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How to increase happiness and support sustainable consumption? – A checklist for evaluation and design

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0. Overview

This paper provides a checklist that can be used for both: evaluating activities and products or invent, design and improve new activities, services and products. Section 1 provides a short review on needs, satisfiers and economic goods. Section 2 then builts on this review to show the relationship between programs to enhance happiness and satisfying human needs. In an influence matrix, one of the tools of Vesters' systems analysis toolbox, we also look into active and buffering factors within the system in order to give hints where trade-offs can be made and where not. In Section 3 we propose a procedure that can be used for evaluating and designing products and services that support sustainable consumption by fulfilling basic needs, enhancing happiness, reducing rebound effects, and coming up with as low as possible environmental impacts. Although the used underlying theories and methods are well established and empirically tested this new way of combination is at this stage conceptual.

1. Sustainable consumption needs to meet needs

Both, the sufficiency and the efficiency path within sustainable consumption focus somehow on needs. The sufficiency approach stresses individuals to focus more on their basic needs and prioritize consumption. This implicitly suggests that there may be consumption that is not contributing to satisfying needs and/or that there is a distinction between basic needs *versus* nice to have needs. The efficiency approach attempts to provide a given demand for services and products at a lower level of resource consumption. However, when we define the observed demand in this efficiency paradigm we may do so on the level of established products, e.g., blue toothbrushes, or at the level of service, e.g., cleaning teethes, or probably even at the level of more basic needs such as maintaining healthy teeth and avoiding smells that conflict with other basic needs.

This means that design for sustainable consumption needs in any case to have a clear concept of basic needs that seek satisfaction. This is also at the heart of the acceptability of such sustainable activities and contributes - in the case of economic goods - to the market success.

The most famous compilation of needs was probably published by Maslow (1970). Table 1-1 does reproduce the five basic needs that have been arranged in a hierarchy. This hierarchy has stimulated much academic discussion and one can at least summarize that the hierarchy is not universally accepted by scholars. While it is widely accepted that physiological needs did not only dominate in the stone-age but are also a necessary condition for human and any other life, there is little agreement on the hierarchy of the remaining needs. Individual and cultural variability on the remaining needs is much higher. This has also much to do with actual living conditions that are very different for different places, socio-economic groups, and spiritual orientations.

Table 1-1: Maslow's hierarchy of needs (Maslow 1970)

level	description	examples
5	Self-Actualization	Fulfillment of one's potential, being true to one's nature
4	Esteem	Achievement, independence, self-esteem, esteem of others etc.
3	Social	Giving affection and receiving affection from others etc.
2	Safety	Security and protection from physical risk etc.
1	Physiological	hunger, thirst, oxygen, warmth etc.

These different starting points of different individuals, regions, countries and cultures have been explicitly a concern when Max-Neef (1991) published on the *human scale development*.

He developed a matrix that spans nine basic needs and four existential categories. The matrix was suggested as a regional planning tool where stakeholder groups would fill in together the cells. In a first step they would look into what factors prevent the fulfilling of the basic needs. In a second step they would then fill-in their views on what would satisfy the basic needs best. Table 1-2 displays the positive matrix provided by Max-Neef. His original version does not include "Transcendence" because he considered this need not to be universal in the 1980s. However, he envisages that it may well do so in future. Considering that our work focuses on the highly developed world and that 20 years have passed since the creation of the matrix, we suggest adding this tenth basic need. However, we agree that this need is still not universal today.

Max-Neef (1991) makes a clear distinction between basic needs, its satisfiers, and economic goods. This is also helpful for our purpose. We see the satisfiers as an abstraction level between basic needs and economic goods. The level of satisfiers is probably most suited to serve as a level where different services[1] can be measured and compared.

Table 1-2: A categorisation of need satisfiers according to Max-Neef (1991/2). Along the rows, ten basic needs are listed. Along the columns, four existential categories are ordered. The cells indicate a variety of need satisfiers.

	Being	**Having**	**Doing**	**Interacting**
Sub-sistence	Physical health, mental health, equilibrium, sense of humour, adaptability	Food, shelter, work	Feed, procreate, rest, work	Living environment, social setting
Protection	Care, adaptability, autonomy, equilibrium, solidarity	Insurance systems, savings, social security, health systems, rights, family, work	Co-operate, prevent, plan, take care of, cure, help	Living space, social environment, dwelling
Affection	Self-esteem, solidarity, respect, tolerance, generosity, receptiveness, passion, determination, sensuality, sense of humour	Friendships, family, partnerships, relationships with nature	Make love, caress, express emotions, share, take care of, cultivate, appreciate	Privacy, intimacy, home, spaces of togetherness
Under-standing	Critical conscience, receptiveness, curiosity, astonishment, discipline, intuition, rationality	Literature, teachers, method, educational policies, communication policies	Investigate, study, experiment, educate, analyse, meditate	Settings of formative interaction, schools, universities, academies, groups, communities, family
Participation	Adaptability, receptiveness, solidarity, willingness, determination, dedication, respect, passion, sense of humour	Rights, responsibilities, duties, privileges, work	Become affiliated, co-operate, propose, share, dissent, obey, interact, agree on, express opinions	Settings of participative interactions, parties, associations, churches, communities, neighbourhoods, family

[1] We will use the terms services and products interchangeably, observing that most products can also be described as service and that providing services can as well be seen as products.

Leisure/ Idleness	Curiosity, receptiveness, imagination, recklessness, sense of humour, tranquillity, sensuality	Games, spectacles, clubs, parties, peace of mind	Day-dream, brood, dream, recall old times, give way to fantasies, remember, relax, have fun, play	Privacy, intimacy, spaces of closeness, free-time, surroundings, landscapes
Creation	Passion, determination, intuition, imagination, boldness, rationality, autonomy, inventiveness, curiosity	Abilities, skills, method, work	Work, invent, build, design, compose, interpret	Productive and feedback settings, workshops, cultural groups, audiences, spaces for expression, temporal freedom
Identity	Sense of belonging, consistency, differentiation, self-esteem, assertiveness	Symbols, language, religions, habits, customs, reference groups, sexuality, values, norms, historical memory, work	Commit oneself, integrate oneself, confront, decide on, get to know oneself, recognise oneself, actualise oneself, grow	Social rhythms, everyday settings, settings which one belongs to, maturation stages
Freedom	Autonomy, self-esteem, determination, passion, assertiveness, open-mindedness, boldness, rebelliousness, tolerance	Equal rights	Dissent, choose, be different from, run risks, develop awareness, commit oneself, disobey	Temporal/spatial plasticity
Transcendence				

In section 2 we will also see how these satisfiers link to factors that have been identified as happiness enhancers (Madjar & Hofstetter 2004b). Max Neef (1991) introduced a classification of different types of satisfiers. This classification already suggests that some satisfiers may be more desirable than others. Norris (2004) summarizes as follows:

1: *Violators and destructors*: these supposedly satisfy a given need (usually protection) but in fact often annihilate the possibility of satisfying this need and impair the satisfaction of other needs. For example, a strong governmental bureaucracy aims to offer protection for unfair treatment, but frequently people are treated unfair by lengthy bureaucratic procedures. Also other needs are annihilated by strong bureaucratic procedures. For example, strong bureaucratic procedures may impair people's understanding of the decision making process, may incite the feeling of being treated as a number, and may impair people's freedom by capturing them in procedures and rules.

2: *Pseudo-satisfiers* stimulate a false sensation of satisfying a certain need, but they may in fact impair the fulfilment of that need. For example, status symbols may be used to fulfil the need for identity, but a preoccupation with the acquisition of status symbols (e.g., expensive brands of clothing) may actually impair the satisfaction of one's identity needs.

3: *Inhibiting satisfiers* may satisfy one need, but inhibit other needs in the process. For example, obsessive economic competitiveness may satisfy the need for (economic) freedom, thereby yielding a larger material prosperity. However, this may be attained at the cost of, e.g., the time spent with family and friends (affection), the quality of the environment (subsistence), and time to relax and enjoy oneself (leisure/idleness).

4: *Singular satisfiers* satisfy one need without interfering with other needs. For example, insurance systems satisfy the need for protection against the financial consequences of, e.g., illness, accidents and burglary without inhibiting the satisfaction of other needs.

5: *Synergic satisfiers* satisfy a certain need, and they simultaneously stimulate and contribute to the satisfaction of other needs. For example, popular education spreads knowledge that satisfies people's need for understanding, but it also helps people to strive towards better living conditions (protection), to enhance their influence on social decision processes (participation) and their self-confidence (identity).

This last category of synergetic satisfiers is probably the most welcome one when we think about sustainable consumption that satisfies the needs of individuals in a maximal way at minimal demand for material-intense economic goods (Table 1-3). For two reasons it may be essential to look closer into synergetic satisfiers:

1. Satisfiers for the need of subsistence, i.e., those satisfiers that are considered to be the most basic ones, are in affluent societies often linked to other needs. Food is not just a way to get nourish and stay healthy. It is also a way to create identity within the natural food or fast food communities or to show solidarity when sticking to fair trade shops. Shelter becomes the place of creation, leisure, but also identity.
2. Economic goods often look at different satisfiers for different needs in order to enlarge the market place and make goods attractive to more individuals. Therefore, truly successful products satisfy a wide variety of individuals with different needs. The fact that "good" advertisement usually focuses on one satisfier alone supports the assertion made by Max-Neef (1991) that pseudo-satisfiers are those that only disseminate with active propaganda.

