Slow Innovation

Marc Steen and Steven Dhondt
marc.steen_at_no.nl, TNO, Delft, The Netherlands
steven.dhondt_at_tno.nl, TNO, Hoofddorp, The Netherlands

Please do not quote from this paper without permission of the author(s)

Abstract: Many innovation projects seem to be based on the idea that speed is good; that organizing pressure and moving quickly from idea to implementation is central to more and better innovation. However, many innovation projects—even though they may deliver technical inventions or small-scale pilots—fail to have significant and sustainable impact. We believe that too much focus on speed is one of the reasons for that; that an overemphasis on speed can hamper exploration, reflection and learning. Therefore, we propose *slow innovation*, in order to complement current approaches. Furthermore, we think of innovation processes as complex systems and explore ways to facilitate social processes, between the participants in innovation processes, and to foster joint exploration, reflection and learning. In this paper, we focus on one research programme by TNO which aims to understand innovation processes and to organize these more effectively. Both authors plan to be working in that programme from 2011 to 2014 and will need to develop practical activities and ways of working—which informs our very practical research question: How can we attempt to organize *slow innovation*? We address that question by discussing some ideas of pragmatist philosopher John Dewey's, especially his ideas on practice and theory, on experience and knowledge, and on inquiry and communication, and by developing guiding principles for *slow innovation*. Based on these guiding principles, we discuss a range of practical activities and ways of working for this research programme. We close the paper with discussing some 'next steps' that we anticipate in further preparing this research programme.

Introduction

Currently, the main idea in innovation management is the idea of *speed*. Successful innovation is seen as a speedy process: innovators should organize pressure within the project and move as quickly as possible from idea to implementation. However, many innovation projects—although they may deliver technical inventions and small-scale pilots—fail to have significant and durable impact because of this focus on speed. We think that we also need *slow innovation*, room for exploration, reflection and learning, and attention for social processes within innovation projects, in order to make let these projects have significant and sustainable impact. In this paper we explore possible theoretical underpinnings of *slow innovation* and, based on these, we propose actions for organizing a four-year research programme in which we plan to be working from 2011 to 2014.

We, the authors, work at TNO, the *Netherlands Organisation for Applied Scientific Research*, a research and innovation organization with approx. 4500 employees. TNO's mission is to develop knowledge and to apply knowledge; to bridge the gap between academic research and industrial development. TNO conducts both relatively short-term, market-oriented projects for a range of clients (approx. 400 Million Euro per year) and relatively long-term, knowledge-oriented projects for various government departments (approx. 200 Million Euro per year). In this paper, we focus on one long-

term, knowledge-oriented research programme that has as one of its aims to better understand innovation processes and to organize these more effectively. In the paper, we discuss how we plan to create room within this research and innovation programme to organize *slow innovation*, with which we intend to invoke an alternative, complementary approach to innovation: an approach that provides room for exploration, reflection and learning, so that participants in an innovation process can constructively combine practice and theory and engage in joint learning and joint creation.

As part of the preparation for this programme, we have formulated two research questions: What can we do, practically and theoretically, in order to promote *slow innovation*? Which guiding principles, activities and ways of working can we develop to organize *slow innovation*?

In the sections below, we will first discuss the supposed **need for speed** and propose *slow innovation* as an alternative or complementary approach, and also introduce the view of innovation processes as dynamic, complex systems. In the section after that, we **introduce our case**, the 'Behaviour and Innovation' research programme, and discuss some of its goals. Then we discuss some texts by pragmatist philosopher **John Dewey** in order to develop guiding principles that will help to organize *slow innovation*. Next, we apply these principles to propose and discuss some possible **activities and ways of working** for this programme. We close the paper with a **discussion of 'next steps'**; how we can prepare the programme and what kind of problems we can anticipate.

Problem: The supposed 'need for speed'

According to management scientists, in our current competitive environment, everything should be organised according to 'time-based competition'; 'a broad-based competitive strategy which emphasizes time as the major factor for achieving and maintaining a sustainable competitive advantage. It seeks to compress the time required to propose, develop, manufacture, market and deliver its products' (Inman 2010). Techniques used to enhance the speed are, for example, cross-functional teams, project management and concurrent engineering.

The main image is that most innovations, and certainly in the domain of complex or major societal innovation, fail (Keller and Aiken 2009). This not only has to do with the uncertain nature of the innovations themselves, but also with the way we have organized the innovation process itself. The main goal of innovation management is to speed up the innovation process. We forget that speed is the least important element of the innovation process (Loch et al. 2005). If we stress speed as the most critical performance element of innovation, then we transform the innovation process into a technocratic approach with the wrong elements at the core.

