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Schumpeter's Theory of Economic Development Revised

A Story about True Entrepreneurs, High Bandwidth, False Hopes and Low Morale

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The split personality of Joseph Alois Schumpeter

Conventional wisdom goes that there are two kinds of Schumpeter (Langlois, 1987). The early Schumpeter (Schumpeter Mark I) *of The Theory of Economic Development* believed in the importance of bold entrepreneurs. The later Schumpeter (Schumpeter Mark II) of *Capitalism, Socialism, and Democracy* envisaged their demise and replacement by a new mode of economic organisation (Freeman, 1982; Phillips, 1971). This new mode, the growth of the great combines (Schumpeter, 1934) or the rise of trustification, is the final stage of capitalism. After that, it would inevitably resolve itself into socialism (Schumpeter, 1942).

The final argument was not only a politically incorrect one in the specific setting in which it was introduced, it also proved to be plainly wrong. This might explain why Schumpeter has mainly figured as a 'footnote economist' in post-war economic theory – often mentioned but hardly taken seriously (Andersen, 1991; Freeman, 1994). Even in the only area of economic writing in which he has maintained a following and that has rightly recognised him as the founding father of the field – evolutionary economics – only his emphasis on the role of uncertainty and on the importance of innovation is preserved. His thesis on the entrepreneurial 'act of will' is being dismissed as an overly romantic model (Freeman, 1994).

Yet there are two important reasons to revalue the 'romantic' model that Schumpeter unfolded in early work. First of all, Schumpeter's vision during his entire career was completely consistent (Langlois, 1987). In *The Theory of Economic Development* the predominant role of large oligopolistic firms in technical innovation is already acknowledged by Schumpeter[1]. He did in fact discuss the relationship between socialism and entrepreneurship at length in the second German edition (1926) of *The Theory of Economic Development*. But in the English translation (1934) upon which most authors base their view of Schumpeter, this part is omitted (Csontos, 1987). On the other hand, in later work Schumpeter still stresses the importance of individual entrepreneurs, albeit in a different institutional setting: a development engineer in the R&D Department of a large electrical firm could be regarded as an 'entrepreneur' in his sense of the word (Schumpeter, 1939). Thus, Schumpeter never completely abandoned his initial model of the entrepreneur as the agent of technological and economical change.

In any case, the empirical observation that the social function of the individual entrepreneur is eroding does not render the theoretical argument invalid that the entrepreneur is the major agent of change. In fact, the core argument of *Capitalism, Socialism, and Democracy* is that the very disappearance of the

[1] "And if the competitive economy is broken up by the growth of great combines, as it is increasingly the case to-day in all countries, then this must become more and more true of real life, and the carrying out of new combinations must become in ever grater measure the internal concern of one and the same economic body. The difference so made is great enough to serve as the water-shed between two epochs in the social history of capitalism" (Schumpeter, 1934:67),

entrepreneur is the reason why the process of economic development comes to a halt and capitalism gives way to socialism.

Schumpeter gives two reasons why the social function of the entrepreneur becomes less and less important:

> "[For, on the one hand,] it is much easier now than is has been in the past to do things that lie outside the familiar routine – innovation itself is being reduced to routine. Technological progress is increasingly becoming the business of teams of trained specialists who turn out what is required and make it work in predictable ways. The romance of earlier commercial venture is rapidly wearing away, because so many more things can be strictly calculated that had of old to be visualised in a flash of genius.
>
> On the other hand, personality and will power must count for less in environments which have become accustomed to economic change – best instanced by an incessant stream of new consumer's and producer's goods – and which, instead of resisting, accept it as a matter of course." (Schumpeter, 1942:132)

I believe that both trends which Schumpeter describes here do not fit reality at all, have probably never done so and do certainly not comply with more recent societal developments. With regard to the first argument, I would confront it with one of the most frequently recurrent themes in cultural criticism which states that the ever increasing rate of scientific and technological development has only *increased* general feelings of uncertainty[2]. Paradoxically, by striving to reduce uncertainty and complexity at a particular level today we only introduce higher uncertainty and complexity to deal with tomorrow. Stated differently, as the complexity of the knowledge-base of the economy continues to grow so does the *relative* ignorance of each individual within this economy (Beck, 1992). In an era of high technology, industrial production has never been *riskier* (Elam, 1993). If there ever was a need for entrepreneurial leadership, it is in the age of high technology and high uncertainty.

I would critique the second argument along similar lines. Consumers might have gotten used to constant change[3] but the seemingly meek absorption of yet another technology could also be an indication that people are pounded into apathy by the forceful rhythm of technological change. If there are so many new products and services appearing every year, it becomes increasingly difficult for a firm to give a distinctive edge or profile to its specific products.

In short, I believe that the conventional reading of Schumpeter puts too much emphasis on the difference between his 'early' and 'later' works and that Schumpeter himself overrated the obsolescence of the entrepreneurial function. Therefore a study of technological change and innovation like this should pay careful attention to Schumpeter's model of economic and technological change as he unfolds it in *The Theory of Economic Development*.

Let us do just that.

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[2] See the massive two volumes of Johannes van der Pot on the evaluation of technical progress (Van de Pot, 1994). For the specific theme of cultural change lagging behind technological change, see Chapters 200-202.

The Theory of Economic Development

The central analytic scheme that pervades all of Schumpeter's work is the evolution of economic systems, or "processes of economic development", as he labelled it himself. These processes are inherently dynamic, as opposed to the static structures of the theory of equilibrium, which explicitly or implicitly always has been and still is the centre of traditional theory (Schumpeter, 1934). This does not mean that Schumpeter rejects the theory of equilibrium. On the contrary, it is the underlying base for his own dynamic model. But as a theory on its own the Walrasian framework has little or no empirical relevance. This is because capitalism is, according to Schumpeter, by nature a form or method of economic change that not only never is but never can be stationary (Schumpeter, 1942). The fundamental impulse that sets and keeps the capitalist engine in motion comes from the introduction of so-called 'new combinations' (new consumers' goods, new methods of production or transportation, new markets, new forms of industrial organisation) that capitalist enterprise creates (Schumpeter, 1942). These disruptive processes of 'creative destruction' account for the greater part of economic growth. Yet they are not covered by mainstream economic theory, where technical change still is regarded as "a shorthand for any kind of shift in the production function." (Solow, 1956)

Schumpeter's model of economic development is not a substitute for the theory of equilibrium but rather a necessary complement. Without it, it is impossible to understand the functioning of an economic system. But the static description of an economic system – economic life from the standpoint of a "circular flow" – is an essential building block for the dynamic model, and Schumpeter spends the entire first chapter of *The Theory of Economic Development* on it.

Schumpeter's description of the 'circular flow' starts from the assumptions that somewhere in the economic system a demand is ready awaiting every supply, and nowhere in the system are there commodities without complements[4]. Under these conditions, all goods find a market, and the circular flow of economic life is closed. In a steady state, costs in this closed system are the price totals of the services of the production factors. Prices obtained for the products must equal these price totals. The ultimate logical consequence of this ideal model of the clearing market is that production must flow on essentially profitless– *profit is a symptom of imperfection.*[5]

A second important logical consequence that follows from this model is that in a steady state all behaviour from the actors in the model (both producers and consumers) is based on merely routines.

