MASTERING THREE

A THREEFOLD METHOD TOWARDS A VITAL BUILDING PRACTICE

NYENRODE BUSINESS UNIVERSITEIT

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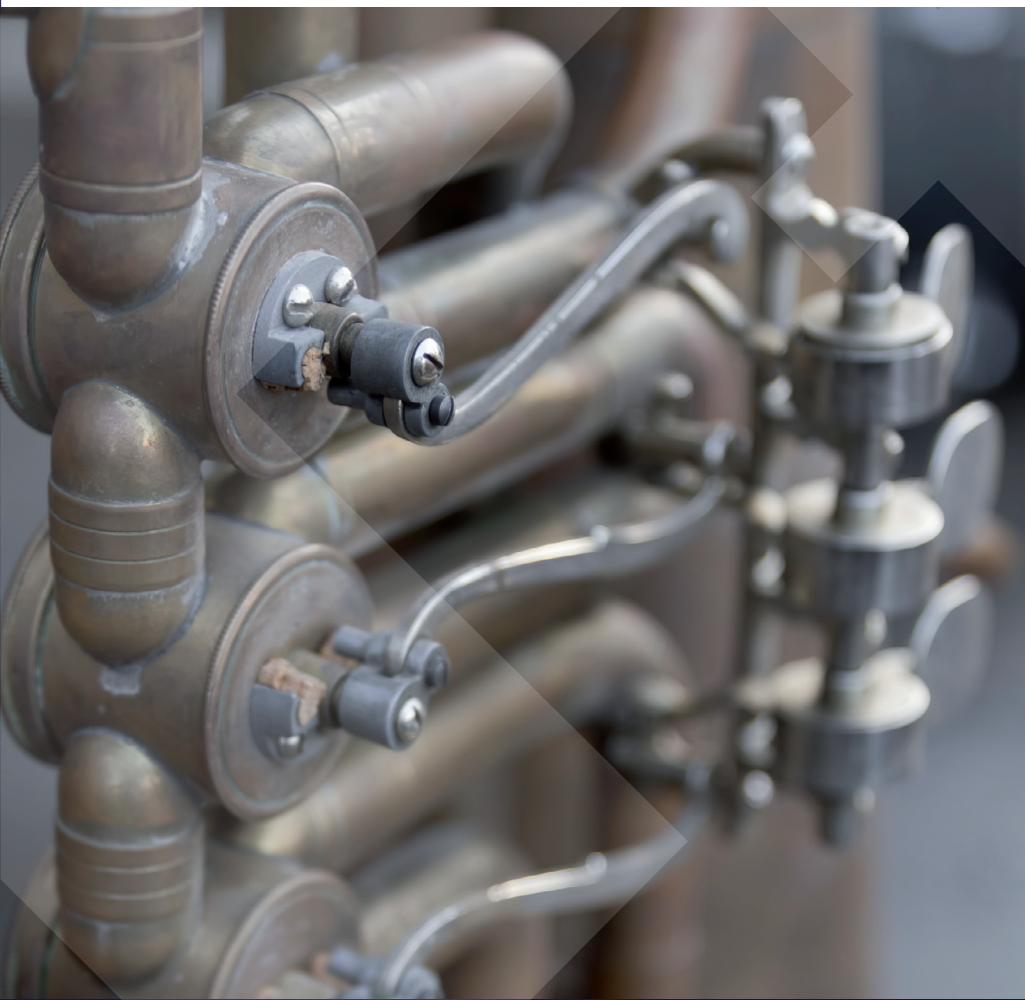

HENK DIEPENMAAT • JOOST VAN ETTEKOVEN • ANKE VAN HAL

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TOWARDS A VITAL BUILDING PRACTICE

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Nyenrode Business Universiteit
Center for Sustainability
Straatweg 25
PO Box 130
3620 AC Breukelen

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Introduction

The current construction sector is characterised by intensive cooperation and a growing aspiration for innovation and sustainability. Collaboration in the sector is often regarded as a precondition for sustainable construction innovations. But is this true? Does it apply to any kind of cooperation? Is one kind better than another? What kind of collaboration is the best? And what conditions must cooperation meet? These questions were the basis for the research that we, researchers from the Center for Sustainability at Nyenrode Business Universiteit, carried out in 2010 and 2011, sponsored by the Royal BAM Groep nv.

The research reveals that the ideal process of cooperation in the construction sector does not exist. However, several distinct kinds of cooperation can be observed. It also appears that the right mix of these kinds of cooperation with specific innovation and sustainability ambitions leads to three robust methods. A mutually interrelated application of these methods – selecting which specific method is chosen at what time requires precision – will eventually lead to a vital sustainable building practice, and maximum value for all parties involved.

This publication describes the results of the research. However, we first discuss the main research question, the research approach, the definitions used, and take a look at the construction sector as a whole.

1. Research question, research approach and definitions

1.1 Research question

In the initial stages the study focused explicitly on factors that foster co-operation with a view to achieving sustainable development innovation in construction. To this end the literature was examined for suitable leads. Various practical cases of sustainable building innovation in the Netherlands where cooperation appeared to play an important role were also analysed.
The literature search resulted in a rich and multifaceted picture. There are many aspects one can focus on and perspectives that one can choose. The case studies also presented us with a range of influential factors where, at first sight, there appeared to be little coherence. A rich yet disjointed harvest of theory and practice. However, further scrutiny of the results of the case studies fuelled the idea that *specific* kinds of cooperation lead to *specific* kinds of innovation and sustainability. We discovered vague patterns of combinations of kinds of cooperation, proposed innovation and specific interpretations of sustainability. Ascertaining what these patterns were would then help the construction sector to choose and design their methods. This hypothesis led to the following research question:

>> *What are the robust methods to achieve sustainable innovation through collaboration?*

1.2 Research approach

To answer this question, a brief description of the construction sector was provided (Chapter 2). Two studies were subsequently performed. The first study focused on determining the preconditions for successful collaboration (Chapter 3). The second study focused straightaway on answering the main question. A combined process of literature review, analysis of practice, and expanding on current insights from the scientific literature, developing new insights and designing consistency, led to three main methods. The result was then critically reviewed in discussions and workshops by professionals from the construction sector, and then amended accordingly (Chapter 4).

Definitions

The main concepts of the research question – *sustainability, innovation* and *collaboration* — are defined as follows in the context of this study:

Sustainability respects the interests of actors involved directly and indirectly, consciously and unconsciously, now and in the future.

In line with previous research conducted by the researchers (Van Hall, 2009; Diepenmaat, 1997, 2011), the pursuit of sustainability is considered to be a task in which the interests of many more actors (parties) come together than in an unsustainable context. In this definition, sustainability is much more about representing the interests of parties, rather than about meeting the agreed lists. It is then about representing the interests of people here and now, and also of those of people elsewhere and later (see also the Dutch National Strategy for Sustainable Development, 2002). To put it in more concrete terms, it's not just about the interests of the parties already directly involved in the construction sector, like investors and users of the built environment. (However, those interests do play a major role in contrast to what is often the case in other definitions of sustainability.) On top of this, it is about the interests of the people who, directly or indirectly, experience the *consequences* of construction activities. People elsewhere in the world e.g. the inhabitants of tropical rain forests where timber is produced, and the interests of future generations (which is, for that matter, the core of the most generally accepted definition of sustainability (Brundtland, 1987)).
In this definition, optimum sustainability is achieved when the interests of people whose interests are not usually represented, but who are affected or influenced by the construction activities, are also taken into consideration. And these are current and future generations.
The interests of people in the 'here and now' differ from project to project. And of course we cannot know exactly what the interests of future generations will be. But we know that resource depletion and pollution of the earth will do little good for generations to come. This is why, in this definition, we consider measures that we now identify as sustainable as well as measures that also represent the interests of people elsewhere and later. In practice, representing the interests of people elsewhere and later often comes down to minimising the negative impact of representing the interests of people here and now.

The question fundamental to the definition of *innovation* is: is it something completely new or something new to the person faced with it? We find both aspects relevant and therefore apply Rogers' definition (1995, p.11): "An innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption." It involves not only the introduction of new products but also of new services, procedures and processes associated with those new products. Because our research concentrates on the construction sector, it is, in this particular case, also about the products that play a role in this sector. Therefore this includes all scales (from innovative urban design to an innovative dormer window) and the entire *lifecycle* (from a specific phase of the process, e.g. innovative demolition and recycling to the innovation of the entire cycle). It may be products aimed at a separate part of a building, but also integrated products that combine previously discrete functions. For example, new concepts for roofs, walls, floors, equipment and fittings, and sometimes entire buildings. These are all adaptations and improvements to what already exists. However, totally new products are also developed. Our definition of innovation includes all these variants.

An **innovation** is an idea, practice or project that is perceived as new by an individual or other unit of adoption.

We used the definition of *sustainable innovation* given by Keijzers (2008, p.10-11), founder of the Nyenrode Center for Sustainability: "Innovations contribute in three respects to new affordable quality: they have *technical quality* (they are better products/services that meet (new) needs more efficiently); *environmental quality* (they make sustainable use of natural resources, use less fossil fuel, and make less demands on space and nature); and *social quality* (products, made in a dignified manner, that contribute to a dignified life)." Sustainable innovation is defined in Bos-Brouwers' dissertation (2010, p.14) as the development and renewal of products, services, processes and organisations that improve corporate performance on social, environmental and economic aspects both in the short and long term. It is her belief that sustainable innovation can be distinguished from conventional innovation processes by ambition, direction of development, and the integration of stakeholder interests. The researchers agree with this definition.

Sustainable innovations have technical quality, environmental quality and social quality. They improve business performance in social, environmental and economic fields, in both the short and long term.
These qualities and improvements respect the interests of actors. It is precisely this that renders these innovations sustainable.

An appropriate definition of *cooperation* proved to be more difficult. There is no lack of definitions, but most of them cover only one aspect. With some adjustment, we found three quotes that fit the bill:

Collaboration is a kind of organisation between parties on the basis of sustainable agreements with durable intention but finite (Kaats, Van Klaveren and Opheij, 2005, freely interpreted).

Collaboration requires a kind of person who is a specialist in his field, but who, as a matter of course, can also see beyond the limits of his own department (Noordhuis and Van der Veen, 2005).

Cooperation requires breaking through system boundaries and short-term perspectives, and thinking in a wider context. Responsible profit and 'fun' are the basis of cooperation aimed at achieving sustainable innovations (Keijzers, 2008, p.11, freely interpreted).

Key to answering the research question
The three main concepts, sustainability, innovation and collaboration, are not just distinct from each other. We have established that there are also similarities. Collaboration, innovation and sustainability are all methods that aim to *accommodate interests* and *create value*. This means that new value is generated and that new or existing interests are catered for (further). This observation is an important key to answering the research question. It implies that the three main concepts can be brought together under one single denominator of value/interest. We will use this key later.

2. The construction sector

A rough outline of the current construction sector is given in order to determine the urgency of the research question for this sector – the focus of the present research. The first question to arise is: How does this sector relate to the three central concepts from the research question, sustainability, innovation and cooperation? In addition, a pragmatic historical outline of the sector is then presented. This historical outline clarifies the growing importance of the three central concepts for the future construction industry.

2.1 Sustainability, innovation and cooperation in the construction sector

Sustainability in the construction sector is incontestable. And in tough economic times sustainability in particular is becoming increasingly deemed to be a market opportunity. The reasons to work on sustainability in the construction sector are diverse. Sometimes concerns about climate change, biodiversity and the living conditions of people in other parts of the world are the most important reasons for working on sustainability. Sometimes the main driver is a concern about a scarcity of energy and materials in the future; or wide-ranging customer demands; or impending, more stringent regulations, both nationally and internationally. Or even a combination of all these arguments. 'The Circle of Blame' (Cadman, 2000) has, in practice, already been broken by many. The argument 'I cannot do anything because there is no demand' would seem no longer to apply as architects, residents, government and various parties in the chain are demonstrating that the initiative for sustainable building can be taken by different parties.

Research (Pries and Heijgen, 2005) has shown that *innovation* in the construction sector in the Netherlands is mainly incremental in nature. An incremental innovation is a small-scale innovation that brings minor change. The number of incremental innovations in the construction sector in the Netherlands in 2005 was ten times greater than the number of radical innovations. Because incremental innovations are relatively invisible and also difficult to quantify, the actual difference can be many times greater. Moreover, most innovations in the construction sector are process innovations. This means that what we are looking at in many cases are a company's own production processes. These are, by their very nature, relatively introverted, i.e. the outside world is not really considered. At that time, the motive for the majority of the sector was to innovate with a view to optimising (internal) efficiency. In only 25% of cases the intention was to meet market demands. And in 30% of cases regulations were the direct driver of the innovation. It is unknown what the current figures are.

