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#### Publication date

2003

#### Document Version

Accepted author manuscript

#### Published in

Open House International

#### Citation (APA)

Geraedts, RP., & van der Voordt, DJM. (2003). Offices for living in: An instrument for measuring the potential for transforming offices into homes. *Open House International*, 28(3), 80-90.

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## OFFICES FOR LIVING IN

### An instrument for measuring the potential for transforming offices into homes

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#### **ABSTRACT**

A large number of office premises seem difficult to rent out because they no longer meet the demands of the market. A solution must be found for these premises and also for office buildings that have been empty for longer periods. Reallocation or transformation to other functions such as homes can be envisaged here. In addition, due to the lack of available locations for building homes, corporations and project developers are desperately looking for alternatives. The transformation of offices into homes can also be a good option for this objective.

In the current study answers are provided to the questions: how many and which office buildings stood empty in a particular area of Rotterdam; which groups of households can be identified for the transformation of empty office buildings into homes; what is the demand profile of these groups; and with which instruments can the transformation potential of empty or soon-to-be empty office buildings be measured.

#### ***Conclusions and recommendations***

An important veto criterion for the transformation process is the dovetailing with the council policy; offices in residential areas should in preference be transformed into dwellings. Favourable features such as the availability of parking spaces, a positive ambience and other characteristics of an area suitable for working in increase the chance of renting as office space. Old buildings in the area, a bad net/gross ratio, poor energy performance and structural deterioration are, in contrast, unfavourable factors when renting out office buildings. Buildings with these characteristics are more readily considered for transformation. The type, accessibility and size of the dwelling are of critical importance when weighing up the decision of whether to rent or buy a particular home. Priorities vary between target groups. The lay out of the dwelling and the level of relaxation provided appear to be of secondary importance. People seeking accommodation are more concerned with the distance to a tram, bus or metro stop and a railway station, and less concerned with the frequency of public transport.

A number of test cases have shown that the developed Transformation Meter is a good tool for assessing for specific city areas (step-by-step, from a global to a detailed perspective) what the market supply of empty office buildings is, what the market demand is with regard to target groups and requirements, and the match between the two from the point of view of availability and buildings.

#### ***Key words***

Transformation potential, instrument, offices, homes, living, structurally vacant, revising

## 1. INTRODUCTION

### Problems

In the beginning of the 1990s there was widespread talk of structural vacancy in office buildings. By structural vacancy we mean that the floor space has been empty for three consecutive years in buildings that have been completed for at least three years. In the following period the office market picked up and demand rose, especially in the mid and top sectors. The rental prices improved and the vacancy decreased. A great deal of new building construction is not really a consequence of demand for extension but rather from moving premises. Due to greater demands for quality, office organisations are being attracted to new premises with a high quality and situated in a high-value area.

A large number of office premises seem difficult to rent out because they no longer meet the demands of the market. A solution must be found for these premises and also for office buildings that have been vacant for longer periods. Reallocation or transformation to other functions such as homes can be envisaged here. In addition, due to the lack of available locations for building homes, corporations and project developers are desperately looking for alternatives. The transformation of offices into homes can also be a good option for this objective.

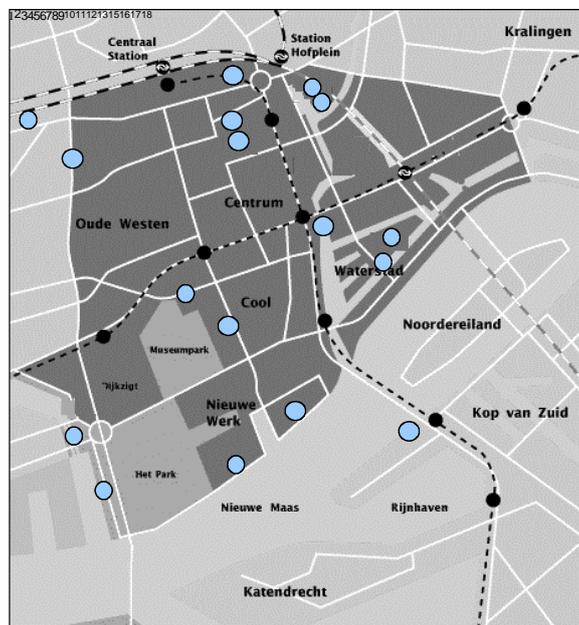


Figure 1: An overview of central Rotterdam with a number of structurally vacant office buildings that are marked out for transformation into homes

### Objective

The transformation research aims to provide an insight into the transformation of vacant office buildings. The research is focused on structural vacancy in the area of Rotterdam and the transformation into homes. The objective is to describe the market supply (vacancy of office buildings), the demand (target groups, living requirements) and the match between the two from the point of view and availability and buildings. The research provides answers to the following questions among other things:

1. How many and which office buildings stand vacant in the area of Rotterdam or are soon to be vacant. This question is answered in Section 2: Vacancy of Offices in Rotterdam (1998).
2. Which target groups can be identified in connection with the transformation of vacant office buildings to homes, and what is the demand profile of these target groups in relation to the location, building features and costs? This question is answered in Section 3: Demand for residential space.
3. Using which instrument can the transformation potential of vacant or soon-to-be vacant office buildings be determined from the point of view of supply and the building itself, in the first instance quickly and globally (Quick Scan) and in the second instance on a more detailed level. This question is answered in Section 4: Transformation Meter.

## 2. VACANCY OF OFFICES IN ROTTERDAM

Developments in the Rotterdam have followed a fickle course. After a rise in the number of vacancies in the beginning of the 1990s, with a peak in 1993/1994, the numbers then dropped off dramatically. In 1998 there were roughly 257,000 m<sup>2</sup> of office space to let in Rotterdam (including Cappelle a/d IJssel). In 1996 the space on offer totalled 394,000 m<sup>2</sup>.