[3] But see Alvin Toffler's core argument in 'Future Shock' ("[the] dizzying disorientation brought on by the premature arrival of the future") that man has suddenly been overtaken by the astonishing advances of modern technology, without being in any way prepared for it (Toffler, 1971).

[4] p.8

The sellers of all commodities appear again as buyers in sufficient measure to acquire those goods which will maintain their consumption and their productive equipment in the next economic period at the level so far attained, and vica versa. Consequently, *the individual household or firm acts according to empirically given data and in an equally empirically determined manner*. Data may change, but everyone will cling as tightly as possible to habitual economic methods and only submit to the pressure of circumstances as it becomes necessary[6].

The routinized way in which the system-cum-actors functions has an important impact on the role and very existence of entrepreneurs. Since the combining of the original factors of production is performed every period mechanically as it were, *there is no class of people in the economic system whose characteristic is that they posses produced means of production of consumption goods*. Hence, if we choose to call the manager or owner of a business 'entrepreneur', then he would be an entrepreneur without special function and without income of a special kind[7] – but this can hardly be considered an entrepreneur in the original Schumpeterian sense.

Two circumstances, however, disturb the equilibrium between the value of the product and the means of production again and again. The first is friction and modern neo-classical theory has more or less dealt with that. The second element is spontaneous changes in the data with which the individual is accustomed to reckon. They create new situations, adaptations to which require time. And before that can happen a great many positive or negative discrepancies between cost and receipt occur in the economic system[8]. Neo-classical theory so far has not found a way to explain such discontinuous changes. It will, in fact, never be able to find a way because it can only investigate the new equilibrium position ex post – *after* the changes have occurred[9].

This brings us to the second chapter, in which Schumpeter unravels the "fundamental phenomenon of economic development".

Schumpeter does not deny the existence of autonomous growth in economic systems (for instance, due to a quasi-automatic increase in population and capital). But the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumer's goods, the new methods of production, new markets, and new forms of industrial organisation that capitalist enterprises create (Schumpeter, 1942):

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[5] p.30-31

[6] p.8

[7] p.45-46. This is actually a quote from Walras ("[un] entrepreneur faisant ne bénéfice ni perte") and the literal translation is slightly different than the one given here: "[he would be] an entrepreneur [who] does not make benefits nor losses".

[8] p.33

[9] p.62-63

> "The slow and continuous increase in time of the national supply of productive means and of savings[10] is obviously an important factor in explaining the course of economic history through centuries, but it is completely overshadowed by the fact that development consists primarily in employing existing resources in a different way, in doing new things with them, irrespective of whether those resources increase or not."

While consumers' wants are the fundamental force in a theory of circular flow, for a theory of economic change the producers take the leading role:

> "[Yet] innovations in the economic system do not as a rule take place in such a way that first new wants arise spontaneously in consumers and then the productive apparatus swings around through their pressure. We do not deny the presence of this nexus. It is, however, the producer who as a rule initiates economic change, and consumers are educated by him if necessary; they are, as it were, taught to want new things, or things which differ in some respect from those they have been in the habit of using." (p.65)

I emphasised the last part because here Schumpeter already seems to anticipate the importance of the management of niches for the successful introduction of new products and practices – a topic which I will explore much deeper later on. For now, the focus is on the producer and it is here that the heroic entrepreneur enters the stage.

Schumpeter defines production as the combinations or materials and forces that are *within our reach*[11]. The producer is *not an inventor* (Schumpeter, 1947). All components that he needs for his product or service, whether physical or immaterial, already exist and are in most cases also readily available. The basic driving force behind structural economic growth is the introduction of new combinations of materials and forces, not the *creation* of new possibilities:

> "They [new combinations, RtV] are always present, abundantly accumulated by all sorts of people. Often they are also generally known and being discussed by scientific or literary writers. In other cases, there is nothing to discover about them, because they are quite obvious […] it is this "doing the thing," without which possibilities are dead, of which leader's function consists […] It is, therefore, more by will than by intellect that the leaders fulfil their function, more by "authority", "personal weight", and so forth than by original ideas. Economic leadership in particular must hence be distinguished from "invention". As long as they are not carried into practise, inventions are economically irrelevant. And to carry any improvement into effect is a task entirely different from the invention of it, and a task, moreover, requiring entirely different kinds of aptitudes […] It is, therefore, not advisable, and it may be downright misleading, to stress the element of invention as much as many writers do." (p.88-89)

Development in the Schumpeterian sense is then defined by the carrying out of new combinations. This concept covers the following five cases:

1. The introduction of a new good – that is one with which consumers are not yet familiar – or a new quality of a good.
2. The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means to be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.
3. The opening of a new market, that is a market into which the country in question has not previously entered, whether or not this market has existed before.

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[10] The source of growth in the traditional doctrine of economic growth. Walt Rostow's manifesto 'The Stages of Economic Growth', one of the key studies in the field of development economics, is entirely based on this idea.

[11] p.65

4. The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5. The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position. [p.66]

Schumpeter is realistic enough to see that the carrying out of new combinations involves more than "an act of will": command over means of production is necessary. In most of the cases, the entrepreneur or producer-to-be must resort to credit, especially since most of new ventures start do not have returns from previous production. Consequently, if someone wants to become an entrepreneur at all, she or he must succeed in raising funds, that is, in convincing some kind of sponsor.

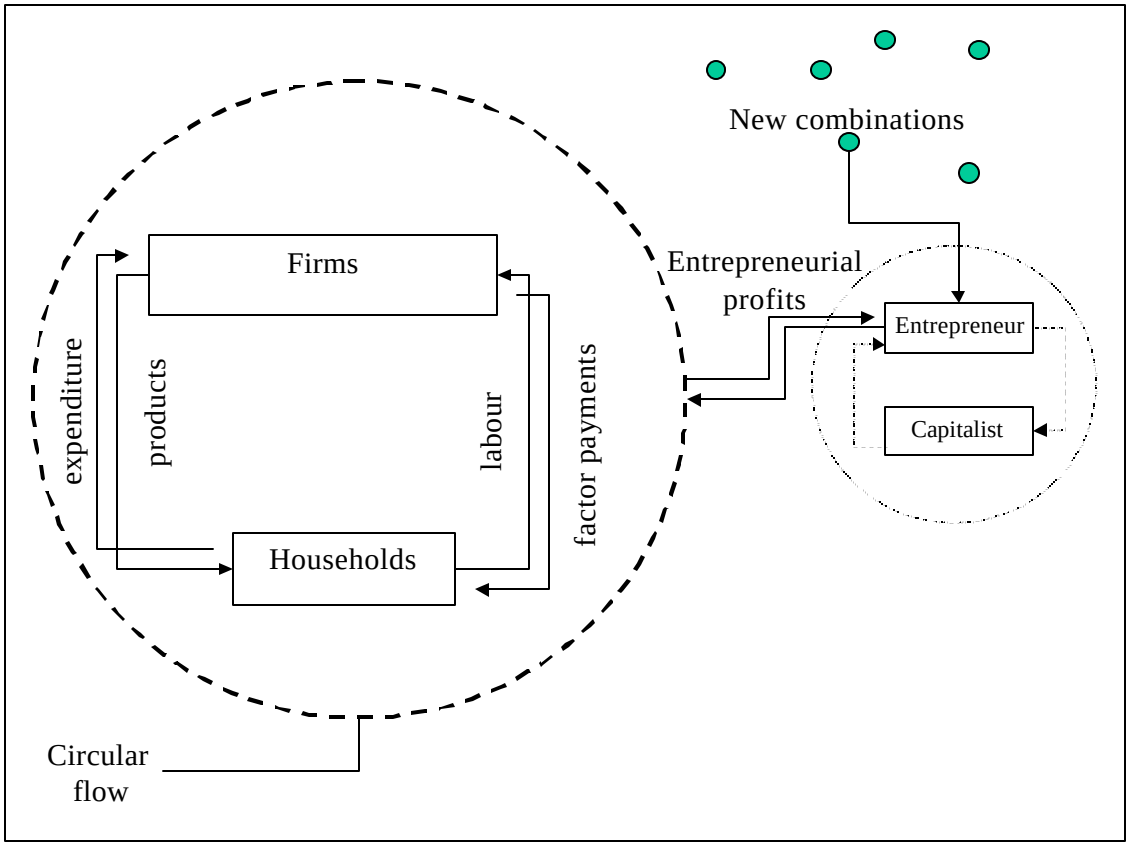
The provision of credit comes from a second hero in the dramatic play of economic change, the "capitalist". Schumpeter anticipates the rise of the venture capitalists: because most of the money that goes around in the circular flows in definite established channels, by far the greater part of the funds of the capitalist consists of funds which are themselves the result of successful innovation and 'entrepreneurial profit'.[12] These venture capitalists are entrepreneurs in their own right. First of all, it is they who bear the financial risk (the entrepreneur only risks his reputation – but this is a grave issue in certain cultural settings). Secondly, because capital is nothing but the diversion of the factors of – established – production to new uses, the venture capitalist needs to be a bold and outspoken person too. He needs to *dictate* a new direction to production.[13]

