Affordable Needs: The Dynamics of Novelties, Needs, and Rights

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abstract

When technologies are promised, developed and used, many things change in the same movement. One of the ambitions of anticipating such changes is to improve the embedding of technology in society and to do 'better' the next time. A change that often is overlooked is the change in 'needs'. According to the old wisdom, need is the mother of invention. When an innovation is successful, the argument goes, there must have been a need for this, albeit 'latent'. On the other hand, history suggests that technological change will incite new needs. This raises the intriguing question how novelty and needs are co-produced. When needs are not pre-given, but dependent upon socio-technical configurations, and, in fact, both cause and effect of technological change, a range of philosophical, sociological and design questions come to the fore.

In this paper I will address the central question by following two lines. First, the various uses of the concept of 'need' in technical change are studied and categorized. Here I explore various strands of innovation literature as well as technological and cultural criticism. A recurrent theme is whether and how what is conceived of as needs depends on the historical period and the locality. Central here is the institutional definition of needs by experts or markets. Second, I will review a few cases to reconstruct how needs are part of the co-evolutionary process of technical change and provides new suggestions how to anticipate science and technology in society.

The pattern that appears is that novelties are turned into needs and, subsequently, into rights. I conclude that the distinction between 'real' or 'genuine' needs on the one hand, and artificial needs on the other is misleading. Therefore, the question whether needs are real or artificial is not very helpful. The relevant and sensible question is which needs we can afford.

introduction

According to the old wisdom, need is the mother of invention. Given the scarce resources and the unsatisfied needs, human ingenuity comes with appropriate and welcome solutions. But, in its turn, needs have fathers and mothers as well and one of them is invention. This is obvious in individual purchases, as many authors have already observed. Two years ago, I did not need a digital camera. Today, I need a digital camera and many firms would be more than happy to satisfy my need. Twenty years ago, I did not need a mobile phone. Today, I need a mobile phone and many firms would be more than happy to satisfy my need. Two hundred years ago, there was no need for bicycles. Today, I need a bicycle and many firms would be more than happy to satisfy my need. It is also apparent in technological systems and public utilities, as Frédéric Graber (2007) has described in his case study of water supply in eighteenth and nineteenth-century Paris.

Two things are at stake here. First, the dynamics of needs: the malleable nature of what is defined as necessary or luxury, of what is needed, which apparently depend on time and place. The definitions and expressions of need highlight the dominant patterns of life and point potential consumers to items they might need and want. Second, the dynamics of socio-technical change: creation of novelty not only introduces new products, processes and systems, but also new socio-technical arrangements and, in the end, new societies. To need a mobile phone is not just a token of an immature mimetic desire; it is also a token of a changed social setting that expects or even requires people to be connected. In a Foucauldian sense, to need a mobile phones is an internalization of the disciplining force of modern societies.

When needs are not pre-given, but dependent upon socio-technical configurations, and, in fact, both cause and effect of innovation, a range of questions come to the fore. How to understand the co-creation of both needs and innovation? What is the relationship between 'promising' and 'needed'? How are the ambiguities of 'need' expressed in the rising role of 'users' in innovation studies? How do expectations and needs figure in attempts to steer, or modulate, ongoing socio-technical transformation (Technology Assessment in all its varieties)?

This paper explores a range of questions that, in my mind, are related. Yet, the relationships may not be explicit enough. The questions circle around the dynamics of innovation, i.e. the continuous creation of novelty in products, processes and systems and the concomitant socio-technical transformations.

needs in innovation processes

I will start the exploration with an investigation into the ways in which 'needs' figure in accounts of innovation. One of the building blocks of our understanding of innovation processes and systems is the concept of 'need'. According to the old wisdom, need is the mother of invention. When an innovation is successful, it is so because there has been a need for this. This need can be 'latent', that is, the need may be unrecognized the user and even by the producer. By the time a new product reaches the market, the user might sense a need to purchase it. In logical sense, this is a dubious reasoning, a tautology, as there are no independent indications of the purchase and the imputed cause of the purchase, the need. Yet, the reasoning is powerful and very common. In cases of 'latent needs' reminding the customer of his or her need is useful. In STS term this is so-called 'demand articulation'.

