# What is the quality of your valuation data?

**Ruud M. KATHMANN and Marco KUIJPER, the Netherlands**

**Key words**: data quality, geo-information, property taxes, quality assurance, valuation

## SUMMARY

In the Netherlands all nine million properties are valued annually. The estimated market value is formally assessed and used for taxation, other formal purposes and is (for residential properties) also available on the internet for sorts of private use.

The correctness (accuracy, reliability) of the estimated value is therefore of great importance. This quality of the valuations is of course being optimized by the use of systems for automated valuation models (AVM's or CAMA-systems) and careful testing of the valuation results using statistical techniques as well as the check of samples of properties.

But the result of any valuation and specially the results of mass valuations are depending on the quality of the data that is used for the valuation. Without proper market data it is impossible to estimate market values. But as important as market data is the availability of object characteristics of all properties. The object characteristics used for the mass valuation range from location, size of parcel, type of property, size and year of construction of buildings to maintenance condition, quality of materials and facilities.

It is therefore very important that a municipality, who in the Netherlands is responsible for the valuation, can guarantee the correctness of the registered object characteristics before the valuation models are used and as part of the quality checks on the results of the valuation.

For that purpose in the Netherlands we have developed a protocol for measuring the quality of the registered object characteristics. Municipalities are obliged to use this protocol at least once a year to gain insight in the quality of the data available. The protocol gives for instance guidelines for the size of samples to be taken for comparing the registered data with the real world. The results of these samples are then extrapolated to all properties in the municipalities.

If the percentage of errors in the registered data is too high, the municipality has to perform extra checks and an optimization of the data registered. In some cases a re-inventory of one or more characteristics of all properties can be necessary.

Because for instance also results of market analyses and on-site inspections for the handling of appeals can be used in the protocol for measuring data quality, the protocol works quite

efficient for the municipalities and is also of great importance for the Netherlands Council for Real Estate assessment who is responsible for the supervision of the mass valuation in the Netherlands.

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## 1. INTRODUCTION

### 1.1 Content of the paper

We have experienced that the process of maintaining the data quality is essential for an effective and qualitative good valuation. Good data quality is also important for the trust of taxpayers in the outcome of the mass appraisal. Finally the availability of up to date information and a stable system for checking and updating object characteristics is precondition to start a transition to an annual appraisal system.

In this paper we give information about the different sources of information that are used by municipalities in The Netherlands to execute the annual appraisal process. Furthermore we will focus in this paper on the importance to examine and, if necessary improve, the quality of the data.

In The Netherlands all real estate is assessed annually for levying taxes and other government purposes. Real estate owners receive an official notification of the assessed value of all their real estate properties annually. The 380 municipalities are fully responsible for the valuation process. For this valuation they make use of three types of information sources. These are:

1. Information from the system of base registers (such as the Cadastre, the Register of Persons (Inhabitants) and the Base Register Addresses and Buildings);
2. Information from systems for advertising the supply of real estate properties on the market;
3. Information municipalities specifically collect for mass valuation.

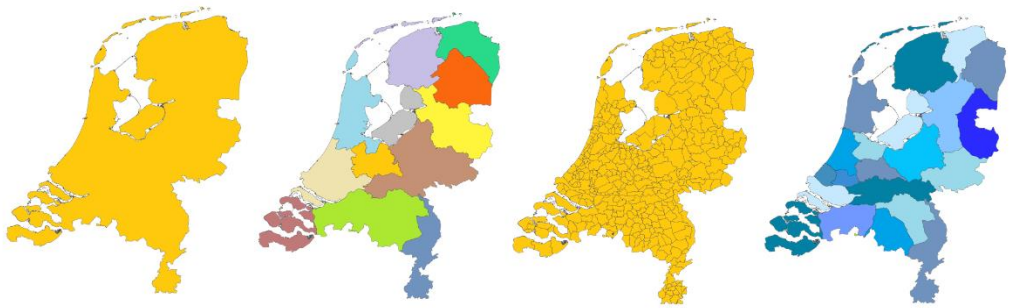
Before we look at the data used for the mass valuation of all real estate properties we first give an overview of the system of real estate taxation in the Netherlands and the other parts of the system for annual valuation and assessment based on the special Act for Real Estate Assessment. This system determines the high quality demands for the appraisal results and therefore for the quality of data.

Parts of this paper are also published in [1] and [2].

### 1.2 Content of the paper

The Netherlands is a small, densely populated country located in Western Europe that recognizes a central, regional (provices) and local government. The central government consists of the administration, ministries and advisory committees. The decentralized government consists of 12 provinces, 380 municipalities and 21 polderboards. Both

municipalities and polderboards are a type of local government that are spread over the entire country. The figure below shows the provinces, municipalities and polderboards.



**1 country** **12 provinces** **380 municipalities** **21 waterboards**

Both the central, regional and the local government have the authority to levy taxes and in doing so the central and both local governments make use, among other things, of the value of real estate properties for these taxes. Up until 1995 the various authorities were individually responsible for the assessment of the real estate property values for their taxes. These various authorities applied several methods and definitions.

### 1.3 Property taxation in The Netherlands

In The Netherlands approximately 15.5 billion euro is being levied in real estate taxes on an annual basis, of which 13.5 billion euro must be considered periodical (annual) taxes that are being levied on the owners and users of real estate properties. The other 2 billion euro is being levied sporadically when triggered by a particular event, such as the sale of a property. In the table below the amounts are beings shown per "type" of tax. A distinction has been made between periodic and sporadic taxes and between central and local governments.

| | **Periodic (billion euro's per year)** | **Sporadic (billion euro's per year)** |
|---|---|---|
| **Central government** | **€ 4.5 (total)**<br>*€ 2.5 (home owners forfeit)*<br>*€ 1.0 (capital return tax)*<br>*€ 1.0 (landlord charge)* | **€ 2.0 (total)**<br>*€ 1.0 (transfer tax)*<br>*€ 1.0 (estate/inheritance tax)* |
| **Local governments** | **€ 10.0 (total)**<br>*€ 3.5 (real estate property tax)*<br>*€ 4.5 (other municipal taxes/ fees)*<br>*€ 0.8 (water system charges built)*<br>*€ 1.2 (water treatment tax)* | Not applicable |
| **Total** | **€ 14.5** | **€ 2.0** |

## 1.4 Property taxation in The Netherlands

On January 1st, 1995, the Special Act for Real Estate Assessment (in Dutch: Wet WOZ) was initiated. This law had the purpose to establish legislation for the definition and documentation of real estate property values for various taxes. The Special Act for Real Estate Assessment aims to realize the following purposes: efficiency, clarity, quality and uniformity. Initially the Special Act for Real Estate Assessment determined that all municipalities had to assess the value of all real estate properties every four years and that it was mandatory for other government organizations to use these assessed values for their taxation purposes. As of 2007 an annual appraisal has been introduced. This annual appraisal and assessment is done with the value reference date set one year prior to the year of use. The Council for Real Estate Assessment is an independent government organization that supervises and monitors the quality of real estate property assessment.