In terms of *cooperation*, Pries and Heijgen established in 2005 that most innovations came from companies working on their own. However, they were already discerning a trend towards more cooperation. To quote: "The construction sector has become increasingly complex in the past few years. This means that we are seeing more cooperation when it comes to innovation" (Pries and Heijgen, 2005, p.3). And today there are hardly any innovative developments in the building sector that do not involve cooperation. Examples include supply chain integration, LEAN working, reducing failure costs, public-private partnerships, working from Total Cost of Ownership and new procurement methods.

2.2 A historical outline of the construction sector

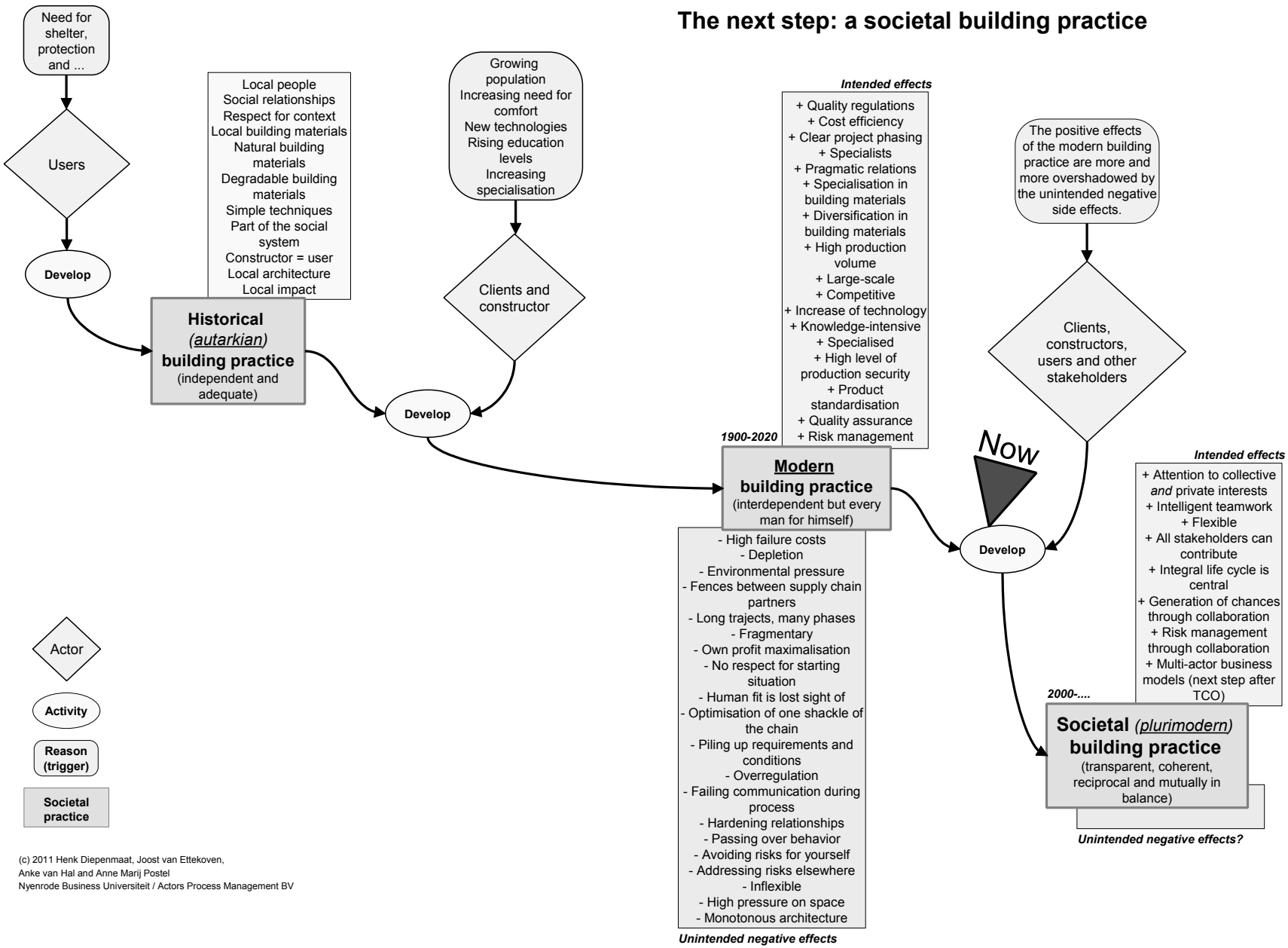
To get a clearer picture of the changes that play an important role in the sector, the researchers developed a pragmatic historical outline of the construction sector (see Figure 2.1) based on several brainstorming sessions and interviews with experts. In parallel, similar historical outlines were made of the child welfare and the agro-food sectors (not included here). As summarised below, they show very similar patterns with the construction industry and together they therefore give an excellent idea of social development (Diepenmaat, 2011).

There are three phases in this historical outline of the building industry that are associated with the past, the present, and the desired, but also expected, future:

1. *Historical building practice*, characterised as independent and adequate.
2. Today's *Modern building practice,* characterised as 'interdependent' but 'every man for himself'.
3. The future *Societal building practice,* characterised as 'transparent', 'coherent', 'reciprocal' and 'mutually in balance'.

Modern building practice has a number of major advantages over historical building practice, even more so in light of developments such as an ever-increasing population and a growing demand for more comfort. It is clear, however, that all this comes at a price. A host of undesirable side effects has been the result: failure costs, depletion, environmental damage, etc. Even the economic crisis can be seen to exemplify such undesirable side effects: the cause is value creation by specific parties at the expense of others. These side effects are forcing the industry to reconsider the customary, modern ways of working. Better cooperation, i.e. more professional and more involved, is a logical step given the complexity of the new demands the sector is facing. For example, a shift in focus from constructing new buildings to redeveloping existing buildings; a growing scarcity of raw materials; shrinkage in certain regions; affordability, etc. All this requires innovative forms of cooperation that take into account the interests of stakeholders.

Today's construction sector is also highly specialised, though in practice most things are interrelated. This bigger picture sometimes gets lost in day-to-day practice. And the result is that specialisation leads to fragmentation. To counteract this fragmentation, there is an urgent need for improved cooperation. Literature on this subject shows that increasing specialisation among companies – in addition to customer demand for



Figuur 2.1: *Historical outline construction sector*

Download figure at www.nyenrode.nl/masteringthree

higher quality and more complex products – is an important reason for collaboration (Kaats, Van Klaveren, Opheij, 2005).

The future is pre-eminently a sustainable one because it takes the interests of stakeholders very seriously, and achieving this future very much depends on innovation and collaboration. If this is to be accomplished, research into robust methods of cooperation in sustainable innovation is desperately needed. The three main concepts, sustainability, cooperation and innovation, are indeed central to this.

3. Research part 1: conditions for successful cooperation

Based on the case studies (see Appendix 2), a literature search, and the brainstorming sessions with those directly involved in the research (specialists in the field of sustainable building and multi-actor processes), the researchers first worked out five general conditions for successful cooperation.

Condition 1
There must be an *initiator who gets things going*. The initiator will not be deterred by opposition or setbacks, which will inevitably arise. Failing to adhere to the generally accepted norm almost always leads to resistance and clashes with existing rules and procedures. The initiating party does not necessarily need to be particularly big. Even small parties can take on this role, as demonstrated by the Cooperative Association Q. This association brings together relatively small parties to jointly develop cost-neutral Cradle to Cradle building concepts.

Condition 2
An open attitude and sufficient room for manoeuvre. The investigation demonstrated that cooperation in new areas requires an open attitude, a certain vulnerability, and an attitude of forgiveness toward partners.
The housing association Wonion works innovatively in this field. They use a form of open tendering and offer interested players the freedom to work in coalitions in order to develop solutions for functional challenges. Moreover, the assessment of the submissions is in public and is interactive.

Condition 3
An appropriate organisation and effective agreements. This means that parties together create an environment where transparency, exploration and inquiry really are possible. Everything should be well organised, with clear agreements, simply because an appropriate organisation is not necessarily the logical consequence of an intention to cooperate. For example, the Woonwaard housing association asked the supply chain partners to take a course with them. And in the context of developing their W&R concept, the Royal BAM Group organises 'innovation days' with their co-makers.

Condition 4
Broaden your outlook, so you see more. This involves looking beyond the boundaries of your own field, involving less obvious parties etc. This broader scope emerged in many interviews and was highlighted during the case studies. There is a definite need for a more holistic, less fragmentary approach. The term 'systems engineering', an interdisciplinary approach that contributes to the completion of successful integrated systems, was mentioned many times to describe this condition. Systems engineering seeks not only to achieve technical excellence, but also to honour the interests of customers i.e. stakeholders. The objective is to provide a quality product that meets the users' needs (INCOSE, 2011). Striking features are the terms 'interdisciplinary', 'integral', 'effective', 'successful systems', 'business objectives', 'coalition targets' alongside the technical goals and with a keen eye on meeting 'user needs'.

For example, a health expert was called in at a very early stage of developing the Q-construction methods. The result was that it was decided to develop a 'vapour permeable' building system, which facilitates more natural and comfortable humidity control leading to a healthier and more stable climate.
The 'invitation paradox', as established in previous studies (Diepenmaat, 1997; 2011) emerged in the case studies and the interviews: you only know *with hindsight* when the results are clear, who you should have involved *at the outset*. This paradox applies to conditions 2 and 4.

Condition 5
The fifth and final condition is: u*nchain the supply chain if necessary*. The study came up with a range of different forms of cooperation. Concepts such as LEAN working and supply chain integration were frequently mentioned in the case studies and interviews. With this type of cooperation, it is clear to everyone exactly when and what is required of them and what knowledge is required. Nobody does anything superfluous. This method can be very successful and renders the chain strong and solid. However, this is both an advantage and a disadvantage. Indeed, the experiences of the sector during the economic crisis show that if there is change then it must

be possible to alter course quickly. The chain has to become, as it were, liquid and then solidify into a new configuration that works better for the new situation. The phenomenon of the rigidity of societal cooperation patterns and the resultant inertia towards change is, for example, known from the literature on societal transition towards sustainability (Grin, Rotmans, Diepenmaat 2011). The literature on corporate cultures and their poor mutability provides a fascinating insight into this phenomenon.

Reorganising the supply chain is evident in the case Eindhoven Airport. By eliminating a number of phases from the traditional project phasing – thus facing a jump from a provisional building permit to detailed working drawings – it was necessary to redefine the roles and responsibilities of, for example, the architect, builder and client in order to achieve the desired result together. In this case the architect had to exchange his role of determining and prescribing the quality of the design in drawings and specifications for the active support of the operational parties.

These five conditions may sound as though we're stating the obvious. However, when the five conditions are inverted, it immediately becomes clear why many cooperation projects are not successful in practice:

1. There is no initiator and the target players are passive;
2. The attitude of the parties is not open;
3. An appropriate organisation and effective agreements are missing;
4. The scope is narrow, everyone thinks to already know how things are to be done;
5. The chain is shackled, the positions are taken and are immutable.

This opposite situation is apparent in the construction sector. The general conclusion of this part of the study was that the five conditions should always be part of some kind of cooperation if sustainable innovation and success are to be achieved. The fifth condition confirms the suspicion that several forms of cooperation are possible. Metaphorically speaking, the conditions are ingredients that must be used in each dish in order to attain a particular taste, but nevertheless the dishes themselves may vary considerably. These five conditions form the initial basis, but more details are required in answering the main question.

4 Research part 2: methods to innovate sustainably together

The first field explorations in theory and practice led us to suspect that there are different patterns within 'innovating sustainably together'. In

the case of the Eindhoven Terminal, for example, the discussion was about a *building team* as an innovative form of cooperation, whereas in the case of Woonwaard it was the *smooth functioning chain* of renovation partners and their suppliers that was referred to. We came across both team orientation and chain orientation more often. Innovation in cooperation at Woonwaard was to organise the existing chain in a different way thereby rendering it more efficient and more effective (referred to as *supply chain integration*), and cooperation innovation in the case of Cirkelstad (Circle City) pertains specifically to *reintegrating unskilled labourers* in the processes (new parties are added). We are therefore looking for patterns, i.e. characteristic methods.

