son). This can also be used in order to specify which internal or external study programmes will be linked to.

F   Ability to be criticised and to criticise

Ability to be criticised (ability to be refuted) offers others the opportunity to selectively make progress by building upon technical scientifical know-how and knowledge (accumulation) obtained through study. Statements are only of a scientific interest when they are bold and do not solely use risk-free citations, self-evident aspects or even clichés, on the contrary, statements must question these. This daring must not only be apparent in the project design but in particular during execution.

Ability to be criticised can be shown from a readiness and initiative to expose the results in their consecutive phases, to publish them for instance on the internet in a refutable manner, and in this way open them to criticism in all phases of the research even though these phases are unripe. Drawings and arguments must not conceal their weaknesses.

G   Convergence and limitations

A proposal for the nature of the end product is required with a summation of the sub-projects. Questions to be answered in the proposal are:

- Who is ultimately responsible, who takes part, how often do they meet, what do they organise, how do they divide the common tasks, how is a synergy created, which facilities are desired?
- How is it to be represented (on the website, in book form, in a conference)?
- How do the sub-projects converge?

NAMING AND DESCRIBING
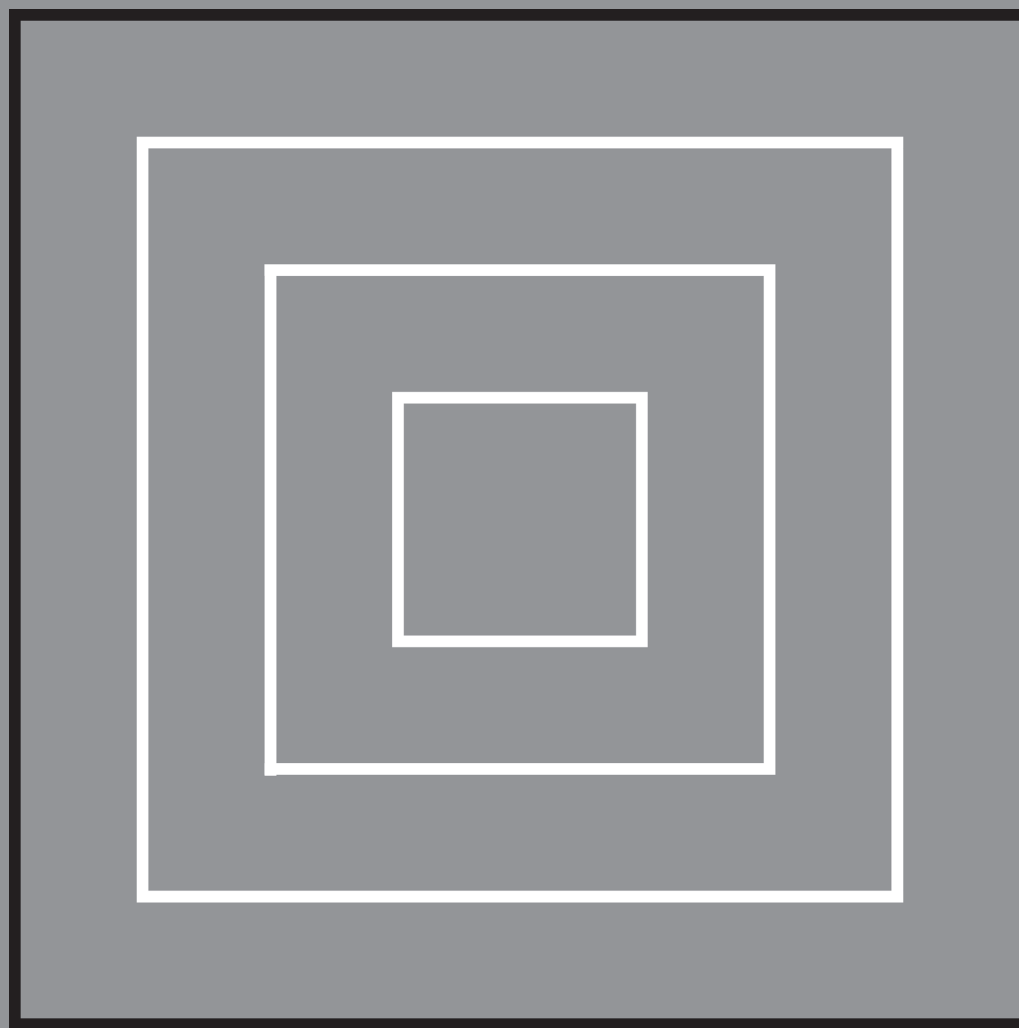
A   NAMING AND DESCRIBING

An important condition for scientific work is a conceptual framework and careful descrip-tion of the subject to be studied. Naming, describing and referring are also essential constitu-ents of study related to design.

Naming components and concepts
In their contribution, De Jong and Rosemann stress the importance of concepts in design, as well as their focus, supposed scale, possible overlaps. The lack of concepts in naming the mountain of possible forms and transformations whilst communicating on design actually is a problem for the science of designing. It causes a proliferation of neologisms, often not to be fathomed by outsiders. Definition does not always offer a solution. For that purpose the constituent concepts fail that are presumed when a definition is in the making. Defining is preceded by the conditional positioning of concepts A and B *vis-à-vis* one another: which concepts A pre-supposes concept B to be defined? May concepts A be named?

It is important to avoid a change of level of abstraction in a discourse or use of 'legenda', the 'things to be read', in construction. Mistakes preceding logical ones like these often play a rôle when designs are discussed. Designers tend to use rather paradoxical expressions whilst commenting on their design, like 'concentrated deconcentration'. Words often fail to suggest the world of shapes.

Retrieval and reference
The contribution of de Jong and van der Voordt dovetails both practically and theoretically with suggestions *vis-à-vis* citations of scientific results and facilitating that.

Descriptive research
Lans and Van der Voordt explore the value of a painstaking description of reality for theory development and the practice of designing. They argue to describe facts or designs in such a way that, 'ex ante', a minimal amount of inter-connections is suggested. That description should be clearly distinguished from the interpretation of facts and the establishment of rela-tionships. Criticism by way of comparing different interpretations of the same material de-pends on this in order to exist at all. Concrete examples of study illustrate advantages and disadvantages of the phenomenological approach. The authors advocate to raise the domi-nant form of design study – analyses of plans and comparison of previous cases – to a higher level. In addition, process description is discussed by way of two examples: the planning process of the '*Bijlmermeer*' project of the City of Amsterdam in the sixties, and the indi-vidual one, and one of thought as well, of a designer of architecture. Both studies yielded relevant insights for the theories of planning and of architecture.

Historical research
Máčel shows that the results of historical research depend on the interpretation of history as a science. His contribution consists of three parts: 1) heuristics (how to deal with historical sources and references), 2) analysis (how to analyse text and drawings dating from the past), and 3) interpretation (focusing on issues such as context, typology, style and meaning). Fi-nally he reflects on architectural history as a social science and the relationship between his-torical research and architectural criticism.

Map Study
Moens' contribution focuses on the formal and functional description of the earth's surface, on the basis of aerial photographs and maps. It discusses several types of maps; how they

are made and how they may be used as support of design decisions. In addition, traps and foot holes are indicated in order to prevent faulty interpretation of the towers of map-making. Without interpretation, it could not be done at all. Just think about the 'things to be read', the units of the legend and choosing them. The degree and measure of interpretation is then at stake; and to what level they are suggested. Only after description the topographical facts should be placed into mutual relations according to a model. In the case of topographical maps of the military the problem becomes clear. Different connections are already pre-supposed in them; no longer susceptive to design decisions.

Casuistry resulting in laws

Most ancient social application of induction, a distinct set of cases within one general ruling, is the law. The juridical method where casuistry leads to jurisprudence is a predecessor of the scientific method. Facts, their modelling, debate and inter-subjective judgement play an important rôle.

Hobma and Schutte discuss the importance of legal study in the context of designing. On one hand they make practical distinctions, based on straight application of legal research: essentially retrieval and sorting; for instance for getting a building license. On the other, they deal with scientific legal study, explicitly aiming for a more general kind of knowledge.

The Chapter is consolidated in this section, while this prolegomenon from quarters not exclusively empirical gives a feeling for a scientific approach as it applies in the domain of architecture. An exclusively empirical approach fails to give a solution for many problems in this respect.

Conclusion

Together, the five sections reflect the value of descriptive study, the necessity of a clear, unambiguous terminology, and checking points to pre-empt all too subjective interpretations, or even faulty ones, of reality.

4 NAMING COMPONENTS AND CONCEPTS

TAEKE DE JONG
JÜRGEN ROSEMANN

Specific terminology exists in each scientific discipline enabling effective description and specialist communication. In some disciplines the number of defined concepts is relatively small (as in logic, mathematics, physics, history and geography, even though with the last two the number of names is uniquely large), in others (chemical nomenclature, medical science and above all in biology and ecology) this is very large. This has partly to do with variation in the phenomenon to be explained.

What can be done when a designing discipline, such as architecture, is expected to *create* these phenomena and to increase their variation (especially in form and structure)?

A few technical architectural dictionaries exist[a] (concepts) and encyclopaedia (concepts and names); however there is little interest for them in architectural design; they are mainly of historical interest. This by no means covers the topicality of new design assignments. In architecture there is an infinite number of proposals created; partly expressed by drawings and pictures. It is thought that from each drawing new concepts and conceptions may be derived allowing parts of the design process to be subject of discussion. However, their number is so large, that this vocabulary will never become widely accepted.

A research project into reference words, which summarise the competence of professors in architecture[b], brought to light that many subjects and dilemmas of study by design, design, design research and typology could hardly be reproduced in everyday language or technical language. The number of new terms (neologisms) in this profession is, therefore, large.

Designers show a distinctive creativeness in using neologisms for the explanation of their designs, neologisms like that empirical researchers simply dismiss as of no use in their jargon (family structure, age, income). However, it is of utmost importance that these concepts are taken seriously because they show the inadequacy of empirical jargon. They can herald a change in focus demanding another concept definition. Intensive defining is, therefore, not always the right thing to do. Conditional positioning is an alternative for precise defining.

The sheer size of the Index of this book (see page 531) is an indication of the prime importance of naming in the science of design. The first naming of components, concepts and design activities in the transformation of the earth's surface is determining the focus from where the remainder is named and considered. That this focus may be chosen differently, implies that a number of vocabularies are possible and desirable. Naming, typing and making legends are hiding an implicit, often blockading classification within which both study and design will express themselves subsequently and necessary. Already a seemingly objective description comprises in its terms at least one tacit pre-supposition that one should be conscious on in order to be able to speak in a different language about the same phenomenon.

The importance of naming and therefore implicit classification for design comes nowhere so directly to the fore as in the Chapter of the section technical study 'Classification and Combination' (see page 345). In it, the discussion, of a standing measured by decades, about naming the building materials and components is described as well as the shortcomings of any classification for a design opting for a different selection of building blocks in order to get to new designs. Any designer is facing, in each compositional task, such tacit, sometimes stimulating, but usually blockading pre-suppositions with which components have been named or imagined traditionally.

This Chapter gives some indications how the components of an image and their reconstruction into a concept may be delimited and named. This way it is becoming possible to talk about them and to retrieve them.

a   Venturi, M. (1950) *Town Planning Glossary; 10.000 multilingual terms in one alphabet for European Town Planners;*
-   Kay, N.W. (1955) *The Modern Building Encyclopaedia, an authoritative reference to all aspects of the building and allied trades;*
-   Graf, Huber et al. (1956) *Das Kleine Lexikon der Bautechnik (im Anhang DIN-normen im Bauwesen);*
-   Saylor, H.H. (1962, 1952) *Dictionary of Architecture;*
-   Académie D'Architecture (1963) *Lexique Des Termes Du Batiment;*
-   Barbier, M., R. Cadierques et al. (1963) *Dictionnaire Technique du Batiment et des Travaux Publics;*
-   Burke, A.E., J. Dalzell et al. (1963 / 1959 / 1955 / 1950) *Architectural and Building Trades Dictionary;*
-   Kinniburgh, W. (1966) *Dictionary of Building Materials;*
-   Frommhold, H. (1967) *Begriffsbestimmungen aus dem Bauwesen;*
-   Koepf, H. (1968) *Bildwörterbuch der Architektur;*
-   Koch, W. and G. Kötting (1971) *Termen en Begrippen in de Bouwkunst;*
-   Cowan, H.J. (1973) *Dictionary of Architectural Science;*
-   Killer, W.K. (1973) *Bautechnisches Englisch im Bild;*
-   Meling, G. (1973) *Naturstein Lexikon; Werkstoff, Werkzeuge und Machinen, Wirtschaft und Handel, Gestaltung und Technieken von der Antike bis heute;*
-   Walker, J.A. (1973) *Glossary of Art, Architecture and Design since 1945;*
-   Hall, J. (1974) *Dictionary of Subjects and Symbols in Art;*
-   Harris, C.M. (1975) *Dictionary of Architecture and Construction;*
-   Villena, L. (1975) *Glossaire Burgenfachwörterbuch des mittelalterlichen Wehrbaus;*
-   Curl, J.S. (1977) *English Architecture;*
-   Baumgart, F. (1978) *DuMont's kleines Sachlexikon der Architectur;*
-   Stein, J.S. (1980) *Construction Glossary an Encyclopedic Reference and Manual;*
-   Bak, L. (1983) *Vademecum ruimtelijke planning;*
-   Mohr, A.H. (1983) *Vestingbouwkundige Termen;*
-   Logie, G. (1986) *Glossary of land resources;*
-   Stichting Bouwresearch, P. Erasmus et al. (1989) *Terminologie van de voorbereiding en de kwaliteit in de bouw;*
-   Nederlands Normalisatie Instituut (1991) *Algemene termen in de bouw;*
-   Reinders, C.G. (1992) *Vaktaal; vaktermengids bij kerkgebouwen;*
-   Renes, J. (1992) *Historische landschapselementen;*
-   Wilde, E. de and H. Volker (1995) *Prisma Vakwoordenboek Bouw;*
-   Haslinghuis, E.J. and H. Jense (1997) *Bouwkundige termen.*
b   Jong, T.M. de (1997) *Hoogleraren Bouwkunde in trefwoorden.*

expresiveness →

explicitness →
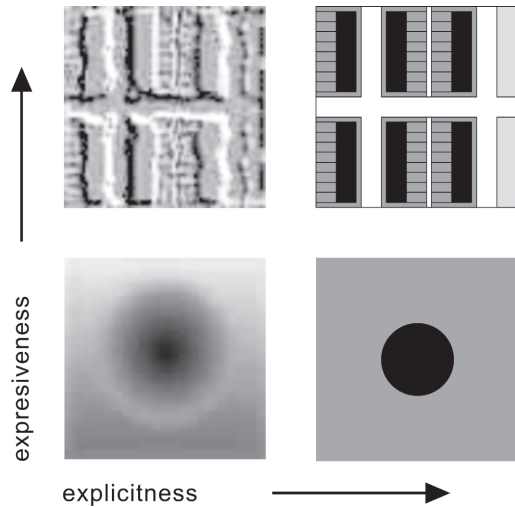
4 Information content of a drawing
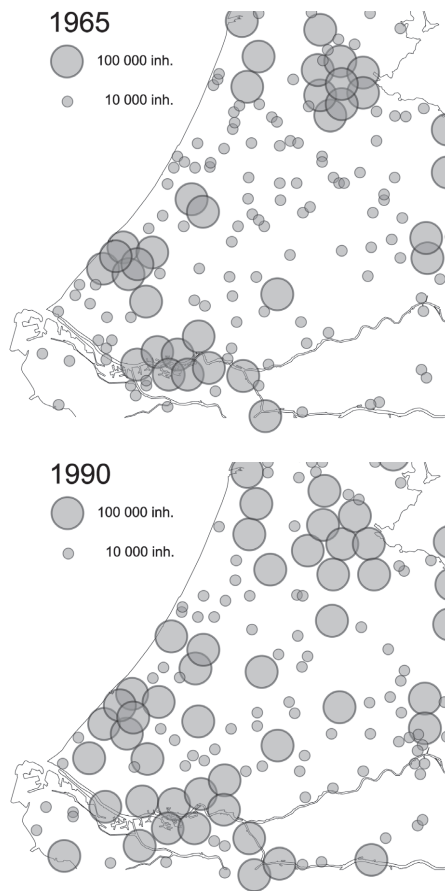
4.1 COMPONENTS AND CONCEPTS IN DRAWINGS

A picture says more a thousand words, but which words are these? This question is of importance for the scientific status of drawing, its documentation and retrievability.

A drawing is made in order to read something from it. Legibility is dependent upon explicitness and expressiveness. That is not the same. An explicit drawing, like a black circle on a grey field with for legend units 'black = built' and 'grey = vacant', for instance, may be very explicit, but is not expressive. The upper plot divisions are more expressive, while their legends (vocabulary) are more comprehensive and have been spread in more than one legend plane in the drawing (information content). When the borders between the legend units are drawn vaguely, the drawing may be more expressive, but it is less explicit. The precise positioning of legends planes has more tolerance (see paragraphs 24.10 and 24.11). Less explicit drawings make sense for creating an impression, but say less in a scholarly than in a poetical sense. Nevertheless they are essential in the designing process.

While consulting an archive of drawings it is only important to retrieve the drawing from which may be read what one wants to know. So it is not only important from a scholarly viewpoint to know what a drawing is depicting, but especially which properties, attributes and operations may be read from what is depicted.

4.2 FOCUS: SEED OF COMPONENTS AND CONCEPTS

The chosen focus primarily determines the viewpoint from which components and concepts are defined. During the design process, the interpretation of the location determines in a major way the first components with which the composition of the design is created. This way, over the years the interpretation of the urban area in the Randstad has changed focus. During the process the selection of the constituting and surrounding components of the image and the concepts related thereto did change. In the figure below the Randstad is represented in units of 100 000 and 10 000 people (large and small circles) in 1965 and 1995 respectively.

The large circles have a radius of 3km and represent reasonably well the urban surface area, which on average in the Netherlands is occupied by 100 000 inhabitants. This also applies to the small circles of 10 000 inhabitants. Where the circles overlap a higher than average population density for the Netherlands exists. The interpretation of this urban area throughout the years is similar to the formation of a different structure of the stars into a different constellation. Through this a different political, design technical and scholarly grasp on the composition also originates. In 1965 the Randstad was made up of a few large and a few small towns, recognisably separated by buffer zones and a 'Green Heart' between them. In 1995 it was mostly called a 'north-wing ' and a 'south-wing'. The Green Heart is becoming thought of less as a component. The 'focus' is shifting. Now it is generally called a 'Deltametropolis'.

A different focus is created upon the surrounding landscape based on the concept of a Deltametropolis, than one based on the concept of a north- and south-wing of the Randstad with Green Heart. The placing of the first components in the composition of the Netherlands determines the concept formation for the rest. In the figure below these concept shifts are represented using larger units (agglomerations, regions, parts of the country).

1965
100 000 inh.
10 000 inh.

1990
100 000 inh.
10 000 inh.

5 Succession of sprawl

6 Big cities around the Green Heart

7 North and South wing

8 Deltametropolis

Historical sciences show more examples of limited object constancy. Languages, people, nations and social categories appear, thrive, diminish, disappear or shift on the map in relation to their territory. The ability to free oneself from old categories, to choose a new focus, is the hallmark of creative researchers and designers (see also page 390).

4.3 UNRAVELLING SCALE

Changes in abstraction within a reasoning can lead to paradoxes like the statement "I am lying". If I am lying, I speak the truth and vice versa. It is a statement and at the same time a statement *about* the statement *itself*. Such self-reflexive statements were banished from the set theory at the beginning of the last century by Russell.[a] He would not allow changes in abstraction using a mathematical argument: "A set of sets may not contain *itself*". This wisdom has by no means entered into everyday language, not even in science.

The accompanying figure shows a spatial example of concept confusion, based upon a difference in the scale of consideration (scale paradox). It is shown here that identical spatial patterns allow different conclusions to be drawn when elements are involved in the consideration using a differing scope (scale level, largest frame, smallest texture grain).

For example if in figure 9 one takes one circle each time and the surroundings into consideration then one must ascertain a difference, although equality should be ascertained when one repeatedly compares groups of seven with the surroundings. Something similar applies to the consideration from inside to outside and from outside to inside. The paradoxical concept 'homogenous mixture' indicates precisely which dilemma this entails: it is homogenous at a specific scale level, at a lower abstraction level it is heterogeneous.

The concept 'bundled deconcentration', well known in Dutch urban planning, is another example. For concepts like that the question must be asked immediately: "using which scale for one, and which scale for the other?" Moreover, this figure shows that such confusion of tongues is possible using a factor three linear scale level difference. Between the grains of sand and the earth lie 7 decimals; therefore there are more than 14 concept confusions lurking.
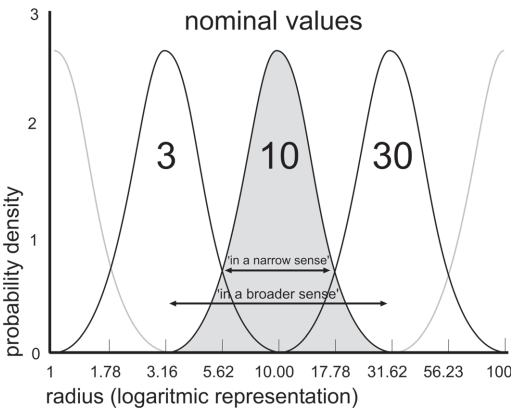
This gave rise to allocation of a frame and a grain which differ systematically to other scale levels by a factor of around three for architectural categories, (discourses, drawings, uniformity in legends, concepts and objects) in the urban development[b] and the technology of building[c] in order to enable the *context* of the category in question to be defined (such as on other scale level).