Table 1-3: Synergic Satisfiers that provide satisfactions of several needs at the same time (Max-Neef 1991)

Satisfier	**Need**	**Needs, the satisfaction of which it stimulates**
Breast-feeding	Subsistence	Protection, affection, identity
Self-managed production	Subsistence	Understanding, participation, creation, identity, freedom
Popular education	Understanding	Protection, participation, creation, identity, freedom
Democratic community organizations	Participation	Protection, affection, leisure, creation, identity, freedom
Barefoot medicine	Protection	Subsistence, understanding, participation
Barefoot banking	Protection	Subsistence, participation, creation, freedom
Democratic trade unions	Protetion	Understanding, participation, identity
Direct democracy	Participation	Protection, understanding, identity, freedom
Educational games	Leisure	Understanding, creation
Self-managed house building programs	Subsistence	Understanding, participation
Preventive medicine	Protection	Understanding, participation, subsistence
Meditation	Understanding	Leisure, creation, identity
Cultural television	Leisure	Understanding

We learn from this introduction that activities and economic goods for sustainable consumption should be designed in a way that they serve as a set of satisfiers for different basic needs. In addition, the activities and goods need to be designed for low environmental impacts and positive social and economic contributions. This will help to maximize need satisfaction with a minimal number of satisfiers and environmental impacts. Whether and how this would also make people happier is discussed in the next section.

2. Satisfying basic needs and enhancing happiness – a contradiction?

2.1 Factors that enhance happiness and their interdependencies

All aspects from the happiness enhancing programs as well as happiness enhancing activities collected in Madjar & Hofstetter (2004b) are listed in Table 2-1. Similar activities will be merged together and some of the aspects found will not be used for further analysis in order to reduce the number of variables for sustainable activities that enhance happiness (a "Y" in the second column means that this variable will be used either by combining it with other variables or by using it as a single variable, a "N" means that the variable will not be retained, an explanation about the "why not" is then given).

Table 2-1: How to become happier (master-list of the different happiness enhancing aspects/activities from Madjar & Hofstetter 2004b)

No	Summary of happiness enhancing activities	Acceptance for further analysis (if not accepted, explanation why not)	Short form	Column in Table 2-2
1	keep busy and be more active, exercise regularly (mental and physical activity)	Y	keep busy and active	A
2	spend more time socializing with family and friends, making new friends and creating networks	Y	become an outgoing social personality creating network	B
3	be productive at meaningful work, seek work that engages your skills	Y	meaningful work that engages your skills	C
4	seek leisure that engages your skills, look for new hobbies, sports	Y	skill engaging leisure activities	H
5	get better organized and plan things out	Y	Take control of your life, get organized	N
6	stop worrying, eliminate negative feelings and thinking	Y (will be integrated in No. 8)	See No. 8	E
7	lower your expectations and aspirations	Y	lower expectations & aspirations	D
8	develop positive, optimistic thinking, transform negative thinking into positive thinking	Y	positive, optimistic thinking for present and future	E
9	become present oriented, be in the moment	Y	become present oriented	F
10	work on a healthy personality (healthy food, enough sleep, enough physical movements)	Y	healthy personality (food, sleep, movements)	G
11	develop an outgoing social personality,	Y (will be integrated in No. 2)	see No. 2	B
12	be open for new experiences and for changes in believes	Y	be open for new experiences / changes in believes	V
13	be yourself	Y	be yourself	I
14	give priority to close relationships	Y	prioritize close relationships	J
15	put happiness as your most important priority, act happily, meditate on the good things in life	Y	prioritize happiness, act happily	R
16	be grateful	Y	be grateful	S
17	focus beyond self	Y	focus beyond self	L
18	nurture your spiritual (religious) self	Y	nurture spiritual (religious) self	K
19	don't equate happiness with money	Y	don't equate happiness with money	M
20	take control of your life, set yourself achievable and important (non-materialistic) goals	Y (first part will be integrated in N)	set achievable important non-materialistic goals	U
21	transform unlucky events into lucky events by preventing actively unlucky situations	N (not clear how to perform)	-	-
22	follow the lucky inspirations by listening to the inner voice/ supporting the own intuition	Y (will be integrated in No. 13)	see No. 13	I
23	count with a lucky future by expecting that • luck will also be there in future time	Y (first part will be integrated in No. 8, second part will be	see No. 2, 8 and 14	B E

	• the interactions with others will be positive	integrated in No. 2 and No. 14)		J
24	enhance your self-esteem	Y	Enhance self-esteem	O
25	transcend happiness	Y (will be integrated in No. 18)	see No. 18	K
26	Have sex (preferably with someone you love)	Y	have sex with a person you love	Q
27	read books	N (is a sub-activity of leisure)	-	-
28	engage in volunteer work (social work)	Y (will be integrated in No. 17)	see No. 17	L
29	give love a high value in life	Y	give love a high value in life	T
30	act extraverted	Y	act extraverted	P
31	be (act) autotelic	Y (will be integrated in No. 20, we focus hereby on non-materialistic goals as this serves more for sustainable consumption)	see No. 20	U
32	recent holiday trip	N (is regarding sustainable consumption not preferable)	-	-
33	Passive involvement in sports	N (is part of leisure activities)	-	-
34	Mental work (games etc.)	N (is part of leisure activities)	-	-

In a further step the interdependencies of the variables are analyzed using the influence matrix (so called “paper computer”) from Vester (2000). Vester created this tool in 1970 as working utility for cross-linked thinking to assess complex systems. It aims to provide a broader view about a system and the interaction of the variables by visualizing these interactions and the roles of the different variables within the system. The “paper computer” is only one tool in the sensitivity model of Vester. With the sensitivity tool a complete system can be analyzed by visualizing the influence of changes in the variables on the whole system. Therefore, additional to the “paper computer” further tools are needed for a complete systems analysis. The sensitivity model has been used to assess systems like company structures, communities, eco-systems etc. As we do not want to simulate a complex system but only want to visualize the interactions of our variables we are only using the “paper computer” tool. From Table 2-1 we extract the variables we will use for this analysis (see Table 2-2).

For each variable in Table 2-2 we analyze the effect on all other variables. The assessment will be done by using a classification from zero to three (zero = no effect from variable x on variable y, 1 = weak effect from x on y, 2 = medium effect from x on y and 3 = strong effect from x on y). This assessment has been made line by line (see Table 2-3). For example, in Table 2-3 the variable “keeping busy and active” was assessed to have a medium effect on the variable “being an outgoing social personality creating network” as keeping busy and active could lead to an outgoing social personality but it is not a must. Therefore, the field in row “A” and column “B” was assessed with the number “2”. The effect from the variable “keeping busy and active” on the variable “meaningful work that engages your skills” is weaker but still a certain effect is there, so the field in row “A” and column “C” was assessed with the number “1”. It has to be mentioned that the assessment is a subjective classification that resulted based on the assessments of the two authors only.

Table 2-2: Variables from Table 2-1 that will be used for further analysis

	Short form
A	keep busy and active
B	become an outgoing social personality creating networks
C	meaningful work that engages your skills
D	lower expectations & aspirations
E	positive, optimistic thinking for present and future
F	become present oriented
G	healthy personality (food, sleep, movements)
H	skill engaging leisure activities
I	be yourself
J	prioritize close relationships
K	nurture spiritual (religious) self
L	focus beyond self
M	don't equate happiness with money
N	Take control of your life, get organized
O	Enhance self-esteem
P	act extraverted
Q	have sex with a person you love
R	prioritize happiness, act happily
S	be grateful
T	give love a high value in life
U	set achievable important non-materialistic goals
V	be open for new experiences / changes in believes

After the whole matrix is filled, the elements are classified into "active elements", "passive elements", "critical elements" and "buffering elements" (Vester 2000). *Active elements* influence all other elements strongly and are weakly influences by the other elements. It is not easy to influence them within the system but if they are changed, they will have a sustainable influence on the analyzed system. *Reactive elements* act just the opposite way. They can serve as indicators for system changes but it is difficult to change them directly. *Critical elements* influence all other elements strongly and are strongly influenced by the other elements while *buffering elements* are weakly influenced by other elements and influence others also weakly (they act like a buffer). Critical elements are "critical" as by changing them the system could swing in an uncontrolled manner (Vester, undated). To classify the elements two calculations are needed:

1. "Q" is the active sum of a variable (AS) divided by the passive sum of a variable (PS) where "AS" is the sum of all numbers in a row and "PS" is the sum of all numbers in a column. The highest "Q"-value means that this is the most active element, lowest Q-value means that this is the most reactive element.
2. "P" is the multiplication of the active sum of a variable (AS) and the passive sum of a variable (PS). Highest "P"-value is the most critical element while lowest "P"-value is the most buffering element.

Table 2-3: Influence matrix by Vester (2000) applied to happiness enhancing factors from Table 2-2.