Such speed can only be generated if we put *action* at the front, if we stress the *analytical* mind as the main driver of the processes, if we *reduce* the solution process as making the innovation into small bits, and if we reduce the unknown into something known. This supposed need for speed is based on the assumption that control can help us innovate. In contrast, we believe that innovation starts with and requires *reflection*, *interpretative* minds, and the ability to see the whole picture:

- *Activity as primary driver?* The assumption of project management seems to be that 'movers' or 'champions' can keep everybody active during the project, and that this will help to promote innovation. In contrast, we believe that keeping everybody busy will not lead to more or better innovation. Reflection, insight, creativity, and communication, that is, connected thinking, are needed—and these are not facilitated by moving around busily. Rather, we believe that innovation can be promoted by creating spaces for reflection and conversation.
- *Analytical and reductionist approach?* Another key assumption seems to be that one can organize an innovation process as an analytical and reductionist enterprise. Solutions are sought by breaking down the problem into small parts that can be coped with one by one. However, innovation should (also) be organized as an interpretative process; the people involved need to have time and space for exploration and communication; innovation can occur when people share and create meaning in

conversations with one another (Lester and Piore 2004). Furthermore, a holistic view on possible problem definitions and possible solutions need to be explored and further developed, in a creative process.

- *Known parts?* Related to such reductionist approaches, is the assumption that innovations can be created by reducing unknown problems into known problems. Of course, many innovations are not completely new, but often use or combine existing, known solutions. But the integration of such known realities is not fostered by reducing the problem into separate parts. Again, it is the general insight which is needed at the top level which then can instruct how to start combining known solutions.

We propose another approach to innovation based on exploration, reflection and learning. Control, as enabler of a speed-obsessed perspective on innovation, cannot be at the forefront of such an approach. Instead, we propose that innovation processes should be recognised as *dynamic, complex systems* that cannot be effectively steered in detail. The number of actors, the number of interests and the relations between these are so numerous that these processes are *complex systems*. Furthermore, we propose that innovation processes contain a large number of relations that develop over time, some over a short term and others on a longer term, so that there is *dynamic complexity*.

　　Slow innovation recognizes this and follows the principles of complexity thinking (Stacey 2007). We propose that innovation processes should be organised—not managed—as if they are complex systems, that is, by creating conditions—not by control—and that this is a way to improve the likelihood of successful innovation. We believe that cook-book instructions or any sort of quick-fixes or one-size-fits-all will not help innovation. Rather, we should be thinking in terms of guiding principles which can help us maximize chances for innovations to happen. One guiding principle could be to think humbly of our own efforts to organize innovation; many innovation projects are unsuccessful or do not go as planned—however, our effort remains to up the chances for success.

Case: The 'Behaviour and Innovation' programme

We will study one part of the 'Behaviour and Innovation' (B&I) research and innovation programme, in which we are involved. This programme is part of the *TNO Strategic Plan 2011—2014: Innovating with impact*. In this plan there are 19 application-oriented research and innovation programmes, clustered into 7 'Themes' (*Healthy living, Industrial innovation, Integral Security, Energy, Mobility, Built environment* and *Information society)* and, perpendicular to these, there are five research and innovation programmes (*Models, Sensors, Materials, System Biology, Innovation and Behaviour* and *Strategy and Change*) that are oriented towards developing relatively more fundamental knowledge, tools and methods, which can be used and evaluated in the application-oriented programmes.

　　The 'B&I' programme consists of three parts, each addressing another level: *a micro-level*, targeted at understanding and influencing individual people's, and small groups of people's, behaviour; *a meso-level*, targeted at understanding and improving innovation processes within and between organizations or businesses; and *a macro-level*, targeted at understanding and improving system innovation in a broader societal and political context. We will focus on the *meso-level* part, in which we are involved.

Goals of the programme

The goal is to develop and evaluate (specific and generic) knowledge about effectively organizing innovation processes (from *Programme Proposal*):

> A key ambition is to develop (and evaluate and further develop in practice) a model for effectively organizing cooperation within innovation and change processes, based on understanding innovation processes as 'complex systems' using principles

such as self-organization and emergence, in which many and diverse aspects are integrated (e.g. structures, cultures, processes and competences). Key topics in such a conceptualization of innovation processes are: adaptive capacity, participation, partnering, co-design/co-creation, iterations, multi-disciplinarity and learning. On the basis of these models, we mean to develop a methodology to enhance the adaptive capacity of organizations.

We plan to develop the following models, tools and methods (from *Programme Proposal*):

- *Maturity Model*, which can be used to evaluate and monitor the capabilities of an organization or a network of organizations to encompass innovation and change. The idea is that an organization (or network or organizations) moves through this *Maturity Model*, towards improved capabilities to effectively organize structures, cultures, processes and competences in integral ways, in order to innovate successfully. The Maturity Model not so much gives a checklist for necessary conditions for progress, but rather several sufficient conditions which help foster innovation;
- *Tools for Diagnosing*, for assessing and monitoring the innovation capabilities of an organization or a network of organizations, in relation to the 'maturity model';
- *Tools for Intervention*, for organizing change and improving the innovation capabilities, e.g. focus on structure, culture, processes, competences, on using ICT tools effectively (e.g. using crowd sourcing or other social communication tools);
- *Ways of Working* for improving cooperating and learning within organizations and between organizations, taking into account topics like strategy and organizational conditions.

These models and tools must lead to a new way of organizing innovation and change processes: a way of organizing innovation processes, in which innovation is conceptualized as an *open, participatory, iterative*, and *multi-disciplinary* effort, and which productively combines theories and practices. This generic knowledge will be applied in almost all 'Themes'. These goals are, of course, related to the high-level goals of TNO: to improve the ability of TNO, together with partners and clients, to innovate effectively and efficiently.

