What is design?

a brief introduction

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AR2U090 Research & Design Methodology for Urbanism
What is design?  
... A few descriptions/definitions...

| Design is devising courses of action aimed at changing existing situations into preferred ones. | {Simon, 1996 #256} |
| The process of inventing physical things which display new physical order, organisation, form, in response to function. | {Alexander, 1964 #2} |
| The planning and patterning of any act towards a desired, foreseeable end constitutes the design process... design as the primary underlying matrix of life... Design is the conscious effort to impose meaningful order. | {Papanek, 1984 #3773} |
| The imaginative creation of possible forms, which are created to achieve certain purposes and are complete with the instructions for making them. | {Lynch, 1981 #167} |
| A goal-oriented, constrained, decision-making, exploration and learning activity which operates within a context which depends on the designer's perception of the context. | {Gero, 1990 #315} |
| Design is the specification of a system structure that does possess certain desired affordances in order to support certain desired behaviors, but does not possess certain undesired affordances in order to avoid certain undesired behaviors. | {Maier, 2009 #4500} |
| (Noun) a specification of an object, manifested by some agent, intended to accomplish goals, in a particular environment, using a set of primitive components, satisfying a set of requirements, subject to some constraints; (Verb, transitive) to create a design, in an environment (where the designer operates). | {Ralph, 2009 #3647} |
Where to start?

- Design (and planning) are described within various domains, some examples:
  - A domain called Design Thinking;
  - As a topic within the cognitive sciences, studying ‘cognitive planning’ (and ‘cognitive designing’);
  - Within the domain of urban planning and design, urbanism;
  - Within the domain of geodesign.
General notions: the same?

“Some people hold that designing and planning are two distinct activities; an architect designs, a traffic engineer plans. Rittel made no such distinction; in fact, he considered the terms to be synonymous”. (Protzen & Harris, 2010, p2)

Both concerned with preparing for anticipated future events (including intentions, purposes, etc.) and about taking decisions.

General notions: different? 1/2

“While one usually plans for an eventuality, one designs to cause an eventuality. Designing is therefore different from planning in its intent, its expectations for the future, and the extent of its conditional nature.” (Salustri and Eng, 2007, p22)

<table>
<thead>
<tr>
<th>Planning (word-like)</th>
<th>Designing (image-like)</th>
</tr>
</thead>
<tbody>
<tr>
<td>starts concrete</td>
<td>starts abstract</td>
</tr>
<tr>
<td>anticipates on events</td>
<td>tries to cause events</td>
</tr>
<tr>
<td>less uncertainties</td>
<td>more uncertainties</td>
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“Design does not replace planning, but planning is incomplete without design… Operational design must help the commander provide enough structure to an ill-structured problem so that planning can lead to effective action toward strategic objectives. Executed correctly, the two processes always are complementary, overlapping, synergistic, and continuous.” General James N. Mattis in Banach et al (2012)

<table>
<thead>
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<th>Planning</th>
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<tbody>
<tr>
<td>rational, rigorous, reductive, repeatable</td>
<td>critical, creative, continuous and circular</td>
</tr>
<tr>
<td>high degree of certainty with respect to future events</td>
<td>high degree of uncertainty about future events</td>
</tr>
<tr>
<td>main purpose is to formalize the approach to influencing future events</td>
<td>main purpose is to understand, learn, and adapt to iteratively (re) frame and (re)solve problems</td>
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Cognitive planning

“The ability to plan, or "think ahead" …“cognitive planning” may be defined as the ability to organize cognitive behaviour in time and space and is necessary in situations where a goal must be achieved through a series of intermediate steps each of which does not necessarily lead directly towards that goal.” (Owen, 1997, p431)

Cognitive design

A lot of similarities, different emphasis:

- Imagination, novelty (Dong 2010)
- Creativity, analogical reasoning, ‘mental leaps’ (Thagard 1995)
- Interaction between internal and external representations (Visser 2006)

*Cognitive design is not (yet) part of main stream cognitive science, but emerging from the domain of design thinking.*


Urban Design and Planning

Different elements of primary concern (Carmona 2010):

• In urban design, the focus is on the morphology of space and form, including public space, architecture, activity patterns and history;
• whereas urban planning is focusing on governmental issues, systems of legitimation and communication.

• Few links to cognitive planning (Portugali 2011) and cognitive design (Caliskan 2013).