	System factors	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	AS	Q	Q*100
A	keep busy and active	0	2	1	0	1	1	2	1	1	1	0	0	0	1	2	1	0	0	0	0	0	1	15	0.83	83
B	become an outgoing social personality creating networks	3	0	0	0	2	2	0	1	1	2	0	2	0	1	2	3	0	0	1	1	0	1	22	1.29	129
C	meaningful work that engages your skills	1	1	0	2	1	1	0	1	2	1	1	2	3	1	2	0	0	1	1	0	1	1	23	1.44	144
D	lower expectations & aspirations	0	0	0	0	1	1	0	0	1	0	1	1	2	1	1	0	0	0	2	0	1	0	12	0.86	86
E	positive, optimistic thinking for present & future	0	1	1	1	0	0	1	0	2	1	1	1	0	2	2	0	0	2	1	1	0	1	18	0.78	78
F	become present oriented	0	1	0	2	1	0	0	1	3	1	1	1	1	3	1	0	0	0	1	1	0	1	19	0.90	90
G	healthy personality (food, sleep, movement)	2	0	0	0	0	1	0	0	1	0	1	0	0	2	2	0	1	0	1	0	0	1	12	1.50	150
H	skill engaging leisure activities	2	0	1	0	1	3	0	0	1	0	0	0	2	1	2	0	0	1	0	0	1	1	16	1.45	145
I	be yourself (personal growth)	0	0	0	1	1	2	0	0	0	0	1	1	1	1	3	0	0	0	1	1	1	1	15	0.48	48
J	give priority to close relationships	1	1	0	2	2	1	0	0	1	0	0	3	1	1	2	0	2	0	1	3	0	1	22	1.10	110
K	nurture spiritual (religious) self	0	1	1	1	1	1	1	0	1	1	0	3	1	1	1	0	0	0	3	2	0	2	21	1.50	150
L	focus beyond self	1	1	1	0	0	0	0	0	1	2	1	0	0	1	1	0	0	0	1	2	0	1	13	0.48	48
M	don't equate happiness with money	0	0	3	0	1	1	0	1	2	2	0	1	0	0	2	0	0	1	0	3	2	0	19	0.83	83
N	take control of your life, get organized	1	0	1	0	0	1	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0	1	8	0.36	36
O	enhance your self-esteem	1	1	0	0	2	0	0	1	3	1	0	2	1	2	0	2	1	0	0	0	1	1	19	0.63	63
P	act extraverted	3	3	0	0	1	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	1	12	1.50	150
Q	have sex with a person you love	0	0	0	0	1	2	1	0	1	2	0	1	1	0	1	0	0	1	0	2	0	1	14	1.75	175
R	prioritize happiness, act happily	0	1	3	1	3	2	1	2	2	1	0	1	1	1	1	1	2	0	1	1	1	1	27	2.45	245
S	be grateful (personal growth)	0	0	0	2	2	1	0	0	1	1	3	2	1	0	0	0	0	0	0	1	0	0	14	0.82	82
T	give love a high value in life	0	1	1	0	1	1	0	0	2	3	2	3	3	0	0	0	2	1	2	0	0	0	22	1.16	116
U	set achievable important non-materialistic goals	1	1	2	1	0	0	0	1	1	1	1	1	3	3	1	0	0	2	1	1	0	1	22	2.75	275
V	be open for new experiences / changes in believes	2	2	1	1	1	0	1	2	0	0	1	2	2	0	1	1	0	2	0	0	0	0	19	1.06	106
	PS	18	17	16	14	23	21	8	11	31	20	14	27	23	22	30	8	8	11	17	19	8	18			
	P	270	374	368	168	414	399	96	176	465	440	294	351	437	176	570	96	112	297	238	418	176	342			

In Figure 2-1 (P-values) and Figure 2-2 (Q-values) the classification of the variables will be visualized. The classification of the P-values (critical buffering) and the Q-values (active-reactive) will be done according to Table 2-4.

Table 2-4: Classification of P-values and Q-values (Vester, undated)

P-values (critical-buffering)			Q-values * 100 (active-reactive)	
highly critical	$> 2.5 * (n-1)^2$		highly active	> 225
critical	$1.71\text{-}2.5 * (n-1)^2$		active	161-225
slightly critical	$1.21\text{-}1.70 * (n-1)^2$		slightly active	131-160
neutral	$0.81\text{-}1.20 * (n-1)^2$		neutral	76-130
slightly buffering	$0.51\text{-}0.80 * (n-1)^2$		slightly reactive	63-75
buffering	$0.16\text{-}0.5 * (n-1)^2$		reactive	45-62
strongly buffering	$>0.16 * (n-1)^2$		Strongly reactive	<45

Figure 2-1 shows that none of the defined variables are critical or highly critical. The most critical element is “enhancing self-esteem”. This means that enhancing self esteem is the most highly linked variable in the system. It has a high effect on all other variables and will also be highly affected by all other variables, so it could be used as a “lever” in our system.

Next higher variables are the neutral elements “be yourself”, “don’t equate happiness with money”, “give priority to close relationship”, “give love a high value in life”, and “positive and optimistic thinking”. Although these elements are not critical, their interactions with the other variables are higher than the average and it is possible, that they could also be used as a “lever”.

“Healthy personality” and “act extraverted” are the most buffering elements in the system. By changing the system these elements will be more or less stable.

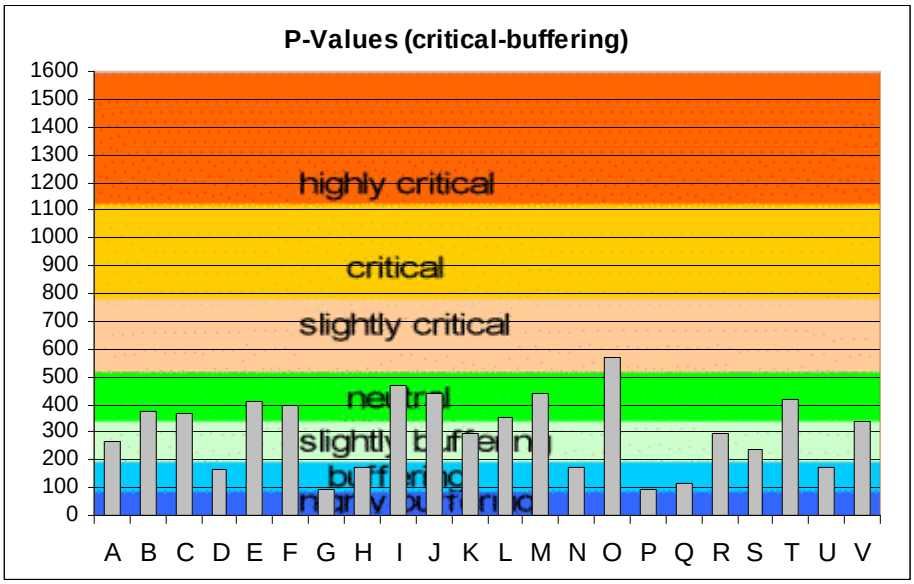

Figure 2-1: Classification of the P-values (critical-buffering)

For “enhance your self-esteem”, the most critical element, it can be seen that the active sum is 19 and the passive sum is 30. This means that the average scoring for this element is 0.9 (19points divided by 21 happiness enhancers) while the average scoring of the passive sum is 1.4. This shows that even for the most critical element in our system the impact from the other elements and the impacts on the other elements is below the arithmetical mean of 0,1,2,3.

Looking at the active and reactive elements (Figure 2-2) we see that there are two highly active elements: “set achievable important non-materialistic goals” and “prioritize happiness, act happily”. These elements are not influenced much by the other elements of the system and can therefore not be used as a “lever” within the system but if they could be changed, they have a big and sustainable influence on the other elements. As our “sustainable happiness system” (the elements we selected for this analysis) is influenced by other elements from outside (like further personal needs, knowledge, teaching, idol’s etc.) this means that also active elements could be changed (in opposite to a complete system modeling where it is difficult to change active elements). Therefore, regarding the change in enhancing happiness active elements are interesting.

“Have sex with a person you love”, “act extraverted”, “nurture spiritual (religious) self” and “healthy personality” are active elements that can be influenced as well by elements from outside the system (see above).

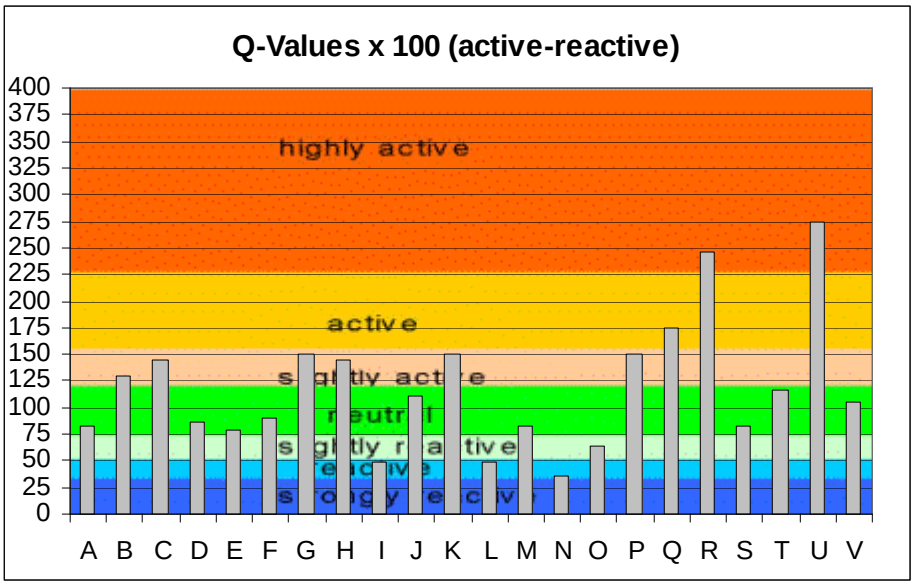

Figure 2-2: Classification of the Q-values (active-reactive)

The most reactive elements are “take control of you life, get organized” and “be yourself”. Changes in the other elements have a big influence on these elements but they do not influence the others. In Vester’s system (Vester 2000) these elements are good indicators to see if there is a change in the system but it does not help much to change them directly as they do not influence the system much.