As a further starting point for the research into characteristic methods, the search terms *generating value* and *promoting interests* were chosen. The reason for this was that during our research into defining the central terms we established that *cooperation*, *innovation* and *sustainability* have the following in common: all three definitions focus on value creation; new value is generated and (new or existing) interests are developed (further). See also the key at the end of Chapter 1.

In a combined process of literature review, an analysis of practice, expansion of existing insights from the scientific literature, developing new insights and designing consistency, three characteristic patterns in innovating sustainably together were distinguished. Their differences and interdependence were clarified by placing them in an field of interests (see below).

4.1 Searching for patterns: basic dimensions

A literature review led to the selection of two sources as the basis of the study: the studies by Porter and Kramer (2011), and by Treacy and Wiersema (1993; 1995). These sources show a clear link between the concepts of *operational management*, *creating value* and *promoting interests*. Linking these theoretical insights to the researchers' knowledge on sustainability, multi-actor processes, and merging of interests in the construction sector generated a first impression of the answer to the research question.

Porter (1985) initially defined two different strategies in the value chain in order to deliver above average performance in a given industry: (i) *be cheaper* (cost leadership), or (ii) *be better* (as a result of differentiation). However, over time Porter widened his horizon. In 2011 he and Kramer wrote an article in which they stressed the importance of shared value creation. In their words: "*Which involves creating economic value in a way*

that also creates value for society by addressing its needs and challenges." (Porter and Kramer, 2011).

Based on extensive research in the 1990s, Treacy and Wiersema (1993; 1995) identified three strategies to create/add value in the commercial sector in general: (i) *Operational Excellence*; (ii) *Product Leadership*, and (iii) *Customer Intimacy*. Each strategy portrayed a very different picture of how value could be added and a very different opinion of the nature of business activities, the limits of the business model, and the scope of attention. They formed, as it were, three different routes to commercial success.

i. *Operational Excellence* is, according to the authors: "providing customers with reliable products or services at competitive prices and delivered with minimal difficulty or inconvenience." (Treacy and Wiersema, 1992, p.84). This means, freely translated, that what you already do you should do as well as possible. It's all about excellent operational processes. The emphasis is on improving the process. This also renders the product or service cheaper straightaway (see 'be cheaper' by Porter). But also excellent logistics and other process improvements contribute towards operational excellence.

ii. *Product Leadership*, according to the authors is: "offering customers leading-edge products and services that consistently enhance the customer's use or application of the product, thereby making rivals' goods obsolete." (Treacy and Wiersema, 1992, p.85) This means that you have to make something that is clearly better than that of the competition. The focus is on the product. 'Make the better product', in Porter's terms. Naturally there is much attention to R&D and technology.

iii. Finally, *Customer Intimacy* is, according to the authors: "segmenting and targeting markets precisely and then tailoring offerings to match exactly the demands of those niches." (Treacy and Wiersema, 1992, p.84). *Customer intimacy* focuses therefore on the relationship with the customer. Put yourself in his shoes, know what he wants, and meet his needs. A particularly customer-oriented strategy. Relationship marketing and repeated contact are the main axis.

Treacy and Wiersema (1992, p.84) also talk of 'masters of two': companies that have good control of at least two of these three value strategies. They were the *really* successful companies; examples of companies towards the end of the last century that you could say were excellent. On the basis of their three strategies they predicted that "the big winners of the future will have mastered 2".

Porter and Kramer, and Treacy and Wiersema were an inspiration for us because they demonstrated a clear link between operational management, value creation and interests. However, both observed that expanding towards interests (in addition to operational interests) is highly restricted to the interests of customers. In our sustainability perspective (see also the definition of sustainability), it is not only about the interests of suppliers and customers (who, indeed, do play a major role), but also about the interests of people who, directly or indirectly, consciously or unconsciously, experience the *consequences* of the activities of the providers. 'The people from elsewhere and later' as we referred to them, but also people here and now whose interests are sometimes forgotten. People who live and work in the vicinity of a new building under construction, for example, shopkeepers, the unemployed, lonely elderly. Indeed this is really about greater social involvement.

Inspired by Customer Intimacy we therefore introduce the concept of *Societal Intimacy* or *Sociality*; i.e. sensitivity for all parties, including those in the future and in other parts of the world, who are related directly or indirectly, actively or passively, currently or potentially, to a company or – with respect to the construction sector – to a (city) building project. Societal Intimacy connects directly with Porter and Kramer's (2011) concept of shared value creation. We prefer to call this *value-creating cooperation* because we believe that cooperation is a direct consequence of a working method that aims for value creation.

Operational Excellence aims to 'be cheaper' and requires process efficiency and process effectiveness. *Product Leadership* strives to 'be better' and particularly requires managing the product. A clear distinction can be made here between *process efficiency* on the one hand, and *effectiveness of the product* on the other. Cradle to Cradle founders McDonough and Braungart also make a similar distinction between efficiency *within* the existing process and *outward*-directed effectiveness. (McDonough and Braungart, 2001; 2002). They argue:

> "Eco-efficiency is an outwardly admirable and certainly well-intended concept, but, unfortunately, it is not a strategy for success over the long term, because it does not reach deep enough. It works within the same system that caused the problem in the first place, slowing it down with moral proscriptions and punitive demands. It presents little more than an illusion of change. Relying on eco-efficiency to save the environment will in fact achieve the opposite – it will let industry finish off everything quietly, per-

sistently and completely. [...] But there is an alternative – one that will allow both business and nature to be fecund and productive. This alternative is what we call 'eco-effectiveness'."

The objective of *Societal Intimacy* is to take the interests of involved parties seriously and to promote these interests. In addition to social orientation this also requires a sharp focus on value-creating partnerships (Diepenmaat, 2011). We, as researchers, arrive at the following three strategies: *Efficiency of the process, Effectiveness of the product,* and *Societal Intimacy.*

Table 4.1 presents the inspiring triptychs of Porter (and Kramer)[1], Treacy and Wiersema, and our own three basic dimensions.

Source of inspiration Porter (and Kramer)	*Source of inspiration Treacy and Wiersema*	*Researchers*
Be cheaper	Operational Excellence	Basic dimension 1: Improve **efficiency** of the **process**
Be better	Product Leadership	Basic dimension 2: Improve **effectiveness** of the **product**
Shared value creation	Customer Intimacy	Basic dimension 3: Improve the **Societal Intimacy**

Table 4.1: *The search for basic dimensions*

We can now use this insight to take a closer look at the construction sector. Both the tripartite division of Porter (and Kramer), that of Treacy and Wiersema, and ours are in evidence in the sector. As follows: basic dimension 1 was, for a long time, the decisive prime mover for the sector. Everything came down to competing on price. Due to scarcity, particularly in the housing market, it seemed as though attention for the customer (*Customer Intimacy*, or, more broadly, Dimension 3) was, in the past, not really deemed necessary. Whatever was built, was indeed sold (though often not directly to the users themselves, but to developers or housing associations who determined what should be built). *Be better and product leadership* (basic dimension 2, a strategy often driven by innovation), thrives particularly well in a climate where competition is not only based on cost, but also on quality in particular. *Shared value creation, Customer Intimacy and Societal Intimacy* (basic dimension 3) have really come into

1 We refer to 'Porter (and Kramer)' instead of 'Porter and Kramer' because the basis was laid by Porter. Together with Kramer he later presented the concept of Shared Value Creation.

vogue in recent years as a consequence of to the many discussions about sustainable building. The focus on costs dominated the construction sector for a long time, and product innovation was a niche. This currently appears to be changing. Basic dimension 3 is steaming ahead, with basic dimension 2 in its wake.

4.2 Positioning in the field of interests

We then went on to examine the following question: how can we better understand the interrelationship between the three basic dimensions in more depth? There was a considerable amount of discussion about this question, which ultimately led to the following consideration, which was built up in three steps. The binding element is the previously mentioned key: the extent to which value is generated, thereby meeting the interests of the various parties involved. This is the core of our definition of sustainability (see definitions above). But these concepts also apply to the basis of innovation and value-creating cooperation. The diagrams below illustrate the unifying capacity of value creation and promotion of interests.

Step 1: the extent of the promotion of interests

The optimum promotion of interests takes into account the interests of all parties involved. In the worst case scenario, the interests of all stakeholders are seriously harmed. (See the vertical axis in Figure 4.1.) Every actor also decides for himself what he considers to be his interests. An exception to this is future generations: we need to gauge and respect their interests.

If an actor's interests are promoted particularly well, his place is at the top of the axis. If this is not the case, his place will be lower down. (The figure is a simplification; in practice parties have multiple interests that can be assessed differently. See, for example, Maslow's hierarchy of needs (1943). However it's not about all the specific interests individually, but about an impression of the average). The more parties that can be placed high on the axis, the more value is created. Only when an actor that is high on the axis can compensate for the interests of an actor that is low on the axis is the *coalition* between the two stable (they shift towards each other because the highest gives something up, and the lowest receives something). Stable coalitions are, *on average,* high, with very little individual *distribution* along the axis. Figure 4.1 demonstrates very unstable cooperation. The average is low. Actor C will have to be compensated. Actor A would seem to be the obvious candidate, but he has little room at his disposal.

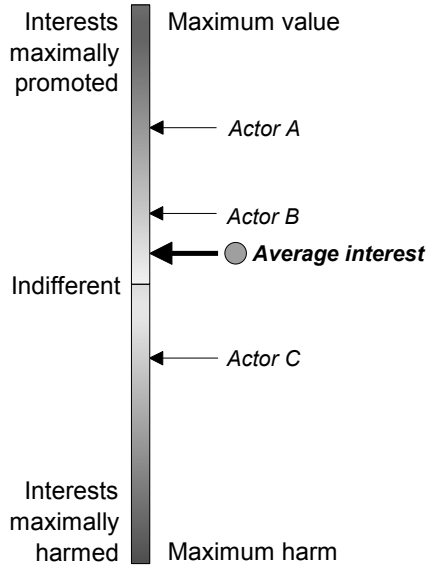


Figure 4.1: *The extent of interest promotion*

Does cooperation with low partners actually exist? Who is willing to collaborate without promoting self-interest? The recent crisis in the construction sector unfortunately throws up many of these forms of cooperation. Companies that work, for example, below cost price are no longer the exception. Were they not to do this, their interests would be served even less, and their situation would deteriorate even further – this is the way they think (they drop even further down the line).

Step 2: the extent of value creating cooperation: the field of interests

The hallmark of a process aimed at *Societal Intimacy* is that more parties than usual are involved. For example, see again our definition of sustainability, people in the future, and people in other parts of the world. But also the unemployed neighbour, or lonely elderly people in the community. (Note: it is not about the number of active and aware people who are involved in the process, but about the number of people whose interests are promoted.)

Interests management is a point in the field of interests. It indicates the extent to which the interests of the involved players are met.

To express the growth in the number of parties involved, the horizontal axis is added to the figure. It is now immediately obvious how many actors are involved: a lot or a few. The field that emerges in this way is referred to as the field of interests[2] (see Figure 4.2). A point in this field indicates the extent to which the interests of the involved players of a certain size are met. We therefore call such a point **interests management**. The higher interests management is located, the better the interests of this coalition will be met. And the lower, the worse it gets. The more to the right, the more parties involved (the larger the total group). And the more to the left, the fewer parties involved.

Maximum social value is generated top right in the field. This is where we place the sustainable society. And bottom right is where we find maximum social misery. Top left is a self-involved party 'in splendid isolation' which is managing rather well, thank you – an egoist. Bottom left is a wretch all on his own. Where the axes meet (at 0.0) is the point where no one is involved, and therefore no interest is served or violated. Along the entire horizontal axis, if the interests of those involved are neither violated, nor served, then what we see is a disjointed collection of actors. At this level, indicated by *indifferent* in the figure, the actors are totally unfocused and completely uninvolved with each other. Then there is no society, let alone a sustainable one.

