Managing innovation for sustainability

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Abstract: 'Sustainability' is a major and growing driver of business change. Its implications for innovation are clear – living and working in a world of up to 9 billion people with rising expectations, providing energy, food and resource security, dealing with climate change, ecosystem degradation, a widening economic divide and a host of other interdependent issues will require massive change in products, service, processes, marketing approaches and the underlying business models which frame them. The focus of this paper is to develop an understanding of new approaches to innovation management required to take account of the growing pressures and emerging opportunities in the 'sustainability' agenda. In particular it draws on case studies of a variety of organizations to help answer the question of what practical actions might be taken beyond the rhetoric of moving towards greater sustainability or 'greening' of business.

Keywords: sustainability, innovation routines; dynamic capability

1 Introduction

The evidence underpinning concern about sustainability is extensive and there is a sense of urgency about much of the discussion it provokes (MEA 2005, UNEP 2007, Rockstrom et al 2009. WWF suggests that lifestyles in the developed world at present require the resources of around 2 planets and if emerging economies follow the same trajectory this will rise to 2.5 by 2050. (WWF 2010) Others draw attention to the implications of reaching 'peak' availability of key strategic energy and physical resources. (Brown 2011; Adams and Jeanrenaud 2008; Heinberg 2007)

Current discussion echoes earlier concerns dating back to the 1972 Club of Rome report on 'Limits to growth' and it is important, as then, to temper the more sensational predictions with an understanding of where and how change is taking place and make realistic assessments of potential impacts (D. H. Meadows et. al. 1972)(Cole, Freeman, Jahoda, & Pavitt, 1973).

But it is also important to reflect a more optimistic view which sees significant *opportunities* emerging. The provision of alternative goods and services, more efficient approaches to resource and energy management, new partnerships and ways of working can help unleash a new era of economic development. A recent Price Waterhouse Coopers report suggests significant market potential in the

provision of 'green' goods and services; their estimate was as high as 3% of global GDP. UNEP's (2011) report illustrates how 'greening the economy' is already becoming a powerful new engine of growth in the twenty-first century. The World Business Council for Sustainable Development's (WBCSD) Vision 2050 sets out new opportunities for businesses in responding to sustainability challenges, promoting whole system perspectives (WBCSD 2010).

The scale on which change is required is also leading some commentators to talk about a systems level shift and to argue that what is emerging – as a consequence of socio-economic pressures and enabling technologies – is another 'long wave' of innovation (Freeman & Perez, 1989; Perez, 2002). In their studies of such 'Kondratiev' waves Freeman and Perez talk about the need to change the lens through which activities are viewed – the 'techno-economic paradigm' (TEP) – and the economic growth cycles which are associated with this. Long waves of this kind are associated with an acceleration towards a crisis followed by a period of significant economic growth and social restructuring. Sustainability commentators see a '6th wave' emerging which is linked to growing social movements (and the communication networks underpinning them. Figure 1 illustrates this.

