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Systems thinking for design thinking.

Darzentas, John and Darzentas, Jenny

Systems Thinking for Design Thinking: Towards Proposing a Generic Approach to Design

John Darzentas, Jenny Darzentas

Dept. of Product and Systems Design Engineering

University of the Aegean

Syros, Greece

The story of Penelope…

- Excellent student, very good communication skills, passionate about design
- Began work on her final year project with great enthusiasm
- Undertook nearly two years of intensive research… in a variety of countries, and under several supervisors.
- Gathered masses of material using very many types of participative design methods and techniques (cultural probes, diaries, focus groups, etc.) as well as ethnographic approaches
- She learnt many things…

- ….but in the end was unable to organise the material to help her to create the design intervention.

- **Result:** Large disconnect between her final concept and her research

What was the design space?

Helping the population to take more exercise

- Studied populations of various ages and backgrounds, in more that one country and culture.
- Some findings:
  - people are not motivated enough to exercise regularly
  - fear is not a good motivator
  - difficulties to fit exercise into existing way of life
  - expense in money (equipment, gym fees) and time (lost from work or personal relaxation time, time with family, etc.)
  - 'pain for no visible gain'
  - …

- Design intervention:
  - mobile phone application for a balancing exercise to perform while standing and travelling on trams, underground trains and buses

Current practices for approaching the design problem space

- Research shows that many designers have evolved their own methods for tackling problems using a combination of:
  - insight,
  - market research,
  - brainstorming and collaborative methods
- Design students are taught a variety of different methods and processes
- 'selection of tools' by both professionals and students to analyse the design space depends upon what seems the most tractable in the given circumstances.
- Often such spaces are framed against background of experiential knowledge (of those stakeholders, including the designer)
- They engage with the problem
  - within a dominant narrative (e.g. cost benefit, usability, sustainability, etc.)
  - according to a 'brief' (healthier population, equality of resources) etc.

The design space in a systemic perspective

- Changing these dominant narratives is the first challenge for designers and design educators.

- Using the systemic perspective to frame the design space presents challenges:
  - Change people's way of thinking (mechanistic to interconnected)
    - so ingrained is the rationalistic mechanistic approach that we are 'programmed' to look for cause and effect and inner workings of the machine
    - However, understanding that tweaking on part of the system produces effects elsewhere is helpful example and one close to real life
  - Learn new terminology and its meanings
  - …

Systems Thinking for Design Thinking

- Despite the challenges, in Design we see a renewed and increasing involvement of Systems Thinking

- But apart from the holistic view of design problems and the realization that as much as possible of the whole of the design space should be considered from the initial stages

- there should be:
  - Systemic proposals as far as Design praxis is concerned in terms of methods and methodologies

  - Acknowledgement in Design Thinking of the use of Systems tenets and potential principles in general

  - Also grounding and justifying with the aid of Systems Thinking the adoption of the various methods and methodologies used in Design

- But most of all generic Systems Thinking Design approaches should be formed and used

Systems Thinking for Design Thinking

These proposals offer a main platform/framework to design students and practitioners for reference and grounding.

We posit Systems Thinking as contributing towards both

- **a theoretical framework for Design Culture**
- **a methodology for Design Practice**

Systems Thinking for Design Thinking

- This paper attempts to present a general proposal for the Systemic tackling of design problems.

- The principal assumption is that the forming of the design Space should be a main Design concern.

- The 'how' this Space is formed is a major issue here.

- The 'why' all this effort to adopt Systemic Thinking should be applied must also be justified.

- The utilisation of Systems tenets which can be treated as basic Design Principles, should be attempted and treated as a main structuring and processing tools

Why Systems in Design?

- Trying to explain the '**why systems in Design**' we can start via a trajectory through experience to summarise it as follows:

  - Happy with disciplinary thinking and praxis tools, solving complicated problems assumed definable but requiring a number of assumptions to be satisfied. Main tendency being the simplification.