Gap between theory and practice

In the *Programme Proposal* we argue that there is a gap between theory and practice (or between practice and theory), in the ways in which we understand and organize innovation processes (from Programme Proposal):

> There is a gap between what is known (theoretically) in academy about innovation processes and how people in industry (practically) organize innovation processes. In academy it is well-known that innovation processes can best be viewed and organized as cyclic or iterative processes and as multi-disciplinary processes… Furthermore, it is advocated that innovation processes can be organized according to the 'open innovation' paradigm or via co-development approaches… However, in practice, innovators often organize their innovation projects as if they are linear processes …, or they do not pay a lot of attention to involve people from different disciplines or from different interests.

We take this gap as a cue to rethink the relation between practice and theory, and theory and practice.

Our practical goal remains to facilitate learning-by-doing while working in innovation processes, and thus improving the participants' ability to innovate more

effectively. We envision that *slow innovation* offers would be an appropriate approach, because it would offer space and opportunities for exploration, reflection and learning. We turn to philosophy to help us re-think the practice and theory and the relations between these, and, more specifically, we turn to pragmatist philosopher John Dewey, because throughout his entire oeuvre he was concerned with these issues. His philosophy, like all philosophical pragmatists, starts and ends with people's concrete experiences and actions. By discussing his ideas, we hope to be able to develop further our ideas for slow innovation.

Theory: Discussing some of John Dewey's ideas

In order to attempt to bridge this gap between theory and practice, we will interpret and apply some insights from pragmatist philosopher John Dewey. *Philosophical* pragmatism is rather different from some common understandings of pragmatism. Sometimes pragmatism is used to refer to approaching a problem pragmatically, that is, by focusing on the means, on instruments and tools, in order to reach an end—an end which is taken for granted and not discussed. This approach could not be more different from the philosophical pragmatism of Dewey, who was worried about focusing on means and advocated, instead, focusing on ends and means in relation to each other—and on organizing processes of inquiry and communication in which people can simultaneously discuss means and ends (cf. RP: 42)[1].

This focus on improvement and positive change is similar to a design approach; for example, Dewey's proposal to organize processes of inquiry is similar to the proposal to organize 'design thinking' (Cross 2006; Lawson 2006; cf. also Thackara 2006: 2, who described design as an engagement with two key questions: 'where do we want to be?' and 'how do we get there?').

Turning to Dewey would seem to be appropriate because he was keen to connect theory and practice, and throughout his career, he connected his 'scholarly work' to 'practical affairs'; he was 'both intelligent *and* engaged' (Hildebrand 2008: 3).

Let us remark, briefly, that, for ideas on organizing change or learning within organizations, we could also have turned to established, contemporary authors in management and organization studies, such as Argyris (1992), Schein (1988), Senge (1990) or Wenger (1998). However, some of these authors seem to have the assumption that control is possible. For example, Letiche (2008, 174-181) argued that: Argyris believes that we can find 'truth' via an *analytical* approach; Schein believes that an accurate *diagnosis* is possible if we organize *processes* and interactions between people involved; and Senge seeks for hidden causalities, in dynamic, complex systems, and to understand and 'leverage' these. Furthermore, Wenger, who has an information systems background, seems to have a rather optimistic perspective on the possibility to effectively organize 'communities of practice' (1998). We have turned to philosopher Dewey, because he rethinks practice and theory on a more fundamental level than these authors in management and organization studies, and because he does not seem to offer quick-fixes.

Below, we will briefly discuss some of Dewey's ideas concerning *philosophy*, *experience*, *knowledge*, *inquiry*, *change* and *communication and cooperation*. After that, we will relate these to our purpose of understanding and organizing innovation processes, and propose several guiding principles for organizing the 'B&I' programme.

Philosophy

Quoting Dewey in the context of innovation and organizational change is appropriate because he saw philosophy as a way to develop tools that people can use to address issues in the real world. He wanted to help 'recover' philosophy, so that 'it ceases to be a device

---

[1] We will use the following abbreviations to refer to texts by Dewey: HWT for *How we think* (1910); RP for *Reconstruction in philosophy* (1920); HNC for *Human nature and conduct* (1922); PP for *The public and its problems* (1927); LTI for *Logic: The theory of inquiry* (1938); and EN for *Experience and nature* (1965).

for dealing with the problems of philosophers and becomes a method, cultivated by philosophers, for dealing with the problems of man' (Dewey 1917: 65).

Furthermore, it would seem that Dewey's philosophy is especially relevant when one wishes to engage with innovation processes—when one is confronted with novelty and wants to bring about change—because Dewey argued that the main task of philosophy is 'to establish working connections between old and new subject-matters', between *what is* and *what could be*:

> 'We cannot lay hold of the new, we cannot even keep it before our minds, much less understand it, save by the use of ideas and knowledge we already possess. … The greater the gap, the disparity between what has become a familiar possession and the traits presented in new subject-matter, the greater is the burden imposed upon reflection; the distance between old and new is the measure of the range and depth of the thought required. (EN: viii-ix).