Peter Drucker, one of the most influential authors on business puts it like this: "The is one valid definition of business purpose: to create a customer" (P.E. Drucker 1954, *The Practice of Management*, New York: Harper & Row, 37). In a standard text book on consumer behavior Blackwell e.a. write: "Consumer motivation represents the drive to satisfy both physiological and psychological needs through product purchase and consumption." (Roger Blackwell, P.W. Miniard and J. Engel (2001) *Consumer Behavior,* Mason, Ohio: South Western Thomson Learning, p.255). They discuss the following list (Ch.8):

- physiological needs
- safety and health needs
- the need for love and companionship
- the need for financial resources and security
- the need for pleasure
- social image needs
- the need to possess
- the need to give
- the need for information
- the need for variety

Many more lists circulate. The most well-known ordering has been given by Maslow (1954), who placed the need for self-actualization on top. "What a man can be, he must be. This need we may call self-actualization […]It refers to the desire for self-fulfilment, namely for one to become actualized in what one is potentially. This tendency might be phrased as the desire to become more and more what one is, to become everything that one is capable of becoming." (Maslow 1954). See Figure 1. The hierarchy holds some plausibility but be contested easily with many cases, e.g. a hunger strike for the sake of conscience or political statement.
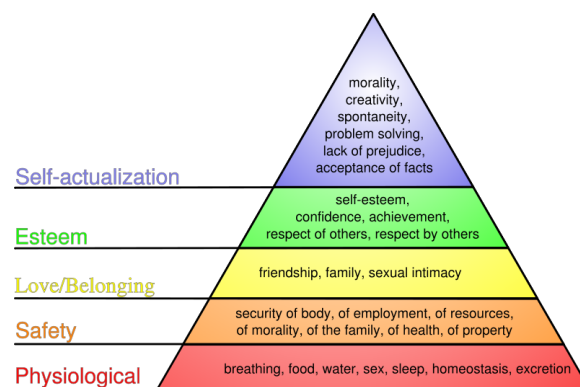

Figure 1: The famous hierarchy of needs, according Maslow 1954

One of the building blocks of our understanding of innovation processes and systems is the concept of 'need'. When an innovation is successful, the argument goes, there must have been a need for this, albeit 'latent'. On the other hand, it is also a well-known that technological change can incite new needs. For instance, in his seminal book on *Diffusion of Innovations* Everett M. Rogers (2003) notes that "A need is a state of dissatisfaction or frustration that occurs when one's desires outweighs one's actualities (...) An individual may develop a need when he or she learns that an innovation exists. Therefore, innovations *can* lead to needs, as well as vice versa.." (p.164)

In the sociology of expectations another, contrasting account of technological change is given (Van Lente 1993, Van Lente 2000, Borup e.a. 2006). On the basis of circulating and shared expectations researchers, technologists and firms decide what options to take and routes to follow. The central idea here is the transformation of promises into requirement. It is not a matter of pre-defined problems or articulated needs, but a matter of ongoing technical change driven by promises in which actors cannot afford to miss the next generation of technologies. In other words: a technological promise is the mother of invention.
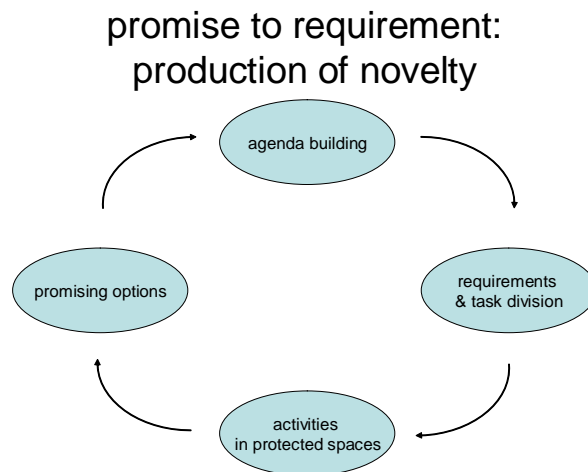

Figure 2: From promise to requirement

The notion of needs figures in many strands of research. A brief list is given in Table 1.