In 2006 it was decided to make the WOZ-registration (Registration of assessed values) part of the System of Base Registers that is being developed within the Dutch government. In doing so the municipal registration of assessed values became a part of the public sector information system, which now consists of 11 base registrations that are connected with each other. This decision also had consequences for the work procedures underlying the maintenance of public sector information. These work procedures are increasingly being connected with one another. There are, for example, base registers available about the cadastral situation (ownership), the registered persons (inhabitants) and about businesses. These registers have been there traditionally, but have been modernized in recent years and have been implemented in the System of Base Registers as mentioned above, of which the registration of assessed values is an integral part.

Finally, a digital infrastructure has been developed in The Netherlands of which central and local governments are obliged to make use when designing their digital service towards citizens and businesses. Government organizations are using this digital infrastructure to improve their data exchange and to offer their digital services in a reliable and safe manner. For instance with this digital infrastructure each inhabitant in the Netherlands has a safe digital letterbox to receive (confidential) letters of any government agency.
Given the specialized character of the mass appraisal process an important part of the work is not done by "regular appraisers" but by specialists in the field of defining and optimizing models (statistics and econometrics) and specialists in the field of accurate data management.

## 1.5 The Netherlands Council for Real Estate Assessment

The Netherlands Council for Real Estate Assessment is an independent organization that supervises and monitors valuation in the context of the Special Act for Real Estate Assessment. If municipalities do not meet the minimum quality standards as set by the organization, it is initially the municipal council which will be held accountable. If the

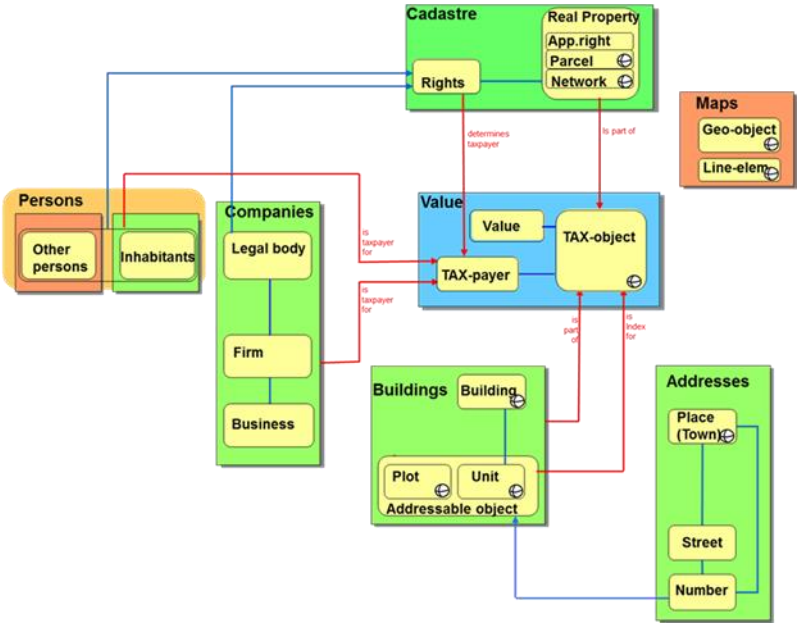
necessary improvements are not being realized, the Minister of Finance may, in extreme cases, decide to have this Act executed by another party instead of by the municipality.
In the working period 2015 - 2020 the Netherlands Council for Real Estate Assessment wants to improve the trust in the execution of the Special Act for Real Estate Assessment by:

1. ensuring that there is an adequate WOZ-process in which quality, continuity and efficiency are continually being adapted to societal expectations;
2. encouraging all municipalities to have a WOZ-process by 2020 in which stakeholders (taxpayers) are able to send out signals, in an easy accessible way, to the municipalities about the accuracy of the assessments and about the accuracy of all underlying data;
3. ensuring that base registration of assessed values becomes embedded in the system of base registrations and that accuracy, completeness and timeliness of links with all "connected' base registers is secured;
4. achieving the goal that from all municipal employees who are contributing to the execution of the Special Act for Real Estate Assessment can be verified that they have the expertise needed to do their part in the work process;
5. achieving the goal that all systems being used for mass appraisal in the execution of the Special Act for Real Estate Assessment will meet the quality standards defined for that purpose.

## 2. INFORMATION FROM THE SYSTEM OF BASE REGISTERS

In The Netherlands a number of registers have been formally designated as a base register. In these registers certain important data about citizens, businesses and institutions have been recorded in a centralized manner. These registers are primarily intended for official use by government agencies on central level and decentralized level (municipalities) etc. But some of these registers are also available for public use.

This system should deliver "authentic data" of such a high quality that the government can use this information for its work without any further investigation. One of the most important concepts behind this idea is the mandatory feedback. At the moment the user of data from a base register doubts the reliability of the data he may deviate from this data, only if the doubt about the reliability of the data has been reported back to the organization that is responsible for the data within that base register. The data will be given a notation and the administrator will then investigate the correctness of the data. In this way a self-cleansing system is being created.




One of the base registers that is essential for mass valuation in relation to the Special Act for Real Estate Assessment is the Base Register Cadastre. The ownership situation of all parcels is recorded in this register. Because of the legal system in the Netherlands the Cadastre gives complete information on the ownership of all properties. Therefore the Base Register Cadaster is the most important source of information to set up the list of properties to be assessed (tax list).

In addition the market data (sale price), in case of a sale, is also included in this Base Register Cadastre. So the Cadastre is also an important source of market data.
The Base Register Addresses and Buildings is being used to identify buildings and associated primary object characteristics, such as size (usable floor area) and building year.

The information derived from the system of base registers is very important for appraisal, assessment and taxation of real estate. But for all categories the information is not complete.
For setting op the complete list of properties to be valued the cadastral information is not adequate. Because of the Act of Real Estate Assessment the demarcation of a property to be appraised is not only determined by ownership, but also by use. Not only the owner of a property pays property tax, but also the user of the property. For making a correct demarcation of properties and a complete list of properties municipalities also have to make inventories of the self contained units with separate users.