The larger the innovation, the greater the need for philosophy—one might say. The task of philosophy, as Dewey sees it, is to help people to cope with and to adapt to changing circumstances—circumstances which one can experience as confusing or perplexing, and in which knowledge and processes of inquiry and communication can help people to more better cope, that is, to more effectively think and act.

Experience

Dewey argued that *experience* is 'what James called a double-barrelled word ... it includes what men do and suffer, what they strive for, love believe and endure, and also how men act and are acted upon, the ways in which they do and suffer, desire and enjoy, see, believe imagine' (EN: 8). In other words, *experience*, for Dewey, includes both *what* one does and undergoes and the *process* of doing and undergoing.

Furthermore, Dewey distinguished between two forms of experience: between 'gross, macroscopic, crude subject-matters in primary experience', that is, 'what is experienced as the result of a minimum of incidental reflection', and secondary form of experience of 'refined, derived objects of reflection', that is, 'what is experienced in consequence of continued and regulated reflective inquiry.' (RP: 3-4). Related to this, he advocated moving between these two forms of experience in order that 'the subject-matter of primary experience sets the problems and furnishes the first data of the which constructs the secondary objects' and in order that 'test and verification of the latter [secondary experience] is secured … by returning to things of crude or macroscopic experience [primary experience]' (EN: 5).

Moreover, Dewey practised and promoted an 'empirical method', which asks of us to move back and forth between practices (primary experiences) and reflections (secondary experiences): so that 'refined methods and products be traced back to their origin in primary existence, in all its heterogeneity and fullness; so that the needs and problems out of which they arise and which they have to satisfy be acknowledged' and 'that the secondary methods and conclusions be brought back to the things of ordinary experience, in all their coarseness and crudity, for verification' (EN: 36).

Knowledge

Dewey, and other pragmatists with him, developed an alternative to the dominant conceptualization, in the Western tradition, of theory and practice, which puts theory in a superior position in relation to practice. This is obvious, for example, in the 'Technical Rationality' paradigm, which Schön (who was influenced by Dewey) critiques (1983: 24):

> 'The application of basic science yields applied science. Applied science yields diagnostic and problem-solving techniques which are applied in turn to the actual delivery of services. The order of application is also an order of derivation and

dependence. Applied science is said to "rest on" the foundation of basic science. And the more basic and general the knowledge, the higher the status of its producer.'

Many educational curriculums and processes in the workplace are based on that idea: that science produces theoretical knowledge, which can be transferred, in a top-down manner, to practitioners, who can then apply this knowledge.

Instead, Dewey argued that doing and knowing are inseparable: 'knowledge is a by-product of activity: people do things in the world, and the doing results in learning something that, if deemed useful, gets carried along into the next activity' (Menand 2001: 322). It is inappropriate and ineffective to separate practice and theory, because 'thinking and acting are just two names for a single process—the process of making our way as best we can in a universe shot through with contingency' (Menand 2001: 360).

Furthermore, Dewey saw *knowledge* differently than is commonly done, for example, in traditional philosophy and in mainstream science. The latter are typically concerned with general principles, fixed essences and stable facts, with what is 'universal' and 'necessary' (RP: 78); their quest is to create general knowledge claims about how things are—what Dewey called 'the spectator conception of knowledge' (RP: 112). Conversely, Dewey held that knowledge is always provisional and that we should continuously reconstruct knowledge based on experiences; experiences with are always 'particular' and 'contingent' (RP: 78). In addition, Dewey provides an explanation for our 'preference for unity, permanence, universals over plurality, change and particulars' (EN: xi). It is a result of our experiences of new, confusing or unsettling situations: 'The need for security compels men to fasten upon the regular in order to minimize and to control the precarious and fluctuating' (EN: xi).

Moreover, Dewey suggested appreciating 'applied' science in relation to 'pure science', because it is typically concerned with practice and theory in close relation to one another. Thus, one mighty say that applied science is *really* science because it is concerned with bringing about change in the *real* world:

> 'What is sometimes termed "applied" science, may then be more truly science than is what is conventionally called pure science. For it is directly concerned with not just instrumentalities, but instrumentalities at work in effecting modifications of existence in behalf of conclusions that are reflectively preferred.' (EN: 161).

Inquiry

Dewey developed, in various versions (e.g. HWT; LTI), ways to organize processes of inquiry. He wished to help people to organize inquiry as a process of careful, reflective thinking and careful, practical experimentation; a process in which the problem is explored and articulated, and in which possible solutions are explored and tested. He envisioned a process of inquiry that starts from a situation of perplexity and that moves, via a process in which doing and thinking are fused, to a situation which contains some sort of resolution. He defined inquiry as 'the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole.' (LTI, 104-5)

He wished to provide an alternative to what often happens; that people start with taken-for-granted assumptions or that they jump to conclusions too quickly. He called this '*the* philosophic fallacy', in which people confuse 'eventual functions', that is, the outcomes of a situation, and 'antecedent existence', that is, what comes before the situation (EN, 29). Throughout his work, he was keen to question taken-for-granted assumptions and dichotomies, like object-subject, nature-experience or and individual-social. Questioning such assumptions and dichotomies, enabled him to explore and develop innovative and better approaches to problems which were problematic precisely because these assumptions and dichotomies stood in the way of finding effective solutions.

