

Designing disruption

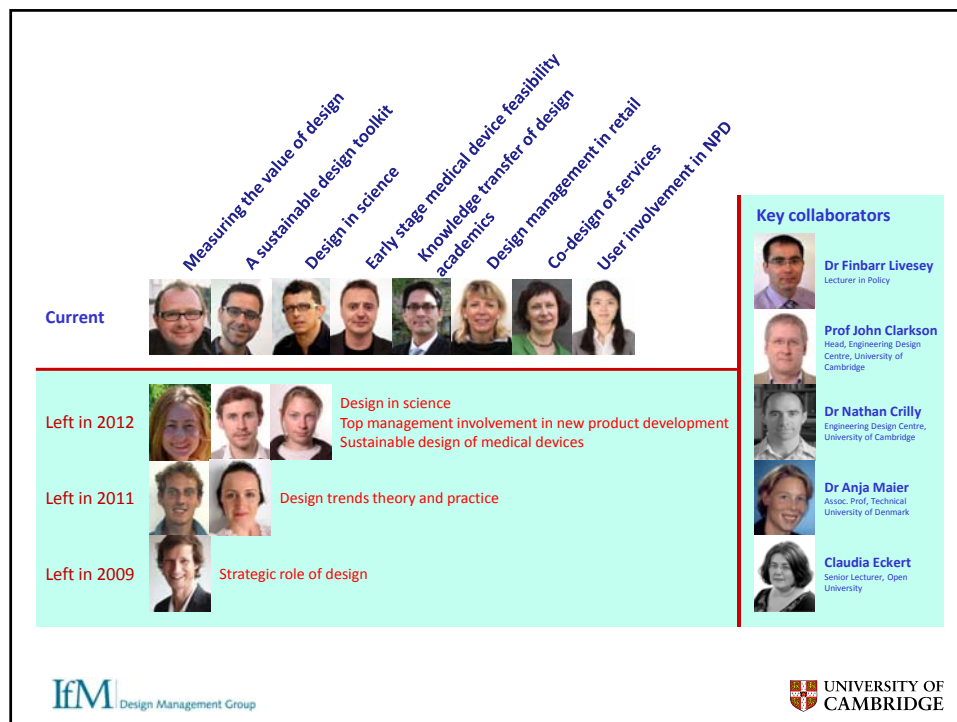
Dr James Moultrie
Design Management Group



Understanding and improving the ways
in which design and new product
development are managed:

- Valuing the benefits of design
- Integrating design and technology
- How to design sustainable products and services
- New ways of managing new product development
- Using design as a strategic resource