Table 1 Needs in research

discipline	discussion
psychology and biology	the famous layers of needs, Maslow, latent needs, needs and imitation, conspicuous consumption
anthropology:	needs in the fabric of social life
cultural studies:	relativistic accounts of needs
political philosophy and history:	the distribution of needs, philosophy of needs, need as a modern invention, scarcity
economics:	'preferences' as starting point, as intentional black box
innovation studies	demand articulation, user-producer

Cultural critics and social philosophers, on the other hand, claim that the innovation race is detrimental. Here the idea is that a distinction can/should be made between 'real' or 'genuine' needs and artificial needs. (Illich Ellul, 1967). In sustainability questions and debates we see the same deadlock / dead end: when one is not prepared to question the need of people (need of mobility, luxury), no much progress seems to be possible.

In the literature we find long discussions on the distinctions between 'basic needs' and 'non-basic needs', and on the distinction between needs and wants. (Soper 2006, Doyal and Gough 1991). A

recurrent theme is the idea that what is conceived of as needs depends on the historical period and the locality:

> "Any rigorous conceptualisation of social determination and need dissolves the idea of absolute need. And a thorough-going relativity applies to time as well as place. The necessities of life are not fixed. They are continuously being adapted and augmented as changes take place in a society and in its products. Increasing stratification and a developing division of labour, as well as the growth of powerful new organisations, create, as well as reconstitute, 'need'. Certainly no standard of sufficiency could be revised only to take account of changes in prices, for that would ignore changes in the goods and services consumed as well as new obligations and expectations placed on members of the community." (Townsend, 1979:17–18, cited in Ytrehus, 2001).

This is contested by Doyal and Gough (1991) in their influential *Theory of Human Needs.* In spite of all the relativistic differences, they seek to establish principles to define universal needs. The ground from which they start is the idea of participation in social life. Here two notions follow: physical health and autonomy; both are a starting point for a minimum of participation in social life. The stress on objectivity of needs not only leads away from (cultural) relativism but also from the idea that needs are individual expressions. Here the distinction is made between 'wants' and 'needs' (a distinction elaborated by Theodore Rivers 2008).

Table 1. Needs-satisfaction. Characteristics of different theoretical traditions

	The spatial, physical-normative tradition	Market-oriented tradition	The cultural-relativist tradition	The universal standards tradition
Goal of needs-satisfaction	Satisfaction of objective needs	Satisfaction of subjective preferences	Social inclusion	General welfare goals
How standards of needs-satisfaction are established	Experts define standards on the basis of knowledge about "objective needs"	No standards – market oriented preferences	Experts define standards	Defined on the basis of an understanding of overall political, societal goals
Perceptions of changes of needs	Needs don't change, they are objective human properties	"Needs" change when preference change	Needs change in relation to social and cultural context	Universal goals, but needs change in relation to social and cultural context
Existence of a "lower limit" of needs-satisfaction	Yes	No	No	Yes
Establishment of "necessary" dwelling size	Standards of "necessary" dwelling size is established by experts	Defined according to individual preferences in the market	"Necessary" dwelling size a relative concept	"Necessary" dwelling size defined according to overall societal goals

source: Ytrehus 2001

This brings me to a tentative definition, that does not start from the assumed source of needs but from the actions that are inspired by needs:

something is needed if, when lacking, it invokes a sense of loss and incites efforts to repair

the case of cows

The term 'needs' is surprisingly absent in innovation studies. A literature search reveals that the notion of 'needs' is used in the case of children and adolescents, animals, mentally retarded and women. This suggests that the needs of 'normal' subjects (i.e. middle-aged men) are seen as 'private

terrain', whereas it is allowed to speculate about the needs of 'non-normal' subjects (i.e. children and adolescents, animals, mentally retarded and women).

