

**The construction of
Design Orienting Scenario
Final Report**

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**SusHouse**

Strategies towards the Sustainable Household

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1. Scenario building task in the SusHouse research process

The scenario building task answers two aims within the research:

- identifying coherent sustainable alternatives to the current situation in a creative process involving the market stakeholders; and,
- formalising these alternative into articulated projects in order to be able to assess their pertinence in terms of environment, their impact on economy, their acceptability among users.

In order to achieve these goals, the approach adopted in the SusHouse research used scenarios as a methodological tool to elaborate and envision alternatives to the present organisation of the household system.

1.1 DOS (Design Orienting Scenario) method

The scenarios building methodology in this research was developed from consolidated methodologies used in future thinking methodologies. These methodologies have been adapted from their initial purpose of policy making to serve as a more focalised context of system innovation and encourage the emergence of new type of interaction among stakeholders. This particular type of scenario, which is grounded on the evolution of the product system, is called "Design Orienting Scenario".

1.1.1 Scenarios approach in future thinking methodologies

Introduced by H. Kahn in the fifties as:

“hypothetical sequences of events, built in the intent of attracting attention to casual process and points of decision” (Manzini & Jégou, Jan. 1998).

Thus, scenario thinking develops as an attempt to describe possible alternative futures to show it is open and trigger concrete actions in the present to better control and orient socio-economical or technological decisions.

Elaboration of these future thinking methodologies generated a wide typology of scenarios whose common denominators could be summed-up in three main points:

- plurality of hypothesis: scenarios are intended as a set of hypotheses bringing together and framing the panorama of possible future evolution of a given present situation;
- narrative forms: scenarios are literally “stories” describing the steps of decisions, actions and their articulations that will match a future situation with the present one; and,
- either a forecasting or a backcasting approach: the former starts from the analyse of the past and present situation to follow the main lines of possible and probable future developments while the latter postulates a desirable future situation, a goal to be reached and looks for its feasibility and conditions of occurrence focusing on the present actions to be implemented.

The main purpose of these scenario thinking approaches is to represent and perceive the possible futures of a given situation. These approaches mainly address the general aims of policy making showing the probable impacts of macro-trends, (i.e. demographic dynamics; pollution diffusion...) or policy related decisions, (i.e. economical measures; new legislation...) on the broad socio-economical system, (called "Policy Orienting Scenario" POS).

The hypothesis of the SusHouse research is slightly different. Possible change towards sustainability are based on a capability of a particular methodology to trigger system innovation among a particular group of stakeholders especially during the two workshop sessions.

For this purpose of the research, a different category of scenario has to be defined to show the effect decisions made by this particular group of stakeholders may have on the global sustainability of the system. Parallel to the previous model of "Policy Orienting Scenario" (POS), these scenarios are called "Design Orienting Scenario" (DOS)" to stress the fact they are based on a changes in the "product system" rather than political decision.

1.1.2 “Policy Orienting Scenario” (POS) versus “Design Orienting Scenario” (DOS)

The main characteristics and differences between “Policy Orienting Scenario” (POS) and “Design Orienting Scenario” (DOS) could be described as:

- “POS” help decision making at a general political level, “DOS” support choices in terms of projects at the level of a group of stakeholders and address, from the start, clearly identified actors (the precise group of companies or institutions who wonders about their own future), “POS” address a large range of social actors that can not be identified individually.
- The delimitation of the system for the scenarios is part of the “POS” approach, an early step of the methodology consists precisely in identifying a limited and manageable number of key variables among the infinite number of factors that may relate to the particular situation. The reference system for “DOS” is better known and identified from the start, either the system relates directly to the particular companies/institutions and the system consists of their strategic environment, or the approach focuses a socio-economical area and the system relates to a determined market.
- Starting from macro-trends and the emerging questions, “POS” tends to characterise through one or more global visions of society the effects of various political decisions on a plurality of individual choices. “DOS” tends to show the effects of single decisions of a group of actors on the focused system through one or more visions of this particular focused system.
- “POS” tends to be used by the public or private sector to assess and show to the public possible effect of different policy alternatives. “DOS” are used by single social actors or a small group of actors to orient their own future and build appropriate business solutions.

1.1.3 “Actor-based DOS” versus “Function-based DOS”

A final distinction in the nature of the Design Orienting Scenario has to be made between:

- The focused system is a particular actor, (i.e. a company, an institution) and, given its particular situation (i.e. its know-how, identity, human resources...) and the strategic environment (macro / emerging trends), the “DOS” tends to show how particular business decisions/project implementation could affect the future development of this actor. Scenarios are then called “Actor-based DOS”.
- The focused system is the environment of a given actor (i.e. the functional system describing a market sector) and given all the present range of actors playing in this particular sector (competitors, providers, sub-contractors, intermediary, distributors, public authorities...) and the same strategic environment (macro / emerging trends). The “DOS” tends to show how consistent changes in the actors’ behaviour could affect the evolution of the focused functional system and if the present actors themselves may change (i.e. entrance of new players, partnerships to be built, shift in the role of particular stakeholders...). Scenarios are then called “Function-based DOS”.

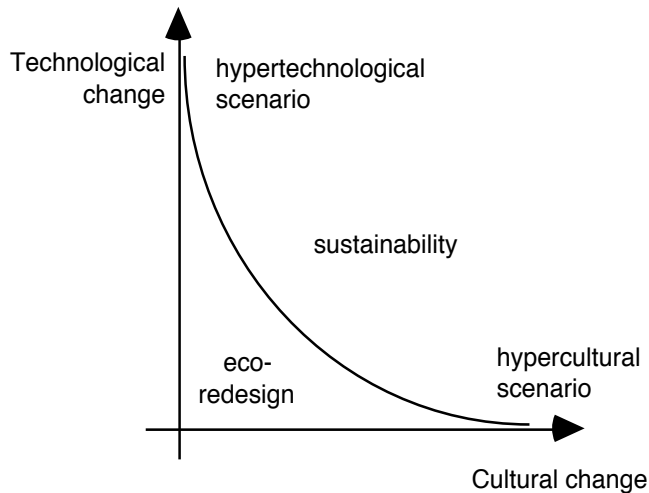
The SusHouse research focuses on system innovation among stakeholders as the motor of change towards a sustainable household. The focussed system is then centred on the household and the nature and categories of stakeholders involved may evolve. Hence DOS belong to the "function-based" type (not focussing on a particular actor to picture its various possible futures but on a function of the household with the aim of describing how this function may be solved and by which categories of stakeholders).

1.2 Scenario framework within the SusHouse research

1.2.1 Scenarios in the perspective of sustainability

This section describes the notion of sustainability and how the scenario hypothesis should be approached.

Figure 1: A combination of technological and cultural innovation

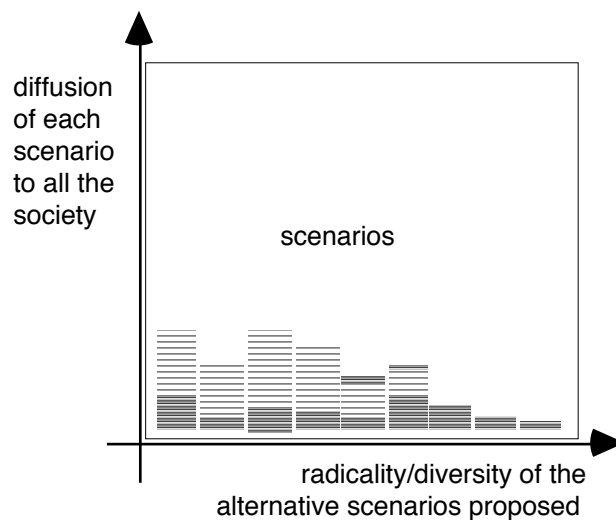


By taking as a parameter of reference the consumption of environmental resources, it has been asserted that the present consumption by industrial societies should be reduced by ninety percent. This result can be achieved via different routes through combining a 'technological change' with a 'cultural change' (see Figure 1). These lie between two extreme scenarios both theoretical but which delimit the vast range of possibilities in which the SusHouse research takes place:

- on one hand, the 'hyper-technological scenario', where the reduction in the consumption of resources only relies upon a drastic increase in the environmental performance of the technological system; and,
- on the other hand, the 'hyper-cultural scenario', where the reduction in consumption of environmental resources is only based on radical change in expectation in terms of consumption.

The maximum practicality of scenarios as intended to be built in this research, occurs in the area which shows a certain balance between the technical dimension and the cultural dimension of innovation (Manzini & Jégou, may. 1998).

Figure 2: A wide range of radical innovative solutions



Sustainability is a matter of both the implementation of radically new processes, products, social patterns... and their diffusion to the entire society. This research aims to picture qualitatively a wide range of innovative alternative scenarios rather than to describe the modalities, steps and conditions of their generalisation (e.g. what are the multiple alternatives to the current domestic washing versus how to diffuse the use of neighbourhoods laundrettes in the urban population).

1.2.2 Macro-trends context

This section describes the main macro-trends setting the future context in which SusHouse scenarios should be implemented. Macro-trends are understood as an on-going phenomenon tangible in the present and fulfilling both characteristics of:

- constituting the main determinants of the considered future; and,
- being of such importance and so deeply grounded that no sensitive shift could affect them in this coming period.