The frame stated is labelled with a measurement, e.g. '10 m radius'. Such a 'nominal measurement' may be interpreted as 'flexible' up to the measurement of the adjacent radius, e.g. '3m up to 30m radius'.
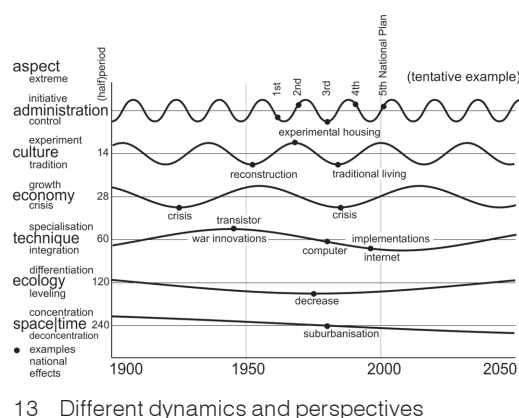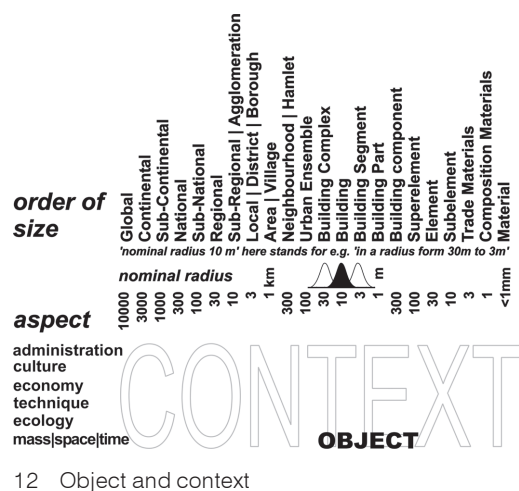

scope

"difference"

"equality"

9   Scale paradox
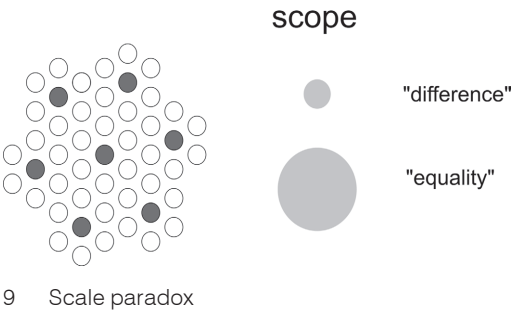
FRAME	NOMINAL RADIUS	
Global	10000	
Continental	3000	
Sub-continental	1000	
National	300	
Sub-national	100	
Regional	30	
Sub-regional	10	
Local	District	Borough	3	
Area	Village	1	km
Neighbourhood	Hamlet	300	
Ensemble	100	
Building complex	30	
Building	10	
Building segment	3	
Building part	1	m
Building component	300	
Superelement	100	
Element	30	
Subelement	10	
Supermaterial	3	
Material	1	
Submaterial	<1	mm

10   Scale articulation

nominal values

3   10   30

in a narrow sense
in a broader sense

probability density

radius (logaritmic representation)

11   Scope of nominal measures

a   Russell, B. (1919) *Introduction to mathematical philosophy*.
b   Jong, T.M. de and M. Paasman (1998) *Een vocabulaire voor besluitvorming over de kaart van Nederland*.
c   See Eekhout, A.C.J.M. (1998) *Ontwerpmethodologie*.

12   Object and context

13   Different dynamics and perspectives

radius				m						mm
frame stage	300	100	30	10	3	1	300	100	30	10
initiative										
programme										
development										
design										
effect analysis										
execution										
usage										
maintenance										
evaluation										
demolition										

14   The context during the building process

4.4   CONTEXT: GROUND OF COMPONENTS AND CONCEPTS

As soon as one has 'placed' an architectural proposal, object, concept, conception, research or design on a scale level or 'radius', the rest is 'context'. The concept has obtained an 'interior' (everything which is smaller than the texture grain of the object) and an 'exterior' (everything which is greater than the frame of the object). This does not just mean in the widest sense of 'spatial context', but, also, more specifically, an 'ecological', 'technical', 'economical', 'cultural', or 'managerial' context. These contexts are also scale sensitive.

When naming the scale boundaries a concept is, from a particular viewpoint, spatially 'placed', regardless of the way a similar problem exists in the time. The concept 'Perspective' in time exists here as an analogy for 'context' in space, which becomes significant when the intended and unintended effects of a design are to be interpreted, named and estimated. In which perspective does this happen, with which plan horizon and under which assumptions with regard to external developments (initiating or controling government, an opportunity- or tradition directed culture, growing or stagnating economy, technology which is successful using function combinations or on the contrary using function separation, an increasing or decreasing spatial pressure).

Articulation of scale can clarify the concept 'goal' and 'mean' on the level of policy: if the State wants to reach a goal through a subsidy, this mean may be a goal for more local authorities. In this way economies are sub-divided in micro, meso and macro economies. Concepts like 'loss', 'profit', 'savings' and conclusions about them may not be inter-changed between them, even if the used words sound the same. Something similar is valid in time: if a goal has been reached, the result has become a mean for a goal further away. It needs no mentioning that the meaning of a concept depends on the context and the perspective within it is used and that it is often used 'removed from its context'.[a]

The building process always takes place in a social and material context and in a perspective based thereon. Each stage can have a different political, cultural, economical, technical, ecological and spatial context and employ, by the same token a language game.[b] The resulting conceptual confusion can often be solved by asking on which scale level the ambiguous concepts have been intended.

4.5   UNRAVELLING OVERLAPS

Once the perspective and context of the architectural system of concepts have been determined, one must check as to how far the concepts overlap. Overlapping concepts are lucrative in the acquisition of research, because one is allocated a budget in order to research the same thing using another name and possibly with slightly different limitations. However, they actually hinder retrievability and accumulation of research results and therefore growth of knowledge and proficiency. With this in mind one must not disallow new concepts (and then for example create a 'thesaurus' using permitted and well-defined concepts.) After all, the value of university research is in extending boundaries, shifting perspectives and changing focus.

The domain of overlapping concepts can be divided by giving the overlap a new name of its own. Supposing that, in a building one makes a distinction between load bearing, dividing and finishing structures to determine their effect on the required design-effort, their effect on manpower by production or to divide the budget between three participating parties. Then overlapping can lead to disagreement.

a   The functional CIAM separation 'living, working, recreation and traffic' resulted into separation of living and working on a much larger distance (1000 metres) than was called for by the hinder between both (100 metres).

b   A term of Wittgenstein, L. (1953) *Philosophische Untersuchungen*. Recent edition: Wittgenstein, L. and G.E.M. Anscombe (1997) *Philosophical investigations*.

Set theory offers in this case symbols for 'without' (asymmetric difference, represented using \) and the 'overlapping between' (diametre, represented using ∩). This results in 5 exclusive concepts: (1) supporters\partitions (2) supporters ∩ partitons (4) partitions ∩ finish, (5) finish\partitions and (3) partitions\(supporters ∪ finish), whereby ∪ stands for 'union' (in this case from two disjunctive sets which are not considered to be overlapping). One can here also use concepts like (1) 'non-partitioning supporters', (2) 'partitioning supporters' etc.

Things become more complex, when a designer creates (6) a bearing construction as a finish. The Venn-diagram then indicates three overlapping circles with the categories 'bearing and finishing' and 'bearing and dividing and finishing' If this was unforeseen during the budget apportionment, to which budget must the time spent on the design be charged? Who makes the profit during execution? Therefore, in practice, an incorrect concept formation leads to confusion, let alone in science. This is very much the case when one wishes to compare different situations whereby the overlapping areas are not specified. It is also plausible in this case that an implicitly overlapping system of concepts is an obstacle for combined architecture innovations.

 Neologisms may be required on the road to unambiguity, if one locates their domain in such a manner with respect to other concepts, (for example using Venn-diagrams) in order to accomplish a system of concepts. The requirement to avoid overlapping areas applies again to the other concept location.

The procedure is: to divide the domain of overlapping concepts once again into exclusive concepts and, if required, summarise them in order to accomplish a system of inclusive concepts giving insight into abstraction levels. The question "can one imagine 'B' without 'A' ", combined with the reverse question can aid this and yields surprising results especially with an inclusive system of concepts.[a] If the answer to both questions is negative and/or affirmative then these are respectively overlapping and/or exclusive concepts. If the answer is different, these are inclusive concepts with an asymmetric relation.

An irritating concept confusion exists when one places non-equivalent categories of different abstraction level against each other such as 'man and society' or 'man and the environment' and then also includes this in a schedule, which conceals more than it clarifies. A good example of this is Udo de Haes'[b] environmental definition, however, almost every scientist was an accessory to this.

 However the technical environmental professors (Duijvestein, De Jong and Schmidt) present a 'technical definition'.[c] After all, one cannot imagine a society without an environment, but one can imagine an environment without people. The first schedule is, therefore, misleading from a technical point of view. Maybe this definition difference is typical for a contrast in language games between empiricists and designers, the way in which they reduce reality. The example puts the problems of the relations between concepts up for discussion. The second representation implies an actual asymmetry in the relationship between man and the environment, lacking in the first representation.

 Does defining consist of making connections with other concepts? Are concepts therefore nothing more than a summary of potential connections (valencies) with the rest, their context? Is a property something different from a relation, an action that shows the feature? What name should we give to such actions? Does the naming of actions form another sort of concept than the naming of objects? It is quite similar to the physics argument: whether light is a wave- (action-) phenomenon versus is light a particle- (object-) phenomenon.
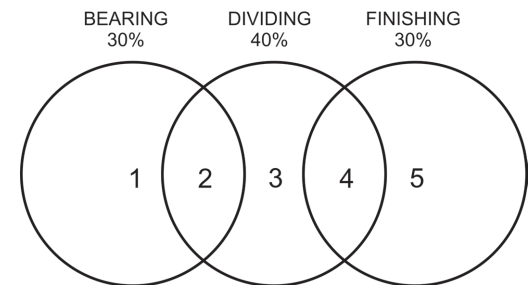
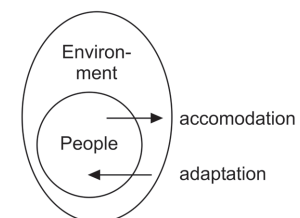15 Overlapping concepts
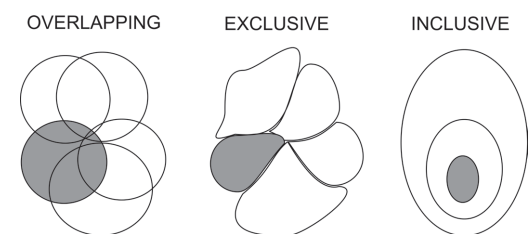
16 Exclusive and inclusive concepts

Environment is the physical, non-living surroundings of society in reciprocal relationship

17 Environment according to Udo de Haes

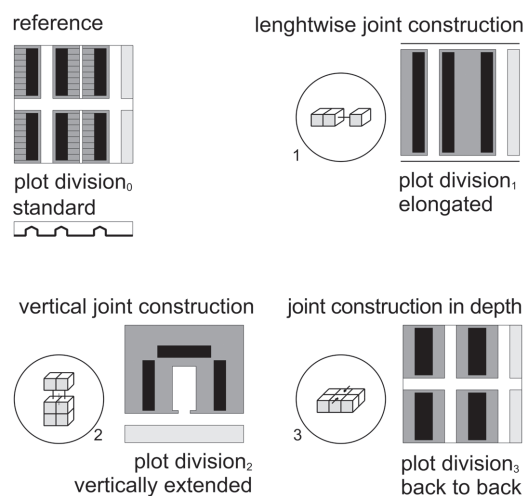Environment is the set of conditions for life
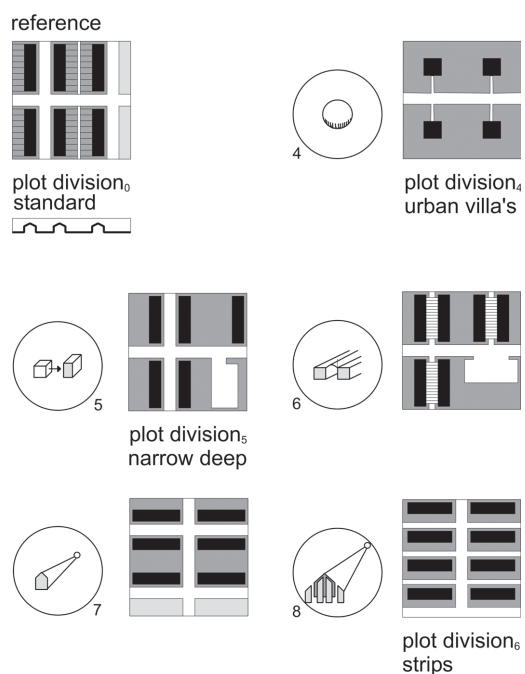

18 Environment in technical sense

a   Jong, T.M. de (1998) *Sustaining design*.
b   Boersma, J.J., J.W. Copius Peereboom et al. (1984) *Basisboek Milieu*.
c   Jong, T.M. de (1997) *Inleiding technische ecologie en milieuplanning*.

reference

plot division$_0$
standard

lenghtwise joint construction

1

plot division$_1$
elongated

vertical joint construction

2

plot division$_2$
vertically extended

joint construction in depth

3

plot division$_3$
back to back

19   Three transformations on one reference

reference

plot division$_0$
standard

4

plot division$_4$
urban villa's

5

6

plot division$_5$
narrow deep

7

8

plot division$_6$
strips

20   Transformations difficult to name

a   Latin for: 'other things being equal'.
b   In logic it is usage to place in this notation (full-sentence function) the operations (the verbs) outside the brackets. In order to be able to retrieve drawings with such full-sentence functions, it would be better to place the result (the object) outside the brackets.
c   The legends for a drawing may be regarded as its vocabulary.
d   Between the result and the reference no space is written.
e   Latin for 'part for the whole'.

4.6   NAMING TRANSFORMATIONS: INSTRUMENTS OF CONCEPT FORMATION

Figure 19 shows a reference plot division$_0$ with 48 houses on one hectare with an operation $O_{1..3}$ transformed into another plot division$_{1..3}$ with the same number of houses per hectare (*ceteris paribus*[a]).

All representations (images, nouns, adjectives and verbs) in this figure are concepts, abstract representations. They represent a collection of examples in reality (extension of the concept) and do not form the image of one specific situation. The square images are plot divisions: possible layout distribution of built-on space and a few categories of open spaces with mutual bearing. The open space is split into public landscaped areas and private grounds (light and dark grey) and public road space (white). They maintain a *bearing* upon each other *within* the plot divisions in the sense that if the built-on area (independently) varies, then the open space will also (dependently) vary. It can also be said that: open space y is influenced by, or an action of, built-on space x: y(x) open space(built-on space). The expression y(x) is called a sentence function. As soon as this connection is operational then the concept has become a function: y=f(x), composed of operations between variables (see paragraph 24.19). A Mathematical operationalisation would be: open space = total space – built on space. However, there are innumerable qualitative design-operationalisations (transformations) possible within this quantitive rule.

From the diagram with the plot division transformations the operation of lengthwise joint construction, can be read on a reference: long blocks(plot division). Such a notation object(subject) where the brackets mean 'as operation of', is also a full-sentence function that has become independent.[b] The operation is dependent on the way in which one builds adjacently: in the length, the width or the height of the building block. The function can be used as key-word for the drawings specified by transformations.

The noun 'plot division' and its depiction are comprising here this way the constituent legend units[c] (constituent concepts) and (spatial) connections between the legend units. In the word 'plot description' this stays implicit, in the picture it is explicit. Focus can change by alternative grouping if 'private space' is a legend unit composed of built-up area and gardens. The meaning of 'plot-division' changes accordingly, perhaps better named by 'parcelling'.

The verb (evoked in the circles) pre-supposes an imaginary connection within time between the plot divisions mutually: first, the reference, then the operation and then the result. If one is opting for a different reference (for instance neighbourhoods rather than houses), the same operations would have a different result. This connection can more generally be described as 'plot division' as operation of a reference: plot division(reference).[d]

The adjectives give one property of the plot division, or actually of the built part of it (*pars pro toto*[e]). However the concept 'plot division' is a set of properties; most of them lack verbal equivalents. A property can be described as an operation. Zoning is an operation of the plot division: resulting in a property zoned(plot division(reference)). If a property serves the identifying of a depiction, this property is termed an attribute.

In figure 20 operations are visualised using the same reference plot division, however these can not be reproduced using just an existing verb. However, naming the transformation by a sentence function result (origin) could be efficient for retrieval.

Design operation$_4$ could be called 'compact building' or 'concentration' in three dimensions (length, height, and depth) on a scale level of one quarter of a hectare. This results in urban villas measuring 15x15x15m. On a scale level of the hectare as a whole, however, the concentration (*ceteris paribus*) would accommodate one building measuring 24x24x24m. So, the term 'concentration' is a scale sensitive transformation

Operation$_5$ is a form of concentration in length. The result being a narrow and deep dwelling when using an equally sized plot division surface (*ceteris paribus*). This has a number of effects upon the open space and its technical facilities.

Operation$_8$ results in southerly directed strip plot divisions, therefore, enabling all of the houses to be orientated towards the sun and, therefore, can also be internally zoned for warm and cold rooms. This operation is difficult to describe using a verb; this is why it is visualised with the aim of this operation (zoning), which requires a reference point outside the plot division (the sun, the south).

The adaptations of the plot divisions are mainly geared towards the built-on space, but at the same time they also have a spatial effect, which is difficult to define, on the public landscaped areas, paving and the open private space. The result is known as an effect on the built-on space, but the result of the adaptation is much broader.

In architectonic and urban development, designing always contains an intervention in an existing situation, focusing on specific effects. When one is in the position to name these interventions as design operations (transformations), then one can summarise many patterns as result of a few transformations on every reference. The concept 'concentration' is an example, if one specifies this concept per scale level and direction.

4.7   CONDITIONAL POSITIONING OF CONCEPTS

What is called 'assumption' in our imaginative capacity is, in reality, a 'pre-condition'. If I am driving a car, I assume that there is petrol in the tank. This is also a pre-condition to actually being able to drive. If something does not 'work', then one of the conditions for its working is lacking, in this example the petrol. Such a pre-condition is a 'cause of failure', the 'cause' of a non-event that one had indeed expected (assumed). Yet, the classical notion of 'cause' does involve an 'occurring event', even though one does not expect it (for example, the cause of a fire). With the concept of 'cause', then, one is actively thinking about an event that has come before and that caused perceived consequences (active cause).

All these causes are a condition for something to happen, but not all conditions are also causes.

There are many more conditions than there are causes. Petrol, for example, is not the only pre-condition necessary to be able to drive a car. There also have to be pipes that supply the petrol to the engine, there must be an engine, and this engine must be able to transfer its capacity to the wheels. And, indeed, the car must have these wheels. The design of the car is actually the collection of pre-conditions needed for one to be able to talk about a car. These are object pre-conditions, but there are also a basically infinite number of context pre-conditions. I cannot drive a car if I am sick, if there are no cars or roads for me to drive upon, or if someone prevents me from doing so for whatever reason. Thus, the context is a collection of pre-conditions for the architectural object.

Studying the context and object pre-conditions does not result exclusively from the linear logic of causal thinking. Under certain conditions, something *can* happen, or in the case of a certain cause it *probably will* happen. Conditional logical does not always unlock the probable, but it does unlock the possible.

This logic fits in with study by design. Just as there are chains of cause and effect, there are also pre-conditional chains by which, under certain circumstances, patterns and processes are not so much predictable, but rather imaginable. This imaginability is introspectively verifiable using the test, "if I can imagine A without B, but not B without A, then A is the pre-condition for B".[a] We call it 'conditional analysis'.

Petrol is the pre-condition for a working petrol engine, but a petrol engine is not a pre-condition for petrol. This is not a case of causality since petrol is not the cause of the working, but only one of its conditions. A load-bearing structure is the pre-condition for a roof, but a roof is not a pre-condition fort a load-bearing structure. Thus, one can pre-conditionally position
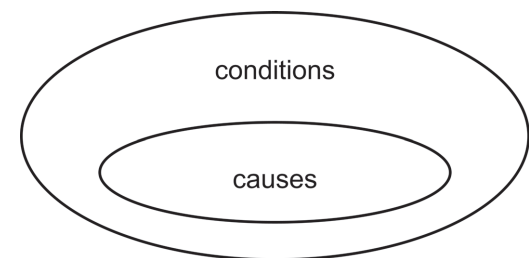
21   Not every condition is a cause, but every cause is a condition for something to happen
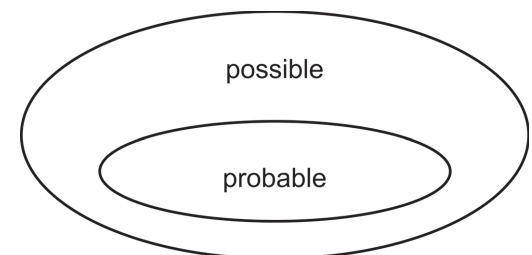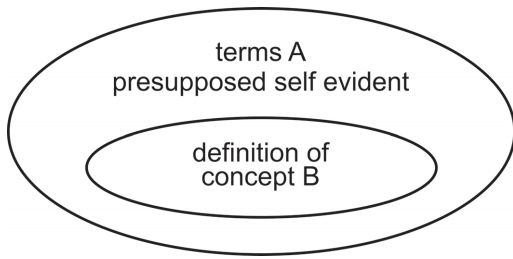

22   Any probable event is per definition possible, but there are improbable possibilities
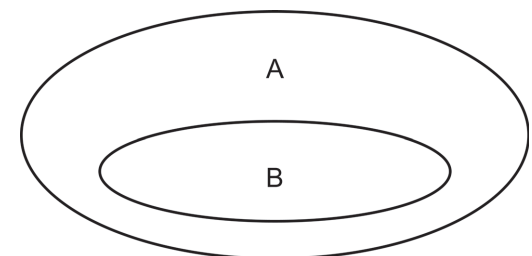
23   'A not imaginable without B'

a   Jong, T.M. de (1992) *Kleine methodologie voor ontwerpend onderzoek*. Here, quite a few concepts from design and research are compared by conditional analyses.

24 Terms A pre-supposed in a definition of B

design elements in regard to one another. Aspects of the context can be studied as pre-conditions for parts of the design. Design study and study by design considers variations in pre-conditions. Within the design process, results from certain design phases are pre-conditions for a continuing of the design.

