WP 1 - Deliverable 1:
ANALYTICAL FRAMEWORK PAPER
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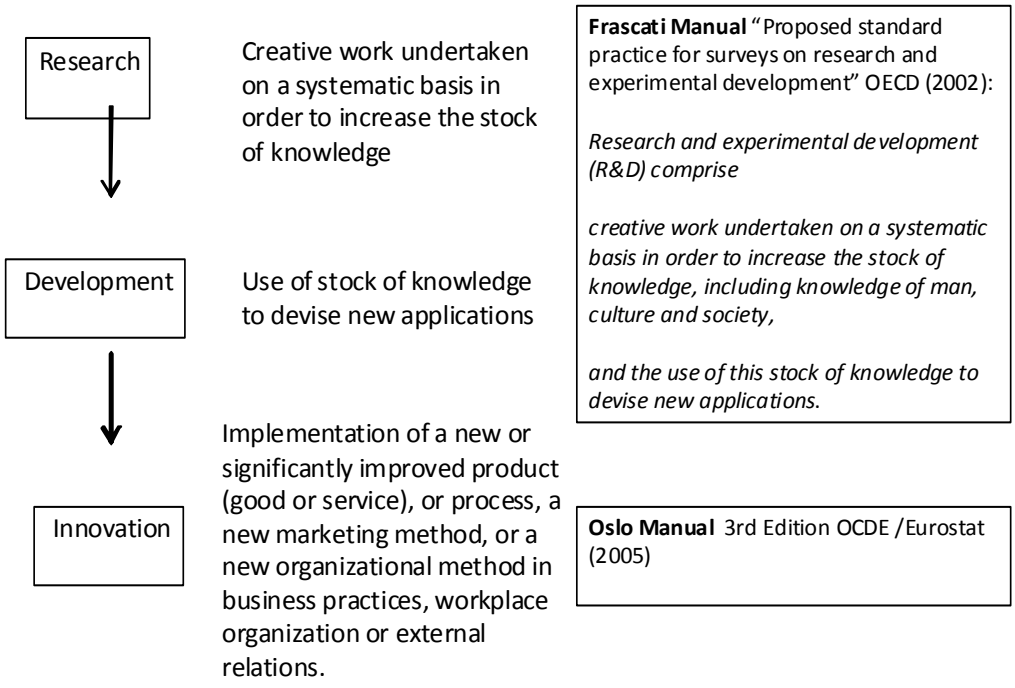
1 Mapping design concept within the conceptual framework of Frascati family of manuals

1 The Organisation for Economic Co-operation and Develoment (OECD) and the statistical office of the European Union (Eurostat) developed the Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development and the Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data. The Frascati family of manuals provide a common framework so most research, development and innovation surveys follow standard guidelines allowing comparability of data collected.

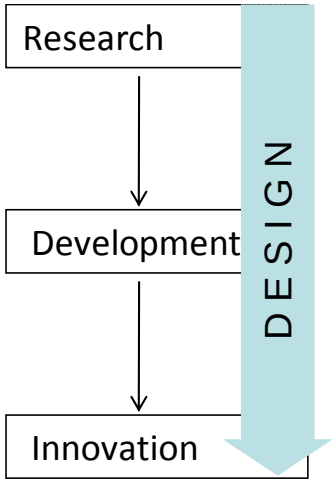
2 The Frascati family of manuals is based on a conceptual framework which has evolved iteratively with successive editions of the manual.

3 The conceptual framework presented by the combined Frascati and Oslo manuals does not leave any room for a 'fourth step' in the chain of concepts. Thus, any new articulation of design as a specific concept must fit within the established frameworks.



4 The latest versions of the Frascati and Oslo Manuals are no longer exclusive of science and technology. The concept of 'research' is now open to include any creative work. Experimental development is open to the use of any stock of knowledge to devise any new application. Innovation is open to any implementation.

5 As a result of this broad treatment of Innovation, Development and Research, the conceptual framework of Frascati family of manuals does not leave any room for design to be characterized either as a step after innovation or as something different from innovation. Thus, within the existing conceptual framework of Research, Development and Innovation, design can only be described as a specific form of Research, Development or Innovation.