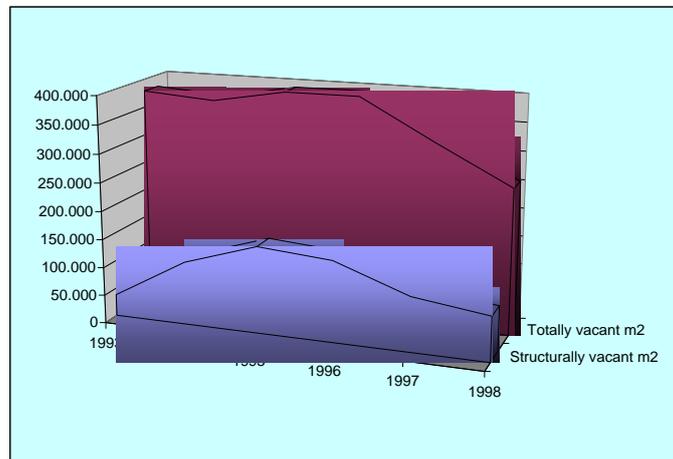


Figure 2. The supply of offices in Rotterdam between 1976-1998. Source: Office Report Rotterdam 1998 (Kantorenrapportage Rotterdam 1998).

### **Structural vacancy**

Within the municipal area of Rotterdam in 1998, the structural offering (longer than three years) was halved in comparison with 1995 to 80,000 m<sup>2</sup>. The causes of structural vacancy can be divided into factors concerning location, building and the market. When the causes of structural vacancy in Rotterdam are reviewed it is apparent that the number of market factors play a much less significant role.

Factors concerning the buildings themselves make up the most significant cause for difficulties in renting. From the point of view of the premises involved, structural vacancy is most frequent in office buildings built between 1960 and 1980. This can be explained by the generally sombre appearance of these buildings, as well as by the fact that they have become outdated from a technical and functional viewpoint.

### *The lower end of the office market*

Part of the current supply is at the lower end of the office market. For the purposes of this paper this is understood to mean office space with a rental price between 80 to 90 euro/m<sup>2</sup>. It has been established that about 50,000 m<sup>2</sup> (13%) of the total falls under this limit.

There is a gap between the quality of the premises on offer and the demand for office space from the perspective of location and building quality. A constantly recurring cycle plays a significant role here. In times of a large demand for new office space when the supply is limited, many new building projects are set in motion. In view of the long development and realisation time of several years, the demand can drop off dramatically as a result of developments that may occur in conjunction in the market. As a result, when the building project is delivered it can immediately become vacant. This difference between the supply and demand cycles is often called the "pig" cycle.

### **Policy of the city council**

The spearhead of the city council's policy is to strengthen living function (residential process) in the inner city. It is suggested that 10% of the population should live in the inner city to support (cultural) amenities. This is twice as many as is now the case. Because of this a deterrent policy is being implemented regarding the development of offices outside areas designated specially for this purpose (the so-called Office Axes). The city council is actively creating opportunities in priority areas for converting outdated office premises into residential buildings. To this end they are implementing policies such as adjusting the existing zoning plan and granting subsidies for transformation projects.

### **Transformation outlook**

The outlook for converting the current supply of office buildings is dependent on the following factors:

1. *Length of vacancy*

The longer a building has been vacant, the more likely the current owner will be willing to convert.

2. *Cause of the vacancy: market, location or building*

When a building is vacant due to market factors, transformation is not desirable from the viewpoint of the owner. Since the location on the Rotterdam office market is the determining factor when it comes to whether an office can be rented, it can be taken that when an office is vacant due to its location, the outlook for transformation into homes is very favourable.

3. *City council policy*

When the vacant office building is in a priority area designated by the city council, transformation into homes is a matter of course because it is also beneficial to the area. The priority areas can be found mostly in central areas. In accordance with city council policy, the buildings along the office axes will in principle maintain their office function.



Figure 3: *Left: an office building on the Koningslaan converted into homes*  
*Right: an empty office building on the Stadhuisplein in Rotterdam, suitable for transformation*

### **3. THE DEMAND FOR RESIDENTIAL SPACE**

Because a quarter of the people looking for accommodation are under 25 years old (among whom are many students), transformation to cheap, small homes can be a suitable choice. When it comes to the transformation of vacant office buildings into homes, one-parent families with young children and traditional families with young children come less into the picture.

#### ***Wishes and preferences for living and target groups***

The transformation of empty office buildings into homes is only feasible when these homes fulfil a need. The supply must match the demand, both with regard to the location and the living environment, as well as with regard to the building characteristics and the individual homes. In order to judge whether a converted building meets the wishes and preferences of potential target groups, the results of several studies lead to the headings listed in figure 4. The type of home, size, an attractive and safe living environment and a payable price are important for every target group. Differences are concerned mainly with price and the level of quality, preference for a single family home versus an apartment and living in a lively environment with many amenities versus living in a quiet area.

#### ***The match between supply and demand***

It appears from the studies that were consulted into the wishes and preferences that the individual points on the demand side differ strongly in importance.

##### ***Living environment***

People make choices about the living environment more on the basis of the total impression – for example, an urban environment with many amenities or equally a quiet, suburban environment with a lot of greenery – than on the explicit availability of specific amenities. Nonetheless it appears the proximity of shops for daily errands, greenery and parking in front of the door score highly with many people.

### Public transport

Even though a high frequency and long “opening times” of public transport often contribute to satisfaction with the living situation, these points rarely if ever play a role in the decision process of people looking for a home. People are mostly concerned with the distance to public transport facilities. The distance to a tram, bus or metro stop and a train station are therefore significant variables for the supply profile; the frequency and times of public transport are not.