We conclude that when creating a checklist for more sustainable consumption a focus should be laid on the critical and active elements of the analyzed system, because they influence the other happiness enhancing factors the most. These are the following elements:

a) set achievable important non-materialistic goals (highly active)
b) prioritize happiness, act happily (highly active)
c) have sex with a person you love (active)
d) enhancing self-esteem (slightly critical)
e) act extraverted (slightly active)
f) nurture spiritual (religious) self (slightly active)
g) healthy personality (slightly active)
h) skill engaging leisure activities (slightly active)
i) meaningful work that engages your skills (slightly active)
j) becoming an outgoing social personality creating networks (slightly active)

As stated before, active elements can be changed in our model because we have external factors that are not included in the system. For example, self esteem can be enhanced by personal and family changes or with the help of psychologists that are not in our list of variables. Prioritizing happiness, doing skill engaging leisure activities or engaging in meaningful work can be influenced by societal as well as by family and personal changes (see also Table 4-2 in Madjar & Hofstetter 2004b and Kasser 2002).

2.2 Do factors to enhance happiness also support the satisfactions of basic needs?

In order to answer this question we classify the happiness enhancing variables according to the different need categories from Max-Neef (see Table 1-2). Table 2-5 uses the short forms of happiness enhancers (Table 2-2) and groups them according to Max-Neef's classification (see Table 1-2) using his categories "being" and "doing" only. We did not use "having" and "interacting" as the aspects to enhance happiness are either actions or characteristics that could lead to "having" aspects or to "interacting" aspects.

Table 2-5: Classification of happiness enhancing aspects according to basic needs (based on Table 1-2)

	Being	**Doing**	**happiness enhancing activities from Table 2-2**
Subsistence	Physical health, mental health, equilibrium, sense of humour, adaptability	Feed, procreate, rest, work	keep busy and active healthy personality (food, sleep, movements) meaningful work that engages your skills lower expectations & aspirations positive, optimistic thinking for present and future
Protection	Care, adaptability, autonomy, equilibrium, solidarity	Co-operate, prevent, plan, take care of, cure, help	focus beyond self self-esteem
Affection	Self-esteem, solidarity, respect, tolerance, generosity, receptiveness, passion, determination, sensuality, sense of humour	Make love, caress, express emotions, share, take care of, cultivate, appreciate	positive, optimistic thinking for present and future prioritize happiness, act happily be grateful act extraverted lower expectations & aspirations
Understanding	Critical conscience, receptiveness, curiosity, astonishment, discipline, intuition, rationality	Investigate, study, experiment, educate, analyse, meditate	focus beyond self don't equate happiness with money give love a high value in life lower expectations & aspirations be open for new experiences / changes in believes
Participation	Adaptability, receptiveness, solidarity, willingness, determination, dedication, respect, passion, sense of humour	Become affiliated, co-operate, propose, share, dissent, obey, interact, agree on, express opinions	outgoing social personality creating network meaningful work that engages your skills prioritize close relationships focus beyond self give love a high value in life
Leisure/	Curiosity, receptiveness, imagination, recklessness, sense of humour, tranquillity, sensuality	Day-dream, brood, dream, recall old times, give way to fantasies, remember, relax, have fun, play	skill engaging leisure activities have sex with a person you love
Creation	Passion, determination, intuition, imagination, boldness, rationality, autonomy, inventiveness, curiosity	Work, invent, build, design, compose, interpret	meaningful work that engages your skills get organized, set achievable important non-materialistic goals be (act) autotelic positive, optimistic thinking for present and future be yourself

Identity	Sense of belonging, consistency, differentiation, self-esteem, assertiveness	Commit oneself, integrate oneself, confront, decide on, get to know oneself, recognise oneself, actualise oneself, grow	positive, optimistic thinking for present and future become present oriented be yourself have sex with a person you love meaningful work that engages your skills nurture spiritual (religious) self focus beyond self don't equate happiness with money give love a high value in life lower expectations & aspirations enhance self-esteem
Freedom	Autonomy, self-esteem, determination, passion, assertiveness, open-mindedness, boldness, rebelliousness, tolerance	Dissent, choose, be different from, run risks, develop awareness, commit oneself, disobey	be (act) autotelic be yourself enhance self-esteem focus beyond self
Transcendence			nurture spiritual (religious) self be open for new experiences / changes in believes

Table 2-5 reveals that most of the happiness enhancing aspects are related to subsistence, affection, understanding, participation, and identity. Only two factors cover the need for protection, for leisure and for transcendence. Although there are not many aspects in the leisure level, these aspects cover a larger number of sub-aspects (e.g. leisure/idleness covers all types of activities that support skill engaging activities like having new hobbies, playing games, doing sport etc.).

We see also that different variables like "positive, optimistic thinking", "enhance self esteem", "focus beyond self" etc. satisfy different needs.

Table 2-5 also answers the sections and sub-sections questions. There is no contradiction in enhancing happiness and satisfying basic needs. In contrary, we find that happiness enhancers fit very well with the satisfiers identified by Max-Neef (1991) and also cover all ten basic needs. In Hofstetter & Madjar (2003) we provide evidence that there is a high correlation between subjective well-being, life satisfaction, and happiness. Therefore, the good match of happiness enhancers and satisfaction enhancers is no big surprise.

The additional characterization of the nature of some of the happiness enhancers may be helpful to refine the checklists suggested in Section 3. The most active and critical factors identified in Section 2.1 should probably get higher attention in the design and improvement process.

3. A checklist to design for a more happy and sustainable future

The evaluation and combination of classifications for basic needs, satisfiers, and happiness enhancers invites to actually use these insights to suggest a new design procedure for sustainable consumption activities. Before we present such a procedure including a checklist we shall recall some conditions that should be fulfilled by sustainable consumption activities:

1. Contribute to environmental, social and economic sustainability of our future.

In this project and this paper we focus on the environmental dimension alone:

2. Maximize satisfaction and minimize amount of consumption by satisfying basic needs as broadly and deeply as possible in an as non-material way as possible.
3. Increase satisfaction by focusing on happiness enhancing activities for basic needs that are not yet satisfied.
4. The activity has to fit the person, i.e., a large number of sustainable consumption activities needs to be developed that fits different characters and covers and satisfies a large number and combinations of needs.
5. The activity must be attractive and promising enough that it is picked up and then also stimulating enough to be maintained[2].
6. The activity should not stimulate or even generate more needs, especially if they are material. Otherwise, the treadmill effect is at work, i.e., rebound effects eat up the initial savings in resource consumption and environmental impacts.
7. If single activities require large shares of otherwise limiting factors without contributing to environmental degradation this is helpful and often a strong factor to prevent rebound effects or even contribute to positive spillover effects. Such limiting factors include time use, money, space, skills, resources, and information.
8. Contributing to a lifestyle that puts minimal pressure on the environment.

There are at least two ways to design economic goods that serve in satisfying sustainable consumption:

1. The designer can start from scratch. In our case this means that Table 1-2 with the list of basic needs and satisfiers is used together with its extension in Table 2-5 in order to stimulate the designer on what direction the new product or service could have.
2. An existing product or service shall be made more sustainable from a consumption point of view[3]. In this case, the product needs first an assessment and weak-spot

[2] Making a habit out of the activity would be the easiest way of maintaining it. However, if this happens it is important that the activity is performed with enough variation to be still stimulation and enhancing happiness.

[3] It is obvious that one could also focus on the production side and improve the production processes, switch to less polluting materials and increase the efficiency of the product performance. A Life Cycle Assessment would help to identify weak-spots and eco-design would then be used to improve the product. This improvement should be done anyway. However, the improvement of the production side is even more important after a product has been optimized from a consumption point of view.

analysis. From this, a number of improvement needs can be identified that are matched with more or less convincing options for improvements.