The basic structure from Schumpeter's model of economic development has two distinctive spheres in a 'neutral' surrounding environment. On the one hand is the (semi-)closed system of the circular flow, that is either in equilibrium or striving for it. On the other hand is the symbiotic pair of the entrepreneur and the sponsor, that is always looking for ways to induce change in the peaceful yet boring routine-life of the circular flow. Both spheres function within an endless reservoir of new combinations (e.g., scientific knowledge and technological inventions) but it is only the entrepreneur – backed by the capitalist – who is able to introduce new combinations and new routines in the circular flow[14].

[12] p.72

[13] p.116

[14] Schumpeter uses a definition that strictly separates the two spheres: "[everyone] is an entrepreneur only when he actually "carriers out new combinations," and loses that character as soon as he has built up his business, when he settles down to running it as other people run their businesses." (p.78)



The key difference between the two spheres is the character of the decision-making process. Whereas in the circular flow all behaviour is based on rigid routines, the entrepreneur does not have any fixed pattern or structure to rely on when he tries to introduce new combinations:

> "While in the accustomed circular flow every individual can act promptly and rationally because he is sure of his ground and is supported by the conduct […] he cannot simply do this when he is confronted by a new task […] While he swims with the stream in the circular flow which is familiar to him, he swims against the stream if he wished to change its channel. What was formerly a help becomes a hindrance. What was a familiar datum becomes an unknown. Where the boundaries of routine stop, many people can go no further and the rest can only do so in a highly variable manner […] (p.80)
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> In particular with the ordinary routine there is no need for leadership […] This is so because all knowledge and habit once acquired becomes as firmly rooted in ourselves as a railway embankment in the earth. It does not require to be continually renewed and consciously reproduced, but sinks into the strata of subconsciousness […] from this it follows also for economic life that every step outside the boundary of routine has difficulties and involves a new element. It is this element that constitutes the phenomenon of leadership […] Here the success of everything depends upon intuition, the capacity of seeing things in a way which afterwards proves to be true, even though it cannot be established at the moment, and of grasping the essential fact, discarding the unessential, even though one can give no account of the principles by which this is done […] (p.85)

A core element of entrepreneurship is the ability to deal with uncertainty. This should be further specified in relation to the dynamic linkage between the two spheres. Once a new introduction get a foothold in the circular flow, the hitherto stable data of the system is altered and the equilibrium is upset. Schumpeter argues that this makes accurate calculation in general impossible, but especially for

the planning of new enterprises[15]. Thus successful entrepreneurs cannot deal very well with uncertainty in the circular flow. What they are relatively good at is in foreseeing what kind of improvement a certain new (but existing and known) combination will bring to the established structure of the circular flow, and in actually realising these improvements.

The carrying out of new combinations is a special function and the privilege of a relatively small special class of people. The question whether entrepreneurship is also the privilege of a limited number of *states* is another matter. Schumpeter is not particularly clear on this point. On the one hand he argues that people in pre-industrial societies (in casu Central Europe anno 1900) cannot step out of the beaten path (of the circular flow) because their economy has not changed at all for centuries. On the other hand he presumes that entrepreneurial aptitudes are distributed in a statistically normal way. There is no reason to believe why this presumption should not hold on a global scale. In this respect it is important to note that the innovative character of a specific introduction of a new combination is always *relative*, that is, the degree of novelty is related to the local circular flow. The introduction of the same piece of technology can appear as a radical innovation in one particular setting and as a modest incremental one in another. Schumpeter seems to acknowledge this in his description of new combinations. The opening up of new markets (3) is an innovation in its own right. Case (1) could be read in a similar way: the introduction of a new good or a new quality of a good that is one with which *a specific set* of consumers are not yet familiar with.

Business cycles: novelty de novo

On numerous occasions neo-classical economists have been criticised for the meagre treatment they give to the notion of technological change, despite the widely-acknowledged fact that technological is a major explanatory factor for economic change. From the onset Schumpeter has contrasted his model of economic development with the mainstream theory of equilibrium[16]. He pays a lot of attention to socio-technical changes – the introduction of 'new combinations' – and as such his model could be regarded as a viable alternative to neo-classical economics. Schumpeter has indeed become the patron saint of most economists that swim against the mainstream. But the question remains whether he has found adequate explanations for the occurrence of technological change. His description of science and technology as a readily available pool of knowledge and of the heroic entrepreneurs as *dei ex machina* seems to suggest that Schumpeter, like most neo-classical economists, treats technological change as an exogenous variable. Then what is the fundamental difference between the two approaches?

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[15] p.236

[16] p.xi (Preface 1934)

In the first German edition of *The Theory of Economic Development* Schumpeter used the labels 'dynamic' versus 'static' to mark the dichotomy between his model and the theory of equilibrium. In deference to Frisch' critique that the (neo-)classical theory is perfectly able to deal with dynamic equilibria, he dropped the labels in later editions. Yet he kept the distinction[17]. A more suitable label for Schumpeter's work would have been 'evolutionary economics' – and he is being acknowledged as the founding father of evolutionary economics – but by the time Schumpeter wrote his earlier work the notion of evolution had fallen into disgrace and he probably decided for strategic reasons not to use it[18].

The essential difference between Schumpeter's evolutionary perspective and that of neo-classical economists is that Schumpeter treats uncertainty as a key explanation for the patterns of economic development whereas in mainstream economics the notion of uncertainty is wholly absent[19]. The objective world is seen as an essentially predictable system because in a world of uncertainty it would be impossible to match the internal mental processes to the external material reality, that is, to know (Te Velde, 1999). It is assumed to be in a dynamic equilibrium with stable parameters – with Newton's description of astronomical change as a plausible (Boulding, 1981; Ryle, 1949). Hence, systems have a tendency towards stability, regularity and predictability.