SIGNIFICANT POINTS FROM DEMAND PERSPECTIVE	
Location (living environment)	Building (dwellings)
1. Representative/character	1. Type of house
a Nature of the building	2. Entrance
b Social image	3. Size of home
c Vitality	a Number of rooms
d Greenness	b Living room
2. Facilities	c Kitchen
a Shops	d Bedrooms
b Bars, restaurants, etc.	e Sanitary space
c Schools	f Storage space
d Bank/post office	4. Layout of the home
e Medical facilities	5. Level of facilities
f Recreation facilities	6. Outside space
3. Accessibility by public transport	7. View out en view in
a Distance to public transport	8. Environmental factors
b Frequency and times	a Heating
c Distances to tram or metro	b Ventilation
d Frequency and times	c Noise
e Distance tot train station	d Sun and daylight
f Frequency and times	e Energy usage
4. Accessibility by car	f Material usage
a Distance to motorway	9. General conditions
b Traffic trough flow	a Accessibility
c Parking opportunities	b Safety
	c Alterability
	d Adequate management
	10. Costs
	a Purchase or rental price
	b Additional costs

Figure 4: Significant points from the supply perspective

### Homes

The type of home, openness, and size (especially the size of the living room and the number of rooms) are the deciding factor for many people looking for a home when it comes to the decision whether or not to rent or to buy. The costs, the ration between price and quality, renting versus buying and the character of the environment are just as important factors. Preferences regarding these variables and the priority put on them vary per target group, depending on age, income and time of life. The lay out of the home, relaxation level, environmental aspects and general conditions appear to come in second place.

### Target group profiles

If one is to use a Quick Scan to determine if a vacant building is suitable to inhabit by one or more specific target groups, then a translation step is needed to the demand profile per target group. This is also true if one is looking for a suitable building for a specific target group. Many details about wishes and preferences for living are not or barely differentiated by target group. In the end five profiles were put together (see figure 5).

### Comparing supply and demand

With regard to location, the demand of homes and the supply of offices can be well compared with each other. In both cases, emphasis is on the same points, for example image, distance to amenities, accessibility. At a building level, this is not so simple. A part of the characteristics of the supply can be primarily regarded as conditions that make transformation to a particular type of home easy or otherwise difficult and expensive. For example, this applies to the support structure and fittings. These characteristics don't appear in the demand profile as such. The degree to which the offering meets the characteristics that are asked for can therefore only be determined when a transformation plan has been worked out, at the very least at a global level (number of homes, type of home, size(s) of home. Based on this global rental or purchases can be specified. Subsequently it can be investigated – again initially on a global level – if the revenue from the rental or sale balances the costs to be incurred for the transformation and acquisition of the building.

Target group 1: Starters	Target group 2: Starters	Target group 3: Young two-income
Young, low income, standalone group homes	Young, low income, standalone semi-independent homes	
<b>Location (living environment)</b> 1. Urban environment 2. Rich in facilities	<b>Location (living environment)</b> 1. Urban environment 2. Rich in facilities	<b>Location (living environment)</b> 1. Urban environment 2. Rich in facilities 3. Suburban area (space, greenery) 4. Easily accessible by car 5. Good parking opportunities
<b>Building (homes)</b> 3. Unit in group of 3-7 occupants 4. Sitting-, bedroom, average 22m <sup>2</sup> 5. Common sanitation 1 shower/toilet for 4 people 6. Common dining kitchen 7. Common outside space 1,5 m <sup>2</sup> /unit 8. Common bicycle storage 9. Common wash space 10. Total 50 m <sup>2</sup> ; usable area 35 m <sup>2</sup>	<b>Building (homes)</b> 3. Semi-independent unit with common facilities 4. Sitting-, bedroom, average 22m <sup>2</sup> 5. Sanitation for 2 people 6. Kitchen for 2 people 7. Common outside space 1,5 m <sup>2</sup> /unit 8. Common bicycle storage 9. Common wash space 10. Total 50 m <sup>2</sup> ; usable area 35 m <sup>2</sup>	<b>Building (homes)</b> 6. Large luxury apartment 7. Own outside space
<b>Costs</b> 11. Max. rent 150 - 250 Euro	<b>Costs</b> 11. Max. rent 200 - 300 Euro	<b>Costs</b> 8. Max. rent 500 - 700 Euro 9. idem 700 - 900 Euro for top apartments 10. Purchase price 100.000 - 200.000 Euro
Target group 4: Seniors 55+	Target group 5: Seniors 55+	
Low to average income	High income	
<b>Location (living environment)</b> 1. Safe living environment (social safety) 2. Shops, everyday facilities and public transport within walking distance (<500 m) 3. Preference for urban environment 4. Suburban area (space, greenery)	<b>Location (living environment)</b> 1. Safe living environment (social safety) 2. Shops, greenery, bank/post office and public transport within walking distance (<500 m) 3. Easily accessible by car 4. Good parking opportunities 5. Partly urban, partly suburban	
<b>Building (homes)</b> 5. Preferably not on ground level 6. Lift available 7. Preferably no inside stairs 8. At least 3 rooms 9. Living room 25 - 30 m <sup>2</sup> ; bedroom > 11,5 m <sup>2</sup> 10. Direct connection between living, bedroom and bathroom 11. Extra attention for sound isolation 12. Adaptable with regard to elderly people	<b>Building (homes)</b> 6. Preferably not on ground level 7. Lift available 8. Preferably no inside stairs 9. Porch, no walkway 10. 4 - 5 rooms 11. Living room 30 - 40 m <sup>2</sup> ; big kitchen 12. Direct connection between living, bedroom and bathroom 13. Large bathroom 14. Balcony or roof terrace 10 - 15 m <sup>2</sup> 15. Extra attention for sound isolation 16. Adaptable with regard to elderly people	
<b>Costs</b> 13. Max. rent 350 Euro 14. Purchase price 75.000 - 100.000 Euro	<b>Costs</b> 17. Rent > 500 Euro 18. Rent > 1000 Euro for top apartments 19. Purchase price 100.000 - 400.000 Euro	

**Five Target groups for inner city Transformation projects**

Five profiles with living wishes and preferences that come under consideration for homes in former office buildings (transformation projects).