  - Moving into more specific domain which even at its beginning could be called multi/interdisciplinary, but still treating its problems as complicated and simplifiable mainly by adopting reductionism.

  - Then the world of heavily multi/interdisciplinary problems comes with the main characteristic being the move from complication to complexity. The problems are now really complex, basically because they are human centric and not the neater complicated engineering ones.

Need to retain complexity

- A lot of effort is still required from all those involved with complex human centric problems to admit that complexity with its creative richness, is a very useful thing and must be welcomed and not be 'bulldozed' out of the problem space.

- Design, as a representative domain of the complex world of problem tackling, is evolving in exciting ways, but it is always challenged by reasons to apply reductionism.

- Systems Thinking, on the other hand works with the 'holon' which cannot be defined nor easily co-exist with reductionism.

- new challenges: "Service Design" genuinely human centric and complex.

Towards a Systems Thinking Approach

- For a Systems Thinking approach to tackling design problems the primary step is to justify the claimed importance of **'how'** its **design problem space** is discovered, understood and 'formed'.

- In other words 'how' to acquire a Systemic representation of that space, i.e. **'The System' with which we Design.**

Towards a Systems Thinking Approach

- The understanding and discovery of a representative System of the design problem space can be guided by:
  - tenets and potential principles of Systems Thinking such as **emerging properties, requisite variety, self reference, organisation, self organisation, distinction, closed (as far their organisation), open (as far as energy and matter), etc.**

- The forming of the System of the problem space, mainly in terms of its dynamic characteristics and processes can be supported by:
  - notions such as **structure, states, control, attractors, code, etc.**

- The aim being to acquire as representative a System as possible, with its parts and their relations and its 'life'.

Example of utilising the notions of complexity and variety

Complexity:

- The more complex a system appears to be, the 'healthier' it is, because if understood, it offers more opportunities for design interventions than a less complex one.

Variety can be seen in a similar way:

- in cybernetics it has been introduced to measure the potential of a system to defend itself against external threats or interference in the sense that only variety controls or defeats variety.
    - e.g. Systems Thinking designers will possess the knowledge to add in to their methods the determining of the variety of demands, i.e. the number of different demands on their design intervention.
- Cybernetics also provides the notion of requisite variety (i.e. the minimum number of choices needed to resolve uncertainty)

Towards Proposing a Generic Approach to Design

- The proposed generic approach to design is an attempt to bring together Systems Thinking with current co-design participatory methodologies

- The proposal is concentrating on the representing and structuring of the System to be designed and it is our position that this is the front line to successful design interventions.

- A range of systems methodologies such as those coming from the management domain can complement and aid the Design praxis.

Summarising the generic approach

- Structure/form the problem space (i.e. the system) for **Learning and understanding**

- using a various tools :
  - rich pictures
  - ethnographic approaches
  - Participative design activities (ANT, Action research, co-design …)
  - ….

Summarising the generic approach

- Use tenets, concepts, 'evolved principles' to guide:
    - the structuring of the 'system' (design space)
    - the learning about, and understanding of, that system

- Use systems methodologies (SSM, SDD, "giga-mapping", etc.) and other methodologies to move towards design thinking and praxis by returning continuously to the system, and utilising tenets etc.

To conclude:

- Converging to a design brief could be achieved via a 'discourse' based upon, for instance, 'relevant subsystems' (to use the Soft Systems Methodology term)

- Penelope, we believe, could have benefitted from this approach.

What could Penelope have done differently?

Had she 'anchored' her problem space in a systems perspective (i.e. faced the design space as a system)

- She would then have been able to make use of principles and tenets from the systemic perspective to help her to :

    - make (better) sense of her data collections e.g. she would have discovered interconnections (emerging properties, new components…)

    - organise the data gathered via various methods and techniques e.g. by distinguishing the 'relevant sub systems'

- This would then have offered her support to:

    - be guided to think about ways to deal the problem space and where the design intervention(s) could have impact
    - ….thereby avoiding the disconnect between elicited material and her design outcome and potentially retaining opportunities for creativity and innovation