Mutual conditional positioning of concepts shows the very possibility of definition itself. One can not define a concept in terms that pre-suppose the concept itself. Whether the concept to define is contained in the defining terms or not is brought into light by conditional analysis.

The conditional analysis goes:

1 "Could you imagine terms A without B?"
2 "Yes."
3 "Could you imagine B without terms A?"
4 "No."
5 "Then terms A are pre-supposed by B."

B could be defined using terms A.
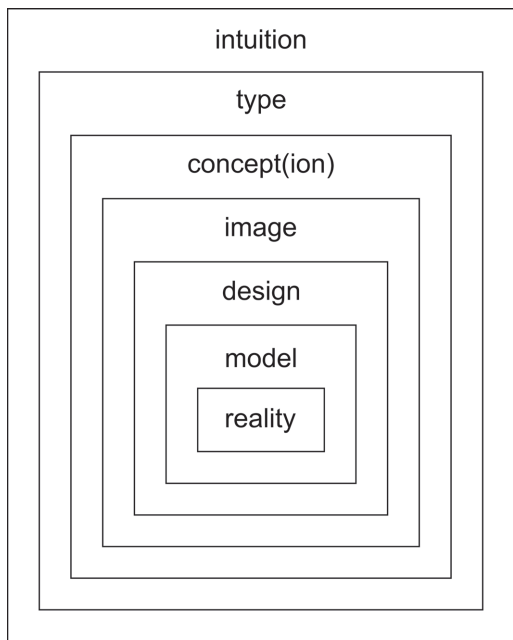
25 Stairs of imagination

Conditional analysis can help positioning terms for defining abstract and vague concepts. A useful example is given in figure 266 'From possibility to norm'. In the next sections of this book crucial concepts in describing design processes could be positioned like in figure 25. However, in this figure the focus is on imagination of not yet existing objects produced in a design process. It is a designer's focus defining a model in terms of design. An empirical scientist perhaps pre-supposes a reality without which s(he) can not imagine models. S(he) will position the terms the reverse and define a design in terms of a model. To understand differences in focus one should enter a higher level of philosophical abstraction of discussing such differences on itself. In Chapter 44 (see page 413) we will discuss them in the perspective of idealism and materialism.

4.8   CONCLUSION

In this Chapter we tried to discuss naming concepts and components in a conditional way. It started with focus as pre-condition of choosing components, frame and grain, getting grip on context, unraveling overlaps, naming transformations and conditionality in technical design and in defining concepts. So the sequence supposes conditionality on a higher level of abstraction than the subjects discussed, the level of the discussion itself. Should we start on that level of discussing discussions with conditionality and end with focus? That kind of focus perhaps goes beyond imagination. Anyway, the Bible starts with naming.

5 RETRIEVAL AND REFERENCE

TAEKE DE JONG
THEO VAN DER VOORDT

Knowledge from study may be transferred in different ways: in words and images, via lectures and exhibitions, in the form of articles or books; and electronically.

For the time being, the form used most frequently is written publication in text and illustration. However publishing on CD-ROM and the Internet are witnessing rapid development. Maybe this is going to have important consequences for the way in which people are searching for information. In this contribution we discuss some points needing attention for optimal accessibility of knowledge from study and suitably dealing with the sources used. We refer to handbooks for the conventional playing rules of reporting in writing such as clear and interest evoking titles of chapters and paragraphs, clear structure and table of contents, avoiding unnecessary jargon, a clear summary and their like.[a,b] The emphasis in this Chapter is on adequate pointers to references and the use of key-words.

Before embarking, first, something about the way to stimulate potential readers to take notice of the information. It starts already with the cover and the titlepage. These give a first impression of what is waiting for the potential reader. With this author, text or images present themselves. One glance should make clear what the subject is; although it is sometimes attractive to confuse the reader. Starting from cover and title page, the reference data (copyright notice, year of publication, ISBN number, place of issue and publisher), table of contents, foreword (written by a recommending outsider or referee) and introduction, the reader is introduced from his own world into the world of the author. The author and those responsible for the lay-out should picture themselves in this process and shape the publication from the vantage point of potential readers (the target audience), their questions, their pre-suppositions, or lack thereof.

Possible pre-suppositions of the reader should be supplemented or corrected. With this it is prevented that potential readers are thinking after a while "What the hell is this?" A clear text on the back cover, an index of key-words, a list of references and a sensible use of footnotes and final-notes are important conditions as well in order to achieve a publication that invites reading.

5.1 REFERENCES

Reference to texts, illustrations or electronic publications is an important condition for the possibility of judging a publication. To the reader it is an indication of the degree to which the discourse of the author is supported by insight from other sources, or checked against them. Referencing employs key-words. The name of the authors and year of publication are the most important ones. With these two data: for instance (Jong, de and Van der Voordt, 2002) the text of a publication usually refers to a list of literature or a reference list in the final part of the publication: it is a citation. At that spot more key-words per publication should be provided in order to enable the reader locating it in a library or ordering it in a bookshop. For architecture, images and electronic publications are greatly important, so that 'References' should rather be used as a term than 'Literature'. This chapter is usually not numbered along with the chapters of content, although just on conventional, not rational grounds.

List of references

The place of issue, the name of the publisher, the ISBN number and possibly the web address (URL) are important key-words in order to find the publication. If these have been left out in the referral data or in the list of references, the potential reader is de-motivated to look for the publication and consult it himself. When one, for instance, wants to point at this article (Jong, T.M. de and D.J.M. van der Voordt, 2002) this can be done by including in the reference list the following data:

a   Elling, R.B., B. Andeweg et al. (1994) *Rapportagetechniek. Schrijven voor lezers met weinig tijd.* Tips and tools for writing reports, feasability studies, procedures and so on, particularly focussing on technical and business administration education.
b   Blokzijl, W.J. (2001) *Schriftelijk rapporteren voor bouwkunde.*

Book section:

Jong, T.M. de and D.J.M van der Voordt (2002) *Retrieval and Reference* in: Jong, T.M. de and D.J.M. van der Voordt; eds. (2002) Ways to study and research urban, architectural and technical design (Delft) Delft University Press.

Edited book:

Jong, T.M. de and D.J.M. van der Voordt; eds. (2002) *Ways to study and research urban, architectural and technical design* (Delft) Delft University Press.

Time and place have here been bracketed and are separating in this way clearly authors, title and publisher. This reference has been made with the computer programme Endnote. This database programme is popular in academic circles and used in Maastricht, Rotterdam and other places. It is plugged in in the word processor, and is maintaining all references, preserves them for future publications, provides access to the literature databases on the Internet and edits them according to any desired lay-out (different for each author or publisher) of the reference list in the document processed.

Making a personal database

The present list of reference was made first in Excel, and then exported[a] to Endnote. It is recommended to start a personal list of books and articles, read or consulted, from the start of a study and to maintain it, keeping it up-to-date. It does not only serve recollection of what has been read; it is also lowering the threshold of referring to others when reporting. In Excel the list looks as showed in the enclosed table.

Per publication (row) 30 data may be stored, e.g. number of pages, ISBN-number, abstract, key-words, notes and so on. They need not all to be taken up into the list of literature of a book or article to make the reader find the publication. They are of especially good service in electronic retrieval, if they have been filled in correctly. It is not always necessary to fill in all columns. However, it is important that this possibility remains open. It may also be used collectively.[b] Some staff members of the Faculty of Architecture of TUD ordering a book are supplying key-words with which the content of the book may be characterised according to him. These are added to the list, with the name of this reviewer and are made available to students of certain modules of the curriculum. If they find a title, they may ask the staff member with this title on his shelves: 'Is this a publication answering my question?'

Filling in a list like this requires following some conventions in order to come to a consistent list of literature, so that a computer programme can do its work later. Names of the authors or editors that wrote or edited a publication should be separated from one another by a semicolon (;). One mentions first the surname of the author, without prefixes (like 'Van der') and after a comma (,) the Christian names or initials with prefixes (see the example given).

Different reference types

The first row of the preceding list contains standard fieldnames a computer programme can recognise. In database jargon each next row is a record (a document card in a box) with 30 fields (data on each card).[c] The first field is each time the reference type (a book, book section, edited book, article in a magazine, conference proceeding, etc.) In the example two reference types have been used. In the first row (record) the first field reads 'Book Section'. This is an article in a book with articles by different authors, put together by editors (listed under 'Secondary Author'). In the second row an 'Edited Book' is listed. Herein the editors are included as 'Author'. In the literature list they can be recognised as editors by the added 'ed.'. A computer programme such as Endnote adds this automatically to an Edited Book, but not to a reference type 'Book'. This type has just one author, unless his book is part of a series with series' editor. In that case this editor is mentioned in the column 'Secondary Au-

Reference Type	Book Section	Edited Book
Author	Jong, T. M., de; Voordt, D.J.M. van der	Jong, T. M., de; Voordt, D.J.M. van der
Year	2002	2002
Title	Retrieval and reference	Ways to study and research
Secondary Author	Jong, T. M., de; Voordt, D.J.M. van der	-
Secondary Title	Ways to study and research	-
Place Published	Delft	Delft
Publisher	Delft University Press	Delft University Press
Volume	-	-
Number of Volumes	-	-

26　Conventions of reference according to Endnote

a　Excel files may be translated in text-files (.txt) with tabs and may be 'imported' along these lines to practically all database programmes. Endnote only needs adding one line with the word 'Generic' at the start of such a textual file.
b　On the Faculty of Architecture of Delft University of Technology such a list of some 1300 titles used in education (also in the first years) is available; occasionally with as many as 100 'key-words' per title.
c　In a database stored as a textual file (.txt) the fields are usually separated with tabs, while each record starts on a new line.

thor'. If an Edited Book is part of a series with a series' editor, he is mentioned in a field 'Tertiary Author'.

Endnote can distinguish sixteen reference types with their own lay-out requirements: Journal Article, Book, Book Section, Edited Book, Magazine Article, Newspaper Article, Conference Proceedings, Thesis, Personal Communication, Computer Programme, Report, Map, Audiovisual Material, Artwork, Patent and Electronic Source. Also to those who do not use Endnote, it is important to be aware of these differences. Each reference type uses in a different way the available fields. This way, in the case of Conference Proceedings the name of the conference is mentioned in the field 'Secondary Title' and the venue in the field 'Place Published'. Each publisher has his own conventions for making the literature list. A considerable number of these lay-out conventions is digitally available in Endnote and on the Internet.

Article and publication

A published book also mentions an ISBN number: a sequence of 10 digits ordered in 4 groups. The publisher (407 is Delft University Press) and his language (90 is Dutch) may be derived from it. If the ISBN number starts with a 0 or 1, it is an Anglo-American publisher (3, 4 and 9942 are respectively German, French and Surinam publishers, regardless of the language they are publishing). The final digit is a control digit. Remaining digits are provided for the publisher and the numbering given to the publications himself. A programme like Endnote can not mention ISBN numbers in Book Sections. Therefore, it makes sense to enter the Edited Book as a whole on its own separately. One must select then between key-words of all separate articles. If one is referring to different articles separately, it is superfluous to indicate all the time the data of the publication in which they appeared; furthermore, the articles may be found via key-words immediately.

Many key-words

A few key-words per publication is insufficient nowadays. In a library a search for publications can be carried out using author, title, and a few other reference words. This seldom produces the content required. Edited Books, sometimes extremely important for students, are often characterised by a few reference words.

These reference words characterise the whole book, but do not refer to a useful chapter, for anyone especially a lay-person, which summarises the whole field of study. When carrying out a search in a library, one very quickly chances upon extensive standard books for this field of study, which as a first point of contact with the subject for a lay-person is too complex. Architecture does not have an unambiguous nomenclature which in Chemistry, for example, makes searching pleasurable. This problem is intensified when carrying out a search for images (Maps, Artwork) that are of significant importance for Architecture. An image can say more than a thousand words, but which words are these? Very often an image can portray a tremendous number of concepts in mutual relation (see page 36). It is almost impossible to characterise them using singular reference words. A method invented for this is the Faculty of Architecture's Interactive Image Archive (IAAI, see page 49), which, in time, will also enable texts to be retrieved in a more goal-orientated manner. This method is inspired by formal logic (sentence functions) and the mathematical concept of function a simplified manner. (See page 40 and 225).

5.2   REGISTER OF KEY-WORDS

The last chapter of a book or its end is ideally a complete alphabetical list of key-words for its contents (list of key-words, register, index). Although not usual, a register like that would be quite appropriate for an article as well. Since a register per key-word is pointing to consecutive pages where the key-word is occurring, it is a good author's habit to give in the case of a first occurrence of a professional term in the text its most important definition, description or context. This provides the best possible link to the experiential world of the reader, by

giving first a description and only then (between brackets) the professional term. This may be done unobtrusively, without cumbersome sentences 'defining in passing', for instance:

'In this series of drawings one sees a process of increasing accumulation of the built environment (concentration).'

'Concentration' is here the key-word to which the index refers. After such a phrasing, this shorter professional term can be used, since the index is referring the reader directly to the first page where the term is used. If all is well, the context (built environment), description or definition (process of increasing accumulation) is given there.

Not sub-dividing list of key-words

By including on a standing basis the index in the final pages of the publication the reader may intuitively find it at once. State-of-the-art word processors are putting together an index like that automatically when one marks the words concerned in the publications an index word and mark the place where the list should be generated. In the present text the marked key-words are printed with a wide spacing, except in the head-lines. An index is an alphabetical gate to the publication, the table of contents is a systematic one. Therefore it is not logical to make in the alphabetical list of key-words a distinction between a 'register of persons' and a 'register of subjects'. This complicates retrieval without necessity. Since the word processor can assist us in this regard, it is worth the effort to mark author's names, as well for the index, even if they have been collected already in the list of references. This allows the reader to readily return to where he or she has been reading about a given author. An author's name can be used as a label for a line of thought. There is a lot to say for including in the index in addition to key-words and (place) names also crucial adjectives and verbs or words in a different language. These words may be integrated in alphabetical sequence in the index. By the same token it is superfluous to make, for instance, a separate register of English or Latin terms. Let it not be forgotten also, to make images retrievable with key-words; so give each illustration a title with crucial key-words to which the index can point. The word processor can also produce a separate list of illustrations; useful if provenance has to be acknowledged in terms of intellectual property and copyright.

Headings

The table of contents with its pagination in the beginning of the book or article gives systematical entrance to the publication and can contain the central key-words in their context (the headings). This table of contents can be generated in a word processor automatically with any desirable number of levels (chapters, paragraphs, sub-paragraphs), if the chapter and paragraph titles are head-marked at the right level (heading 1, 2, 3). Do not exceed 3 numbered levels and use logically decreasing letter sizes (like 16, 14 and 12 point). Headings should assist the reader in navigating through the publication, should arouse curiosity in the text and represent its content in crucial key-words. In the rules already marked for the table of contents as a heading, the key-words can not be marked once again for the index. After the heading one should return to that key-word in the text, in order to be able to mark it for the index. By starting a paragraph by explaining the heading in different words, legibility is enhanced; especially desirable when the rule is followed that a heading may never exceed one line. When the heading is a good rendering of the content, the table of contents is a concise survey of the proceeding of the discourse. When the table of contents is regarded this way, the line of discourse may show up in a reversed way.

Combined key-words

Next to author and year of publication the title is the third important key-word allowing retrieval of a publication. We talk here deliberately of a 'key-word', although the title of a publication is usually composed of more than one word. In this contribution we recommend key-

words comprising several words, since the number of professional publications has increased the previous century to such an extent, that just one single word is pointing to too many publications for convenient retrieval. That is quite clear on the Internet. Just type the word 'building' and one is faced by the task of visiting some 30.000.000 sites. Search engines allow connecting words to the logical terms 'AND', 'OR', 'NOT' or 'NEAR'. The disadvantage of single key-words is that they can not transfer relations between concepts even with those tools, while they are the essence of a scientific document. So see to it, that the most important relations addressed by the publication may be recognised in title and headings and possibly in matching illustrations. Two illustrations next to one another may clarify effectively by their differences and similarities what can be hardly expressed in words. For that purpose poetical means and ambiguous evocative use of language or images is also used. Although this might be functional, it is loosing its aim if it does not connect to the pre-suppositions of the potential user.

Choosing key-words

Making a text retrievable begins by marking reference words which touch on the very core of the matter in question and may be chosen, at some point, when carrying out a search. This must not be limited to substantive nouns. Names of places, persons, adjectives, verbs and even dates can often fulfil an excellent rôle when searching for a text or an image. Articles, conjunctions and prepositions must not be marked, unless these change the meaning of adjacently situated words significantly. Imagine that, in the text fragment below[a], the following reference words have been marked with a marker or by the word processor for the index:

'If you ask a constructor what a hybrid bearing construction is, then he will reply with definitions which have nothing to do with the hybrid character of buildings. Because hybrid load bearing constructions are, according to constructors' definitions, just load bearing constructions that include different construction systems or various materials.'

This provides the following register (using the sortfunction in the word processor if required)

- *Construction systems*
- *Load bearing constructions*
- *Hybrid*
- *Materials*

Compiling key-words

The relationships between these concepts can be expressed partially by re-arranging the words and coupling some groups to one reference word. A classical way of doing this is the hyphen (-), as used in 'Zuid-Holland'. The hyphen also keeps the compiled terms together during electronic selection in an index. This is different with the concept of 'hybrid load bearing construction'. These four words must be considered as one concept with its own meaning, but are separated in the case of alphabetical selection and than loose their meaning.

It is standard practice in the world of computers to replace spaces with an underscore (_): hybrid_load_bearing_constructions. Due to this, reference words, which are of no use as searching terms, are not split into three reference words when placed in alphabetical order or when read by a computer:

- *Construction_systems*
- *Hybrid_load_bearing_constructions*
- *Materials*

The question is, will the term hybrid actually be used in order to search the section stated? If it is thought that the passage will more readily be sought using the term 'load bearing' constructions, load_bearing_construction_hybrid can also be used.

a   Weeren, K. van (1999) *Hybride gebouwen en hybride draagconstructies*.

Most relationships, when attempted to be conveyed using a scientific text or an image, are not relationships within concepts or variables; they actually lie in between. These relationships are seldom symmetrical: there is a primary active variable (independent variable) (x) and resulting from this a passive (dependent variable) (y), an input and an output, a cause and a consequence, but also a condition and a possibility created through this, such as insulation and internal temperature, columns and beams.

Colloquial language almost always establishes such a relationship in the syntax of a sentence with an active subject, (who or what does what?) a predicate, (what is being done?) and a passive direct object (who or what undergoes the action?) In formal logic, such a sentence is abbreviated to a sentence function: y(x). See also page 40 and 225 This can be interpreted as: y as an action or working of x. This abbreviated representation is suitable for use as a reference word, when the bracket is used as a special syntactic coupling symbol and all spaces are omitted: direct object(subject). Van Weeren's text can therefore be represented as follows:

load bearing construction(hybrid construction system and material).

The load bearing construction is determined by the hybrid construction system and material, not the reverse, expressed as:

construction system and material(hybrid loadbearing construction).

This would imply that the construction system and material could have been chosen as a consequence of hybrid uses of the load bearing construction. If both are to be considered (inter-action) then both have to be mentioned as a key-word.

'Nested' summaries

A representation of A as an action of B as an action of C, A(B(C)), is known as 'nesting' in the world of computer programming. Van Weeren continues his text using an example from the municipality of Zoetermeer.

'Hybrid load bearing construction: furniture mall Zoetermeer

The Furniture mall in Zoetermeer can probably be called a hybrid building. The building is used for three different functions: basement parking, large-scale shopping areas above, and above this, residential housing. Co-incidentally, here too, hybrid constructions are present, but they have little to do with the fact that there are different functions in the building. At the entrance, in one singular detail different construction elements come together: a pre-fabricated concrete column, a pre-fabricated concrete beam, a steel beam and a steel column with an special form, covered by a pre-fabricated floor, which in some areas is extended with concrete floor segments which were poured on-site.

The fact that steel, on-site poured concrete and pre-fabricated concrete are inter-mingled with each other has nothing to do with the hybrid character of the building. This is just a consequence of insufficient space below the ceiling. The (cheap!) pre-fabricated concrete construction system did not generate enough space. Therefore, an on-site change to an integrated steel beam in the floor was implemented. It was also impossible to realise the required form of floor finish using (cheap) pre-fabricated concrete; this however was possible using on-site poured concrete.

Construction costs are a major factor for the design, especially with projects such as a furniture mall. This is even more so for the load bearing structure. The floors account for most of the cost of the load bearing construction. An unbeatable alternative in the area of floors in this situation is pre-fabricated concrete hollow core slabs. These elements cost Dfl. 70.— per m^2 for a span of approx. 7m, which was implemented in this case, with total construction costs of around Dfl.2000.— per m^2. If a form cannot be constructed in one go, with this material (rec-

tangular slabs), then the special segments of the form are created using on-site poured *concrete. This hybrid is* cheaper *than opting for a total system which could be manufactured in the form desired.'*

This relatively compact text can be summarised using three reference words. The actions within actions are made explicit using 'nesting'.

furniture mall(parking, sales area(furniture), housing, entrance(pre-fabricated versus on site pouring), Zoetermeer)

pre-fabricated(concrete(column, beam, floor(hollow core slabs, costs, steel(girder))

on site poured(floor segment(lack of space(ceiling versus floors), floor finish form), costs)

In the index, the content of this book is retrievable this way.

The syntax of a text

Research proposals can be analysed in this way. Using the reference words of such a text could be more efficiently and concisely re-written and contextually assessed. It could then be seen at a glance if too many, too few or too complex (multiple nested) relationships are made and how operational they are for research (computable, measurable). In the interim reports, analysed in the same way, new relationships can be involved in the research and others removed. One can also train oneself in making notes and making summaries of the readings. In the future intelligent linguistic databases will be created, which can comprehend 'summaries' such as these. Besides this, the content of a record could be represented as follows:

*Recordname(fieldname1(fieldcontents), fieldname2(fieldcontents)…)*

The most important area of application and also the reason to change to syntactically compiled key-words is the problem of the retrievabliltiy of images.