In short, Dewey believed that one should organize processes of inquiry in which people jointly explore problems and jointly develop solutions. In such an approach, knowledge is not concerned with correctly representing some external reality, but with brining about change in a desired direction.

Change

A key element in Dewey's work, besides his 'Practical starting point', is his 'Melioristic Motive'; he believed that '*this* life is neither perfectly good nor bad; it can be improved only through human effort' (Hildebrand, 2008: 4-5).

> 'Meliorism is the belief that the specific conditions which exist at one moment, be they comparatively bad or comparatively good, in any event may be bettered. It encourages intelligence to study the positive means of good and the obstructions to their realization, and to put forth endeavor for the improvement of conditions.' (RP: 178).

Dewey believed that we can encourage people to engage in 'reflective thinking' so that they can better understand and organize their impulses and habits (HNC) and that people who share similar or related interests can develop and organize 'publics' through which they engage with politics (PP).

We would like to remark that Dewey's focus on improvement, on positive change, is different from what many branches of the natural sciences are concerned with. In the latter, there is often a friction between *what is* and *what we know about what is*. In contrast, some branches of the social sciences, are concerned with a friction between *what is*, and *what could be* or *what ought to be*: there is a contrast 'between an existence which is actual, and a belief, desire and aspiration for something which is better but non-existent' (EN: 220). Indeed, the social sciences are—or should be—concerned with *what could be* or *what ought to be*; with values, not (only) with facts (Flyvbjerg 2001).

Communication and cooperation

A last issue, related to most issues mentioned above, is Dewey's belief that we can—and indeed *should*—organize and promote processes of communication and cooperation between people in order to bring about positive change. In his advocacy, he was keen to focus on *processes* because he believed that a carefully conducted process is a critical element in any attempt to generate positive results. For example, he was keen to use verbs and adverbs, rather than adjectives or nouns, because these express 'a way, a mode of acting' (RP: 156).

He had especially high expectations of people's abilities to engage in communication, and wrote: 'Of all affairs, communication is the most wonderful' (EN: 166). He argued that communication is not about expressing *what is*, but is about the process of communication and cooperation (similar to his focus on the process of inquiry in order to develop and test knowledge, instead of focusing on knowledge as if it were referring to some fixed, stable truth):

> 'The heart of language is not "expression" of something antecedent, much less expression of antecedent thought. It is communication; the establishment of cooperation in an activity in which there are partners, and in which the activity of each is modified and regulated by partnership.' (EN: 179)

Guiding principles

Our present purpose is to articulate activities and ways of working to practically organize this 'B&I' programme, which aims to better understand and to effectively organize innovation. For that purpose, we propose the following guiding principles (in

engineering-style bullet points, although we intend to *not* treat them as cook-book instructions):

- We need move back and forth between practices ('primary experiences') and reflections ('secondary experiences'); we need to engage with specific, practical situations and reflect on these specific, practical experiences;
- We need to treat knowledge as always provisional and we need to continuously reconstruct knowledge based on experiences; thus, people can generate knowledge based on practices, which others can use in their practices;
- We need to organize processes of inquiry in which participants jointly explore and articulate which problem to address, and jointly explore, develop and test solutions; and we need to be concerned not only with *what is*, but also with *what could be* or *what ought to be*;
- We need to promote and foster processes of communication and cooperation between participants, in order to realize the above—these are also intended to facilitate processes of individual and joint learning.

These guiding principles are intended to bridge the gap between practice and theory; to productively combine doing and thinking—because separating them from one another will inevitably lead to either 'unintelligent practice' or 'unpractical intelligence' (EN: 93).

Proposal: Activities and ways of working in slow innovation

In this section, we will apply these guiding principles to propose specific activities and ways of working to practically realize the 'Innovation and Behaviour' programme. (In the proposal for the programme, we did already propose and discuss 'social learning' and 'open innovation' as ways of working and introduced some terms to express how we envision to organize the programme—the present article elaborates on that.)

Social learning

A key activity will be to initiate and organize the *TNO Innovation Impact Academy*. This will be an environment that is intended to promote exploration, reflection and learning, in which people from TNO and people from partner organizations and client organizations will participate. The idea is to bring together people who work in diverse projects in the *Themes* (see section 'Our Case', above) and people who work in the 'B&I' programme, so that they can engage in joint learning—so that the former can engage in reflection (and in secondary experiences), and the former can engage in practices (and in primary experiences). We imagine that, in this *TNO Innovation Impact Academy*, we can learn-by-doing; we can develop, and apply, try-out and further develop (generic) theories, models and tools, based on (specific) practices.