Considering the household and its perspective of evolution, the following four groups of macro-trends constitute the basic background considered before implementing the scenarios:

Demography and new typology of household. Macro-trends in this area are :

- General movement of urbanisation for more than three quarters of the world population within the next century, picturing big cities with huge suburbs, deserted and often unused countryside.
- Progressive ageing of population dictating a sustainable society with more than half of the people over 50 with a combination of a stabilised demography and a diffusion of health prevention.
- Destructuration of the traditional married family living together producing a multiplicity of household typologies: students, singles, uni-parental and mosaic family, isolated elderly etc.

Macro-economy and environment as a scarce commodity:

“In a sustainable society, environmental resources will become a ‘scarce commodity’, a significant factor - maybe the most significant - in the financial affairs of companies, families and society in general” (Manzini & Jégou, May. 1998).

Emerging trends in this area are:

- Internalisation of environmental costs inducing increased economic prices of raw materials, non-renewable energy, the treatment of effluents and waste and the occupation of space than what is regarded as ‘normal’ today.
- Implication of each economical stakeholder in the whole product cycle through ‘extended producer responsibility’, users involvement in the ‘de-mission’ of goods, ‘sector agreements’ to optimise globally the ecological loop etc.
- De-materialisation of activities through production trends towards ‘de-materialised’ goods (smaller, lighter and more durable); ‘digital products’ (conveying a great deal of information while utilising a reduced amount of matter and energy); ‘system optimisation’ (where the development of services allows a better use of equipment and reduced mobility of persons and things); and, a general shift towards producing and selling ‘product-results’ rather than material goods (inducing a mechanism where companies have economical interest to reduce the environmental weight of the mix of products and services they offer to achieve these results).

Technology, systems interconnection and new artefact materiality. Technological trends will be viewed from the implication in terms of the eco-efficiency of products and goods:

- Diffusion of the new information technologies with major consequences in terms of ‘de-localisation’ (allowing more flexibility in the distribution of production/consumption places, industrial complementary and environmentally efficient processes); ‘de-standardisation’ (allowing traditional market-oriented product customisation to be extended to product and process adapted to the different local contexts); ‘de-intermediation’ (allowing ‘lighter’ organisations with potentially more flexibility and reactivity to their environment contingencies) (Manzini & Jégou, May 1998).
- Development of production and consumption systems based on renewable resources, closing the material cycle and realising an ‘artificial cycle’ which works side by side with the natural cycle without exceeding the limits fixed by the capacity of the latter to regenerate itself. In practice, it entails the use of custom-made more eco-efficient materials, their recycling, the productive use of industrial effluents and the ‘cascading’ use of energy (Manzini & Jégou, May. 1998).

Micro-economy, multiplicity of economies and working activities:

The deployment of new technology causes a general reduction of the use of persons in production activities, resulting in a scarcity of traditional stable employment. Emerging trends in this area are :

- Fragmented rhythm in the professional life characterised by a shorter period of activity, succession of various jobs with periods of interruption and increased education and training.
- Increased attention to the various and combined levels of economical activity such as ‘informal sector’, ‘multi-activity’, ‘self-entrepreneurship’, ‘homework/telework’ etc.
- Growing awareness of a global vision of the different kinds of work: ‘job work’ (or traditional ‘paid work’ affected by a strong reduction in quantity and subject to constant instability and redefinition); ‘goal directed or project work’ (including all activities such as associative involvement, neighbourhood care, community building... considered useful but hardly remunerated by the traditional economy or classified as black-labour, bargain or charity activity); ‘self-directed work’ (including all the nether entered into accounts domestic work, care for near social environment and self-training) (Manzini & Jégou, May. 1998).

1.2.3 System definition

This section intends to set the frame and limits in which the scenario building should take place.

Focus of the system

The focus of the system and its boundaries is developed in detail by the functions and the environmental assessment task. Here only a rough definition is given to frame the basis on which the scenarios are developed. The hypothesis of the research starts from the environmental assessment of the household as it is organised today and identifies three critical functions:

- nutrition-related functions (shopping, cooling, cooking...);
- textile care-related functions (laundry, clothes care...); and,
- sheltering-related functions (heating, cooling, outside interface...).

Each of these functions constituted of internal activities occurring in the household frame but implies a constant relationship with the external environment far beyond the limits of the household system:

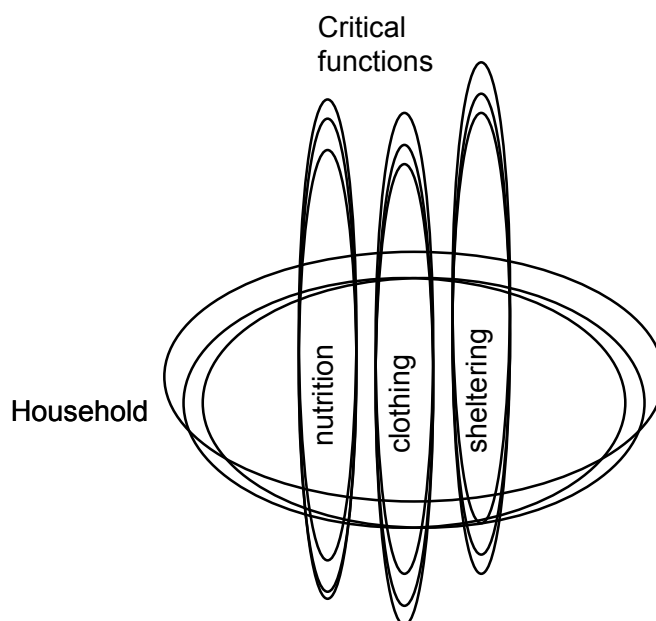
- existing infrastructure in which the household is embedded;
- the entire life cycle of goods, products and equipment used in the household; and,
- the global offer of outside services etc.

How the distribution between 'internal' and 'external' to the household is likely to evolve include:

- possible internalisation through development of auto-production;
- do-it-yourself...;
- possible externalisation through home delivery, neighbourhood services...

The nature of the function itself may evolve by how it is fulfilled and through transformation in the social expectation: ongoing social dynamics toward 'cocooning' or 'nomadism'...; consumer trends of leisure, health and body care...

Figure 3: Household system and critical functions



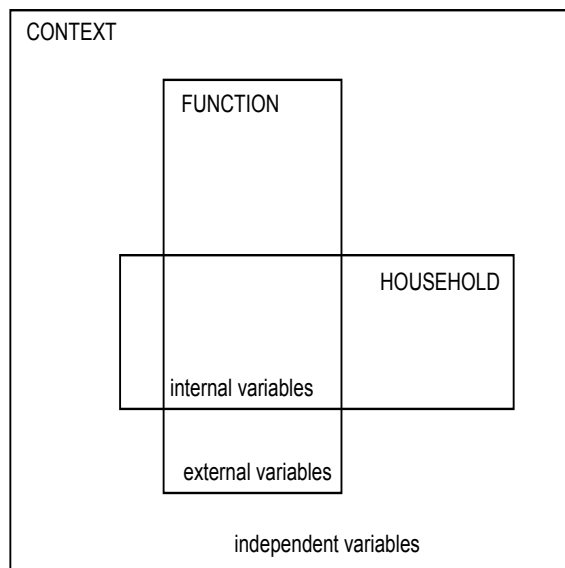
The studied systems are each of the critical functions identified but focused on the household. They are respectively defined as:

- household / shopping-cooking-eating;
- household / clothing care; and,
- household / shelter.

Variables influencing the system

Each of the household function systems (household/SCE, household/clothing-care, household/shelter) depend upon a series of variables influencing its environmental impact.

Figure 4: various categories of variables influencing the system



Three categories of variables have to be considered:

1. 'Independent variables':

Variables that define the global context in which the scenario will take place and on which the fulfilment of the function by the members of the household does not interfere directly. Macro-trends described before are part of these independent variables (i.e. the ageing of the population, the diffusion of information technology...).

2. 'External variables':

Variables that interfere in the fulfilment of the function but does not depend upon the household choices or organisation (i.e. the availability of services such as various catering providers or restaurants that present an alternative to the fulfilment of the shopping-cooking-eating function by the household members).

3. 'Internal variables':

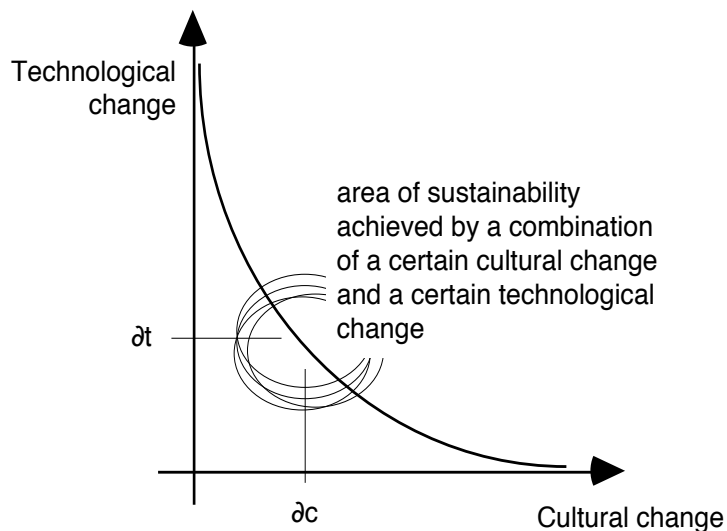
Variables depending of the choices of the household and the way its members organise the fulfilment of the function (i.e. the number of piece of clothes owned by household members or the type of washing/drying technology present inside the household space).

