Developing the Product Design Specification

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April 2023

Emerging trends in innovative companies

‘THE DESIGN MATURITY LADDER’ - the four degrees of intensity of design use in companies.

Developed by the Danish Design Centre and was subsequently adopted in Sweden (The Association of Swedish Engineering Industries and Swedish Industrial Design Foundation)

Design as a tool for Innovation (Pierre Bitard, Julie Basset)

from Global Review of Innovation Intelligence and Policy Studies

The design maturity ladder

- Level 1: Non-design

Design plays only a tiny part of the product development process and professional designers play no part in the process.

- Level 2: Design

As ‘styling’ - companies make use of design as the final touch in the product development process. Design services may be provided by a professional designer or they may be provided by others.

- Level 3: Design as a process

Design is integrated into the product development process at the first stage of development.

- Level 4: Design as an innovation strategy

Design professionals work together with the owner, managers or high level executives to renew the company, or to deepen, expand or renew large parts of the company’s business ideas.

product design

Higher level uses of design are observable in those companies where design is considered as a very important aspect of the business (design as a process)…..

…and where it is an indispensable dimension of the firm's activities....

.....design as an innovation strategy

Design as a tool for Innovation (Pierre Bitard, Julie Basset)

from Global Review of Innovation Intelligence and Policy Studies

So how should we consider it ?

“a strategic business initiative that can differentiate between companies in competitive markets”

“a <u>process</u> by which companies develop new products to meet customer needs and bring ideas to life”

product design

An overview of New Product Design Management

The purpose is to manage the development of your product via the discipline of design

ensuring that what you're going to design can actually be manufactured.

But in a way that satisfies the wants and needs of the customers…

….and makes it profitable for your company based around a core of design based activities

in this instance design is presented as a systematic and disciplined process.

product design specification

From Product Design Brief to…

The PDS evolves from the design brief.

- The design brief outlines the design goal and any major constraints and considerations that need to be addressed
- The PDS goes further to determine the precise limits for the full set of requirements in the product being designed.
- For the Product Design Brief - it's not all about engineering, or how it will be manufactured…….

guidelines for the preparation of a product design specification

- remember that the PDS is a control document. It represents the specification of what you are trying to achieve - not the achievement itself.
- remember that it is a user document - for use by you and by others. It should therefore be written succinctly and clearly.
- never write a PDS in essay form. Use short, sharp definitive statements -under clear headings. It is useful to allow space for amendments and additions, therefore do not crowd the page.
- two headings to a page is usually adequate at the start;

guidelines cont'd

- From the beginning, try to quantify parameters in each area - for example weight. Engineers frequently say they do not know the extent of such parameters; if in doubt - estimate a figure based on information already gained, it can become more specific when known.
- Always date the documentation and put an issue number on it.
- Clearly document any amendments.

product design specification

guidelines cont'd

- since a PDS is always unique in a new design situation, the relationship between the elements always varies.
- It is recommended that in preparing the PDS that you also vary your starting point - for example you may start with performance and on another with environment or aesthetics.
- Varying the point will aid the acquisition of the flexibility of thinking which is required to prepare a good PDS.