Schumpeter, on the contrary, takes as his starting point the empirical notion that the economic system does not move along continually and smoothly. The introduction of new combinations by entrepreneurs into the circular flow unsettles everything. Routines that could always be trusted blindfolded suddenly do not work anymore:

> "Counter-movements, setbacks, incidents of the most various kinds, occur which obstruct the path of development; there are breakdowns in the economic value system which interrupt it […] The counter-movements do not merely obstruct development; they put an end to it. A great many values are annihilated; the fundamental conditions and presuppositions of the plans of the leading man in the economic system are changed […] The new development proceeds from different conditions and in part from the action of different people; many old hopes and values are buried forever, wholly new ones arise"[20]

The introduction of new combinations as such does not explain the occurrence of the characteristic ups and downs in an economic system. If the appearance of entrepreneurs would be continuous and evenly

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[17] ibid.

[18] Schumpeter was well aware of the slippery meaning of the word 'evolution'. In the second German edition of The Theory of Economic Development (1912) he points out "[…] dass wir vorsichtig sein müssen mit dem Entwicklungsphänomen, das wir erschaun, moch mehr mir dem Begriff, in den wir es fassen, am meisten mit dem Wort, mit dem wir diesen Begriff bezeichnen und dessen Assoziationen nach allem möglichen unerwünschten Richtungen hin irrlichteren. [… A]lle die vorschnellen, ungenügend fundierten Generalisationen, in denen das Wort ["Entwicklung," i.e. "development" and/or 'evolution"] eine Rolle spielt, haben viele unter uns mit Wort, Begriff und Sache in gleicher Weise die Geduld verlieren las sen." (quoted in (Andersen, 1991))

[19] It is a well-known fact that genuine uncertainty cannot be analysed within the framework of mainstream economic theories (Diederen, 1993). At most risk (in Knight's sense) is assumed but behavioural uncertainty cannot be included since in most cases it would not yield a market equilibrium.

distributed in time, the disturbances that are caused by their actions could be continuously absorbed[21]. The changes which would be effected by them in the circular flow would be of only local importance and easily overcome by the economic system as a whole[22]. But new enterprises do not appear independently of one another but in groups. It is this swarm-like appearance that lays at the root of the occurrence of business cycles.

This leaves Schumpeter with the question why entrepreneurs appear in clusters. He gives a two-step explanation. The first step connects the two spheres of the circular flow and the entrepreneur-capitalist. Whereas the actions of entrepreneurs (introduction of new combinations) upset the equilibrium (and adjoining routines) in the circular flow, the resulting disequilibrium (and adjoining uncertainty) in return limits further actions of the entrepreneurs. This is because uncertainty about the state of the circular flow is especially harmful to the planning of new enterprises[23]. In explaining the occurrence of technological change (embodied in the appearance of new enterprises) in economic terms (the state of the circular flow) Schumpeter turns it into an endogenous variable. But with the mutual dependency of the two spheres he saddles us with yet another chicken-and-egg problem. I will deal with that in a moment. Let me first turn to the second step in Schumpeter's explanation of business cycles.

Once the level of uncertainty in the circular flow has reached a certain critical level, the window of opportunity for other original entrepreneurs has been closed. But before that happens, other less original entrepreneurs have already joined the bandwagon of the first entrepreneur. Others will follow the first round of imitators and so on *ad infinitum* until all entrepreneurial profits have vanished, the new combination has become old news and life in the circular flow has returned to business as usual:

> "[The] carrying of new combinations is difficult and only accessible to people with certain qualities […] However, if one or a few have advanced with success many of the difficulties disappear. Others can then follow these pioneers, as they will clearly do under the stimulus of the success now attainable. Their success again makes it easier, through the increasingly complete removal of the obstacles […] for more people to follow suit, until finally the innovation becomes familiar and the acceptance of it a matter of free choice […every] normal boom starts in one or a few branches of industry, and that it derives its character from the innovations in the industry where it begins. But the pioneers remove the obstacles for the others not only in the branch of production in which they first appear, but, owing to the nature of these obstacles, *ipso facto* in other branches too"[24]

Note that the second step is an explanation after the fact. It does not tell us why that particular new combination has gained popularity (and why others have not). Answers to this question are outside the realm of economic theory. That is why I turn to sociology in the final part of this paper.

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[20] p.216-217

[21] p.231

[22] p.224

[23] p.236.

The chicken-and-egg problem of the first step can be phrased in general terms as follows: how is it possible that novelty (new combinations/ structural changes) arise out of existing structures and processes? This is a hotly debated issue in (biological) evolutionary theory. A core dictum of conventional evolutionary theory – the gradualist standpoint – is *natura non facit saltum*: nature does not make jumps. The only way structural changes (e.g., the sudden extinction of a population) can be explained is by producing some external cause (e.g., impact of a gigantic meteorite). Schumpeter could, with Marshall, have chosen the gradualist camp. It would have saved him from the problem of having to explain the very occurrence of business cycles. But it would also have turned technological change into an exogenous variable – a fate that has haunted the neo-classical heirs of Marshall. Instead, he adopts the saltationist standpoint with the motto *natura facit saltum*: nature does make jumps:

> "Natura non facit saltum – diesen Satz hat Marshall als motto seinem Werke vorangestellt, und in der Tat drückt er treffend den Character desselben aus. Aber ich möchte ihm entgegenhalten, dass die Entwicklung der menschli chen Kultur wenistens, und namentlich die des Wissens, gerade sprunggeweise vor sich geht. Gewaltige Anläufe und Perioden der Stagnation, überschwengliche Hoffnungen and bittere Enttäuschungen wechseln sich ab und mag das Neue auf dem Alten fussen, so ist der Fortschritt doch kein stetiger. Unsere Wissenschaft weiss davon zu berichten."[25]

At the same time, though, Schumpeter insists on several occasions that shockwise changes in economic life are not forced upon it from without but arise by its own initiative, *from within*[26]. In other words, there is an *internal* economic development ('evolution') and no mere adaptation of economic life to changing data. Hence, economic evolution is in a certain sense endogenous. To give one of Schumpeter's examples: the opening up of external markets (3) is *internal* to the economic evolution of a country (sic!)[27].

In other words, Schumpeter tries to encapsulate the shockwise, structural changes that set his model apart from the classical theory of equilibrium in an overall evolutionary process of economic development[28]. What he tries to describe is a process of 'revolutionary evolution'. This is a

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[24] p.229

[25] Bemerkungen über das Zurechnungsproblem (1909). Reprinted in Aufsätze zur ökonomischen Theorie (1952). Quoted in (Andersen, 1991).

[26] p.63 (italics added).