Young families with children are not listed here as a profile because in common their preference is for a single-family home with a garden.

Figure 5: Profiles of five target groups for transformation projects

#### 4. TRANSFORMATION METER

The developed instrument – the Transformation Meter – is made up of a number of checklists with which in different steps, from global to specific, the office buildings on offer can be judged on their transformation potential into homes (figure 6).

TRANSFORMATION METER			
Step	Action	Level	Result
Step 0	Inventory empty offices on market availability	Market	Gain insight where empty offices are
Step 1	Assess available offices using veto criteria	Location Building	Fast selection of offices; determine whether they are suitable for further research
Step 2	Assess available offices using gradual criteria	Location Building	Gradual assessment of the transformation potential of the building
Step 3	Determine the transformation class	Building	Transformation class of the office building
Step 4	Detailed assessment of building	Location Building	Detailed assessment of the transformation potential of the building

Figure 6: The four different steps of the Transformation Meter

The Transformation Meter is put to use mostly in the early planning stage of the transformation

process: from the very first initiative up to and including the results of the feasibility study. As a result, a decision can already be taken at this stage of definitively not to continue along the development path.

**Step 0: Drawing up an inventory of available buildings**

Before going to work with the Transformation Meter, an analysis should be made in a particular city area of what the market supply is in long-term vacant offices or offices that will soon be vacant. This is carried out using both research literature (reports from estate agents organisations) and through research.



Figure 7: Left: a vacant office building on the Blaak in Rotterdam city centre: suitable for transformation Right: vacant office building in Capelle (industrial zone): unsuitable for transformation

**Step 1: Assessment using veto criteria**

The instrument offers the user the opportunity to make an initial scan that is quick and involves little work yet provides rich information using five veto criteria. A veto criterion means that whenever of the involved criteria is met, the transformation of the particular office building into homes can be abandoned immediately. Further detailed study is then no longer necessary. By reviewing the potential market in a city area, a quick selection can be made of interesting buildings in this way.

STEP 1: VETO ASSESSMENT OF AVAILABLE OFFICES FOR TRANSFORMATION						RG/22-04-2002	
General group-independent criteria							
Rule: if one of the criteria is applicable (answer = Yes), then the particular building is eliminated for transformation							
VETO CRITERIA LOCATION				Score			
ASPECT		CRITERION	DATA	Yes	No		
1 Urban situation	#04	1 Office on remote industrial zone	Council map	<input type="checkbox"/>	<input type="checkbox"/>		
	#05	2 Office lies in the middle of an office park	Idem	<input type="checkbox"/>	<input type="checkbox"/>		
	#06	3 Office lies in a priority area (city council policy) (offices has to stay offices)	Idem + council policy	<input type="checkbox"/>	<input type="checkbox"/>		
Order to ask questions ---->							
VETO CRITERIA BUILDING							
2 Year of construction	#07	1 Office has been built recently (< 3 years)	Year of construction	<input type="checkbox"/>	<input type="checkbox"/>		
	#08	2 Office recently renovated (< 3 years)	Year of renovation	<input type="checkbox"/>	<input type="checkbox"/>		
3 Vacancy	#03	1 Office stands partially vacant (with exception of ground floor)	Office for Estate agents Publications	<input type="checkbox"/>	<input type="checkbox"/>		
	#01	2 Office stands vacant < 1 year	Idem	<input type="checkbox"/>	<input type="checkbox"/>		
4 Main dimensions	#09	1 Storey high < 2.70 or > 5.70 m.	Estate agent or on site	<input type="checkbox"/>	<input type="checkbox"/>		
	#10	2 Office depth < 10 m.	Idem	<input type="checkbox"/>	<input type="checkbox"/>		
5 Capacity in new homes	#02	1 S 40 1p-units realisable at 50 m2	2000 m2	<input type="checkbox"/>	<input type="checkbox"/>		

Figure 8: Step 1, veto assessment of available offices for transformation into homes

Figure 8 provides an overview of the veto criteria of available office buildings for transformation into homes. The criteria are valid for every target group. Veto criterion 1 from the point of view of location is concerned with the urban location of the building. When for example a building is situated in a remote industrial zone, then further research into transformation opportunities is pointless. The remaining veto criteria 2 up to and including 5 are concerned with the building itself. The “Data” column shows where information can be found in order to assess the particular points. The first column uses a numeric system to indicate the order in which the veto criteria can best be assessed. This is because certain information is easier to obtain than others. For example, vacancy and its duration (see question #01 from figure 8) are regularly reported by the Dutch association of project developers. The last column indicates if the particular criterion is applicable or not. As soon as one of the criteria is applicable (assessment=yes), then the particular office is not suitable for transformation and further research is not necessary.

**Step 2: Assessment using gradual criteria**

Should the results of the veto scan from step 1 indicate a possible suitability for transformation (not one question has a “Yes” answer), then using a more detailed scan with so-called gradual criteria, the following step can provide a more accurate picture of the transformation opportunities. By gradual or incremental criteria we mean that the individual assessment of a criterion does not lead to an overall pass or fail assessment of the building, rather that the total criteria form a gradual picture of the transformation potential of a building.