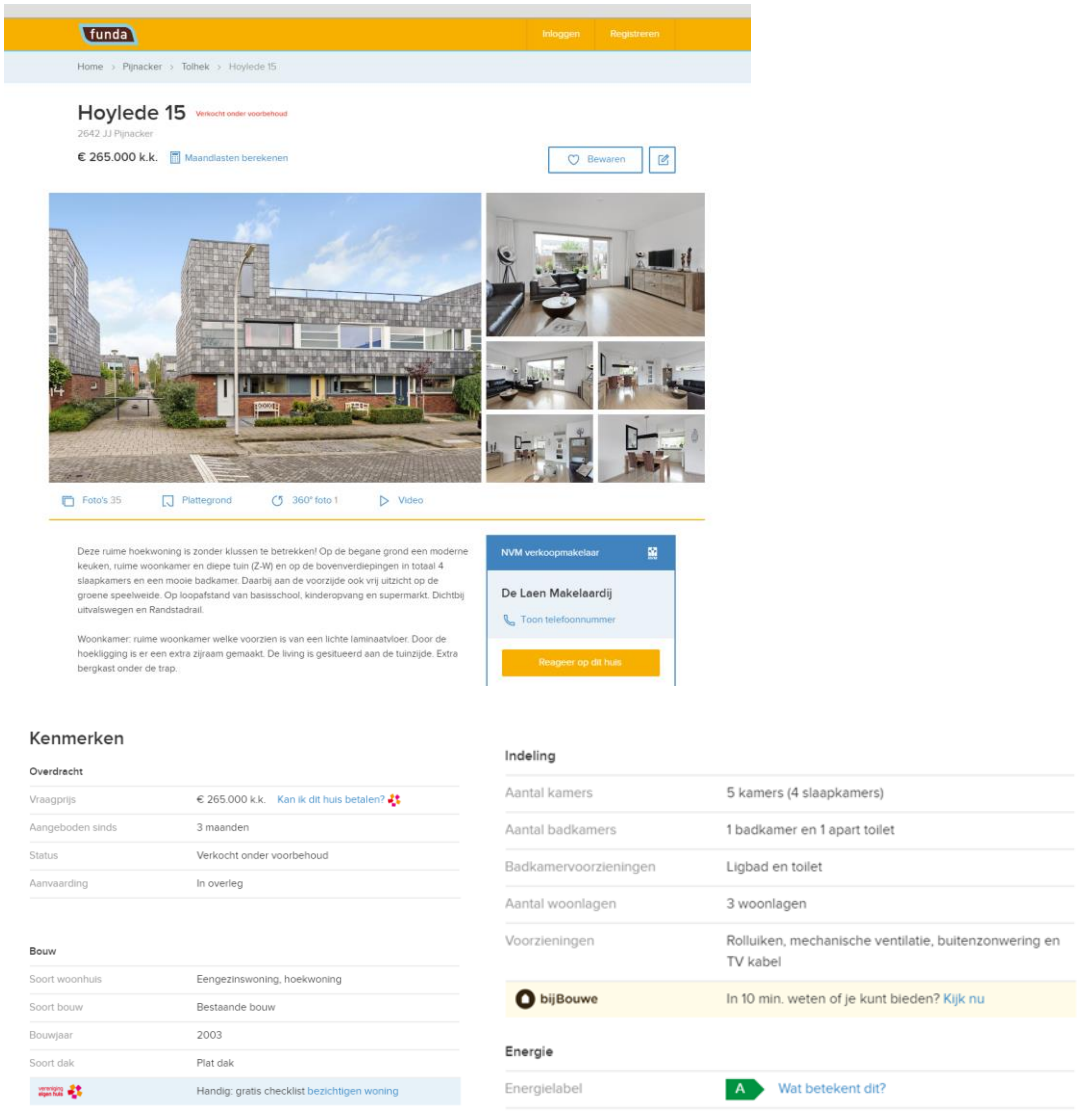
The Base Register Cadastre has complete and accurate information on sale prices for residential properties as well as for non-residential properties. But despite the completeness of sales prices, this register does not present all market data available. For instance for commercial real estate like office space and shops also rent prices are needed. And for a

market analysis of sales we not only need information on the successful transfers, but als on properties on the market for a shorter or longer term, that haven't been sold yet.

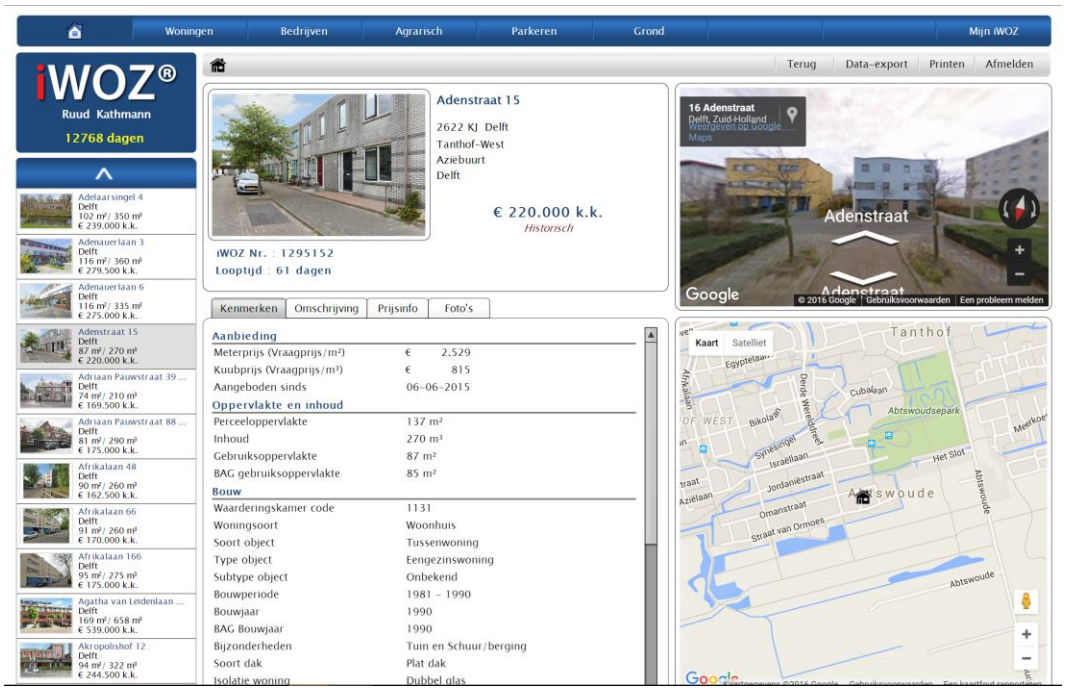
And for an accurate appraisal of a property more object characteristics are needed than only size (usable floor area) and building year.

## 3. INFORMATION FROM SYSTEMS FOR ADVERTISING THE SUPPLY OF REAL ESTATE PROPERTIES ON THE MARKET

In The Netherlands several systems are available on the internet that present advertisements for the supply of real estate properties.



These systems include characteristics and photos of the objects for sale in combination with the asking prices. This information is, in context of mass valuation, important both for checking and updating the object characteristics as well as for analyzing the market. The length of the period between first advertisement on the internet and the actual date of sale is important market information. But also asking prices for properties that are on the market for a long period present information needed for a correct and complete market analysis.
For the mass appraisal of real estate all advertisements for residential and non-residential properties are automatically collected from the different webpages and combined in one central database for market analysis.