[27] "We sometimes read in the nineteenth century that the opening up of new countries was the background on which economic evolution achieved what it did. In a sense this statement is true. But if the inference is that this circumstance was, in our parlance, an external factor, that is, something distinct from economic evolution and independently acting upon it, then the statement ceases to be true: our vision of the evolution of capitalism must precisely include the opening up of new countries as one of its elements and as a result of the same process which also produced all the other economic features of that epoch." (Schumpeter, 1939:9)

[28] "The author begs to add another more exact definiton, which he is in the habit of using: what we are about to consider is that kind of change arising from within the system which so displaces its equilibrium point that the new one cannot be reached from the old one by infinitesimal steps. Add successively as many mail coaches as you please, you will never get a railway thereby." (Schumpeter, 1934:64f)

contradictio in terminis and Schumpeter has never been able to solve the tension between continuity and change. The explicit role he ascribes to entrepreneurs as the sources of innovation does not seem to be in accordance with his emphasis on endogenous evolutionary change. But Schumpeter's arguments are really more subtle than that of a dramatist who would like to write the epic of the heroic entrepreneur. As he himself stressed in the later editions of *The Theory of Economic Development*, Schumpeter was not so much interested in the individuality of entrepreneurs and in the concrete factors of change, but with the method by which these work, with the mechanism of change. He sees the "entrepreneur" merely as the *bearer of the mechanism of change* (Schumpeter, 1934:61f). These changes (e.g., the appearance of new markers, new scientific findings) are generated by the evolution of the socio-economic system and would have occurred anyway but they have to be effectuated by an acting individual: the entrepreneur. Schumpeter did not have the mathematical tools at his disposal that could explain how small incremental steps can cumulate to big radical changes. He therefore had to present the entrepreneur of the generator of novelty *de novo*, which contradicts his argument that the entrepreneur is "merely the bearer of [endogenous] evolutionary change". Just as gradualists need a meteorite to explain the sudden extinction of dinosaurs, Schumpeter needed an entrepreneur to explain the jump from stagecoaches to railways. But the novel science of self-organised critical systems might just give a solution to the paradox of revolutionary evolution.

The general equilibrium theory assumes that economic systems are in a stable balance. Small freak events can never have dramatic consequences and contingency is irrelevant (Bak, 1997). But if the economic system is in balance, how did we get there in the first place, that is, how did we end up with railways, nuclear power plants and global computer networks? It is nearly impossible to imagine the current state of high technology as the outcome of a gradual, piecemeal process of infinite small steps. On the other hand, economic systems are no chaotic systems that have no memory of the past and cannot evolve. Rather, economic systems are neither stable nor chaotic but something in-between. They can be characterised as self-organised critical systems that are on the edge of chaos but self-organise themselves into this state, with no external tuning or organisation required (Bak, 1997). One feature of such systems is a power law distribution of the characteristic events (e.g., radical socio-technological innovation) (Bak & Sneppen, 1993). Although large events are comparatively rare, events can and do happen on all scales, *with no different mechanism needed to explain the rare large events than that which explains the smaller, more common ones.* Hence, there is no external force needed to explain the events. Any self-organised critical system naturally has infrequent large events:

> "The theory explains why huge solar flares that disrupt telecommunications occur, on average, every 10 to 20 years. The large events are not periodic […] If we have patience enough, we are bound to experience even larger flares with more devastating effects, with a frequency given by extrapolating the critical behaviour further" (Bak, 1997)

Schumpeter's intuitive description of economic development as a continuous evolution with sudden radical changes that occur from within might have been right after all.

The question then remains, why some innovations have an avalanche effect (such as described by Schumpeter), and others don't. This brings us back to the central role of entrepreneurs. Economic systems are not fully deterministic systems – contingency occurs. This means that there is at least some space for voluntaristic action from agents. But they are bound to the ongoing endogenous changes of the system as a whole. Entrepreneurs are neither 'merely' bearers of change nor autonomous agents. It is the interplay between the individual action and the ever-changing environment that determines the final outcome.

In his later work, however, Schumpeter seems to play the role of the entrepreneur down in favour of the institutional environment. So what precisely were his arguments and who do they relate to the previous conclusion that entrepreneurs are still an essential part of economic development?

The death of an entrepreneur

Schumpeter explicitly tackles the diminishing importance of the entrepreneur in Chapter XII of *Capitalism, Socialism ad Democracy*, 'The Obsolescence of the Entrepreneurial Function'. His core argument is that the social function of the entrepreneur, of "getting things done", is already losing importance and is bound to lose it at an accelerating rate in the future even if the economic process itself of which entrepreneurship was the prime mover went on unabated.(Schumpeter, 1942:132). Schumpeter then gives three kinds of resistance to innovations. I have already dealt with two of them. With regard to the first argument, it should further be noted that from Schumpeter's own model of economic development it does not follow at all that the 'routinisation of technological progress' lessens the need for entrepreneurial action. After all, according to Schumpeter invention and innovation are two separate things. An institutionalisation of the invention process will probably have an impact on the practise of innovation. But it does not render it irrelevant. It appears to me that Schumpeter has grossly overstated the relevance of his first argument. He has on the contrary understated the importance of the third kind of resistance to innovation that he gives: the established interests of those producers who are threatened by the innovation in the productive process. It are not only the existing producers that will resist changes to the present situation but a much wider range of groups that make up the 'maintenance constituency' of the dominant established technology. These are all individuals and groups that have come to depend on the technology (cum market) and have adopted to its constraints. This group includes both the conventional category of consumers and a whole range of individuals and groups whose primary function is to keep the system going (Staudenmaier, 1988).

The two arguments on which Schumpeter builds his obsolescence thesis appear to me as ad-hoc explanations for the changing shape of the entrepreneurial function. Schumpeter makes the empirical point that the economic progress tends to become depersonalised and atomised – individual action

tends to become replaced by bureau and committee work[29]. That seems to be a valid observation, certainly in the time that *Capitalism, Socialism ad Democracy* was written. But that does not imply that the entrepreneurial function as such looses importance. It only no longer resides in individuals but in groups. Yet I would argue that there is still considerable need for '*personal* force and *personal* responsibility for success'[30] in the process of constructing, maintaining and extending social networks. And in the neo-industrial era of high technology, high complexity and high uncertainty, the role of 'virtuous leadership' in managing such networks might become even more important – a theme that has been elaborated by Mark Elam in his excellent treatise on innovation as the craft of combination.

Elam starts his analysis of innovative capacity with the assumption that any innovation or new combination requires the combinations of substantial quantities of *information* and *skill* (Elam, 1993) p.60. Information can be characterised as 'literary inscriptions' or more broadly (using Varian and Shapiro's well-known tongue-in-cheek definition) as 'anything that can be digitised'. Skills on the other hand are human facilities closely related to the formation and acting out of habits and routines. Both assets have very different but complementary roles in the process of technological innovation. Skills – personal knowledge – can only be exchanged in its partial codification as information. Information, on the other hand, has no meaning until it is being complemented by personal knowledge and experience, that is, interpreted by a skilled person (Te Velde, 1999). In the words of Michael Polyani, who coined the popular notion of 'tacit knowledge' (but took it literally from Heidegger): "if a piece of information is to be successfully translated into an innovation, skills must come to 'dwell' in it" (Polanyi & Prosch, 1975, Quoted in Elam, 1993:60). Information is (literally) 'empty talk' unless it is brought to life and lived in and out by skilled individuals (Dosi, 1988:p.1130, quoted in Elam, 1993:60). It is impossible to talk of creative problem-solving activities and social learning without talking about the development of skills (Elam, 1993:91).

