Conversion of office buildings

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A cross-case analysis based on 14 conversions of vacant office buildings

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Abstract

Building conversion is a way of activating and reusing vacant office buildings. Former research (Barlow and Gann, 1993, Brand, 1994, Douglas, 2006, Geraedts and Van der Voordt, 2003, 2007) has shown possibilities for conversion through theory and practise, and has delivered instruments for determining the conversion possibility of vacant buildings. Still, building conversion is not taking place on a large scale. There may be several reasons; lack of knowledge about building conversion, uncertainty about financial feasibility, and little knowledge about the chances and risks of building conversions. This paper aims at answering the following questions: What are the risks and chances of building conversions? Can these be revealed at an early stage, increasing the feasibility of the project? These questions will be answered based on a cross-case analysis of 14 buildings in the Netherlands which were converted from offices to housing. We will discuss legal, financial, technical, functional and architectonic issues, both theoretically and empirically, by presenting findings from the 14 cases, revealing the risks and chances of building conversions to support decision making on dealing with vacant office buildings.

Introduction

Building conversion is a well known phenomenon; inner city buildings loose their function, and adapt to new use. In the Netherlands though, the scale on which since 2001 office buildings have lost their function is so far unprecedented; at the end of 2006 about 6 million square metres, equalling 14% percent of the office space in the Netherlands, was vacant. Building conversion is a way of coping with vacant office buildings. The alternatives are consolidation, renovation or upgrading, or demolition - eventually with new construction on the site. Most owners of vacant office buildings choose consolidation; to do nothing, but to wait for better times. This choice is often not based on rational reasoning. The value of office buildings is based on rent value, not on the value of the building itself. Hence, the sale of a vacant building brings less than the sale of an occupied building. The building will not be sold in accordance with its book value, which means facial loss for the seller. For housing market investors and real estate developers, high asking prices is a reason for not converting vacant office buildings into housing. The different real estate markets are separated; office market actors have little knowledge about the housing market, and vice versa. Among the stakeholders on the real estate market there is a general lack of knowledge about conversion processes (Remøy, 2007). Still, several vacant office buildings have been converted into housing. Which building- and location-characteristics influenced the project positively or negatively? Can risks and chances of conversion projects be revealed and controlled, increasing the financial feasibility of the project?

Method

This paper is based upon a cross-case analysis of 14 cases. The cases were selected for the book "Transformation of office buildings" that was published in January 2007 (Van der Voordt et al., 2007). The cases were chosen to make it possible to generalise the findings within a specific group of conversion projects (Flyvbjerg, 2004): They are all examples of conversion from offices into housing, they are of significant size (the smallest counted 18 apartments) and the cases chosen were carried out during the last ten years, since the juridical framework stayed more or less the same during this period. Table 1 gives an overview of the 14 cases that were studied. The studies were performed after the conversion. Case study

evidence includes material from several sources; the situation before conversion was studied through documents; text, photos and drawings, and the situation after conversion was studied through documents and visits to the building. Interviews with stakeholders were held to gain insight in the process and to gain additional information of the situation before conversion. In any building project, several actors are involved, the client, the developer, the architect, the structural engineer, the installation engineer and finally the assigned builder. We intended to perform two interviews for each project, one with the architect and one with the developer. In some cases though, there was no architect involved, while in two cases we also interviewed the client. The interviews were semi-structured, based on an interview protocol (Yin, 1989, Mason, 1996), evolving during the six months period in which they were held.

Table 1: conversion cases

	Delivery	Delivery converted	Amount of units	Type of dwelling	Interviews
De Stadhouder	1974	2005	70	Starters buy	1
Lodewijk Estate	1954	1999	24	Seniors, buy / rent	1
De Enk	1956	2006	69	Starters, buy	2
Schuttersveld	1915-1923	2003	104	Luxurious, buy	2
Westplantsoen	1970-1980	1999	45	Students, rent	1
Billiton	1938	2004	28	Luxurious, buy	2
Hof ter Hage	1935-1967	1998	*97	Mixed, buy	2
Wilhelmina Estate	1969	2007	*43	Mixed, buy	2
Granida	1958	2005	*30	Luxurious, rent	3
Residence De Deel	1959	1999	18	Seniors, buy	1
Twentec Building	1960-1965	2002	*87	Luxurious, rent	2
Eendrachtkade	1980	2004	83	Students, rent	1
The Churchill towers	1970	1999	120	Mixed, rent	2
Puntegale	1940-1946	1999	*210	Starters, rent	2

*Other functional programs were added, such as shops, health care and commercial space.