5.3 IMAGE SEARCH ON INTERNET

The Internet is the largest image archive in existence. The images are inexpensive, quickly retrievable from any location, sometimes in motion (animated GIF) and mostly in colour. Animated gifs are excellent for placing transparencies over a drawing in order to show alternating images: all locations remain at the same place, therefore, no-one has to overcome any locational comparability problems. However, internet images are coarse (the screen representation varies from 72 dots per inch (dpi) to extremely rough images (quick loading thumbnails), or they cost too much download time (for high resolution images). The Saariste website,[a] for example, gives numerous photos of historical architectural examples per architect. High quality photos can be ordered via the site. Many architectural offices have a similar website[b] from which simple images of their work can be downloaded directly from the web (refer to source and web site!) and used in a word processor or a drawing programme.

These coarse images are only suitable for printing small images. Line drawings without filled-in colour areas are often not very clear. It is possible to obtain drawings as CAD-files (DXF-format or otherwise) from the web.[c] This is not a raster file, but a vector file with an unlimited zoom focus, which can easily be edited personally.

The Architecture Faculty building[d] in Delft, for example, can be obtained from the web in layers for educational purposes. In order to do this you need a special programme on your computer (a plug-in). The global map of the Netherlands can also be downloaded in many layers and in various file formats without using a plug-in.[e] If you have access to a drawing programme such as CAD, Corel Draw or Adobe Illustrator, this can be used to compile various layers, colour, cut out details and, if necessary, re-convert into a raster file which can then be used in a written report using a word processor.
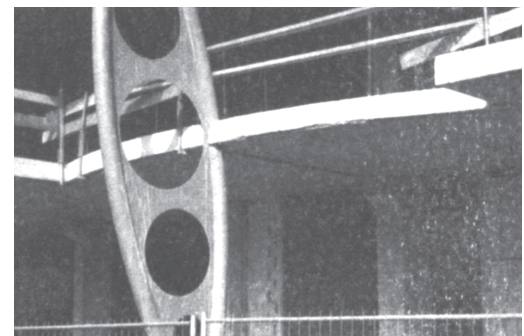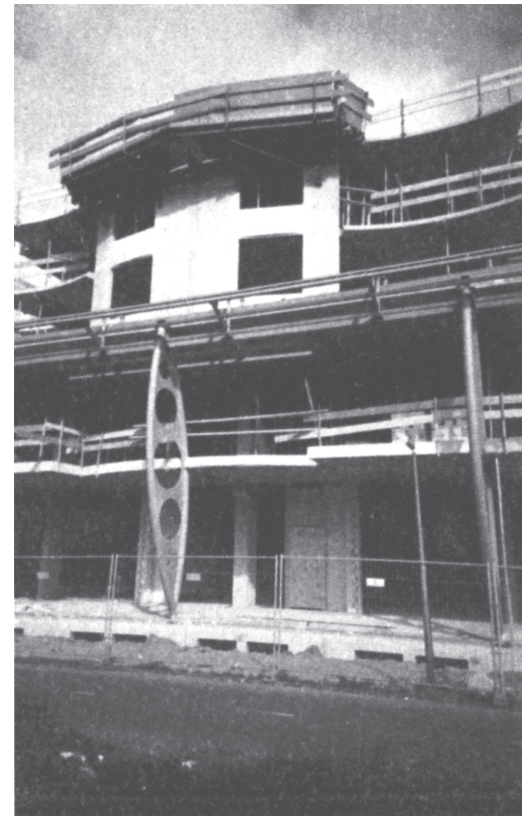
27 Shopping mall in Zoetermeer, under construction; entrance and construction detail

a http://www.bk.tudelft.nl/d-arch/agram/
b http://www.architectenwerk.nl
   http://www.archined.nl, http://www.luna.nl/~xino/
c http://www.greatbuildings.com
d http://www.bk.tudelft.nl/users/barendse/internet/
   onderwijs/bk_dwgf_2d/bk_dwg_2d_frm.htm
e http://www.ai.bk.tudelft.nl/projects/data/top_data.html

Research shows that Internet users become depressed due to the sheer volume. The main problem of this medium is the search function. The images are poorly documented and therefore difficult to retrieve using scientific image properties. Image recognition using colour and global composition is possible;[a] image recognition by means of architectural structure is still in its infancy.[b] The Interactive Image Archive is dealt with below in order to give insight into which image characteristics are of primary importance as reference words in order to enable image retrieval.

Image and image characteristics

The TU Delft's Faculty of Architecture has developed an Interactive Image Archive (IAAI), the purpose of which is to store images using sciential characteristics and in doing this making the images retrievable for students, graduates and researchers. It comprises a de-central input programme and a central programme for data processing and output to the Internet.[c] In future development the 100 best documented and the 100 most consulted images will be automatically shown on the Internet site.[d]

A committee then chooses monthly the scientifically or esthically best for a top ten which serves as a homepage. When one of these images is clicked upon, an enlarged image appears with many key-words. These reference words can be clicked on in order to show the images (small images), which comply with that characteristic. These thumbnails are also 'clickable' which shows enlarged images with reference words etc.

Not every image has an equally good provision of reference words. This depends on the individual effort of suppliers (students and researchers) at the time of input. The input programme is for Architecture students (ca. 3000) and staff (ca. 300) and can be downloaded from the stated website using every computer within the faculty. The image, to be entered from the computer, is shown and a series of questions is asked, both scientifically relevant as image characteristics, from construction drawing to regional plan. Not all reference words are required to be filled in. Student number or log-in name, authors name, frame and grain (scale) are compulsory, and location, if possible. The date is automatically recorded. The Faculty of Architecture is considered as the copyright publisher and the place of publication is Delft. At the end, the opportunity is given to enter free, syntactically compiled reference words, possibly using simultaneously provided professors' much used terminology or those of the Faculty library. The input programme sends the data to a personal server space of 50Mb, which is allocated to each student and to the central data processor, which continually compiles the Internet page.

Scale

One of the most powerful search functions for images in the IAAI is scale. Scale indications such as '1:1000' are dependent on the paper format when determining what is readable. This is why for computer images the radius of the 'frame' and the 'grain' (see also page 210) of the image replace these usual indications. The radius of the frame means the smallest circle described (from the series 1,3,10,30…mm, m, or km, see page 37) which the image portrayed can contain in every direction or the largest registered circle within the boundaries of the image. The radius of the grain means the radius of a described circle (in the same series) that could in reality contain the smallest detail readable from the image. The relationship between grain and frame determines whether the image concerns a contract drawing (grain/frame = 0.001), a sketch plan (0.01), or a rough draft (0.1). When choosing grain and/or frame the search assignment can not only be limited to construction drawings, architectural or urban development drawings from the archive, but within this, distinctions can be made between rough drafts, sketch plans, final designs or contract drawings.

a   http://disney.ctr.columbia.edu/WebSEEk/
b   http://www.bk.tudelft.nl/Informatica/koutamanis/
     onderwijs/index.html
c   http://ai.bk.tudelft.nl/
d   http://ai.bk.tudelft.nl/

Location, concept and perspective

If during the input into the IAAI, geographical co-ordinates or postcodes have been entered, the location is automatically mapped on the Internet site. A location on the map of the Netherlands can then be clicked on, in the IAAI website. The output programme then shows every entered project situated at this location. In time this map can be 'filled' with three-dimensional CAD drawings, which can be zoomed in upon, into the actual rooms. In this way within a few years the Netherlands will be virtually transformed by the designers of the 21st century into a sort of flight simulator scenery.

Some locations are popular for many projects resulting in an overlap of designs in this landscape. The total image must then be limited to a specific future perspective.[a] For example, one may only wish to view designs which are intended for the context of shrinking European Economy, a steering national government, a traditionally orientated local culture, etc. The input required for this per image, must place the image in one context (everything which falls outside the framework and structure) and in a future perspective (see diagram on page 38).

This is not only important for such selections in futuristic spectacular computer applications; it also has crucial functions for utilisation and supply of an image archive. When nothing is known about the context and the perspective in which an image has been placed, the external effects cannot be assessed, it is taken out of context and is mostly of no other use than inspiration. A design may fit in and function in a particular context, and not in another. The image supplier, usually the designer, is, therefore, requested during the input programme to enter the intended functional period for the image portrayed (plan horizon) and which perspectives per scale level it provides as probable future (see page 7).

This awareness appears to have a high educational value and aids systematic creation of a graduation thesis. If, on the other hand, the user or assessor has totally different perspectives regarding the probable future, this does not automatically mean that this will be judged as a poor assessment, if the designer has explicitly stated his perspectives. In turn, the assessor is challenged, to make future pre-suppositions explicit and to compare this with what the designer or researcher had in mind outside the design. Subsequently it can be assessed as to whether the design in various perspectives of various assessors holds its ground or not, therefore allowing the 'robustness' to be determined for various scenarios.

Readability

Various actors in the construction process want to be able to read various effects (environmental, ecological, technical, economical, cultural and administrative) using the design drawing. Images are sought in which these effects are 'readable'. The majority of effects are only readable within a specific context and in a well-described perspective.

Only when such questions have been answered, can questions be asked regarding the effects, which in that specific context and from that perspective can be read from the drawing or image. In the input programme of the IAAI the diagram on page 38 is used. Which effects are precisely readable is not asked, but of which nature (environmental, ecological, technical, economical, cultural, administrative) and scale (1,3,10,30…. mm, m, km) their action is.

Distinction is made between intended and unintended effects. The intended effects are desired by definition, they contain (if present) the programme. The unintended effects may be desirable and undesirable. The unintended effects cannot all play a rôle in the designing, however the image producer can involve them in the accountability of his design in retrospect. It is only of a scientific interest to specify by scale and nature in advance, even though they do not yet play a rôle in the designing. The awareness of such effects is important when choosing participants in the construction process and for references during research.

a It is requested that within the plan horizon and per scale level the environmental (concentration<>deconcentration), ecological (homogenous<>heteregenous), technical (combination<>specialisation), economic (shrinking<>expanding), cultural (tradition<>experimentally directed) and administrative (directive<>following) perspectives are specified. They are noted as syntactically compiled reference words.

5.4 REFEREES

Texts and images get a scientific status when they are actively exposed to the possibly refuting judgement of experts outside the personal circle (referees). This is pre-supposing in any case that they can be judged; in its turn this is pre-supposing that they can be found again. With images pretending at any moment a possible future (designs) this potential to be judged presents a problem that may be partly solved by making the context, perspective and demonstrable effects on the presented (future) image explicit. The designer should actively start searching critical referees. One who is not interested in criticism and critique is not fit for scholarship. To the student this is the teacher or researcher recognised as a judge for a certain professional area by his appointment; possibly within the Faculty itself. For the university researcher this is someone outside his own university. Up to now editorial boards of highly regarded journal or publishers are catering for such a judgement (peer review). With the rise of the Internet, Internet-'journals' are coming into being, only to be distinguished from normal web-sites by organised peer review.

A publication with scholarly ambitions can be recognised by the circumstance that the referees can be traced. For referees it is vital that all aspects of a study: texts, images, references (which is not the same as referees) can be retrieved.

6 DESCRIPTIVE RESEARCH

WENDELIEN LANS
THEO VAN DER VOORDT

A lot of knowledge is needed for a good design; one that is functional, affordable, with architectonic interest etc. The same applies to a wealth of other activities within the architectural discipline; as there are policy development, spatial planning, formulating programmes of requirement, building and maintenance. Knowledge may contribute to well-considered and well-founded decisions. A methodological way to collect knowledge is the precise description of reality. The subject of description can relate to facts and wishes, to people and material objects, to plans and realised buildings. Examples are charting the housing preferences of potential inhabitants of VINEX-locations[a], a careful description of a building,[b] or plan documentations.[c]

A lot of insight may also be derived from detailed description of processes; as there are the thinking process of a designer or the decision making process concerning large projects in infrastructure. Two questions are of prime importance: 'What is going on?' and 'How is it going?'[d] The results may be presented as texts, drawings, tables, graphs, statistical notions (mean, spread), maps like the one of a city or a function chart, web-sites and databases. The description may be focused on individual variables and on relations between variables. Suppose, that local authorities want to know the opinion of the community on different designs resulting from a prize contest. Then it could be interesting to find out whether the preferences are differing per age category, or that 'laymen' and professionals are differing in preference.

In the present contribution we are describing firstly some characteristics of descriptive research. Next, we present examples of descriptive research and show how results can contribute to development of the architectural discipline. We conclude with recommendations.

6.1 CHARACTERISTICS OF DESCRIPTIVE RESEARCH

It is characteristic for descriptive research that it is restricted to factual registration and that there is no quest for an explanation why reality is showing itself this way. In principle, descriptive research is not aiming at forming hypotheses or development of theory. Another characteristic of descriptive research is objectivity or neutrality. Descriptive research is about describing how reality *is*. In this regard descriptive research differs from prescriptive research that is primarily concerned with the question how the reality *should be*. Descriptive research is making inventories; prescriptive research is normative.

With descriptive research in its purest form explaining and evaluating is left to the reader or to other disciplines. This applies for instance to the statistical surveys of Statistics Netherlands (CBS). Disciplines like geography (description of the earth) and social geography (description of the spatial aspects of social phenomena) are largely based on descriptions of reality. However, in practice there is a gliding scale from pure description to analysis, interpretation and evaluation. The same applies for the dimension objective <> subjective. Analysis and interpretation of the data are seldom completely objective. As a consequence, a biography (description of a life), or a plan documentation, is always partly, or even strongly coloured by the selective perception of the author.

When a study is explicitly focused on looking for explanation or on formulating a hypothesis or theory, we talk about 'exploring study' or 'study(explorative)'. Explorative study starts without clear preliminary ideas, at best with vague suspicions, looking for linkages and concluding with a careful explanation for what is found. In the case of testing study there is already in advance a coherent body of statements on reality (hypotheses). Next, whether the

a   See e.g. Wassenberg, F.A.G., H.M. Kruythoff et al. (1994) *Woonwensen en realisatie van VINEX-locaties in de Randstad*. Priemus, H., F.A.G. Wassenberg et al. (1995) *Mozaïek woningmarkt stadsregio Rotterdam*.
b   See e.g. Tettero, W. (1991) *Ministerie van Sociale Zaken en Werkgelegenheid*.
c   See e.g. the collections of building plans of Risselada et al and Barbieri et al, that are discussed in subsection four of this Chapter.
d   Baarda, D.B. and M.P.M. de Goede (2001) *Basisboek methoden en technieken*. See also Bechtel, R., R. Marans et al. (1987) *Methods in environmental and behavioural research*.

theory is supported by observations in reality is checked by study. That type of study is trying to provide more certainty as to the correctness of the hypotheses. When the results of study are providing more and more support for the hypotheses (in the jargon: confirmation of the hypotheses), the confidence in the theory is increasing. The tripod descriptive – explorative – testing is closely related to the empirical cycle as described in the classical monograph '*Methodology*' by A.D. de Groot.[a] Descriptive study and research is predominantly orienting on the observation stage, explorative study on the induction stage, testing study on the stage of deduction and testing.

6.2   METHODOLOGICAL CHOICES

The approach of descriptive research can vary greatly. Usually a choice must be made, given the limited means of study, between research aiming for study in width (a limited number of data on a lot of objects) and study in depth (for instance thorough description of one single case). The advantage of a case study (casuistry) is that it allows deeper penetration into the core of the matter. The corresponding disadvantage is that it is often difficult to generalise on the basis of one single case and to draw general conclusions.[b]

A second methodological choice is related to systematics. A lot of descriptive research is trying to describe reality according to a systematic approach rigorously followed. Usually it is based on theoretical considerations and is dependent on the objective of the study as well. Our own study of the decision making surrounding a pilot project in office innovation made use, for instance, of the study scheme presented here.[c] It was endeavoured to get, per stage, a picture of the agents concerned, their tasks and commissions, (changes in) objectives etc. In contrast, the phenomenological approach is refraining from a systematic approach on purpose. One wants to get into the heart of the matter and is trying to let the data speak for itself as much as is possible. It is only afterwards that an ordering is made on the basis of the findings. The phenomenological approach is particularly suitable for explorative study, when it is of prime importance to develop new ideas and insights. The emphasis is then not so much on generalising, but on generating knowledge and on building hypotheses.

When one does not look with a certain distance ('from outside') at phenomena, but via introspection ('looking within') a significant degree of subjectivity may well result; particularly when the introspection of the student himself is concerned and not the introspection of his respondents. This need not present a difficulty; as long as the material is primarily used for building hypotheses and the student is open to objective checking by other people or objects.

A third methodological choice is the one between quantitative study and qualitative study. A study of demographic developments or a description of the stock of homes according to certain characteristics is suitable for a quantitative approach. Advantageous in a quantitative approach is the possibility of analysing data statistically with the assistance of advanced software like Excel and SPSS.[d] Vast quantities of data may be summarised succinctly in central magnitudes such as 'mean' and 'spread' (see page 219) and in graphs and tables. Another advantage is the high degree of objectivity. However, not all phenomena can be expressed in numbers ('imponderabilia'). A description and analysis of the oeuvre of an architect is calling for a more qualitative approach. For a practical guidebook for the approach of qualitative study we refer to Baarda et al.[e]

6.3   METHODOLOGICAL POINTS OF ATTENTION

A description of an object or process is realised from a specific context or perspective. By the same token, every description is in a certain sense subjective. This applies to the choice of aspects to be described as well as for operationalisation (the way of 'measuring', see also page 92) and interpretation of the results. By making the context or line of approach explicit

	Initiative	Preparation	Design	Construction	Use and maintenance
Players and responsibilities					
Objectives					
Activities					
Aimed result		The cells include a description of the items per phase			
Time schedule					
Time actually spent					
Costs					
Information and tools					
Positive and negative experience					

28   Possible framework for a systematic description of a plan process

a   Groot, A.D. de (1961) *Methodologie: grondslagen van onderzoek en denken in de gedragswetenschappen*. English edition: (1969) *Methodology: foundations of interference and research in the behavioural sciences*.
b   Swanborn, P.G. (1996) *Case-study's: wat, wanneer en hoe*?
c   Voordt, D.J.M. van der (1999) *Universitair Vastgoed: de leer- en werkomgeving*.
d   Ronden, J. den and W. van Nieuwenhuysen (1996) *Handboek SPSS voor windows*.
e   Baarda, D.B., M.P.M. de Goede et al. (2001) *Basisboek kwalitatief onderzoek*.

the results of descriptive study can be better judged as to their value. Checking them against the judgement of others increases reliability and objectivity. In this context the term 'inter-subjectivity' is often applied.

In addition, it is important to define concepts used clearly; this precludes interpretation problems. A topic of attention is the change in meaning of a concept in the due course of time. This may cause that results from study from different historical periods are difficult to compare. Striking examples are the standard company classification with which CBS is describing industrial development, the legends of maps and borders between municipalities. When these are changing over the years a calculation factor is needed in order to make them comparable. A related point of attention is the size of the grain of the measurements and the units used for measuring. Is utilisation of space described per postal code, per municipality, or per sub-municipality? Are the project costs of a plan description referring to the costs of investment or to the costs of construction? Is the scale of the graph a multiple of ten, or of hundred? Which operations on the data (adding, calculating a mean or ratios) are permitted? Are we dealing with data on individual people or objects, like year of construction or its state, or with aggregated data, like the average year of construction for a range of buildings? These are important questions to ask, not only while defining and measuring variables, but also while being informed on results of study by other parties. Subconsciously – or maybe even consciously – the presentation of data may give a distorted picture of reality. A booklet such as '*How to lie with statistics*' speaks in this regard for itself.[a]

6.4   EXAMPLES OF DESCRIPTIVE RESEARCH

Descriptive research is often used in the Faculty of Architecture as well as outside it. It partly concerns study linked to individual projects and direct application, with the aim of being able to solve the design task: think of a description of urban characteristics of a building location or an inventory of the number of parking lots in the direct environment. However, in these cases rather finding out and registration than study proper is called for. The examples we will be discussing have been chosen on the basis of sufficient depth, methodological approach and the intention of contributing to the body of knowledge of the architectural discipline. Two examples relate to a project description; in the present case objects from the built environment. The other two examples concern descriptive study of an individual thought process and a collective decision making process.

a.   Phenomenological studies

An example of a phenomenological approach is the introspective study of Van Lennep of the hotel room.[b] In it, the author is in search of the essence of inhabiting a room. For that purpose he analyses what it is that makes a room a 'room of one's own'; and why it is possible to feel at home – after a while – even in a hotel room. On the hotel room:

I have paid for it. In that sense it is 'my' room, but in no other respect. Just hours before, it was someone else's room. His traces have been wiped out with care. The hotel room is for everyone, so it belongs to no one. Even if I do not approve of the engravings on the wall that does not disturb me, for it is not my room after all. While unpacking, the room is already belonging more to me. If I have slept in it and return in the evening, the feeling increases. The hotel room does not only give me the experience of inhabiting in an original form, it is teaching me a form of existence that I hardly know at home; or not at all. I do not have any obligation. My activities are having a freedom, a being loose from everything that I do not know in this form at home. The hotel room is still indicating something of the adventure, a new task, after which one goes home contentedly. Dirty hotel rooms or with shoddy furniture do not evoke the sense of feeling at home. If a hotel room is too expensive, the same is true.

A second example is the PhD. thesis of Pennartz.[c] The subject of the study is the significance of space and spaciousness for the social conduct of people. The author describes three em-

a   Huff, D (1954) *How to lie with statistics*.
b   Lennep, D.J. van (1956) *De hotelkamer*.
c   Pennartz, P.J.J. (1979) *Mensen en ruimte, een studie naar de sociale betekenis van de gebouwde omgeving*.

pirical studies, one quantitative and two qualitative. The study is aiming at building a theory on the influence and experiencing of the built environment with regard to habitation. Theories and concepts from the social sciences are those predominantly used. Space and time are seen as framework for human activity. By way of an analysis of the relation between spatial characteristics of the home, characteristics of its inhabitants and the interest they are taking in privacy (studied via a written questionnaire) the aspects have been formulated influencing most strongly the wishes and appreciation with regard to privacy in the home. It is shown that the importance people associate with privacy is hardly dependent on spatial characteristics of the situation in the home; if at all. However, as a part of human behaviour, privacy is influenced by it, especially in the case of children. In addition, privacy proves to be an important aspect of valuing the home.