The problem with both information and skill is that they have rather peculiar economic characteristics. In dealing with both assets, trust plays an essential role. Although virtually every commercial transaction has within itself an element of trust (Arrow, 1973) this element is especially strong in exchanges of information and skills. This is because there is an inherent asymmetry between the seller and buyer of information and skills. If the buyer would know beforehand what kind of information he would get, he might never have considered buying it – the infamous information-paradox (Arrow, 1971). Likewise, when a firm employs someone bearing new skills they can never really be sure of what it is that they are buying (Elam, 1993:91). The latter deficiency supersedes the first because information is at the end always anchored into somebody's personal knowledge. The more complex the particular piece of information becomes, the more we need to rely on people who have experienced

[29] p. 133

[30] Ibid. Italics added.

and learnt things we have not (cf. Hayek, 1949; Knight, 1921)[31]. Information alone is never going to be enough to successfully tame the uncertainties that invade our minds – it always has to be complemented by trust (Elam, 1993:69-70):

> "In the last resort, no decisive grounds can be offered for trusting; trust always extrapolates from the available evidence […] Although the one who trusts is never at a loss for reasons and is quite capable of giving an account of why he shows trust in this or that case, the point of such reasons is really to uphold his self-respect and justify him socially. They prevent him from appearing to himself and others as a fool, as an inexperienced man ill-adapted to life, in the event of his trust being abused. At most, they are brought into account for the placing of trust, but not for trust itself." (Luhmann, 1979:26, quoted by Elam, 1993:70).

Information and skill can only contribute to the generation of innovative power if they themselves are sufficiently trustworthy. It is neither information or skill that holds any innovation as a new combination together – it is sufficient virtue:

> "If your information does not come from a reliable source it will not matter how accurate it is, you will still not be able to use it. If you cannot place enough trust in the probity and technical competence of a particular worker, it will not matter how honest or talented she actually is, you will still not be able to employ her […as] industrial production becomes more knowledge-based and skill-intensive it must also become more virtuous. As technological ambitions grow so does the challenge of managing the 'non-contractual elements in contract'. Therefore, if innovative power is too low to take on a new productive challenge the first thing we should look for is an absence of virtue rather than a shortage of information or skill." (Elam, 1993:92),

The entrepreneur has two important functions within the innovation process in his capacity of 'virtuous leader'. First, while joining forces in the new enterprise, he has to commit not only himself but also the other actors to a broad programme of collective learning – the construction of mutual consensus (Te Velde, 1999). It is not possible to arrive at such a situation by blunt exercise of formal hierarchical power – mutual binding is only effective when it is done on a voluntary base. Effective – informal – collaboration only occurs when personal interests and social obligations are perceived by each participant as more or less the same thing (Elam, 1993:93):

> "[The other actors] will have to be able to share his "vision" and feel comfortable about being a party to it. The entrepreneur will also need to be able to successfully detach and partially free the people he depends on from the other competing commitments they have (no doubt including personal ones) and bind them tightly to his own enterprise. Therefore, rather than effective communication; the pattern of innovation as interactive learning […] can be conceived as primarily hinging on "shared commitments" and the ability of all people implicated to award each other enough "credit". Or, in other words, new combinations in a world of high technology are, in the last analysis, best conceived as founded of nothing more solid or reliable than so much trust." (Elam, 1993:111)

Secondly, the entrepreneur acts as a 'guarantor' for certainty and as a focal point of trust. Thus, whereas the first function boils down to building and sharing a dream that "something great is going on", the second function is basically to convince all actors involved that these great things "can really be done". By virtue of his virtue, the entrepreneur assures the individual participants that all other

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[31] "Under organized dealings with our environment, attention and interest shift from errors in men's opinions of things to the errors of their opinions of men. Organized control of nature in a real sense depends less on the possibility of knowing nature than it does on the possibility of knowing the accuracy of other men's knowledge of nature, and their powers of using this knowledge" (Knight, 1921:292-293)

agents – both human ("he will stick to his promises") and non-human ("this site can handle over 100,000 visitors a day") are to be trusted.

Schumpeter's treatment of "personal weight" – in some way comparable with Elam's notion of 'virtue' – in *The Theory of Economic Development* is rather ambiguous. One the one hand, all the entrepreneur has to do is to convince the banker who is to finance him[32]. On the other hand he has to "impress the social group [that is adjoined to the new combination]"[33] and "educate the consumers" and teach them "to want new things, or things which differ in some respect or other from those which they have been in the habit of using (Schumpeter, 1934:65). In the age of 'perfect competitive capitalism', from which Schumpeter already noted that it was coming to an end, one could argue that the carrying out of new combinations was a low-trust affair. It could be depicted, albeit in a fairly romantic and superficial way, as a feat of the exceptional will-power of a single entrepreneur. But in the era of high technology, high complexity and high dependency of other people, the entrepreneur must be able to "woo support" and "to negotiate with and handle men with consummate skill" (Schumpeter, 1927). It might not come as a surprise, then, that in his later work, Schumpeter explicitly recognises the rise of collective entrepreneurship:

> "[…the] entrepreneurial function need not to be embodied in […] a single physical person. Every social environment has its own ways of filling the entrepreneurial function […it] may be and often is filled co-operatively. With the development of the largest-scale corporations this has evidently become of major importance: aptitudes that no single individual combines can thus be built into a corporate personality; on the other hand, the constituent physical personalities must inevitably to some extent, and very often to a serious extent, interfere with each other." (Schumpeter, 1949:260-261).

Managing promises

New combinations do not drop like manna from heaven – their realisation requires considerable resources. This is especially valid for complex technological innovations which often require massive amounts of (high-skilled) labour and capital. The crucial challenge for any entrepreneur is to acquire these necessary resources while there is yet little to offer in return to the sponsors. The establishment

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[32] "[The entrepreneurial kind of leadership] has none of that glamour which characterises other kinds of leadership. It consists in fulfilling a very special task which only in rare cases appeals to the imagination of the public. For its success, kennness and vigor are not more essential than a certain narrowness which seizes the immediate change and nothing else. "Personal weight" is, to be sure, not without importance. Yet the personality of the capitalist entrepreneur need not, and generally does not, asnwer to the idea most of us have of what a "leader" looks like, so much that there is some difficulty in realizing that he comes within the sociological category of leader at all. He "leads" the means of production into new channels. But this he does, not by convincing people of the desirability of carrying out his plan or by creating confidence in his leading in the manner of a political leader – the only man he has to convince or to impress it the banker who is to finance them – but by buying them or their services, and then using them as he sees fit." (Schumpeter, 1934:89),

[33] "Even leadership which influences merely by example, as artistic or scientific leadership, does not consist simply in finding or creating the new thing but in so impressing the social group with it as to draw it on its wake.

of shared positive expectations about the innovation-to-be is part and parcel of the implementation of any new combination. The entrepreneur – who is initially on his own – always has to operate within a given 'cultural matrix of expectations' (Van de Belt & Rip, 1987) – a set of expectations that are shared and stabilised at a certain level and are *embedded* in an organisation, a professional community, or in society as a whole (Van Lente, 1993:49). This matrix depicts the conceptual side of the established 'ways of doing' in the circular flow. It is nearly impossible for an entrepreneur to deviate too much from the established matrix. Yet the fact that expectations are naturally rather diffuse and vague leaves the entrepreneur considerable moving space to align others into his plans. In other words, the entrepreneur is not a Darwinian slave of the selection environment but can – at least to a certain extent – change the selection environment so that is better fits its variation (and not just the other way around). Sometimes, radical changes at a higher level within the matrix can also be used as a crowbar at lower levels.

For instance, the incredible metamorphosis of Nokia from a paper-mill to a world-leader in mobile telecommunications technology can to a large extent be explained by the immediate sense of urge at the national level that the Finnish industry should abandon its one-sided focus on wood and paper production and should gear its efforts towards the promising telecommunications technology market instead[34] (Sadowski & Dittrich, 2000).