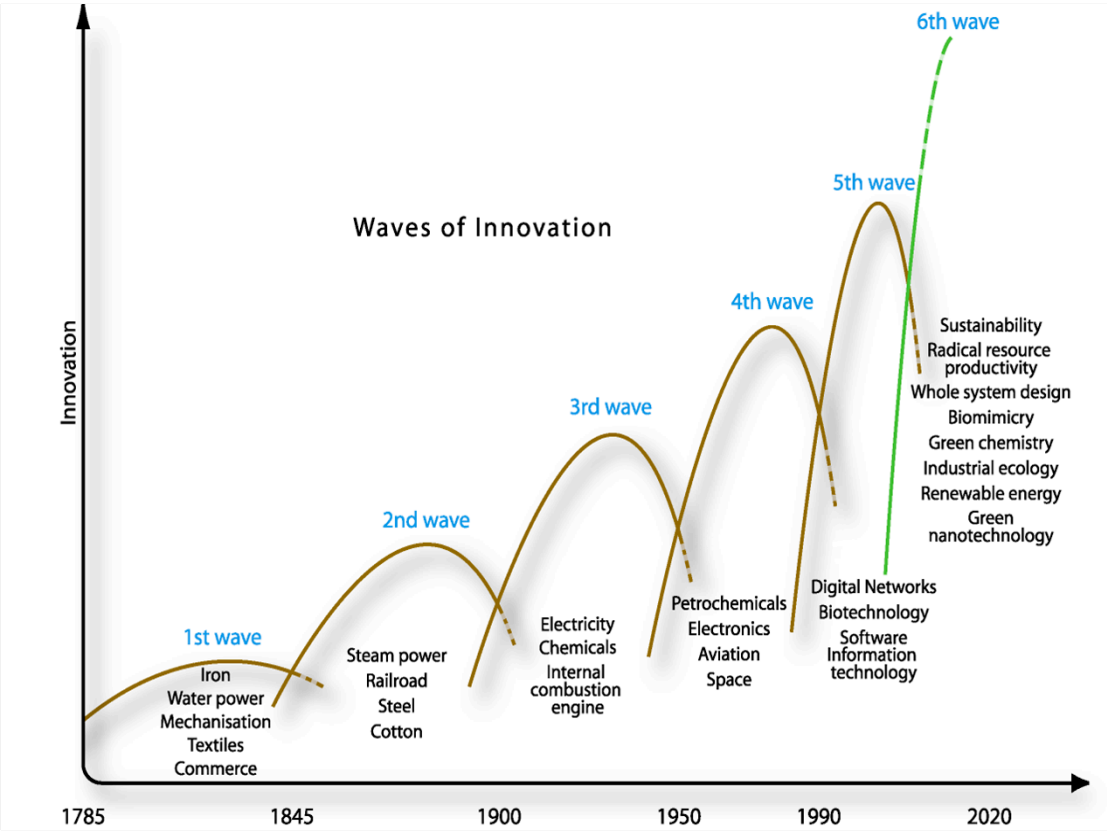


Figure 1: Sustainability as a 6th 'long wave' (Source The Natural Step 2004)

Whatever the perspective adopted it is clear that change – innovation – will be needed. Growing concern of the kind described above is driving a combination of increasingly strong legislation, international environmental management standards, new sustainability metrics and reporting standards that will force business to adopt 'greener' approaches if they are to retain a licence to operate. At the same time the opportunities opened up for 'doing what we do better' (through 'lean, green' investments in improving efficiencies around resources, energy, logistics, etc.) and 'doing different' – radical new moves towards systems change – make it an increasingly significant item in strategic planning amongst progressive organizations of all sizes. Evidence for this can be seen in their participation and active engagement with United Nations and NGO business initiatives (such as the UN Global Compact and The Climate Group) and in networks like the Global Sustainability Forum. It is also reflected in strategic human resource development – for example the growth in job titles dealing explicitly with the sustainability agenda and of specialist programmes such as WWF's One Planet MBA and One Planet Leaders.

Whilst there is plenty of discussion about the need for innovation it is less clear *how* this process will be managed. Innovation research highlights a well-established framework for what might be termed 'best practice' innovation – a suite of routines around which organizations can organize the search, select and implementation stages of an innovation process (Tidd & Bessant, 2009). Typical elements include well-established approaches and criteria for strategic decision-making and resource allocation to innovation projects and stage gate systems for reviewing the validity of these decisions as innovation projects take shape. But the theory of dynamic capability argues that organizations need to deal with a changing context by reviewing these routines and adapting, editing and adding to them (Teece & Pisano, 1994).

So we need to ask whether our current models for handling the process are sufficient – or will the nature and pace of change be so disruptive that it requires radically new approaches? What kinds of innovation ecosystem might emerge and how will current players position themselves within it? What opportunities exist for entrepreneurs and how can they best frame their activities to ride the waves of radical change? What new skills will we need within – and between – our organizations? What tools, techniques and approaches will help equip established players and aspiring new entrants to manage effectively? In the face of radical change, what do we need to do more of, less of and differently in the ways we manage innovation?

2. Managing innovation

The innovation challenge is essentially around processes of search (for innovation trigger signals), selection (resource allocation) and implementation. As many writers have noted organizations develop 'routines' for these activities and these behaviour patterns gradually become embedded and reinforced into policies, structures and processes (Nelson & Winter, 1982)(Arrow, 1962).