Interviews

In the interviews, we questioned project specificities. The first issue was the project initiative. Mostly, the project was initiated by the developer, but sometimes also by the local municipality or the owner of the vacant building. The second issue was the spatial program, the appointed user and feasibility. We questioned the relation with the local municipality and their role in the project. The third issue was the design phase. Mostly, the architect had the most information about this part of the project, but due to the project character, other stakeholders played more important roles than they would have done in a typical new construction project. The director of the project was sometimes the architect, sometimes the developer. The fourth issue was the construction phase and eventual problems surfacing at this stage of the project. The final issue was about delivery, use and building management; process evaluation, financial feasibility and user satisfaction.

Additional data, the project documents

We visited the buildings and photographed the new situation. In some cases, we spoke to the inhabitants. Furthermore, for extra information, we used photos of the existing situation and the architectural drawings of the building before and after conversion. In many cases, these drawings gave a good overview of the existing structure, stairways, elevators and exterior and structural walls, while the interior walls were less credible. The interiors of office buildings are often adapted without updating or making new drawings. The written documents consisted of magazine- and newspaper- articles. These were especially useful for projects that were converted several years ago and where the interviewees were forgetting details.

Data analysis

We had 24 interviews about 14 projects. For each project, we wrote project and process descriptions, distilled from the interviews and the written documents. The drawings and photos were used to explain the situation. The stories we wrote based on the interviews were sent to the interviewees for feedback and accordance. When the interviewees did not agree on the story we had a second round of feedback. The stories written up from only one interview were validated by another stakeholder of the same project. The projects and data were filled in a matrix and analysed for patterns (Yin, 1989). As a result, the projects could be divided in three categories; buildings from before 1950 (or designed before 1950), buildings from 1950 to 1965 and buildings from 1965 to 1980. The 5 buildings from before 1950 share several characteristics; they

are monumental in their appearance, 3 are classified as monuments. The buildings have structural, solid outer walls and considerable size. Four were built to accommodate specific governmental services. 4 buildings were built between 1950 and 1965 (though Lodewijk Estate was built in 1954, it was built from an earlier design). During the fifties, new construction methods entered the market. The buildings of the Akzo headquarters [De Enk] in Arnhem and the GGD Building [Granida] in Eindhoven have a construction of columns in the facade with additional columns in the centre of the building, while the Estate De Deel and the Twentec Building are early examples of constructions with columns and free floors. Of the 5 buildings newer than 1965, one of them has a structural facade in the form of facade columns, four have a construction of columns and free floors. Of these four, in two of them the columns are put directly behind the facade, while in the other two the facade is kept completely free from the construction.

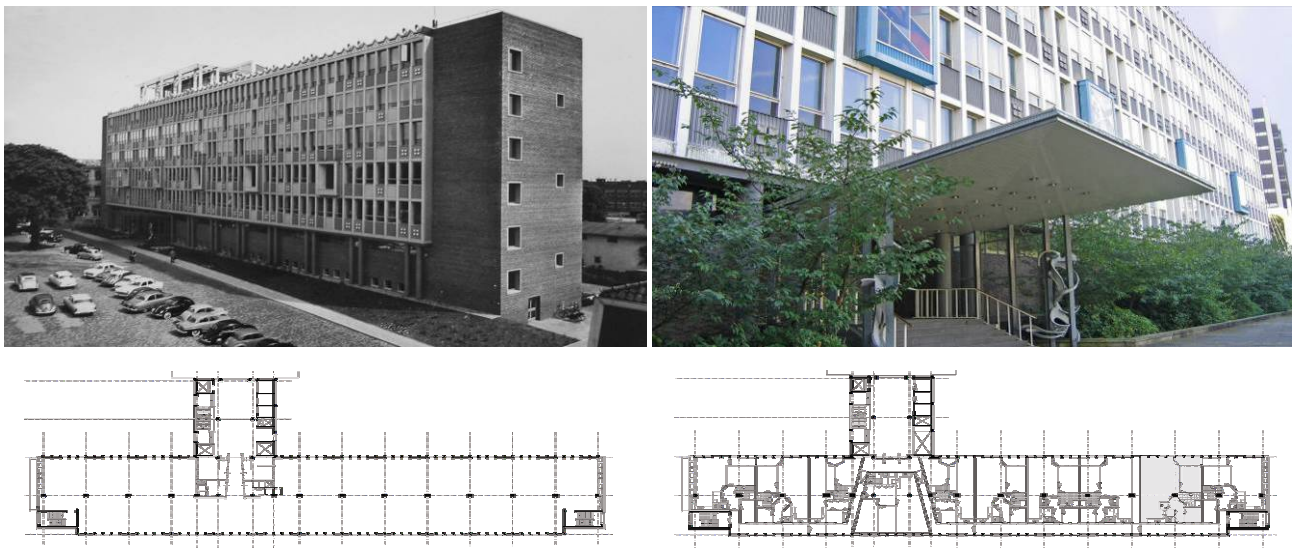

Figure 1: De Enk. Left: the building before conversion, to the right the building after conversion.