In some areas the notion of needs is extremely extensively developed, for instance about the housing of cows. Many models exist to derive housing specifications from the needs of cows. In their article on 'Behavioral needs of the transition cow and considerations for special needs facility design' (*Vet Clin Food Anim* 20 (2004) 495–520), Nigel Cook and Kenneth Nordlund explain it as follows:

> We believe that to improve the health and well-being of dairy cattle in modern free stall facilities, we must provide for the needs of each cow so that she can behave as a herding animal, eating with the herd, resting with the herd, and socializing without fear. (Cook e.a. 2004, 496)

From this they derive many requirements for housing types (see Table 1). For people, such an approach is not promising. See what nice political programme follows when we replace 'cow' with 'human being', 'stall facilities' with 'living environment', and 'herd' with 'society' - and, for the sake of gender 'she' with 'they':

> We believe that to improve the health and well-being of *human beings* in modern free *living environments*, we must provide for the needs of each *human being* so that *they* can behave as a member of society, eating with society, resting with society, and socializing without fear.

It is, on the one hand, a noble intention. On the other hand, is it uncomfortable, and even suspicious to hear about a distinction between the "we" and the "human beings". It is an utopian intention, to have explicit ideas about the 'good life', about the needs that express and underpin the 'good life', *and* to seek to realize them. The utopian tradition, as has been pointed out by many authors, is strong in the modern political thinking (Achterhuis). Apparently, needs require to be subjectively owned (Soper, 2006).

Table 1
Target group size, suggested housing type and duration of stay based on a proportion of the lactating cow herd for a new special needs facility

|	% of Lactating herd	Number of cows in a 1000 lactating cow dairy	Housing type	Duration of stay (days)
Nonlactating group				
Far-dry	11	110	Free stall	35–40
Close-up mature cows	6	60	Free stall	21
Close-up heifers	3	30	Free stall	21
Maternity cows	1	10	Individual calving pen	2
Maternity heifers	1	10	Individual calving pen	2
Postfresh group				
Nonsaleable milk group	2	20	Free stall or Bedded pack	2 to 4
Fresh cows	6	60	Free stall	21
Fresh heifers	2	20	Free stall	14
Work group	3	30	Free stall	1
Treatment pen	3	30	Bedded pack	10
Lame cows	2.5	25	Bedded pack	21

source: Cook 2004, 502

the case of Internet

A recurrent theme is whether and how what is conceived of as needs depends on the historical period and the locality. Central here is the institutional definition of needs by experts or markets. Second, in a case study of the Digital Revolution, a reconstruction is made of how needs are part of the co-evolutionary process of technical change. Based on an analysis of articles in *NRC Handelsblad* in the period 1990-2010, we can reconstruct how needs are part of the co-evolutionary process of technical change.

Clearly, the growth of internet use is growing dramatically. Miranda ea. (2011) have investigated this growth worldwide and fit it to the well-known S-curves, which still seem to be a valid model to account for the spread of usage.

Table 4
World Internet usage statistics distribution among several geographic regions taken from references [8] and [10].

| Region	Internet users (Jun 2010)	Penetration as % region population (2010 est.)	Penetration as % world population (2010 est.)	User growth 2000–2010
Africa	110,931,700	10.9	5.6	2357%
Asia	825,094,396	21.5	42.0	622%
Europe	475,069,448	58.4	24.2	352%
Middle East	63,240,946	29.8	3.2	1825%
North America	266,224,500	77.4	13.5	146%
Latin America	204,689,836	34.5	10.4	1033%
Oceania/Australia	21,263,990	61.3	1.1	179%
World	1,966,514,816		28.7	445%