## 4. INFORMATION MUNICIPALITIES SPECIFICALLY COLLECT FOR MASS VALUATION

Appraisers often say that the value of real estate is depending on location, location and location. In the same manner of speech we can say that the mass appraisal of real estate is depending on data quality, data quality and data quality. A lot of automated systems for mass appraisal are available with different types of modeling. In the Netherlands not only multiple regression types of models are used, but also other types more directly using sales comparison. Good models and experienced and well trained mass appraiser specialist are needed for the yearly mass appraisal, but we have experienced that the most important aspect for successful mass appraisal results is the quality of data.
In mass appraisal the outcome of the appraisal for a specific property is entirely depending on the object characteristics registered. In the Netherlands we have a system in which we

combine the use of data characteristics available in formal registers (the formal system of base registers) and the collecting of data specially for the mass appraisal.

The Base Register of Buildings only registers the building year and the size (usable floor area) of the main building. The rest of the information important for model-based valuation must be collected by the municipality. This could be, for example, the type of the building, the size of different parts of the building (for instance shopping space versus storage space or an old part of the building versus a newly built enlargement), annexes to the building or information that provides insight into the maintenance condition or in the quality of an object.
Also some market data must be collected by the municipalities themselves, such as rental prices of non-residential properties, because the rental transactions are not registered in contrast to the sales of real property.

For the collecting, updating and quality control of object characteristics in the Netherlands a distinction is made between primary characteristics and secondary characteristics. This distinction is not related to the importance but to the way the object characteristics can be changed. Primary object characteristics can only be changed by building activities. As primary object characteristics used in the appraisal models in the Netherlands we can mention:

- type of property;
- number and type of annexes (for instance garage space);
- size of the land plot;
- size of the (main) building and of the annexes;
- building year of the (main) building and of the annexes;
- information on building year and size for different parts of the (main) building.

Secondary object characteristics are the characteristics that can change without building activities, for instance because of time, but also because of preferences of buyers. The secondary object characteristics registered and updated for the annual appraisal in the Netherlands are:

- maintenance condition of the property (sometimes with a distinction between maintenance condition of the structure and outside of the building on the one hand and the maintenance condition of the interior on the other hand);
- quality of the property (sometimes with a distinction between quality of materials used for the building on the one hand and the level to which the property meets for instance actual wishes for residential facilities of property owners and potential buyers, like quality of kitchen facilities);
- the location of the property related to services available in the neighborhood en potential nuisance caused by properties or infrastructure in de direct surroundings).

For collecting, checking and updating information municipalities increasingly make use of the knowledge of stakeholders, for example by sending out information forms or by asking

stakeholders to provide information through interactive websites. It turns out that asking stakeholders to help updating object characteristics is not only an efficient way to improve data quality, but also improves the trust these stakeholders have in the quality of the data and the quality of the assessed values.

## 5. MAINTAINING THE RIGHTNESS OF OBJECT CHARACTERISTICS

The Netherlands Council for Real Estate Assessment formulates quality standards and guidelines to which the assessment process must comply. These requirements relate to the products (the valuations), the underlying work procedures and to the internal management of these work procedures. In addition the Netherlands Council for Real Estate Assessment reviews whether municipalities, the organizations who are responsible for the assessments, meet these quality standards and guidelines.

Whatever the source of the object characteristics (base registers or collected for the mass appraisal), the appraiser is responsible for a good system of quality control. For this quality control in the Netherland we use a procedure in which as much of experiences during market analysis and the handling of complaints (appeals) are used to estimate to quality of data. This procedure is translated into a protocol that is presented as appendix 3.

Using the protocol the appraiser can make an estimation for which percentage of the properties the object characteristics in the registration need improvements. Using this information the appraiser can measure whether the activities for updating object characteristics are effective or whether an extra project for improving data quality is needed.

## 6. CONCLUDING REMARKS

- Good object characteristics are essential for an accurate mass appraisal of real estate property. Quality of object characteristics is more often a problem than the quality of the systems used.
- To register object characteristics in a proper way and use them in a CAMA system, it is important to have uniform definitions and instructions for measuring (for instance usable floor area) or assessing (for instance quality of a property) object characteristics.
- Uniform definitions for the characteristics record are always important. It does not matter whether there is a central or decentralized appraisal. Because if there is a centralized appraisal decentralized sources of data can be used and the other way around.
- For primary object characteristics such as size and building year the setting of uniform definitions and standards is relatively simple. For the secondary object characteristics such as quality of the building, maintenance condition or location definitions are much harder to set out and use.

- Sharing information with other government and non-government organizations makes the appraisal process more efficient. This also applies for the use of "big data" from the internet especially data about the real estate market.
- It is recommended that before starting the appraisal an assessment is made of the quality of the registration of the object characteristics to be used for the appraisal. If the quality is inadequate, improvement measures must be taken before starting the analysis and the building of valuation models within the CAMA system.

## REFERENCES


[1] KATHMANN, R.M. and KUIJPER, M.; Property Valuation and Taxation in The Netherlands, A case study conducted by the Netherlands Council for Real Estate Assessment; 2015; The Hague, The Netherlands

[2] KATHMANN, R.M. and KUIJPER, M.; How to Evaluate Valuation Models?; 2006; The Hague, The Netherlands


## BIOGRAPHICAL NOTES

Ruud M. Kathmann has studied geodetic engineering at the Delft University of Technology and graduated in 1985. He is a member of the management team of the Dutch Council for Real Estate Assessment. From this position Ruud is closely involved to the development of the System of Base Registers. In The Netherlands Ruud is considered to be one of the leading specialists on the areas of geo-information, mass-appraisal and e-government. Ruud is also a observing member of The European Group of Valuers' Associations (TEGoVA).

Marco Kuijper completed his study geodetic engineering at the Delft University of Technology where he graduated in 2001. In 2006 Marco became a certified internal auditor after completing a study on this discipline at the Erasmus University Rotterdam. At the Dutch Council for Real Estate Assessment one of the main tasks of Marco is developing the organizational strategy. Marco is a member of the Membership Recognition committee of the International Association of Assessing Officers (IAAO).

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## Appendix 1: MEASURING INSTRUCTION USABLE FLOOR AREA RESIDENTIAL PROPERTIES

Measurement of the usable floor area of a residential property per floor level

### Step 1: Measure the total usable floor area of the floor level

**Principle:** Always measure an area (or areas) within the outer/separating walls, including supporting and non-supporting partition walls. Outer/separating walls are the walls that separate one house from the other house (or from the outside). Furthermore, all interior walls in the property are being designated as "non-supporting".

