

Towards a model of goods and services for the analysis of innovation and design

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Outline of the presentation

1. Assessing the characteristics-based models of goods and services
2. Reformulating their theoretical foundations
3. Towards a new model of goods and services geared for design

Characteristics-based models

The Saviotti-Metcalfe¹ model of goods



Characteristics-based models

The Saviotti-Metcalfe¹ model of goods



Example, a car:

technical characteristic set: engine, transmission, breaking system, body, etc.

service characteristic set: speed, number of passengers, luggage space, comfort, etc.

Characteristics-based models

Major revision of Gallouj & Weinstein² for services

Extensions by Djellal & Gallouj³, de Vries⁴, and Windrum & García-Goñi⁵

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Same rationale of the Saviotti-Metcalfe model

Addition of several new sets to account for innovation in services

Some shortcomings

Sets are hardly distinguishable

Some shortcomings

Sets are hardly distinguishable

Sets are not specific enough

Some shortcomings

Sets are hardly distinguishable

Sets are not specific enough

Unclear how sets are the object of intentional change

2. Reformulating the theoretical foundations

The dual nature of technical systems

Research in the field of philosophy of technology and design

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Link: Herbert Simon's *The sciences of the artificial*⁶;
artefact as an interface between “inner” and “outer” environments

For Saviotti⁷, X / Y is similar to *inner / outer* environments of Simon

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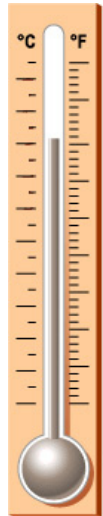
Simon as stepping-stone to the *dual nature thesis*

For Kroes & Meijers⁸, technical artefacts have two dimensions:
they are *structures* which realise *functions*

Kroes'9 example of a bulb thermometer

Explaining the glass bulb device

in structural terms: geometry of glass, mass, chemical composition, etc.

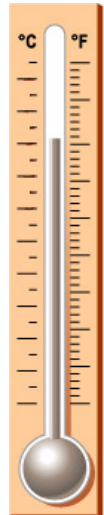


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Explaining the glass bulb device

in structural terms: geometry of glass, mass, chemical composition, etc.

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Kroes' example of a bulb thermometer

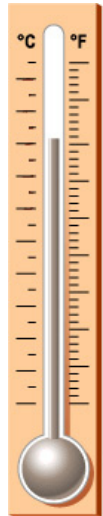
Explaining the glass bulb device

in structural terms: geometry of glass, mass, chemical composition, etc.

in functional terms: ensures the reliability of measurements

A full description ties together structures and functions

How exactly do these dimensions relate?



Modelling the structural and functional dimensions

An approach based on Christopher Alexander's *Notes on the synthesis of form*¹⁰

The objects of design are divisible into *form* and *context*

Form compares to the *structural dimension*

context compares to the *functional dimension*

The two dimensions relate according to abstract *patterns*

Alexander's example of the tea kettle

List of functional elements:

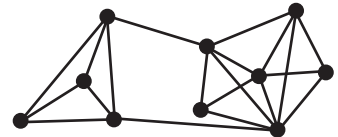
- it is not too small;
- it is easy to store in the kitchen;
- it pours cleanly;
- the material it is made of does not cost too much;
- it is not too hard to be assembled; ...



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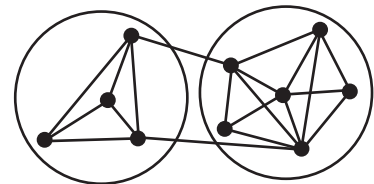
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The patterns represent the proper delineation of the structural dimension



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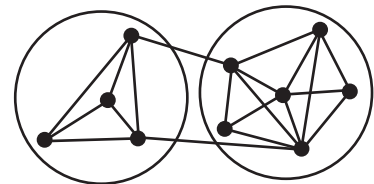
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The patterns represent the proper delineation of the structural dimension

There are many possible coherent descriptions of the same artefact



The dual nature thesis and complex technical systems¹¹

Technical artefacts vs. socio-technical systems



landing gear

The dual nature thesis and complex technical systems¹¹

Technical artefacts vs. socio-technical systems



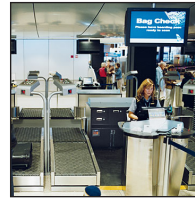
landing gear



aircraft



luggage transport



check-in staff

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Technical artefacts vs. socio-technical systems