For the qualitative part of the study 25 families were interviewed on feeling at home, the functions of the different rooms in it and cosiness at home. The talks have been recorded and typed out. On the basis of a content analysis items have been selected for further working out; like 'knowing one's way around everywhere', 'having control over your own time', or 'the meaning of the place of the space'. Per item, texts were collected from the interviews and summarised. In this the original data has been maintained as long as possible in its context intact, receiving minimal interpretation. Finally 'constant structures' have been distilled from this. For situations within which people are feeling at home this is, for instance, "being free from social control, not needing to respond to certain expectations of others and being able to withdraw from observation by others", and also "being significant to others, getting assistance from them and giving it to them, belonging to them". The structures have been largely formulated in terms of relationships with other persons. Spatial characteristics have been made hardly explicit, while these are in fact the conditions determining to what extent certain human activity can take place. For the theme 'cosiness' spatial characteristics were more explicitly taken into account.

By inquiry in time and place, or when and where the home is at its cosiest, data was collected on the significance of the place of activity, the structure and size of the space. All this is illustrated on the basis of parts of the interviews. Closure of spaces, the possibility to partake in collective activity and to observe one another determine largely whether a space is experienced as being cosy. In this, size and shape are important factors. Work and great emphasis on efficient facilities are lowering cosiness. Next to spatial characteristics, the characteristics of the activities are influencing the experience of cosiness as well. Taking pleasure in activity, beyond obligation and absence of boredom are enlarging the feeling of cosiness. Pennartz relates his findings to future developments in the area of work and leisure time and the significance the home is going to have in the future.

Comment

Both studies are providing a deeper insight in – at first sight – very common phenomena. However the conclusions are very global and have been translated hardly in spatial implications: that is largely left to the policy makers and the designers themselves. Often the thread is picked up by different studies, like the one by Marja van der Werf focussing on inhabitant preferences and usage quality.[a] On the basis of studies by others – Pennartz among them – she is providing realistic guidelines for a usage-orientated home. Another example is given by Franceline de Jong.[b] She ordered the results from a large number of habitation preference studies per part of the home; on this basis she put forward a theory on the relation between inhabitant characteristics and habitation preferences.

One disadvantage of the phenomenological approach is its labour-intensity and the risk of a lack of balance between a lot of material and few conclusions ready for application. Perhaps this is the reason that the phenomenological approach is not often applied in the environ-

a   Werf, F. van der (1993) *Open ontwerpen*.
b   Jong, F. de (1997) *Woonvoorkeurenonderzoek: theorie, empirie en relevantie voor de praktijk*.

ment of the designer's discipline. Usually the wishes and preferences for habitation are enquired into as directly and concretely as possible.[a] A descriptive study by Wassenberg *et al.*, for instance, is addressing the question *what* should be built on VINEX locations and *for whom*. Attention is also given to policy and boundary conditions. Use has been made of study of the literature, discussions with parties in the market and a poll among those who are considering to move to a VINEX home. The pre-suppositions of the market parties prove to differ from the results of the poll in several respects. This underlines the usefulness of empirical study. Building in high densities will not be accepted by many consumers. For most of the candidates high-rise apartment buildings are not a good solution. Particularly people who intend to move to a suburb want a garden. Its absence can only be compensated for by an extra high quality of the immediate surroundings (water, exceptional quality of greenery). Parking garages are not appreciated. The most important requirement is a lot of space within the home. Consequently, less surface space is not a good solution for building in high densities.

b.   Architectonic studies

Between 1985 and 1991 the Faculty of Architecture TUD produced seven '*Architectonic Studies*', edited by Leen van Duin *et al.*[b] It was tried, on the basis of plan analyses and interviews with designers, to get better insight into the objectives and design methods of architects. The series is a next step following four notebooks in the education module '*Architectonic Designing*' (1981–1984). Around the change of the millennium a book was published on hundred years of Dutch architecture 1901-2000'.[c] In it, a large number of plan discussions was collected once again. In the plan analyses, intensive use is made of a systematic thematic fourfold structure: 1) effectiveness, 2) intention (programmatic analysis, focused on functionality), 3) material form and, 4) image. This ordering is derived from an article by P. Frankl dating from 1914.[d] The interviews with the designers are following the design process between the commission and the final design.

In contrast to architectonic studies, the collections of building plans of large and industrialised housing projects, libraries, homes and theatres restrict themselves largely to description of the plans.[e] In the preface to the '*Collections of building plans: libraries*' Barbieri states that this collection intends to offer students the wherewithal needed for formulating and then solving the problem of the 'construction' of the architectonic design of a specific building type. The book is meant to be an educational instrument for architectonic designing. It is presupposing a methodology and apparatus of epistemological means and techniques. Point of departure is that a design, following selection and combination of a sequence of parts and elements, can be constructed into an architectonic whole. The collections of building plans is providing the ingredients for this, by describing for an array of libraries a number of functional, constructive and formal aspects. Criteria for the selection of the plans are lacking. In the '*Collections of building plans for the basis*' however – with photographs, blue-prints, cross-sections and details of forty homes – it is indicated which aspects are the basis for selecting the plans; for instance type of home, floor plan, type of articulation. By making this visible the plans become better legible and comparable. In addition the introduction is providing a number of questions, clustered in themes like technique, process, environment, type, situation and programme. These questions establish a handy utensil to study the plans systematically.

Comment

The plan documentation in architectonic study can be seen partly as a descriptive study. However, they are going a step further by putting the plans in a social context, by tracing underlying arguments and comparing plans to other plans. There is a lot to be learned from this. An evaluation in the form of a valuing judgement, drawing lessons from plusses and minuses and distilling designing principles and representative variants of solution is neverthe-

a   See Kempen, R., H. Floor et al. (1994) *Wonen op maat.* Wassenberg, F.A.G., H.M. Kruythoff et al. (1994) *Woonwensen en realisatie van VINEX-locaties in de Randstad.*

b   Duin, L. van (1985-1991) *Architectonische studies 1-7.*

c   Barbieri, S.U. and L. van Duin (1999) *Honderd jaar architectuur in Nederland, 1901-2000.*

d   Frankl, P. (1914) *Die Entwicklungsphasen der neueren Baukunst.*

e   Risselada, M. (1993) *Plannenmap: het ontwerp van het grote woonhuis;* Risselada, M. (1996) *Plannenmap: het ontwerp van het geïndustrialiseerde woonhuis;* Barbieri, S.U., L. van Duin et al. (1997) *Plannenmap: bibliotheken;* Haaksma, S.H.H. (1999) *Plannenmap voor de basis;* Barbieri, S.U., L. van Duin et al. (2000) *Plandocumentatie theaters.*

less largely absent. This is applying even more for collections of building plans. Apart from modest inroads into plan analysis, it largely concerns a description of the plans. This can be defended as an educational means for students. But for the development of the profession it is a missed opportunity. Studies like this would increase in value by adding a comparative analysis of the plans and by Post-Occupancy Evaluation (see page 151) of realised buildings. This is giving better insight into alternative approaches of design, relations between means and objectives of designing and advantages and disadvantages of variants of solution.

c. Architectural thought

An example of a clear and systematic description of a process is Hamel's' study of designing processes from a cognitive-psychological point of view.[a] Based on a review of literature on design methodology, Hamel developed a descriptive model that represents experienced architects reasoning during the design process. The next step was an empirical test of this model using verbal protocols of architects thinking aloud while working on a design. The author concludes that a design process consists of repeated cyclic processes with three principal steps: analysis, synthesis, and choosing of forms.

- Analysis includes a review of the task, collecting additional information and dividing the total problem into sub-problems. This decomposition is based on different dimensions, like functional aspects, aesthetics, construction aspects and town planning.
- The synthesis focuses on solving sub-problems, an integration of sub-solutions for each dimension and subsequently integrating these sub-solutions into one overall solution.
- Choosing forms is described as giving shape to the solution in such a way that the design can be considered as 'architecture'.

According to Hamel each step includes three stages: orientation, execution, and evaluation. The designer's task consists mainly of transformation (from text to drawings, from user's activities to square metres), switching (from concept to detail and vice versa, from one sub-problem or dimension to other sub-problems and dimensions) and feedback (from solutions to objectives).

Hamel's descriptive model fits in with other design methodology models that are partly descriptive, partly prescriptive. Lawson[b] discerns five tasks: preparation, analysis, synthesis, evaluation and communication, which continually inter-change. However, some differences appear between Hamel's (a psychologist) the models and the other authors (mostly architects or engineers):

- In prescriptive models, 'analysis' consists of compiling and structuring the problem, investigating data and identifying objectives, whereas Hamel's descriptive model highlights gathering information, decomposing the problem and solving sub-problems.
- In most prescriptive models, synthesis is conceived as generating solutions, whereas in the descriptive model the search for solutions is divided into two separate steps. Step one is searching for a solution for each sub-problem separately (analysis), step two is finding a combined solution for the design problem as a whole (synthesis).
- In prescriptive models, shaping is primarily directed towards aesthetic experiences, whereas according to Hamel, the designer is also looking for 'elegant' solutions, using no more means than necessary.
- In the prescriptive models evaluation is interpreted as overall activity, as a means of weighing up solutions against objectives. According to Hamel evaluation is a part of every step in the process: each sub-solution is evaluated with reference to relevant criteria. As such, design processes explicitly show characteristics of problem solving processes and are related to the TOTE cycle of systems analysis: Test → Operate → Test → Exit (see page 254).

a Hamel, R (1990) *Over het denken van de architect: een cognitief psychologische beschrijving van het ontwerpproces bij architecten.*
b Lawson, B.R. (1997) *How designers think: the design process demystified.*

According to Boekholt[a] the sequence is not fixed. Processes are drifting from formulation of objectives to generation of solutions and (in between) evaluation of solutions. It may also happen that a solution is generating new objectives, or that an evaluation necessitates new analyses, before new (partial) solutions may be thought out.

Comment

Descriptive models of the designing process can be used for testing prescriptive models and founding them empirically. Furthermore, designers can mirror their own activities in them. Hamel also analysed for all steps in the designing process what a designer should know and what he should be able to do. This is making his study not only theoretically interesting, but also socially relevant, particularly for education in designing. The difference in problem formulation, use of language and framework of concepts of scholarly students and architectonic designers is posing a problem. Hamel's suggestion for shared authorship would perhaps alleviate this problem.

d.   History of the emergence of the Bijlmermeer

Amazement about the radical break in the Dutch building of cities caused Maarten Mentzel[b] to start a search for the backgrounds and motives for designing the Bijlmermeer. That settlement in Amsterdam was designed in the late sixties. The aim was an exceptional example of modern town planning, inspired by Le Corbusier's ideas. Soon after completion, the quarter became problematic. His thesis contains a systematic description of the process of realisation and the habitation history, demonstrating a cleavage between the expectations of the planners and architects and reality. His most important sources are existing documents and articles in newspapers and the professional media. In contrast to Pennartz, postponing the selection of data as long as possible, Mentzel is orientating his study primarily on continuity and on changing designing ideas, as well as on factors influencing them. He is paying attention to the (habitation) buildings as well as to the environment, motives and ideologies and the planning process. The results have been placed in a theoretical framework with three dimensions: knowledge, group and organisation, and planning. For this dimension of knowledge a study is made of what the importance and influence of knowledge and ideology has been and how insights from the sciences and the arts have been dealt with. The dimension 'group and organisation' is high-lighted from social-psychological mechanisms, with special attention to the functioning of the small group that was charged with the formulation of a plan. The study of the planning dimension is focused on the initial stage during which the objectives were formulated.

With regard to the knowledge dimension Mentzel concludes that a small group of people dominated the planning process. The choice for high-rise building is purely based on the ideas of (urban) architects and planners. Second thoughts generated by urban studies and results of studies in habitation preferences have not played a rôle of any importance. The same is valid for socio-economic developments like an increase in spending income, leisure time and mobility. Ideas from outside were only admitted if they fitted into the shared striving for a 'daring' design, leading to distinction. The planning group felt itself supported by pleas for systematic building and labour-saving building devices – among others from the national Minister at the time, Bogaers – and by a report from the High-rise / Low-rise Committee stating that high-rise is requiring for broad segments of the population 'just' an adaptation of style of living and its civilisation.

The dimension 'group and organisation' is analysed according to the theory of Janis and Mann. They formulated seven criteria for an ideal process of decision making. It is essential that decision shapers should study with the information from experts objectives, and the values associated with them, and audit alternative solutions in terms of costs and risks. According

a   Boekholt, J.T. (1984) *Bouwkundig ontwerpen: een beschrijving van de structuur van bouwkundige ontwerpprocessen.*
b   Mentzel, M. (1989) *Bijlmermeer als grensverleggend ideaal.*

to Janis and Mann, reality often differs strongly from a rational decision process and the shaping of decision is characterised by thinking as a group. This applies in particular when there is a strong coherence within the group, isolation, no procedures for methodical searching and little willingness to look for different solutions, see also page 389. Conditions like these can readily lead to decisions with great disadvantageous consequences. Mentzel is showing that the conditions mentioned were emphatically present in the planning process of the Bijlmermeer.

With regard to the planning dimension Mentzel demonstrates that insufficient attention has been devoted to the strategic stage: the global determining of objectives and means. During the stages of an increasingly more specific determining of objectives and means alternative plans have hardly been discussed; if at all. Lack of time certainly played a rôle.

Comment

Careful description of a planning process can shed light on what makes a project more, or less, successful; certainly when the description is related to the comments of planners, designers and users, as well as placed in a theoretical framework. This creates a better understanding of the case, while the study is contributing to the furthering of theory, building on the processes shaping decision. In spite of the social-historical approach, Mentzel's study offers a thorough reflection on planning principles and designing strategies. In studies by urban architects the intention is often more strongly focused on understanding spatial forms. An example is the study by Han Meyer[a], for an important part a set of descriptions of the relation between city and harbour in London, Barcelona, New York and Rotterdam and the differences in cultural appreciation of the spatial form of this relation. On this basis Meyer formulates a number of agenda points for the design of intermediary open spaces. Among other topics, Meyer is pleading for designing a new typology of public spaces enabling a symbiosis between large-scale networks and the small-scale of urban fragments.

6.5 CONCLUSION

Descriptive research and study can assist designing in several ways. In the first place as a basis for the programme of requirements. On the basis of demographic and socio-economic data, for instance, it can be decided to reserve a supply of homes for elderly people, to transform a neighbourhood school into a community centre, or to build a new hospital with x beds. Data from descriptive study are used then to make predictions on a situation that is in the future desirable or probable. In the second place, descriptions of plans and of realised buildings may be an important source of inspiration for the development of a plan. Architects and city-builders often get their inspiration from references in the past; i.e. precedents, see also page 401. Implicitly a designer is trying to distil from the descriptions hypotheses and predictions on the functioning of the partial solutions selected by him or her as they relate to wishes formulated by the commissioners or by him/herself. In the third place the results from descriptive research can be used as a means to test designs. By comparing a design to other designs and realised buildings it may be considered on which points this design matches or is standing out. Maybe, on this basis predictions can be made on the functioning of the building to be realised. Linked to an evaluative moment, this may, or may not, necessitate adaptations. Descriptions of processes can also teach a lot. They can give insight in factors for success and failure and in the significance of study for decision making. Descriptive research is increasing in value when it does not limit itself to mere description, but also contains initiations to interpretation and evaluation of its findings. A more intensive co-operation between those who study and those who design could enlarge the application potential in the design process. This seems to apply particularly for the start of the study – the formulation of the problem and of the objective – and for the finalisation of the study: the formulation of conclusion and recommendations, together with making the results accessible.

a   Meyer, H. (1996) *De stad en de haven*. English translation: (1999) *City and port*.

7   HISTORICAL RESEARCH

OTAKAR MÁČEL

The methodology of study in the history of architecture is permeated by fundamental pre-suppositions with regard to the arts and architecture itself. Since the history of art – with the history of architecture as one of its constituent parts – does not feature its own universal-historical systemisation, but is one of its parts, the methodological problem is permeated by the concept of history as a branch of learning. This sees to it that a systematic rendering of the method of the history of architecture is complex; and, in a historical perspective, by no means conclusive.[a] The present text is a first attempt to formulate the methodological start-ing points of the study of the history of architecture based on its practice and the literature: a systematic formalisation along the lines of a model. This entails that the practice is more 'synthetic' and demonstrates more methodical cross connections.

I depart from the object, the building. On that basis I try to explain the different steps of the study of architectural history: heuristics, analysis and interpretation. Firstly the use of sources (heuristics) is dealt with, next the methodology of analysis and interpretation and finally the 'usefulness' of the methodology for designing.

In accordance with my education as an art historian, I regard the history of architec-ture as one of the parts of the history of art. This means that my methodological discourse is presented before the background of the methodology of the history of art. It also implies that architecture is regarded here as a member of the 'family' of the visual arts. This may be re-strictive. Wherever possible I will draw attention to this restriction of the methodology when it comes to architecture. On the other hand, I would like to make clear from the start that the way to proceed as described should be applicable for an object dating from the fourth cen-tury B.C. as well as for an object of the fifties of the twentieth century.

7.1   USE OF SOURCES – HEURISTICS

a.   Sources and Literature

The use of sources is an essential point of departure for the study of the history of architec-ture. With this a distinction may be made between the sources themselves and the literature on them. 'Literature' means here the architecture-historical studies on the subject of the study which have already been written. The documenting material, printed or not, from the era of the subject of the study falls under the category 'sources'.

In an Architecture Faculty the study of architectural history is usually restricted to study of the literature, particularly when it concerns the work of students. This may be sufficient, seen within an educational perspective, but it certainly is not seen fundamentally, while only the sources are witnesses of the past; not the interpretations of the present.[b] Also, where the study of the literature is concerned the source material is called for: not by way of personal experience – autopsy – but, 'second-hand', pre-processed by others. Study of literature is a pre-requisite, but can not replace in any way the study of the sources. However, it may point the way towards the sources.

Clear separation between sources and literature as described has a demonstrative pur-pose. In practice things may be more vague. The borderline between a documentary source and the literature does not always resemble a honed razorblade. Furthermore, it is not always possible to consult all kinds of sources personally.

b.   Kinds of sources

The sources themselves may be differentiated as primary and secondary. Primary sources include the building itself, design drawings and models: the building of course, since only by its materiality it embodies architecture. The blue-print and the model are admittedly no build-ings, but represent in a visual form the concept of the building. Texts on architecture, regard-

a   As far as is known Dutch historians of architecture have written seldom methodological treatises. An attempt to it was made in the inaugural address of Grinten, E. F. van der (1963) *Bouwkunst-geschiedenis of bouw-kunstgeschiede-nis: grenzen en mogelijkheden in de geschiedschrijving der bouwkunst;* or: Mekking, A.J.J. (1986) *De Sint-Servaas-kerk te Maastricht.*

b   See for instance the different descriptions en floor plan il-lustrations of the same building (San Carlo alle Quatro Fontane), Grinten, E. F. van der (1963) p.8-9, 22-23.

Examples of ordering are the following:

Topographical ordering
Published descriptive lists of monuments, topographical inventories like:

- Maiocchi, R. (1937-1949) *Codice diplomatico-artistico di Pavia dell anno 1330 ad 1550 I+II*.

Also, under this heading are collection catalogues of museums and other collections, particularly important for architectural drawings and models, e. g.:

- Egger, H. (1903) *Kritisches Verzeichnis der Sammlung architectonischer Handzeichnungen der K.K. Hof-Bibliothek;*

- Drexler, A. (1986) *An illustrated catalogue of the Mies van der Rohe drawings in the Museum of Modern Art;*

- Blau, E. and E. Kaufman (1989) *Architecture and its image. Four centuries of architectural representation, works from the collection of the Canadian Centre for Architecture.*

The last one mentioned is an example of a combined topographical-monograph ordering.

Chronological ordering
Editions of sources, with or without commentary, relating to a specific era, like:

- Schloßer, J. von (1924) *Die Kunstliteratur. Ein Handbuch zur Quellenkunde der neueren Kunstgeschichte;*

- Lefaivre, L. and A. Tzonis (1984) *Theorieën van het architektonies ontwerpen* or

- Ockman, J. (1993) *Architectural culture 1943 - 1968.*

Bibliographic ordering
Lists of documentary sources, e. g.:

- Senkevitch Jr., A. (1974) *Soviet architecture 1917 - 1962: a bibliographical guide to source material*.

Monographic ordering
Catalogues of collected works, e. g.

- Boesiger, W. (1946-1970) *Le Corbusier et Pierre Jeanneret: oeuvre complete*;

 to one project, e.g.:

- Neutelings Riedijk Architecten (1998) *Minnaertgebouw Universiteit Utrecht*.

Reprints of tracts and theoretical observation also belong under this heading.

a   E.g. Kruft, H.W. (1991) *Geschichte der Architekturtheorie. Von der Antike bis zur Gegenwart*. English translation: (1994) *A history of architectural theory: from Vitruvius to the present.*
b   For a very extensive and systematic treatise on source material and criticism see Tietze, H. (1913) *Die Methode der Kunstgeschichte*. p.184-278.
c   Compare e.g. Bauer, H. (1976) *Kunsthistorik: eine kritische Einführung in das Studium der Kunstgeschichte*. p.108, 120 en Badt, K. (1971) *Eine Wissenschaftslehre der Kunstgeschichte*. p.64-65.
d   See, for instance, the cumbersome and time-consuming search for the provenance of the ideal monastery schema from Sankt Gallen.

less of their importance, belong to the category of secondary sources. They are words, not buildings. They lack the significance of visual information. This applies in a general sense. When texts on architecture are an object of study themselves they should be viewed as a primary source.[a] Secondary sources are then 'addenda'; e.g. the texts of the designer himself, illustrations, letters, testimonies and opinions of contemporaries, business documents like bills, licences, legal papers, correspondence on the commission, etc.[b] Finding source material often requires special effort, particularly in archives, since many archives follow their own systematic approach and are usually not focused on architecture.