6 The Frascati Manual (OECD 2002) describes the scope of design as a specific activity within research and development, limited to the creation of plans or drawings aimed at defining functional issues:

> *Industrial design:*
> *124. The vast bulk of design work in an industrial area is geared towards production processes and as such is not classified as R&D. There are however some elements of design work which should be considered as R&D. These include plans and drawings aimed at defining procedures, technical specifications and operational features necessary to the conception, development and manufacturing of new products and processes.*
>
> *125. For example, if an engineering product which incorporates machined, heat-treated and/or electroplated components has been developed, the drawing up and documenting of the requirements for surface smoothness, heat treatment procedures or electroplating process requirements, whether incorporated in the drawings or as separate specification sheets, are considered R&D.*

7 The Oslo Manual (OECD 2005) describes design a specific type of innovation as part of the development and implementation of product innovation limited to aesthetical/form elements and also considers that design can be a marketing innovation:

> *162. Design is an integral part of the development and implementation of product innovations. However, design changes that do not involve a significant change in a product's functional characteristics or intended uses are not product innovations. However, they can be marketing innovations, as discussed below. Routine upgrades or regular seasonal changes are also not product innovations.*
>
> *172. Marketing innovations include significant changes in product design that are part of a new marketing concept. Product design changes here refer to changes in product form and appearance that do not alter the product's functional or user characteristics…*

8 The Oslo Manual thus limits the concept of design to the creation of form and appearance of products, although it accepts that design activities may be understood by enterprises in more general terms.

> *2.4. Design*
>
> *344. The term product design, as used in the definition of marketing innovations, refers to the form and appearance of products and not their technical specifications or other user or functional characteristics … However, design activities may be understood by enterprises in more general terms, as an integral part of the development and implementation of product or process innovations, as described in Section 2.2.3 of this chapter. The categorisation of design activities will thus depend on the type of innovation they are related to.*
>
> *345. All design activities for the development and implementation of product innovations (including work on form and appearance) and of process innovations should be included either in R&D or in other preparations for product and process innovations.*
>
> *346. Work related to changes in product design that are marketing innovations (and not product innovations, i.e. where the functional characteristics or intended uses of the product in question are not significantly improved) should be included in Preparations for marketing innovations.*

9 The definition of design presented in paragraph 345 of the Oslo manual "all design activities for the development and implementation of product innovations should be included either in R&D or in other preparations …" is not in line with the narrow concept of design presented in paragraph 124 of the Frascati Manual: "The vast bulk of design work in an industrial area is geared towards production processes and as such is not classified as R&D. There are, however, some elements of design work which should be considered as R&D. These include plans and drawings aimed at defining procedures, technical specifications and operational features necessary to the conception, development and manufacturing of new products and processes".

10 The Frascati family of manuals accommodates design within the concepts of Research, Development and Innovation and acknowledges that design could be understood more broadly. The definitions used between the two manuals are not in line and they acknowledge that the definition of design could be broader (Tether 2006).

2 Conceptual foundations for defining Design as an economic factor of production.

11 The EU Commission "Staff Working Document Design as a Driver of User-Centered Innovation notes that:

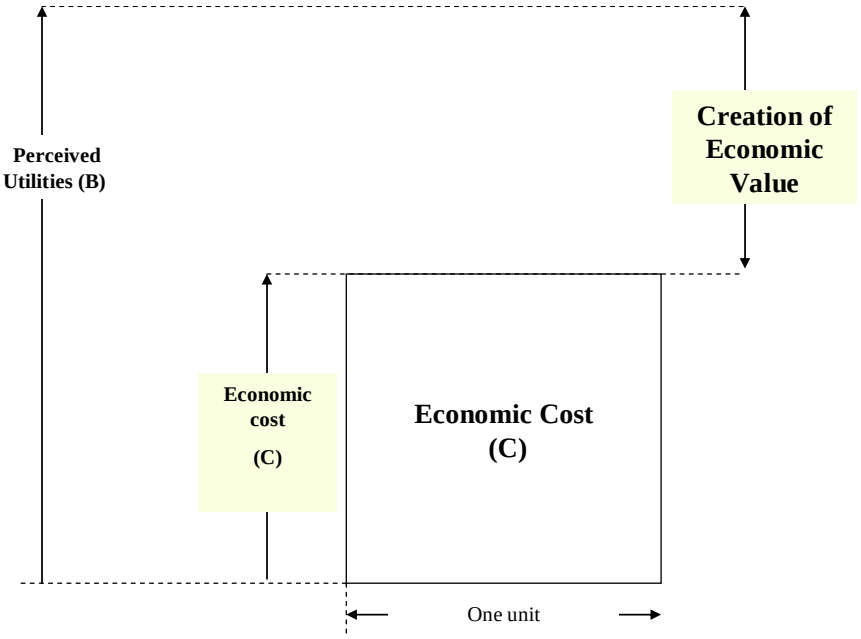
> *Design has no commonly agreed definition and the word is given different meanings in different contexts. Very often, design is associated with the aesthetic aspect of objects only, whereas in reality, its application is much broader.*