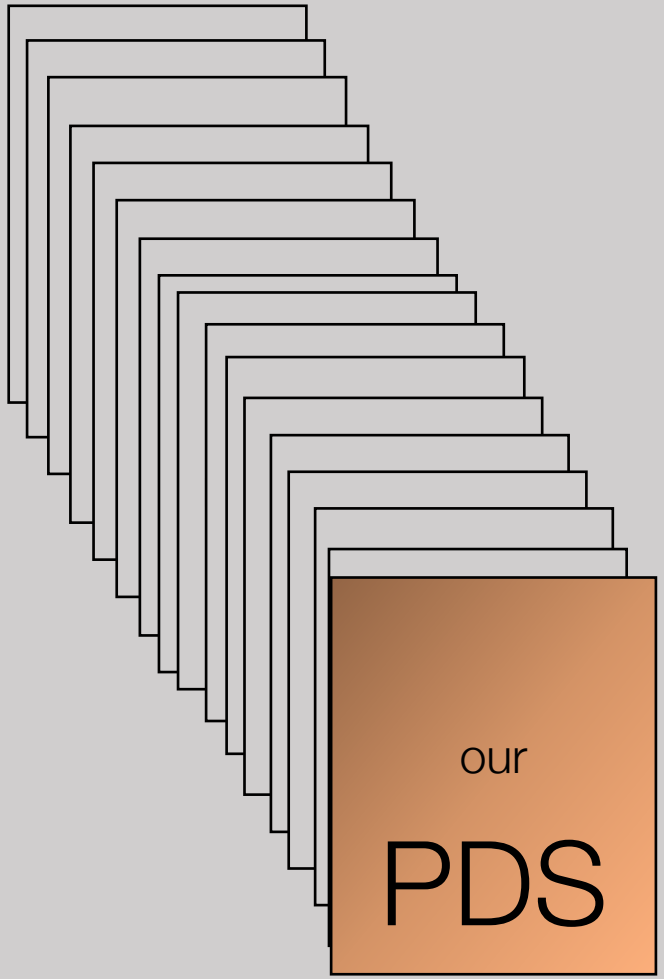
product design specification

guidelines cont'd

Performance	Logistics	Ergonomics	Prototyping
IP	Circular Economy	Manufacture & Assembly	Market Share

product design specification

guidelines cont'd



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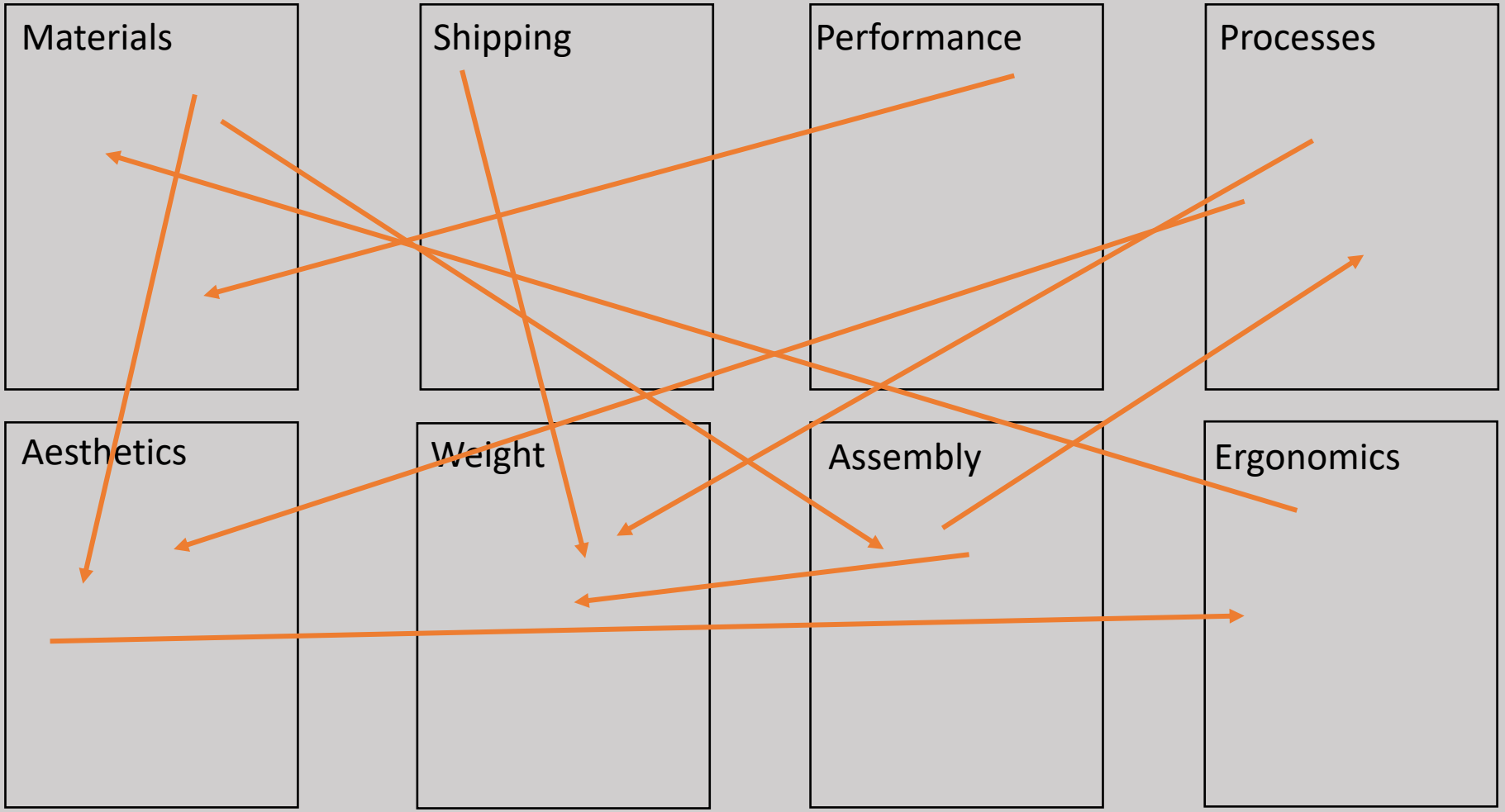
product design specification

guidelines cont'd



the relationship between the elements always varies.