GRADUAL CRITERIA LOCATION			Score	
ASPECT	CRITERION	DATA	Yes	No
1 Ground property	1 Ground rent	Estate agents		
2 Vacancy	1 Vacancy office > 1, 2 or 3 years	Office for Estate agents		
3 Character of urban situation Note: Assessment dependant on target group; example young people not in the middle of residential area	1 Location on or near city limits ( example along motorway)	Map or estate agent		
	2 No other buildings in immediate area	Map or estate agent		
	3 Lifeless area	On site		
	4 No greenery in neighbourhood	On site		
	5 Bad reputation or social environment, vandalism	On site and local press		
	6 Danger, stink or noise problems (factories , train, cars)	On site		
4 Distance/quality of facilities Note: The quality of facilities can be described in terms of good condition, wide variety, number of different facilities	1 Shop for daily errand > 1 km.	Neighbourhood investigation		
	2 Neighbourhood meeting places (square, park) > 500 m.	Idem		
	3 Catering (snack bar, café, restaurant) > 500 m.	Idem		
	4 Bank/post office > 2 km.	Idem		
	5 Basis medical facilities (family doctor, clinic) > 5 km.	Idem		
	6 Sport facilit. (fitness, swimming pool, sports park) > 2 km.	Idem		
	7 Educational facilities (from nursery to university) > 2 km.	Idem		
5 Accessibility using public transport The frequency determines the quality	1 Distance to station > 2 km.	Map or council policy		
	2 Distance to bus/metro/tram > 1 km.	Map or public transport sced.		
6 Accessibility using a car and parking Obstacles: narrowing, ramps, bridges; Trough flow: one-way traffic, parking bans, jams	1 Many obstacles/limitations; poor through flow	On site		
	2 Distance to parking place > 250 m.	On site / new design		
	3 $\leq$ 1 parking place/200 m <sup>2</sup> living space realizable	On site / new design		

Figure 9: Step 2, gradual assessment of the available offices for transformation into homes: location

Figure 9 provides an overview of six main aspects and 20 detailed aspects of the gradual assessment of offices for transformation into homes from the point of view of location. Every question that is answered with a “Yes” thus contributes to a bad transformation score. The named criteria are not the same for each target group. Thus students would prefer to live in the city centre with all its entertainment amenities, while young families with children would rather live in a quiet residential area.

GRADUAL CRITERIA BUILDING			Score	
ASPECT	CRITERION	DATA	Yes	No
7 Character of building Note: Relationship with Location point 1.1	1 Totally unrecognisable compared to surrounding buildings	On site		
	2 Totally no individual building identify to realise	On site / new design		
	3 Very bad maintenance, completely impoverished	On site / outside		
	4 Bad view due to other buildings > 75% floor area	On site (see also 1.1)		
8 Extensibility	1 Not horizontal extensible (other buildings)	On site		
	2 No vertical extensible (sloping roof or constr. to weak)	On site		
	3 No possibility to develop cellar under the building	On site / estate agent		
9 Support construction (walls, columns, floors) Rhythm of facade (positioning inner walls)	1 State of support construction is bad or dangerous	On site / in building		
	2 The grid of the support structure < 3.6 m.	On site / estate agent		
	3 Height of storey < 2.8 m. or > 6.0 m.	In building / estate agent		
10 Facade Note: outside space dependant on target group Adaptability with regard to outside space and facade openings	1 No connection possibilities or grid > 5.4 m.	On site / estate agent		
	2 Facade openings not adaptable	On site		
	3 Daylight entry < 10% of floor area new units			
	4 Windows in facades can not be re-used or opened	On site / new design		
11 Entrance (building, lift, stairs, units) Check Planning permissions demands for accessibility/escape exits	1 Very unclear/unsafe entrance to the building	On site / new design		
	2 No lift present or realisable in building (> 4 storeys)	On site / estate agent		
	3 No emergency stair well present	On site / new design		
	4 Distance new units to stairs/lift > 50 m.	On site / new design		
12 Installations	1 No or insufficient conduits realisable	On site / new design		
13 Environment Light, air, noise, dangerous materials	1 Noise level at the facade > 50 dB (office limit 60 dB)	City council		
	2 Noise insulation of floors > 4 dB	On site / new design		
	3 No or very bad sunning possibilities	On site		
	4 Very bad heat insulation of facade and/or roof	On site or city council		
	5 Presence of large quantities of dangerous materials	On site or city council		

Figure 10 Step 2, gradual assessment of available offices for transformation into homes: building

Figure 10 provides an overview of the gradual assessment of offices from the point of view of the building. Seven different gradual points are listed from this perspective, divided into 24 detailed aspects.

### Step 3: Determining the Transformation Class

Following the gradual assessment of both the location and the building, the rest of the transformation class information can be worked out for the particular building.

The total score for the location is determined by multiplying the total number of “Yes” scores by the

default weighting factor for the location: 5 (see A in figure 11). The maximum score for the location equals  $20 \times 5 = 100$ . In the same way the total score for the building is determined by multiplying the total number of "Yes" scores by the weighting factor of the building: 3 (see B in figure 11).

Total Location (= number 'Yes'):	<b>8</b>	x	Total Building (= number 'Yes'):	<b>11</b>	x
Default weighting:	<b>5</b>	=	Default weighting:	<b>3</b>	=
Score for Location:	<b>40</b>	A	Score for Building:	<b>33</b>	B
Maximum for Location (20x5):	<b>100</b>		Maximum for Building (24x3):	<b>72</b>	

Figure 11: Determining the total transformation scores for location and building by multiplying the number of "Yes" scores in the answer column by the default weighting factor from 5 and 3; example score for location = 40, score for building = 33

The maximum score for the building equals  $24 \times 3 = 72$ . The maximum score for location and building together is  $100 + 72 = 172$ . On the basis of the maximum and minimum scores, a table can be made with five different Transformation Classes (figure 12).