12 The aim of this document is to advance towards a new definition of design, specifically as an economic factor of production. To do this, we shall first identify the economic issues where design can play a relevant role.

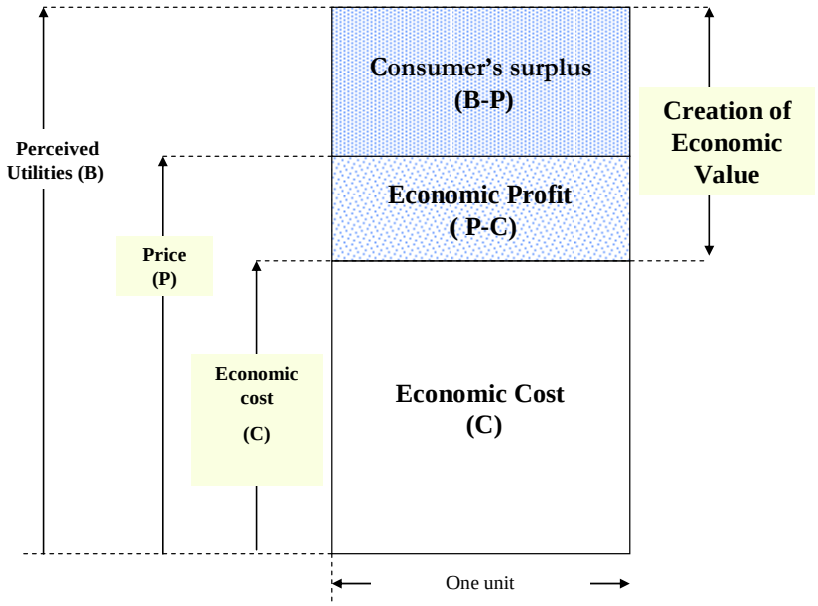
13 The different definitions of Economics usually relate to the study of how to satisfy people's unlimited wants or needs with limited resources and have something to do with scarcity of resources. So in economic terms, it is necessary to understand the capacity of any object of transaction (goods, services, environments, experiences, communication…) to satisfy people's needs.

14 In economics, utility is defined as the capacity to satisfy wants or needs perceived by consumers in any object of transaction. Since people's availability of resources is limited, it is fundamental to identify needs or wants and to offer objects of transaction with the correct combination of utilities (Stigler 1950, Read 2007)

15 Economic value creation results from the difference between "perceived utilities" gained in a transaction and the economic cost of delivering that transaction. Since economic value creation depends on the utilities perceived, it is observer relative and it is not intrinsec. Therefore, it is client-based.