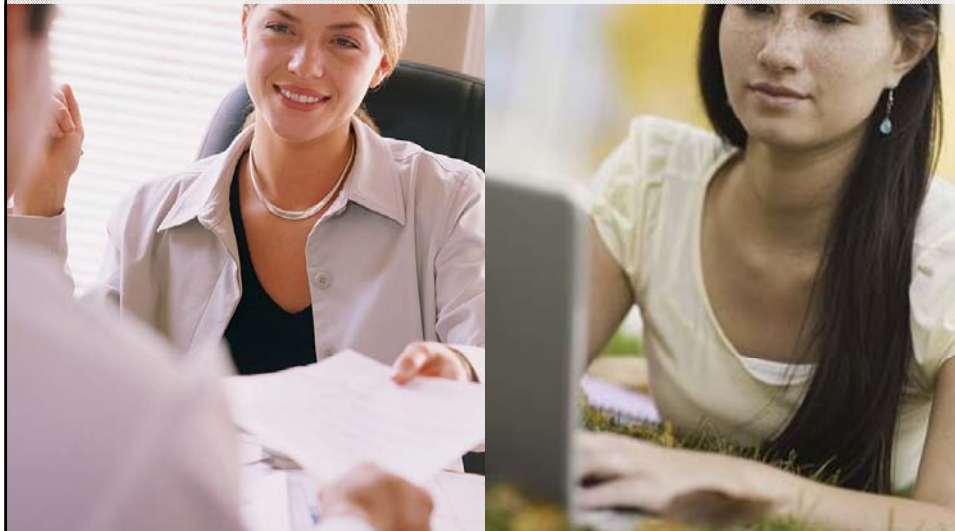






Wei Liu: Customer involvement in new product development

PhD Candidate



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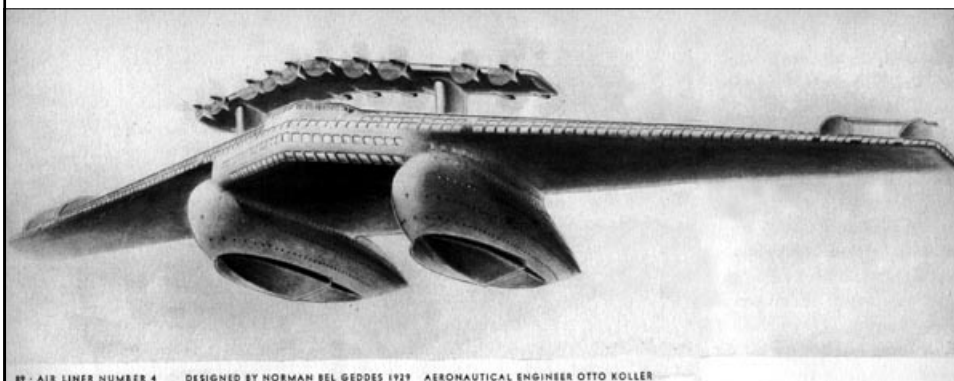
Designing disruption

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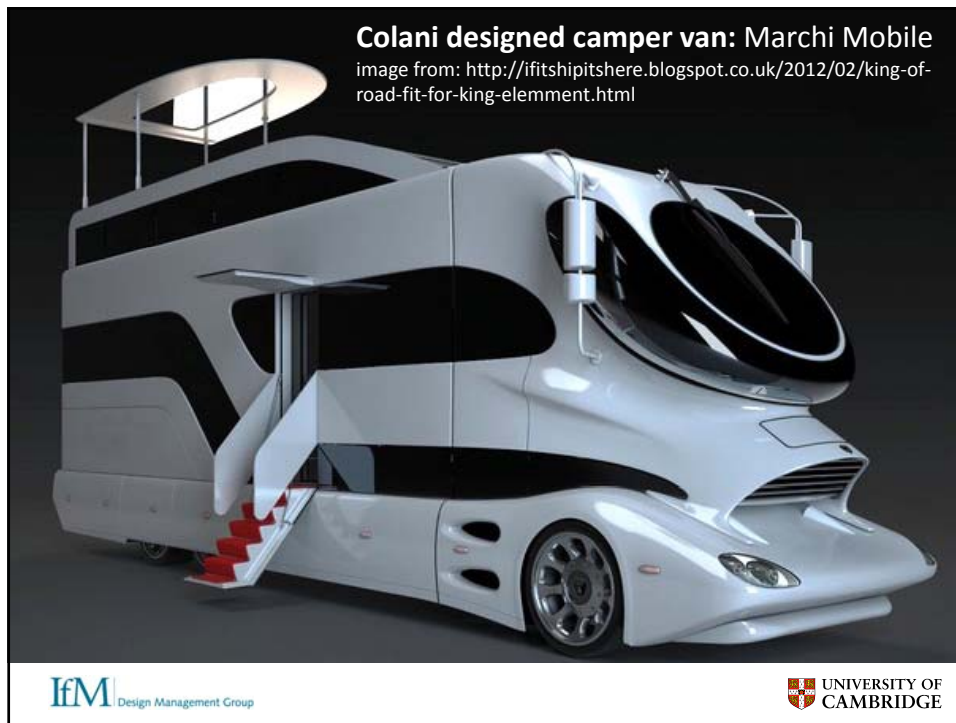
Le Corbusier's Ville Contemporaine Plan for Paris, 1922
<http://www.ecosensual.net/drm/ideas/LeCorbusier1.jpg>