**Just measure the usable floor area of which the highest point is at least 1.50 meters high1.**

- Divide the total usable floor area in easy-to-measure areas by making use of the standard basic shapes:
  - Rectangle
  - Circle
  - Quarter circle
  - Triangle
  - Semi circle
  - Ellipse

**Take this into account when measuring, for example, a bay window.**

- Summarize all usable floor area parts.
- **Make corrections for 5 elements[2].**
  - Stairwell larger than 4.0 $m^2$ (Deduction)
  - Service shaft or detached building structure (other than a staircase) larger than 0.50 $m^2$ (Deduction)
  - Alcove larger than 0.50 $m^2$ (Can be an addition or a deduction[3].)
  - Elevator shaft (Deduction)
  - Loft larger than 4.0 $m^2$ (Deduction)

### Step 2: Measure the usable floor area of the miscellaneous indoor area(s) (if existing)

An area is considered a miscellaneous indoor area (other than primary living space) when one of the following situations is applicable:

- The highest point is between 1.50 meters and 2.00 meters high.
- The highest point is above 2.00 meters, but the interconnected area higher than 2.00 meters is smaller than 4.0 $m^2$ (only applicable when there is also a part of the area with a height of less than 2.00 meters).
- The area (s) is (are) architecturally only suitable as storage space(s), such as a bicycle storage, a garage or a non-walkable attic.
- There is a storage attic, which is an attic only accessible by non-fixed stairs, and/or an attic with insufficient daylight (window area less than one square meter).

In case of doubt, the areas are being counted as primary living areas. For example hallway, kitchen and pantry, laundry room, pantry, boiler room, storage closet and electrical room are counted as primary living areas, unless

[1] Floors under staircases are included in accordance with NEN 2580.

[2] This list corresponds with the list in NEN 2580. In NEN 2580 the usable floor area of the supporting partition walls is excluded from the measurement (deductible item). Regarding this aspect, this measuring instruction differs from NEN 2580. No distinction is being made between supporting and non-supporting partition walls. The supporting partition walls are included in the usable floor area according to this instruction.

[3] Depending on the selected standard basic shapes.

one of the four situations, as mentioned above, is applicable (for example central heating system in the storage attic, utility room with a height of less than 2.00 meters).
Make use of the basic shapes and elements when measuring, and measure within the partition walls.

### Step 3: Determine the "primary living area"

Subtract the usable floor area as located in step 2 from the usable floor area as located in step 1 to determine the "primary living area".

### Step 4: Measure the usable floor area of the building-related outdoor area(s) (if existing)

An area is considered a building-related outdoor area if this area is not or only partially surrounded by fixed walls and therefore has no fixed outer boundary. Think for instance of a balcony or terrace. In case an apartment is situated on the ground floor, a terrace, when and in so far as this terrace rests on support that has been integrated into the building structure of the residential property, must be considered as a building-related outdoor area. This is an exception to the general rule and NEN 2580.
To determine the usable floor area of a building-related outdoor area, distinction is being made between a covered area and a non-covered area:

- In case of a covered building-related outdoor area, the usable floor area is measured up to the vertical projection of the canopy or roof;

- In case of a non-covered building-related outdoor area, the usable floor area is measured up to the ascending partition structure, such as a fence, roof curb or edge of the floor construction.

Make use of the basic shapes and elements when measuring.

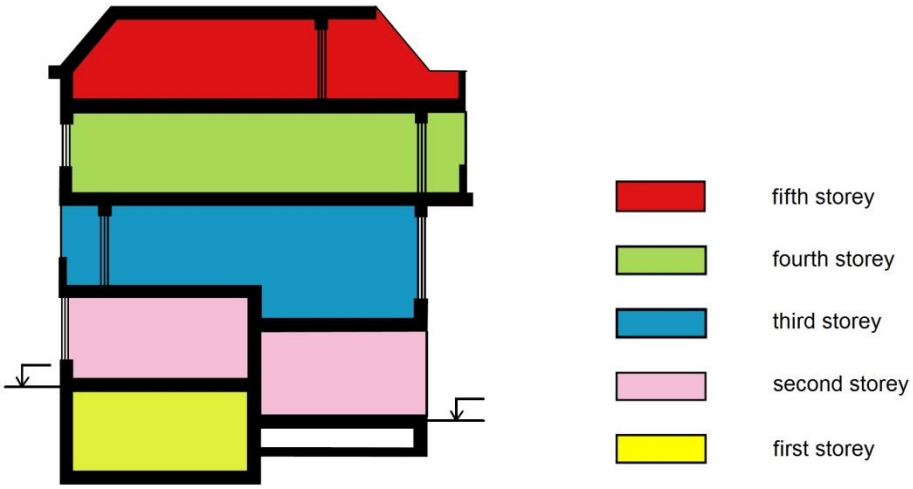
### Step 5: Proceed to the next floor level (if existing)

Repeat steps 1 through 4.

### Step 6: Determine the total usable floor area of the residential property broken down into different usable floor areas

Summarize the located habitable floor areas per floor level to one primary living area for the residential property. Do the same for the usable floor area miscellaneous indoor area and the usable floor area building-related outdoor area.

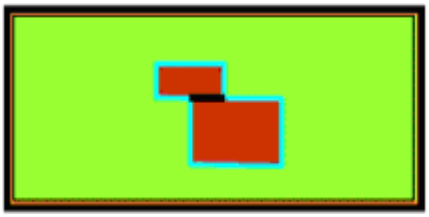
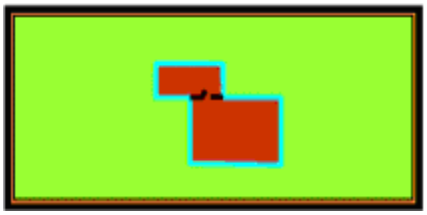
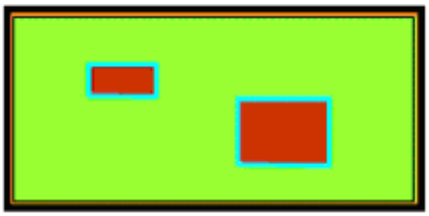
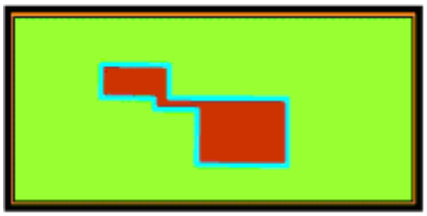
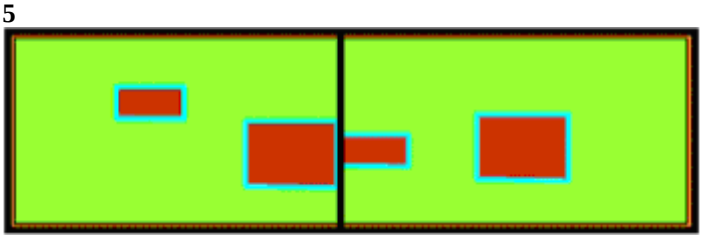
*Illustration 1: Floor levels (Source: NNI, NEN-2580)*




**Measuring the area of exterior storage space(s)**

An area is an exterior storage area if there is **no adjacent wall** with the main building and if the area is **only accessible through the open air**. Furthermore, the exterior storage area can never have a residential function.
The measuring of the exterior storage area is done according to the same principle as applied to the residential property (step 1).
If there is more than one exterior storage area, the measured areas will be summarized into a single usable floor area exterior storage area for the residential property.