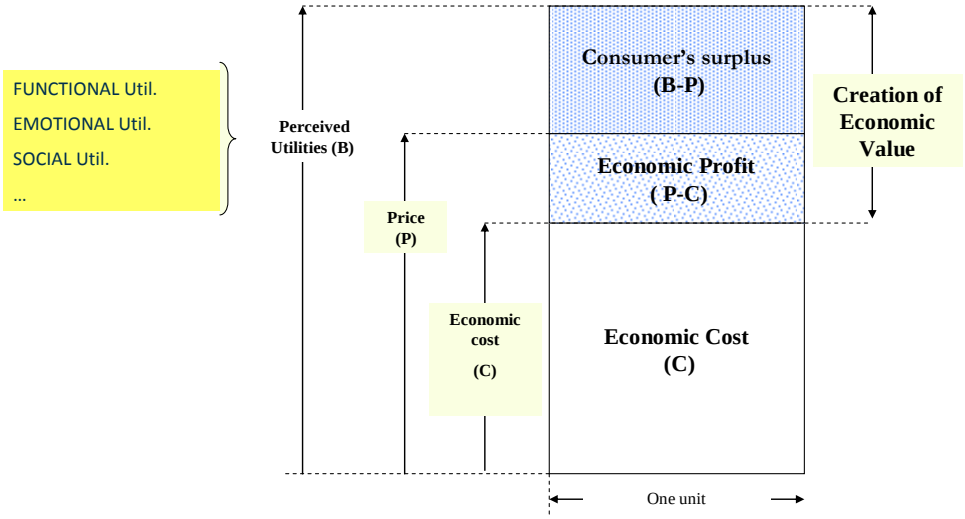
16 Depending on the price the market accepts, the creation of economic value is divided between economic profit (for the business) and consumer's surplus.



17 The Commission Staff Working Document "Design as a driver of user-centered innovation" notes that design plays a role in the creation of utilities as well as to lower costs. Therefore design has a role in the creation of economic value:

Design thus contributes to creating unique competitive advantages that helps the move away from pure price competition, not least through the creation and strengthening of identities and brands at corporate or product level. Additionally, design has the potential to lower costs, such as production, assembly, packaging, storing, transportation and disposal costs, and — as such — strengthens profitability and competitiveness.

18 From this description, we can see that design input need not be focused exclusively at the product level, and that design can have an impact on promotion, brand development, corporate identity, cost reduction and process execution. Thus, creating utilities, design contributes to the delivery of functional (performance, functionality), social (how am I perceived by others) and emotional utilities (how does it make me feel), or a combination of all three (Crilly et al 2004, Verganti 2004).



19 Thus, if design is to play a role in the creation of economic value, design shall have a role in satisfying better functional, emotional and social needs or similar needs more efficiently.

3 Generic definitions of design and how these relate to defining design as an economic factor of production

20 There have many attempts to capture the intangible nature of design, ranging from broad and holistic definitions to highly specific. However, none of these definitions has been created explicitly to characterises design in economic terms. In general, the broader the definition, the less helpful it is in considering design as an economic factor of production.

A sample of generic definitions of design:

> *Design is a creative activity whose aim is to establish the multi-faceted qualities of objects, processes, services and their systems in whole life cycles. Therefore, design is the central factor of innovative humanisation of technologies and the crucial factor of cultural and economic exchange. (http://www.icsid.org/about/about/articles31.htm)*
>
> *The term 'design' broadly embraces the whole orbit of man-made, visible surroundings, from simple everyday goods to the complex pattern of a whole town" (Walter Gropius 1947)*
>
> *To design is to devise courses of action aimed at changing existing situations into preferred ones (Herbert Simon, 1988)*
>
> *The process of inventing physical things which display new physical order, organization, form, in response to function." (Alexander 1964)*
>
> *'Design for user-centred innovation is the activity of conceiving and developing a plan for a new or significantly improved product, service or system that ensures the best interface with user needs, aspirations and abilities, and that allows for aspects of economic, social and environmental sustainability to be taken into account.' (EC Staff Working Document 'Design a driver of user-centred innovation' 2009).*
>
> *Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success. (http://www.ideo.com/about/).*

21 In section 2, we described how design as an economic factor of production relates explicitly to the creation of functional, emotional and social utilities. Some existing definitions of design begin to capture these elements.

22 The Frascati manual emphasises the 'functional' nature of design:

> *124. There are, however, some elements of design work which should be considered as R&D. These include plans and drawings aimed at defining procedures, technical specifications and operational features necessary to the conception, development and manufacturing of new products and processes. (OECD-EUROSTAT Frascati Manual, paragraph 124)*

23 The Oslo manual emphasises the emotional and social aspects of design, but only in specific relation to product form or aesthetics.