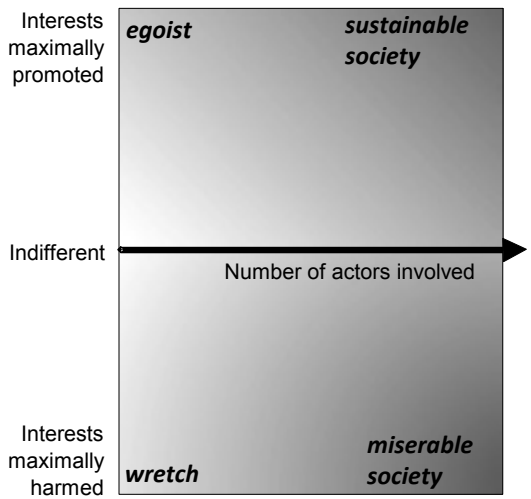


Figure 4.2: *The field of interests*

2 'The field of interests' is based on the 'radical actor thesis' and closely related tot the 'actors space' from Diepenmaat, 2011. It has several mathematical, pragmatic and philosophical characteristics which cannot yet be discussed in this publication.

Step 3: positioning the three basic dimensions in the field of interest
Interests management (a point in the field of interests) can be the start or end point of a vector. This vector (an arrow) indicates a shift, a change in interests management.[3]

- If the arrow points to a specific point, then we know what kind of product (or service or product-service combination) should be realised: the parties involved want to reach that goal as efficiently as possible.
- If the arrow moves from a single point, then the target is still unknown. A new relationship between all the interests of all the parties will be actively sought from the starting situation. The goal is to achieve a better – new or renewed – product. It is not yet known what that product is.

It is now possible to go on to establish the nature of the three basic dimensions and their mutual coherence. We can now place them in the field of interests (see Figure 4.3 and subsequent explanation). We take an existing coalition of companies and their customers, and place this coalition as the interests management in the field of interests (the big dot). Below we discuss the three basic dimensions individually, whereas in practice we often see combinations. However, it is necessary to describe the basic dimensions individually because they are basic components of more complex arrangements. It can be compared with colour theory: a painter works with a variety of mixed colours, but the basis is the painter's keen sense of colour theory.

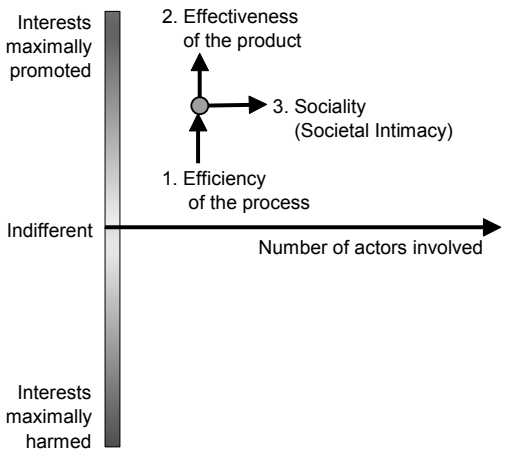


Figure 4.3: *Basic dimensions in the field of interests*

3 This corresponds to the treatment from multi-actor practices and their changes in the actor space, see Diepenmaat (2011) Intermezzo 2 and in particular page 160.

Orientation 1: *efficiency of the process*
The focus is on improving the existing (production) process. This orientation does not initially change anything in the product (or service or the product-service combination), or the parties involved. However, due to suboptimal processes, such as failure costs, inadequate modes of production, misunderstandings, poor manuals, and organisational clumsiness, the maximum interest level has not yet been achieved and the maximum value has not yet been generated. The process can be improved! For this reason, the arrow's starting point is *below* the desired maximum (dot). By increasing process efficiency, the optimal promotion of meeting interests can be approached, and the maximum value can be converted into money. So it is possible to work upward from a suboptimal situation towards a known optimal situation. This may eventually mean a change in the resulting product, and also in the number of parties involved (the three orientations influence each other), but that is not the primary intention. The primary intention is to improve the process.

To use a sports metaphor: the bar is set at a certain height, but we can't get over it yet, so we must work on improving our jump.

Orientation 2: *effectiveness of the product*
The focus here is mainly on improving the product (or service or product-service combination). The focus is therefore not on process (orientation 1) or coalition (orientation 3), although that might be a consequence of product improvement. This dimension is generally about product innovation, based on a known product and the interests of existing stakeholders. Innovation will lead to a shift upward on the vertical axis. Because as a result of the improved product, the existing interests are better met than before. (Most product innovation cases require an innovative process.)

So here we are not improving our ability to reach the current height of the bar, we are setting the bar even higher. Where it finally comes to rest is something we will only know at the end of the innovation process.

Orientation 3: *sociality*
Orientation 3 increases the number of parties involved, usually with new interests. It is no longer only about the usual interests, but about the interests of all parties involved in a project or activity in whatever way. So the arrow moves to the right. This is about *Societal Intimacy*. The focus is tending towards greater social involvement. Many more interests are taken into account than just the interests of, for example, business partners.

To return to the sports metaphor: you're not just involved in high jumping, but you are also busy organising a sports day with different sports and activities for spectators. Different parties enjoy it in different ways, and the high jump will also flourish, as a result, for example, of an increase in the number of sports club members.

Combining strategies

From the perspective of only a high jumper this third approach would seem irrational. Because you want to do the high jump, don't you? Why would you change the number of people involved and not the product or process? You make the process much more complex, but you yourself will, in all likelihood, not do any better. For most people, sociality is important, but then preferably in combination with a clearly distinct *own advantage*.

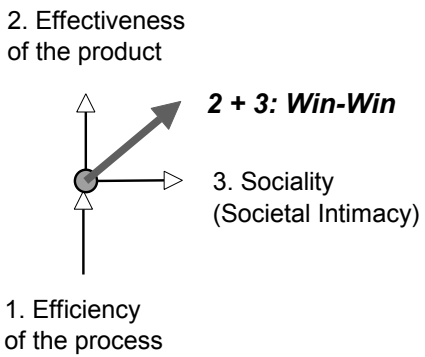


Figure 4.4: *Creating a win-win situation*

This observation led us to a combination of orientation 2 and orientation 3. This leads to an arrow pointing to the top right. It is the active search for the space at the top right that leads to enthusiasm among participants in new collaborations. The bar should be higher and the game has to become more versatile. By combining 2 and 3, both the incumbent and the acceding parties have something to gain (see the arrow in Figure 4.4). The effectiveness will increase and the interests of many more of the parties involved will be promoted.

Subsequently, efficiency needs to undergo an improvement (orientation 1). In essence this is a triple win. That's real innovation! Here are the real opportunities for business and society. However, it is no easy task to implement these three fields in practice.

It is important to realise that the win-win approach is very different from a strategy in which a target group should relinquish interests in order to be sustainable. For this target group this would mean an arrow pointing downwards. For a further discussion see box: 'Sustainable development and the field of interests'.

Our current society is essentially underperforming in all three orientations. So we want to make progress in all three orientations! Making production processes more efficient is often a first step towards improvement because it immediately generates cash and other benefits. But sooner or later you are completely out-improved and the market will require different things. This is why product innovation is also in the picture. It obviously costs money, but is crucial for the continuity of the company. Sociality is often seen as unimportant. The attention sequence for many companies today is: orientation 1, then 2, then 3.

But it can, of course, be the reverse. As a company of the future you have to generate maximum social value because then you are well embedded and robust. It is therefore necessary to combine innovative products and services. And you will deliver them as efficiently as possible. The sequence here is exactly the opposite: from orientation 3 through 2 to 1!

Imagine you are a CEO or another kind of manager. Your remit is to steer your building company into the future. You know that the second and third orientations are becoming increasingly important. That is already difficult enough. But suppose you are skilled in all three orientations. How do you deal with these three orientations together? Do you opt for 1, 2, 3, or the opposite 3, 2, 1? Or a different sequence? What's the best option?

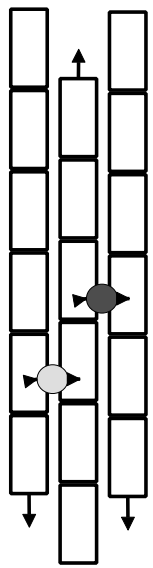


Figure 4.5:
Cakewalk principle

The 'Cakewalk' comes to mind here, something that those more advanced in years will be familiar with. The Cakewalk, also known as Luna Park, was a fairground attraction that put your skills to the test. Through a system of moving ladders, shaking conveyor belts and rotating tubs you had to get from the entrance to the exit.
The first challenge was an intriguing construction of three ladders moving up and down side by side. The rungs were too far from each other to use a ladder to

climb up. If you stayed on one ladder, then you'd certainly move upwards, only to drop down again later. But the rungs moved up and down in respect of each other. By moving to one of the other rungs at the exact right moment it was possible to get to another rung! If your timing was right, then this new rung got you a little higher (see the light grey dot in the diagram).

If your timing was bad, then this new rung took you down (see dark grey dot in the figure). Basically you had to be alert to new opportunities because if you stayed on this rung you would never get any higher.

This also applies to the three orientations. If you stick to one then there will be a time when you are not able to go any further, and you are likely to drop. You should therefore switch frequently. If you switch constantly at the right time and in the appropriate way, then you will gradually arrive at the top right of the field of interests. This is where the interests of all parties are met. If your timing is bad, then you will continue to fall. You will end up below on the left, and this is not really where you want to be.

We believe that the winners of the future must be true masters of the Cakewalk. You must understand the three ladders, separately and together. If we do this right, the result will be a strong coalition in a delightful society. See also box: 'Sustainable development and the field of interests'.

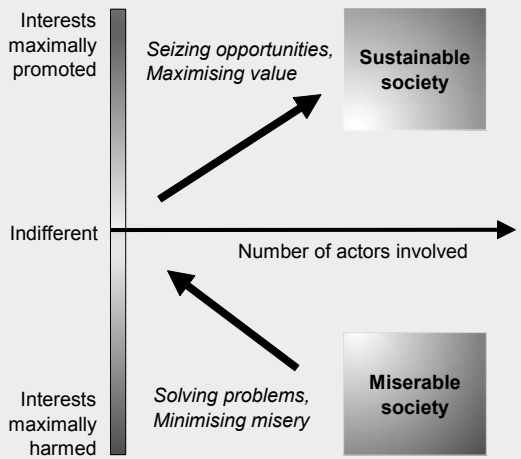
Sustainable development and the field of interests
Sustainability respects the interests from directly and indirectly, consciously and unconsciously involved actors both now and in the future (see definitions above). Sustainable development honours interests, and therefore generates value.

In the *lower* half of the field of interests, generating value means either reducing the extent to which interests are violated (an upward arrow), *or* reducing the number of players whose interests are violated (an arrow to the left). The *combination* of both (the vectoral sum of the two: an arrow pointing top-left) also generates value. An example: food aid in Africa: fewer people go hungry (to the left), and people are less hungry (upwards).

In the *upper* half of the field of interests, generating value means either increasing the extent to which interests are honoured (an upward arrow) or increasing the number of players who experience value (an arrow to the right). The combination of both (the vectoral sum of the two: an arrow pointing top-right) also generates value.

An example: future-oriented and environment-oriented sustainable building: the interests of more parties will be honoured (to the right) and the interests of these parties are honoured to a greater extent (upwards).

Sustainable development presupposes a continuous effort to respect the interests of actors optimally, even beyond the generations (Brundtland, 1987). Sustainable development, striving for a sustainable society, honours increasingly more interests and therefore generates value. The theoretical optimum is located top-right in the field of interests, where the interests of all parties are maximally honoured. A sustainability-oriented society is always actively looking for the top-right position in the field of interests. Moreover, transferring to other parties should be avoided. More practically: making exorbitant profits as a municipal land developer at the expense of residents and contractors generates value in one place, but destroys value in other places. That is not sustainable. Sustainable development requires working continuously to achieve maximum value and minimum suffering (negative value). It is this *combined* pursuit of the sustainable that prevents parties from promoting their own interests, while damaging those of other actors.



We believe that our view of sustainability, which focuses on generating value for and by actors, by respecting and honouring the interests of these actors, provides a workable and positive extension to existing sustainability concepts, such as that of Brundtland (1987) – taking care of future generations – and that of Elkington (1998) – People, Planet, Profit. Of course actors will differ considerably when it comes to the interests they wish to see honoured, and the extent

to which these are either met or violated. This also changes over time. But it is exactly *this discussion about interests*, which we believe should be conducted more vigorously, that forms the basis of a continuous development process towards a sustainable society.

In response to the central research question: '*What are the robust methods to achieve sustainable innovation through collaboration in the construction sector?*' we arrive at three powerful, discrete, interconnected and also related, operational methods to achieve sustainable innovation through collaboration in the construction sector, namely:

1. Better collaboration, focusing on more efficient processes.
2. Innovating together, focusing on more effective products.
3. Innovating sustainably together, focusing on creating a better society (Societal Intimacy).