Source: Miranda TFSC 2011
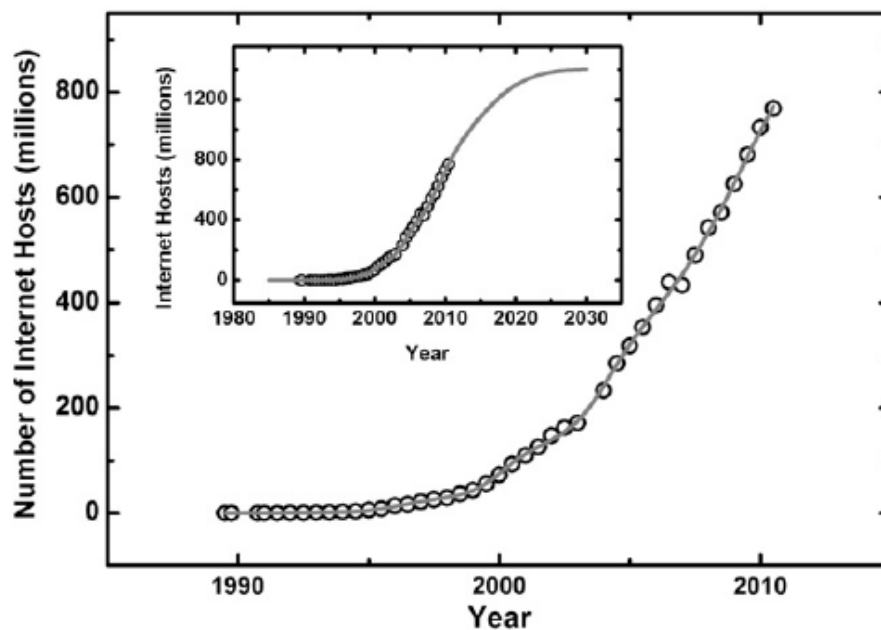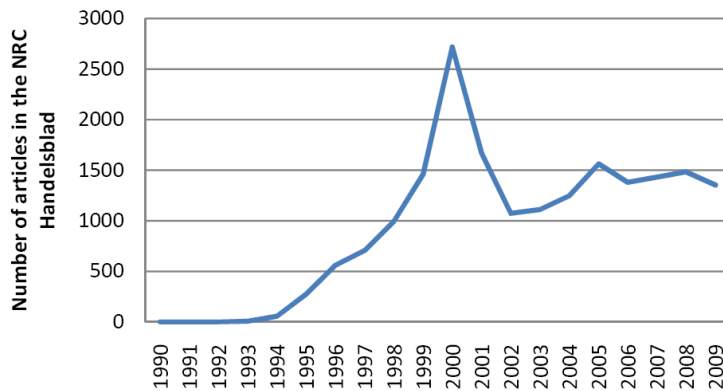
Figure 17: Number of articles in the NRC Handelsblad containing the keyword "internet" (1990-2004).
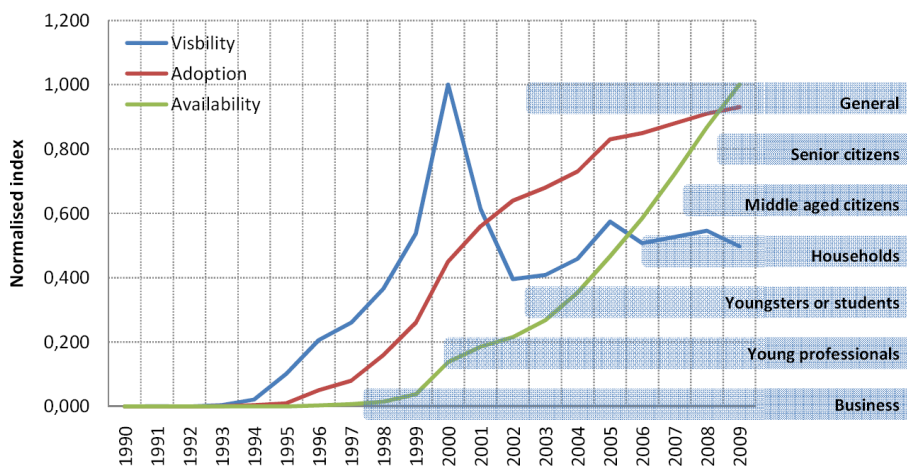
We have performed a study on the appearance of 'Internet' in the Dutch journal NRC Handelsblad, see figures above. While the coverage had a peak around the turn of the century, the adoption and visibility continued. It can be traced how the use of Internet became the standard. In 1996, the fear was that those who used internet had an undeserved head start.