> *2.4. Design*
> *344. The term product design, as used in the definition of marketing innovations, refers to the form and appearance of products and not their technical*

specifications or other user or functional characteristics… (OECD-EUROSTAT Oslo Manual, paragraph 344)

24 Many standard definitions make a distinction between the act of designing (verb) and the artifacts that result (noun). The following two dictionary definitions also combine elements of the functional and also the emotional/social.

i) The Oxford Dictionaries (http://oxforddictionaries.com/definition/design) provide a definition of design including the look dimension and the function dimension:

Noun: a plan or drawing produced to show the look and function or workings of a building, garment, or other object before it is made.

Verb [with object]: decide upon the look and functioning of (a building, garment, or other object), by making a detailed drawing of it.

ii) The Macmillan dictionary provides a definition of design that also includes the look dimension and the function dimension (http://www.macmillandictionary.com/dictionary/american/design_19)

Noun: the way that something is made so that it works in a certain way or has a certain appearance

Verb: to decide how something will be made, including how it will work and what it will look like, and often to make drawings of it

25 Definitions of design from professional bodies also recognise this multi-faceted nature of design as encompassing both functional and emotional/social concerns:

Design is a knowledge-based discipline which determines the shape, processes and specifications for products, environments, and information. Design contributes to increased competitiveness, product and service differentiation, export growth and economic diversification. (The Society of Graphic Designers of Canada: http://www.gdc.net/designers/features/articles/122.php)

Design means planning which takes aesthetic and ethical considerations, usability and marketing into account and which is targeted at businesses in industry, trade and services and at public sector organisations. The object of design may be a product, a service, communications, the living environment, and a corporate or organisational identity.' (Salimaki et al 2004)

26 From an economic perspective, a key aspect of design is that it aims to create the correct fit, or a balance, between functional utilities (directly related to the function/performance/usability dimension of design) and the emotional and social utilities (more related with the aesthetic/form/meaning dimension of design).

27 Consumers will dedicate their limited resources to either one object of consumption or another according to the perceived utilities and costs. Competition between diverse utilities and costs originate substitution processes and the length of economic lives. Substitution may occur when a new alternative offers the better/new utilities or when a new alternative offers similar utilities at a lower cost.

28 The fit of functional, emotional and social utilities is economically right when it cause substitution. A design may economically succeed when it satisfies similar needs at lower costs or when it satisfies higher/new needs at the same cost, or when it satisfies

substantially higher /newer needs at an increased cost. Substitution works both ways, to substitute and to be substituted. Design will benefit from an economic life as long as it is not substituted by new designs. Protection of design outcomes and enforcement of rights thus plays a key economic role.

29 Definitions of design show that consensus exist on the fact that design involves both functional as well as emotional/social issues. Economics definitions are based on scarcity bringing the key importance of utilities in economic value creation. Thus, we will work with the following definition of design as an economic factor of production:

> *To design is to create the correct fit of functional, emotional and social utilities.*

30 This definition includes the concept of "correct fit". In an economic context, we understand that fit is economically correct when the perceived utilities are better than existing alternatives or are similar but at a lower cost. In economic terms, to prevent the destruction of the value created by design, it is necessary that the outputs of design activity should be protectable and that protection shall be enforceable. This definition also encompasses the perspective of consumers/customers, as it is based on the economic notion of perceived utilities.

31 If to design is to create the correct fit of functional, emotional and social utilities, then, achieving an appropriate fit between perceived emotional/social and functional utilities is the discriminating factor that distinguishes a design activity from other forms of R&D or innovation activities. Thus, we can expand on our definition to express design in the context of R&D and innovation:

> *Design is a type of R&D and/or innovation activity that aims to achieve the correct fit between perceived emotional/social and functional utilities*

32 Design can be viewed as both a process and also an outcome. Thus, we can adapt our definition, recognising these two basic categories:

> *Design as a process: Activities aimed at creating the correct fit of functional, emotional and social utilities.*
>
> *Design as an outcome: Goods, services, marketing or organizational methods perceived by the market as embodying the correct fit between emotional, social and functional utilities*

33 By exception, we can also articulate what is not design:

> *Design activities are not R&D or innovation activities focused solely on performance improvements (scientific or technical improvements) without considering the emotional or social utilities perceived by the market.*
>
> *Design activities are not artistic activities focused solely on emotional or social utilities without considering the functional utilities perceived by the market.*

34 In section 1, we concluded that in the current Frascati family of manuals (R&D and Innovation), the definitions of design that are used are not in line and that the definition of design could be broader. Using the definition of design developed above, we can also describe design within the contexts of both R&D and Innovation.