Geodesign i.r.t. Urban Planning and Design

- March 20, together with Alexander Wandl
Academic design?!

How can design contribute to academic practices?
General structure of a reasoning process

what + how leads to outcome
Deduction

At the start of a process of Deduction, we know the ‘elements’ in the situation, and we know ‘how’ they will interact. This allows us to reason towards an outcome. For instance, if we know that there are planets in the sky, and we are aware of the natural laws that govern their movement within the solar system, we can predict where a planet will be at a certain point in time.
Induction

In Induction, we again know the ‘elements’ in the situation, and we know the outcome of the interaction of the elements, in the sense that we can observe the movement of the planets across the night sky. But suppose we do not yet know the laws of gravity, the pattern of relationships that governs these movements.... Can we use our observations of the movement of these planets to formulate such a law?

\[ \text{what} \quad + \quad ? \quad \text{leads to} \quad \text{outcome} \]
Analytical reasoning -> design reasoning

Deduction and induction are the two forms of reasoning that are used in analysis, and they serve to understand and predict real world phenomena. But Deduction and Induction are not enough in the world of productive practice, if we want to MAKE something that is new and creates value for people. In productive practice, we need a different reasoning pattern:

Abduction.

In Abduction we set out to create a new ‘what’, a new ‘element’ for the problem situation, so that the interactions in the system lead to a desired outcome. Abduction comes in two forms.
Normal abduction

In ‘normal abduction’, we know the value we want to achieve through the desired outcome, and also the ‘how’, a pattern of relationships that will help achieve the value we seek. The missing element is a ‘what’ (an object, a service, a system) that still needs to be created. This is often what we do in engineering and design: solving a problem by creating solutions that will function within a fixed pattern of relationships.
Design abduction

In Design Abduction, the starting point is that we know something ONLY about the nature of the outcome, the desired value we want to achieve. So the challenge is to figure out ‘what’ new elements to create, while there is no known or chosen ‘how’, a ‘pattern of relationships’ that we can trust to lead to the desired outcome.

Thus in design we have to create or choose both a ‘how’ and a ‘pattern of relationships’. As these are quite dependent on one another, they should be developed in parallel. This double creative step requires designers to devise proposals for both the ‘what’ and ‘how’, and test them in conjunction.
Q: How do we do this?
A: By creating frames

A frame is the implication that by applying a particular pattern of relationships we can create a desired outcome. A frame contains a hypothesis, the statement that the problem can be fruitfully approached AS IF it can be solved by a proposed ‘how’.
Method in madness?

This reasoning pattern can lead to the impression that designers are just playing around with ideas a bit in what may look to be a childishly playful, trial-and-error process.

Yet this is the only way to create progress in Design Abduction, and designers have developed sophisticated practices to achieve a good framing of the problem situation. Design is fundamentally different from other forms of reasoning, but it is not as random and irrational as it may seem.

As Nigel Cross said, quoting Hamlet in his valedictory lecture [Cross, 1996]:

“Yes they are quite mad. But there is method in their madness”.
A nine-step model of frame-creation in design

- Archeology: analyzing the history of the problem owner & of the initial problem formulation
- Paradox: analyzing the problem situation: what makes this hard?
- Context: analyzing the inner circle of stakeholders
- Field: exploring the broader field
- Themes: investigating the themes in the broader field
- Frames: identifying patterns in the themes to create frames
- Futures: exploring the possible outcomes and value propositions
- Transformation: investigate the change in practices required for implementation
- Integration: draw lessons from the new approach & identify opportunities
Academic design 1/2

- **academic discussion**
- **model**
- **problem solving & design**
- **new knowledge / paradigm**
- **innovation new ventures**
- **future scenarios new designs**
Academic design 2/2

(1) Themes are frames formulated through a frame creation process, based on problems and issues from practice.

(2) In making the model, the themes are matched by the learning from the discussions in relevant scientific fields.

(4) Then we can create design interventions, and reflect upon them on the basis of these models, in an iterative process.

(3) Reflection on theory, based on the experiments with the models (resulting in academic papers into the ‘parent disciplines’, again in an iterative process). If the integrated model is successful in combining academic rigor and practical relevance within an approach that can be seen as novel and challenging the paradigms and conventional wisdom in both worlds,

this can lead to

(5) the creation of new academic knowledge, possibly including a shift in the paradigm, (6) new ventures, and the longer sight-lines into possible futures can lead to new development scenarios and radically innovative designs (7).