Component (or subcomponent) design specification

In detail design you have to take into account the interfacing of the component with those adjacent to it and its effect on the whole, it will be found useful to draw up a Component Design Specification [CDS] roughly along the same lines as a PDS.

A CDS may cover a wide variety of components in general terms with only the performance characteristics varying.

component design specification [CDS]

- Performance- inputs/outputs, loads, transients, duty required, stresses, effect of adjacent components/interfaces.
- Local constraints – imposed on the components by the nature of its surrounding environment and interfacing component parts.
- Environment – temperature, humidity, corrosion, shock, vibration etc.
- Testing – requirements of the part itself.
- Shelf life & storage – where are spares likely to be held and for how long?
- Quality, Reliability, Life – fatigue life, performance under cyclical loading etc.
- Maintenance – throw away philosophy or remove and repair?

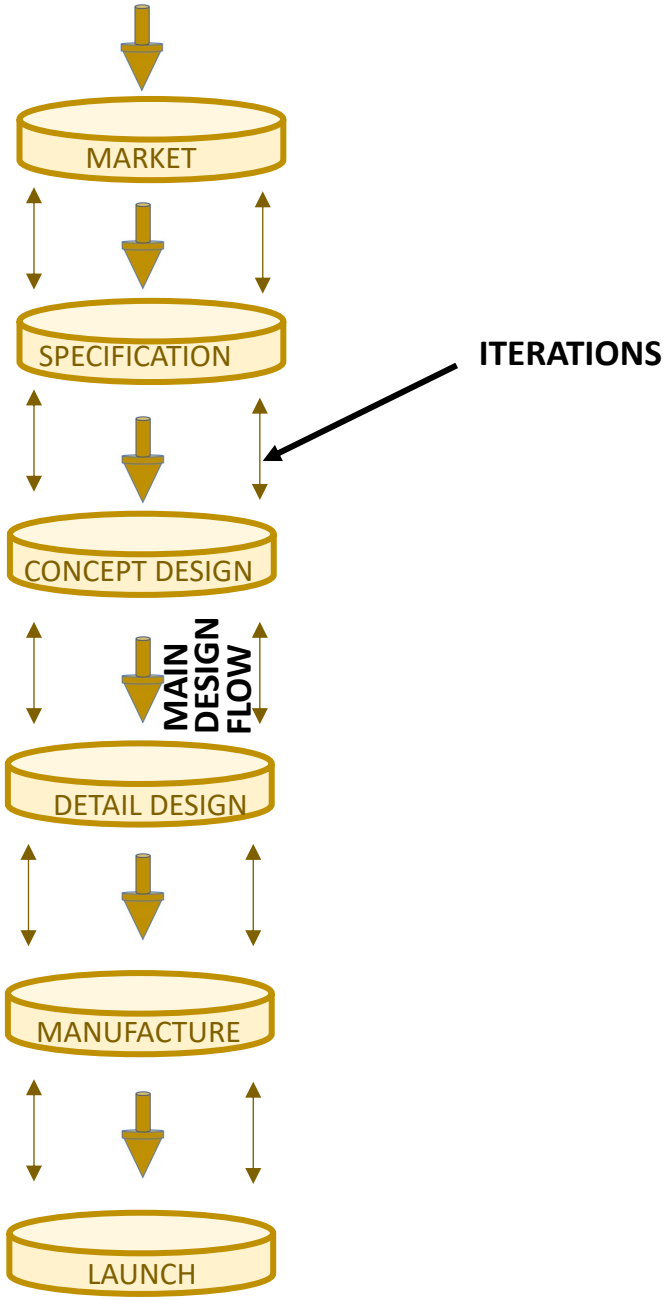
component design specification [CDS]

many of these elements are naturally linked, however, itemising them separately has always been found to be very useful and helpful, as with a PDS it represents a disciplined breakdown.