Within an established 'selection environment' organizations become linked to particular technological and market trajectories which effectively bound their routines. This favours established incumbents since they have evolved within that environment and have developed well-rehearsed and effective routines for dealing with it (March, 1991). But it can also mean that they lack the ability to search and explore in alternative and novel environments – often expressed as an inability to '*think outside the box'*. At the limit – as Dorothy Leonard argues – their 'core competencies' may become 'core rigidities' which limit the organization's ability to deal with changing conditions (Leonard-Barton, 1995).

The issue is problematic because different degrees of novelty require different solutions to the search, select, implement questions and trying to manage these simultaneously – developing 'ambidexterity' - sets up tensions across an organization (M. Tushman & O'Reilly, 1996). For example, there is a long standing discussion in innovation literature around' exploration' and

'exploitation' – both are search behaviours but one is essentially incremental, adaptive learning whilst the second is radical, generative learning (Benner & M. L. Tushman, 2003)(March & Olsen, 1981).

In similar fashion concern with selection (and subsequent resource allocation) has led to the evolution of routines for dealing with this - decision rules and criteria, portfolio techniques, stage gate review systems, etc. Different configurations to suit different size and scale of projects have been explored – for example 'fuzzy front end' tools for early stage selection (Koen et al., 2001) , 'fast track routines' for simple small-scale projects (Belliveau, Griffin, & Somermeyer, 2002) and idea management funnels and systems for use in high involvement innovation where the participation of many people in suggestion schemes leads to a high volume of idea flow for screening (Schroeder & Robinson, 2004)(Bessant, 2003).

Under 'discontinuous' conditions – triggered, for example, by the emergence of a radical new technology or the emergence of a new market, or a shift in the regulatory framework – established incumbents often face a major challenge. Heuristics and internal rules for resource allocation are unhelpful and may actively militate against placing bets on the new options because they are far outside the firm's 'normal' framework. As Christensen argues, in his studies of disruption caused by emergence of new markets, the existing decision-making and underlying reward and reinforcement systems strongly favour the status quo, working with existing customers and suppliers. Such bounded decision making creates an opportunity for new entrants to colonize new market space – and then migrate towards incumbent's territory (Christensen, 1997). In similar fashion Henderson and Clark argue that shifting to new 'architectures' – new configurations involving new knowledge sets and their arrangements – poses problems for established incumbents (Henderson & Clark, 1990).

We suggest that innovation for sustainable development (ISD) highlights this problem of dynamic capability in that it forces firms to learn new approaches and let go of old ones around the core search, select and implement questions. By its nature ISD involves working with different knowledge components – new technologies, new markets, new environmental or regulatory conditions, etc. – and firms need to develop enhanced absorptive capacity for handling this (Zahra & George, 2002). In particular they need capability (and enabling tools and methods) to acquire, assimilate and exploit new knowledge and to work at a systems level.

3. Managing system-level innovation

A key point is that the search and selection space is not one-dimensional. As Henderson and Clark point out it is not just a question of searching near or far from core knowledge concepts but also *across* configurations – the 'component/architecture challenge. They argue that innovation rarely involves dealing with a single technology or market but rather a bundle of knowledge