A different systemisation of sources is also possible. In that case the works of art – by the same token works of architecture – are seen as objects of the study as an independent category and positioned outside of the sources. The distinction between primary and secondary sources then looks different.[c]

c.   Critique of sources

This entails the assessment of sources in terms of their value to yield information; at the same time the factual data of the literature already existing may be checked. Questioning the usefulness of the sources relates to the following problems: the correctness (possible 'falsum', the partiality of the source *vis-à-vis* the subject, etc.), the provenance (may seem obvious, but sometimes it is not)[d], the time (dating), the author or origin and the originality of the information. In that last case the question must be answered whether the source is a primary one in terms of content and chronology, or that it reproduces data already known. Some data will probably never be found. In that case an answer must be reconstructed from contextual data. In the case of an anonymous building inquiries concerning the author or time of construction may only be answered approximately by a comparison of style criticism.

d.   Ordering the source material

Systemising the data obtained depends on the subject of the study. Usually ordering the source material first in terms of elementary information, like time, place, subject and author or a combination thereof, is the thing to do obvious. Thematic ordering of primary sources as to type, based on its functional use or on form (form typology) or on material and construction is specific to architecture. This stage is occasionally the final objective of the study. Arranging the source material may already encompass an element of analysis and interpretation, especially in the case of editions of sources containing comments. However, the emphasis of editions like that rests on representing the sources. Examples of ordering are listed alongside.

e.   Adjacent disciplines

In addition to general history, here considered as an obvious background, processing and ordering source material often needs support by other disciplines of learning. In part specialised branches within the historical discipline are concerned, the traditional disciplines enabling it being, among others:
- Paleography (the learning associated with the development of lettering and writing) enabling reading old sources.
- Diplomacy, devoting itself to the origination, kinds and dating of legal sources and writs
- Chronology, that might assist in re-calculating old types of time keeping to our current one, dating. This is particularly important for the history of architecture of previous ages up to and including the eighteenth century.

In the case of material sources help from chemical and physical technologies is sometimes needed. Computer technology may also be helpful in ordering and comparing sources. Critique of sources may also call upon other areas of learning like legal studies, philology, economics, mathematics (statistics) etc.

7.2 ANALYSIS

The first conceptual recording of the image and structure of a building (the drawing) is morphological and technical analysis. This should result in the description of the building with its specific characteristics.

a. Morphological analysis

A morphological analysis is an approach bound by an object. Its purpose is determining the specific characteristics of the architectonic work (what and how), in order to interpret them later in a criticism and comparison of style and to put them in a broader perspective (why). A morphological analysis analyses the architectonic (visual) properties of a building or of a design drawing, the conceptual version of a building. Whether a drawing is the only rendering of the design, or when it has a complementing function might make a difference; in the second case it documents the existing building and eventually the stages of the design.

From the vantage point of systemisation one might make a distinction between formal and structural aspects of the style-critical analysis in spite of the fact that in reality all aspects of a building always relate to one another as a unity. The concept (disposition) of the blue-print, the articulations of the elevation (the building mass rising from the blue-print) and the ensuing spatial concept may be seen as structural aspects. The problems of the ordering of the whole (composition, rhythm) and the visualisation of the constructive aspects (tectonics) also belong under this heading. Formal aspects are, for instance, the ordering of the outer walls, detailing and the architectural decoration (also of the interior) and the 'use' of visual artworks within the building.

A morphological analysis of a building displays its specific, individual architectonic characteristics: the materialisation of the design idea is charted.

b. Technical analysis

Since a building is bound to a concrete place and subject to physical laws as a material object it also has technical and physical properties. Style critique can not determine them; at least in an artistic, sublimated form (construction tectonics). Following Robert Hedicke[a] one might call the analysis of these properties the technical methodology. This type of analysis is directed towards the properties characterising the building in terms of site, building materials, and construction. Style-critical and technical analysis complement one another.

One may view the site as something outside of the work of piece of architecture proper. On the other hand the site is physically insolubly connected with a building. Considering that the site by its size, positioning (geomorphic disposition, adjacent buildings) and structure of the soil is one of the determinants of the design and its actual execution these aspects always require attention. Possibly references in terms of cultural history of the site might be important.[b]

The significance of the building material for the manifestation of architecture speaks for itself, since the material chosen also determines the construction of the building and the structure of the building surface. Information on the kind and provenance of the building material may also provide insight into the building process and its history.

The building construction is a literal embodiment of the physical *raison d'être* of a building. Vitruvius already mentions 'stabilitas' as one of the three necessary conditions for architecture. That is the reason that the identification of the construction of a building is a necessary step in the architectural-historical study while giving the background information for the analysis in terms of style critique. Not only the building itself, but also its drawings and blue-prints are an important source for this analysis. Usually building constructions distinguish materials used and the construction proper.

7.3 INTERPRETATION

The interpretation of a building aims at determining and understanding the original architectonic intention of the work and its significance and place in the development of architecture.

Typological ordering
Usually surveys of kinds of building, like:
- Dimier, A. (1949-1967) *Recueil de plans d'eglises cisterciennes;*
- Sherwood, R. (1978) *Modern housing prototypes*;
- Barbieri, S.U., L. van Duin et al. (2000) *Plandocumentatie theaters*.

Material and construction
Description and survey, e.g.:
- Leonhardt, A. (1964-65) *Vom Caementum zum Zement I-III;*
- Quarmby, A. (1974) *The plastics architect;*
- Oosterhoff, J. (1978) *Constructies, momenten uit de geschiedenis van het overspannen en ondersteunen*.

a   Hedicke, R. (1924) *Methodenlehre der Kunstgeschichte: ein Handbuch für Studierende*, p.100-132. Although the book is rather dated, among the historians of art Hedicke is from a methodological perspective an exception because of his attention to the technical aspects of the visual arts (including architecture). Remarkable is his still topical observation: *"Außer den Kreisen der Architekten-Kunsthistoriker und der Künstler ist heute das Technische in der Kunstgeschichte verachtet, und äußert sich auch darin, daß die Studenten der Kunstgeschichte für das technische in der bildenden Kunst heute gar kein Interesse und Verständnis mehr besitzen."* l.c. p.102.

b   For a widely ranging meaning of the building site see Norberg-Schulz, Chr. (1981) *Genius loci: towards a phenomenology of architecture*.

Any historical study – and, perforce, architectural-historical ones – always focuses on the intentions and context at the time of the work itself. It is the only way to understand the work: it is a *conditio sine qua non*. This way we may now experience a gothic church as impressive by the materiality of its daring construction and the clear spaciousness, while in the middle ages it was just surpassing materiality and the mutual symbolic functions of the parts establishing the 'experiencing' of this architecture. The 'delight in art' at that time carried much more the stamp of theology than present-day appreciation; it was of a different order. However, this approach is only tentative: it is not only seldom that all data can be found, but a complete experiential transition to the past is impossible; the work of a historian of architecture is done by necessity in the present. The past is over. Although understanding sources in their original significance results in some access to the history, historiography is an activity of the present. Already in 1868 the historian Johann Gustav Droysen put it this way: *"Unsere ganze Wissenschaft beruht darauf, daß wir aus solchen noch gegenwärtigen Materialien nicht die Vergangenheit herstellen, sondern unsere Vorstellungen von ihnen begründen, berichtigen, erweitern wollen, und zwar durch ein methodisch verfahren, das sich aus diesem ersten Lehrsatz entwickelt."* [a] Even when 'our imaginings' of the past are determined by today's position of the historian, the importance of the transient 'social relevance' is not always relevant for analysis and interpretation of the sources. In the study the sources can only be understood within the original context. In contrast, actuality can determine what is going to happen with the result of the study. This may affect the selection of the theme of the study. It becomes clear then where the historical approach and current social interests ('relevance') cross one another. With problems of monument in the national trust, for instance, the knowledge of the original significance of a building plays a leading rôle since it is a factual testimony of the past. At the same time its value as a remembrance, decisive for putting it on the list of monuments, rests on an interpretation in the here and now. The rôle of 'social relevance' (present context of the building) comes much more strongly to the fore during renovation and renewed usage.

a. Context as a frame of reference

Where the stage of analysis addresses the question 'what' the characteristics are of the work of architecture, the stage of interpretation addresses the question of the 'how' of these characteristics and their original significance. Although the building embodies its characteristics and, therefore, also its significance itself, it can not be understood by itself. The answers to these questions can only be found in the inter-connection of the work with its contemporary context: a building does not come into being in a timeless vacuum, but in a specific historical situation. This entails that the pure object-driven approach of the architectural work must yield to a broader approach, related to the historical context of its origins. This may call for study of the relationship of the architectural work with the contemporary aesthetic norm(s), technical know-how, the conventions and backgrounds of its use and study of (original) significance of the architectural work transcending these categories. It may also be undertaken on a more general level (school, area, era). Not only determining and interpreting the characteristics and significance of the architectural work is important for study in architectural history, but also their changes. In this way interpretation might have several aspects and levels. Since these aspects and levels always relate to one another, rendering them systematically is a difficult and schematic exercise by necessity. It also depends on the theme of the study. I have opted for arranging the interpretation according to the context of the architectural work, in this case the context of factual originating, the context of the functional use, the context of the style and the context of the iconographic and transcendental significance of the work. It is admittedly a heterogeneous systemisation, but it attempts to encompass and conclude the problem of interpretation. Allocating the architectural work within the history of architecture would then require weighing all four contexts as they inter-relate.

a   Droysen, J.G. (1960) *Grundriß der Historik: eine Enzyklo-pädie und Methodologie der Geschichte (1868)*, p.20.

WAYS TO STUDY AND RESEARCH

b.   *Context of the originating*

The most immediate context applicable to the architectural work is the one of the commissioner, the author (designer) and the constructor (building company). Together they embody the conditions for the building to get into being, so that their rôles in that process should always be studied. The factual data on the commission, the author and execution should already have been determined by the critique of the sources. Here their specific rôles *vis-à-vis* the characteristics and intentions of the individual architectural work stand central. Studying the commission, the author and the building company can be an independent objective of a study – separately or not – focused on the individual building or on a general theme.

The commission

A commission, given by a principal, starts the designing and building. Compared to the art of painting, for instance, this is specific for architecture and for arts and crafts. Historically speaking, this difference is of relatively recent origin, since the nineteenth century. This commission includes the destination, so the kind of use (type) of the building and the specific wishes and conditions of the commissioner. These wishes are inter-related with his social position and with his possible political ambitions. The study of the commission and the commissioner may choose several directions, but this aspect always marks the specific history of the originating of the building. The kind of commission and the position of the commissioner also point to typological considerations.

See e.g.:
- Panofsky, E. (1946) *Abbot Suger on the Abbey Church of St. Denis and its art treassures;*
- Boorsch, S. (1982-83) *The Building of the Vatican. The Papacy and Architecture;*
- Ellis, R. and D. Cuff (1989) *Architects' people;*
- Dijkstra, Tj. (1991) *De kunst van het opdrachtgeven.*

The author(s)

If the commission starts the originating of a building, then the commissioner is its cause. The author (designer, architect, master builder) is the one who outlines with his knowledge, purpose and, perhaps, talent the building. At first sight the author seems as a person less important where it comes to the history of art and architecture, since the object of this discipline is primarily the work of the author and not this person. In addition his alienation with the building commences with the completion of the work with regard to the intentions of the maker. From this moment on the work may be understood by others in a different way than the author had in mind. Although the author is the cause of the building, he himself is not always the most important source of information. Many buildings are anonymous or only associated with just a name with a background. Nevertheless, the author is a crucial link in the chain of the interpretation of an architectural work. Author related considerations with regard to the building include his training, professional experience and expertise, the relationship to the commissioner and the intentions and ambitions inherent in the commission.

        An intermediary problem between the categories 'author' and 'execution' is the operation for its own profession (from construction hut to the architects' office). Knowledge of this may contribute to the insights into the social status of the author, the task distribution during designing and the relationship with the executor.

The literary genres on authors most common are the monograph, the biography and the texts of the authors themselves. In addition historical studies on the profession and the education of architects are relevant, e. g.:
- Briggs, M.S. (1927) *The architect in history* (Pevsner, N. (1930-31) *Zur Geschichte des Architektenberufs*.);
- Harvey, J.H. (1972) *The mediaeval architect;*
- Müller, W. (1989) *Architekten in der Welt der Antike;*
- Severin, I. (1992) *Baumeister und Architekten. Studien zur Darstellung eines Berufstandes in Porträt und Bildnis;*
- Saunders, W.S. (1996) *Reflections on architectural practices in the nineties;*
- Pfammatter, U. (1997) *Die Erfindung des modernen Architekten. Ursprung und Entwicklung seiner wissenschaftlich-industriellen Ausbildung.*

The execution

Without builders there is no building. In spite of that the building company plays a less important rôle in the history of architecture, while it plays only an intermediate rôle, in a certain sense a hidden one, however indispensable it may be. Nevertheless, a minimum of knowledge of this problem is needed from a factographic viewpoint. And what is more, the possibilities of execution of the design may influence the resulting Gestalt of the building. The organisational structure of a building enterprise may be of importance for conserving and passing the knowledge of building to future generations like in the Middle Ages – where the author and the enterprise worked together – in studying the building. If in the problem of the execution the question of technical know-how is taken into account also, the significance of this contextual aspect increases. The building enterprise may be seen as the carrier of con-

Examples in the literature on the execution include:
- Grote, A. (1959) *Der vollkommen Architectus. Baumeister und Baubetrieb bis zum Angang der Neuzeit;*
- Colombier, P. du (1973) *Les chantiers des cathédrales: ouvriers, architectes, sculpteurs;*
- Binding, G. and N. Nußbaum (1978) *Mittelalterlicher Baubetrieb;*
- Vroom, W.H. (1981) *De financiering van de kathedraalbouw.*

temporary technical knowledge. This knowledge determines, together with that of the author, the possibilities of materialisation of the design.

c.   Context of use – Typology

Utilisation function is a characteristic difference between the visual arts and architecture. Admittedly paintings and pieces of sculpture are always used as well – their museum function is relatively recent – but, the work of architecture is, in its assembled state, structurally determined by its intended use. Already Vitruvius names 'utilitas' as one out of three fundamental characteristics of architecture. The functional use is an essential property of architecture, but a building may loose that function temporarily – the Pantheon as a stable for horses – or forever, or get a new one. Nothing new under the sun; witness the re-construction of monasteries into hospitals, military barracks or industrial plants.

With the originating of the building the functional use is inherent in the commission. In order to consider the commission within its own 'kind' requires comparison with different building serving the same purpose: a typological comparison.[a] The answer to the question why a building has a certain appearance may be determined by historical experience already existing (tradition) with the structure of buildings of the same kind. Next to this the ascertainment of the possible provenance of a typological solution such a comparison may also bring to light the specific contemporary expression of the function and change in the customary typology. The typological problem has dis-enfranchised itself within the history of architecture to a distinct type of study, addressing the development of the different kinds of buildings. This needs knowledge of the specific functional usage; that is one outside the discipline of architecture. In this vein the development of the theatre-type can not be understood without knowledge of the development of acting, nor the development of hospitals without the history of the medical sciences, nor the development of prisons without the history of penal law, etc. It is obvious that this type of study calls for different fields than history. Typological problems can be quite complex. Next to type-driven history the socio-economic and political aspects play a specific rôle.

Typological literature is rather many-sided. Some publications have the documentary nature of an edition of sources. Others concentrate especially on systemising the development of the blue-print of the type concerned. The more synthetic publications regard the development of the type as a whole and relate it to the historical backgrounds causing it. Typological literature may also deal with the subject within a certain territory or time-period.

d.   Context of Style – Style-critical interpretation

Morphological analysis addresses the recording of the formal and structural attributes of the individual architectural work. The style-critical interpretation consists of a comparison of these individual attributes to other works; in the first instance with contemporary works, but they may be earlier or later buildings as well, depending on the aspirations of the study. 'Reflective' sources, theoretical writings and criticism, are important for such a comparison. In this way the historian of architecture may get insight into the prevailing or usual aesthetic norm(s) at that time and in the design toolbox. Then he can judge which position the building occupies there – he can place the building in its context. This might mean that the work conforms to that norm; which means that it is an example of a standard solution or an imitation, or copy.[b] It may be that the work does not co-incide with the usual norm, while the author was looking in his work for new solutions of the design problem. It also may be that the author rejected the norm and continued to base himself on an older point of departure, or did not understand the new norm, like, for example, in some buildings of the Renaissance north of the Alps.

This enables the positioning of the work of architecture with regard to the contemporary time. It should become clear which problems and challenges characterised the profession at that time and how the architectonic ambitions and the talent of the author as embodied in the building (drawing) relate to that. The concepts 'contemporary' and aesthetic norm are

A general typological survey is the one of

- Pevsner, N. (1976) *A history of the building types*.

Examples of monographical-typological literature include:

- D'Amico, S. and F. Savio (1954-1966) *Enciclopedia dello spettacolo (10 vol.);*
- Braunfels, W. (1969) *Abendländische Klosterbaukunst;*
- Thompson, J.D. and G. Goldin (1975) *The hospital, a social and architectural history;*
- Petersen, M.A. (1978) *Gedetineerden onder dak; geschiedenis van het gevangeniswezen in Nederland vanaf 1795, bezien van zijn behuizing;*
- Geist, J.F. (1979) *Passagen, ein Bautyp des 19. Jahrhunderts;*
- Wesemael, P.J.W. van (2001) *Architecture of instruction and design : a socio-historical analysis of world exhibitions as a didactic phenomenon (1798-1851-1970).* (Formerly published in Dutch: (1997) *Architectuur van instructie en vermaak. Een maatschappijhistorische analyse van de wereldtentoonstellingen als didactisch verschijnsel (1798-1851-1970).*)

The literature based on style-critical interpretation may vary from monographic treatment to the history of a style period. The subject of the literature might also be some elements of the interpretation, like tectonics, e.g.:

- Frampton, K. and J. Cava (1995) *Studies in tectonic culture : the poetics of construction in nineteenth and twentieth century architecture*.

The interpretation of the concept of style is part of every systematic historical study of art. See e.g.:

- Bauer, H. (1976) *Kunsthistorik: eine kritische Einführung in das Studium der Kunstgeschichte*, p. 74-80, 87-89;
- Dittmann, L. (1967) *Stil, Symbol, Struktur: Studien zu Kategorien der Kunstgeschichte*.

a   Here, the concept 'type' is for the time being not identified with the function of use; however it should be linked to this function exclusively.
b   In the practice of the study the deliberations should be more subtle. On the related problems see, amongst others, Bakos (1991) *Peripherie und die kunsthistorische Entwicklung*.

not intended here as a static moment, but as co-eval development with temporal limits determined by the theme of study. This positioning of the work within the development of architecture may be realised on different levels. It may relate to the collected works of the author himself (along the lines of a monograph), to the significance within certain territorial boundaries (the cathedral of Chartres and Gothic building in Northern France, or the 'Zonnestraal' sanatorium and the 'Nieuwe Bouwen' in the Netherlands), or to a generalist tendency along the lines of a general development (the significance of Borromini's oeuvre for European Baroque). The last example indicates that a contemporary comparison alone is not always sufficient. Borromini's oeuvre became very significant in Central Europe only a century after his death.[a]

A generalist approach is the style-critical interpretation of groups of buildings in the broader context of time and place. This may lead to determining the aesthetic norm and design tool box used to realise it (periodising) within a period, style or stream of development.

With a style-critical interpretation the concept 'style' has a historically normative character. It is an abstraction of characteristics of the individual works of architecture. That is what is linking these works. The concept of style is necessary in the study of the history of architecture for identifying the collective qualities. Further explanation of the concept of style would require a separate, historically founded, exposé.[b]

e. Context of the significance – iconography, iconology

Formulating the significance is here related to what is admittedly depicted by the work of art, but what surpasses the style-critically formulated visual meaning of a work of art. In the general history of art that is the field of iconography and iconology. Originally, iconography was only occupied with identification and analysis of the depiction. The concept of iconology, formulated later, implies explanation of its symbolic meaning. From the time that iconography was considered more contextual-interpretative[c], the difference between the two levels of interpretation started to become vague. Both approaches were developed by studies of medieval art and the mythology of antiquity surviving in it. Since both approaches consider the work of art, more often than not, as a carrier of meaning and content, without paying attention to its appearance, they are sometimes regarded in the history of art as one-sided.[d] In the history of architecture these terms are in a similar interpretation of significance infrequently used, while they can be hardly distinguished from one another.[e]

Iconography

Since architecture can hardly be reckoned to depict (mimetic) arts, iconographic study can orient itself especially on formulation and interpretation of the 'pictures' present in the building within the architectural genre. They may be architectural motives; that is to say, the shapes and details of other buildings having become independent, used as an element of composition outside of their original context (the triumphal arch, the Palladio motive, columns, the dome etc) for architectonic and / or symbolic reasons. They may also be elements originating outside of architecture, like the round windows in ships, or elements of utility structures, with an allusion to attributes.

The interpretation of the 'pictures' of other buildings concerned as a total might also fall within the iconographic frame-work. An example is the visualisation of a ruin: the ruin of an aquaduct as a folly, or a neo-medieval ruin of a castle as a hunting lodge. Other 'depicting' buildings may fit under this heading: e.g. a Chinese pagoda as a garden pavilion, or the church in Oudenbosch, The Netherlands: a replica of Saint Peter's in Rome. The shapes appropriated from outside architecture, as there are the shape of a ship or anthropomorphic ones (the follies in Bomarzo, Italy) and zoomorphic shapes (a fried chips joint shaped like a duck, see Robert Venturi) fall in this category.

Determining and interpreting the iconographic characteristics of one building is the task set to morphological analysis and style-critical interpretation. However, beyond the level of

The iconographic literature is heterogeneous and partly overlaps style-critical considerations.