> "It's clear that via Internet a very selective group gains a head start in the housing market. The most wanted houses are already gone by the time off-liners receive their housing paper. This is the bugbear of the growing use of information technology by the government and semi-governmental institutions." (NRC, 13-09-1996)

A few years later, the ones not using internet were seen as the source of problems:

> "The coming years the difference between haves and have-nots of [ICT] will continue to grow. Therefore, it is necessary that 'traditional' forms of communication will continue to exist." (NRC 13-12-1999)

And, eventually, Internet was declared as a necessity, even more so than a refrigerator.

> Dutch population cannot do without the internet [...] research by TNS/NIPO and webwereld.nl shows. It was a confirmation of what everyone already felt. […] Internet is more important than a refrigerator. The internet replaced the fridge and the television as the most important household appliance. (NRC, 26-11-2005).

Recently, on January 24 2013, Reuters reported that the Federal Court of Justice in Karlsruhe declared the right to claim compensation from service providers if their Internet access is disrupted, "because the Internet is an "essential" part of life". The occasion was a case of a man who had been disconnected from telephone, fax and internet from the end of 2008 to early 2009. He had already been compensated for the former two, but now also insisted on compensation for not having Internet. This was granted. "The Internet plays a very important role today and affects the private life of an individual in very decisive ways. Therefore loss of use of the Internet is comparable to the loss of use of a car," a court spokeswoman told Germany's ARD television.

needs and technology assessment

Thus far, the reasoning in this paper leads to the following propositions:
1. needs are parts of forms of life
2. forms of life are dynamic
3. new technologies express and modify forms of life
4. new technologies express and modify needs
5. new needs may turn into rights

Together, this gives rise to the following scheme on how needs are produced in ongoing socio-technical transformation.

production of needs
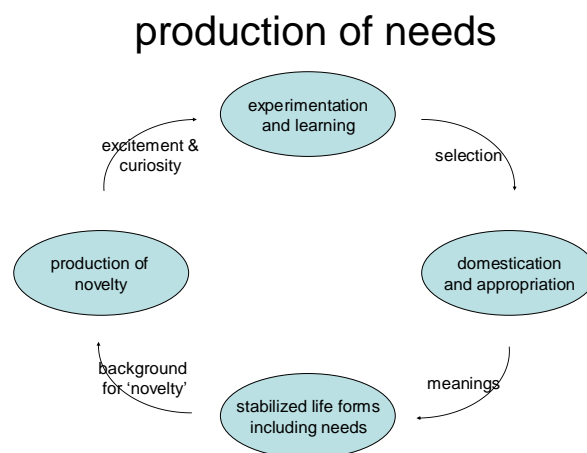
Figure 3. Production of needs

Needs should be central but disappear quickly in academic accounts. In economic accounts of innovation the only relationship is to 'preferences', which are not further scrutinized, as they are assumed to stem from rational, free customers. This contradicts the way consumers are approached as spoiled children with malleable wishes, in the same way as in democracies citizens are seen (i) mature and rational - the cornerstone of ideological legitimation – and (ii) seen as receptive to balloons and free hats.

Traditionally, in STS 'needs' of ordinary people have been defended vis-à-vis the logic of technological progress. The last decade a new twist has been given to this: the role of users in innovation. Users, according to the proponents of this approach, are important sources of creativity, necessary ingredients of legitimacy and are needed for any stable social embedment of new

technologies. Inspired by the Von Hippel accounts of the creative role of lead users in medical appliances, a range of studies has introduced and emphasized the various ways in which 'users' enter the scene of innovation. A blind spot here is the uncritical appraisal of any. As long as user involvement is intensified, developments are seen as 'good'. This tends to be an uncritical embracement of what users think are their needs. But what if the wishes of users are childish, harmful and immature?