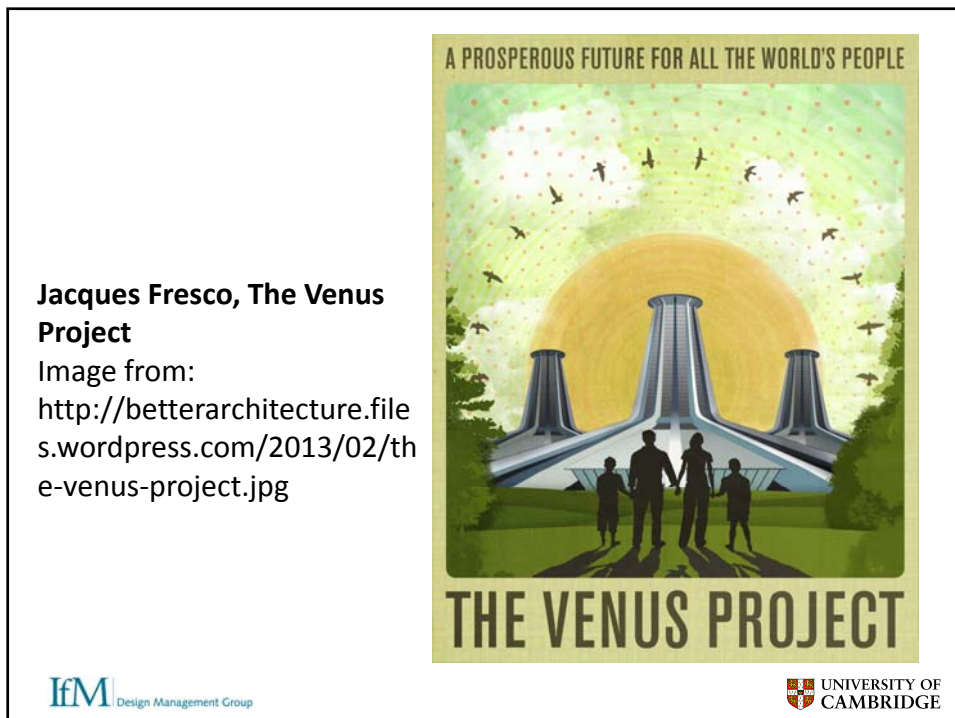


Norman Bel Geddes: Air Liner No. 4 1929

<http://home.att.net/~dannysoar/BelGeddes.htm>







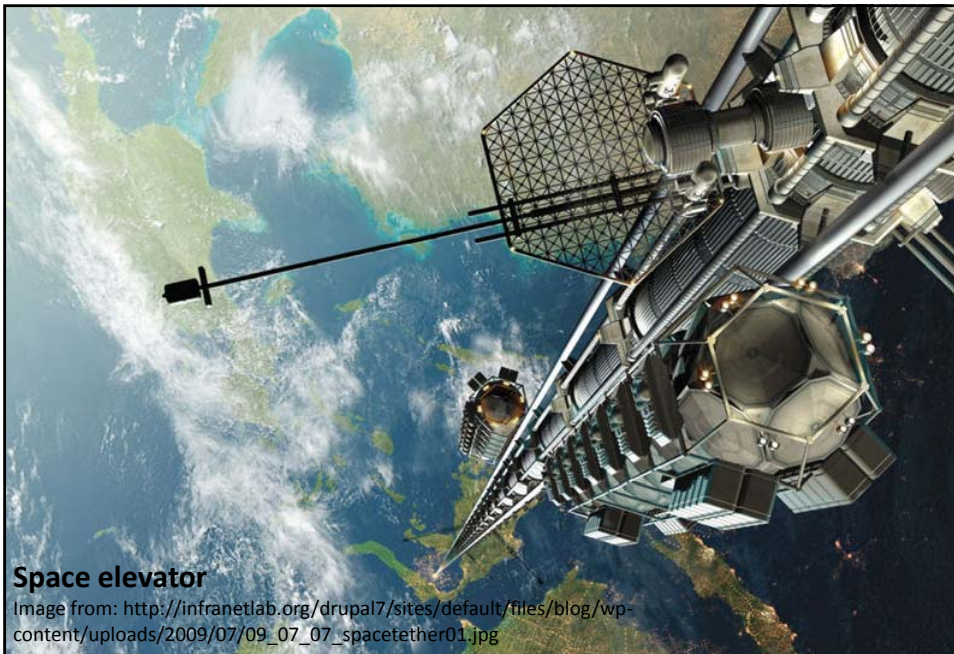
Jacques Fresco, The Venus Project

Image from: <http://4.bp.blogspot.com/-YjvsXgDo3T0/TpnePSKZhwI/AAAAAAAAAig/3CtAI105anU/s1600/000.jpg>