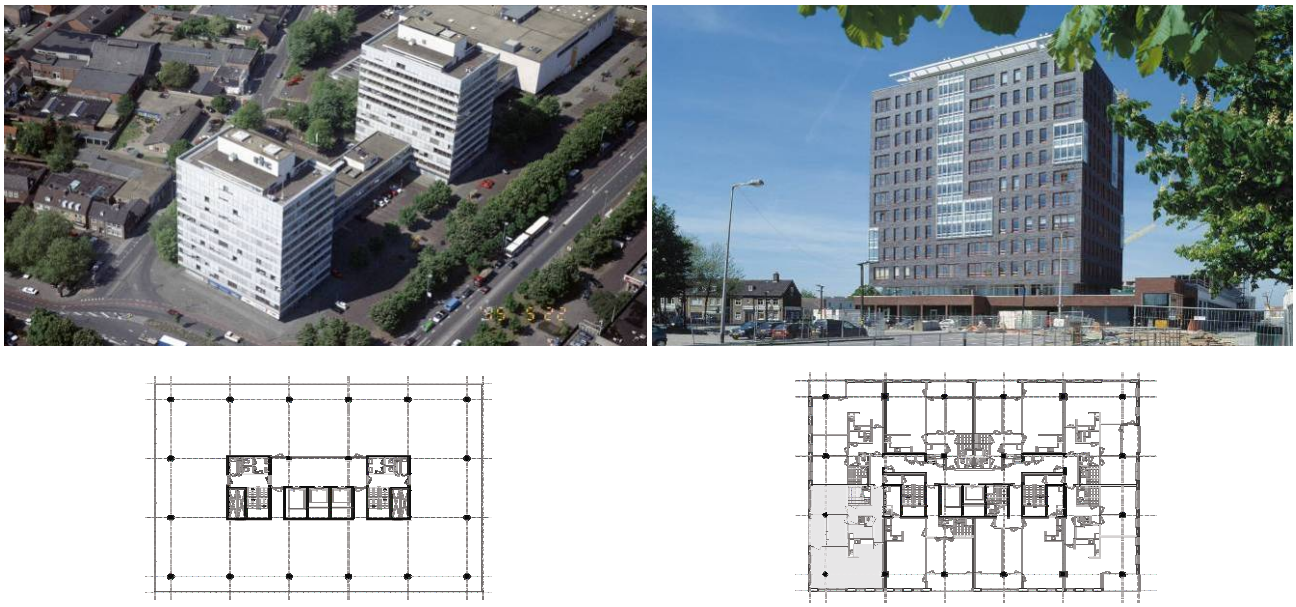

Figure 2: Twentec building. Left the building before conversion, to the right the building after conversion.

Risks

Former research (De Vrij, 2004, Geraedts and Van der Voordt, 2007) developed instruments to decide office buildings potential for conversion, and also developed checklists to determine development risks (Table 2).

Table 2: Checklist of potential risks, translated from de Vrij (2004)

Location and Market	**Aspect**
1. Legal	
	1. Zoning law
	2. Land ownership
	3. Soil pollution
2. Financial	
	1. Purchasing costs of vacant office buildings
	2. Housing (rental) and commercial space market
3. Technical	
	1. Stench pollution
	2. Noise pollution
4. Functional / Architectonic	
	1. Bad reputation, unsafe area
	2. Amount of parking places
	3. Amount of facilities in the area
	4. Accessibility by public transport
	5. Routing of the area
Building	**Aspect**
1. Legal	
	1. Presence of asbestos
	2. Monumental status
	3. Dutch building decree, including fire regulation
	4. Municipal building act
2. Financial	
	1. Acquirement / purchasing costs
	2. Initial phase investments
	3. Financial feasibility
	4. Vacancy of the new function
3. Technical	
	1. Incorrect technical assessment
	2. Inadequate pipes, ducts, electricity system and water supply
	3. Inadequate acoustic insulation of the floors
	4. Inadequate thermal insulation of facade, openings and roof
	5. Damp / condensation in structure
	6. Joints of brick walls in poor condition
	7. Daylight < 10% of the appointed living-space
	8. Sunlight; building is poorly situated
	9. Inadequate / poor state of main structure or foundation
4. Functional / Architectonic	
	1. Incorrect assessment of functional possibilities
	2. Low recognisability of the building and its entrance
	3. Building too slender or too deep
	4. Too loose fit, too high floors
	5. No basement
	6. Windows not operable
	7. Few or poor quality of interior walls, few points for attaching interior walls to the facade
	8. No balconies or roof terraces
	9. Not enough elevators and staircases

