheim 2012]

– Designs, e.g. architecture, often over-constrained
– Art, e.g. poetry, finds value in constraints



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Constraint Removal AND Design Sketching

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How to Undertake

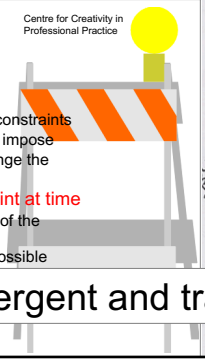
Three-stage technique

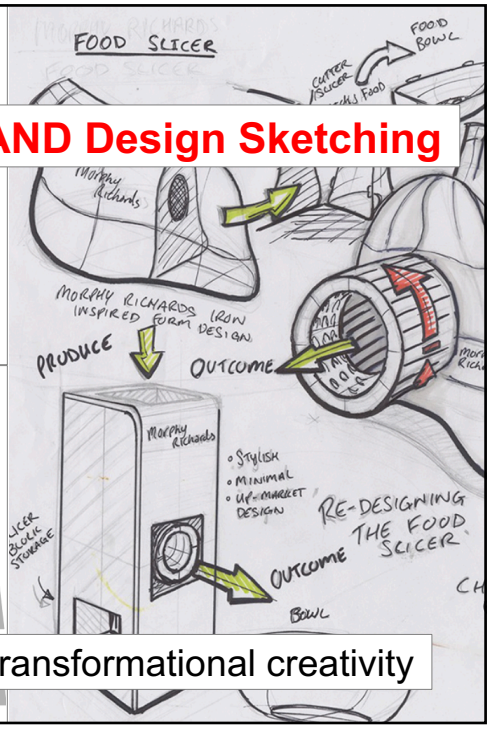
1. Open brainstorm to surface constraints
2. Select constraints to relax or impose
3. Handle the constraint to change the space for creative thinking

Imagine removing one constraint at time

– Imagine alternative versions of the design space
– Brainstorm new ideas now possible

Pr

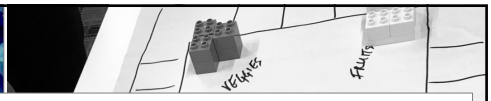




Supports divergent and transformational creativity

29





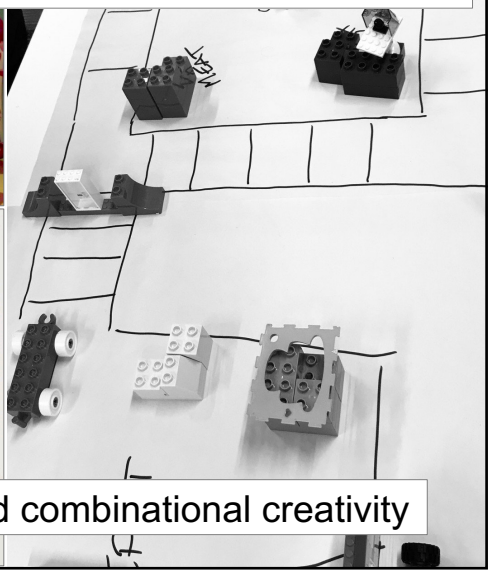
Entertaining

Creativity Triggers AND Desktop Walkthrough

[Burnay et al. 2016]

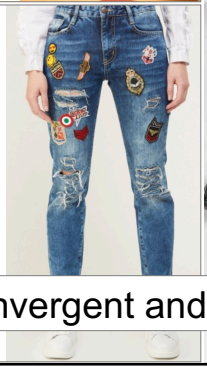
- ✓ Competing apps have shortened attention spans
- ✓ What do many people now use mobile devices for?
- ✓ 24/7 entertainment is needed
- ✓ Add new features for entertaining
- ✓ Deliver features in more entertaining ways