In a given context defined by a range of fixed 'independent variables', the various possible way to fulfil a given function for the members of a household is described respectively by the combination of 'external variables' and 'internal variables'. It is to be noted:

- The difference between "internal/external variables" and "internal/external activities" of the household should be precise to avoid any ambiguity: shopping, for example, is considered as an internal variable when it is assumed by the household entity even if someone has to go outside the house to fulfil this activity.
- The influence of independent variables - and in particular macro-trends - on the household may be considerable (i.e. ageing of population may reduce the average mobility of the household and incentive the demand of home delivery services...). But in order to keep the reflection centred on how the household organises to fulfil each function, the research will concentrate on internal and external variables keeping the independent variables as a background context (as described in section 1.2.2.) in which the reflection will evolve.

Limits within to consider the variables

Figure 5: sustainability as a combination of technological and cultural change



The interesting range of scenarios to be considered to move toward sustainability is based on the combination of a certain technological change with a certain cultural change (see 1.2.1. / "a combination of technological and cultural innovation").

Technological Change

Technological perspectives could be hierarchised in:

- Average in use (i.e. technology exploited today in domestic appliances).
- Easy/economic to diffuse (i.e. improvements in technology to be applied to current appliances and, for some, integrated in the next generations of equipment).
- Available but not diffused (i.e. technology developed to the stage of prototypes but only used for test yet).
- Technically feasible (i.e. studied technology with no other concrete materialisation than some laboratory demonstrations).
- Experimental (i.e. scientific phenomenon noticed for their potential but with no concrete application).
- Conceptually possible (i.e. idea of processes theoretically possible but never experimented).

The aim of research is to build scenarios possibly based on advanced technology and assess their potential in terms of sustainability. The technology to be considered for scenario

building should be developed and concrete enough to be assessed in both environmental and economical terms. Level 3: “available but not diffused” on the previous scale is set as the most advanced perspective to be taken into consideration but avoiding the resulting scenario being pure conceptual speculation.

Social change

Social agreement to a determinate cultural change could also be of various amplitudes:

- Most common attitude (i.e. habits of the majority of the population).
- Socio-style (i.e. the new modality constituting one of the dominant behaviour in the population).
- Sociological niche (i.e. enough people agree to adopt this new modality to be identified as a social group).
- Declared aspiration (i.e. existing minorities of people declare they would agree to this new modalities even if they do not do so yet).
- Utopia (i.e. some people declared a positive opinion in favour of the new washing modality but say they would never consider to use it themselves).

Even if social acceptance is very difficult to assess a priori, each cultural change connected to the variables should be located in this scale. With the aim of the research being to implement a range of alternative solutions, all proposed scenarios should be attractive enough in terms of cultural change to be started right away even if at the very beginning, the trend concerns only a minority of people. The level of a ‘sociological niche’ in the previous scale is set as the minimum level of acceptability for the hypothesis so that a clear adopter group is identified and the implementation of the resulting scenario is realistic.

2. THE SUSHOUSE SCENARIO BUILDING METHODOLOGY

The scenario building task interacts all along the all research process especially providing three types of contribution:

- It structures the problematic, mapping the context for scenario building and providing a framework to trigger creativity among stakeholders during the first range of workshops.
- It provides a methodology to organise and cluster creative outputs of the workshops and articulate them into scenarios.
- It sets the format of a Design Orienting Scenario in order to reach the necessary level of consistency and communication to be able, on one hand, to assess their pertinence in terms of environment, their impact on economy, their acceptability among users and, on the other hand, to provide concrete hypothesis to be further developed by stakeholders during a second range of workshops.

2.1 Setting a framework for the first creativity workshop

As defined in the scenario framework (see 1.2.3 System definition), in a given context defined by a range of evolving ‘independent variables’, the various possible way to fulfil a given function for the members of an household is described by respectively, the combination of ‘external variables’ and ‘internal variables’. This two level segmentation has been proposed as a working methodology to structure the creative reflection of stakeholders during the first range of workshops.

2.1.1 Alternative TECHNO-CULTURAL OPTIONS to fulfil the function

The focussed function was first considered, in general, independently from how the household would organise to realise it (i.e. the need for clean clothes and textile care...). The

fulfilment of the function in this sense depends from both the nature of the technological processes involved and the expectations in terms of fulfilment by the users. These two dimensions could vary describing respectively, two categories of 'external variables':

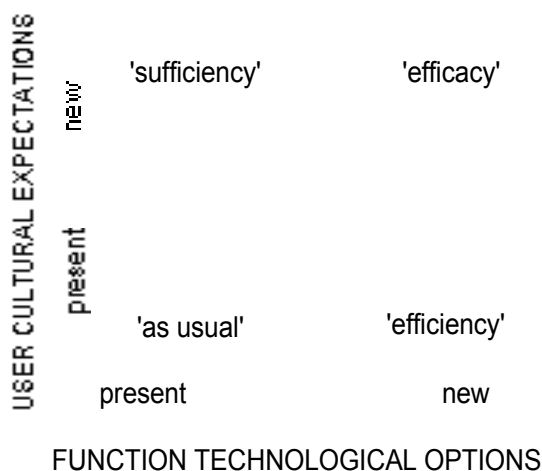
1. FUNCTION TECHNOLOGICAL OPTIONS:

- The technical system involved to fulfil the function remains basically the same or new technology is involved.

2. USER CULTURAL EXPECTATIONS:

The user expectations remains at the same level as today or a certain lowering in the expected fulfilment of the function may be considered.

Figure 6: Techno-Cultural Option matrix



A first matrix, picturing four different ways of reconsidering the fulfilment of the focussed function was proposed as a starting point to trigger the reflection in the workshops:

1. The "as usual" area represent the present situation both in term of technology available and user expectations.
2. The area of 'efficiency' describes a situation combining the present user expectations with the best available technological improvements in terms of environment.
3. Area of 'sufficiency' describes a situation combining the present technology with acceptable changes in common user expectations.
4. Area of 'efficacy' describes a situation where both technological alternatives and cultural changes could be considered.

2.1.2 Different SOCIO-ORGANISATIONAL OPTIONS of the household

Given a techno-cultural option, the members of the household could organise in various modes to fulfil the function. Main possible dimensions of socio-organisation of the household were given as a check-list to support the creative sessions in the workshops. As a working methodology, these 'internal variables" were presented in form of polarities:

User behaviour could be characterised as:

SOCIAL/COLLECTIVE (members of households will tend to collaborate as a social community)	versus	INDIVIDUAL (members of the household will behave as a group of individualities acting separately)
MAKE (members of the household will tend to fulfil the function through their own work)	versus	BUY (members of the household will tend to purchase product and services to fulfil the function)

Technical options of organisation could be characterised as:

INSIDE (technical infrastructure involved in the fulfilment of the function are situated inside the household)	versus	OUTSIDE (technical infrastructure involved in the fulfilment of the function relates to a larger context outside the household)
ENABLING (technical infrastructure tends to enable the members of the household to fulfil the function on their own)	versus	RELIEVING (technical infrastructure involved in the fulfilment of the function tends to provide the household with finished, ready to use products or services)

Socio-economical solution of organisation could be characterised as:

SERVICES (members of the household will tend to rely on services to have the functions fulfilled)	versus	PRODUCTS (members of the household will tend to achieve the fulfilment of the function through the use of their own equipment)
DO-IT-YOURSELF (members of the household will tend to elaborate on their own the products they needs to fulfil the functions)	versus	FINAL PRODUCT SERVICES (members of the household will tend to achieve the fulfilment of the function by buying final products with high service added value)
SHARING (member of households will tend to share the equipment necessary to fulfil the functions)	versus	INDIVIDUAL USE (member of the household will tend to own their personal equipment to fulfil individually the functions)

2.2 Clustering creative outputs into articulated scenarios

The second contribution of the scenario building task takes place after the creative workshops have taken place. It consist in providing a methodology to organise the creative outputs, select the most relevant and aggregate them in order to build articulated and consistent scenario. The methodology consists in two steps:

- First the various creative outputs are sorted according their different nature and completed;

- Second, a particular process of merging of the singles propositions takes place in order to group the ones presenting the same dynamic and to unify them into coherent scenarios.

2.2.1 Differentiation of goals, strategies and proposals

The fulfilment of a function by the members of the household consist of the cross-fertilisation between 'TECHNO-CULTURAL OPTIONS' implementing the function and 'SOCIO-ORGANISATIONAL POSSIBILITIES' describing the household. Starting from these two frameworks as creative backgrounds, the first range of creative workshops ends up with a list of new ideas. The resulting issues of this creative process show different nature and a classification was proposed to distinguish:

- GOALS which, is to say, specific purpose to reach, coherent with the initial aim of sustainability (i.e. "to light and heat only where household members are" or "to have a unique street delivery of goods for all the neighbourhood"). If sustainability is considered the initial "goal" to be reached, these propositions are subdivision of this main aim. They may be interesting to consider because their achievement will lead toward sustainability and at the same time, they represent a more concrete objective, already orienting towards potential solutions.
- STRATEGIES which, is to say socio-cultural, economical or technological dynamic on which relies a possible progression toward sustainability (i.e. "the appeal of diminishing tasks to be cared by household members may allow to externalise some functions to external professional eco-efficient services"). These propositions are strategies in the sense they indicate actions that, talking advantage of the focused socio-cultural, economical or technological dynamic, will bring to reach "goals" that else, would not have been possible to reach.
- PROPOSALS which, is to say concepts of products or services that may be implemented in order to achieve positive effects toward sustainability (i.e. "disposable underwear that does not need to be washed", "a computer aided cookbook that select the ways to cook ingredients with less impact").
- In that sense, ideas and project are considered as "proposals" as long as they are coherent with one or more "strategies" considered and they bring to the achievement of one or more previously set "goals".