The same blind spot for the ongoing production of needs can be located in Technology Assessment. TA approaches (CTA, PTA, STA) seek to enrich and broaden technological development by reflection and participation of stakeholders. While this is very useful and wise, what is missing is a countervailing power to the ongoing production of novelty with its own needs production. Therefore, I plead for a TA that starts not with new technological options but from notions of the good life, and investigate how (old and new) technologies may support these. (See Figure 4 and 5).
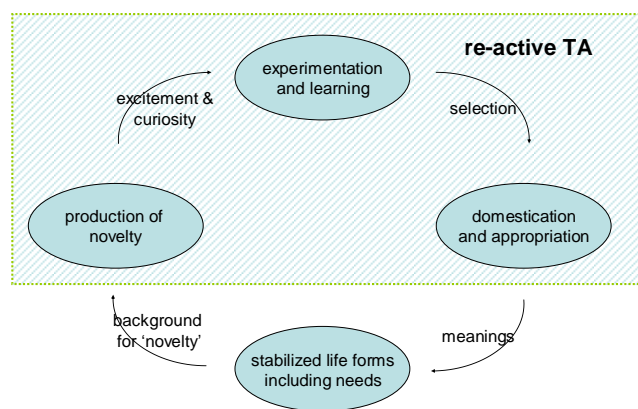

Figure 4. Traditional Technology Assessment

Thinking about the good life is as old as the philosophical tradition. It is more than providing wish lists, it is a specification of what really matters, and entails more than what the text book of *Consumer Behavior* recalls: "Roper Starch Worldwide, a market research firm, has been surveying Americans about what they consider the 'good life' to be for more than 20 years. In the 1970s, people defined the good life as including a steady job, a home, a good marriage, and a college education for their children. Today, the list is twice as long. It now includes a swimming pool, travel abroad, a second car, and money – lots of it." (p.241)
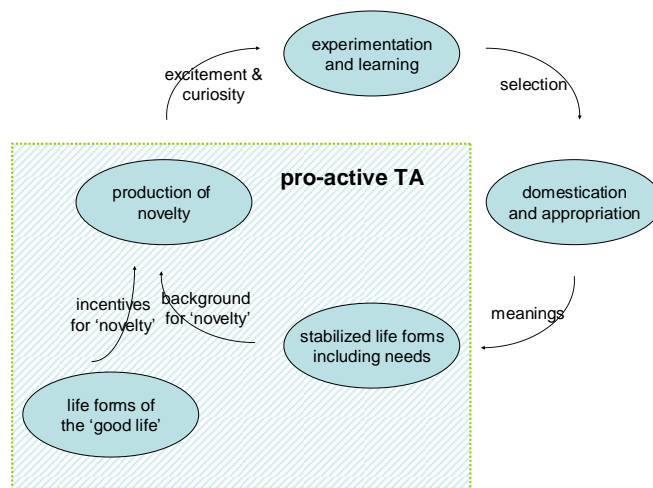
Figure 5. TA and the good life

conclusion

In this paper I explored how 'needs' interfere with 'innovation'. On the one hand, needs appear to be central in innovation, as new products and systems are seen as fulfilling needs. On the other hand, needs tend to disappear from innovation discourses, in spite of the recent STS attention to the role of users, or user's representations and demand articulation. The phenomenon that I am interested in is the continuous creation of needs and the rendering out-of-date of needs in the ongoing dynamics of socio-technical change. How do we know what needs are, what is their position in the waves of innovation? The dynamics of expectations framework, that sees the production of novelty as starting from promises, is a helpful way to give a place to 'needs' in innovation. It appears that the lack of attention to the ongoing production of needs is also apparent in traditional Technology Assessment, that tend to be reactive to new emerging technologies. Starting from a deeper reflection on what we really need, a more pro-active TA should be possible. These questions are pressing in the light of 'sustainability'. The distinction between 'real' or 'genuine' needs on the one hand, and artificial needs on the other is misleading. Therefore, the question whether needs are real or artificial is not very helpful. The relevant and sensible question is: which needs we can afford?

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