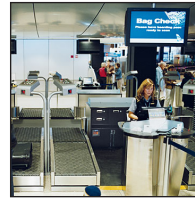
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check-in staff

How to establish the boundaries of complex technical systems?
Include all needed for proper functioning, which can be designed

The issue of subjectivity

Complex technical systems involve several stakeholders

Each stakeholder has a different idea about functions

Since functions determine the boundaries,
perceptions of their structures may also vary

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The structural and functional dimensions of technical systems are subjective

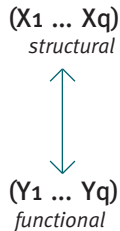
3. Towards a new model of goods and services

Conclusion #1

Goods and services are technical systems with structural and functional dimensions which are subjective to the stakeholders involved in their design, operation, and use.

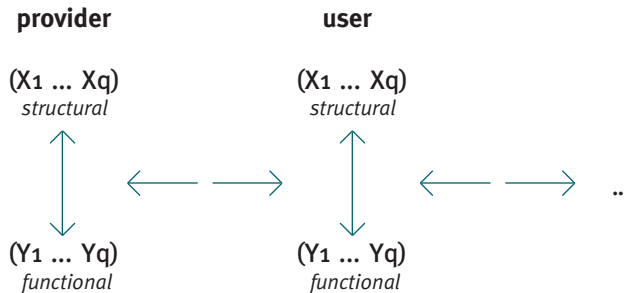
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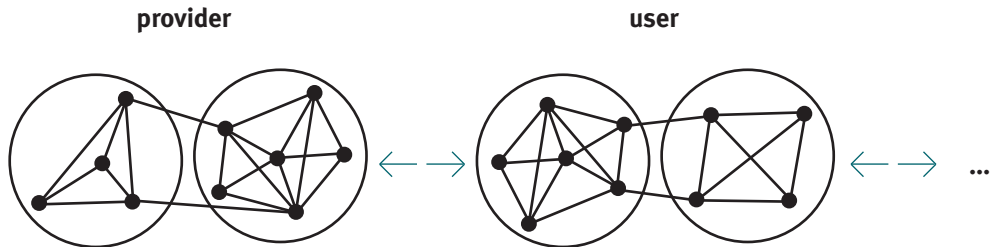
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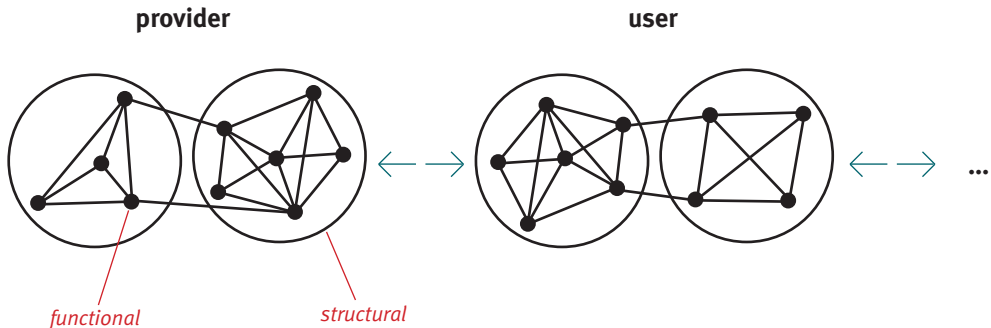
Conclusion #2

Goods and services may be modelled as patterns that represent the coherent relation between their structural and functional dimensions. These patterns are the *characteristic sets* of the new model.



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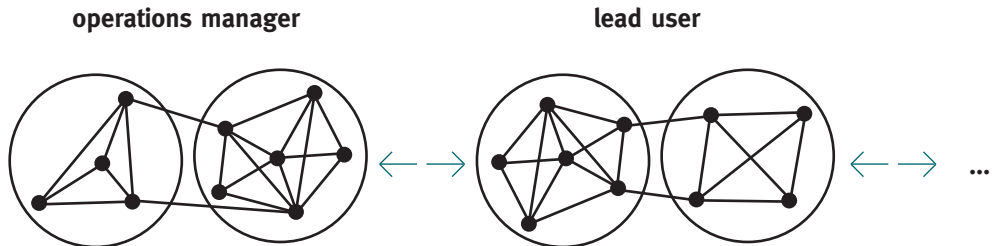


Conclusion #3

Design refers to the creation of the structural dimensions of new goods or services, in view of the functions to be realized.

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Thank you!

Any comments or questions?