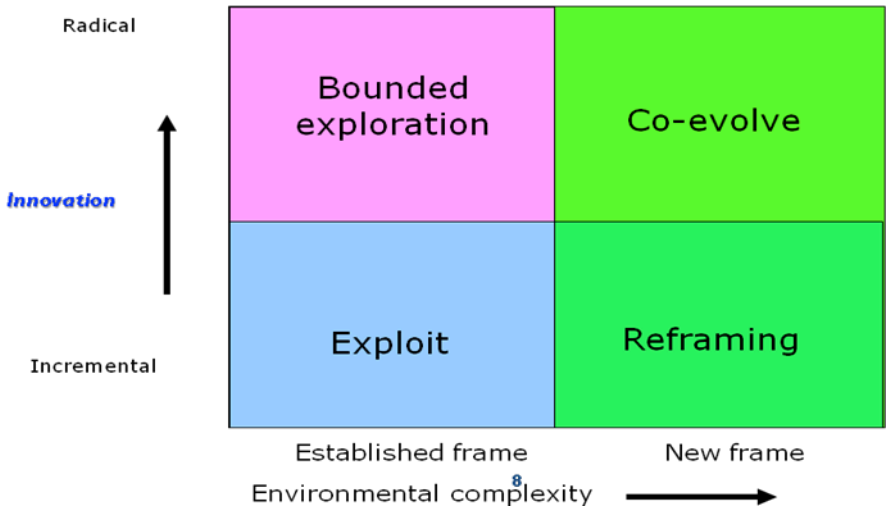
which is brought together into a configuration. Successful innovation management requires that we can get hold of and use knowledge about *components* but also about how those can be put together – what they termed the *architecture* of an innovation (Henderson and Clark 1990). This is particularly relevant in the case of ISD where a systems level view is required.

One of the difficulties with this is that innovation knowledge flows – and the structures which evolve to support them – tend to reflect the nature of the innovation. So if it is at component level then the relevant people with skills and knowledge around these components will talk to each other – and when change takes place they can integrate new knowledge. But when change takes place at the higher system level – 'architectural innovation' in Henderson and Clark's terms – then the existing channels and flows may not be appropriate or sufficient to support the innovation and the firm needs to develop new ones. This is another reason why existing incumbents often fare badly when major system level change takes place – because they have the twin difficulties of learning and configuring a new knowledge system and 'unlearning' an old and established one.

We can map this innovation management challenge as in figure 2. The vertical axis refers to the familiar 'incremental/radical' dimension in innovation whilst the second relates to 'environmental complexity' - the number of elements *and* their potential interactions. Rising complexity means that it becomes increasingly difficult to predict a particular state because of the increasing number of potential configurations of these elements.

In this way we capture the 'component/architecture' challenge outlined above. Firms can innovate at component level – the left hand side – in both incremental and radical fashion but such changes take place within an assumed core configuration of technological and market elements – the dominant architecture. Moving to the right introduces the problem of new and emergent architectures arising out of alternative ways of framing amongst complex elements. Arguably ISD represents a significant challenge to innovation management because it requires bringing in multiple new elements and stakeholders.

Figure 2: Simplified map of innovation space



Zones 1 and 2 represent 'business as usual' innovation space within which established routines for search, select and implement work well. But on the right hand side there are configurations which require the development of new routines and the modification – or even abandonment – of existing ones. This favours new entrant entrepreneurs over established players who have both a learning and an 'unlearning' challenge around such configuration of innovation management routines.

Reconfiguration can take place at incremental level (zone 3) – essentially finding new ways of doing what we already do. The case of 'lean' thinking provides an example; the extreme conditions of post-war Japan brought new elements into the frame as far as manufacturing was concerned. Faced with shortages of skilled labour, reliable energy sources or key raw materials firms like Toyota were unable to follow the establish mass production trajectories which dominated innovation thinking. Instead they developed an alternative approach to process innovation based around minimizing waste. This led to a radically different performance in terms of key productivity indicators but it also involved a suite of new innovation management routines (for example the development of effective employee involvement, concurrent engineering, kaizen tools and methods, etc.).

Zone 4 represents the 'edge of chaos' complex environment where innovation emerges as a product of a process of co-evolution. Rather than the end point of a predefined trajectory it is the result of complex interactions between independent elements. Processes of amplification and feedback reinforce what begin as small shifts in direction – attractor basins – and gradually define a trajectory. (This is the pattern in the 'ferment' state / fluid state before a dominant design emerges)

(Utterback, 1994). Search and selection strategies here are difficult since it is, by definition, impossible to predict what is going to be important or where the initial emergence will start and around which feedback and amplification will happen. Under such conditions innovation strategy breaks down into three core principles: - be in there, be in there early and be in there influentially (i.e. in a position to be part of the feedback and amplification mechanisms).