STEP 3: DETERMINING THE TRANSFORMATION CLASS OF OFFICES		
0 - 34	Transformation Class 1: very transformable	<--- Total score A + B: <b>73</b> Maximum score Location + Building: <b>172</b>  ---> TRANSFORMATION CLASS: <b>3</b>
35 - 69	Transformation Class 2: transformable	
70 - 104	Transformation Class 3: limited transformable	
105 - 139	Transformation Class 4: barely transformable	
140 - 172	Transformation Class 5: not transformable	

Figure 12: Table with five different Transformation Classes of buildings; total score for the example = 73, class = 3

In Transformation Class 1 a building is very suitable for transformation because the total transformation score is less than 34. In Transformation Class 5, a building cannot be transformed because the total transformation score is more than 139. With this maximum score it is therefore completely pointless to transform the office building into homes.

#### Step 4: Detailed assessment

Finally, an assessment can take place at the most detailed level of the transformation potential of an office building. For each assessment criterion, five possible outcomes or scores are drawn up. Thus, outcome 1 = very unfavourable and outcome 5 = very favourable for the transformation into homes. Figure 13 shows an example of the sub point 'Extensibility' from the perspective of the Building.

STEP 4: DETAILED ASSESSMENT OF OFFICES FOR TRANSFORMATION				
Score 1 = Very unfavourable for transformation into homes; 2 = Unfavourable; 3 = Average; 4 = Favourable; 5 = Very favourable for transformation into homes Weighting 1 = Unimportant for target group; 2 = Of little importance; 3 = Average importance; 4 = Fairly important; 5 = Very important for target group Correctable 1 = Not correctable; 2 = Barely correctable; 3 = Average correctable; 4 = Good correctable; 5 = Very good correctable;				
ASSESSMENT BUILDING				
ASPECT	CRITERION	Weighting per Target group	Score = Criterion x Weighting	Correctable
<b>8 Extensibility</b>				
8.1 Horizontal extensibility of the building Extensibility ground floor for living or parking space	1 Not horizontal extensible	1		1
	2 Barely horizontal extensible	2		2
	3 Limited horizontal extensible	3		3
	4 Good horizontal extensible	4		4
	5 Very good horizontal extensible	5		5
8.2 Vertical extensibility of the building Extendible on top of roof for realising new units	1 Not vertical extensible	1		1
	2 Barely vertical extensible	2		2
	3 Limited vertical extensible	3		3
	4 Good vertical extensible	4		4
	5 Very good vertical extensible	5		5
8.3 Realising cellar under the building for parking and storage space	1 No possibility to develop cellar under the building	1		1
	2 Limited possibilities to develop cellar under building	2		2
	3 Cellar can be well developed	3		3
	4 Cellar present under part of the building (50%)	4		4
	5 Cellar present under the entire building	5		5

Figure 13: Example of a detailed assessment of the building feature "Extensibility."

The outcome 8.1.1 'Not horizontal extensible' (=unfavourable for transformation into homes) is also used as a criterion in the previous Step 2 (gradual assessment) in the main feature 8: Extensibility (see also point 8.1 in figure 10).

#### Weighting per target group

Using the weighting of the various transformation features with regard to each other, a relationship can be drawn up between the different transformation features and the importance associated with

them by the different target groups and types of householder. In this way, different detailed requirement profiles can be drawn up to assess the match between supply and demand.

#### *Correction of location and building aspects*

On this detailed level also a column is added to point out the correction possibility of the aspect concerning. The transformation possibility of office buildings into homes is highly determined by the correction possibilities of the different aspects. An important location aspect, for instance the office is located on a remote industrial zone, cannot be corrected, but the entrance of a building or the face can be easily corrected.

## **5. REFLECTION AND CONCLUSIONS**

### ***Market supply***

From the analysis of the market supply, the following points in particular come to the fore:

- Once of the most importance is the tie-in with the city council policy: for example, offices in residential areas should in preference be transformed into buildings
- The criterion "minimum offering per building 2000m<sup>2</sup> can be put in perspective. Strict adherence to this norm would eliminate too many buildings in Rotterdam. Moreover, in practice it appears that smaller buildings come into consideration for transformation on a daily basis.
- Favour location features such as good parking opportunities, a positive ambience and the character of a working area increase the chances of re-renting as an office building
- Dilapidated buildings in the area, a bad net/gross ratio, low energy performance and structural aging are in contrast unfavourable for the ability to rent as an office building. Buildings with these characteristics come into consideration sooner for transformation

### ***Market demand***

From the research into living wishes and preferences the following points in particular come to the fore:

- The type of home, entrance, and size (especially the size of the living room and the number of rooms) are the deciding factor for many people looking for a home when it comes to the decision whether or not to rent or to buy. The costs, the ration between price and quality, renting versus buying and the character of the environment are just as important factors. Priorities vary per target group.
- The layout of the home and the relaxation level seem to come in second place
- People make choices about the living environment more on the basis of the total impression – for example, an urban environment with many amenities or equally a quiet, suburban environment with a lot of greenery – than on the explicit availability of specific amenities
- People seeking accommodation are more concerned with the distance to a tram, bus or metro stop and a railway station, and less concerned with the frequency of public transport.

### ***Transformation Meter***

- A number of test cases have shown that the developed Transformation Meter is a good instrument for assessing in specific city areas (step-by-step, from a global to a detailed perspective) what the market supply of empty office buildings is, what the market demand is with regard to target groups and requirements, and the match between the two from the point of view of availability and buildings.
- By allowing different (professional users) to work with this instrument, an extensive framework exists for describing assessment criteria.