What these operational methods actually mean in practice is as follows:

1. Better cooperation, focusing on more efficient processes

This first method means that the same production process that is *currently* already being performed together, will, in the future, be performed better in terms of efficiency. Thereby the process will usually become faster and cheaper, and errors in the product are avoided. The product may therefore change, as may the players field and interests, but the focus is on improving the process. It involves Operational Excellence. Much can be gained by better cooperation. By better measuring, better communication, better planning and better control, duplication of effort and failure costs will be prevented and materials will be saved. But a complex production process can also be re-engineered, which involves radical rethinking and redesign (see also Hammer, 1990), or can be optimised with the help of LEAN management (see also Wamock and Jones, 1996).

An example of this is the increasing use of Building Information Modelling (BIM) applications in the construction sector. BIM means that it is possible for the various parties involved in the realisation phase of a building, such as architects and consultants, to work in the same digital model. Each party can link their own information to this model. This improves the integration of architecture, construction and installations in the early stages of the design. It is also possible to link maintenance modules to the model, whereby it can continue to be used during the operational phase of the building.

The following examples emerged from the case studies and interviews:

Regular subcontractors are used when constructing the W&R home by BAM, each of whom has their own place in the construction sequence. The *building sequence* principle, which can for example be compared with a production line in the automotive industry, is a very effective working method in the housing sector. One additional advantage is that the efficient production process ultimately translates into affordable housing.
In the case of the Eindhoven Terminal all decisions were based on the short implementation time available. This meant that interventions had to be made in the traditional phasing of the process and in the traditional way of working. We referred earlier to the changing role of the parties involved as a result of the alternative project phasing.

In the case of the Woonwaard housing association, efficiency of the renovation process is the ultimate goal. Woonwaard asked its renovation partners to follow a LEAN management course to improve mutual cooperation and optimise the renovation process. If parties work together in this way on a more efficient process, the result will be a higher quality end product and reduced failure costs.

The comprehensive application of front engineering in the Cooperative Association Q leads to very low failure costs. To achieve this the parties involved during the design and construction of the house work together according to a fixed code and method. A practical example of the design of the house is the principle of the core house that is employed by Q. This means that all 'humid areas' (kitchen, bathroom and toilet) are located around a central core in the house. The advantage of this is that pipes can be shorter in length. This, in turn, leads to less loss and less materials used.

Full descriptions of the cases referred to can be found in *Appendix 2*.

2. Innovating together, focusing on more effective products

Parties in the second method are going through a development process that includes innovation. The objective is an innovative product (or service or a product-service combination). The *result* is therefore of a different quality than in the case of 'better cooperation'. Process and players/interests may also change, but the focus is on the new product. This is about Product Leadership. The essential difference between this method and the previous one is that with 2 something substantial changes to the output through cooperation (the focus in 1 is on the production process).

Compared with method 1, method 2 adds a collective, creative, design-based component.

For example: a new technique for PV systems. This technique is based on a very different principle than the usual technique. As a result, less light is lost and a much higher concentration factor of sun is possible.

The case studies and interviews revealed the following:

BAM W&R works on two different ways to renew and improve the W&R concept. To this end, innovation days will be organised annually with their co-makers. At these events the applications of new and improved materials and techniques will be looked at with the co-makers. However, in order to develop new variants of the W&R concept, there will be cooperation with external parties, including engineering firms, market researchers and knowledge institutes. This led to BAM W&R developing two sustainable variants, namely the W&R Green and the W&R Passive House. These methods are two examples of incremental and radical innovation of the W&R concept.

The unconventional aspect of the approach at Eindhoven Terminal is that at the start of the construction phase it was not yet exactly clear how the building would be realised. What was clear was that the building should be flexible and expandable. This was the basis for making compartments in the design and for controlling the climate per compartment. Finished compartments could then be taken into use immediately on completion.

The Cooperative Association Q developed and integrated a number of technical innovations in their dwelling. The goals – healthy, sustainable and affordable – led to the development and testing of, among other things, a 'vapour open' timber construction method constructed from 90% renewable raw materials. The intended long life of the residence requires a flexible floor plan and flexible use of the residence. The long life is facilitated by the use of a freely dividable plan and a flexible electricity concept (a plug-in channel system in walls and ceilings).

The approach taken by the Wonion housing association, which gives market parties more space than usual, stimulates coalitions of market parties to come up with innovative and better solutions in the areas of energy use, material use, and comfort in new buildings as part of the total building system.

3. Innovating sustainably together, focusing on creating a better society (Societal Intimacy).

The aim of this third method is to (further) meet (including parties elsewhere and later) certain interests thereby also generating value for parties other than the usual ones. Process and product may thereby radically change, but the focus is on the players field and interests. The big difference with method 2 is that there one looks outward to the players field to get involved. The usual construction parties are the starting point (client, contractor, subcontractors), but the network of the remaining parties that are related to the (construction) activity is also involved. The aim is definitely not only to work more efficiently (method 1) or just to improve on already existing functions of parties already involved (method 2), but also to increase the number of interests that are honoured, also for other actors in particular (see also the concept of 'The merger of interests', Hall, 2009; the discipline of multi-actor process management Diepenmaat, 2011; Regeer et al., 2011). As already mentioned, what one tries to achieve is a combination of effectiveness and sociality, because that leads to the best result.

An example: the US company Blu Homes makes highly sustainable residences that are fully prefabricated, adapted to all the resident's needs, and are unfolded on location (Blu Homes Inc., 2010). The company was inspired by Apple: combine drop-dead design with sophisticated software and control the entire home buying and building experience (Woody, 2011).

Examples of cooperation models with partners other than the usual ones emerged from the case studies and interviews:

Circle-City Rotterdam: in 2005 the four initiators introduced, in cooperation with the business sector, the high-quality re-use of materials in special projects designed for people on social welfare benefits. Re-using materials released when buildings are demolished means that the parties involved contribute to a cleaner environment. Furthermore, the high quality re-use of materials leads to a substantial reduction in the use of primary raw materials and in transport movements. The partners in the Rotterdam Circle-City project provide work for low educated people and for people who are unlikely to enter the labour market. This gives them new opportunities to eventually join the labour market. At the same time it makes a contribution towards increasing the independence of city residents and reducing the shortage of staff in the construction sector. In this way many interests are honoured, also those of new parties.

Cooperative Association Q and a supply consortium of Wonion involved a health expert in the development of their new products. The expert participated in a method 2 activity, and as a result the health interests of residents and users were addressed and guaranteed in an explicit and comprehensive manner.
Another good example is the case of do-it-yourself houses in Rotterdam. The local municipality handed over a totally impoverished housing block to current and future residents on the condition that they would invest in their own houses. Supervised by an architect, the residents together transformed the housing block into an architectural masterpiece that added charm to the entire neighbourhood, and where the residents could implement their own wishes for their home at relatively low cost.

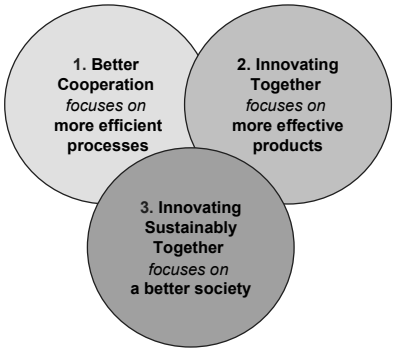
4.3 Further elaboration of the methods

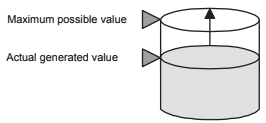
The literature review, extensive discussions with people from the field and intensive discussions among the researchers themselves led to the conclusion that the three methods are fundamentally different in many ways. In this part of the article we examine these differences. We have made a distinction between basic aspects that match the three central concepts in our research question (sustainability, innovation, and cooperation), and then move on to other aspects. These latter aspects emerged naturally from the various discussions because they are relevant to the question of how to put a method into practice. Table 4.2 illustrates the results to date. Besides that the three methods and their different aspects are shown in figure 4.6. We do not exclude the fact that we may add even more differences in the future. However, examining our findings among various parties in practice has not led us to formulate any additional aspects. Each aspect is explained more precisely in the box.

Methods / *Aspects*	**Better Cooperation**	**Innovating Together**	**Innovating Sustainably Together**
Basic aspects directly related to the research question			
1. Focus	On production process (how)	On resulting product/service (what)	On interests of total players field (why/to whom)
2. Interpretation of Sustainability	Less waste in production	Development of more sustainable products and services	To optimally respect the needs of parties
3. Type of innovation	Improvement of the process	Product innovation (products, services and combinations)	Societal and social innovation
4. Dominant organisational form of cooperation	Chain	Team	Network
Further aspects relevant to put cooperation into effect			
5. Result	More efficient process (profit)	More effective product (continuity)	Valuable coalition (societal robustness)
6. Goal Orientation	Exploiting	Extrapolating	Exploring
7. Dominant Value Strategy	Operational Excellence	Product Leadership	Societal Intimacy
8. Market Interaction	Sales	Marketing	Societal value
9. Process Characteristics	Diagnostic	Designing	Sensitive to societal players field
10. Type of Professionals	Sharp Analysts	Creative Designers	Knowledge Brokers with *people skills*
11. Methods	Descriptive Process Models and Monitoring	Facilitating Methods for Multi-expert groups	Stakeholders analyses, coalition models, conflict models, settlement models
12. When appropriate?	*Extending Cash cows*	Creating *Stars*	Generating Sustainable *Stars* and Embedding *Cash Cows* in a Sustainable Way
13. Typical risks	Nitpicking and introspection	Quixotic behaviour (Disruptive Innovation)	Endless discussion
14. Appropriate type of leadership	Management/ administration	Leadership	Distributed leadership (collective self-steering)
15. Type of initiator	Administrator	Entrepreneur	Integrator
16. Time horizon	Short term	Near future	Social adequacy, now and in the future

Tabel 4.2: *Aspects of the methods compared*

A threefold method towards sustainable innovation through cooperation





Orientation 1: ***Process efficiency*** (doing better what is being done already)

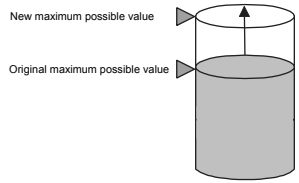
Increases the value level within pre-existing boundaries

Examples: reduce failure costs, diminish redundancy, prevent misunderstandings, optimise critical paths
Central question: How?

1. Focus on: excellent production process
2. Interpretation of sustainability: Less waste (of any kind) in production
3. Type of innovation: Improvement of the process
4. Dominant organizational form of cooperation: Chain
5. Result: More efficient process (profit)
6. Goal orientation: Exploiting
7. Dominant value strategy: Operational Excellence
8. Market interaction: Sales
9. Process characteristics: Diagnostic
10. Type of professionals: Sharp analysts
11. Methods: Descriptive process models and monitoring
12. When appropriate?: Extending *Cash Cows*
13. Typical risks: Nitpicking and introspection
14. Appropriate type of leadership: Management/administration
15. Type of initiator: Administrator
16. Time Horizon: Short term

We pull the three methods apart to show clearly the strong differences between them. In practice, combinations will show up, like the color theories in painting: a painter uses the colors separately and mixes them selectively, conscious of the emerging result on the canvas. Just mixing colors at random will end up in an unpleasant grey-brown.
2011, Henk Diepenmaat, Joost van Ettekoven, Anke van Hal, Center for Sustainability, Nyenrode Business Universiteit, the Netherlands

Figure 4.6: *Threefold method*

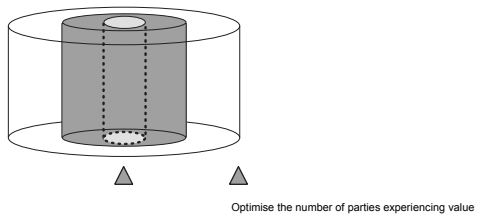


Orientation 2: ***Product innovation*** (renewing that what is being produced)

Shifts upward the maximum level of value

Examples: From lightbulb via energy saving lamp to LED. Towards more energy efficient and comfortable homes.
Central question: What?