We envision that people from the 'Themes' will work in the 'B&I' programme for a couple of months in order to 'reflect on what they do', and vice versa, that people from the 'B&I' programme 'get their feet wet' and 'their hand dirty' in the 'Themes'. People who have moved to this other context (from a 'Theme' to the 'B&I' programme, or the other way around) will maintain in contact with the people in their home base, via 'home group sharing', for example via meetings in which they talk about what they experience 'out there'. Furthermore, we envision, for example, 'open fire settings' ('haardvuursessies' in Dutch) in which people can share stories in a relaxed way, 'friendly consulting' in which project team members provide peer reviewing and peer support to one another.

An idea to organize the 'open fire settings', 'friendly consulting' and 'home group sharing' (mentioned above) is to organize storytelling as a way to express and share experiences and to facilitate joint learning. This would pose a more productive alternative to the ubiquitous sheets presentations with only bullet-pointed conclusions. Storytelling would be a more appropriate way for people to talk about what really matters to them. A related idea is to identify people, within and outside TNO, who are innovation 'virtuosos', for example, because of their 'craftsmanship' (Sennett 2008), their passion

and virtuosity in the craft of innovation management, and to invite them to talk about their 'primary' and 'secondary' experiences with innovation projects.

We propose that Dewey's ideas on the need to move back and forth between 'primary experiences' and 'secondary experiences', on the need to organize processes of inquiry and learning, based on communication and cooperation are critical to do this successfully.

For example, there is a risk that, in this 'B&I' programme we create our own 'ivory tower' and become abstract and distanced from practice; we would develop knowledge that we intend to transfer to, for example, colleagues at TNO, who are conducting innovation projects for a client, for example a hospital, where these innovation projects will impact the practices of hospital employees, who are working for patients (which would be an undesirable case of 'Technical Ratinoality'). In this example, the theory can be more than five steps away from practice—which would not be in line with what we would like to do. It would then be a good idea if the people from the 'B&I' programme get out of their ivory tower and go to this hospital (marketing people would maybe call this a 'safari', with several strange and undesirable connotations attached to it), in order to have some very specific and contextualized 'primary experiences', so that we can empathize with the patients, the care professionals, the people working on this project, etcetera. We can, of course, think of more and more detailed examples of doing this—the point is that we need to move between practice and theory.

Moreover, by facilitating social processes, we would like to mitigate the 'lone wolf' effect; we would not like to see isolated people develop knowledge about innovation processes or people keeping this knowledge to them or to some closed circle around them. This effect occurs sometimes within TNO, possibly because people perceive their 'knowledge' as critical to their own 'unique selling proposition', that is, their position within TNO, which (unintentionally) makes colleagues into competitors. We expect that *Engaged Management*, that is, managers who actively encourage and support cooperation and sharing knowledge, would be necessary to mitigate this effect.

Developing knowledge

Another goal is to develop knowledge and apply knowledge; this is not only TNO's mission, but also critical to the 'B&I' programme. In our case, we will be concerned with knowledge that helps to better understand innovation processes and to organize these more effectively. We hope to develop and apply this knowledge through 'learning-by-doing'; by active involvement in projects in these 'Themes', by getting our 'feet wet' and our 'hands dirty'. This situation can be visualized—see Figure 1.

In order to ensure a productive combination of developing theories and improving practices, we need to do the following:

- We will review current theories and methods (state-of-the art, e.g. from academia, and also by making explicit the diverse experiences and tacit knowledge within TNO). Based on that, we can develop practical and workable theories and methods, which we can then make available to projects in the 'Themes' (*arrows 1*).
- These (practical, workable) theories and methods will be applied in diverse projects in these 'Themes' (A, B, C, D, E); partly sequentially (e.g. to facilitate iterations and learning over a period of time) and partly in parallel (e.g. to see differences between how one theory or method works in different projects) (*arrows 2*).
- By applying these theories and methods within diverse practice, practical knowledge and know-how is generated. The value of theories and methods is in their application—and this application of innovative knowledge, in application areas that are relevant to society, is a key role of TNO (*arrows 3*).
- Based on these practical experiences, we can develop and further improve theories and methods, and possibly we can generate added value for academia by practically applying and also combining theories and methods (X+, Y+, Z+) (*arrows 4*).
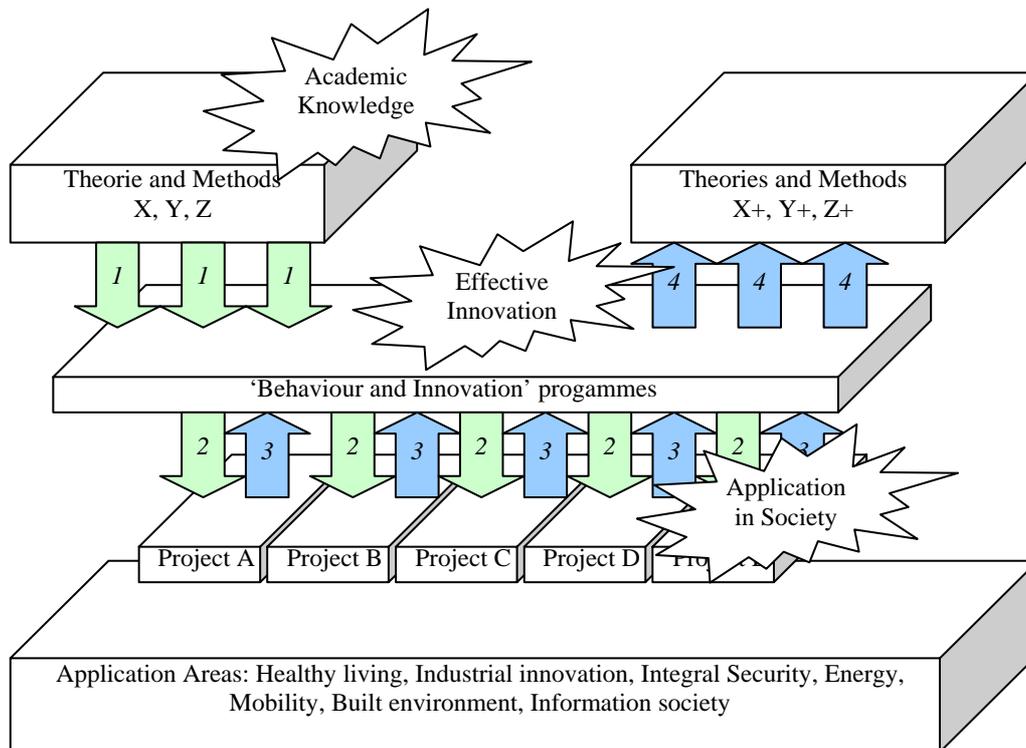
Figure 1: Relations between Academic Knowledge, Effective Innovation and Application in Society (with excuses for the inappropriate suggestion of hierarchy between them)