If expectations were mere conceptual soap bubbles they would be of very limited interest. Yet the evolution of expectations has a very material side. When expectations become to some extent shared and stabilised, they can force the actors involved to join the bandwagon (Van Lente, 1993:50). How strong such pressures can be is witnessed by the present sorry state of several European telecom giants who have spend billions on UMTS[35] frequencies, pushed by the 'animal spirits' at the stock markets. The diffuse promise of wireless Internet access was in fact so powerful that any decision *not* to invest

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It is, therefore, more by will than by intellect that the leaders fulfil their function, more by "authority," "personal weighit," and so forth than by original ideas." (Schumpeter, 1934:88),.

[34] This metamorphosis did not happen overnight. Already in the 1960s research into semiconductor technology begon in the Cable Work's Electronics department. In the early 1970s, the majority of telephone exchanges were still electro-mechanical analog switches and no general consensus about digitization existed. Yet Nokia began developing the digital switch that eventually became the Nokia DX 200. The DX 200 was a success, and gradually evolved into the multifaceted platform that is still the basis for Nokia's network infrastructure today. There are also structural causes for Nokia's success. In its days as a lumber industry, Nokia was faced with the challenge to establish and maintain communications with its remote base camps in the forests. It became an early adoptor of wireless communication devices and eventually decided to produce the technology in-house (after acquiring a small R&D firm). In a following stage, Nokia became the preferred supplier to Sonera, the Finnish PTT, and as such enjoyed indirectly strong support from the Finnish government.

[35] UMTS (Universal Mobile Telecommunications System) is a so-called "third-generation (3G)," broadband, packet-based transmission of text , digitized voice, video, and multimedia at data rates up to and possibly higher than 2 megabits per second (Mbps), offering a consistent set of services to mobile computer and phone users no matter where they are located in the world. Based on the Global System for Mobile (GSM) communication standard, UMTS, endorsed by major standards bodies and manufacturers, is the planned standard for mobile users around the world by 2002.

into this technological trajectory would probably have probably have resulted in a sharp drop in value at the stock markets.

Promises alone will not be enough to sustain the support for a certain innovation – rhetoric can buy the entrepreneur some much needed time but at the end of the day expectations have to be grounded into the material reality, that is, at least some empirical evidence should be constructed to support the claims being made. This is the 'guarantor' task of the entrepreneur. The rhetorical (evolution of expectations) and material (actual material development) dimension of innovation trajectories each have their own distinctive dynamics. When these two tracks support each other expectations can turn into self-fulfilling prophecies. If these two tracks grow too much apart, the entire operation might fall apart.

The inherent qualities of a product are not *automatically* linked to the perception of the product. While most entrepreneurs (and especially the more technically oriented ones) focus on the first issue (that is, the material track) the 'management' of the rhetorical track is an important task on its own. Expectations have certain dynamics on their own. They are generated, coupled with other expectations, transformed from a general to a specific level, stabilised and destabilised (Van Lente, 1993:58). Most dynamics occur when expectations are exported outside the current support community. This is because the shape of dynamics heavily depends on the characteristics of the bearer. Hence, when other actors with different backgrounds (i.e., venture capitalists) are getting involved, the original expectation (or set of expectations) might be considerably transformed. The tragedy of the entrepreneur is that he needs a certain critical mass to get his innovation going but that he often looses control when more and more people are getting involved.

Skilful management of expectations involves talking to the right kind of people at the right moment in time using the right dose of expectations. You should capture your audience but don't disappoint them afterwards. The introduction of any new combination or radical innovation is necessarily surrounded by a hype of overly optimistic expectations. The *thesis* is brought forward that this particular technology holds great promises. The rhetorical track is now much further advanced than the material track. This is not a sustainable situation: if the two tracks are not better aligned the introduction of the new technology will loose momentum. Hence, the focus now shifts to the material track. The observation of the actual state of the technology and the disenchantment of the original illusion of radical progress is the *anti-thesis* in the dialectical process of innovation. The contrast between the thesis and anti-thesis can be interpreted in two ways. If the rhetorical and material track have grown widely apart the most obvious conclusion is the *negative synthesis* that the technology can not fulfil the initial high expectations and that no more money should be thrown down the drain. On the other hand, if the differences between the two tracks still seem to be surmountable the very deficiency of the material track can be rhetorically used to attract extra resources. This is the *positive synthesis*: *if only* additional investments are made the technology will be able to fulfil its promises. Skilful

entrepreneurship requires the timely formulation of antitheses in such a way that the additional resources are geared towards the resolution of the critical problems – the 'reverse salients' that hamper further diffusion of the innovation (cf. Hughes, 1983).

The rise and fall of UMTS is a nice illustration of the dialectic nature of the introduction of new combinations. In 1999, at the first presentation of the UMTS consortium, manufacturers and operators proudly stated that the technology had a bandwidth of 2Mpbs – ample speed for broadband applications such as video-conferencing. During 2000 such broadband applications were shown on TV commercials from Siemens, one of the manufacturers. Yet at the beginning of 2001 the Marketing president of Ericsson, one of the other manufacturers in the consortium, declared that "[as] a private person [he] would already be satisfied if [he] would have 25kpbs permanently available." (Van Bentum, Bogaarts, & Croonenberg, 2001). This is a factor 80 less bandwidth than was initially promised. Given this wide gap between dreams and reality some commentators reached the conclusion that UMTS is the worst which has ever happened to the telecom industry. The manufactures of course have a distinctively different reading of the events. Ericsson's President of Internet Applications for instance argues that the telecom industry should radically alter the way in which it attempts to attract users:

> "[It's] all about services, not the technology. We have great opportunity here, but we should stop talking to the user about WAP and GPRS. Communication should always be service-oriented. They shouldn't have to care about the technology." (Springham, 2001)

In other words, the problem is not so much in the mismatch between theory and practice but in the specific rhetorical strategy that has been chosen. Later on, 'though, the same spokesperson does explicitly acknowledge the danger of inflating expectations too much:

> "As one of the few companies to have started talk of 4G, I wonder exactly what services we can expect, and whether the market runs the risk of falling into the same trap as before and promising more than it can realistically deliver? The answer is straightforward, namely that for every new technology and generation that you want to introduce, you have to start planning ten years in advance." (Springham, 2001)

The innovation trajectory of UMTS cannot be seen in isolation of the developments at a higher level. The generic category of information and communications technology (ICT) has seen spectacular increases in shares prices ever since the IPO of Netscape at August 5 1995[36] but similarly spectacular decreases in shares prices after the collapse of NASDAQ in the spring of 2000. It is yet to soon to say whether the negative or positive synthesis will have the upper hand. But new combinations like email and WWW (both combinations of already long existing principles and technologies) have already caused such strong avalanche effects that at the highest level of the cultural matrix the promise of ICT

[36] Netscape used a quite innovative business model. It gave away its browsers to sell its servers , which it then also began giving away. The company has a total of $14 million in revenues, of which it managed to eke out a $4

is probably already sufficiently stable to suggest that the developments at lower levels will not come to a grinding halt[37]. This does not necessarily imply that a demand for wireless Internet access can be successfully constructed and, if it can, in what technological flavour it will come (UMTS or GPRS or another yet unknown technology)[38].