Remember…….. Overlap is acceptable, <u>omission is not.</u>

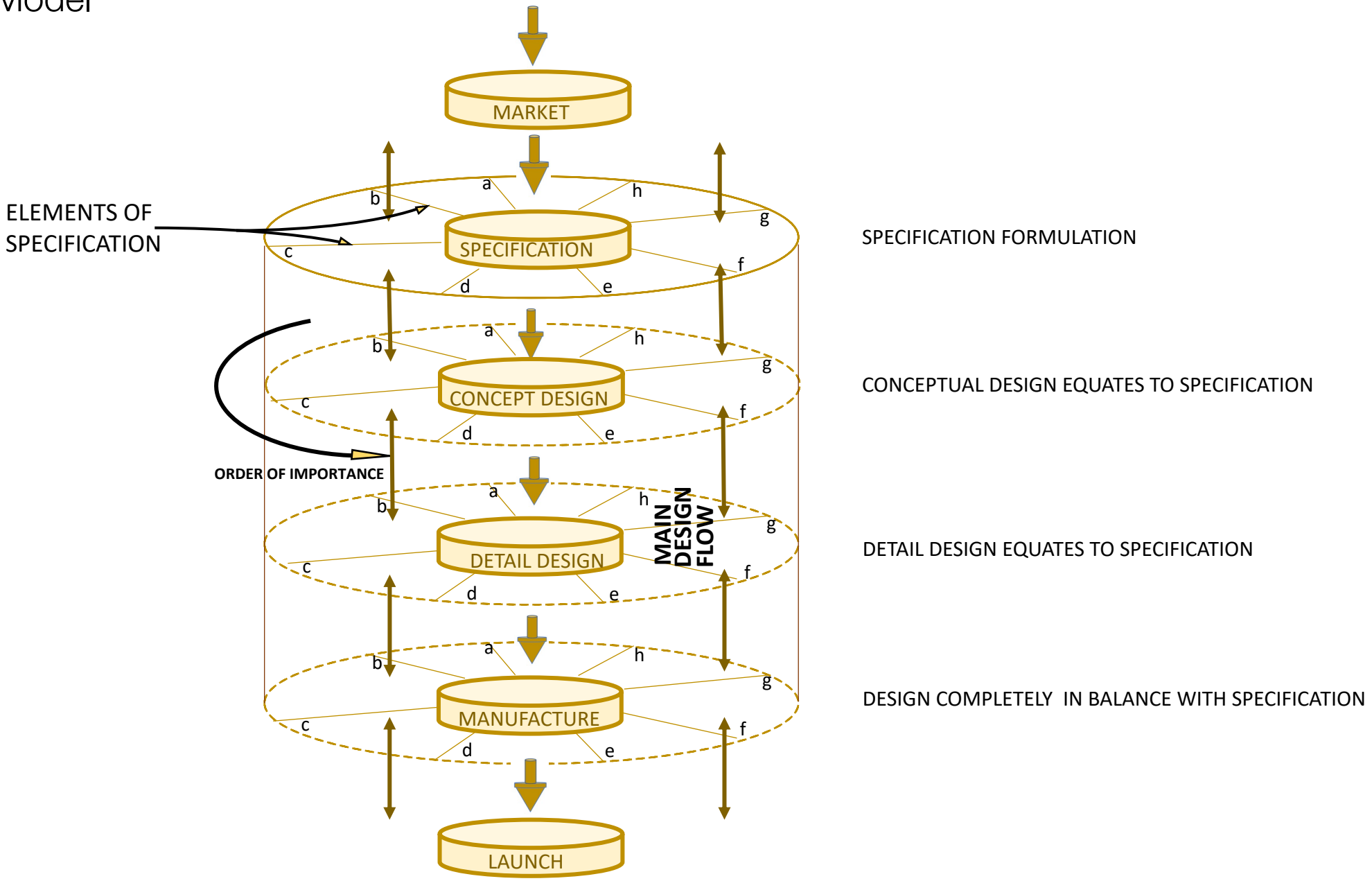
Total Design activity Model

Stuart Pugh 1990



Total Design activity Model

Stuart Pugh 1990



Total Design activity Model

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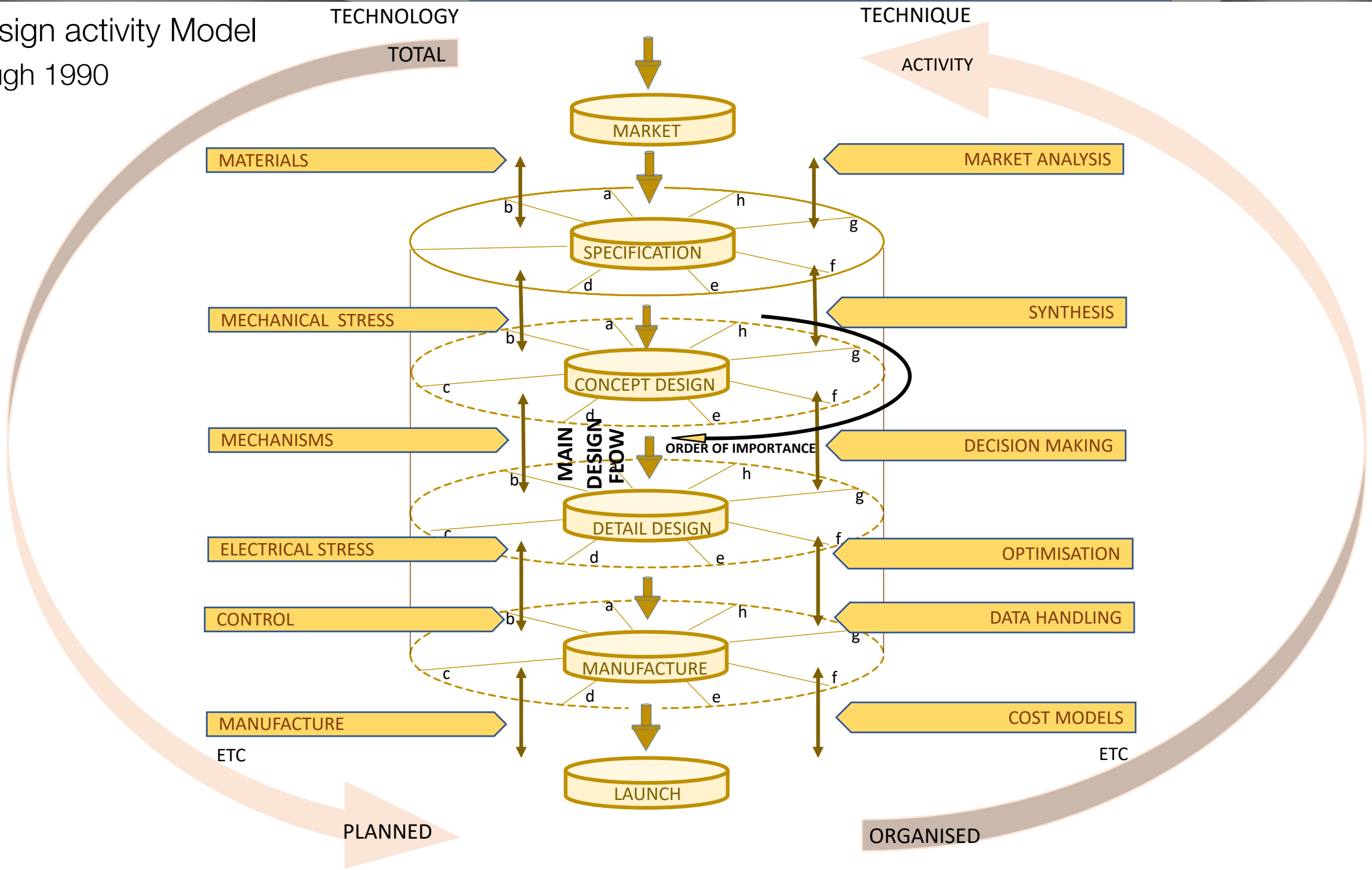

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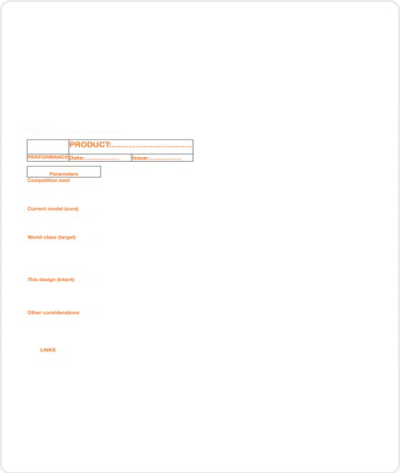

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product design specification

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Parameters	
Competition best	description
Current model (ours)	description
World-class (target)	description

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product design specification

This design (intent)	description
Other considerations	description

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Performance

The device will need to be able to perform consistently irrespective of state, with the device having 3 categories of state

a	Dormant	-i.e. being carried or in storage
b	Passive	- i.e. the device is in use but under no load or undue mechanical stress
c	Active	- i.e. the device being deployed and activated due to the loading of a falling man.

In its product life span the device is unlikely to be used continuously, it is more likely to be used very frequently [staccato].

Turning handle & safety trigger - The device will need to provide a turning handle to allow the reeling of the line. It will also need a safety mechanism in the form of a mechanical trigger mechanism

The device will need to be able to reel out the safety line in a controlled and stress less manner without snagging or 'birds-nesting. Conversely the device must allow the worker to reel in the safety line in a similar manner.

Energy absorber - the device will require an in-line, sewn 'rip stitched' energy absorber with a static strength of +22kN after arrested fall.

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Next week

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