## **JUSTIFICATION**

### ***Demand and supply***

The total supply of (structurally) vacant office buildings in Rotterdam is derived from quantitative and qualitative data taken from research publications and discussions with experts. The data was analysed and compared. A great deal of numerical data was derived from the yearly publication *De Rotterdamse kantorenmarkt* and a study from the Dutch Organization of Real Estate Agents (NEPROM). To get an impression of the lower end of the Rotterdam office market as well as the future supply, a written survey was done among 50 players in the Rotterdam office market. The policy of

Geraedts, R.P., and D.J.M. van der Voordt (2002), Offices for living in: An instrument for measuring the potential for transforming offices into homes. *Open House International* Vol. 28 no. 3, 80-90.

Rotterdam city council is illustrated in the business plan drawn up by Ontwikkelingsbedrijf Rotterdam (OBR or Rotterdam Development Company) and supplemented by conversations with those directly involved with council policy.

To form a picture of the relevant target groups and their most important living wishes, use was made among other things of a recent study by De Jong (1997). With regard to the present study, every study into living requirements was consulted (Wassenberg and others, 1994; Primus and others, 1995).

### *Instrument*

A very detailed study of literature regarding the transformation of non-domestic buildings into domestic buildings was undertaken in order to produce an overview of all the factors that can play a significant role. Fifteen detailed interviews were held in The Netherlands with a diverse range of parties involved in the transformation process in order to draw up the veto criteria. The resulting checklist was applied and tested in three case studies in Rotterdam. Subsequently, the checklist was further developed and refined into the current three-step model: beginning with a veto assessment via an incremental assessment to a very detailed assessment of the transformation potential.

## **REFERENCES**

- Geraedts, Van der Voordt*; FGH TransformationDelft BMVB, 1998.  
*Winters, Van Heel*; Tussenrapportages FGH Onderzoek, TU Delft BMVB, 1997.  
*Hulsman, C., Knoop, F.A.*, Leegstand aanpakken of weg ermee?, FGH Bank, BMVB, TU Delft, 1996.  
*NEPROM*; Structureel aanbod van kantoorruimte 1995-1998.  
*Dynamis Research*; Spreekende Cijfers, 1998.  
*OBR*; Jaarlijkse kantorenrapportage van Ontwikkelingsbedrijf Rotterdam, 1998.  
*Jong, F. De*; Woonvoorkeurenonderzoek. TU Delft, 1997.  
*Priemus, Wassenberg en Van Rosmalen*; Mozaïek woningmarkt Rotterdam, 1995.  
*Stadswonen*; Jaarverslag 1997, Rotterdam, 1998.  
*Baird, G., Gray, J., Isaacs, N.*, et al., Building Evaluation Techniques, University of Wellington, 1995.  
*Barlow, J, Gann, D.*; Offices into Flats, Joseph Rowntree Foundation, York, 1993.  
*London Planning and Advisory Committee*, Offices to other uses, London, 1996.  
*Stichting Architecten Research*; Hurenkaart kantoren en bijlagen en opname-staten, Eindhoven 1990.

**TRANSFORMATION METER FOR OFFICE BUILDINGS**

**STEP 1: VETO ASSESSMENT OF AVAILABLE OFFICES FOR TRANSFORMATION**

RG/22-04-2002

General group-independent criteria

Rule: if one of the criteria is applicable (answer = Yes), then the particular building is eliminated for transformation

**VETO CRITERIA LOCATION**

Score

ASPECT	CRITERION	DATA	Score	
			Yes	No
1 Urban situation <i>Order to ask questions ---&gt;</i>	#04 1 Office on remote industrial zone	Council map	<input type="checkbox"/>	<input type="checkbox"/>
	#05 2 Office lies in the middle of an office park	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	#06 3 Office lies in a priority area (city council policy) (offices has to stay offices)	Idem + council policy	<input type="checkbox"/>	<input type="checkbox"/>

**VETO CRITERIA BUILDING**

2 Year of construction	#07 1 Office has been built recently (< 3 years)	Year of construction	<input type="checkbox"/>	<input type="checkbox"/>
	#08 2 Office recently renovated (< 3 years)	Year of renovation	<input type="checkbox"/>	<input type="checkbox"/>
3 Vacancy	#03 1 Office stands partially vacant (with exception of ground floor)	Office for Estate agents	<input type="checkbox"/>	<input type="checkbox"/>
	#01 2 Office stands vacant < 1 year	Publications Idem	<input type="checkbox"/>	<input type="checkbox"/>
4 Main dimensions	#09 1 Storey high < 2.70 or > 5.70 m.	Estate agent or on site	<input type="checkbox"/>	<input type="checkbox"/>
	#10 2 Office depth < 10 m.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
5 Capacity in new homes	#02 1 S 40 1p-units realisable at 50 m2	2000 m2	<input type="checkbox"/>	<input type="checkbox"/>

**STEP 2: GRADUAL ASSESSMENT OF AVAILABLE OFFICES FOR TRANSFORMATION**

General and specific target group-dependant criteria

The assessments are based on the worst scores from the most detailed check (step #4)