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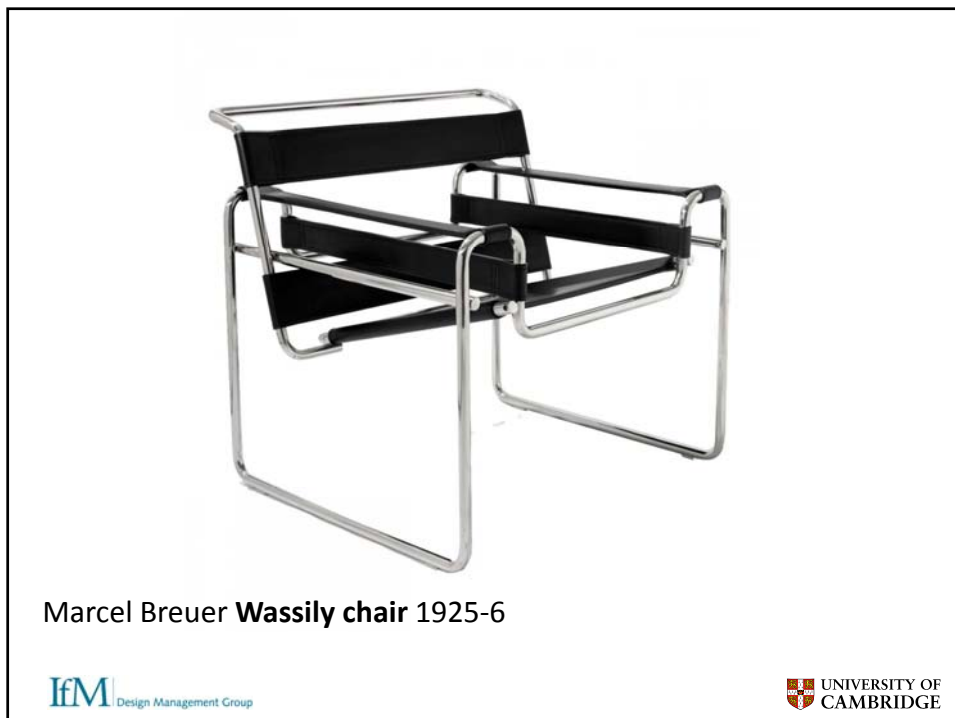


Space elevator

Image from: http://infranetlab.org/drupal7/sites/default/files/blog/wp-content/uploads/2009/07/09_07_07_spacetether01.jpg

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Saarinen, **Tulip Arm Chair** 1956

Ross Lovegrove, **Go Chair** 2001





One shot stool, Materialise

Image from:

<http://inhabitat.com/one-shot-stool-by-materialise/>

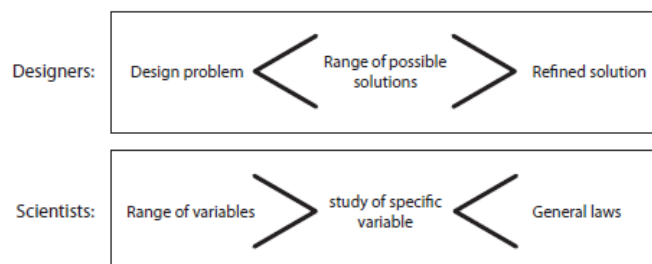


Design in science

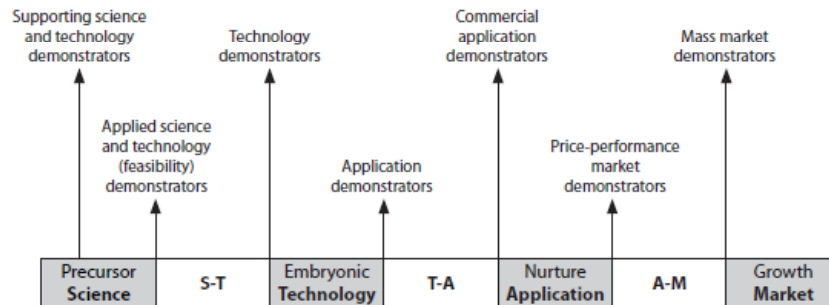
Design in Science

How and to what extent can design play a useful role in early stage scientific research?

How will the role and impact of design engagement be influenced by factors such as the type of science, the extent to which the science is applied and its complexity?



STAM Framework ...



Design in Science

EPSRC funded research project exploring role of design in early stage scientific research.