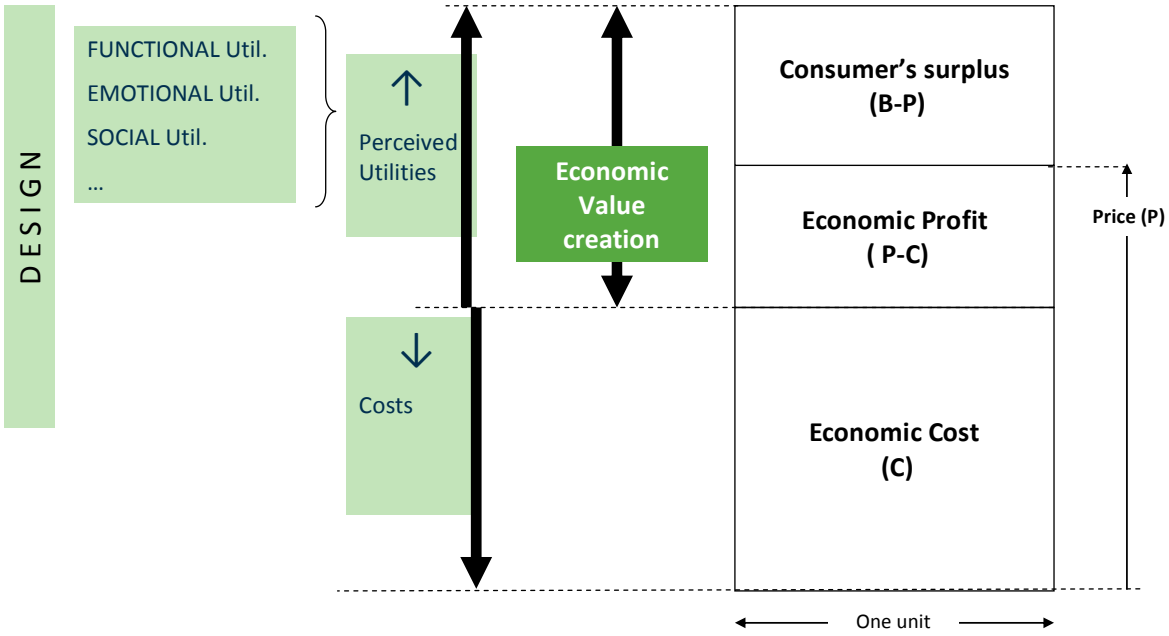
35 *Design as a type of research and development activity: Within an R&D process, design is the set of activities that aims to achieve the correct fit of perceived functional, emotional and social utilities of a research or development outcome.*

Design as a type of innovation activity: Within an innovation process, design is the set of activities that aims to achieve the correct fit of perceived functional, emotional and social utilities of an innovation outcome.

4 Relevant parameters for measurement of design

36 There is no evidence of causality between the cost to generate an intangible asset and its resulting economic value. The investment in design is a necessary condition to increase utilities or to reduce costs (or both) but the investment is not a sufficient condition for success. Some relationships and correlations have been noted, but we need to identify standard parameters to monitor the contribution of design to the economic value creation for business and GDP growth for nations.

37 Design may act as a generator of the correct mix of utilities or to increase efficiency reducing costs for similar utilities. The relationship between the effort in design and reaching economic profit is known in economics and can be summarized as follows:



38 Thus, in order to monitor and measure design as a factor of production we will need to monitor inputs (material, financial and human resources) and the relevant outputs and outcomes as a result of those inputs. From the collection and study of this data we may better understand the existing relationships and how to improve outcome results.

39 Input parameters might include factors such as: human resources dedicated, financial resources dedicated

40 Outputs might include new or improved goods, services, marketing or organisational innovations. Parameters might include factors such as: IP rights resulting from the design activity

41 Outcome parameters as a result of these new outputs might include:

- New margins, new volume of sales from designs based on differentiation (more utilities)
- Improved margins, improved volume of sales form substitution processes based on designs similar utilities but lower costs.
- Economic life continuation of previous years designs. Variation of margins, variation of sales volume

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