4. Mapping innovation for sustainable development (ISD)

We suggest that it is in zones 3 and 4 that much of the innovative activity around ISD will take place. In terms of sustainability outcomes zone 3 is associated with the 'eco-efficiency' concept (WBCSD 2000) which involves finding new and more efficient ways of 'doing more with less'. Eco-efficiency, with its famous '3 Rs' - reduce, re-use, recycle - has its roots in early industrialization, but is now being widely adopted by companies. Reducing carbon footprint through supply chain improvements or switching to less energy or resource intensive products and services which deliver equivalent value can generate significant savings. 3M, for example, saved nearly US$ 1.4 billion over a 34 year period and prevented billions of pounds of pollutants entering the environment through their Pollution-Prevention-Pays (3P) programmes (3M 2011). GE Industrial saved $12.8 million per year by using high-efficiency lights in their plants. One of Alcoa's facilities in France achieved an 85% reduction in water consumption leading to a $40,000 a-year reduction in operating costs (Senge et al 2008).

In zone 4 it will involve significant *systems* level thinking around emergent and radically different solutions. Such system-level innovation has the capacity to generate positive social and environmental impacts rather than simply minimizing negative ones, representing a shift from eco-efficiency to 'eco-effectiveness' (McDonough and Braungart 2002). According to Porter and Kramer (2011) the focus on creating 'shared value', which builds connections between social, environmental and economic progress, has the power to unleash the next wave of global growth.

One aspect of this is the involvement of multiple players, that have traditionally not worked together, in co-creating system level change. For instance, Grameen Shakti, a rural renewable energy initiative in Bangladesh, fosters collaboration between the micro-finance sector, suppliers of solar energy equipment and consumers, enabling millions of poor households to leapfrog to new energy systems. It is generating new employment opportunities, increasing rural incomes, empowering women, and reducing the use of environmentally polluting kerosene . Grameen Shakti is the world largest and fastest growing rural renewable energy company in the world (Grameen Foundation 2011).

Unilever's new Sustainable Living Plan, which builds partnerships with multiple stakeholders including suppliers, NGOs, consumers, aims to create a better future in which billions of people can increase their quality of life without increasing

their environmental footprint. The new plan is fueling innovation, generating markets and saving money (Unilever 2011).

Innovations can arise from developing unusual partnerships across sectors. For example, the GreenZone, in Umea, Sweden, designed by architect Anders Nyquist, is an early example of holistic planning. It involves a block of interconnected businesses, including a car dealership, a petrol station and carwash and a fast food restaurant. The buildings are connected, allowing a recycling and sharing of heat (The Green Zone 2011).

5. Visions for the future

Reconfiguring an established organization's innovation approaches and portfolio on this scale is a major strategic undertaking and requires a combination of clear and stretching vision linked to a coherent roadmap for delivering it. A number of models for such frameworks are emerging around the sustainability challenge – for example, the World Business Council for Sustainable Development involved 29 major multi-national companies and many NGOs, academics and other partners in elaborating a vision in which *'by 2050 some nine billion people live well, and with the limits of the planet'*.

Applying such long-term models for business planning is beginning to deliver business as well as social benefits; for example, one of the 'success' stories has been the growth of floorings business Interface which has made radical changes to its business and operating model and secured significant business growth. Interface has cut greenhouse gas emissions by 82%, fossil fuel consumption by 60%, waste by 66%, water use by 75% ; and increased sales by 66%, doubled earnings and raised profit margins. To quote Ray Anderson, founder and chairman; *"As we climb Mount Sustainability with the four sustainability principles on top, we are doing better than ever on bottom-line business. This is not at the cost of social or ecological systems, but at the cost of our competitors who still haven't got it."*

In the next section we explore how this is being experienced within the Philips company.

6. Philips as a case example.

Philips is a Dutch multi-national corporation, founded in 1891 in Eindhoven and now headquartered in Amsterdam. In 2010 sales of EUR 25 billion were generated in over 100 countries through its 118.000 employees organized in the three business sectors: Lighting, Consumer Lifestyle and Healthcare.

Responding to major global environmental and social trends like climate change, the rise of the middle class in emerging markets, increasing consumer empowerment and demand for sustainable lifestyles and ageing populations, Philips changed its strategic positioning to "Health and Well-being" in 2007, and

in 2010 sustainability became an integral and explicit element of the Philips Management Agenda.