Scenarios are constituted by the integration of these three categories of elements. Such articulated propositions of "goals", "strategies" and "proposals", further called "GSP", confer the particular "design-oriented" character of this typology of scenario in the sense that:

- "Goals" assume the normative dimension of the project (what I want to obtain).
- "Strategies" assume the pragmatic dimension of the project (what I am able to obtain).
- "Proposals" assume the visionary dimension of the project (what I am able to imagine).

2.2.2 Clusterisation of the GSP propositions

The second step of the methodology tends to complete and aggregate the single ideas progressively into consistent scenarios. First, each single proposition must be completed in order to reach a complete GSP proposition consisting of articulated goal-strategy-proposal. The aim of this step is to get rid of creative outputs that may appear attractive and valuable at first sight but that may not be complete or appropriate answers. Three cases mostly encountered can be described:

- Certain GOALS may be in line with sustainability but no solution seems to be available to reach them (i.e. "to provide a feeling of warmth without spending energy").
- Certain PROPOSALS may lead towards sustainability but no reasons why they should be implemented could be found (i.e. "to wear clothes for a long period without washing them").

- Certain STRATEGIES clearly recall a series of interesting PROPOSALS but all together are not likely to be in line with sustainability (i.e. "to develop domestic dry-cleaning facilities in order to answer the demand of easy-care solutions"). Only complete GSP propositions are maintained as shown in Table 1.

GOALS	STRATEGIES	PROPOSALS
i.e. re-evaluation of second hand clothes	i.e. possibility of an intensive clothes turnover (the strategy rely on socio-cultural trend of frequent wardrobe renewal)	i.e. a 'clothes exchanging store' service
i.e. acceptance of a certain dirt	i.e. use a technical device for cleanness certification (the strategy rely on socio-cultural trend of externalising human subjectivity into a scientific measure process)	i.e. a 'dirt detector'
i.e. prolonging the cleanness duration	i.e. soft cleaning process as easy care solution (the strategy rely on socio-cultural trend of reducing time dedicated to clothing-care)	i.e. an 'air washing' device
etc...		

Table 1: example of a GSP chart

Secondly, GSP propositions showing converging natures should be aggregated to form a consistent scenario. The clusterisation process is based on GSP propositions having homogeneous strategies. The reason why clustering by strategies is connected with the nature of scenarios being a theoretical representation of one core idea. In other words, various elements are constitutive of the same scenario only because they are typical of the same socio-cultural, economical or technological dynamic. Thus, typical scenarios are made of different proposals, answering various goals all in line with sustainability and linked by the same core strategy.

2.3 Formalising Design Orienting Scenarios

The last step of the scenario building process consists in presenting the DOS with an appropriate form so that it can be easily communicated for the purpose of the research. At the same time, this formalisation work is also a process to develop the DOS until a certain level of consistency is reached. It helps to get deep enough in each of the particular dimensions focussed by the research: the pertinence in terms of environment; the impact on the economy; the acceptability among users and, at the end, the potentiality to incentive convergence of stakeholders and their involvement in a spin-of project.

2.3.1 Various components of a DOS

Design Orienting Scenario is based on the implementation of the proposals. The formalisation of a D.O.S. consist then in 3 different parts:

1. A global "Vision" picturing the effect of the implementation of the proposals and their possible impact on the context defined as background of the research.
2. The "Essential Characteristics" explaining the main effects and benefits the DOS is expected to have in terms of sustainability, economics and user acceptance.

3. The various "Proposals" developed as concrete products and/or services.

Vision

The Vision is a short, dense abstract, written in a literature style that should tease the readers to look at the scenario more into details. Concretely, the presentation of a Vision consists in half a page to one page of a summary that characterise the daily atmosphere. This is induced by the implementation of the various proposals in the household context with the minimum connecting elements to set the scene and give an insight in the motivations and effects of their implementation. It describes in particular the central strategy that emerged from the clusterisation of the GSP proposition and represents the core atmosphere of the D.O.S. It sums the various goals that are proposed to achieve the implementation of the D.O.S. A title illustrating the atmosphere of the D.O.S. is also added.

Essential characteristics

The Essential Characteristics could be seen as a pre-assessment of a DOS in the sense that it prepares the various assessments in terms of environmental, economics and consumer acceptance that will be achieved afterwards. In other words, it presents the initial intentions of the DOS: why it should reduce the environmental impact? how it may affect the economical framework? and, for what reasons it may be accepted or not by the consumers? The presentation of the Essential Characteristics consists in a limited list of key points from three point of view summarised in a Table 2.

Environment	5 main points pro's and con's
Economics	5 main points about stakeholders panorama, prices, chain structure, etc
User acceptance	5 main points about lifestyles features, possible adopter groups, attractiveness and motivation of implementation or resistance, etc

Table 2: Key points of the Essential Characteristics

Proposals

As set in the definition of a "Design Orienting Scenario", the implementation of the proposals are the foundation of the DOS, the reason why the context may change and better fit to the goal of sustainability set at the beginning. The description of the proposal should then stress the passage from a rough concept/idea issued in a creative session to a consistent product and/or service developed enough to assess impact of its eventual implementation. It assumes the "project" dimensions of a DOS, which is to say, to express refined solutions where all the focussed dimensions -here especially the environmental but also the economical and consumer dimensions- are taken into consideration and emerging problem/conflict are already solved. The presentation of a Proposals consists of half a page to one page of concrete description of the specifications of the product and/or service: core idea, modalities of use, target users, technical components, background technologies, business organisation, stakeholders involved, price level, environmental impacts and benefits.

3. RESULTS IN TERMS OF DOS

This last section describes the results of the previous methodology applied in the sustainable household research. As synthetic presentation of the twenty-seven DOS obtained (see the nine specific "Scenario Building Task" reports), an integrated vision at a household level is

proposed. The process of clusterisation of the DOS presenting the same nature in the different function results in five different household DOSs. A synthetic mapping of them based on the predominant socio-organisational options explored is proposed.

3.1 Internal pre-selection of the DOS

Twenty-seven DOS have been obtained at the end of the scenario building process followed during the SusHouse research. They result from all the GSP propositions obtained filtered for pragmatic purposes of the research. The most consistent and promising DOSs in the sense of the initial sustainability goal, were selected by the research team keeping in mind the comparison purpose between the various European countries/cultures taking part in the research. For each of the initial focussed functions (Shopping-Cooking-Eating; Clothing Care; Shelter) a set of guide-line were set to balance the number of DOS explored with possibilities to make cross-cultural comparisons:

- one DOS country-specific;
- one DOS developed in all the countries; and,
- a third DOS shared by two countries.

The following charts show the repartition of the twenty-seven final DOS on a both function and country basis.

SHELTER	IT	UK	GR
Comfort management service	Comfort management service	Green comfort management service	Comfort management service
Edumation	Edumation		Edumation
Come together			Come together
Wearables	Wearables		
Active house		Active house	
Natural living		Natural living	

Table 3: Shelter DOSs

SCE	HU	NL	UK
Eat centre		Super-rant Neighbourhood food centre	
Local & green		Local green menu through green consumer demand	Local and green
E-shopping Cooking machine		Intelligent cooking and storing (ics)	Virtual shopping
			High tech eating
High-tech rural garden	High-tech rural garden		

Table 4: Shopping, Cooking and Eating DOSs

Clothing care	GE	IT	NL
Outsourcing	Clothing care outsourcing	Clothing and clothing care provider	Clothing and clothing care outsourcing
Community-like	Collective clothing care	Community system for clothing care	Neighbourhood cloting pool
			Chain of users
Eternal product	My clothes my eternal friend		Eternally yours
Soft care		Soft care	
Easy care		Easy care	