1. Focus on: Excellent product/service
2. Interpretation of sustainability: Development of more sustainable products and services
3. Type of innovation: Product innovation (products, services and combinations)
4. Dominant organizational form of cooperation: Team
5. Result: More effective product (continuity)
6. Goal orientation: Extrapolating
7. Dominant value strategy: Product Leadership
8. Market interaction: Marketing
9. Process characteristics: Designing
10. Type of professionals: Creative designers
11. Methods: Facilitating methods for multi-expert groups
12. When appropriate?: Creating *Stars*
13. Typical risks: Quixotic behavior (Disruptive Innovation)
14. Appropriate type of leadership: Leadership
15. Type of initiator: Entrepreneur
16. Time Horizon: Near future



Orientation 3: ***Sociality*** (generating societal value)

Optimises the players field that experiences value

Examples: Energy efficient homes including a financial arrangement; Thuisbezorgd.nl; BAAS (Building As A Service)
Central question: Why? To whom?

1. Focus on: Interests of total playing field
2. Interpretation of sustainability: To optimally respect the needs of parties
3. Type of innovation: Societal and social innovation
4. Dominant organizational form of cooperation: Network
5. Result: Valuable coalition (societal robustness)
6. Goal orientation: Exploring
7. Dominant value strategy: Societal Intimacy
8. Market interaction: Societal value
9. Process characteristics: Sensitive to societal playing field
10. Type of professionals: Knowledge brokers with people skills
11. Methods: Stakeholders analyses, coalition models, conflict models, settlement models
12. When appropriate?: Generating *Sustainable Stars* and embedding *Cash Cows* in a sustainable way
13. Typical risks: Endless discussion
14. Appropriate type of leadership: Distributed leadership (collective self-steering)
15. Type of initiator: Integrator
16. Time Horizon: Societal adequacy, now and in the future

Download figure at www.nyenrode.nl/masteringthree

1. Focus
Re 1. Better Cooperation, focuses on the process.
Re 2. Innovating together, focuses on the product.
Re 3. Innovating sustainably together, focuses on the interests of parties and not on processes or products. It is about merging interests and multi-actor process management.

2. Interpretation of sustainability
Re 1. Better Cooperation makes a contribution towards sustainability in the sense that waste is avoided. Fewer raw materials, fewer side effects (emissions, waste... the list is a long one), less friction in the process. In terms of the PPP model (Elkington, 1998), the result benefits along all three dimensions: people (friction and harmonious cooperation), planet (raw materials and energy), and profit (greater yield through reduced costs and failure costs). The scope is to avoid waste in the current process.
Re 2. Innovating Together contributes towards sustainability in the sense that the innovated products are produced, used and discarded more sustainably (preferably recycled and even more preferably 'reborn' through Cradle to Cradle processes).
Re 3. Innovating Sustainably Together plugs directly into the definition of sustainability: to continually respect the needs of as many people as possible, and, at the same time, to defile the needs as little as possible. Societal sustainability is then the situation in which this is achieved to the maximum (upper right in the field of interests, Figure 1).

3. Type of innovation
Re 1. The focus with Better Cooperation is on process innovation.
Re 2. The focus with Innovating Together is on product innovation.
Re 3. The focus with Innovating Sustainably Together is on social and societal innovation.

4. Dominant organisational form of cooperation
Re 1. Better Cooperation is about a well-organised, often repetitive process. The chain as the organisational form usually fits in very well with this kind of process.
Re 2. Innovating Together: a highly qualified and diverse team will have to develop or design new things through extrapolation. How a high performing team can be achieved has been studied widely by Katzenbach and Smith (Katzenbach and Smith, 1993).
Re 3. Innovating Sustainably Together: it is important to know how to operate in a wider and flexible players field. Therefore, the preferred organisational form is the *network,* which, according to Manuel Castells, is a flexible organisation of chains and organisations as a result of the emergence and widespread adoption of information technology resulting in a network economy. According to Manuel Castells, the power is no longer with the agencies themselves, but in the way they participate in the networks (Manuel Castels, 1996-1998). Looking ahead, he predicts: "We go to companies operating on a global scale, but they are able to create customised products for local markets. People will also be able to interact with the media, and make up their own package. We're not moving towards a global village, but to the global production of tailor-made village houses."(NRC Handelsblad, November 8, 1997.)

5. Results
Re 1. Better cooperation results in a more efficient process. The improvement is manifest in a faster and cheaper supply, fewer mistakes and less waste production.
Re 2. Innovating Together results in a more effective product. The existing properties of the product are improved.
Re 3. Innovating Sustainably Together: the result of the cooperation is appreciated for various reasons by a broad coalition.

6. Goal Orientation
Re 1. Better Cooperation: the goal is to maximise efficiency (the result is not in dispute). The activity is exploitative, purposeful, the objective is known (absence of noise in all respects).
Re 2. Innovating Together: the goal is excellent products (the process used is of secondary importance). The activity is not so much targeted but rather extrapolatory, aiming for the better along familiar dimensions without knowing exactly where the better is.
Re 3. Innovating Sustainably Together: the goal orientation is highly explorative and in a wide field.

7. Dominant value strategy
Re 1. Better Cooperation: the underlying value strategy is Operational Excellence.
Re 2. Innovating Together: the underlying value strategy is Product Leadership.
Re 3. Innovating Sustainably Together: the underlying value strategy is Societal Intimacy.

8. Market Interaction
Re 1. Better Cooperation: market interaction is about an increase in earnings or a cheaper product.
Re 2. Innovating Together: market interaction is about hitting the target group at the right spot, and the continuity of the company.
Re 3. Innovating Sustainably Together: market interaction is about being properly embedded in a social coalition that provides added value to society. Profit is not the only goal and the customer should not only be seduced, but that what the cooperation yields should be regarded as useful by many involved, even if only indirectly.

9. Process Characteristics
Re 1. Better Cooperation: the improvement process is mainly analytical, and more specifically, diagnostic in nature. The process is mainly performance oriented.
Re 2. Innovating Together: the improvement process is design-oriented. The emphasis is not on improving the past, but on creating the future. The process is not so much focused on improved performance, but much more on adding utility value. The process is creative and searching in nature as

opposed to that of the first method. The term Fuzzy Front End, mentioned regularly in the literature (Koen et al., 2001; Hassi et al., 2009) links up with this creative process.
Re 3. Innovating Sustainably Together; the process is characterised by sensitivity to the players field. Cooperation, interest in one another, interaction with each other, in short, the exploration of others. Both cooperation and its results (process and product) receive attention.

10. Type of Professionals
Re 1. Better Cooperation: analytical skills and quality expertise are needed. It certainly includes creativity within the existing process frameworks.
Re 2. Innovating Together is more about creative and innovative professionals, designers with technological skills. It is about creativity but starting from the existing frameworks. (There is also a need for people who are able to facilitate such activities, group processes with experts, in a stimulating manner.)
Re 3. Innovating Sustainably Together is about having, in addition to the many specialists, professional generalists who understand the specialisms and who are highly sensitive to others in the wide players field, and are at the same time able to handle this discipline. Knowledge brokers and multi-stakeholder process managers are key figures.

11. Instrumentation (appropriate supporting methods)
Re 1. Better cooperation: the use of integral process models, static and dynamic (process simulation) models are very appropriate. They *describe* the process in question. In addition, there is a need for performance monitoring (for example, by means of the scorecards developed by Kaplan and Norton, etc.). That the numbers tell the tale is true for this method. Process improvement varies from being incremental to revolutionary. A revolutionary offshoot is Business Process Reengineering (Hammer, 1990) in which the entire process can be radically changed in favour of increased efficiency.
Re 2. Innovating Together: it is difficult to specify methods that bear on the creative process itself because it is sometimes difficult to predict. Scientific disciplines such as *product design* and *industrial design* and *innovation science* traditionally focus on this method.
A range of methods is available that can focus and accelerate creative processes among specialists and experts. This is mainly about specific workshop sessions and teamwork with professionals of a different breed. A recent example is the government's research laboratory as part of 'The Netherlands Different' programme. Design-driven development through prototyping is central to these approaches (Brown, 2009; Kelley and Litmann, 2001).
Re 3. Innovating Sustainably Together is all about sensitivity to each other and creating value together (Diepenmaat and Te Riele, 2001). The parties in this method differ even more from each other than the specialists in method 2. Therefore appropriate methods just plug in in order to be able to see through the major players fields in practice, both integrated and focused on individual players. Activities within this method are, therefore, and more so than in the other two methods, ideal mixes of methodological approaches and social sensitivity. Suitable methods include, for example, stakeholder analyses, coalition models, conflict models, settlement models and various other methods (see Diepenmaat 2011), and the Innovation labs facilitated by the Nyenrode Center for Sustainability.

12. When appropriate?
Re 1. Better Cooperation is particularly appropriate for highly repetitive products for which there is considerable demand (or expected demand). It also requires constant attention in the case of outright cash cows (see also the portfolio management of the Boston Consulting Group).
Re 2. Innovating Together is relevant if there is a need to enrich the current product line: a new star is then developed. It is also relevant in the case of existing products when demand is starting to decline. Balancing control and flexibility (methods 1 and 2) is the basis of a vital business. This can extend the life cycle of a product (Levitt, 1965) or even of an entire company (see Adizes, 1990).
Re 3. Innovating Sustainably Together: is relevant if you want develop *stars* in a sustainable context. You can also place a product from methods 2 or 1 in this third method in a wider and more sustainable stakeholder context. For example, the delivery of energy services to a house or utility building that is still to be delivered.

13. Specific risks
The advantages of each of the three methods have already been mentioned, but each individual method also has its own risks.
With a dominant focus on the first method: Better Cooperation, you run the risk of operating penny wise, pound foolish: so much attention goes on process improvement (often with many small steps) that essential greater changes are not perceived. For a now classic formulation of this danger see Hamel and Prahalad, 1994. Moreover, people can be completely lost in the case of a dominant emphasis on process efficiency.
Re 2. Innovating Together: there is a risk here that the technical experts involved in innovation are so fascinated by the technological improvement process that sight of the customer and the market potential is completely lost. This can be seen as a variation of Disruptive Innovation (Christensen, 1997).
Re 3. Innovating Sustainably Together: here you run the risk of endless discussions, too long an attention span, and frequently appealing to another for action.

14. Appropriate type of leadership
Re 1. Better Collaboration: there is a need for management in the classic sense of the word: the constant solving of small and greater problems and seeking opportunities for improvement. Actually this is more a case of (chain) management and administration than leadership.
Re 2. Innovating Together: there is a need for innovative and visionary leadership. The leader leads his own, sometimes broad-based innovation team and future customer relationships that are relevant for innovation.
Re 3. Innovating Sustainably Together: the players field is clearly wider than the mandate of individual managers or leaders of the parties involved. For this reason, the appropriate form of leadership is focused on collective self-steering. This is about distributed leadership, where everyone contributes

for his own reasons towards a shared greater whole, where each has control over just a small part. For a discussion of distributed leadership in a context of sustainable development see Diepenmaat, Mager and Wittmayer in "Quartermaster of the Future" (2011).

15. Type of initiator
Re 1. Better Cooperation: there is a need for flexible managers who, while improving the product, are able to protect production from risk.
Re 2. Innovating Together: there is a need for entrepreneurs who are able to identify opportunities and act upon them unscrupulously.
Re 3. Innovating Sustainably Together: there is a strong need for the integrating capabilities of the initiator. He must be able to combine self-interest and collective interests and quickly distinguish the interests of the other 'targeted' players (highly empathetic qualities).

16. Time horizon
Re 1. Better Cooperation: the focus is on the short term results. Less obstructions in the process directly result in a higher production. The effect is not only assignable and predictable, but can even be experienced at short-notice.
Re 2. Innovating Together: the results often show up in the near future. The development of a new product or service takes time and money. Therefor it is about an investment to make. The break-even point will – in case of success – be achieved just later.
Re 3. Innovating Sustainably Together: also the long term effects will be explicitly taken into account. Long term high or through time increasing performances will keep products and services successful on the long term. The results are in this way more socially robust.

4.4 Practitioners' ideas about the three methods

A round table discussion in which the results of the research were presented to the practitioners involved was organised to conclude the research. The meeting discussed where the three methods are in evidence today in building practice and what the expectations are for the future.

Each participant was asked to allocate a total of 100 points to those areas where attention was currently given to each method in their own organisation. The participants were then asked how a 100 additional points should be allocated with the future in mind. After assessing their own organisation, the same question was asked for the construction sector as a whole. The participants were then given a little time to explain their scores, and these scores were then placed on an overview.

In this publication we only explain the results for the sector as a whole. Most attention is currently given in the sector to method 1: process efficiency (61%); followed by method 2: product effectiveness (24.6%); and finally method 3: sociality (14.4%).