The company has a long-standing commitment to sustainability principles; for example, in the early 20th century Philips' employees benefitted from schools, housing and pension schemes. It has also been a key actor in several international sustainability initiatives. In the early 1970s, Philips participated in the Club of Rome's "The Limits to Growth" dialogue and in 1974 the first corporate environmental function was established. Initially this function created transparency on how Philips complied with environmental laws and health & safety regulations. Later, in 2003, a structured sustainable supply chain program was also introduced.

Philips' involvement in the WBCSD dates back to 1992, when the Council was set up in the wake of the first Rio Earth Summit. Philips was one of the 29 multinational companies that co-shaped this vision and required multi-sector pathways to get there.[1] Vision 2050 was developed using the back-casting approach, suggesting required action towards a desired future, rather than extrapolating and forecasting for the current situation.

Philips' EcoVision programs were first launched in 1998, setting corporate sustainability-related targets and the first green innovation targets were introduced in 2007 in EcoVision4. In parallel in 2003, the Philips Environmental Report (first published in 1999) was extended into a Sustainability Report and in 2009 this was integrated into the Philips Annual Report, signaling the full embedding of sustainability in Philips' business practices.

Vision 2015 and EcoVision5

In September 2010, Philips published Vision 2015, stating: *Philips wants to be a global leader in health and well-being... to simply make a difference to people's lives with meaningful, sustainable innovations.*[2]

Philips EcoVision5[3] program for 2010–2015 establishes concrete targets for sustainable innovation:

- To bring care to 500 million people
- To improve the energy efficiency of our overall portfolio by 50%
- To double the amount of recycled materials in our products as well as to double the collection and recycling of Philips products.

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[1] See http://www.wbcsd.org/Plugins/DocSearch/details.asp?DocTypeId=33&ObjectId=Mzc0MDE

[2] More background information to be found at: http://www.philips.com/about/company/missionandvisionvaluesandstrategy/vision2015.page

[3] More information to be found at: http://www.philips.com/about/sustainability/index.page

On sustainable innovation, the Philips Annual Report 2010 states: *Green and Social Innovation are the building blocks for Sustainable Innovation. Green Innovation focuses on reducing the Environmental or Ecological Footprint of our products. Social Innovation comprises contributions to the improvement of the Human Development Index (HDI)*.[1]

Philips innovation legacy

Philips' legacy of innovation dates back to its foundation in 1891. In 1914, Philips Research was established to fuel the company with innovative technologies. And since the mid 1920s, Philips Design has complemented technology with aesthetic and human perspectives. Today, Philips' multi-disciplinary, multi-cultural employee base continues this tradition of creativity, as reflected in its array of innovations and high patent right, trademark and design right output.

Like many other long-lived corporations Philips has adjusted its innovation approach several times, anticipating major changes in society. In recent decades this has resulted in the opening of an Experience Lab in Eindhoven and the extension of the traditional technology driven product creation process towards end-user driven innovation.

Philips is recognized as a leader in Open Innovation. In the late 1990s the former Research Laboratories were transformed into a vibrant High Tech Campus, now hosting over 80 non-Philips business entities. During the last decade, its focus was "inside-out" based on teaming up, incubation and spin-outs. The next step will be to increase its "outside-in" effectiveness in co-creating sustainable systems solutions.

Managing Innovation at Philips

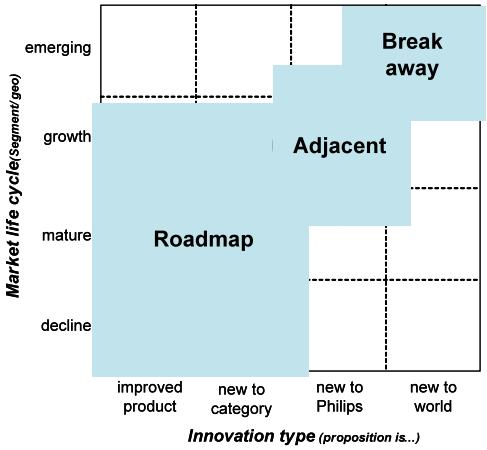
Innovation in Philips is managed using a 4x4 matrix which maps innovation types against the market life cycle – see figure 3. The three innovation types are:

- Roadmap: strengthening the core business
- Adjacencies: new to Philips, creating profitable adjacent business
- Breakaway: new to the world

Philips Sectors work closely with the various units of Philips Corporate Technologies to define a portfolio of innovation areas and topics designed to safeguard the company's future business success.