Table 5: Clothing Care DOSs

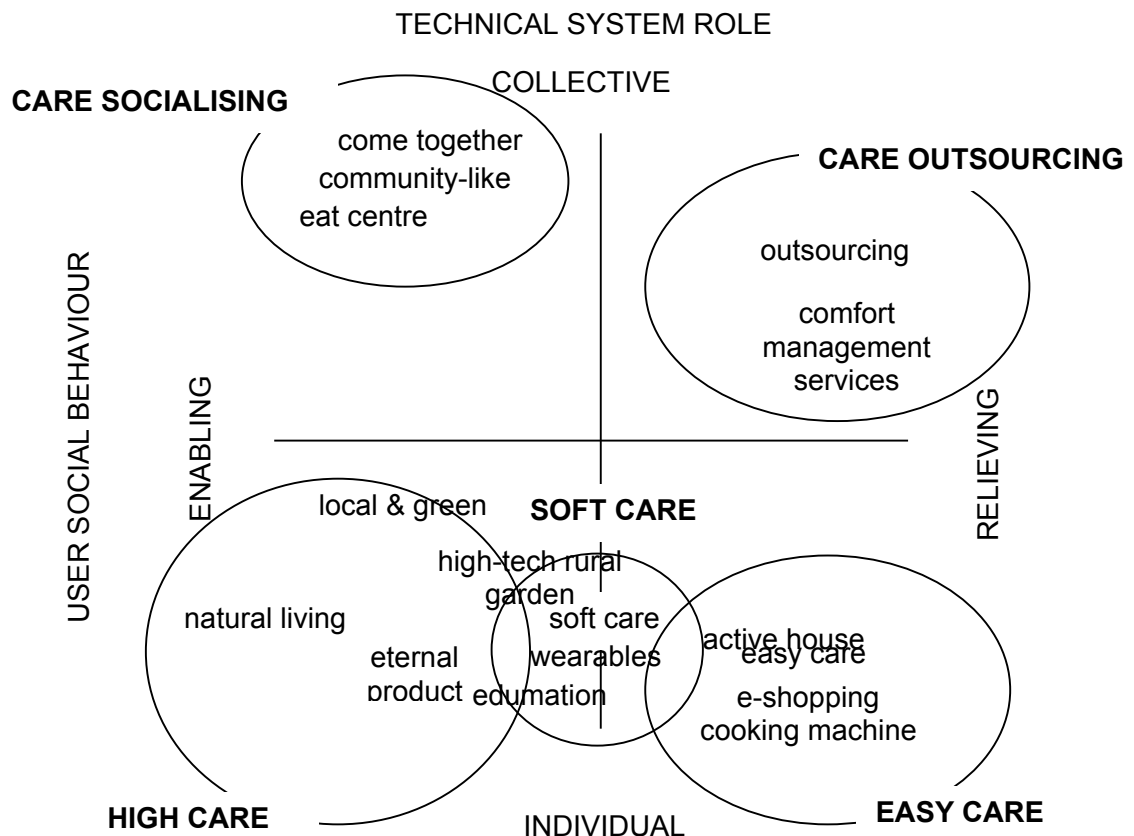
3.2 Clusterisation of the DOS

In line with the methodology developed (see 2.2.2. "Clusterisation of GSP propositions"), a clusterisation of the DOS at the household level is proposed on the basis of the same scenario strategy in the three functions. Among the various strategies present as core of the DOS (see the nine specific "Scenario Building Task" reports) the two following axes shows the most often and main explored polarisation:

- social/collective (members of the household will tend to collaborate as a social community) versus individual (members of the household will behave as a group of individualities acting separately); and,

- do-it-yourself (technical infrastructure tends to enable the members of the household to fulfil the functions on their own) versus service (technical infrastructure involved in the functions tends to provide the household with finished, ready to use product or services). The various DOS emerged in terms of "shelter", "clothing care" and "shopping-cooking-eating" are reported in a map drawn by the two main socio-organisational polarities described above. Five clusters are obtained:

Figure 7: Integrated vision of household DOSs



3.3 Integrated vision of household DOS

Five main household DOS appear on the previous mapping. A Vision of each is described as a synthetic presentation of the various DOS obtained in each functions.

3.3.1 EASY CARE

The "easy-care" household is characterised by high-tech equipment helping users in their daily life. The various tasks are fulfilled automatically or with very low personal involvement. Shopping is conducted virtually and delivered to the household. Automatic cookers quickly prepare food in the kitchen. Clothes have microchip labels which automatically provide cleaning information to clothing washing equipment. The home is fully equipped with intelligent appliances able to regulate the heating, control the lighting and optimise the fulfilment of the various household functions.

Behind this easy/automated domestic space, the environmental goal is to relate as much as possible the eco-efficient equipment and products to push the household members life-styles towards sustainability through rationalisation and optimisation of their behaviours. Intelligent kitchen storage equipment suggests the best methods to cook the available ingredients with the least environmental impact. A 'dirt' detector indicates automatically when it is time to clean each piece of clothing. An automatic energy control system works to match the limited amount of energy allocated to each household with the various requirements of the household members.

The strategy of implementation of this easy-care household is to automatically exchange/control the self-determination of the user demands with an optimised set of both care-free and sustainable solutions. This apparent paradox (between higher comfort/less user involvement and sustainability) is turned into a way to influence the market demand. The scenario takes advantage of the natural trend in the population towards more comfort to orient consumption and daily life patterns towards sustainability. For convenience, household members choose ready-to-eat food that happens to be cooked with sustainable ingredients. In the same way easy to care clothes require the generalisation of waterproof dirt resistant fabrics that lower the needs for deep washing, etc.

Hence the involvement of the household members in the fulfilment of the various functions is very low. Householders either have fully automatic appliances, e.g. food packaging is equipped with microchips to program the kitchen cooker, or take part only in general management of functions, e.g. deciding the comfort preferences in the automatic control system of the household or when the cleaning cycle should begin.

Householders not only have a low involvement but appear to lose their control on what happens in the household. The householders do not have to decide to switch toward a more sustainable household but their choices are guided by appealingly convenient solutions that happen to be more sustainable (through responding to legislation and norms favouring the environment). The result is a paradoxical (and may be dangerous) life-style taking environment into consideration but giving to the population the impression it is doing the opposite.

Key concepts for the EASY-CARE household DOSs are:

- User social behaviour: search for individual care-free solutions. The quality of life, in this case, is intended as the use and consumption of tools and goods that "solve the problem", i.e. the individual freedom to do what you want by yourself and with the minimum of time, effort and attention.
- Technical system role: solutions are (mainly) based on relieving products, physical artefacts that integrate technical possibilities "to solve problems", i.e. products that integrate the knowledge and power that, otherwise, would be required to the user.

3.3.2 CARE OUTSOURCING

The scenario is characterised by a certain deconstruction of the household as it is traditionally thought as a place for the fulfilment of domestic functions. The household is emptied of domestic appliances and is either, the point of arrival of incoming services delivered to the home or, a central life-base from which the household members reach external services installed in the neighbourhood.

A range of services provides the household members with ready-to-consume solutions, such as: warmth and light; prepared food; clean clothes...like a hotel. In a less luxurious/cocoon-like solution, local service points propose the same solutions at a short distance from the household.

The environmental goals of the scenario refer to bigger scales than the level of the single household would allow. Both management and processes of the various functions are

externalised to qualified, bigger structures such as restaurants or clothing care centre which are more likely to implement and control sustainable technology. Even household heating and lighting systems are managed and upgraded by external comfort management services to guarantee the eco-efficiency.

In terms of organisation, the scale of a larger community allows the implementation of a certain level of sharing of equipment and products intensifying their use. Clothes are not owned anymore but leased by clothing centres offering many possibilities from quick turnover subscriptions to the leasing of seasonal wardrobes.

The strategy of implementation of this externalisation scenario is to provide household members with solutions relieving them completely from both material tasks and their management. Their involvement is less based on properties but on the fact of having access to more flexible and specific solutions. The home protection is constantly optimised for each season. The fact of leasing clothes allows individuals to change them more often than when owning them.

The resulting atmosphere is a certain feeling of dissolution of the household where the household is not referred to as a sub-system with clear boundaries. On one hand, household members relate to outside structures for most of the basic domestic functions, such as eating or cleaning their clothes. On the other hand, the household has less control on what happens inside the household where comfort management services penetrates to monitor and upgrade the heating and lighting systems.

Turning this into a positive statement, the appealing proposition of externalising the fulfilment of domestic functions is the progressive shift away from the present immutable model of the private home to the opening of the market to alternatives solutions.

Key concepts for the "care outsourcing" household DOSs are:

- User social behaviour: search for collective care-free solutions. The quality of life, in this case, is intended as having free access to different kinds of services, i.e. the individual freedom to get whatever result by paying somebody else for doing the job for you.
- Technical system role: solutions are (mainly) based on relieving service, socio-technical systems are able to solve different kinds of practical problems, i.e. services that integrate the knowledge, power and organisation that, otherwise, would be required to the user.

3.3.3 HIGH CARE

On one hand the "high-care" scenario is based on a lifestyle in line with natural models. Daily rhythms adapt to the seasonal variations of natural daylight. Diet is based on food available in the householder's region. Clothing is developed and cared for maximum durability. On the other hand, the DOSs require commitment from the household members in terms of:

- personal contribution to domestic tasks, (e.g. preparation of food from basic ingredients or repairing and cleaning of clothes); and,
- general eco-management of the household (e.g. adaptation of the isolation system of the house according to seasonal climate changes or management of the energy production systems).

In environmental terms, the "high-care" scenario is based above all on the drastic reduction of the household members' expectations considering the possibilities and limits of the local natural resources. Consumption tends to be cut down (e.g. the wardrobe is restricted to a few pieces of clothes; food is limited to the varieties and species available in the region; consumption of energy for heating and lighting is limited to the possibilities of local production). Products and equipment are used intensively (e.g. architectural components allow reconfiguration of the living space according to seasonal climate changes; clothes are repaired and up-graded in order to optimise their life-time).

The various DOSs developed for each Functions do not show a strategy of implementation of the household "high-care" scenario but the apparent austerity does not seem to be imposed either but rather chosen by the household members.

The technical systems involved shows appealing high performance (e.g. clothes are produced from high quality technical textiles with high durability and dirt resistant characteristics; insulation materials performance used for the house partly balance the limitations in heating).

DOSs also describe the various affective and psychological motivations that make the scenarios attractive such as:

- the "feeling of autonomy" (the household is involved in a sort of challenge with the local climate by only using local resources to produce energy and eco-management knowledge to use them in the best way); or,
- the "structuring dimension of local production" (self-identity emerging strongly from the consumption of fruit from one's garden or the personal re-design of one's clothes).

The resulting atmosphere for the household is characterised by values like

- a "high-care for artefacts" (e.g. deep involvement in personal clothes that are perceived as a "second skin");
- the "interest in the local dimension" (e.g. the wide variety of forgotten local vegetables, the amazing resources of regional cooking culture); and,
- the "quality of a life in harmony with nature" (e.g. bio-rhythms).