- £180k
- 2 Designers
- 2 ½ years
- 8 in-depth case studies
- Variety of scientific disciplines
- Early/late stage research

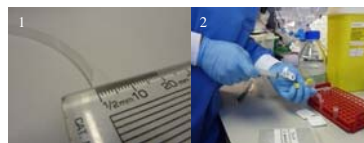


Case Studies

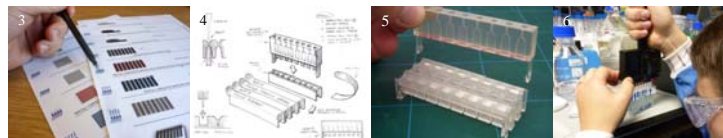
	Project	Dept	Time	Impact
1	Oxygen Mask	Addenbrookes	6 months	Prototypes facilitated user testing and discussions with manufacturers.
2	Fluid Handling Device	Chemical Engineering	6 months	£150k product development. External design consultant employed.
3	Multistable Material	Engineering	3 months	Research proposal suggested.
4	Polymer Opals	Physics	3 months	Research Proposal suggested.
5	Biophotovoltaics	Chem Eng, Biochemistry, Plant Sciences	18 months	Research direction influenced. Joint research bids in prep.
6	Stem Cell Research	Regenerative Medicine	6 months	Software concept, potential for future funding.
7	Signal Processing	Engineering	2 months	Applications identified, research plans drafted.
8	Polymer Wood Composites	Chemistry	3 months	Applications identified, research proposal suggested.

Fluid Handling Device

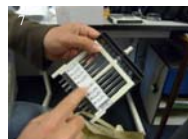
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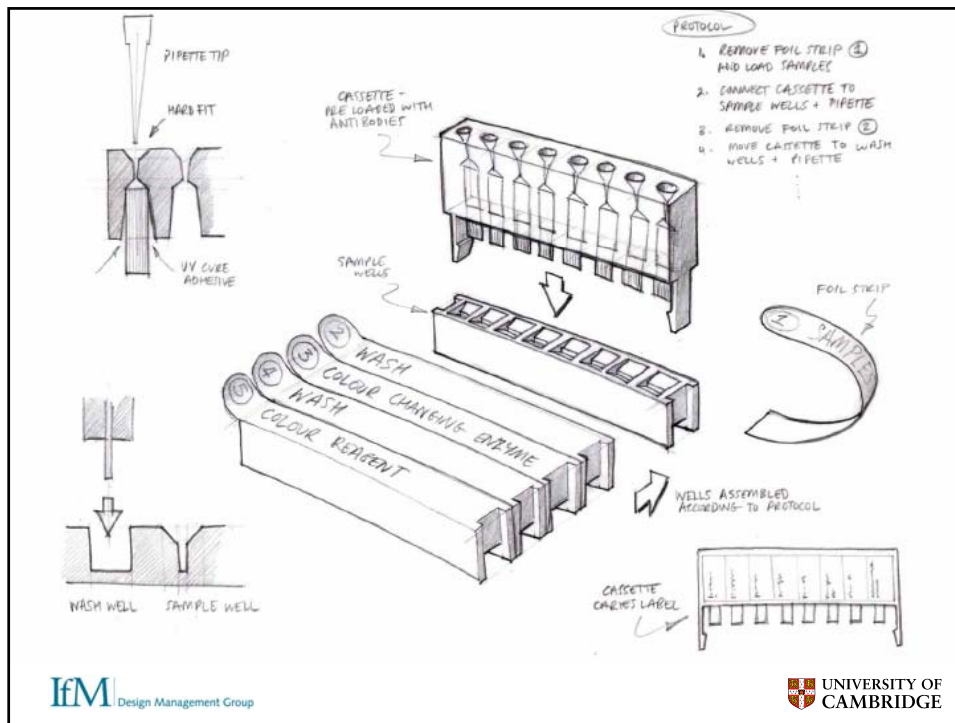