Figure3: Managing innovation at Philips

[1] See http://www.annualreport2010.philips.com/content_ar-2010/proofpoints/improve_footprint.asp



Linking the Philips Sustainability and Innovation Agendas

Since 2004 Philips Green Products have provided consumers with a way to make a difference through their buying decisions. Philips defines 'green' products as those offering significant environmental improvements in one or more Green Key Focal Areas: energy efficiency, packaging, hazardous substances, packaging, weight, recycling and disposal and lifetime reliability.

The lifecycle approach is used to determine a product's overall environmental improvement over its total lifecycle. Most green products directly contribute to EcoVision5 targets 2 and 3: energy efficiency and closing the material loop.

For example, the Consumer Lifestyle division has recently launched the first "Cradle to Cradle" inspired products, such as the Performer EnergyCare vacuum cleaner, 50% made from post-industrial plastics and 25% from bio-based plastics. It is extremely energy-efficient, but it earns its designations as a Green Product primarily because it scores so highly in the focal area of recycling.

Another example is the award-winning Econova LED TV. This high-performance LED TV consumes 60% less power than its predecessor. Even the remote control is efficient – powered by solar energy. In addition, the TV is completely free of PVC and brominated flame retardants, and 60% of the aluminum used in the set is recycled.

In 2010 green products accounted for 37.5% of the Philips sales. By 2015 it will be 50%.

With the launch of EcoVision4 Philips introduced a target on Green Innovation. Within 5 years until 2012 a total of €1bn will be invested in Green Innovation contributing to the green key focal areas and leading to green products. This target was already reached mid 2010. Therefore in 2010 the EcoVision5 program

was launched for the first time setting sustainability target aiming at both the social and environmental dimension of sustainability.

A new innovation paradigm emerging
In her 2007 paper *Democratizing the Future*, Josephine Green (at that time working at Philips Design) suggested that a new innovation paradigm is emerging [1]. Table 1 below introduces the consequences of this for innovation.

Table 1: Evolution of innovation within Philips

PHILIPS

Innovation in Philips, evolution (of recent decades)

	Technology led	& End-user driven (since 1990's)	& Sustainability driven (emerging)
Core contribution	ENABLE	EXPERIENCE	Health & Well-being
High level benefit	Independence from environment	Self-expression (independence from community)	Interdependence with nature and society / community ???
R&D capabilities	Physics, chemistry, math, engineering, material science	& Psychology, pedagogic, medicine, UI, software dev., biology, bio-chemistry, industrial design	& (Social) system design, ecology, geology, sociology, anthropology ??? ... T.b.d.
Fields of Research	Technology	& Technology in application Market research Socio-cultural trend research	& technology / solution impact on individual, society, environment ???
Type of solutions	Standardized & mass hardware → devices & components	& customization via sensors, software, UI, → smart & convenient solutions, branding	& (context) knowledge → resilient systems & systems of systems ???
Way of working	Closed research	Open innovation	Co-creation respecting sustainability principles ???
Innovation process	R&D → "Free" research, technology shapes product development	& milestone driven projects, eco-design 1.0 ,and user insights & value proposition house	& cradle 2 cradle; life's principles, back-casting, eco-design 2.0, etc. ???
Leading business model (in Philips)	Sell hardware products	& enable experience by selling solutions and services	???