But the DOSs differ from a simple "back to nature and past tradition scenario" on one hand, because of the high-tech technical system described above, and on the other hand, by the high level of ecological awareness and knowledge on the environment (e.g. eco-architecture; management of local eco-systems).

In social terms, the DOSs is focused on individualistic solutions, (e.g. local production based on the single household level; high involvement with belongings like personal clothes); but a certain collective dimension may emerge from a focalisation on local systems, (e.g. regional food co-operatives, short distribution chains, convergence of life-styles based on the same local resources)

Key concepts for the "high-care" household DOSs are:

- User social behaviour: search for individual care-demanding solutions. The quality of life, in this case, is intended as a personalised and localised habitat asking for attention and care, i.e. the time, the efforts and the attention needed for some results may be perceived as a positive aspect of our way of living.
- Technical system role: solutions are (mainly) based on "natural" materials and enabling tools: materials and tools whose main characteristic is to leave for user/consumer the skill (knowledge) and the responsibility (decision making) related to what has to be done (for a result).

3.3.4 CARE SOCIALISING

The "care socialising" DOSs are based on a certain level of community life, of collective resources, of sharing of products and services.

The household opens to different levels of collective spaces dedicated to the fulfilment of certain domestic functions together with other households from the neighbourhood, (e.g. cooking and eating together, helping each other taking care and repairing clothes).

Other collective places are also dedicated to collective forms of work, (e.g. participation in a clothing care centre providing the complement of human work necessary to the process in exchange to the access to the service for the cleaning of the personal clothes).

The values are focussed on the community favouring typical collective notions such as:

- "the efficiency of the group", (e.g. sharing/exchanging clothes allow intensification of use, less waste and cutting costs);
- the "feeling of belonging to a community", (e.g. sharing dinning table with neighbour; exchanging clothes...all with the symbolic value those actions involve); and,
- the "personal investment in the building and management of common resources", (e.g. "community work" complementary to "paid work" as source of structure and identity for individuals).

In terms of environment, the benefit of the "care-socialising" scenario is that scale of economies are possible between the level of local community and the present system based on the individual. A collective kitchen or a local centre for clothing care corresponds to a semi-industrial scale in terms of equipment and quantity processed.

Sharing of living areas, (e.g. collective dinning room, living room), sharing of appliances and products, (e.g. particular cooking tools; tableware for parties) allow the increase of the intensity of use. A common management of resources provides a higher level of professional efficiency (as a company would do) than spontaneous group behaviour.

The different function DOSs do not propose implementation strategies for the "care-socialising" scenario that is described starting from the initiative of a particular restricted adopter group, building its own model of community, according to its own motivation and sensitivity and that may, in a second period, expand and diffuse progressively.

The scenario shows particularly the benefits of the systematic inversion of individualistic values, promoting a collective dynamic, opening of personal property, animation of a neighbourhood life, local organisation of events, proximity of generations etc.

Strong differences are mentioned with extremist and exclusive forms of community. The DOSs insist on notions, such as:

- "chosen community", (e.g. collective living spaces don't exclude the existence of private home);
- "flexible community", (e.g. the neighbourhood food and eat centre favour collective cooking and eating together but allow less implication in the group offering take-away and home delivery);
- "aided community", (e.g. a "headmaster" pays attention to the management of common resources; textile experts take care of the clothing care centre; private money such as LETS-like units allow to assess and exchange personal contribution to the community, special measure systems like "wear-value" rationalise the use of clothes in exchange systems).

The resulting atmosphere pictures a living and creative community with strong bounds where collective value provide identity to individuals.

More than the previous notions of "chosen/flexible/aided community", the scenario differs from classical vision of communities by the technical system it rely on. Building a community is not first the constitution of a work force: sophisticated machines assure the cleaning process in clothing care centres and food is partly processed leaving to the community the easy task of assembling pre-prepared dishes. Thus, the "care-socialising" scenario proposes the social benefit of community with the reduction of constraints to the collective management of resources, and looking thus like a local small locally self-managed company.

Key concepts for the "care socialising" household DOSs are:

- User social behaviour: search for collective care-demanding solutions. The quality of life, in this case, is given by the necessity/opportunity to share some caring activities, i.e. the necessity to share the required efforts and, at the same time, an opportunity to make it the ground for new forms of socialisation.
- Technical system role: results are (mainly) based on community enabling tools, such as socio-technical systems whose main characteristic is to enable communities to organise

themselves; and, managing (at the best) the efforts, the knowledge and the responsibility that are needed for a result.

3.3.5 SOFT CARE

A fifth cluster, less focalised and less rich in DOSs than the four former ones, describes a household DOS characterised both by a high attention/implication of the household members in the fulfilment of the domestic tasks and a highly sophisticated system assisting them in these tasks.

Clothing care is fulfilled as a succession of small interventions over the week, (e.g. ventilation of bad smell; soft low temperature cleaning; use of local stain remover), through a full range of dedicated appliances. Part of the food comes from local production in a high-tech greenhouse proposed as an evolution of the house garden. Short cuts in the domestic heating is compensated by sophisticated heating clothes.

As already stated the 'soft care' function DOSs provide characteristic examples but are not exclusive of this cluster and thus, the description of this vision will be less complete than the other ones.

In environmental terms, the aim of the "soft care" DOSs are to create a synergy/cross-fertilisation between on one hand, a lifestyle more aware and careful for the environment and on the other hand, the implementation of a technical infrastructure maximising the sustainability of the household. The energy control system allow the among of energy used to be visualised at any moment by each of the separated appliances of the household providing a feed-back mechanism on the household members patterns and raising awareness on activities with higher environmental impacts. The daily care of clothes is done with the help of the technology allowing the extension of the period of use before thorough washing. The dirt monitoring system and the wearing control labels integrated in clothes allow objective individual judgement about a piece of clothing being clean or not and rationalise thorough washing.

Technical systems are thought to reinforce environmental friendly behaviours and also those new behaviours extend the sustainable performance of the technical systems.

Most of the DOSs from the Functions are presented as a complement to each other or existing processes:

- (e.g. wearable heating and cooling systems compensate the difference between the temperature in the household and the comfort you require;
- food locally produced in the garden complete the household consumption provided by other food systems;
- daily soft care of clothing extends time before a different system is used for deep cleaning).

In this sense their strategy of implementation emerge naturally as an extension of existing process or patterns:

- (e.g. the climatized wardrobe requires no more effort than a normal wardrobe where clothes have to be hung every night;
- the high-tech greenhouse turns hobby gardening into real production).

Household members are required to balance efforts between eco-performance and technical systems. The atmosphere of a "soft care" household appears

- to be a reinforcement of one aspect by the other resulting in a light (or soft) atmosphere characterised by values such as complete freedom and local determination by individuals (but balanced by an environment providing feed-back on consumption to incentive changes in life-styles), or;
- a sophisticated exciting high-tech environment (renewing the image of old sustainable patterns and habits such as home gardening to provide the household with fresh

products, detachable garments to wash only parts of clothes particularly exposed to dirt or put on one more piece of clothing when it is cold inside).

Soft-care household DOSs may be considered as an evolution of the High-care scenarios' key concepts towards the Easy-care' scenarios, or vice versa.

In the first case, it can be seen as a scenario characterised by a user social behaviour similar to the one of the High care scenario, but with a new, and improved, role of technology to face the demand of care (moving from enabling solutions towards relieving solutions).

In the second case, the scenario can be seen as presenting technology as a relieving factor similar to what happens in the Easy-care scenario, but it requires a new user social behaviour with a shift towards increased attention to contexts of use.

4. FEED-BACK FROM THE SUSHOUSE RESEARCH PROCESS

4.1 DOS methodology within the research

The methodological process indicated for Scenario Building brought to various interpretations and consequently differences in the results in terms of scenarios. The following series of remarks underlines the main points of heterogeneity met in the Sustainable Household research process in terms of DOS and discuss the feed-back from the various experiences.

4.1.1 "Design Orienting Scenarios" versus "Policy Orienting Scenarios"

DOS, literally "Design Orienting Scenario" differentiate from what could be called "Policy Orienting Scenario" in the sense that they are based on concrete proposals (solutions in terms of product and/or services) and not on policy making (new rules, legislation, taxation...). In that sense, normative aspects such as taxes, legislation... are not part of the scenario but of the context (hypothesis that may vary to assess the sensitivity of scenario).

This distinction was not clear in most of the various DOSs built within the SusHouse research. Some DOS proposed policy changes as Proposals within the GSP proposition or states a posteriori about the nature of the scenario obtained (whether DOS, POS or mix in between). But the most common position shared among researchers was to consider POS as complementary conditions that facilitate the implementation of the DOS and indicate policy measures within the scenario.

This last resulting statement is not far from the initial proposed methodology: a DOS assessment may change according to variations of its context and especially of its policy context. It is to be noted that a phase of "context variation" was proposed in the early versions of the Scenario Building format and finally abandoned:

"[...] Sensitivity to variations of the context of the scenario retained after the various assessment should be investigated. Different hypothesis concerning 'independent variables' should be tried to determinate if the different scenarios would reinforce / weaken in particular contexts such as:

- *variations in energy and rough material costs;*
- *constrains and incentives in the legislation; and,*
- *other infrastructural aspects (to be discussed)..."* (Manzini & Jégou / Sept. 1999).

This last step of the methodology of "testing" the validity of each DOS according context variations may have helped to keep a clear distinction between DOS and POS but still considering the possible effects of policy measures on the various scenarios.