- André, G. (1939) *Architektur als Gegenstand der Ikonographie;*
- Reinle, A. (1976) *Zeichensprache der Architektur.;*

specific:

- Duby, G. (1978) *Les trois ordres ou l'imaginaire de féodalisme.* (English translation: Duby, G. and A. Goldhammer (1982) *The three orders: feudal society imagined);*
- Moos, St. von (1974) *Turm und Bollwerk: Beiträge zu einer politischen Ikonographie der Italienischen Renaissancearchitektur;*
- Vogt, A.M. (1974) *Russische und Französiche Revolutionsarchitektur 1717-1789;*
- Kähler, G. (1981) *Architektur als Symbolverfall. Das Dampfermotiv in der Baukunst;*
- Kern, H. (1982) *Labyrinthe, Erscheinungsformen und Deutungen 5000 Jahre Gegenwart eines Urbilds* (English translation: (2000) *Through the labyrinth: designs and meanings over 5000 years);*
- Onians, J. (1988) *Bearers of meaning: the Classical orders in antiquity, the Middle Ages, and the Renaissance;*
- Schulte, A.G. and M.J. Kuipers-Verbuijs (1997) *Ruïnes in Nederland.*

a   From the end of the 17th century onward, architects from the Middle of Europe travelled to Rome in order to study the architecture of Borromini there, by that time 'old hat' to Romans, rather than contemporary buildings.
b   For the general definition of the concept of 'style' see Gadamer, H.G. (1970) *Wahrheit und Methode*, p. 466-469.
c   See e.g. Biaostocki, J. (1973) *Iconography.*
d   See e.g. H. Bauer, l.c., p. 93-99. Recently see the discussion by Eddy de Jongh of the re-edition of Panovsky's Meaning in Visual Arts (E. de Jongh: 'To me, this book was not less than a revelation', *De Academische Boekengids* (2000) Vol. 21, p.20).
e   See e.g. Sauer, J. (1924) *Symbolik des Kirchengebäudes und seiner Aussattung in der Auffassung des Mittelalters;* and: Krautheimer, R. (1942) *Introduction to an iconography of medieval architecture.*

the individual building it is an independent iconographic theme, that in its turn may serve as frame of reference for style-critical interpretation.

Iconology

The formal and structural characteristics of a work of architecture may also have allegorical, metaphorical or symbolic meaning, not to be ascertained by style-critical interpretation. They can also refer to contents and meanings outside the building and architecture itself. In that case knowledge on the horizon of the contemporary world-view, on general opinions on the arts and learning, of social norms and values may provide a frame of reference for interpretation. Architectural iconology can in its interpretation also relate to symbolic meaning; and transcend the architectural genre. This is the reason why a precise delimitation between both approaches is difficult.[a] However, architectural iconology emphasises the metaphorical meaning of the work of architecture (the church building as a manifestation of the 'ecclesia' and of the Heavenly Jerusalem, the triomphal columns of the Karlskirche in Vienna as a manifestation of the Habsburg claim to Vienna as the New Rome, etc). The traditional iconological methodology – whether it carries that name or not – is especially mature in the field of medieval and baroque architecture. Although the layered structure of allegory and symbolism has changed in the meantime this does not entail that the alluding 'power' of a work of architecture should have vanished. Actually, the iconological approach is continued in the interpretation of more recent buildings. Usually an interpretation like that is part of the study. The interpretation of Mies van der Rohe's Barcelona pavilion by Fritz Neumeyer as a 'Platonic temple' is an example of architectural iconology of modern architecture.

7.4   LITERATURE

The literature of the history of architecture is as wide as the collected knowledge of the professional field up to now. That is the reason why a study of the literature is almost always the first step in a study of architectural history. This supposes an inventory of knowledge on the subject: it is hardly worthwhile to 'discover' personally what is already known. In a scientific sense this is a *conditio sine qua non*. Further study checks the literature in terms of facts and interpretation. During presentation (publication) of the study the chapter on the study of the literature, the literature criticism, should be positioned at the beginning, seen from the editorial viewpoint. The historian of architecture positions his own study in the 'field'of existing knowledge of the subject, while taking responsibility in terms of content and method for his study. The study of architectural history pre-supposes knowledge of genres of literature of the subject. This is a task for education or self-study.[b]

7.5   REMARKS

By necessity, the preceding description of a methodology of study is succinct and schematic. There are more problems than could be mentioned explicitly. The following remarks intend to highlight some problems.

From the viewpoint of scientific systemisation, my contribution could have started in a different way. For example: "Together with the history of art the history of architecture is part of historical learning. Its object is architecture..." and next the object is described and a methodology of study derived from its properties. But, what is architecture? The historian of architecture Nicolaus Pevsner, at the Faculty of Architecture of Delft in the seventies despised, but in the world outside quite respected, once wrote: *"A shed for bikes is a building. Lincoln cathedral is a piece of architecture. Almost anything wherein there is sufficient space for a man to move is a building; the term 'architecture' is only applicable to buildings also meant to be aesthetically attractive by the designer."*[c] His dictum exemplifies the tendency of the current history of architecture: following the changes of aesthetic norms during the ages; from the viewpoint that not everything that is built carries equal importance, but mainly what characterises this development. This is certainly true in a book on the general development of Euro-

Examples of the literature on iconology include:
General:

- Bandmann, G. (1951) *Ikonologie der Architektur*. p.67-109 (reprint 1969);

- Sedlmayr, H. (1960) *Architektur als abbildende Kunst;*

- Hartog, E. den (1994) *Bouwen en duiden. Studies over architectuur en iconologie*.

Middle Ages: next to the mentioned Sauer, J. (1924) and Krautheimer, R. (1942):

- Sedlmayr, H. (1950) *Die Entstehung der Kathedrale;*

- Panofsky, E. (1951) *Gothic architecture and scholasticism;*

- Simson, O. von (1956) *The Gothic cathedral: origins of Gothic architecture and the medieval concept of order;*

- Mekking, A.J.J. (1986) *De Sint-Servaaskerk te Maastricht*.

Baroque:

- Sedlmayr, H. (1956) *Johann Bernhard Fischer von Erlach*.

Modern age:

- Neumeyer, Fr. (1991) *The artless word; Mies van der Rohe on the building art*.

a   The *Dizionario Enciclopedico di Architettura*, for instance, devotes just 11 lines to iconography, but to iconology one whole page. Portoghesi, P. (1969) *Dizionario Enciclopedico di Architettura*, p. 134-5.
b   Published course-books may be helpful, like Wilk, B. (1987) *Wie finde ich kunstwissenschaftliche Literatur*.
c   Pevsner, N. (1970) *Europese architectuur, middeleeuwen en renaissance*, p.13. Originally published as: Pevsner, N. (1990) *An outline of European architecture (1942)*.

pean architecture, where Pevsner expressed his opinion. From a documentary standpoint (National Trust) or the one of typology this might be different. The proposition that architecture starts where the manifestation of a building transcends its utilitarian function by its 'aesthetic attractiveness' is in daily life a handy criterion. For the practice of the history of architecture it should only be accepted under conditions.

Theoretic as well as pragmatic objections could be formulated against Pevsner's dictum. The theoretic objection mainly rests on the absolute contrast between a building as an ultimate piece of art (cathedral) and a mere contraption serving utility (bike shed). The Gestalt of a building is always completely inter-woven with the fulfilment of its usage, even in the case of a monument. 'Aesthetic attractiveness', the aesthetic function and norm have a historical character; and is therefore, subject to change. That is the reason why it is not possible in the study of architectural history to fix a nomenclatura of the buildings in terms of 'aesthetic attractiveness' as a normative a priori. The field of inquiry of the history of architecture should be open. The differences in intentions and significance of the buildings should result from the study itself. The pragmatic objections to Pevsner's dictum rest on the fact that during the most recent century and a half the production of buildings has increased considerably and that a range of new types of building on a utilitarian basis has emerged, putting into jeopardy the pre-supposed border between 'cathedrals' and 'sheds'. For the history of architecture this is associated with a widening of its domain of study.

From the problem 'cathedrals versus sheds' it is but a small step to the question 'Is architectural history a social science?'[a] While architecture – buildings – caters for one fundamental basic human need: to provide shelter, the use of the 'shelter' and all problems pertaining thereto are also part of the study. Studies like that fall under the umbrella of architectural history, but even more under that of social sciences. How the result of the study contributes to the knowledge of the professional field concerned is more important. The preceding sketch of the methodology of architectural history may make clear that the social aspects of the commission, the author, the user and the construction company are needed for grasping the meaning of the work of architecture. Where an individual building is concerned, or when a typological study is involved, the history of exploitation is also of importance. The history of architecture makes good use of these data. That does not make it a social science; housing is not a house. In this regard a possible theme for study was already hinted at in 'Context of the originating', but it might as well be much broader.

It is obvious that the history of architecture has as its object of study the past of architecture. However, where does the past cease and where do actual conditions start? This is the problem of the relationship between the history of architecture and the critique of architecture. Both analyse and interpret the work of architecture and judge its quality. Added to that, the practice of architectural critique pre-supposes some knowledge of the history of architecture. The essential difference between both disciplines rests in the temporal distance with regard to the object of study. By reacting to contemporary buildings and architectural concepts the critique of architecture is part of the discussion of architecture today. Playing this rôle, the critique can not only reflect existing notions on architecture, but can also influence them. This involvement is its essential property. However, this involvement with a design of today is not the primary aim of the study of architectural history; at best a possible side-effect.[b] In order to shun this type of involvement *vis-à-vis* the object of study a certain historical distancing is required. It also has a methodological advantage, since contemporary opinions are put in a context not yet visible to co-eval observers. An example of mixing both disciples might be Siegfried Giedion, who as an historian of art was also actively involved with the present as secretary of the CIAM. His history of modernity (Time, Space and Architecture. The Growth of a New Tradition, 1941) gives, for that reason, too one-sided a view of that development.[c] Each historian should draw the border-line of historical distancing for himself; as a rough estimate it could be fixed at one human generation. This does not prohibit that the

General literature:
- Hauser, A. (1951) *The social history of art;*
- Stekl, H. (1980) *Architektur und Gesellschaft von der Antike bis zur Gegenwart.*

Special subjects: e.g.:
- Lützeler, H. (1931) *Zur Religionssoziologie Deutscher Barockarchitektur;*
- Rosenau, H. (1958) *Zum Sozialproblem in der Architekturtheorie des 15. bis 19. Jahrhunderts;*
- Müller, M. and R. Bentmann (1970) *Die Villa als Herrschaftsarchitektur: Versuch einer kunst- und sozialgeschichtlichen Analyse* (English translation: (1992) *The villa as hegemonic architecture*);
- Bollerey, F. (1977) *Architekturkonzeption der utopischen Sozialisten, alternatieve Planung und Architektur für den gesellschaftlichen Prozess;*
- Frommel, Chr.L. (1986) *Raffaels Paläste: Wohnen und Leben im Rom der Hochrenaissance.*

a   The title of a meeting on the *'Kunsthistorisch Instituut'* in Utrecht in the beginning of the seventies. This meeting seemed to be a politically engaged protest against the established history of architecture.
b   See for instance the influence of the publications by Kaufmann, E. (1933) *Von Ledoux bis Le Corbusier: Ursprung und Entwicklung der Autonomen Architektur;* and of Wittkower, R. (1949) *Architectural principles in the age of humanism.*
c   *"We need, I think, to recognise the fact that a historian should try to escape from prejudices of his own period. If he merely sees past architecture in the terms of current aesthetics or fashion he is likely to be a propagandist rather than a historian."* Allsop, Br. (1970) *The study of architectural history,* p.68.

person of a historian of architecture can also be active in the field of critique of architecture and voice an opinion on today's architecture. The relationship between the history of architecture and the critique of architecture presented here is not without controversy, also because of the underlying similarities.[a]

For the study of the history of architecture the critique of architecture and art offers important and stimulating source material for the history of reception, development of theory and changes of the aesthetic norm. An example of such a study is Woud, A. van der (1997) *Waarheid en Karakter. Het debat over de bouwkunst 1840-1900.*

7.6   SIGNIFICANCE FOR DESIGNING TODAY

Between the two no direct link exists. The one keeps itself busy with what has already been created, while the other creates something new. The methodology described can not be used for designing a building, but possibly for understanding an existing building better. The potential significance of the history of architecture rests in this. Since designing never has a *'tabula rasa'* for a point of departure, and never happens by the same token without some previous knowledge – also in negative sense – familiarity with what was written here influences a new design. And what is more: a new design is placed in an existing context. Consequently, a certain knowledge of that context might be useful; sometimes it is required.

To put it concretely, this means that the result of the study of the history of architecture can provide background information on design decisions; as there is knowledge on the typology of architecture and usage and the information on provenance and significance of architectural shapes and motifs. Since the use of typologies, and particularly, the one of architectural motifs is always culturally biased, knowledge of the past is important at the time of a design decision. Of course the designer is at liberty in his selection of utilising this knowledge; it should not have to agree with the mind-set of the study. In the case of restoration and renovation the study of architectural history plays a more direct rôle in solving the problem.

Generally, one may state that knowledge of the past of one's own personal field of professional experience contributes to the 'Bildung' of the designer. It is useful in a way that can not be made clear in advance. In contrast to a medical doctor or an electronic engineer, working in the profession of an architect entails a specific view of the past. Culturally, architecture is not getting better and better, but more and more different. That is the reason why her past can return, time after time, and influence designs of today.

a   Compare Dresdner, A. (1915) *Die Kunstkritik: ihre Geschichte und Theorie,* p.9-10 and Venturi, L. (1972) *Geschichte der Kunstkritik,* p.31-33. Originally published as (1936) *History of art criticism.*

8 MAP STUDY

RIET MOENS

A study concerning the making of maps and a study of how to use a map are two different subjects. Study addressing the making of maps comprises not only collecting data and recording them in a map, but also studying the production of maps (reproduction techniques, usage of colour, legend, readability). A study facilitated by maps often generates additional, new maps.

Recording study data by means of symbols in a map may be compared to descriptive study. Actually, a shape is recorded by means of a token. The meaning of all tokens used is described in a list linking each separate token with a description: the legend. Determining the content of the legend, particularly the variety of data to be recorded and the size, is a problem in conceptual terms as well as in terms of technical production. Studying maps by analysis, comparison and deduction exceeds the recording of shapes by means of well-known tokens or those agreed upon. A study like that comprises a historical study (development) as well as a categorising study (recognition). A design study by means of maps is also a possibility.

In this Chapter, making maps as such is not taken into account. How study data may be recorded in a map and how knowledge from a comparison and deduction of maps may contribute to urban designing are central issues.

8.1 MAPPING THE EARTH'S SURFACE

A territory may be documented spatially (without words) by way of a map, aerial photograph, satellite image[a], or a model. We restrict ourselves to images on a flat surface. A map or a remote sensing image is a distortion of reality, since a projection of a spherical surface, in this case a three-dimensional space is recorded. In addition, a map is an abstracted representation of reality. The content of the map is determined by the object of study, like topography, infrastructure, morphology, etc. The data result from measurements in the territory.

The conjunction of study and maps has been extended since the start of the twentieth century with the study associated with remote sensing images. A remote sensing image is a mapping of an environment obtained from a distance, without touching the object physically. A technique often employed is the vertical aerial photography of a territory. These images offer a detailed registration of all shapes present on earth in realistic proportion. A correction of distortions resulting from the projection – from sphere to flat surface – and from the lens technique employed belong to the scientific field of geodesy.

Shapes of the earth's surface may be recognised by the shape itself – like a building or a road – or by a combination of shapes. The images also document the date of the recording; it is automatically included on the image (a photograph) itself. The present generation of topographical maps has all been derived from remote sensing images.

8.2 REMOTE SENSING IMAGES

As a matter of fact, remote sensing images are unstructured material without legends, while maps feature legends, a descriptive list of tokens. The study of remote sensing images demonstrates two different options: production of a (topographical) map, and facilitating study of maps. In both cases recognition and interpretation of shapes is the objective, followed by recording in a document. Differences concern primarily the extent of depth, systematic approach and method of recording. The expertise of the researcher determines the recognition of the shapes. Other capabilities of the researcher, like the power to visualise a shape from above and an extraordinary patience, also play an important rôle. Because a trained researcher recognises and identifies more easily, he will get results more quickly. Knowledge of the territory covered by the satellite images is a great advantage.[b]

a   The aerial photograph and the satellite image have been combined in the concept 'remote sensing image'. These images are being produced with the help of various recording techniques, such as photography, infra red recordings, radar, e.t.q.

b   American Society for Photogrammetry and Ryerson R.A. (1999) *Manual of remote sensing.*
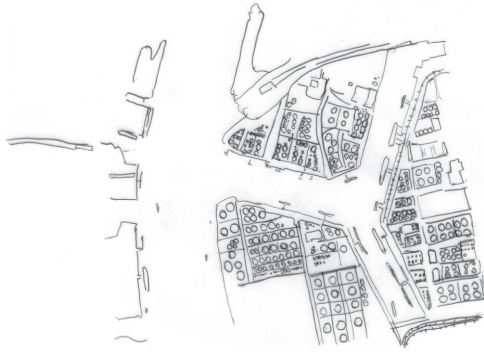
29 Oil port Pernis, Rotterdam. Author's interpretation based on an aerial photograph dating from 1970

1 BUILT-UP AREA		
	1.1 housing	
		1.1.1 detached house 1.1.2 semi-detached house 1.1.3 row of houses 1.1.4 urban villa 1.1.5 appartment buildings low 1.1.6 appartment buildings middle high 1.1.7 appartment buildings high rising 1.1.8 …
	1.2 commercial services	
		1.2.1 shop 1.2.2 shopping centre 1.2.3 shopping mall 1.2.4 hotels, restaurants, pubs 1.2.5 pleasure area 1.2.6 schools 1.2.7 medical provisions 1.2.7 cemeteria 1.2.8 …
	1.3 industry	
		1.3.1 … 1.3.2 …
	1.4 mixed housing and commerce	
		1.4.1 … 1.4.2 …
	1.5 mixed housing and industry	
		1.5.1 … 1.5.2 …
	1.6 mixed commerce and industry	
		1.6.1 … 1.6.2 …
	1.7 traffic and transport	
		1.7.1 … 1.7.2 …

30 Example of a simple determination table

a   A map is a maximally faithful rendering of a part of the earth's surface.
b   A thematic map indicates a specific theme, like infrastructure or soil.

By and large, a study of remote sensing images in order to produce a map is effected as follows. The researcher orders the material and tries, by looking and reading, to distinguish, recognise and identify shapes and structures. Shapes may be recognised and determined by certain characteristics as there are shading or colour, texture, pattern, shape, size, height, shadow, situation or environment. The result is a list of shapes, a preliminary legend. The method of representing the shapes by tokens, or possibly colours, is also recorded. A remote sensing image becomes more than a picture at random from the moment a (preliminary) legend has been drawn up. An ordering typology has been formulated. This typology is strongly determined by the field of expertise of the researcher. The preliminary legend is the basis for subsequent study, the interpretation. Combining shapes, the positioning of shapes with regard to one another and knowledge of a situation add to the content of the remote sensing image at the time of interpretation. The facility of the researcher to imagine a situation plays an important rôle. An example to illustrate: in a harbour area different types of buildings are located; like terminals, shipyards, docks, storage structures. On the waterfront cranes are installed and areas for containers. How would these activities look on an aerial photograph? Is it possible to recognise elements and activities as such?

The result of the operations is a map: a personal interpretation of a remote sensing image. In principle, this map is not objective. By recording the interpretation in a code, the legends, a higher level of objectivity is realised. The same interpretation may then be repeated for another area. In addition the legends heighten the uniformity and precision of the repetitions of the interpretation for other areas. When it becomes clear that no adequate tokens are available to render new shapes whilst interpreting a new area, the legends will be extended with new items. At least all tokens of the map should be present in the legend.

As a result inherent in production of a map – difference in scale with reality, thickness of lines, reproduction of a surface – and the impossibility to reproduce the smallest shapes and elements, they are conjugated, abstracted, omitted and, given their importance, depicted in an exaggerated way. An example of this method of making maps is the topographical map.[a] The topographical map is used as a basic map for the production of thematic maps.[b]

Utilising remote sensing images in the study of an area as a tool or an addition to the maps available is based on recognition and interpretation as well. In fact the same procedure as described is followed. With the help of these images the researcher may determine a further precision and content of the abstracted form, or, if necessary, update the maps with the most recently obtained remote sensing images.

8.3   IDENTIFICATION OF SHAPES

Keys of interpretation and determination tables are used particularly when interpreting remote sensing images. A table helps to identify the shape in an organised and consistent manner. This table may be a written one or pictures with or without description; it can be constructed in different ways. Most frequently employed are a selection table and a table based on elimination. In the case of a selection table the shape is determined by comparing the shape of the reproduction to a standard form from the table. In the case of elimination a selection from different possibilities is made step by step. Proceeding with what is chosen another choice from different possibilities is made by increasing precision. Ultimately, the result should be an unequivocal answer to the question: what shape is this? This method is very suitable for recognition of cultural products like buildings and results of civil engineering. It is also used for the determination of plants.

8.4   THE LEGEND

A distinction should be made between the content of a map and its reproduction or rendering. It is recommended to keep the content of a map as straightforward and unambiguous as possible. Do not combine two totally different studies in one map; make separate maps of the

different subjects of study. These maps may be compared to one another by sieve analysis.[a] Do restrict the number of categories in a legend for the sake of readability. Scientifically well-considered choices must be made where magnitude and importance of the different elements and shapes are concerned. How typical or characteristic these elements and shapes are is also of importance in the study? The choice determines scale and legend of the map. Put differently: the subject of the map determines the 'content' of the legend. The scale of the map chosen determines its level of detail and therefore the number of items in the legend. The content of the study determines the elements that must at least be represented. That is the reason that the content also determines the scale of the map.

Next to the conceptual aspect of the map, technical knowledge on the human capacity to discern is needed. This involves depiction of elements and shapes on a map, use of colouring, grey-tones, and so forth. Knowledge is required on the number of elements that may be distinguished on a map and on the smallest possible element still standing out at the scale chosen. To what extent may elements, for instance, be simplified in shape (straightened) or omitted? What is the importance of an element on a reproduction? What are the limits set to abstraction from reality of a map? Next to this knowledge on human perception there should be cognisance of reproduction techniques, both analogue and digital.