We performed the cross-case analysis of the 14 cases focusing on the risks and unforeseen problems that surfaced during the building phase of the project. The four risk-categories (legal, financial, technical, and functional/architectonic) of de Vrij were used.

Legal

The projects were all completed, which implies that the requirements made in the zoning law and in the building law were met satisfactorily. Asbestos was found in seven of the fourteen projects. The removal of asbestos follows strict rules and therefore carries high expenses. In all the projects though, removal of

eventual asbestos was taken into account in the sales contract of the existing building. What was stated as a risk in previous research is taken into account by developers of conversion projects, and has gone from being a risk to being a cost that can be calculated.

Financial

Apartments in the projects studied were let or sold without problems, except in a few cases; in one case luxurious apartments without a private outdoor space and with incidentally low ceilings (not according to the building rules) were sold only after lowering the price. In another case, some apartments with daylight from the north only, were not sold for the initial asking price. Anyhow, the risk of not being able to sell the apartments in conversion projects is equal to other projects. In some cases, model apartments were furnished to boost the sale, occasionally even before initiating the conversion. Any developer, assisted by an architect, needs to be aware of the users' wishes. Even in a stressed housing market, quality and willingness to pay correspond, especially in the upper part of the housing market.

Technical

3 out of 5 buildings from before 1950 were not constructed according to the construction drawing, or the construction differed and had different measurement from floor to floor. In one of the five projects, the differences were anticipated upon from the start, the floors were radically different. Two of the four buildings from 1950 to1965 were not built according to drawings and the construction materials and measurements were different per floor. The buildings constructed after 1965 showed no such differences. The risk of inconclusive drawings and differing construction is strong in buildings dating from before 1965. Building methods and measuring methods were not as precise. In the first years after the Second World War housing, and not utility buildings, were prioritised in the Netherlands. It was difficult to get building materials, and in many cases entrepreneurs used the materials they could find without changing the drawings.

The main construction was found in unsatisfactorily state only in one of the 14 projects [Granida]. The concrete of the external columns was rotting and was renovated and reinforced. The repair itself forced extra costs onto the project, but additionally, as a result of the repairs the columns got wider, and the design needed modification. In another project [Billiton], concrete rot was found in part of the facade but took a minor investment to repair. Rotting wood or concrete, or oxidising steel can raise the price of a conversion, but in most cases, these problems can be seen in the preliminary phase and will not be a risk. Adding weight to the construction was problematic in one single case only. Office buildings are constructed to carry more weight than housing, hence in most cases, an additional floor can be carried by the existing construction.

Apartments are normally smaller than office units and more shafts are needed for electricity, water and plumbing. In the buildings from before 1965, floors were penetrated and shafts were placed without problems. After 1965, reinforced concrete was commonly used, making larger span without columns possible. The problem of reinforced concrete though, is that it loses strength when the reinforcing steel cables are cut. In three of the five buildings built after 1965, reinforced concrete was used. Nowadays, reinforced concrete is the most common material to use in buildings. When renovating or converting a building newer than 1965, the construction method should be taken into account. Designing apartments with a minimum of shafts is a challenge for the architect. The problem can be solved; the accurate place of the steel trusses can be located with accurate metal detectors [Eendracht].

Reinforced concrete was not used in building constructions before 1965. The measurements of the structural grid were smaller. The small spans came with thin, light floors. These floors are strong; they are constructed to allow for the weight of office equipment, which before 1965 was heavier than it is now. The problem of converting these constructions into housing is the acoustic insulation of the floors. It is reasonable to say, that floors from before 1965 will need to be acoustically improved to meet the requirements of modern building standards. This can be done, as seen in the cases, by adding a floating floor and a lowered ceiling.