In short, we hope to develop two kinds of added value: for academia, we hope to deliver theories and methods for better understanding innovation processes; and for practitioners, we hope help organizations to innovate more effectively by providing practical knowledge and tools

We have a challenge to find ways to move 'up' from specific knowledge (from the projects in the 'Themes') to generic knowledge (in the 'B&I' programme), and to move 'down', the other way, so that we can learn from specific projects and develop the generic *Maturity Model* and the generic *Tools for Diagnosing* and *Tools for Intervention* (see 'Our Case', above). Also, we need to finds ways to move knowledge in-between specific and very different innovation projects; for example, between a project about the business model for electric cars, a project about supporting informal care and social cohesion, a project with new ways to cooperate between policemen, firemen and paramedics, and a project with electronic sensor in water management. It could be difficult to organize productive conversations between people who work on such different projects.

Moreover, this knowledge has to meet two needs: it has to be innovative and sound from the perspective of academia; and it has to be innovative and practical form the perspective of industry, the businesses and organizations that apply this knowledge. We propose to cooperate with both academics and industry to meet their different needs.

For cooperating productively with academia, we envision annual *International Round Tables*, which we organize together with two or three internationally leading groups, with the goal to share ideas and knowledge, and to identify and develop opportunities to cooperate, for example in European research programmes.

For cooperating productively with industry, we envision *Summer Schools*, in which both people from academia and from industry share experiences. Furthermore, we could identify *Change Agents*, that is, people within both the 'Themes' and within the 'B&I' programme who can function as 'linking pins' and can advocate and help to bring about change. In addition, we envision *Co-R&D Spaces* in which TNO, partners or clients can engage in 'open innovation' (Chesbrough 2003) processes, for example, in public-private projects, and *Field Labs*, *Learning Spaces* and in which people can practically try

out innovations 'in the field' and cooperation with specific *Incubators* that can help to create spin-off companies, in the course of the programme.

Furthermore, we envision that, in a programme dedicated to innovation, we should follow innovative approaches and use innovative methods and tools to organize the programme. For example, we intend to organize *Creative Programs*, which would include open innovation, partnering and co-design approaches, and use methods like crowd-sourcing, 'challenges' (multi-disciplinary, one-week projects), tools for online collaboration, etc.

We propose that Dewey's ideas on the need to treat knowledge as provisional, the need to promote and foster processes of inquiry, of learning, of communication and of cooperation are critical, and, as indicated above, such processes cannot be organized via 'cook book instructions' or forced in any top-down manner. On the contrary, such processes need to be facilitated both bottom-up and top-down.

As we have said earlier, it is not so much that innovation processes can be accelerated by a 'ten-step approach', rather, we need to acknowledge that we need to create a process in which we can maximize the chance that innovation can take place. Here are some first ideas how to do this. We would like to have 'real spaces, 'real surroundings', that is, situations in which people can (also) engage with bodily practices and have 'real' (primary) experiences—rather than, as is often the case in the offices of knowledge workers, sitting behind desks, in relatively dull and uninspiring surroundings, and using only your head and having 'artificial' (secondary) experiences. Doing something practical, in addition to reflecting on it. This can be similar to the crucial role of (early) prototypes and (informal) experiments in designers' practices, which can also be found, for example, in 'ateliers' or workshops (Sennett 2008), in which craftsmanship is fostered, and in which people learn to use and develop their skills.

Discussion of 'next steps'

In this paper, we have claimed that innovation processes should not be organised for speed and proposed *slow innovation*, and drew attention to the need, not for speed, but for creating room for exploration, reflection and learning, for more integrative, interpretative approaches. We explored how ideas from John Dewey can help us to understand why such approaches can be helpful.