*Illustration 2: Miscellaneous indoor area versus exterior storage area*

| | |
|---|---|
| **1**<br>  <br>▪ Adjacent wall<br>▪ Only accessible through the open air<br>→ Miscellaneous indoor area | **2**<br>  <br>▪ Adjacent wall<br>▪ Accessible via interior door<br>→ Miscellaneous indoor area |
| **3**<br>  <br>▪ No adjacent wall<br>▪ Only accessible through the open air<br>→ Exterior storage area | **4**<br>  <br>▪ No adjacent wall<br>▪ Accessible via closed connection<br>→ Miscellaneous indoor area |
| **5**<br>  <br>▪ The shed has an adjacent wall with the neighboring residential property<br>→ Exterior storage area | |

*This illustration is partly derived from the Manual Characteristics Base Registers Addresses and Buildings, the Ministry of I & M)*

## Appendix 2: MEASURING INSTRUCTION GROSS VOLUME RESIDENTIAL PROPERTIES

Measuring the gross volume of a residential property, per construction level

**Principle:**

a. The volume of a construction level of a residential property is being measured by multiplying the total floor area of the construction level with the gross height of that level;
b. The total floor area of the construction level of the residential property consists of the area including the outer/partition walls, supporting and non-supporting interior walls and alcoves, stairwells, lofts, vaults etc.;
c. The (gross) height of a construction level is being determined from the top of the base up to and including the base of the next floor level or up to and including the roof construction above;
d. Included in the volume of a residential property are areas with a height of less than 1.50 meters with the exception of crawl spaces;
e. Not added to the volume of the residential property are the volumes of exterior storage areas, or basement areas in apartments and flats and/or the volume of covered building-related exterior areas that belong to the residential property. In determining the gross volume of a residential home or complex of multi-family homes, the existing storage rooms, basements, indoor parking places etc. belonging to the property or complex, are included in the measurement.

### Step 1: Measuring the construction level floor area

Measure the total floor area by measuring along the outer walls. Measure by including exterior walls, interior walls, lofts and stairwells etc. Concaving and protruding building components at the front with a cross-sectional area less than 0.50 m², are disregarded. So, in case of a niche in the front of less than 0.50 m² this is simply being added to the volume and in case of a protruding element this is not being added to the volume.
In case of property-separating-walls measurement is taken "heart-to-heart". If the thickness of the property-separating-wall cannot be measured, it is assumed that this wall is 30 cm thick. (Therefore, a distance of 15 cm from the center of the wall needs to be maintained).
Divide the total floor area in easy-to-measure areas by making use of the standard basic shapes:

- Rectangle
- Triangle
- Circle
- Semi circle
- Quarter circle
- Ellipse

In case of variable heights of the construction level, distinguish areas wherefore the building height can be determined unambiguously.

Summarize all area parts.

Contrary to the measurement of the usable floor area, the entire area is being measured, even if the highest point is less than 1.50 meters. There is therefore no adjustment for stairwells and lofts.

### Step 2: Measure the (gross) height of this construction level

The (gross) height is being determined from the top of the base up to and including the base of the next construction level. In case the thickness of the (property-dividing) floor cannot be measured, it is assumed that this floor is 30 cm thick.
If it is the upper construction level and if there is a flat roof, measurement must include the roof construction. For the thickness of the roof construction 30 cm is being maintained in case this measurement is unknown. When there is no straight ceiling because of a cover up roof construction, go to step 4.

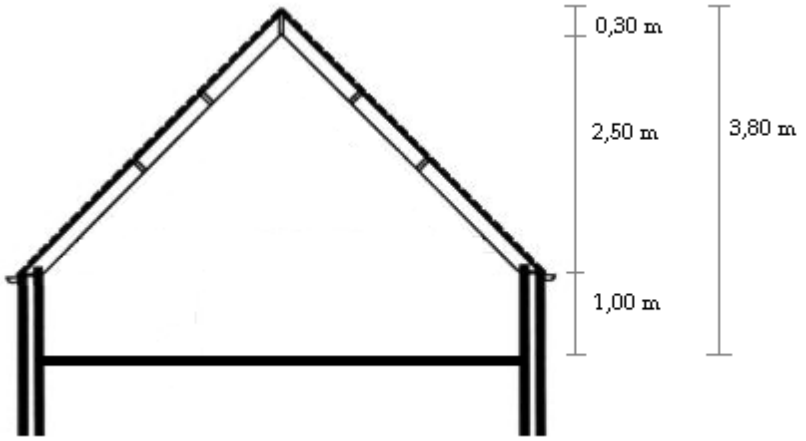
### Step 3: Multiply the volume of the construction level with the (gross) height

This multiplication produces the gross volume per construction level.

### Step 4: Determine the volume of construction levels with a cover up roof construction

In case of a regular gabled (or ridged) roof or lean-to roof the volume of the area below the sloping roof is being measured by multiplying the floor area of this part with the average of the lowest and the highest height . By determining these heights, measurement must be taken from the top of the base up to the (ridge) beam. 30 cm will be added to the measured height for the beam above, up to the roof (the ridge) of the house, if this measurement is unknown.

For example:




The volume of this attic floor level is being calculated as follows: The total floor area is being multiplied by the average floor height. The average floor height in this example is: (2.50 + 0.30) / 2 + 1.00 = 2.40 m
In case of a symmetrical roof construction the average floor height can also be calculated as follows: (3.80 + 1.00) / 2 = 2.40 m

If necessary, implement correction for dormers etc.
In case of a more complex roof construction divide the gross floor area in such parts that, based on an average height, calculation can be done unambiguously.

## Step 5: Proceed to the next construction level (if existing)

Repeat steps 1 through 4.

## Step 6: Determine the volume of the ground floor

This step is not being performed to determine the gross volume of a residential property within a building complex with multi-family homes (the "volume behind the front door").
As repeatedly is being measured from the top of a base of a construction level, the volume of the area on the first construction level needs to be added. Often this is the ground floor, but it can also be a basement floor or just a "floating" floor as first construction level.
If there is a ground floor, basement floor or "floating" floor (located at the base floor of the residential property) it is assumed that this floor is 40 cm thick.
Multiply the gross volume of the lowest construction level with the thickness of the floor (40 cm). If, for example, a house has a part-sized basement or is partially located above a parking garage, the volume of the lowest construction level may consist of several parts.