The Dutch building decree requires a higher level of thermal and acoustic insulation of the facade for housing than for offices. The facades in 6 of the buildings were removed and new facades were added. In 7

projects, the thermal and acoustic insulation of the facades was improved, for 5 of the projects there was no other possibility because these were monumental. The facade of only one project was not altered.

Functional

In the initial phase of a conversion project, before deciding to buy the property, the developer, alone or with the architect and other experts, made quick scans of the possibilities for conversion. Sketches were made, when possible based on the original drawings, to make an estimation of the possibilities to fill in apartments or other functions. The quality of the first sketches and estimations are seen as a risk, though not experienced in any of the cases studied.

Additional risks

Additional to the pre-signalled risks, some new risks appeared in this study. The municipality not allowing exceptions from the zoning plan is a risk. But based on these cases, we recognised the risk of the municipality slowing the process where a change or an exception of the zoning plan was needed. One of the chances of conversion projects is the short time span from first sketch till delivering the apartments. Long lasting procedures may slow the process and delay income, spoiling the financial feasibility of the project.

When a first scan is made of the building to convert, the height of the floors needs attention. In most cases, office buildings have higher floors than requested for apartments, but when both a floating floor and a suspended ceiling are needed, excess height is required. To be sure to obtain a free height of 2,60 meters inside the apartments, the height from floor to floor should be 3 meters, allowing for mechanical ventilation above the suspended ceiling and a minimum height of 10 centimetres for the floating floor.

Not really an additional risk, but a result of other risks is the financial feasibility. A lowered ceiling and floating floor can be placed; constructions can be repaired and reinforced, shafts can be made through reinforced concrete floors and municipalities will allow changes or exceptions to the zoning plan. But the conversion costs will rise as a result.

Risk list based on the cross case analysis

Several of the risks recognised by De Vrij could easily be assessed in the initial phase of the conversion and are not seen as risks. After analysing the 14 cases, the risk-list could be shortened.

Table 3: Risks defined by the cross-case study of the 14 cases

Market, location and building	Aspect
1. Legal	
	1. Zoning law: Impossible to meet requirements (function, form, size)
	2. Dutch building decree: Impossible to meet requirements from the (VROM, 2003), including noise-level prescriptions and fire-precautions
	3. Municipal building act: The municipality is unwilling to cooperate
2. Financial	
	1. Development costs: Slow handling of procedures (loss of income)
	2. Vacancy: Failing incomes from exploitation or sale of the property
3. Technical	
	1. Incorrect or incomplete building structure assessment
	2. Inadequate / poor state of the main structure or foundation (rotten concrete or wood, corroded steel)
	3. Insufficient shafts available; Construction allows no extra penetrations or shafts being made
	4. Inadequate acoustic insulation of the floors / Thin floors
	5. Insufficient thermal and acoustic insulation in the facades
	6. Insufficient daylight for housing
4. Functional / Architectonic	
	1. Incorrect assessment of functional possibilities: Preliminary sketches prove worthless; “unusable” space

Chances

The short development time-span from the first sketch till delivery of the apartments is a chance for conversion projects. The project Stadhouder was developed in two years only, from the first sketch till the delivery. While still working on the design, the facade was removed and the building stripped down to

construction, stairs and elevator. Not only was time saved because the main structure was already there, but also because of this, there were less unworkable days because of bad weather.

The “WYSIWYG-factor” is another chance for conversion projects: What You See Is What You Get. Model apartments can be furnished already before demolition starts. Most people cannot interpret architectural drawings, while this communication form may better inform potential buyers and boost the apartment sales.

From the project De Stadhouder we learnt that the economical feasibility of conversion projects can be influenced positively by exploiting the existing fiscal rules: Increasing the financial feasibility of conversion projects is the possibility to pay only 6% of conveyance duty on the land and existing building, instead of the VAT of 19%. The property is bought with 6% conveyance duty and is then split in apartment shares and sold to the buyers. If the apartments are sold within six months, the conveyance duty only has to be paid over the second sale and is then paid by the buyers. The VAT of 19% is then only paid over the building activities.

Conversion of vacant offices is a possibility for development in an already organised context, in central urban areas. The conversion of an already existing building normally attracts less negative meddling from neighbours or neighbouring users than the demolishment of an existing building and new construction. Adding up, the redevelopment of one building in an area of vacancy, obsolescence and dilapidation can give a possible boost to that area and increase the value of the land within reasonable investment time-perspectives. This gives developers and investors a chance to increase the financial feasibility of a project, for both social housing corporations and corporations active in the liberal housing market.