3.1 Checklist for developing new products and services for sustainable consumption

Based on the conditions listed above we developed a 10-step checklist to design for sustainable consumption:

1. Brainstorm on activities, products and services (APS) based on needs, satisfiers, and happiness enhancers listed in Tables 1-2 and 2-2.
2. Identify for each APS the covered needs and satisfiers listed in Table 1-2 looking only at the columns "being" and "doing". Add the number of covered satisfiers and multiply this number by the number of basic needs that are (partly) covered by these satisfiers.
3. Apply the list of happiness enhancers (Table 2-2) to the potentially new APS and make a list of factors that are completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point).[4]
4. Multiply the number of evaluation points from step 2 and 3 with each other. Rank the APS according to the total points and select the top scorers for next steps.
5. Identify for each new APS one to three most similar established APS that might be substituted by APS for sustainable consumption. This should not just be based on intuition but by looking at the basic needs that are most directly satisfied.
6. Adjust the number and repetitions of activities, products, or services to approximately match the size, amount or extent of the new APS described in step 1[5].
7. Repeat steps 2 and 3 to the identified established APS.
8. Guesstimate for each selected potentially new and existing APS the life cycle costs, hours completely absorbed by APS[6], dwelling space, and other resources. Further, the share of people without sufficient skills and information should be estimated.
9. Perform a streamlined LCA to get a first estimate on environmental life cycle impacts of all APS under consideration.

[4] Based on the evaluation in Section 2.1 we apply an additional weighting for active and critical factors. We suggest to use a weighting factor of 1.5 for enhancing self-esteem (slightly critical), act extraverted (slightly active), nurture spiritual (religious) self (slightly active), healthy personality (slightly active), skill engaging leisure activities (slightly active), meaningful work that engages your skills (slightly active), becoming an outgoing social personality creating networks (slightly active), a weighting of 2 for have sex with a person you love (active), and a weighting of 3 for set achievable important non-materialistic goals (highly active), and prioritize happiness, act happily (highly active). This proposal for weights is preliminary obviously very subjective at this stage.

[5] This is to make sure that we compare similar alternatives, i.e., not driving one mile by car *versus* 1000 miles by plane or a one hour game *versus* a hobby that is entertained during a full year several times a week.

[6] Many APS can be used at the same time with others, e.g., exercising and listening to music or watching TV, driving and calling, etc. We suggest that in such cases an "absorption" factor is used to adjust for the absorption intensity and make results more comparable.

10. Use Table 3-1 to evaluate the new APS according to its potential for sustainable consumption and its competitiveness against established APS.

Table 3-1: Evaluation table for designing new products for sustainable consumption

Activities, products, services		**New APS**	**Existing APS 1**	**Existing APS 2**	**Existing APS 3**	**Remarks**
Number of covered satisfiers	S					„Being“ and „doing“ column from Table 1-2
Number of covered needs	N					From Table 1-2
Score	S*N					
Score from happiness enhancers	H					From Table 2-2
Total score	H*S*N					higher means better potential for SC
Life Cycle Costs	yen					
Ratio existing to new APS	C	1				Ratio >1 is better for avoiding rebound effects and worse for acceptability
Hours 100% absorbed	h					
	T	1				Ratio >1 is better for avoiding rebound effects
Occupied dwelling space	m^2 or m^3					
	D	1				Ratio >1 is better for avoiding rebound effects
Other scarce resources						
	R	1				Ratio >1 is better for avoiding rebound effects and potentially worse for LCA
Share of people without required skills	%					
	L	1				Ratio >1 is better for avoiding rebound effects and worse for market potential
Share of people without required information	%					
	I	1				Ratio >1 is better for avoiding rebound effects and worse for market potential
Score for rebound effect	C*T*D* R*L*I	1				Ratio >1 means that existing APS are better for avoiding rebound effects
Environmental impacts analyzed by streamlined LCA	Eco-Points Eco-Score					
Rank order happiness and satisfaction score						Highest score gives rank no.1 (only difference > 20% justifies different rank)
Rank order rebound effect						Highest ratio gives rank no. 1 (only difference > 20% justifies different rank)
Rank order impacts						Lowest Eco-Points gives rank no.1 (double weight rank order points, only difference > 20% justifies different rank)
Total rank order points						Just sum the three previous rows, lowest sum is best.

Table 3.1 makes in many places normative choices on how to weight and calculate/add different indicators. We assumed a multiplicative nature of happiness enhancers, basic needs, and satisfiers and also of all limiting factors contributing to rebound effects. From a mathematical point of view this means that extra weight is given to those factors that are far away from the average. It is not an equal weighting of the factors. Instead one may as well apply a weighted or un-weighted sum of the single parameters.

We also suggest that the single indicator scores are too uncertain to make a difference between two scores that are within 20% of difference. In such cases an equal rank should be applied. Further, the satisfaction and happiness score and the rebound effect score indicate both a tendency for more or less indirect consumption. We suggest that these two scores together should have equal weight as the actual environmental impact score. Therefore, we apply double weighting to the environmental score.

The finally suggested use of rank orders allows getting an initial overview on how the new APS compares to its established competitors. Sure, if the new APS scores best on all three major evaluation criteria the designer should start to develop the APS, think about mass dissemination and also compile a business plan. The information on the limiting factors in Table 3-1 can not only be used for assessing the tendencies for rebound effects. If the new APS results in high costs or needs huge storage place it could become very hard to sell. If the required skill and information level is very high the product may serve a niche market only. This means there are two sides to the “limiting factors coin”. After this first development phase and reasonable chance that the APS can be disseminated and compete against the APS to be substituted the product may be further improved by going through the design checklist below to improve the APS.

If the new APS scores worst on all three major aspects this may mean that one needs to go back into the brainstorming phase and come up with new ideas. The whole procedure starts over again.

In an in-between situation, the evaluation results in Table 3-1 need to be looked at in more detail. If the environmental impacts are similar or lower than its established APS and if the number of satisfiers and/or points on the happiness evaluation are comparably good or better to the competing APS it is worth to proceed. In a first step one should look specifically to those assessment criteria with bad scores. This may already stimulate ideas for improved versions of the APS. This is the point where the checklist for improvements can be helpful (see below). If only the ranking on rebound effect is really good, then the new APS has neither high potentials to reduce environmental impacts nor to really satisfy consumers. Therefore, it is not worth to develop further the product.

The weighting factors for happiness enhancers and the assumption of equal weight for satisfiers as well as the multiplication for contributors to rebound effects will need to be reconsidered and improved when the checklist has been applied and real world validation becomes possible (see also Section 4).

3.2 Checklist for improving products and services for sustainable consumption

Instead of creating new activities, products or services (APS) one can improve existing products or services to make them more sustainable. While sustainable production aims at improving just the environmental performance of the product, sustainable consumption should enhance the quantity and quality of satisfaction derived from the APS, increase the

consumers' happiness and reduce tendencies for rebound effects through increasing the use of limited factors (time, money etc.). This results in a 12-step design checklist that uses a slightly modified evaluation table provided in Table 3-2.

1. Identify for the APS the covered needs and satisfiers (Columns "being" and "doing" from Table 1-2). Add the number of covered satisfiers and multiply this number by the number of basic needs that are (partly) covered by these satisfiers.
2. Apply the list of happiness enhancers (Table 2-2) to the APS and make a list of factors that are completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point). [7]
3. Multiply the number of evaluation points from step 1 and 2 with each other.
4. Guesstimate life cycle costs, hours completely absorbed by APS[8], dwelling space, and other resources. Further, the share of people without sufficient skills and information should be estimated.
5. Fill in column three and the applicable rows of Table 3-2 to evaluate the APS according to its potential for sustainable consumption.
6. Brainstorm for each row whether there are design alternatives for the activity, product or service that would improve the score. This exercise should lead to a larger set of altered APS compared to the existing one. The items on needs, satisfiers, and happiness enhancers listed in Tables 1-2 and 2-2 may be helpful in considering completely new utilities of an APS..
7. Identify for each design option what needs and satisfiers they cover (Columns "being" and "doing" from Table 1-2). Add the number of covered satisfiers and multiply this number by the number of basic needs that are (partly) covered by these satisfiers.
8. Apply the list of happiness enhancers to the design options and make a list of factors that are completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point).
9. Multiply the number of evaluation points from step 7 and 8 with each other. Rank the design options according to the total points and select the top scorers for next steps.
10. Guesstimate for each design option the life cycle costs, hours completely absorbed by APS, dwelling space, and other resources. Further, the share of people with sufficient skills and information should be estimated.
11. Perform a streamlined LCA to get a first estimate on environmental life cycle impacts of all APS under consideration.

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[7] Based on the evaluation in Section 2.1 we apply an additional weighting for active and critical factors. We suggest to use a weighting factor of 1.5 for enhancing self-esteem (slightly critical), act extraverted (slightly active), nurture spiritual (religious) self (slightly active), healthy personality (slightly active), skill engaging leisure activities (slightly active), meaningful work that engages your skills (slightly active), becoming an outgoing social personality creating networks (slightly active), a weighting of 2 for have sex with a person you love (active), and a weighting of 3 for set achievable important non-materialistic goals (highly active), and prioritize happiness, act happily (highly active). This proposal for weights is preliminary obviously very subjective at this stage.

[8] Many APS can be used at the same time with others, e.g., exercising and listening to music or watching TV, driving and calling, etc. We suggest that in such cases an "absorption" factor is used to adjust for the absorption intensity and make results more comparable.

12. Use Table 3-2 to evaluate the design options together with the existing APS according to its potential for sustainable consumption.