A first synthesis

The basic structure of Schumpeter's model of economic development has two distinctive spheres that are diametrically opposed. The (semi-)closed system of the circular flow that is striving for equilibrium and the symbiotic pair of the entrepreneur and the sponsor that is trying to induce change in the established patterns of the circular flow. Change is resisted by the 'maintenance constituency' which has become dependent on the established routines and has already adopted to its constraints. This is a formidable barrier. Even if the individual entrepreneur is backed by a powerful and resourceful sponsor he needs to built a constituency in his own right to be able to bring changes into the established 'ways of doing' in the circular flow. This is the 'romantic' Schumpeterian image of the entrepreneur as a leader who 'does the thing' more by 'authority' and 'personal weight' than by original ideas. This 'virtuous leadership' does not only require a lot of charisma or chutzpah but also the skilful management of the dynamics of expectations which (by necessity) accompany the introduction of new combinations. Initially, a gospel of the new combination should be actively spread. This is the thesis that the particular combination holds great promise. In a second phase, the timely and specific formulation of antitheses should (re)direct the additional resources towards the 'reverse salients' that block further diffusion of the new combination. By aligning the rhetorical and material track of the innovation trajectory the entrepreneur guarantees that the promises made are not too far ahead of actual progress.

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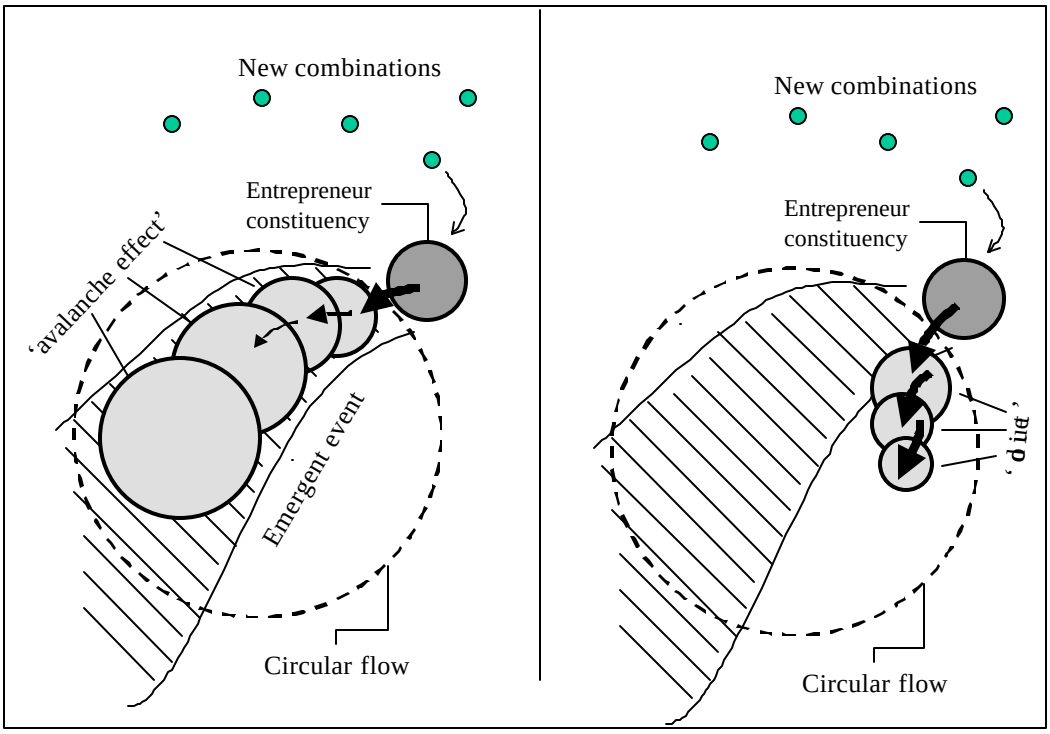
million loss. Despite these unimpressive financial results and the rather shaky business model Netscape raised a dazzling $2.6 billion with its IPO.

[37] Baines, Crafts and Leunig have found striking similarities between the railway mania of 19th century Britain and the dotcom boom of end-of-twentieth century USA. When railroads first came into widespread use in Britain the reaction of the investment community was feverish, but the impact on the real economy was initially quite small. There was huge speculation in railway shares, followed by a spectacular crash in 1845, even in the shares of those companies which would become giants of industry in later decades. Eventually, railways did turn out to be profitable. The railway as such had a major impact on British economic growth in the 25 years that followed the 1845 crash (Bianes, Crafts, & Leunig, 2001).

[38] The spectacular success of mobile telephony can be explained by the fact that it enabled people to effectively use 'idle time' (travelling, waiting). An optimistic scenario is that this trend has 'taught consumers to want new things', that is, mobile telephone has paved the way for other mobile services (such as wireless Internet access). A pessimistic scenario is that this trend has already filled the gap of 'idle time' and that there is no more room for further time-consuming services.

The entrepreneur is not a generator of novelty *de novo*. Economic systems, just like any self-organised systems, naturally have infrequent large events. However, these events have to be set in motion by the 'acts of will' of the entrepreneur. Hence, the crucial role from the entrepreneur within the overall evolution of an economic system is to introduce those new combinations which have an avalanche effect throughout the system. Once a certain critical mass has been reached the influence of the entrepreneur on the innovation trajectory becomes limited.

If the innovation trajectory does not ride on the wave of an emergent broader societal event the capturing of every additional audience of market niche has to be initiated by the acts of the entrepreneur himself. In most of these cases the entrepreneur will soon run out of resources and his constituency will fall apart.



Schumpeter's *Theory of Economic Development* is a major contribution to the study of technological change and innovation. But we believe that the contribution should not be limited to these specific domains. At a highly abstract level, Schumpeter's explanation of economic growth is a radical departure from the conventional description of economic development. The core premise here is that in the circular flow profits are a symptom of imperfection. Profits – that is, 'supranormal' profits – only occur when the 'perfect' steady state of the circular flow is being disturbed by the wilful acts of the entrepreneur. The primary function of the entrepreneur is to construct a rhetorical track for new combinations. The material track is merely supportive to the rhetorical track. In other words, material progress is a side-effect of the skilful management of the dynamics of expectations. When we combine these arguments we arrive at the astonishing conclusion that profits are in the promises that surround

the introduction of new combinations. Phrased in another way, economic growth is not driven by the accumulation of capital (a la Rostow) but by psychological phenomena such as booms in consumer expectations and business confidence.

More than fifty years ago the Spanish philosopher Ortega y Gasset coined the concept of 'Homo Ludens', 'the Playful Man'. The crucial difference between man and other animal is that the latter cannot imagine another world than the physical world he is living in. Man on the other hand is continuously constructing mental images of better worlds to live in. Well-being, not bare being - is the fundamental necessity of man. Man is the animal that considers necessary only the objectively superfluous and he invented technology to produce these superfluities. Economic growth and technological development is driven by the ever-existing discontent of man with its present material conditions. It is the continuous effectuation of our dreams and the production of superfluous things which we call progress:

> "This invented life – invented as a novel or a play is invented – man calls 'human life', well-being […] have we heard right? Is human life in its most human dimension a work of fiction? Is man a sort of novelist of himself who conceives the fanciful figure of a personage with its unreal occupations and then, for the sake of converting it into reality, does all the things he does – and becomes an engineer? [Ortega y Gasset, 1962:108]

One day by an act of heroic entrepreneurship wireless Internet access will be regarded as a basic necessity of modern life.

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