Finally, conversion of vacant offices is a sustainable alternative to demolish and rebuild. Converting vacant office buildings into housing saves building materials and building materials transportation, and produces less waste than demolition and rebuilding. An often heard argument for demolition is that the thermal insulation in older buildings is not adequate. Demolition is in this case used as a sustainability argument. However, the case studies show that the performance of existing office buildings can be adapted to the level of the Dutch building legislation law as well as to the level of comfort expected by the appointed user group.

Figure 3: Granida. Left the building before conversion, to the right the building after conversion.

Conclusion

Most of the risks that were recognised in the cross-case analysis were found in the technical category. The risks within this category turned out to depend on the construction year of the existing building, which have common building characteristics. Fewer technical risks were experienced in the conversion of the 5 buildings

that were originally built between 1965 and 1980. The construction drawings of these buildings were correct and the state of the construction was good. The floors in the buildings from the later part of this period, De Stadhouder, Westplantsoen and Eendrachtskade, had sufficient acoustic insulation for housing. The Eendrachtskade had double glazing, and the thermal insulation of the facade was sufficient for housing, but the acoustic insulation was not. In this case, the municipality made an exception from the building decree since students are considered to tolerate noise well. If the appointed user groups had been seniors, probably the acoustic insulation of the facade would have had to be improved. In the financial category few risks are recognised. However, all technical, legal and functional risks influence the financial feasibility of the project. Hence, it may be concluded that most risks can also be seen as financial risks.

The projects included in this study are completed conversion projects. One of the legal risks was the municipalities' cooperation on zoning plan changes and building decree exceptions. However, the parties involved in all 14 conversions were satisfied with the municipalities' cooperation. One of the questions remaining unanswered is whether the projects would have failed without municipal cooperation. Would lack of cooperation have delayed and threatened the projects' financial feasibility, or would the projects not have been completed at all? A possible next step of this research is to study projects that were considered for conversion, but did not pass the go-no-go.

In the analyses of the 14 cases, we aimed at revealing the factors that influence the projects financial feasibility. The developers we interviewed stated that the earnings on conversion projects are too low compared to new constructions. Also, other actors in the conversion processes complained about overrun budgets and too many hours spent to develop specific solutions to problems that occurred during the building- process. Of the 14 cases, only one developer was willing to share financial information regarding the project. In one case, the developer informed us that the financial goal was not achieved, because of failing exploitation. In the other 13 cases, the developers claimed that there were no financial losses, despite the fact that the budgets were overrun. In future studies we hope to be able to make complete analyses, but then we will need insight in the financial information of the projects.

Acknowledgement

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Sources

Barlow, J. & D. Gann. 1993. *Offices into flats.* York: Joseph Rowntree Foundation.
Brand, S. 1994. *How buildings learn; what happens after they're built.* New York: Viking.
De Vrij, N. 2004. Meten is weten. *Real Estate & Housing.* Delft: Delft University of Technology.
Douglas, J. 2006. *Building adaptation.* Oxford: Butterworth-Heinemann.
Flyvbjerg, B. 2004. Five misunderstandings about case-study research. In Seale, C., G. Gobo, J. F. Gubrium & D. Silverman (Eds.). *Qualitative Research Practice.* London: Sage.
Geraedts, R. P. & D. J. M. Van Der Voordt. 2003. Offices for living in: An instrument for measuring the potential for transforming offices into homes. *Open House International* 28: 80-90.
Geraedts, R. P. & D. J. M. Van Der Voordt. 2007. A Tool to measure opportunities and risks of converting empty offices into dwellings. In 2007, E. (Ed.) *ENHR; Sustainable Urban Areas.* Rotterdam.
Mason, J. 1996. *Qualitative researching.* London: Sage.
Remøy, H. 2007. De markt voor transformatie van kantoren tot woningen / The market for conversion from offices into housing. In Van Der Voordt, T., R. Geraedts, H. Remøy & C. Oudijk (Eds.). *Transformatie van kantoorgebouwen thema's, actoren, instrumenten en projecten.* Rotterdam: Uitgeverij 010.
Van Der Voordt, D. J. M., R. P. Geraedts, H. Remøy & C. Oudijk (Eds.). 2007. *Transformatie van kantoorgebouwen thema's, actoren, instrumenten en projecten. Rotterdam*: Uitgeverij 010.
Vrom. 2003. Bouwbesluit. VROM: www.vrom.nl
Yin, R. K. 1989. *Case study research; design and methods.* London: Sage.