4.1.2 Scenarios versus "social fiction"

DOS are grounded on the proposals: they result from the effects the implementation of these proposals may have on the whole system and on the macro-trends themselves, possibly shifting some of them. In that sense, it is hardly possible to suppose a priori a general trend (such as the "abolition of fashion" "shift to community living/co-housing") if it is not a direct consequence of the implementation of the DOS.

In other words, most of the changes described (economical consequences, social shifts...) should not be presented in a radical way ("this category of stakeholders will totally disappear", "people are not interested anymore in fashion"...) giving a generic pattern. The scenario gains in credibility if it keeps to hypothetical forms: stakeholders in this field will tend to... ; to be implemented, this scenario is targeted at particular social groups with a high degree of community living... etc...

4.1.3 Scenario as a concrete expression of a theoretical central idea based on a strategy

A scenario is not intended as a set of solutions that one particular person is relying on in the daily life (from the "spoon to the city") but a coherent set of solutions unified by the same spirit (based on the "strategy" focalised to aggregate the GSP) that different users may implement in their life in various modes (i.e. relying exclusively to the solution of one scenario or combining solutions of various scenarios). In that sense, scenarios that group very different spirits should have been split (such as out-sourcing for outer-ware versus disposable for underwear; durable owned clothes for adults versus community pools for kids; easy-care automatic appliances versus clothes in elements requiring user participation...).

SusHouse experiences reported about the difficulties in handling such "mono-oriented" scenarios, especially mentioned in the "Second Workshop" and the "Consumer acceptance" was the tendency among stakeholders to mix the various scenarios. The methodological position was the difference between what could be called the "concept of the DOS" (contained in the GSP proposition and especially in the core Strategy on which it is based) and the formalised or "developed" DOS (showing a Vision of the effect from the implementation of the DOS on the initial context). The initial intention was to keep a clear distinction between the theoretical orientation of the scenarios and the complex implementation they may have in the concrete "daily" context. This was decided so that afterwards conclusions would be drawn from the assessment of the pragmatic implementation of the scenario towards the conceptual direction (and the type of reconfiguration of the system it relates to) orienting this scenario, its validity and practicality to achieve the initial goal of sustainability.

The particular issues of a "pragmatic expression of the DOS concept", which, is to say a visualisation of its implementation that represents a realistic view to the observer (consumer or stakeholder) and, at the same time, is typical from the initial concept of the scenario should be further investigated and better defined in the methodology.

4.1.4 The "resolution" of the "project" dimension of a DOS

Some scenarios are much more developed than others especially in the description of the proposals making it difficult to picture them and to make comparisons. The consequence is that short scenarios lack coherence when more developed ones have been justified and every point solved.

In that sense, it is particularly difficult to evaluate new products relating to technologies when just described in a sentence. Some "smart" machines making, in a "smart" way, "smart" environmental results... make scenarios look like science fiction.

4.1.5 Complementary versus substitutive proposals

Some scenarios describe a set of proposals that should be implemented together ("Climatised wardrobe" and "Dirt detector" and "Clothing tanks" are proposed as complementary proposal for the "Soft caring" DOS). Other scenarios describe proposals as different implementations of the same core idea ("Clothary" or "Clothing portfolio" or "Wardrobe leasing" are proposed as substitutive proposal of "Clothing outsourcing" DOS).

Both propositions are acceptable although they belong to two different levels of description of the DOS (the former is a more detailed approach than the later). Substitutive proposals tend to picture variations in the same DOS and complementary proposals tend to go deeper in the elaboration of the scenario keeping the focus of the DOS.

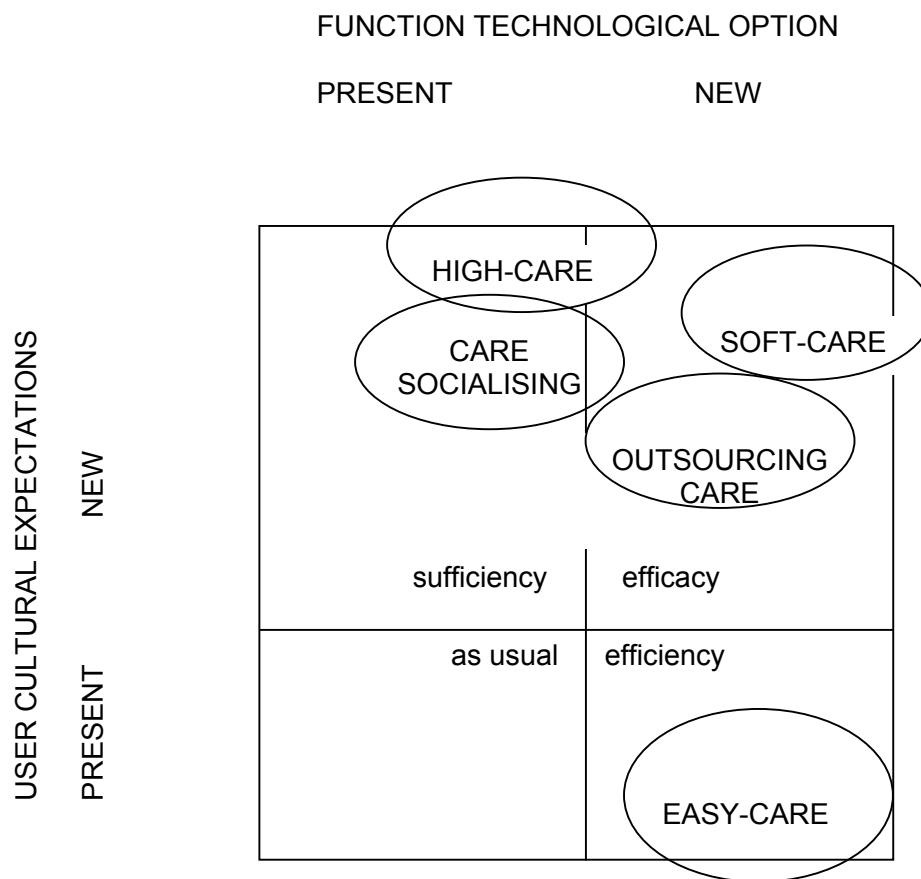
4.1.6 Transversal characteristics of a scenario

A scenario is a scenario in how it differs from other scenarios. This apparently banal consideration means that anything that is not specific to the scenario (such as ideas, solutions, and declinations... that can also be implemented in other scenario) does not help to characterise the core essence of that scenario. These propositions/solutions could be considered as "transversal" and are implemented as a core of a certain scenario (organic agriculture, clean-friendly fabrics, green clothing care technology...) where they are given for granted in other scenarios

4.2 Feed-back on the strategies towards sustainability

The core hypothesis of the research sets sustainability as goal to reach through a combined approach of more or less important changes both in terms of social demand on domestic functions and technical system involved to fulfil them. The level of change involved in the five household DOSs can be reported and positioned schematically on the chart in figure 8.

Figure 8: Techno-cultural chart:



- The “as usual’ area represent the present situation both in terms of technology available and user expectations.
- The area of ‘efficiency’ describes a situation combining the present user expectations with the best available technological improvements in terms of the environment.
- The area of ‘sufficiency’ describes a situation combining current technology with acceptable changes in common user expectations.
- The area of ‘efficacy’ describes a situation where both technological alternatives and cultural changes could be considered.

Most of the household DOS are situated near the area of "Efficacy" where both technological alternatives and cultural changes could be considered. This area of "Efficacy" also describe the field of maximum practicality for scenarios to be implemented showing a certain balanced in term of level o innovation required from both technological and socio-cultural aspect. The following section discusses the theoretical realism and main implementation barriers for each of the macro household DOSs obtained.

4.2.1 EASY-CARE

In the perspective of sustainability, this is a highly current and highly techno-optimistic scenario.

This scenario is current because it is based on the linear evolution of two on-going main trends:

- The trend towards higher levels of individuality, intended as the possibility of organising your life without efforts and without depending on anybody else.

- The trend towards innovative care-free products, intended to relieve the user from help from others (experts or not) and, at the same time, the products are attention free, and don't ask for capability and physical effort to the user.

This scenario is techno-optimistic because it assumes the possibility to solve all the environmental problems generated from the on-going way of living (whose main attitudes and behaviours, as we have seen, will not change) through some technological improvement.

4.2.2 CARE-OUTSOURCING

In the perspective of sustainability, this scenario is partially current and partially innovative. This scenario is partially current because:

- It is based on the evolution of an on-going trend towards a “full-service approach” in business, i.e., to offer an integrated system of products and services (a socio-technical system) whose goal is to relieve users from any effort in getting what they want.
- It is coherent with major trends towards the “marketisation” of everyday life; i.e. towards an increasing role of producer-client relationships (in the framework of the market economy) to solve problems that once were solved in other ways (by yourself or in the framework of the “economy of the gift”).
- It assumes the possibility to solve all the environmental problems generate by the on-going way of living, through some techno-economical improvement, i.e. searching for economy of scale and leaving the responsibility to experts.

This scenario is partially innovative because it is based on a (relatively) new idea of individual freedom: freedom is intended as the possibility to “have access” to whatever we want, i.e. to do what we want, without the burden of owning anything.

4.2.3 HIGH-CARE

In the perspective of sustainability, this scenario is partially current and partially highly socio-optimistic.

This scenario is current because it is based on the linear evolution of the well-established cultural attitude (a kind of traditional counter-trend) that individuality is freedom “to live by yourself with the nature” (making some efforts, but not depending on anybody).