Design



Impact



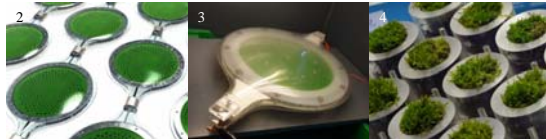


Biophotovoltaics

Start



Design



Impact



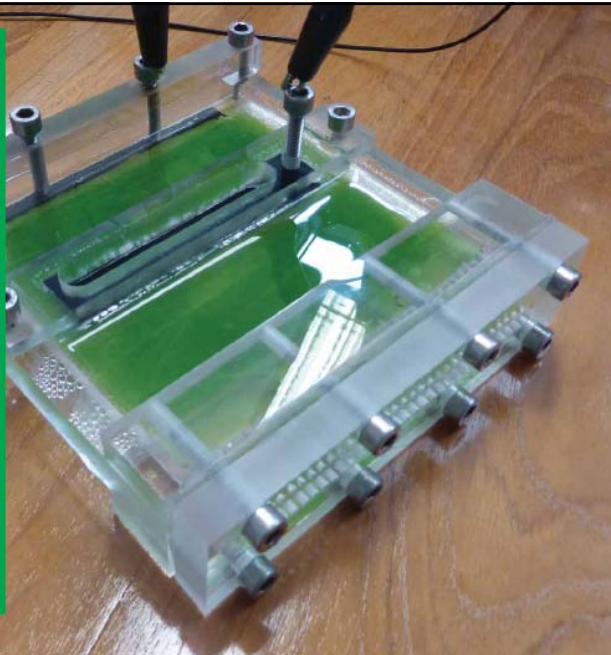
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BIOPHOTOVOLTAICS

Biophotovoltaic devices are biological solar cells that generate energy from the photosynthetic activity of living microorganisms such as algae. A brainstorming session was held with biologists and chemists to generate a series of conceptual designs to demonstrate potential future applications of this technology.

These concepts were presented at the Royal Society Summer Science Exhibition in London during the summer of 2010. One of the concepts, a Biophotovoltaic solar panel, is currently being prototyped so that it can be used by the scientific team to demonstrate the technology to investors.



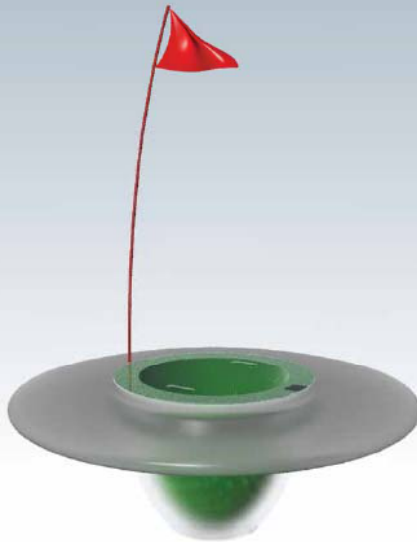
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A small group of algal solar collectors mounted on floating buoys which also harvest desalinated water.

LOCATION: Near-shore, warm climate

CAPACITY: Several units provide electricity and desalinated water for a small coastal community



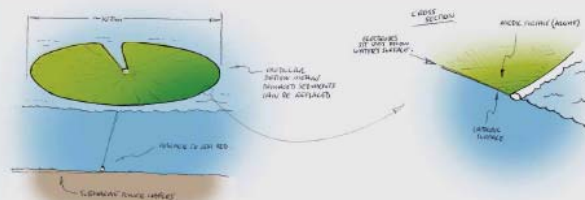
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BIOPHOTOVOLTAIC POWER STATION
A field of large floating algal solar collectors

LOCATION: Offshore, warm climate

CAPACITY: Provides electricity for a large coastal settlement



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BIOPHOTOVOLTAIC SOLAR PANEL

A modular system of bio-solar panels containing algae which can be mounted on a building

LOCATION: Inland, near a water supply, warm climate

CAPACITY: Similar to existing solar panels – meets energy requirements of the building they're mounted on.



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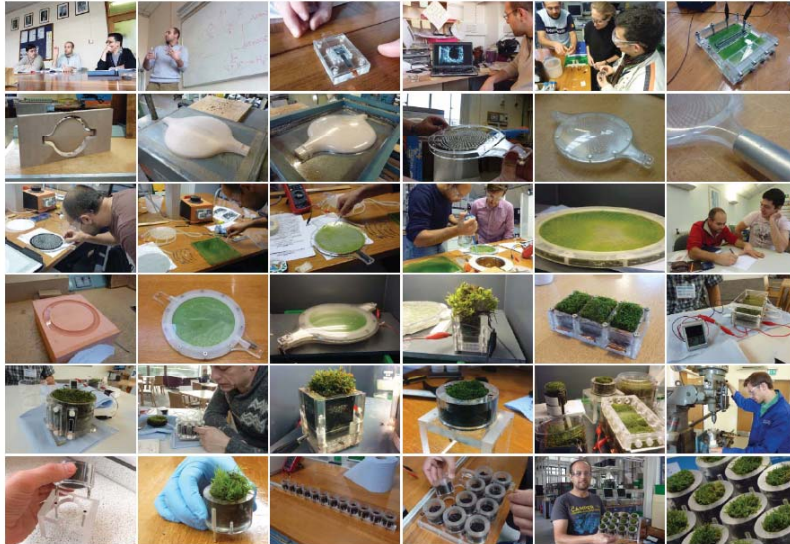
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Design in Science