The additional attention to be given with the future of the sector in mind was allocated as follows: 33.4% for method 1: process efficiency; 35.6% for method 2: product effectiveness; and 31% for method 3: sociality. This is an almost even distribution. When we add this to the initial situation in the sector, we are now looking for a future of the sector in which a more even distribution of attention to the methods will become visible. (Method 1: process efficiency (47.2%); method 2: product effectiveness (30.1%); method 3: sociality (22.7%).) Most attention, but less than before, will still be given to method 1. The reduced attention to method 1 will benefit methods 2 and 3.

A second reference time followed. As part of a lecture to the Executive Platform Supply Chain Excellence in which the three methods were explained, fifty CEOs from different segments of the construction sector were asked a similar question for verification purposes. We specifically asked how attention was currently distributed in the construction sector, and how the participants would like to see the distribution of attention in the construction sector in 10 years' time.

Again we saw that the sector was currently giving considerable attention to method 1: process efficiency (57%), compared with significantly lower scores for method 2: product effectiveness (28.4%), and method 3: sociality (14.6%). These percentages are similar to those above.

In the desired image for the future of the industry, the participants opted for an even distribution of attention across the three methods i.e. method 1: process efficiency (30.2%); method 2: product effectiveness (31.8%); and method 3: sociality (38.0 %). Worthy of note is that in the desired image for the future of the sector, the third method, sociality, was given the same amount of attention as the other two methods.

The above figures suggest the following tentative conclusions:

- The participants at both meetings experienced the difference in emphasis between process efficiency (method 1) and the other methods in the construction sector as a whole to be considerable.
- The difference in emphasis between process efficiency (method 1) and the other two methods in the current situation in the construction sector as a whole was considered to be as great by the participants at both meetings.

* For the future, a more even distribution over the three orientations is desired for the construction sector. This means that methods 2 and 3 will have to increase in importance relatively more so than method 1.

The above surveys are tentative, but they are mutually consistent and reinforce our suspicion that the most successful (coalitions of) firms will, in the future, have to be 'Masters of Three'.

5 Conclusions and recommendations for further research

The central research question described in this publication was:

>> *What are the robust methods to achieve sustainable innovation through collaboration?*

In order to answer this question, we took a definition of sustainability developed by ourselves that respects the interests of different actors and focuses on them. This is therefore about creating value in complex players fields. This makes it possible to bridge the gap between sustainability and research into strategies to generate value. In a combined process of literature review, practice analysis, extension of existing knowledge, developing new insights and the design of consistency, we arrived at three fundamental and interrelated processes. They are:

1: Better cooperation, focusing on more efficient processes.
2: Innovating together, focusing on more effective products (services, product-service combinations).
3: Innovating sustainably together, focusing on creating a better society (Societal Intimacy).

The three methods differ widely. Each has its own strengths and weaknesses, both in the organisation (method of cooperation), and in opinions on innovation and the interpretation of sustainability. The three methods lead to a different perspective on the individual nature and mix of cooperation, innovation and sustainability. They are all therefore three key terms from the question pertaining to *alternative methods* to achieve sustainable innovation in cooperation.

This picture was reinforced when the three alternative methods were placed as vectors against the backdrop of a field of interests. This highlights the specific ways in which different methods honour interests, and thereby generate value. All three vectors add value in their own way, as evidenced by the specific placement and orientation of the vectors in the field of interests. The methods are fundamentally different from the perspective of value generation.

The methods differ in terms of cooperation, innovation and sustainability. But they also differ from each other in many more respects, as is apparent from the broader range of aspects that has been worked out. In all these aspects, including such things as value strategies, emphasis on market interaction, appropriate leadership and the kind of professionals required, the differences are fundamental. This may be expected as the trio indeed involve fundamentally different basic methods. A consistent 'otherness' of the three methods in all these aspects further supports the notion that they are fundamentally different.

The impression might possibly arise that three alternative directions are involved. What springs to mind is the metaphor of a three-forked road that gives access to three different landscapes. You choose your exit, and consequently you do not choose either of the other two roads.
However, companies today have to deal with widely varying interests in increasingly more complex players fields. They face such things as economic fluctuation, scarce resources and talent, ever shorter product cycles, more rapid innovation, tougher competition, changing customer needs, increasingly stringent requirements for sustainability, image and social acceptance of companies and brands. When examining the constraints we already suggested that a consequence of these changes is that organisations must also be flexible and able to shift their focus fast. Therefore what it will be about is having skills in *all three areas*. The final workshop reinforced the impression that the future will require all three methods to be managed, simply because the terrain is changing all the time.

So instead of the metaphor of the crossroads, we return to the three modes of transport in a complex landscape. Just as there are multiple forms of transport available for travelling, there are also several methods that can be successful. Just as the choice of transport depends on the circumstances – by car for longer distances, by boat to cross water and on foot along a mountain path – this also applies to the three methods. Generating maximum value in complex players fields requires a combination of all three methods. Then you advance the most in a varied landscape. The result is a sustainable building practice. Organisations moving into the future should actually be able – to continue the metaphor – to recognise the landscape, and know how to use all three transport modes, often at the same time and in varying degrees. In line with our sources of inspira-

tion surrounding value disciplines from the last century, this is what we call *Mastering Three*.

Recommendations for further research

Organisations wanting to develop sustainable innovations through cooperation, and thereby wanting to generate maximum value, should have the skills to control all three transport modes and also be consistent in handling them. We referred above to the *Cakewalk*. This is, however, difficult in practice because each of the three methods requires totally different qualities. Each of the three methods brings with it an entirely different atmosphere and (organisational) culture. There are still only a few who can excel on all three fronts. The *value paradox* is that a company, as it becomes more professional in one of the three directions, creates its own internal barriers, as it were, to do the same in the other two directions. We therefore recommend further research into the implications of our findings for management. Must other processes and working methods be introduced? Or different people hired? Should several companies be involved? Research therefore into solving the value paradox.

Industries other than the construction sector are facing these very same issues. We therefore recommend conducting further research that focuses on deploying the three methods together also in other sectors.

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References

See the Dutch edition of this publication pages 48-50

Appendix 1: Interviews

See the Dutch edition of this publication page 51

Appendix 2: A selection of case studies

The concept of W&R dwellings (Value and Riant), Royal BAM Group nv

The development of the W&R concept is a response to several negative side effects of modern building practice (see Figure 2.1) that originated at the start of the large-scale housing production in the 1950s and 1960s. Breaking through the monotony, providing improved building quality and reducing failure costs are some examples of the response to these effects. Up until the early nineties builders paid particular attention to high production levels. Combating these effects required a totally different approach to the construction process. This is why the Royal BAM Groep nv launched the W&R concept (Value and Riant) in 1992.

The W&R concept was a new process in the construction sector based on a continuous *building flow* of a reference dwelling which can be adapted in line with the particular characteristics of the location, target group, budget and other conditions. It is not a *standard house*, but a *standard procedure*.

The core of this process is working from a reference dwelling. 80% of the dwelling to be built is the same in every situation, e.g. foundations, construction method, floor plans, etc. All attention in the building process can then be focused on deviations from the reference dwelling, such as a particular facade arrangement, or the use of different materials and details.

By starting from a reference dwelling that can be made suitable for different target groups (from starter to senior) and that provides for ariation in ground-accessed dwellings and apartments, the entire spectrum of the market is covered.

By engaging architects and urban planners, who should of course respect the set properties of the reference dwelling, each project acquires its own unique appearance and blends in with the local context.

In addition to each project having its own unique appearance, decisions can also be taken on the sustainability levels of the house. So, besides the regular W&R dwellings, there are also the W&R Green and the W&R Passive house options. Leading principle in developing the W&R Green were the monthly costs for the end-user. Installation principles and insulation levels are optimized in respect to the lowest possible monthly costs. The Passive House option meets the Passive House requirements.

The W&R concept is continuously innovated and improved. On the one hand through incremental innovation, achieved by organizing yearly innovation days together with the suppliers and subcontractors. The knowledge and experience of these parties is taken into account to optimise the overall building process. On the other hand more radical steps are made by developing new variants of the W&R concept, like the W&R Green and the W&R Passive, in cooperation with knowledge institutes and engineering offices.

The low price and short construction time as a result of the efficient process, combined with the guaranteed quality of the end product make it a very attractive option for the customer and, of no less importance, it strengthens the competitive position of Royal BAM Group nv. Continuous production makes BAM a reliable client for subcontractors and allows for incremental product improvement and development, through which a competitive price/quality ratio is guaranteed.

Eindhoven Airport

Continued growth in regional air traffic forced Eindhoven Airport in 2004 to build a new passenger terminal. In an unusually short pace of time – just short of 18 months – a state-of-the-art arrivals and departures hall was designed, built and operational. Thanks to the successful cooperation between the parties involved in the *building team* it was possible to get the terminal up and running within budget and within the prescribed timeframe. By organizing the process in a different way and by getting the right parties involved at the right time better results could be achieved than with a conventional process.

"Cooperating in the right way only leads to profit" is the opening remark of Dick Smits, managing principal of Eindhoven Airport.

How to cooperate in the right way? Taking Eindhoven Airport as an example, we explain below some important aspects:

An unusual phasing from design to build. Immediately after planning permission was granted based on a detailed VO (Preliminary Design), a building team was called into being. A leap was made straightaway to production drawings. The specifications and procurement phases could be done away with, as well as any 'saving rounds' that often accompany them. The choice to work in a building team with pre-selected partners is a logical consequence of the telescoping of the process under the influence of time constraints. The traditional cascade method would be too time consuming and also mean running a risk that changing circumstances might catch up with the demands and wishes of the client. The traditional cascade method is only interesting for creating highly-repetitive, homogenous products. A classic example is the Model T Ford. The development of a unique, one-off building – such as the passenger terminal – requires a completely different approach i.e. a well-functioning team of skilled professionals.

By changing the customised phasing, the roles and responsibilities of the parties involved during the process also changed. An important shift here is that the responsibility for the production working drawings went to the construction parties. This changed the role of the architect from a prescriptive role to a more supervisory and coordinating role during the process.

Cooperation within a building team has **a different contract structure**. Two types of agreements were used in the Eindhoven Airport building team, namely: (i) the individual framework agreements which set out the business agreements between client and contractor; and (ii) the joint building team contract which stipulates the 'rules of engagement'. The building team contract specified, among other things, that all parties would be jointly responsible for the success of the project. Establishing this joint responsibility is important because it encourages parties to act not only from their own interests, but also to find a happy medium between their own interests and the collective interest.

A third important aspect in this collaboration is alternative risk-sharing among the partners involved. In this case the client – Eindhoven Airport – takes a large part of the risk at its own account and does not place the risk with the construction partners. The construction parties only bear the risk of their own work: construction of the terminal. The other risks, including the risk of purchasing building materials, are for the client himself. Therefore it was unclear at the outset whether the project could be realised within the (financial) constraints. This would become progressively clear during the process. The appropriation of the purchasing risk by the principal was amply repaid during construction of the terminal. Windfalls and setbacks could be offset against each other, and the client still had influence on the choice of materials and prices during the process.

Cooperative Association Q

The principle of a cooperative association of companies that jointly develop a product or construction method is unique in the Dutch construction sector. Architect Edwin Smit, president and founder of the Cooperative Association Q, was inspired by the principle of cooperating businesses in the agricultural sector. He saw wine growers from the same region uniting in a cooperative association to produce wine – from grape pressing to bottling and distribution of the wine. Their joint investment in equipment enabled them to purchase better, more modern and more expensive machinery which would not have been possible on an individual basis.

The Cooperative Association Q is actually more than an experiment to introduce the principle of cooperative associations in the agricultural sector to the construction industry. It is the final result of the quest of a number of pioneers for the ideal form of cooperation in which sustainable, healthy and affordable houses would be the result. This kind of cooperation should also make it possible to avoid the more familiar pitfalls in the construction industry. One major pitfall is the constant reinvention of the wheel (or in this case the house). Previously acquired knowledge seems to evaporate. The problem of the often high failure costs and the effort required to reduce them barely requires any explanation.

To improve and make the processes in the building sector more sustainable, various government programmes and studies have been designed and run focusing on themes such as: improving knowledge exchange between construction parties themselves; supply chain management and failure reduction; fostering the use of wood in construction; affordability of sustainable dwellings; availability of materials in the near future and suchlike. Current building practice shows that the recommendations and guidelines from these studies often do not find their way into everyday building practice. This was ultimately the reason for a small group of people to get together with a view to finally getting the recommendations, implementation plans and high ambitions on paper actually into practice.