Table 3-2: Evaluation table for improving existing products

Activities, products, services		**Esitin g APS**	**Design option APS 1**	**Design Option APS 2**	**Design Option APS 3**	**Remarks**
Number of covered satisfiers	S					„Being“ and „doing“ column from Table 1-2
Number of covered needs	N					From Table 1-2
Score	S*N					
Score from happiness enhancers	H					From Table 2-2
Total score	H*S*N					higher means better potential for SC
Life Cycle Costs	yen					
Ratio existing to new APS	C	1				Ratio >1 is better for avoiding rebound effects and worse for acceptability
Hours 100% absorbed	h					
	T	1				Ratio >1 is better for avoiding rebound effects
Occupied dwelling space	m^2 or m^3					
	D	1				Ratio >1 is better for avoiding rebound effects
Other scarce resources						
	R	1				Ratio >1 is better for avoiding rebound effects and potentially worse for LCA
Share of people without required skills	%					
	L	1				Ratio >1 is better for avoiding rebound effects and worse for market potential
Share of people without required information	%					
	I	1				Ratio >1 is better for avoiding rebound effects and worse for market potential
Score for rebound effect	C*T*D* R*L*I	1				Ratio >1 means that ne design option is better for avoiding rebound effects
Environmental impacts analyzed by streamlined LCA	Eco-Points Eco-Score					
Rank order happiness and satisfaction score						Highest score gives rank no.1 (only difference > 20% justifies different rank)
Rank order rebound effect						Highest ratio gives rank no. 1 (only difference > 20% justifies different rank)
Rank order impacts						Lowest Eco-Points gives rank no.1 (double weight rank order points, only difference > 20% justifies different rank)
Total rank order points						Just sum the three previous rows, lowest sum is best.

Similar to the checklist in Section 3.1 for new APS the final ranking allows to see whether one of the alternatives scores better than the existing APS. All design options that score better than the exiting APS may be considered for the next design steps. It is also important to clarify the impact on dissemination and market place followed by a marketing study or /and business plan. It may well be that the checklist and analysis for sustainable consumption is repeated once more. Limiting factors and life cycle impacts become more quantitative and accurate and the ranking of design alternatives gets more reliable.

A final evaluation is only possible after the new APS is introduced in a test market or group. The new indicator CHap, as established in Hofstetter & Ozawa (2005a), will reveal the relative superiority compared to the APS before it was re-designed or compared to other competing APS.

3.3 Illustrating the checklists using an example

The checklists in Sections 3.1/3.2 and also Tables 3-1/3-2 are both, highly conceptual and very concrete at the same time. These checklists are one of the major outcomes of the research project by Hofstetter et al. (2005b). The development of the checklist is based on other major results of the project (Madjar & Hofstetter 2004a/b, Ozawa & Hofstetter 2004c/d, Hofstetter & Ozawa 2005a). This implies, that the checklist refinement, testing, and further development has still to be done.

In order to illustrate the checklist we will provide here an example. This can not be considered to be a real world application of the checklist. It will rather give a flavor about the potential of the suggested checklists and may stimulate the demand to actually refine and validate the checklists.

What example should we look at? How academic should it be? In Madjar & Hofstetter (2004b) we cite a Chinese saying that attempts to say something about the longevity of happiness enhancers:

If you want to be happy for an hour, drink a beer.
If you want to be happy for a week, kill your pig and eat it.
If you want to be happy for a year, then marry
But if you want to be happy all your life, become a gardener.
(Chinese saying)

The first author of this report followed this advice and started to become a gardener[9]. Therefore, we will illustrate our checklist based on the activity gardening. There are many ways of gardening, the bonsai garden, the wildflower garden, the park, or the “productive” garden that grows vegetables, salads, berries, and fruits. The latter is what we will focus on because this is what the first author has (in addition to lots of flowers and bushes). Living in the city of Zurich makes you realize that it is a privilege to have a (small) garden to grow all this. It makes a lot of sense to keep inhabited areas densely populated in order to make journeys short and public mass transport efficient and economic. Therefore, our example does not assume that we give up the densely populated cities and villages. We would rather ban cars from cities and villages using gates and parking houses at the borders. This frees up

[9] Drinking bear and eating pig did not look like the right type of activities we think about when we developed the checklist. The main author did also marry during the project phase and disagrees with the Chinese saying on its temporal conclusion. Therefore, the gardening looks like the obvious choice.

lots of parking slots and overly wide streets that can be reallocated to apartments for private gardening. You may have realized that these additional ideas bring the harmless example of "gardening" to a much different level where we may easily loose the overview. Therefore, and for the sake of simplicity, we stick to the example of gardening alone assuming that there are at least 20 m^2 (but better 200m^2) of land that can be used for gardening.

Although there have been historic movements to promote private gardening (Dr. Schreber gardens starting in 1860 in Germany) or as a result of the socialistic systems in all communistic countries, we will treat this activity "gardening" like a new activity that gets a revival. Therefore, we follow the checklist in Section 3.1.

1. Brainstorm on activities, products and services (APS) based on needs, satisfiers, and happiness enhancers listed in Tables 1-2 and 2-2.

We already decided to select "gardening" due to its superior position according to the Chinese saying.

2. Identify for each APS the covered needs and satisfiers listed in table 1-2 looking only at the columns "being" and "doing". Add the number of covered satisfiers and multiply this number by the number of basic needs that are (partly) covered by these satisfiers.

Table 3-3 includes those satisfiers that are partly or largely satisfied by gardening. At least 8 out of 10 basic needs get partial satisfaction and 79 out of 129 satisfiers are addressed.[10]

Table 3-3: Satisfiers satisfied by the activity "gardening"

	Being	**Doing**
Subsistence	Physical health, mental health, equilibrium	Feed, procreate, work
Protection	Care, autonomy, equilibrium	plan, take care of, cure
Affection	Self-esteem, respect, tolerance, generosity, passion	share, take care of, cultivate, appreciate
Under-standing	Critical conscience, receptiveness, curiosity, astonishment, discipline, intuition, rationality	Investigate, study, experiment, educate, analyse, meditate
Participation		
Leisure/ Idleness	Curiosity, recklessness, tranquillity, sensuality	Day-dream, brood, dream, recall old times, give way to fantasies, remember, relax,
Creation	Passion, rationality, autonomy, inven-tiveness, curiosity	Work, invent, build, design,
Identity	Sense of belonging, consistency, differentiation, self-esteem, assertiveness	Commit oneself, integrate oneself, decide on, get to know oneself, recognise oneself, actualise oneself, grow
Freedom	Autonomy, self-esteem, passion, assertiveness, open-mindedness, tolerance	Dissent, choose, be different from, run risks, develop awareness, commit oneself,
Transcendence		

3. Apply the list of happiness enhancers (Table 2-2) to the potentially new APS and make a list of factors that are completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point).

[10] It is obvious that Max-Neef (1991) did not think that his list of satisfiers would encompass all possibilities. Nevertheless, we stick to his list and also accept that basic needs with more satisfiers get a slightly higher weight than others. In a more refined form it may make sense to develop matrices that fit the country or consumer group at stake and that some explicit weighting of basic needs and satisfiers is applied where sensible.

The evaluation provided in Table 3-4 (but also Table 3-3, 3-5, and 3-6) should ideally be the result of a group evaluation rather than just single expert judgment. As mentioned before, we are giving different weights to each happiness enhancing factor following our analysis in Section 2.1..

Table 3-4: How does gardening support happiness enhancers? (completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point))

		weight	**Assessment for gardening**	**Total**
A	keep busy and active		3	3
B	become an outgoing social personality creating networks	1.5		
C	meaningful work that engages your skills	1.5	1 (only "1" because it is not really "work" but leisure)	1.5
D	lower expectations & aspirations			
E	positive, optimistic thinking for present and future		1 (things will grow…)	1
F	become present oriented		1	1
G	healthy personality (food, sleep, movements)	1.5	2	3
H	skill engaging leisure activities	1.5	3	4.5
I	be yourself		1	1
J	prioritize close relationships			
K	nurture spiritual (religious) self	1.5		
L	focus beyond self			
M	don't equate happiness with money		2 (the money value of gardening work is very low)	2
N	Take control of your life, get organized		2 (gardening gives lots of structure to a day and year)	2
O	Enhance self-esteem	1.5	1	1.5
P	act extraverted	1.5		
Q	have sex with a person you love	2		
R	prioritize happiness, act happily	2.5		
S	be grateful		2 (that the slugs did not eat all the salads)	2
T	give love a high value in life			
U	set achievable important non-materialistic goals	2.5		
V	be open for new experiences / changes in believes			
	Total		19	22.5

4. Multiply the number of evaluation points from step 2 and 3 with each other. Rank the APS according to the total points and select the top scorers for next steps.

No prioritization is needed at this stage because our brainstorming did yield only one new suggested activity.

5. Identify for each new APS one to three most similar established APS that might be substituted by APS for sustainable consumption. This should not just be based on intuition but by looking at the basic needs that are most directly satisfied.

This is obviously a very difficult step in our analysis because most basic needs and many satisfiers are covered by gardening. If somebody does gardening for the production of locally grown food an obvious substitute would be to use a home-delivery service of a local farmer (or to use the farmer's farm shop) or to buy local organically grown food in shops that provide this. Those using the gardening more for the sake of having something to take care of may instead have a dog. Those that enjoy the outdoor quality would probably establish a walking or hiking habit during weekdays and/or weekend. Those that look at quiet time for reflection might join Yoga-classes, do meditation, or start knitting. Those that just like to be

busy and can afford it would buy a weekend house and finally, since gardening almost substitutes for summer vacations somewhere else this might be another substitute.