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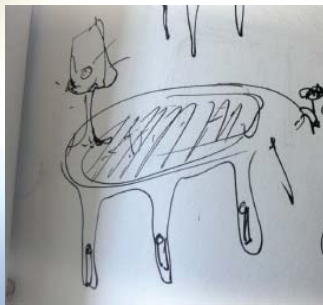
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ALGAE TABLE

A table incorporating a bio-solar panel which stores energy to power a light in the evening

LOCATION: domestic use, warm climates

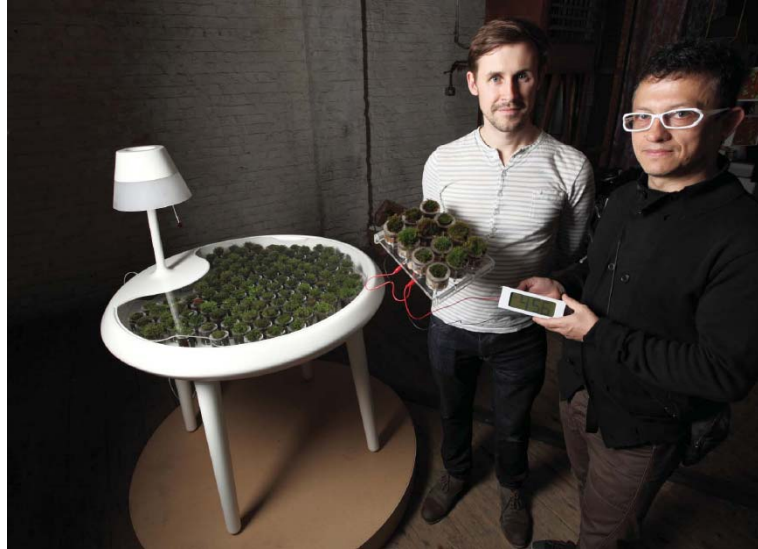
CAPACITY: The lamp



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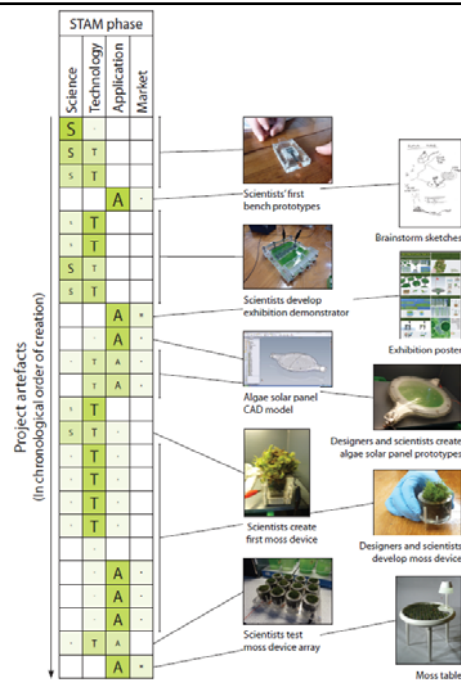
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Design in Science



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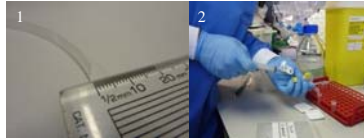


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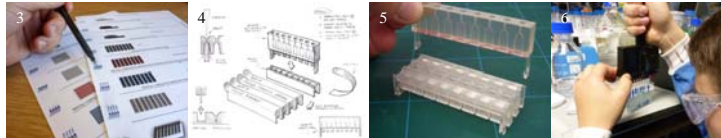
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Fluid Handling Device