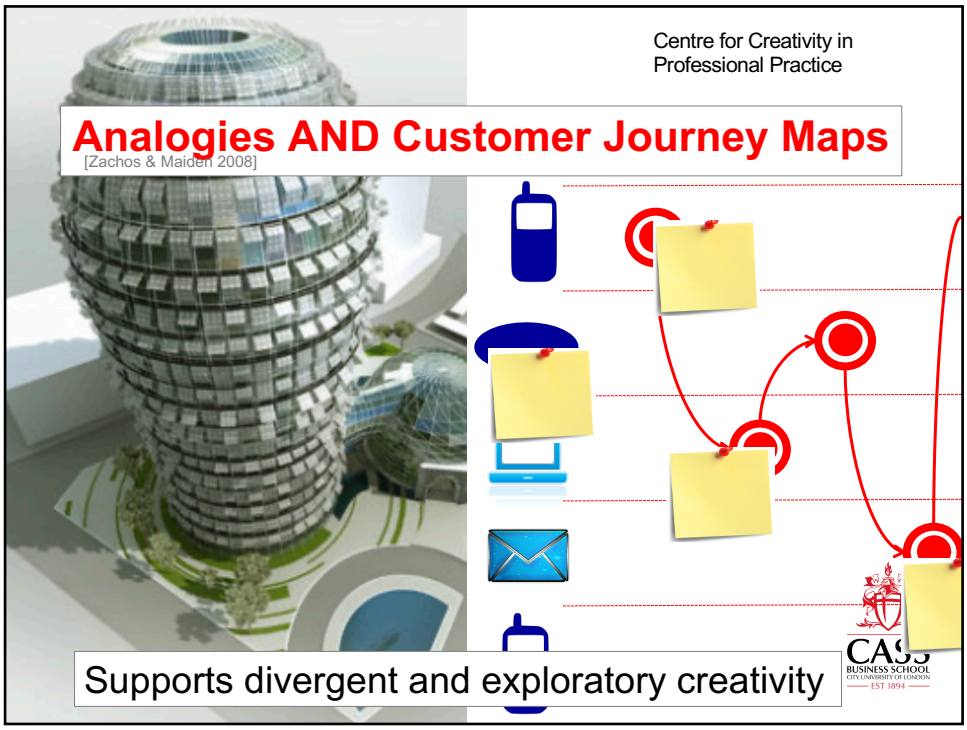
Frugal/Economical

- ✓ Austerity requires people to live more economically
- ✓ Conspicuous wealth is unfashionable
- ✓ Frugal living is more green
- ✓ Millennials live more frugally
- ✓ Reduce costs and resource usage – or at least the p
- ✓ F
- ✓ D

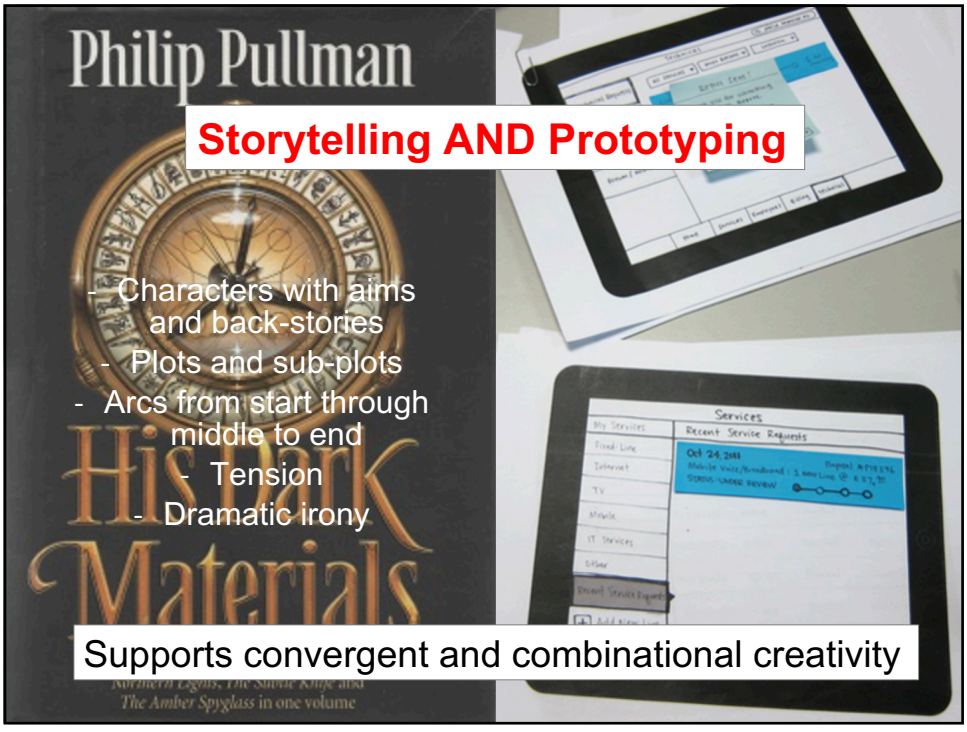


Supports convergent and combinational creativity

30


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Analogies AND Customer Journey Maps
[Zachos & Maiden 2008]
Supports divergent and exploratory creativity