From this wide selection of potential substitutes we will limit our analysis to having a dog, a weekend house in the country side and doing a mix of yoga classes and yoga at home.

6. Adjust the number and repetitions of activities, products, or services to approximately match the size, amount or extent of the new APS described in step 1[11].

When we compare gardening with highly seasonal variations with other activities we should look at a full year. We assume that during the main growing season one would spend at least every second day and almost every weekend in the garden. The dog needs attention several times each day and it is assumed that at least every second day one would go for a longer walk of at least one hour. The weekend house would be visited in the warm season almost every weekend (by car 200km return trip) and the activities would include maintenance work, day-dreaming, and walking/enjoying nature. In the cold season there is only one visit a month, if at all. For the yoga we assume that one class per week is taken plus one to two practice hours per week spent at home.

7. Repeat steps 2 and 3 to the identified established APS.

Tables 3-5 and 3-6 provide an initial evaluation by the authors, all caveat concerning cultural, socio-economic and world-view bias apply.

Table 3-5: How do dogs, weekend houses and yoga support happiness enhancers? (completely satisfied (3 points), good contribution (2 points), and weak contribution (1 point))

	Assessment for	weight	Dog	Weekend house	Yoga	Dog	Weekend house	Yoga
A	keep busy and active		3	2	2	3	2	2
B	become an outgoing social personality creating networks	1.5	1			1.5		
C	meaningful work that engages your skills	1.5		1			1.5	
D	lower expectations & aspirations							
E	positive, optimistic thinking for present and future				1			1
F	become present oriented		1		1	1		1
G	healthy personality (food, sleep, movements)	1.5	1	1	2	1.5	1.5	3
H	skill engaging leisure activities	1.5	2	1	1	3	1.5	1.5
I	be yourself		1		3	1		3
J	prioritize close relationships		2			2		
K	nurture spiritual (religious) self	1.5			2			3
L	focus beyond self		2		1	2		1
M	don't equate happiness with money		1		1	1		1
N	Take control of your life, get organized		2	2	1	2	2	1
O	Enhance self-esteem	1.5	2	1	2	3	1.5	3
P	act extraverted	1.5	1			1.5		
Q	have sex with a person you love	2						
R	prioritize happiness, act happily	2.5						
S	be grateful							
T	give love a high value in life		1			1		
U	set achievable important non-materialistic goals	2.5			1			2.5
V	be open for new experiences / changes in believes				1			1
	Total		20	8	19	23.5	10	24

[11] This is to make sure that we compare similar alternatives, i.e., not driving one mile by car *versus* 1000 miles by plane or a one hour game *versus* a hobby that is entertained during a full year several times a week.

Table 3-6: Number of satisfiers (partly) covered by three activities

	Being	Dog	House	Yoga	Doing	Dog	House	Yoga
Subsis-tence	Physical health, mental health, equilibrium, sense of humour, adaptability	4	1	3	Feed, procreate, rest, work	-	1	1
Protection	Care, adaptability, autonomy, equilibrium, solidarity	2	2	2	Co-operate, prevent, plan, take care of, cure, help	4	1	2
Affection	Self-esteem, solidarity, respect, tolerance, generosity, receptiveness, passion, determination, sensuality, sense of humour	7	2	4	Make love, caress, express emotions, share, take care of, cultivate, appreciate	3	1	2
Under-standing	Critical conscience, receptiveness, curiosity, astonishment, discipline, intuition, rationality	4	1	4	Investigate, study, experiment, educate, analyse, meditate	4	4	4
Participati on	Adaptability, receptiveness, solidarity, willingness, determination, dedication, respect, passion, sense of humour	6	-	3	Become affiliated, co-operate, propose, share, dissent, obey, interact, agree on, express opinions	5	-	2
Leisure/ Idleness	Curiosity, receptiveness, imagination, recklessness, sense of humour, tranquillity, sensuality	3	2	4	Day-dream, brood, dream, recall old times, give way to fantasies, remember, relax, have fun, play	3	7	2
Creation	Passion, determination, intuition, imagination, boldness, rationality, autonomy, inven-tiveness, curiosity	3	5	3	Work, invent, build, design, compose, interpret	1	5	1
Identity	Sense of belonging, consistency, differentiation, self-esteem, assertiveness	2	4	4	Commit oneself, integrate oneself, confront, decide on, get to know oneself, recognise oneself, actualise oneself, grow	7	3	5
Freedom	Autonomy, self-esteem, determination, passion, assertive-ness, open-mindedness, bold-ness, rebelliousness, tolerance	2	1	3	Dissent, choose, be different from, run risks, develop awareness, commit oneself, disobey	4	4	3
Trans-cendence		-	-	1		-	-	1
Total		33	18	31		31	26	23

8. Guesstimate for each selected potentially new and existing APS thelife cycle costs, hours completely absorbed by APS[12], dwelling space, and other resources. Further, the share of people without sufficient skills and information should be estimated.

The results of this guesstimate can be seen in Table 3-7. Let us give few hints for the used assumptions:

Life Cycle Costs: It is assumed that garden is already available at no extra costs. For the dog we basically included food, taxes, doctor appointments and increased transportation fares. For yoga we just included the costs of classes assuming that they take place close from work or home. The weekend home causes extra costs for the trip (20 return trips), the rent or mortgage for the property, the equipment with furniture and household ware, fees for phone, TV etc. and the expenses for maintenance and remodeling work.

Time: This derives basically from the assumed intensities under step 6.

Space: Although the garden does not take up additional dwelling space it does occupy outdoor space. Also, one needs a corner for the gardening tools and for storing the harvest. For dogs and yoga the extra space is obviously small. The weekend house is a special case because it actually generates more and uses more space. Generating more space means that we have tons of additional stuff that we can buy for the extra house. Therefore, we should use a minus sign, instead, in order to avoid calculation problems, we use 1 m^2.

Resources: There are no extra scarce resources to be considered. (=> all 1). Instead of considering the garden space above we could have included above the storage place for tool and harvest and include hear land as a scarce resource.

Skills: People that are not able to bend would fail with gardening (and people with absolutely no green thumb). For a dog you need to have a minimum skill level to deal with somebody more than just yourself. A weekend house requires the ability to deal with money affairs, pay bills, and sign contracts, etc. For yoga we assumed the highest skill level due to the high concentration that is required.

Information: Although we live in an information society we did guess that the required information level is rather high for all activities. If one does not know what yoga is and where yoga classes take place you can not go and learn it. Acquiring the weekend house of your dreams requires lots of information about where the information is. Considering failed attempts of short-time dog-holders we believe that the required information to be a long-term dog-holder is high. For gardening, the gap between growing cultures and just eating them has become large in the last decades and many people would not know how to even start gardening.

9. Perform a streamlined LCA to get a first estimate on environmental life cycle impacts of all APS under consideration.

Instead of making a streamlined analysis we estimate primary energy consumption in kWh making the following assumptions: Spending an Euro causes on average the use of one kWh primary energy. The yoga classes are basically a service and cause 0.5 kWh/Euro. We also assume that the gardening will lower the demand for fruit, berries, salad and vegetables in the

[12] Many APS can be used at the same time with others, e.g., exercising and listening to music or watching TV, driving and calling, etc. We suggest that in such cases an “absorption” factor is used to adjust for the absorption intensity and make results more comparable.

amount of 200 Euro. Food production is high on energy consumption and we assumed 2 kWh/Euro.

10. Use Table 3-1 to evaluate the new APS according to its potential for sustainable consumption and its competitiveness against established APS. (see Table 3.7)

Table 3-7: Evaluation table for sustainable consumption checklist

Activities, products, services		**Garde-ning**	**Dog**	**Week-end House**	**Yoga**	**Remarks**
Number of covered satisfiers	S	79	64	44	54	From Table 3-3 and 3-6
Number of covered needs	N	8	9	8	10	From Table 3-3 and 3-6
Score	S*N	632	567	352	540	
Score from happiness enhancers	H	22.5	23.5	10	24	From Table 3-4 and 3-5
Total score	H*S*N	14'220	13'536	3'520	12'960	higher means better potential for SC
Life Cycle Costs	Euro/a	200	2000	15000	600	
Ratio existing to new APS	C	1	10	75	3	Ratio >1 is better for avoiding rebound effects and worse for acceptability
Hours 100% absorbed	h	150	600	160	125	
	T	1	4	1.07	0.83	Ratio >1 is better for avoiding rebound effects
Occupied dwelling space	m^2	200	5	1	2	
	D	1	0.025	0.005	0.01	Ratio >1 is better for avoiding rebound effects
Other scarce resources		0	0	0	0	
	R	1	1	1	1	Ratio >1 is better for avoiding rebound effects and potentially worse for LCA
Share of people without required skills	%	10	20	10	30	
	L	1	2	1	3	Ratio >1 is better for avoiding rebound effects and worse for market potential
Share of people without required information	%	50	75	50	30	
	I	1	1.5	1	0.6	Ratio >1 is better for avoiding rebound effects and worse for market potential
Score for rebound effect	C*T*D*R*L*I	1	3	0.4	0.04	Ratio >1 means better for avoiding rebound effects
Environmental impacts analyzed by streamlined LCA	Primary energy kWh	-200	2000	15000	300	
Rank order happiness and satisfaction score	H*S*N	1	1	4	1	Highest score gives rank no.1 (only difference > 20% justifies different rank)
Rank order rebound effect		2	1	3	4	Highest ratio gives rank no. 1 (only difference > 20% justifies different rank)
Rank order impacts		2	6	8	4	Lowest Eco-Points gives rank no.1 (double weight rank order points, only difference > 20% justifies different rank)
Total rank order points		5	8	15	9	Just sum the three previous rows, lowest sum is best.