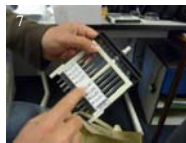
Start



Design



Impact



Biophotovoltaics

Start



Design



Impact

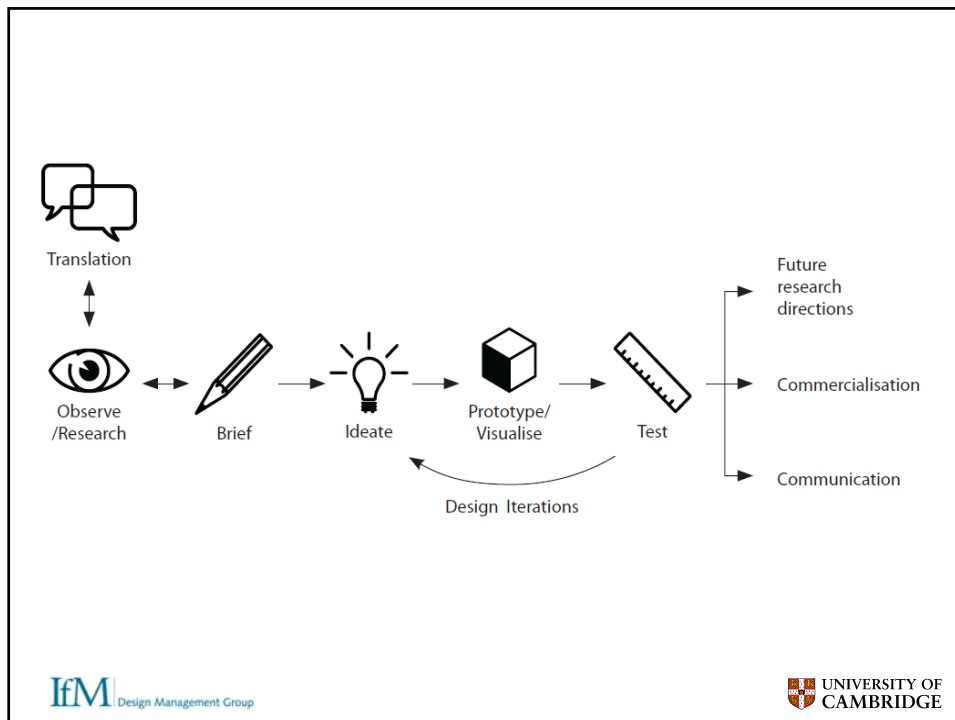


Factors influencing collaboration

Scientist's objective	Specific factors	Generic factors
Commercialisation of research with a specific application in mind		Translation Trust Differing approaches to solving design problems
Commercialisation of research with no specific application in mind	Timing of design engagement Managing expectations of technology	Knowledge of each others' disciplines Lack of resources
Conducting research	Degree of abstraction of the science Size/volume Motivations of scientists	Intellectual property

Contributions of design

Scientist's objective	Specific contributions	Generic contributions
Commercialisation of research with a specific application in mind	Producing models and prototypes to quickly evaluate ideas Bringing the perspective of users and the market place	Communicating the potential of new technology to investors and other non-scientific stakeholders
Commercialisation of research with no specific application in mind	Identifying routes to commercialisation	Creation of artefacts that enable observation of new phenomena Improving scientists' equipment, tools and processes
Conducting research	Influencing the research direction Providing early insight into practical issues Back casting	



Design in Science

EXPLORING HOW INDUSTRIAL DESIGNERS CAN CONTRIBUTE TO SCIENTIFIC RESEARCH

Alex Driver
Carlos Paraita
Dr. Zahra Moultrie

http://www.amazon.co.uk/Design-Science-Industrial-Contribute-Scientific/dp/1902546474/ref=sr_1_1?ie=UTF8&qid=1368196157&sr=8-1&keywords=design+in+science+moultrie

<http://www.youtube.com/watch?v=tZ7pdk0q8ls&feature=relmfu>

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Some recent publications ...

- Johnson J, Moultrie J, (2012), Managing early stage technology development in the Medical Device industry, *International Journal of Innovation Science*, **In Press**
- Felekoglu, Moultrie, (2012/3), Top Management Involvement in New Product Development: A Review and Synthesis, *Journal of Product Innovation Management*, **In Press**
- Driver, A., Peralta, C., & Moultrie, J. 2011 Apr 30. Exploring How Industrial Designers Can Contribute to Scientific Research. *International Journal of Design* [Online] 5:1
- Stevens J, Moultrie J, (2011), Aligning strategy and design perspectives: a framework of design's strategic contributions, *The Design Journal*
- Maier A, Moultrie J, Clarkson P J, (2011), Assessing organisational capabilities: reviewing and guiding the development of maturity grids, *Journal of IEEE Transactions in Engineering Management*

Future work ...

Work Package	Science	Technology	Application	Market
WP 1: Design for 21st Century manufacturing				
WP 2: Design to support disruptive technology transfer				
WP 3: Design led futures thinking				

WP4: Disrupting design

Thank you.