31


Philip Pullman
Storytelling AND Prototyping
- Characters with aims and back-stories
- Plots and sub-plots
- Arcs from start through middle to end
- Tension
- Dramatic irony
His Dark Materials
The Amber Spyglass in one volume
Supports convergent and combinational creativity

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Software System Successes [Maiden et al. 2004, 2005, 2006, 2007]



Applied in requirements projects

- European air traffic management, food information traceability, electronic vehicle use, television

Outcomes

- Novel and useful concepts, requirements and designs

Process

- Greater creative outcomes on second workshop day

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So What?

Recognize that creativity is strategic

Software products often need to innovate

Explore dreams, not requirements

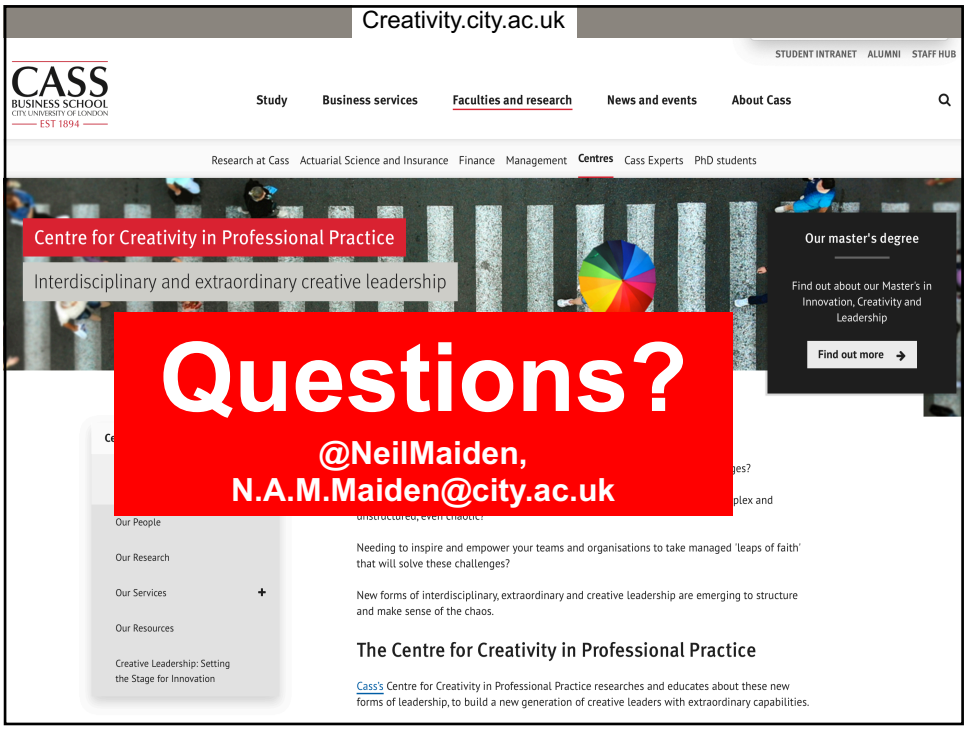
Learn from other sectors – and go beyond them

Exploit creativity and design thinking techniques

Challenge your software development methods

- Make your agile more creative
- Use your modelling languages for invention
- Combine sketching and modelling
- And lots more

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Creativity.city.ac.uk
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N.A.M.Maiden@city.ac.uk
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Creative Leadership: Setting the Stage for Innovation
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The Centre for Creativity in Professional Practice
Cass's Centre for Creativity in Professional Practice researches and educates about these new forms of leadership, to build a new generation of creative leaders with extraordinary capabilities.

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