Rule: assessment 'Yes' is bad for transformation into homes

**GRADUAL CRITERIA LOCATION**

Score

ASPECT	CRITERION	DATA	Score	
			Yes	No
1 Ground property	1 Ground rent	Estate agents	<input type="checkbox"/>	<input type="checkbox"/>
2 Vacancy	1 Vacancy office > 1, 2 or 3 years	Office for Estate agents	<input type="checkbox"/>	<input type="checkbox"/>
3 Character of urban situation Note: Assessment dependant on target group; example young people not in the middle of residential area	1 Location on or near city limits ( example along motorway)	Map or estate agent	<input type="checkbox"/>	<input type="checkbox"/>
	2 No other buildings in immediate area	Map or estate agent	<input type="checkbox"/>	<input type="checkbox"/>
	3 Lifeless area	On site	<input type="checkbox"/>	<input type="checkbox"/>
	4 No greenery in neighbourhood	On site	<input type="checkbox"/>	<input type="checkbox"/>
	5 Bad reputation or social environment, vandalism	On site and local press	<input type="checkbox"/>	<input type="checkbox"/>
	6 Danger, stink or noise problems (factories , train, cars)	On site	<input type="checkbox"/>	<input type="checkbox"/>
4 Distance/quality of facilities Note: The quality of facilities can be described in terms of good condition, wide variety, number of different facilities	1 Shop for daily errand > 1 km.	Neighbourhood investigation	<input type="checkbox"/>	<input type="checkbox"/>
	2 Neighbourhood meeting places (square, park) > 500 m.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	3 Catering (snack bar, café, restaurant) > 500 m.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	4 Bank/post office > 2 km.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	5 Basis medical facilities (family doctor, clinic) > 5 km.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	6 Sport facilit. (fitness, swimming pool, sports park) > 2 km.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
	7 Educational facilities (from nursery to university) > 2 km.	Idem	<input type="checkbox"/>	<input type="checkbox"/>
5 Accessibility using public transport The frequency determines the quality	1 Distance to station > 2 km.	Map or council policy	<input type="checkbox"/>	<input type="checkbox"/>
	2 Distance to bus/metro/tram > 1 km.	Map or public transport sced.	<input type="checkbox"/>	<input type="checkbox"/>
6 Accessibility using a car and parking Obstacles: narrowing, ramps, bridges; Trough flow: one-way traffic, parking bans, jams	1 Many obstacles/limitations; poor through flow	On site	<input type="checkbox"/>	<input type="checkbox"/>
	2 Distance to parking place > 250 m.	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	3 S 1 parking place/200 m2 living space realizable	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>

Total Location (= number 'Yes'):  x  
 Default weighting:  5 =  
 Score for Location:  A  
 Maximum for Location (20x5):  100

**GRADUAL CRITERIA BUILDING**

Score

ASPECT	CRITERION	DATA	Score	
			Yes	No
7 Character of building Note: Relationship with Location point 1.1	1 Totally unrecognisable compared to surrounding buildings	On site	<input type="checkbox"/>	<input type="checkbox"/>
	2 Totally no individual building identify to realise	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	3 Very bad maintenance, completely impoverished	On site / outside	<input type="checkbox"/>	<input type="checkbox"/>
	4 Bad view due to other buildings > 75% floor area	On site (see also 1.1)	<input type="checkbox"/>	<input type="checkbox"/>
8 Extensibility	1 Not horizontal extensible (other buildings)	On site	<input type="checkbox"/>	<input type="checkbox"/>
	2 No vertical extensible (sloping roof or constr. to weak)	On site	<input type="checkbox"/>	<input type="checkbox"/>
	3 No possibility to develop cellar under the building	On site / estate agent	<input type="checkbox"/>	<input type="checkbox"/>
9 Support construction (walls, columns, floors) Rhythm of facade (positioning inner walls)	1 State of support construction is bad or dangerous	On site / in building	<input type="checkbox"/>	<input type="checkbox"/>
	2 The grid of the support structure < 3.6 m.	On site / estate agent	<input type="checkbox"/>	<input type="checkbox"/>
	3 Height of storey < 2.8 m. or > 6.0 m.	In building / estate agent	<input type="checkbox"/>	<input type="checkbox"/>
10 Facade Note: outside space dependant on target group Adaptability with regard to outside space and facade openings	1 No connection possibilities or grid > 5.4 m.	On site / estate agent	<input type="checkbox"/>	<input type="checkbox"/>
	2 Facade openings not adaptable	On site	<input type="checkbox"/>	<input type="checkbox"/>
	3 Daylight entry < 10% of floor area new units	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	4 Windows in facades can not be re-used or opened	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
11 Entrance (building, lift, stairs, units) Check Planning permissions demands for accessibility/escape exits	1 Very unclear/unsafe entrance to the building	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	2 No lift present or realisable in building (> 4 storeys)	On site / estate agent	<input type="checkbox"/>	<input type="checkbox"/>
	3 No emergency stair well present	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	4 Distance new units to stairs/lift > 50 m.	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
12 Installations	1 No or insufficient conduits realisable	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
13 Environment Light, air, noise, dangerous materials	1 Noise level at the facade > 50 dB (office limit 60 dB)	City council	<input type="checkbox"/>	<input type="checkbox"/>
	2 Noise insulation of floors > 4 dB	On site / new design	<input type="checkbox"/>	<input type="checkbox"/>
	3 No or very bad sunning possibilities	On site	<input type="checkbox"/>	<input type="checkbox"/>
	4 Very bad heat insulation of facade and/or roof	On site or city council	<input type="checkbox"/>	<input type="checkbox"/>
	5 Presence of large quantities of dangerous materials	On site or city council	<input type="checkbox"/>	<input type="checkbox"/>

Total Building (= number 'Yes'):  x  
 Default weighting:  3 =  
 Score for Building:  B  
 Maximum for Building (24x3):  72

**STEP 3: DETERMINING THE TRANSFORMATION CLASS OF OFFICES**

0 - 34	Transformation Class 1: very transformable	<--- Total score A + B: <input type="checkbox"/>
35 - 69	Transformation Class 2: transformable	Maximum score Location + Building: <input type="checkbox"/> 172
70 - 104	Transformation Class 3: limited transformable	
105 - 139	Transformation Class 4: barely transformable	
140 - 172	Transformation Class 5: not transformable	

---> **TRANSFORMATION CLASS:**