**Summarize the calculated gross volume per construction level**

For residential properties within a building/complex with multi-family homes:

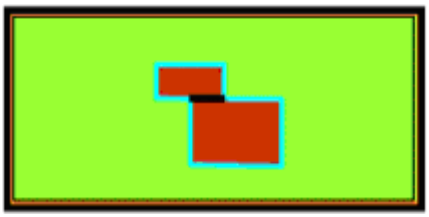
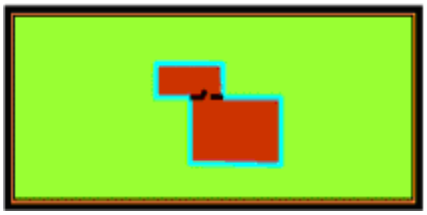
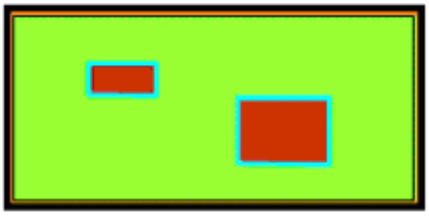
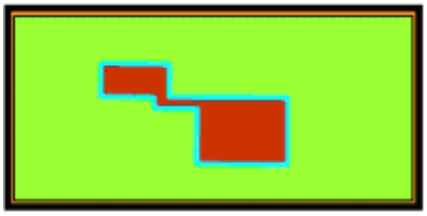
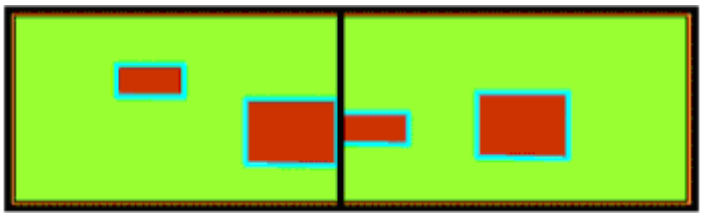
- Summarize the gross volume per construction level of the residential property. This produces the gross volume of the (individual) home within the complex.

For single-family homes or buildings/complexes with multi-family homes:

- Summarize the gross volume per construction level of the residential property (building or complex) and hereby add the calculated volume of the ground floor. This produces the gross volume of the home (building or complex).

**Distinguish between indoor and exterior areas**
Not added to the residential property is the volume of external storage areas, or basements in apartments and flats and/or the volume of covered building-related exterior areas, belonging to the residential property. It is, therefore, appropriate to make a clear distinction between exterior storage area and indoor area.

*Miscellaneous indoor area versus exterior storage area*

| | |
|---|---|
| **1**<br>  <br>▪ Adjacent wall<br>▪ Only accessible through the open air<br>→ Miscellaneous interior area | **2**<br>  <br>▪ Adjacent wall<br>▪ Accessible via interior door<br>→ Miscellaneous interior area |
| **3**<br>  <br>▪ No adjacent wall<br>▪ Only accessible through the pen air<br>→ Exterior storage area | **4**<br>  <br>▪ No adjacent wall<br>▪ Accessible via closed connection<br>→ Miscellaneous interior area |
| **5**<br>  <br>▪ The shed has an adjacent wall with the neighboring residential property<br>→ Exterior storage area | |

*This illustration is partly derived from the Manual Characteristics Base Registers Addresses and Buildings, the Ministry of I & M)*

## Appendix 3: CONTROL PROTOCOL OBJECT CHARACTERISTICS

*Introduction*

The proper recording of all data on a real estate property (the object characteristics) is essential for a good quality of the property records. In the quality control we distinguish between primary and secondary object characteristics.

The property valuations are only of good quality and sufficiently convincing as the underlying object characteristics are of good quality. Therefore it is important that the organization responsible for the mass appraisal examine the quality of the object characteristics and perform all necessary steps to achieve improvements.

*Use control protocol*

The aim of the protocol is to give the user a tool to gain insight into the accuracy of the registered object characteristics and the underlying procedures. To achieve this goal, we make this protocol differentiates between:

1. the accuracy of the recorded (primary and secondary) object characteristics;
2. the process that is the basis for the updating of the object characteristics.

| **Correctness registered object characteristics** | | |
|---|---|---|
| *Primary object characteristics* | | |
| Under primary object attributes we mean:<br>- the size (volume, area);<br>- the building year;<br>- the address;<br>- the type / kind of object;<br>- the object parts (presence of shed, garage, dormer, etc.). | | |
| 1. | Research by a random sample of a predetermined number of objects (see note) whether the primary object characteristics registered correspond with reality. This research is done by a comparison with external sources or any additional site investigation. What is the number of real estate properties which have shown that at least one of the primary object characteristics is registered incorrectly in the property records? Fill this number, in the adjacent formula and calculate the percentage of the investigated real estate properties of which at least one of the primary object characteristics is incorrect. | $\frac{NUMBER}{SAMPLE\ SIZE} * 100\% = \ldots\ldots\ldots\ldots\ldots\ldots\%$ |

| | |
|---|---|
| COMMENTS<br><br>Selection<br>Question 1 only gives a reliable estimate of the accuracy of the recorded object characteristics if enough objects are taken in the sample and if the objects also are representative of the entire administration (or the part of the administration which research focus on). This requires some attention. | |
| Step 1: | Determine which part of the property tax administration the assessment protocol is to adjudicate. For example:<br>- throughout the administration;<br>- all residential property;<br>- all non-residential property<br>- all non-commercial property;<br>- all properties in a given area;<br>- etc. |
| Step 2: | Determine how many objects are included this selection. |
| Step 3: | Determine the required sample size. For instance use: http://www.surveysystem.com/sscalc.htm |
| Step 4: | Select the number (calculated in step 3) of properties randomly. This means that any real-property object has the same chance to get into the sample. |
| **Note: For part 2 of this protocol the same property tax objects can be selected. It may be efficient in order to examine the accuracy of the recorded primary and secondary object characteristics at the same time.** | |
| *Examination*<br>Of all selected objects, the following steps should be followed:: | |
| Step 5: | In the property tax administration registered primary object characteristics of the selected objects are compared with the primary object characteristics as evidenced by an external source (real estate ads, cyclorama, aerial photographs), or the results of an (internal) inspection on the spot. On the basis of this comparison conclusion can be drawn whether registered primary object characteristics are plausible. To assess this, the following rules shall apply:<br>- size (if converted from m3 to m2) shall be within 10%;<br>- if the building year is equal to the building year registered or the difference is less than three years, the registered building year is considered correct. (In older objects (for 1950 to 1900) a greater deviation is allowed.)<br>- the type / object type must match;<br>- the object parts must match. |
| Step 6: | If discrepancies are found in step 5 between the registration for the mass appraisal and other external source (s), there must be further investigation in order to assess whether the object attributes in the registration for the appraisal is expected to be correct (likely) or not. |
| Step 7: | Based on the comparison and (possibly) for further investigation a conclusion needs to drawn whether for this object the primary object characteristics in the records for appraisal are recorded properly. When one or more of the object characteristics of an object is incorrectly registered then the object is considered incorrect. |