The group that would eventually become the Cooperative Association Q, initially consisted of four different parties: an architect (integrator), a critical thinker, an engineer and a financier, all driven by their personal ideology for sustainability and health. The team went on to work together towards sustainable, healthy and affordable housing. Their first step was to approach contacts who were known to have the same ideology and interests. They were asked to participate in the initiative. The team was supplemented by a building physicist and a physician to help develop the health aspects of the project. Much attention was given to the indoor climate. Research institutes TNO and TU Delft were involved at later stages, as were a number of executive and supply parties. In the meantime the initiative has grown into an association of some 30 companies, and new parties are still welcome.

Bringing these contacts together was the beginning of knowledge sharing – a central theme in the development of this kind of housing. The knowledge that was jointly developed was set out in what came to be known as the Q-code and the Q-method. The Q-method describes the design and implementation principles of the Q-construction methodology and includes the principle of ‘centralised design’, ‘vapour open construction method’, standardisation of elements such as floors and walls, etc. The Q-code ensures the quality of the dwelling, based on independent and verifiable benchmarks. Integral product development of the entire dwelling proved difficult to achieve in terms of guarantees, certification and so on. So standardised components and clusters were then developed. The Q-code and the Q-method ensure sustainable quality.

The Q-home: healthy and affordable, therefore sustainable.

The preconceived idea that sustainable living always means more expensive living is negated by the Q-home. In the production of a Q-home the failure costs are reduced by excellent front-engineering, so more money can be invested in the property itself. In this way a more sustainable home

can be achieved. One important element of front-engineering is standardisation of the construction methodology. One example of this is the systematic channel structure that is implemented in all walls and floors to guarantee flexibility of the electrical system during use. And during production no attention needs to be given to the position of the cables and connections.

A healthy indoor environment was the starting point in decisions about the technical details of the dwelling. In contrast to the many methods of vapour-proof timber frame construction, the Q-system uses a vapour-open timber frame construction. The principle of a vapour-open system can be compared with a breathable sailing suit. The wall construction is an active part of moisture control in the home. In addition, much attention is given to the prevention of unwanted radiation and the discharge of certain elements when in use. For example, formaldehyde discharge from glued wood panelling, radon radiation from plaster and concrete, etc. Effective natural ventilation is important here.

The ecological sustainability of the Q-home is found particularly in the use of materials and reduced energy consumption. 90% of the homes are made from renewable materials which means that this concept goes much further than many other construction methods. Energy losses are prevented as far as possible by the core design principle – short ducts are sufficient – and by the use of low temperature heating.

Woonwaard Supply Chain Cooperation in rented accommodation (including Stick-and-Grab day)

A *contractor* of a housing association exercising influence on both the process of task distribution and the substantive aspects relating to realisation does not sound like common practice. And it certainly is not common practice. This unique situation can be found at Woonwaard, a housing association in Alkmaar. Not satisfied with the affairs surrounding the procurement and performance of their renovation and maintenance projects, Woonwaard took the lead in optimising this process.

The entire process – from allocating the work to several contractors to finished product – was completely turned around in a quest for a transparent and effective process. Woonwaard replaced the procedure of a separate procurement process for each project with a more gradual start per project where the contractor was invited to participate as a paid consulting party in the preliminary stages. Only at a later stage was the finalised contract awarded to the contractor. In this way the principal gives his contractors more freedom and money to deliver a more integrated product or service than is the case in the customary process.

To enhance the transparency of pricing by the contractors, Woonwaard wrote a price book containing the bandwidths of prices for the applicable components, materials and products. Traditional risk calculations based on a fixed percentage of the construction costs were no longer accepted. Only clear, substantiated risk estimates could be included in the price. For every contractor a maximum revenue stream was calculated by Woonwaard to avoid too dependent a relationship between client and contractor.

To improve cooperation between the executing parties, Woonwaard asked all partners in the chain to participate in a LEAN course. In addition to information about optimising processes, this course included workshops in which concrete cases from practice had to be optimised. For example, exercises such as: ‘halve the total processing time of a bathroom renovation’. By asking the contractors to participate in this course, the principal helps the contractors get a better understanding of the integral process.

Woonwaard launched six pilot projects with its partners, in which the above measures were implemented. The evaluation clearly demonstrated that demonstrably higher quality was achieved in these projects and that both the planning and the budget were not exceeded. The cooperating organisations showed an interest in more long-term cooperation projects with the same partners, so the experience gained from the pilot projects could be continued.

After completing the first pilot projects, the work for the subsequent period was offered to the same partners through a Stick-and-Grab day. This approach means that the client does not allocate the work on his own, but the client and contractors in concert. Prior to the Stick-and-Grab day, Woonwaard published an overview of the work for the coming year and informed each party of the maximum scope Woonwaard would grant them. The contractors at the Stick-and-Grab day had room to distribute the workload among themselves. The total maximum revenue stream of the various contractors was greater than the total amount of the work that had to be outsourced. This meant that the contractors had to decide together on the universally optimum distribution of work.

At the same time, Woonwaard called into being the 'supply chain cooperation in construction sector' steering committee as a strategic sparring partner for the client himself.

The advantage of this approach
The Woonwaard approach delivers immediate and visible results. The quality of the maintenance work in the pilot projects improved and these projects were completed within budget and on schedule. The principal observes a clear improvement in the cooperation with its contractors and among the contractors themselves. The client is, in fact, in a better position to deliver services to the customer. The contractor has much more freedom and responsibility. The impact on job sharing and planning gives the contractor assurance with respect to profits and continuity for the coming period. The openness and transparency of the process mean that the contractor is also more open is communication with the client, so mutual trust grows. The improved cooperation and the improved product ultimately lead to more job satisfaction.

Although it is cooperation between the client and the contractor, it is ultimately a win-win situation for all parties involved. Not only the client and contractor benefit from rapid and high quality renovation, but also the resident – the end customer – is extremely pleased when the renovation takes place without much hassle. In addition, the resident also benefits the most from the high quality renovation. A happy tenant is, after all, the objective of the very existence of the housing association, making the win-win situation complete.

The financial profit from the decline in failure costs through better communication and project preparation is invested in the development of sustainable innovations.

Wonion 'Soft Selection Methodology'

For many housing associations developing affordable and energy efficient homes is unknown territory. The desire to generate such homes challenged housing association Wonion to embark on a project for 61 energy-neutral homes.

The project leader invited several specialists and consultants to discuss how a good plan could be achieved. However, consulting the various consultants had the opposite effect. Ambiguities and conflicting opinions were the result. It was clear that this approach would not produce the desired results and that a different approach should be devised.

Wonion realised that achieving such a cost-effective, complex project could only be achieved through intensive collaboration and that the market itself would be in a better position to do so than a housing association. Wonion therefore decided to hand the design and development of these homes over to market parties.

To this end, however, the right question had to be addressed to these parties. Wonion therefore proposed five basic conditions the finished homes would have to meet. Besides the requirement that the housing should comply with applicable legislation and regulations, Wonion also submitted the following five basic conditions to the five consortia:
- the value of the building; what is the association's budget?
- the maintenance costs per year
- the energy costs of € 0, - per year
- the level of sustainability
- a healthy and liveable dwelling

It was also agreed that the consortia would make use of supply chain management and would, on completion, share the acquired knowledge. The consortia were asked to develop a property concept within these constraints. The client deliberately did not make too many demands so that the participating consortia had sufficient space to come up with surprising solutions. That the ultimate solution would be arrived at through good cooperation was the starting point. However, Wonion did realise that this would not be a soft option. All the consortia were assigned a process coach who intervened as soon as the cooperation process appeared to be too much in line with 20th century ways of thinking.

The position of the client in this approach can be compared with that of a customer buying a car. The development and the purchase of a car take place in separate paths. The buyer does not necessarily have to be interested in exactly how the car is developed and built. The buyer is primarily interested in whether the finished product will meet his needs and whether it is within the available budget. By establishing the right conditions, Wonion takes on the role of a customer who compares a number of products and takes a decision.

After the development phase, the consortia presented their plans in a public jury session to a jury put together by the client. The public nature of the presentations and panel discussions gave the participants insight into the other proposals and considerations of the jury. The presence of the participating parties at the adjudication in turn encouraged the jury to present a clear and substantive argumentation of its judgment.

Each consortium received an intervention voucher with which they could interact once with the jury deliberations. As a result, balanced interaction between judges and participating consortia ensued. Before the jury hearing, the members were given an opportunity to check specifications of the plans and to consult experts about them. The evaluation matrix was based on three elements, namely: (i) the dis-satisfiers – the detailed quantifiable requirements; (ii) the satisfiers – improved qualities; and (iii) the delighters – the surprising elements the client would not have thought of. The winner would be chosen on the basis of objective criteria and subjective judgment of the jury. The subjective judgment is difficult to quantify and incorporates the gut feeling a jury has about the various consortia and their products.

The transparency of this process leads to a much lower risk of lawsuits after adjudication. The participating parties can see themselves how the decision has been made. It is unlikely that a court would disapprove of such an open and transparent process, and all parties were informed in advance of the process to be followed and the design of the assessment. The consortia could, at the outset, choose whether or not to participate.

Opting for this method also means cost savings for the client. Not least because failure costs could be significantly reduced through supply chain integration. But the process costs could also be reduced. Considerable savings were made on hiring in consultants. The consortia tended to hire in consultants only when they were really needed. What should be considered here is the need to select capable parties who are well attuned to each other.

Each consortium received a reimbursement for calculation expenses for the design and development project. This reimbursement was possible because cuts were made on transaction costs in other parts of the process. Significantly fewer transaction documents were needed because only one transaction took place. The final contract consisted of only a few pages partly due to the fact that a good feeling of trust had developed.

The consortia were positive about the process. They agree that it is a good approach that should be continued. Another positive aspect was the transparency of the process, which gave people room to improve. They learn from the different concepts and can apply the acquired knowledge in the future. Basically the consortia submit one concept and get four in return.

It emerged that the consortia needed more substantive interaction with the client. There was a focus group of architects, residents and city planners with whom they could discuss matters, but more personal contact with the client would appear to be desirable.

One of the parties involved pointed out the following disadvantage: the costs for the consortium were higher than the reimbursement they received. Costs can be kept lower by keeping the architect outside the consortium. The costs would also diminish if the consortia were to collaborate more often on similar projects. The acquired knowledge could then be used more often.

It also turned out that having five consortia working on the concept was too many. If only three consortia were to develop a concept, a higher reimbursement for calculation expenses could be provided to them. The winner was not reimbursed for calculation expenses because he was awarded the assignment.

CV

Associate Prof. H.B. (Henk) Diepenmaat MSc PhD has, since 2011, been working part-time at the Center for Sustainability at Nyenrode Business Universiteit. Since 1998 he has been a director of Actors Process Management BV, a practice that promotes processes with many parties and interests. Henk Diepenmaat has worked in a wide range of sectors, including: construction, agro-food, mobility, energy, healthcare, education, ICT, and the environment. He publishes in many different ways in his fields of expertise. One example: he published the handbook 'Multi-actor process management in theory and practice' in 2011. Henk Diepenmaat is also a co-director of The Greenware Hoods MV, a social company that promotes sustainability in an enterprising manner.

J.G. (Joost) van Ettekoven MSc has worked since 2008 as a researcher at the Center for Sustainability at Nyenrode Business Universiteit. Recurring themes in his research projects include construction, sustainability, innovation, collaboration and design thinking. In addition to his research Joost is also involved in iistudio, a collective of young independent designers working in the field of sustainable innovation in the built environment.

Prof. J.D.M. (Anke) van Hal MSc PhD has been professor of Sustainable Building & Development at the Center for Sustainability (CfS) at Nyenrode Business Universiteit since 2009. The CfS focuses on creating business opportunities from sustainability. In addition, Anke van Hal has, since 2007, been practice professor of Sustainable Housing Transformation at the Faculty of Architecture at TU Delft, prior to which she worked for over 20 years as a sustainable building specialist. Her work is characterised by the term 'the merger of interests', the starting point for which is an analysis of the interests of the parties involved in a project. The second step is to promote these interests in a sustainable manner. And the third step is to find attractive financial packages. Anke van Hal has numerous publications and articles to her name. She is also a member of various juries and advisory boards, and is on the board of The Dutch Green Building Council.

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