Based on these ideas, we proposed and discussed some possible activities and ways of working for the 'Behaviour and Innovation' programme at TNO. One of the goals of the programme is to promote innovation in The Netherlands, and to help solve problems in the Dutch society and industry. The introduction and implementation of the programme will not be a simple endeavour. For example, we may encounter 'not invented here' reactions when we talk with others (in TNO and in partner or client organization) about how *we* think that *they* could run their innovation projects differently.

In addition, we anticipate difficulties in our approach to stimulate and facilitate people who participate in the innovation projects to engage in reflection, especially if these people are normally not very used to reflection. For example, we may ask them to keep diaries in which they describe not only what happens on a content level, but also on a process and interpersonal level and on a personal and emotional level. Probably many of us, including ourselves, will find that difficult or confronting. Furthermore, we have plans to encourage people to share and discuss their experiences—which would involve participants to not also write about their experiences but also to express these: to talk about their feelings and to listen to other people… Moreover, we will probably encounter (interesting but also difficult) issues of reflexivity, because we plan to develop knowledge about and methods for innovation, which we will not only apply to others, but also to ourselves.

In addition, there will probably be critical questions, for example about added value and quality from the academia-side, and about added value and applicability from the industry-side. Furthermore, we will have to deliver results—but what kind of results, not only knowledge about innovation processes, but also successful cases, of how we have helped innovation forward, in order to 'prove' that our knowledge and methods

work. Moreover, we will probably have to evaluate and discuss not only the effects of our interventions on *processes* of innovation (which can be hard enough to express in 'hard' terms, which is often asked for), but also to evaluate and discuss the effects of our interventions, via the innovation processes in which we are involved, on the *outcomes* of these processes. We will probably be asked to 'prove' that our *slow innovation* approach has positive effects on the results of an innovation process.

And, last but not least, we will need to discuss our idea of *slow innovation* with our colleagues and peers, and see whether they can become enthusiast about it—and in this process, our ideas on *slow innovation* will probably change… and we will welcome that, because we believe that is part of the innovation process.

References

Argyris, Chris (1992), *On organizational learning*. Cambridge, Massachusetts: Blackwell Publishing.

Chesbrough, H. W. (2003), *Open innovation: The new imperative for creating and profiting from new technology*. Boston, Massachusetts: Harvard Business School Press.

Cross, Nigel (2006), *Designerly ways of knowing*. London: Springer-Verlag.

Dewey, John (1910), *How we think*. Boston, New York, Chicago: D.C. Heath and Co.

Dewey, John (1917), 'The need for a recovery of philosophy', in *Creative intelligence: Essays in the pragmatic attitude*, John Dewey, ed. New York: Henry Holt and Co., 3-69.

Dewey, John (1920), *Reconstruction in philosophy*. New York: Henry Holt and Co.

Dewey, John (1922), *Human nature and conduct: An introduction to social psychology*. New York: Henry Holt and Co.

Dewey, John (1927), *The public and its problems*. New York: Henry Holt and Co.

Dewey, John (1938), *Logic: The theory of inquiry*. New York: Henry Holt and Co.

Dewey, John (1965), *Experience and nature*. La Salle, Illinois: Open Court Publishing.

Flyvbjerg, Bent (2001), *Making social science matter: Why social inquiry fails and how it can succeed again*. Cambridge: Cambridge University Press.

Hildebrand, David (2008), *Dewey: A beginner's guide*. Oxford: Oneworld Publications.

Inman, R. A. (2010), 'Time-based competition', in *Encyclopedia of Management (online document)*.

Keller, S. and C. Aiken (2009), 'The inconvenient truth about change management: Why it isn't working and what to do about it.', *The McKinsey Quarterly*, April.

Lawson, Bryan (2006), *How designers think: The design process demystified (fourth edition)*. Amsterdam: Elsevier.

Lester, Richard and Michael Piore (2004), *Innovation: The missing dimension*. Cambridge, Massachusetts and London, England: Harvard University Press.

Letiche, Hugo (2008), *Making healthcare care: Managing via simple guiding principles*. Charlotte, NC: Information Age Publishing.

Loch, C. H., C. Terwiesch and C Rush (2005), 'Rush and be wrong or wait and be late? A model of information in collaborative processes', *Production and Operations Management*, 14(3), 331-43.

Menand, Louis (2001), *The metaphysical club: A story of ideas in America*. New York: Farrar, Straus and Giroux.

Schein, E (1988), *Process consultation*. New York: Addison-Wesley.

Schön, Donald A. (1983), *The reflective practitioner: How professionals think in action*. Harper Collins.

Senge, Peter (1990), *The fifth discipline: The art and practice of the learning organization*. New York: Doubleday.

Sennett, Richard (2008), *The craftsman*. London: Penguin Books.

Stacey, R. (2007), *Strategic management and organisational dynamics*. Englewood Cliffs: Prentice Hall.

Thackara, John (2006), *In the bubble: Designing in a complex world*. Cambridge, Massachusetts and London, England: MIT Press.

Wenger, Etienne (1998), *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.