| *Secondary object characteristics* | | | |
|---|---|---|---|
| Not all valuation models use the same secondary object characteristics. As part of this protocol we therefore start with the secondary object characteristics used by the municipality for the appraisal. In addition, at least attention should be paid to the following secondary object characteristics:<br>- the quality (building materials / luxury conveniences);<br>- the maintenance condition;<br>- location. | | | |
| | Which secondary object characteristics involved in the study? | ☐ the quality (materials / luxury)<br>☐ the maintenance condition<br>☐ location<br>☐ otherwise:: .....<br>☐ otherwise:: ..... | |
| 2. | Research by a random sample of a predetermined number of objects (see note) whether the secondary object characteristics registered correspond with reality. This research is done by a comparison with external sources or any additional site investigation.<br>What is the number of real estate properties which have shown that at least one of the secondary object characteristics is registered incorrectly in the property records? Fill this number, in the adjacent formula and calculate the percentage of the investigated real estate properties of which at least one of the secondary object characteristics is incorrect. | $\frac{NUMBER}{SAMPLE\ SIZE} * 100\% = \ldots\ldots\ldots\ldots\ldots\%$ | |
| COMMENTS<br><br>Selection<br>Here, the same objects as in part 1 (primary object characteristics) can be selected. | | | |
| *Examination*<br>For all selected objects, the following steps should be followed: | | | |
| Step 1: | The registered secondary object characteristics are compared with the secondary object characteristics as evidenced by an external source (real estate ads, cyclorama, aerial photographs), or the results of an inspection on the spot. On the basis of this comparison conclusion can be drawn whether registered secondary object characteristics are plausible. | | |
| Step 2: | If discrepancies are found in step 1 between the registration for the mass appraisal and other external source (s), there must be further investigation in order to assess whether the object attributes in the registration for the appraisal is expected to be correct (likely) or not. | | |

| | |
|---|---|
| Step 3: | Based on the comparison and (possibly) for further investigation a conclusion needs to drawn whether for this object the secondary object characteristics in the records for appraisal are recorded properly. When one or more of the object characteristics of an object is incorrectly registered then the object is considered incorrect. |

| **Process updating object characteristics** | | **Yes** | **No** | **nA** |
|---|---|---|---|---|
| *Updating object characteristics* | | | | |
| 3. | Is in the past year at least 20% of the objects visited on-site or through any other devices (estate advertisements, information sheets, measuring building plans, cyclorama, etc.) to check whether all object characteristics are correct? | □ | □ | □ |
| 4. | Over the past five years is at least 90% of the objects visited, on-site or through any other devices (estate advertisements, information sheets, measure again drawings, cyclorama, etc.) to check whether all object characteristics are correct? | □ | □ | □ |
| 5. | Are all relevant construction permits / environmental permits accurately and timely included in the property tax administration? | □ | □ | □ |
| 6. | Can it be demonstrated that the primary object characteristics of the administration for appraisal are consistent with other government administrations (if available)? | □ | □ | □ |
| 7. | Does the municipality has working procedures for monitoring / recording of primary and secondary object characteristics (or a similar document) that describe the definitions applicable for these data and how they are applied? | □ | □ | □ |
| 8 | Describe these working procedures how the definitions and application relate to national standards? | □ | □ | □ |

| | | | | |
|---|---|---|---|---|
| *Market analysis* | | | | |
| 9. | Are the ads from property tax objects offered on the Internet systematically used in order to assess the quality of the recorded object characteristics? | □ | □ | □ |
| 10. | Does the municipality systematically receive signals if sold real-property items are improved after the date of sale? | □ | □ | □ |

| | | | | |
|---|---|---|---|---|
| *Handling of objections* | | | | |
| 11. | Is checked in the handling of every property tax appeal or the (primary and secondary) object attributes are correct? | □ | □ | □ |
| 12. | Each year, after the settlement of property tax appeals, carried out an analysis of the causes of these claims and the result of this analysis, including improvement measures fixed? | □ | □ | □ |

| | | | | |
|---|---|---|---|---|
| *Quality assurance valuation* | | | | |
| 13. | Are embedded in the valuation process measures to prevent (especially secondary) object attributes can be "adapted" to turn the property tax appraisals "on values" and are these measures visibly documented? | □ | □ | □ |

| | | | | |
|---|---|---|---|---|
| *Other measures* | | | | |
| 14. | The municipality has included periodic systematic assessment of the accuracy of the registered object attributes in the work process? | □ | □ | □ |
| 15. | Uses the congregation periodically current aerial photos or cyclorama programs to assess the accuracy of the registered object characteristics? | □ | □ | □ |
| 16. | Does the municipality systematic investigations to detect construction without a permit? | □ | □ | □ |

*Summary, conclusions and improvement measures*

| **Correctness registered object characteristics** | | **ja** | **nee** | **nvt** |
|---|---|---|---|---|
| *Primary object characteristics* | | | | |
| a. | How many objects are there in the municipality? | …… | | |
| b. | What is the percentage of the surveyed objects for which at least one of the primary object characteristics is incorrect (answer to question 1)? | ……% | | |
| c | Assuming that in part "b" specified percentage is representative: for what number of objects in the municipality are the primary object characteristics incorrect? ("a" multiplied by "g") * | …… | | |
| *Conclusion* | | | | |
| d. | Does the accuracy of the recorded primary object characteristics meet the quality standards of the municipality? | □ | □ | □ |
| *Measures to take* | | | | |
| e. | What measures are being taken to improve the accuracy of the recorded primary object characteristics? | | | |
| *Additional research* | | | | |
| f. | Is it necessary to execute (parts of) this protocol again after completing these measures? | □ | □ | □ |

| | | | | |
|---|---|---|---|---|
| *Secondary object characteristics* | | | | |
| g. | What is the percentage of the surveyed objects for which at least one of the secondary object characteristics is incorrect (answer to question 2)? | ……% | | |
| h. | Assuming that in part "g" specified percentage is representative: for what number of objects in the municipality are the primary object characteristics incorrect? ("a" multiplied by "g") * | …… | | |
| *Conclusion* | | | | |
| i. | Does the accuracy of the recorded secondary object characteristics meet the quality standards of the municipality? | □ | □ | □ |
| *Measures to take* | | | | |
| j. | What measures are being taken to improve the accuracy of the recorded secondary object characteristics? | | | |
| *Additional research* | | | | |
| k. | Is it necessary to execute (parts of) this protocol again after completing these measures? | □ | □ | □ |

* This number is an estimate. The case of the "b" and "g" calculated percentages may not necessarily be extrapolated to the entire municipality.

| **Process updating object characteristics** | | **ja** | **nee** | **nvt** |
|---|---|---|---|---|
| *Conclusion* | | | | |
| l. | Are there opportunities to improve the process for the maintenance of the object characteristics? | ◻ | ◻ | ◻ |
| *Measures to take* | | | | |
| m. | What measures are being taken to improve the process for the maintenance of the object characteristics? | | | |
| *Additional research* | | | | |
| n. | Is it necessary to execute (parts of) this protocol again after completing these measures? | ◻ | ◻ | ◻ |

| Control executed by: | | | |
|---|---|---|---|
| Name: | Function: | Date: | Signature: |
| …… | …… | . . / . . / 20 . . | …… |