Table 3-7 provides the preliminary results of this example and illustrates the evaluation part of our checklist. The highly quantitative nature of this evaluation should not hide that many data are guessed and that the evaluation may look different if others would make it. This highly quantitative nature is finally weakened by a ranking exercise.

Gardening turns out to score very well on sustainable consumption and may be added to the recommendation list. However, the space requirement is large which may need major changes in the way we organize our urban areas.

From this evaluation we would probably retain the gardening, having a dog and doing yoga for further evaluation for sustainable consumption. Since all three activities are established, one could calculate the CHap indicator. This would allow quantifying how all the potentials for satisfaction and rebound effect actually materialize and cause other shifts in consumption patterns.

Yoga is rather low in energy consumption and also very good on happiness and satisfaction. Only the evaluation regarding rebound effects makes yoga looking like a looser. However, the low ranking on rebound effects is due to the relatively low costs and very low space requirements. Therefore, if somebody is, e.g., not space limited, yoga may also do well on rebound effects due to its high time use. As mentioned earlier, there are two sides to the rebound effect score. Low costs and space requirements may actually be a selling argument and help the dissemination.

Also, the careful consideration of the single results may be equally important: this may not only explain major differences in ranks but also stimulate designers for improving the APS.

The Chinese saying and the first authors experience from a first year where slugs did not fully recover from the European heat wave of 2003 suggest that gardening has a very high potential to make gardeners happy. The environmental impact may be very low or even negative if organic gardening is applied and the growing conditions at least comparable to agricultural land (soil quality, sun exposure, water availability). This suggests that gardening is indeed a highly recommendable activity for sustainable consumption. However, this only applies if this does not impact the density of populated areas as mentioned before. If gardening would indeed substitute for weekend houses, the net sustainability benefit may become very large. This example illustrates the potential usefulness of this kind of analysis.

4. Conclusions

This paper provides a pragmatic operationalization of the concepts and ideas introduced in Hofstetter & Madjar (2003) to the field of sustainable consumption – at least for the environmental dimension. The checklists provided in Section 3 together with its evaluation table allows considering three major contributors for environmentally sustainable consumption:

1. A classical life cycle assessment or streamlined LCA allows identifying design options and alternatives with the lowest environmental impacts throughout their life cycle.
2. The analysis of limiting factors helps preventing to adopt a product, service or activity that looks from the analysis in point 1 favorable but indirectly allows for or even triggers additional unsustainable consumption. Cheaper, less time consuming or smaller products and services tend to trigger an increase in total consumption. This may “eat up” the environmental savings of a newly designed service.

3. Consumers do not primarily strive to spend all money, time and space they have (underlying assumption of point 2) but actually try to do both: to satisfy their basic needs as completely as possible and to be happy. Therefore, activities, products and services that are able to satisfy basic needs and enhance happiness are likely to maximize utility. This might stop a treadmill effect and stop triggering again additional consumption to compensate for unfulfilled aspirations.

The developed checklists for designing new or improving existing activities, products, or services allow to estimate these factors at reasonable costs and offer a proposal on how to condensate the information to indicators on different aggregation levels. This offers maximum transparency and may stimulate further improvements towards more sustainable consumption.

The whole checklist approach has the quality and purpose of a streamlined evaluation before all design, production and marketing parameters are fixed or even known. The full-fledged analysis would follow the procedure suggested in Hofstetter et al. (2004) and implemented in Hofstetter & Ozawa (2005a) that derives quantitative results for both, the actual change in happiness and the system wide (including rebound effects) environmental impacts. CHap has been established as an index for this full-fledged analysis for those applications where CO_2-emissions alone are used as an indicator for environmental impacts.

There are a number of caveat that apply to both, the basic idea and the operationalization by the checklists. Although there is literature on happiness enhancement, materialism, and sustainable development (see Madjar & Hofstetter 2004b and Hofstetter & Madjar 2003 for reviews) we did not find empirical evidence that high levels of happiness or increases in happiness will indeed lower the pressure on (material) consumption. This remains a hypothesis that awaits falsification. Further, we do not know what limiting factors have the largest quantitative impact on the environmental impacts of consumption patterns. We do know they are relevant and we made further progress in quantifying all rebound effects together (Hofstetter & Ozawa 2005a) but we have no factor analysis that indicates the relative importance of the single factors.

In addition to the mentioned caveat that applies to conceptual model there are also other reasons to use the checklists with care. For instance, we have accepted that all satisfiers listed by Max-Neef (1991) are equally important and that although subsistence is the most basic of all needs it should get equal weight to each others. The checklists did also assume a weighting of the factors that enhance happiness. Here we provide novel results from a systems analysis point of view (Figures 2-1 and 2-2). The most critical and active factors from the happiness enhancing programs have been identified and deserve most attention when activities, products, and services are designed for sustainable consumption. However, the relative weighting remains a first subjective guess. Further, we accepted that all six limiting factors have a multiplicative effect on rebound effects without having any empirical basis to support this assumption.

The checklist approach for designing and improving sustainable consumption activities is promising in the way it integrates elements that have been tested and proven useful in their domains. As a next step, applications and experiences will be needed to refine the tool and also get a better understanding on the importance of pseudo satisfiers, synergic satisfiers, and inhibiting satisfiers. Such insights may even help to prioritize activities, products, and services that should undergo a re-design procedure for more sustainable consumption.

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Literature

Hofstetter P. & Madjar M. (2003). Linking change in happiness, time-use, sustainable consumption, and environmental impacts; An attempt to understand time-rebound effects. Final report to the Society for Non-Traditional Technology, Japan/ BAO & Consultrix, Zürich

Hofstetter P., Madjar M., Ozawa T. (2005b). CHap: CO_2-emissions per unit of happiness: A new indicator for sustainable consumption that considers and minimizes rebound effects. Summary Report to the Society for Non-Traditional Technology; BAO, Zürich; Consultrix, Zürich; AIST Tsukuba

Hofstetter P., Ozawa T. (2005a). CHap for cloth dryer, personal computer, or mobile phone, and major life events – an indicator that measures change in CO_2-emissions and happiness. Deliverable D6, Zürich

Hofstetter, Patrick, T. Ozawa, K. Sugai and S. Toyoda, (2004). CHap: CO_2-emissions per unit of happiness: A new indicator for sustainable consumption that considers and minimizes rebound effects. Report of Phase 1 to the Society for Non-Traditional Technology, Japan/ BAO & Consultrix, Zürich.Zürich, March 1, 2004.

Kasser T. (2002), The high price of materialism, The MIT Press, Cambridge, Massachusetts

Madjar M., Hofstetter P. (2004a). Relationship between using cloth dryers, personal computers or mobile phones and subjective well-being. Deliverable D1, Zürich

Madjar M., Hofstetter P. (2004b). Literature research on characteristics and activities that enhance happiness. Deliverable D2, Zürich

Max-Neef M. (1991), Human Scale Development. New York: Routledge

Max-Neef, M., (1992). Development and human needs. In: P. Ekins and M. Max-Neef (Eds.): *Real-life economics: Understanding wealth creation.* London, New York: Routledge.

Norris G., Jager W. (2004) Household-level modeling for sustainable consumption, Proceedings of the third international workshop on “Sustainable Consumption”, October 21-22, Tokyo, SNTT/AIST/UNEP/METI, 146-166

Ozawa T., Hofstetter P. (2004a). Use of Longitudinal Panel Data to Estimate the Effects of Adopting New Activities to Household Consumption Patterns and Happiness. The Third International Workshop on Sustainable Consumption. Leeds, UK. March 5-6, 2004.

Ozawa T., Hofstetter P. (2004b). The Heterogeneity of Young Japanese Women’s Life – A Consumption Perspective. Proceedings of the third international workshop on “Sustainable Consumption”, October 21-22, Tokyo, SNTT/AIST/UNEP/METI, 98-106

Ozawa T., Hofstetter P. (2004c). Empirical re-analysis of the JPSC panel data to identify major factors that affect change of happiness and life satisfaction. Deliverable D3, Tsukuba

Ozawa T., Hofstetter P. (2004d). Re-analysis of the JPSC data by forming more homogenous sub-groups in order to reduce the variance of consumption elasticities and enhancing the robustness of results. Deliverable D5, Tsukuba

Vester F. (2000), Die Kunst vernetzt zu denken – Ideen und Werkzeuge für einen neuen Umgang mit Komplexität, DVA, Stuttgart

Vester F. (undated), Papiercomputer als Hilfsmittel zur Systembeurteilung, Manuscript from the Studiengruppe für Biologie und Umwelt GmbH, München