7. Discussion

We saw earlier the challenges posed to innovation management in moving into the zone 3 and 4 innovation space posed by ISD. In particular there is a need for clear strategic frameworks to guide and shape project level activities over a sustained period of time. In the Philips example we can see this pattern emerging

[1] http://trex.id.iit.edu/events/strategyconference/2007/community/presentations/josephine_green.pdf

– with a long-term commitment to sustainability taking more concrete form in the past decade with an explicit vision providing the context for specific and targeted initiatives. Such change – reflected in many other company examples – is driven by a recognition of the increasing social and regulatory pressure but also of the significant new business opportunities offered by innovating in this space. As a recent report from consultants BCG suggests, ISD is becoming a mainstream approach characterized by early adopters – termed 'embracers' – who have an explicit strategy and roadmap to shape their activities (Boston_Consulting_Group, 2011).

But as they increasingly target ISD within their businesses there will be challenges to their innovation management systems. For example, 'search' strategies based on 'conventional' R&D or market research may need to shift to take account of new signals giving early warning of newly emerging innovation trajectories (Bessant & Von Stamm, 2007). In the case of Philips there has been a marked shift from an R&D led business to one with a much stronger market orientation and this is now moving into the social and human development domain (Tidd & Bessant, 2009). An indicator here is the growth of new functions within established organizations associated with searching and building links into the emerging sustainability communities.

Similarly resource allocation systems will need to shift to embed ISD values and criteria into established frameworks such as stage gate systems (Bessant, Von Stamm, Moeslein, & Neyer, 2009). Developing explicit criteria, and measuring performance against these, will become an important driver of behaviour change within innovation systems. The example of Green products within Philips is an indicator of this process at work, and similar cases can be found in fields like greenhouse gas emissions. However it could be argued that these represent improvement innovations – essentially doing what is already done in more sustainable fashion. As such they can fit within an existing approach; the challenge may come to innovation management systems when more radical business cases need to be considered which represent significant leaps into the unknown.

Implementing ISD at the level of 'doing what we do but better' will require adaptation in terms of pathways, skills, project management arrangements, etc – and the emerging evidence is that this adaptation is being accommodated within 'embracer' organizations. However more radical ISD projects may need to follow novel pathways, especially when they involve external partners and new configurations of knowledge – 'architectural innovations'. The challenge here is one of learning to work with new partners and raises issues around 'finding, forming and performing' within new innovation networks (Birkinshaw, Bessant, & Delbridge, 2007).

Table 2 summarizes these.

Table 2: Key innovation management challenges associated with sustainability-linked innovation

Innovation activity	*Challenges in zone 3 and 4*
Search	Peripheral vision – searching in unfamiliar fields (sectors, technologies, markets, etc.) Reframing Finding, forming, performing new networks
Selection	Resource allocation under high uncertainty Cognitive dissonance Not invented here
Implementation	Internal mobilization – new skills, structures, etc Crossing the chasm and the diffusion problem New appropriate language
Innovation strategy	Need for a clear framework within which to locate search, select, implementation – a 'roadmap for the future' New corporate paradigm – criteria based on sustainability – people, profit, planet, etc.

If – as an increasing number of commentators argue – ISD is a new Kondratiev-type wave then we can learn some lessons form studies of pervious examples. In particular, as Perez points out, the early stages are associated with a 'substitution' kind of innovation. Innovation takes place around the new techno-economic conditions but is essentially about replacing existing products, processes and services with variants which are more aligned – a 'do better' approach in our terms. But as the new paradigm becomes the dominant lens so the nature of innovation shifts to more radical and unexpected variants. (We can see this in the context of the internet, where early innovation was essentially substituting online versions of what were often manual and physical transactions. Only later did the full potential of widespread reach, customization, social and network effects, etc. give rise to a radical surge of new to the world products, processes and services).

The key message in studies of this kind is that riding the waves of change challenge existing incumbents. In the early stages there is a refocusing of efforts around incremental innovation along the new trajectory – which favours the established players. But as the game shifts so the need for radically different approaches favours new entrant entrepreneurs. The challenge to incumbents is thus one of learning new tricks and letting go of their old ones – a real test of dynamic capability.

Arguably ISD represents just such a shift – and the current success with which' embracers' – like Philips – deal with it may belie a more significant challenge in

the longer term which requires them to rekindle a strong entrepreneurial spirit and create fluid and open structures to enable it to flourish.

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