This scenario is socio-optimistic because it assumes the possibility to solve all the environmental problems by changing behaviours and shifting consumption towards more “green & local” products.

4.2.4 CARE-SOCIALISING

In the perspective of sustainability, this is a highly socio-optimistic scenario.

This scenario is socio-optimistic because it assumes the possibility to solve the environmental problems by changing human behaviour and shifting people’s attitude towards the ideas of caring, sharing and socialising.

4.2.5 SOFT-CARE

In the perspective of sustainability, this is a moderately socio and techno-optimistic scenario. This scenario is moderately socio-optimistic because it assumes the possibility to solve

environmental problems by changing human behaviours (towards an attitude of taking care for things). But at the same time, it assumes that this change will be helped by new (and appropriate) technological solutions.

This scenario is moderately techno-optimistic because it assumes that new and positive technological solutions will exist, but at the same time, it assumes householders' sustainability will be the result of their integration with new (social and individual) behaviours.

Most practical DOSs seem to be the ones belonging to the area of efficacy, which is to say they rely on a balanced change both in terms of "user cultural expectation" and "function technological option" showing two inverse dynamic between the two dimensions:

- "sufficiency with help", which is to say a scenario proposing a cultural change but "helping" users acceptance through the implementation of new technological options; or,
- "efficiency with evolution", which is to say a scenario based on new technological options allowing users to evolve in their expectations.

5. CONCLUSION IN TERMS OF SCENARIO BUILDING

As a conclusion and on the basis of the methodology experimented during the SusHouse research, this last part will tend to formulate recommendations for further scenario building both in terms of process to be followed and finalities of this type of approach.

5.1 Motivations for scenario building

Scenario building refers to consolidated methodologies aimed at supporting decision making. The more a given context is turbulent, the targeted system is complex and the actors involved (or to be involved) are numerous, the more scenario building is useful. In fact, the more the number of elements in the system, the more the elements are interdependent and the uncertainty and rate of change of the context increases and, the more it is difficult to produce intuitively an accurate model of the reality to refer to and to support action. The more actors who should participate in decision making / project building process (and especially when the given context and targeted system are complex) the more it is difficult to create the field, the "interaction plate-form", in which this process may occur.

In this kind of situation, scenario building is a tool that through the methodology allows the limits of single intuition to be overcome and the improvement of the capability to make consistent choices and to justify them. Within that framework, "Design Orienting Scenario" are a particular category of scenarios based on the implementation of new solutions in terms of products or services. Their main purpose is to aggregate stakeholders and trigger system innovation between them. In that sense, they differ from the main range of scenarios that traditionally support policy decision making and aims at orienting the future of large socio-economic and/or socio-technic systems.

5.2 Recommendation for a DOS building process

The results of DOS methodology is the production of shared visions between a plurality of actors and the triggering of implementation of new interaction platforms among them. To aim for these goals, the approach tends to orient and stimulate project activity of the actors in the frame of a large and coherent system innovation.

5.2.1 Intention and system

The first phase aims at explaining and clarifying the initial intention that motivate the exercise and, starting from that intention, define the focus system. Main steps are:

- the formulation of the initial intention in short and concrete terms such as the hypothesis of a "sustainable household" was set for this research;
- the shaping of the system, which is to say the selection of the key element that should be taken into consideration according to the initial intention; and,
- the accurate description of the focused system in the sense of the knowledge necessary to operate in the system: what is the nature of its constitutive elements? what are the present roles and future intentions of the actors? what macro and emerging trends may affect the context in which the system is located? etc...

The result of this first part must be a "manageable" system shaped on the initial intention on a defined horizon of time. The first key idea is to find the right focus in setting the boundaries: not too close to be able to consider alternatives to the current situation and not too broad to keep the focus on significant elements for the intention. The chosen system for scenario building within this research was both enlarged from "internal variables" defining the strict household organisation to "external variables" including the near environment that interfere in the fulfilment of the functions, and limited to exclude "independent variables" that even affecting the household sustainability, were considered as the context.

The second key-idea is to picture the system not as it is now but as it may appear at a particular horizon of time. The careful definition of this horizon is particularly important to set a time framework coherent with the variables (exactly, with the amplitude of variation to be taken into consideration). In the SusHouse framework, this time horizon was implicitly set through consideration in terms of cultural flexibility and technological perspectives (an horizon far enough in terms of cultural change to consider the diffusion of early adopter group behaviour and not too far taking into consideration consistent technology to be able to make reliable assessment). It should be noted that this horizon of 15 to 20 years considered for scenario toward sustainability is different from the 2050 hypothesis set by the SusHouse framework for consistent results in terms of sustainability achieved by the implementation of these scenarios.

5.2.2 Working model

The second phase aims at selecting the relevant factors to take into consideration the fulfilment of the initial intention and explore in a creative way how they may recombine. Main steps are:

- The review of determinant factors that either may interfere with the intention (such as existing trends in line or contrary to the intention) or key-element of the system on which it will be advisable to play in order to fulfil the intention (such as new technological potentialities or shift in actors expectations).
- Expression of the polarities between which these key-factors may vary to fulfil the intention.
- The selection of the main significant polarities and their combination in order to trigger the exploration of new configuration of the system.

The result of this part is one or more two by two matrices. Each matrix presents four areas of potential reconfiguration of the system according to the initial intention. This combination of relevant polarities is intended as both a deductive and an inductive approach to aggregate stakeholders along a creative process. The approach is "deductive" in the sense that the areas of "potential system reconfiguration" are elaborated in a structured process (through a systemic approach starting from the initial intention) and based on shared information (consideration on trends and evolutions that may be collectively discussed). It is also "inductive" in the sense that the cross-fertilisation of the selected polarities opens new area that may trigger creativity of potential stakeholders.

In the process set by the SusHouse research primary layout, the overlap between the "Stakeholder workshop" and "Scenario building" tends to hide the effective meaning of cross-combination of polarities as a tool for concept generation and stakeholder convergence.

5.2.3 Clusterisation of DOS

This third phase aims is to structure the result of the previous phase, first in terms of identifying the nature of the outputs and second in aggregating them into scenario concepts. Main steps are:

- the classification of the each creative issue as "goals", "strategies" or "proposals";
- the articulation of complete "GSP" propositions; and,
- the clusterisation of the "GSP" propositions based on the same strategy.

The results are a series of consistent proposals, answering various goals in line with the initial intention of sustainability and linked by the same core strategy: these articulated GSPs are the basic elements constitutive of a DOS. This process of structuring heterogeneous ideas into scenarios was in line with the initial methodology.

5.2.4 Formalisation of the DOS

This last phase aims at presenting the DOS in an appropriate way for communication. This process of formalisation should give the DOS enough consistence to assess their pertinence in terms of environment, their impact on the economy or their acceptability among users and, at the same time visualise concretely their implications for possible adopter groups and/or potential stakeholders. Main elements of formalisation of a DOS are:

- a series of "solutions" in terms of products or services which implementation is in line with the initial intention of the research;
- a "vision" of the focused system resulting from the implementation of the previous solution in the context; and,
- a series of particular "characteristics" of the scenario showing its pertinence and/or impact in different socio-cultural, economical, environmental, technological... dimensions.

The result is the passage from a theoretical concept scenario (the GSP proposition) to a visualisation of how the focus system (i.e. the household and its environment) would look like if this particular scenario hypothesis was adopted, properly developed and diffuses for a certain time in the society. This visualisation is then the anticipation of the effects of the scenario on its context. Two remarks could then be drawn:

1. This visualisation process is not a simple illustration (whether a story or a picture...) of the scenario but the simulation of its implementation, which is to say a process of resolution of projects, maturation of the solutions and review of their possible implication. This question of the construction of the visualisation is necessary to assess particular impacts of the scenario (such as in this research the "Environmental assessment") or to further describe particular effects of the scenario (such as in this research in the "Economical assessment").
2. The visualisation is not the result of any kind of implementation of the scenario but the most typical representation of the initial core idea of the scenario (archetype of the scenario). This question of the typicality of the visualisation is necessary to trigger reaction from involved actors (such as in this research in the "Consumers acceptance" as well as in the "Stakeholders involvement") and draw recommendations on the practicability of the initial area of reconfiguration of the system.

5.3 Remarks

The DOS methodology is based on a precise definition of the purpose of the study (the focused system) and on the interaction between a "deductive approach" and an "inductive approach" of the problem. More precisely:

- the definition of the focused system and its context is aimed at creating a common language and references between the group of actors involved;
- the deductive approach allows the implement of the "potential system configuration" and to discuss collectively its most probable evolution; and,
- the inductive approach allows the combination of a free and single creation of new proposals with their collective discussion and assessment;

DOS is a tool to orient and incentive projects. In fact:

- it's a system to better assess the alternatives: scenarios allow to better understand the complex panorama of alternatives and opportunities;
- it's a system to stimulate creativity: construction of the scenarios show the non-evident, non-intuitive aspects of the problem from which it is possible to imagine new solutions ;
- it's a system to legitimate choices because it refers to clear explanations of the hypothesis on which proposals are based.

DOS is particularly interesting when the focused system is complex and actors involved are numerous. In fact:

- Its deductive and systemic dimension allow to overcome the limits of the single interpretation of events and bring to build an "interaction plate-form" between the various actors of the process (which is to say to a common language and a shared system of references).
- Its capability to generate shared visions favours the convergence between actors various points of view and consequently, triggers development of shared project and organisations

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