8.5   SCALE OF A MAP

As mentioned, the scale of a map is determined generally by the object of study. The precision of the map is inter-connected with its scale. On a map with a scale 1: 1.000 a road 10 m wide is proportionally represented by a line 1 cm thick. On a scale 1: 10.000 the same road is represented by a line 1 mm thick. At an even smaller scale (1: 100.000) the same road can not be rendered proportionally. However, if we deem this road to be very important, it may be indicated by a token. In that case the legends should mention the width of the road. A deliberately chosen falsification of scale then applies. Measurements on this last map mentioned in order to determine the width of the road, do not yield the correct width of it and are, therefore, not valid. In addition the correct positioning of this road is in jeopardy; within certain margins.

Obviously, maps with a small scale (1: 100.000) can contain less information than maps with a large scale (1: 1.000). On maps with a small scale the shapes have been abstracted and similar or associated shapes are placed in one category. Enlarging maps with a small scale does not yield more information and greater precision. Changing a map with a large scale into one with a smaller scale – the opposite procedure – gives a map with the same information and accuracy, as long as the new map may be reproduced technically. If the reproduction is not feasible the accuracy is at least equal to the one inherent in the new scale.

31   Topographical map of the city of Rhenen on scales 1:100.000, 50.000, 25.000 and 10.000, based on the same aerial photograph[b]

a   Sieve analysis is a method super-imposing maps with the same scale in order to be able to inspect and analyse differences and similarities in mixing, spreading and accumulating spatial components. The method may be extended and refined in various ways by introducing the factor time or potential.

b   Source: Topografische Dienst Nederland
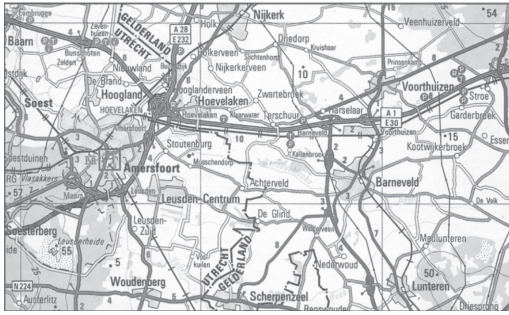
32 Thematical map: the roadmap of The Nether-
lands[a]

8.6 DIFFERENT TYPES OF MAPS

Cartography distinguishes between basic maps – usually topographical maps – and thematic maps. A basic map is a two-dimensional representation of the shapes and elements occurring on the earth's surface. Generally, the basic map comprises the following elements: elevation, water, infrastructure, buildings, land utilisation: forests, meadows, farmland, and so forth. A researcher may use a basic map as a basis or reference for his study. A basic map usually serves as a background for thematic maps. They may be derived directly from the basic map, like a roadmap for motor vehicles, maps for tourists, maps of the distribution of dwelling clusters, maps of waterways, and so on.

One distinct category of thematic maps are maps where the distribution of characteristic non-topographical elements is depicted. Examples are geological maps and maps indicating soil compositions (figure 33 shows different kinds of clay, sand, peat and water), vegetation, population (figure 34 shows units of e.g. 100.000, 50.000, 20.000 people) and statistical deviations. The data for these maps have been obtained by study. They are based on data obtained in the field, or on study of sources in literature.

8.7 STUDY AIDED BY MAPS

Research with the use of maps comprises examination of inventories and source material as well as conventional research methods like describing, comparing, evaluating and recognising problems. Instead of maps, remote sensing images like aerial photos and satellite images can be used for research.
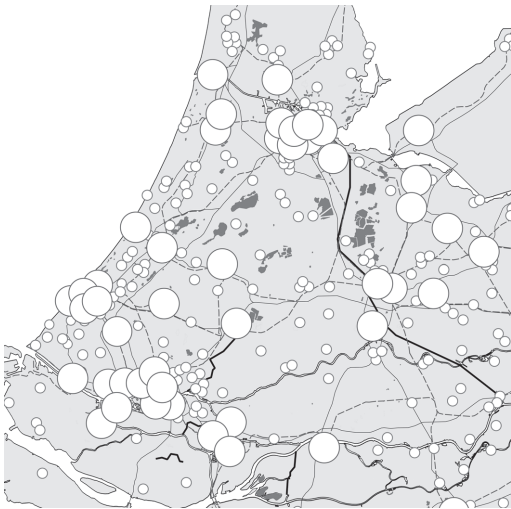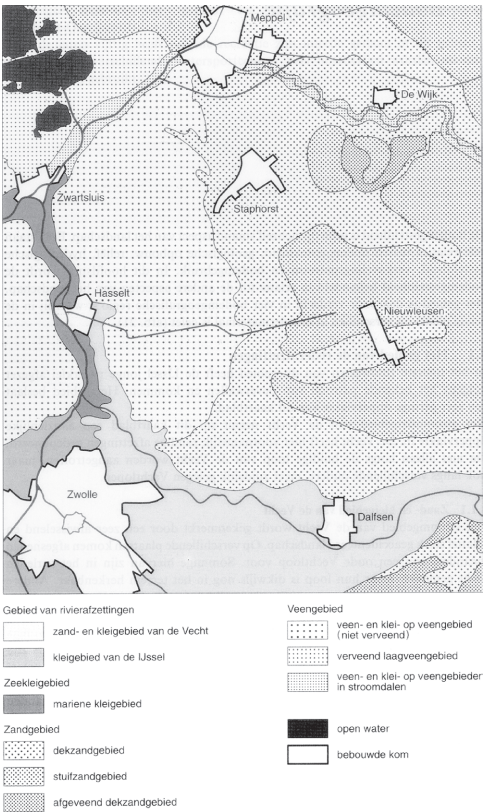
a.   Inventory

This research comprises the following actions, depending on the choice of the subject to be inventoried:
- compilation of material in the form of maps and remote sensing images,
- scaling the maps by enlarging and reducing
- studying the maps and
- processing the research conclusions whether or not in map form.

33 Thematic map: soil composition based in data obtained 'in situ'.

34 Thematic map: dispersion of the population

Gebied van rivierafzettingen
- zand- en kleigebied van de Vecht
- kleigebied van de IJssel

Zeekleigebied
- mariene kleigebied

Zandgebied
- dekzandgebied
- stuifzandgebied
- afgeveend dekzandgebied

Veengebied
- veen- en klei- op veengebied (niet verveend)
- verveend laagveengebied
- veen- en klei- op veengebieder in stroomdalen
- open water
- bebouwde kom

a   Source: Topografische Dienst Nederland

The subject of the inventory determines the contents and the legend of the newly generated map. The inventory is in fact a recording of forms in signs. A description of a form is recorded by means of signs. Normally a topographical map is used as a basic map, because this map is an objective representation of the reality. In fact, these maps could be denominated as second-generation maps.

b. Historical study

When carrying out a historical study of maps, besides an inventory, a comparative research is carried out. The transformation of a form in the course of time is subject of study. The research is normally carried out using topographical maps of varying ages. The map material can be supplemented using aerial photos if required. For clarification purposes maps other than topographical maps are studied, like watercourse maps, property maps etc, using the topographical map as background. Besides the comparison of various historical maps the maps also undergo other processes. Data from various maps are placed under one denominator where possible and recorded in one map. The maps are supplemented with details from written sources where required. For example in the case of research into soil contamination, details from chemical soil research and municipal permits of the companies established in that area are used.[b]

c. Comparative study

Historical comparative study can be supplemented with an interpretation of the maps. Anomalies and similarly formed elements are recognised and established during this study. This way striking topographical elements like parcelling, watercourses, classification and forms of settlements are more closely examined. An attempt is made to find explanations for the characteristics found during the interpretation. These explanations can be based on the comparison of a thematic map like geological and soil maps, groundwater level maps and contour maps. Written sources like taxes, purchase reports of grounds, etc. can also clarify characteristics. The explanation of characteristic elements can result in research of the tolerated deviations within the form. In this manner the archetype of the form can be established. Using this archetype comparative study can subsequently be carried out regarding existence and distribution of this type using other maps. A good example of this is the landscape arrangement, which here in Holland was made using parcelling and settlement structure as a basis.[a]
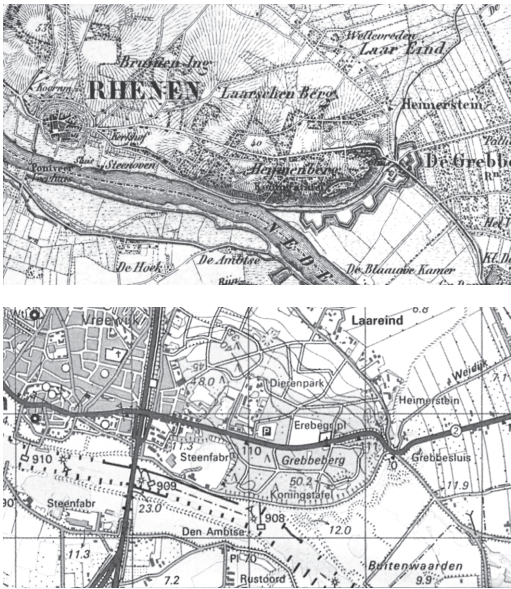
35 Comparison of Rhenen between 1850-1865 and Rhenen around 1987[b]
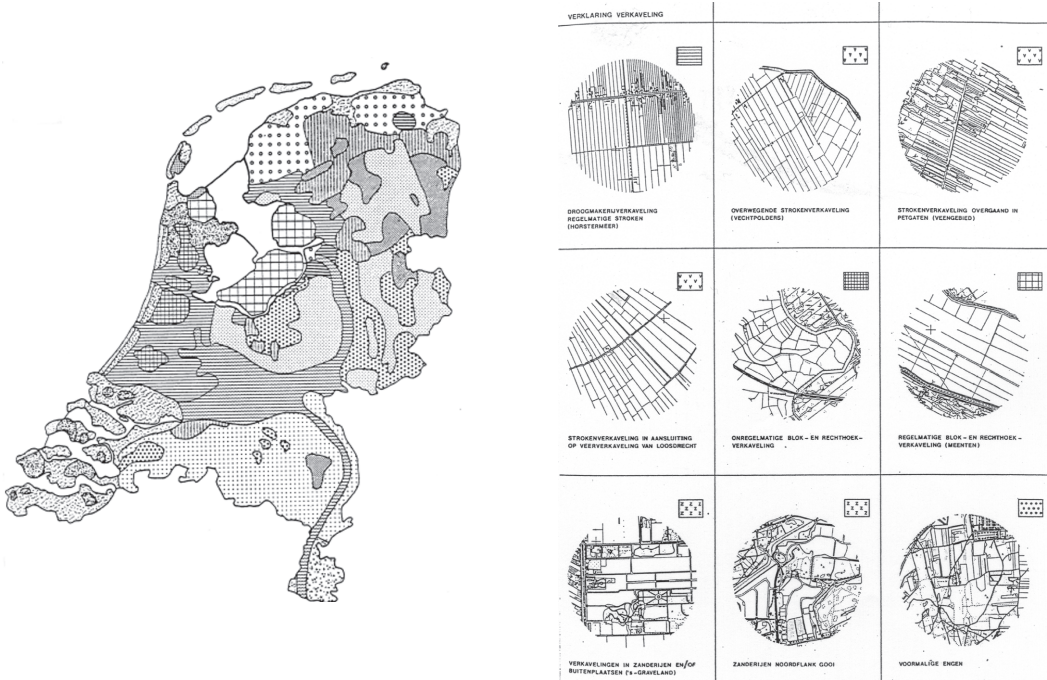
36 Parcelling of The Netherlands according to Hofstee and Vlam (1952)

37 Legenda by image[c]

a   Hofstee, E.W. and A.W. Vlam (1952) *Opmerkingen over de ontwikkeling van de perceelsvorming in Nederland;* Visscher, H.A. (1975) *Nederlandse landschappen;* Maas, Buro (1981) *Een beeld van het Zuidhollandse landschap, deel 1, 2 en 3.*
b   Source: Topografische Dienst Nederland. See also: Topografische Dienst Emmen (2001) *Topografische dubbelatlas; –* (1996) *Grote provincie atlas 1:25.000.*
c   Maas, Buro (1981) *Een beeld van het Zuidhollandse landschap, deel 1, 2 en 3.*

Sieve analyses can also be used for comparing maps of different types. The analysis can produce a suitability, which may or may not be coupled to a weighing. For example, the result of sieve analysis can be a potential map for agriculture. In Ian McHarg's *Design with nature* (1969) this method is described based upon the applications in the area of town and country planning.[a]

The latest development in the area of sieve analysis is analyses carried out using the GIS (geographical information systems) by computer. Maps are stored in the computer in layers of information. The information per layer is recorded in a grid. Combining or sieving various layers creates potential maps for a chosen function. Using this computer application the size of the grid plays an important rôle in the accuracy of the product. In this way the amount of information stored in the different layers is also crucial for the foundations of the result.

d.   Morphologic study

Carrying out a town planning survey, frequently use is made of images of the area in the form of topographical maps and remote sensing images. This way information about the position and structure of buildings, land utilisation, infrastructure, parcelling, water, etc. is collected. With morphological study the emphasis lies on space in every case. In fact it is not about space itself, but about the elements that form and determine space. The distribution, form and direction of space and space forming elements like walls play an important rôle during analysis. Morphologic research is often augmented with an explanation of the elements through the influence of the physical and socio-economic circumstances and history (origination history).

Key questions in morphologic research are:
- Is the form of space sheer co-incidence or are there circumstances which obviously have had an influence on the form and position of the space and the space forming elements?
- To what extent has history made its mark on the current form of town, village or landscape?

Besides studying and analysing historical maps, explanations are sought regarding form and distribution of the space and the elements which are part of this. A number of forms can be explained from geomorphology and sub-soil, however, the building technique and legislation also play a rôle. Palmboom's study into landscape and urbanisation between The Hague and Rotterdam is an example.[b] The intention of the analysis was not only to clarify in words the character of the area, but especially to illustrate the area using map images. Using a large number of map images it is made clear which form the area has, how it is made up and what it looks like. Aspects involved in the study are (small) height differences, parcelling forms, sub-soil, landscape forms (like dunes with shoreline complexes, rivers with riverbanks, tributaries). How insignificant these aspects may be, they had an effect on the area. The time el-

a   McHarg, I (1969) *Design with nature*.
b   Palmboom, F. (1990) *Landschap en verstedelijking tussen Den Haag en Rotterdam*.

38   Sieve analysis according to McHarg (1969)

INCOME   POVERTY   UNEMPLOYED   HOUSING QUALITY   OVERCROWDING   ILLITERACY
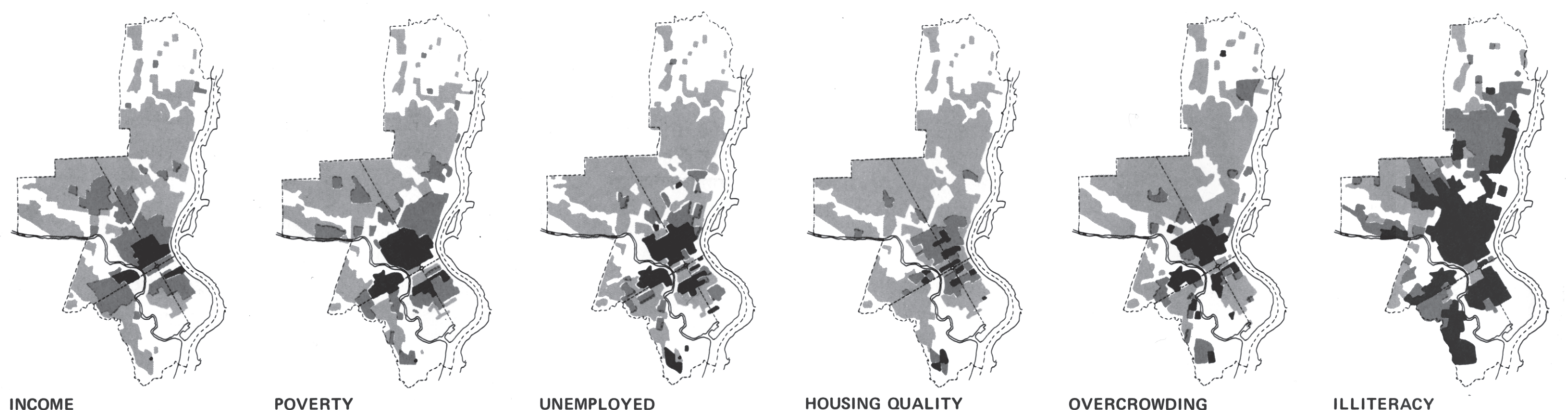
ement arises in an endless series of interventions in the Dutch landscape. Besides the comparison of historical images (time element) with the current situation, attention is also paid to the possible prospective changes. The aim of this analysis is not to freeze current structural images, but is actually for the benefit of the design. According to Palmboom the aim of the analysis is *"to find possible starting points for design proposals in the current situation, which can assist in directing a gradual, lengthy, and partially unpredictable process of change"*.

A similar study was carried out earlier by Buro Maas for parts of South-Holland Province: *An image of the Landscape of South-Holland*.[a] The emphasis in this study is on making the manner of origin and development of the landscape and the accompanying landscape forms, present in South Holland comprehensible. The study serves as a reference frame for municipal and provincial administrations to recognise and evaluate the consequences of intervention within the area - like town expansion or choice of area for a new industrial establishment. Designers can also make use of the landscape details assimilated in this study.
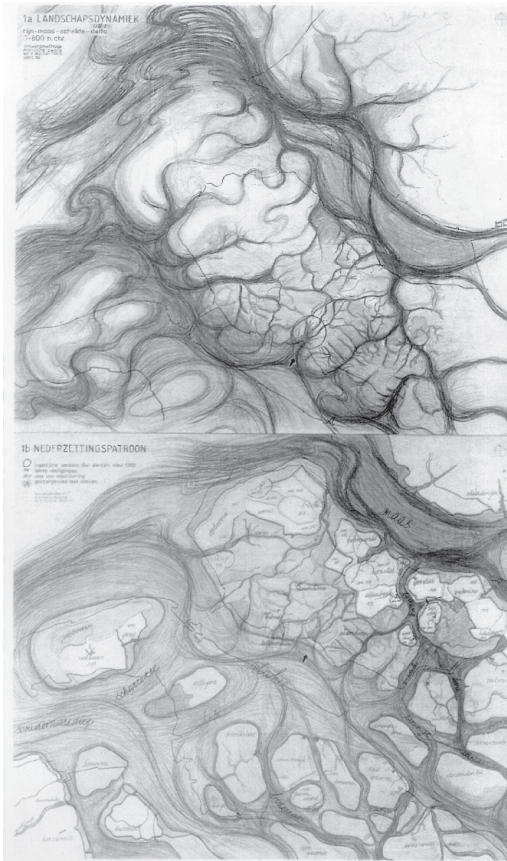

39   Parcelling analysis of Palmboom (1990)

40   Image of the South-Holland Landscape (Buro Maas, 1981)

a   Maas, Buro (1981) *Een beeld van het Zuidhollandse landschap, deel 1, 2 en 3*.

41 Morphological study of the landscape (Reh, 1980)

One special application of making a plan based upon morphological data is the book *How to do it differently* from South-Holland Province.[a] It illustrates how a study into the history of the development of the area surrounding Hellevoetsluis creates motives for designing a rich ecological and greenery structure and an interesting living environment. The planning preparation takes on the course of a creative process, whereby landscape forms are dramatised and transformed. Knowledge of various fields of specialisms comes together in the implementation of the plan. The study shows how a broad development plan takes shape in successive plan phases. A new process is systemising the 'image formation" and making the creative steps of the design process visible. Each step of the design process is explained using an image (map or sketch) and a description.

8.8   CONCLUDING REMARKS

The future of the map lies in digitalisation. The increase of knowledge associated with rendering representations in digital form will contribute to the study of maps and by maps. Due to the increased accuracy of digital representations of the maps expected, a generation of more information by special*ised* techniques will become easier. Aided by geographical information systems (GIS) sieve techniques can be employed more quickly and thoroughly. Digitising the existing body of maps is an awesome task. What should be digitised, and how, involves important decisions.

a   Reh, W. (1980) *Hoe het ook anders kan.*

9 CASUISTRY RESULTING IN LAWS
JUDICIAL ASPECTS OF DESIGN RESEARCH

FRED HOBMA
LOES SCHUTTE-POSTMA

How to arrive at general statements/rules using individual situations (cases) is an important question in many fields of science and in the field of law it is the same.

In this contribution a number of judicial aspects of design research will be discussed: the issue regarding the generation of general rules based upon cases is part of this. We will firstly distinguish between scientific and practical judicial study with respect to building. Furthermore, we will address the unique rôle cases play in law. Some cases can be denoted as 'standard rulings'. In this way a court decision regarding one case is defined as a general ruling regarding a specific area of law. We illustrate this with an example. Finally, we discuss the various levels of scale to be recognised in the ruling on building.

9.1 SCIENTIFIC JUDICIAL RESEARCH

In society many things are not going well, there are problems and also in the extensive area of building: the subsoil appears to be contaminated in many areas in the land, there is a scarcity of locations for new construction, not enough inexpensive living accommodation, 'durable' construction is lacking and complaints are made about newly built houses, etc, etc.

Proposals can be made in order to create new legislation for these problem areas or to amend existing legislation, from different sides (politicians and/or lawyers). A large part of the scientific judicial study lies here. Furthermore, following an inventory of the existing legislation (including the respective legal precedents[a]) and the problems that are not adequately resolved by it, proposals are drawn up for new legislation that should be able to resolve problems. In this way, judicial study, deviating from study in many other scientific fields, is highly prescriptive.

Adriaansens and Fortgens phrase the judicial scientific practice as follows. *"The judicial scientific work, according to many, differs significantly from the scientific work in the remaining fields of social science and natural sciences. It is mainly composed of classification of information, document processing, establishing the scope of legal rules and harmonising the conflicting regulations. In order to do this, considerable amounts of literature, case law, legislation and other regulations must be read and processed. At a higher abstraction level, the aim of judicial scientific practice is the establishment, development and systemising of general legal rule, using general legal principles, legislation, legal precedents and doctrine"*.[b]

With judicial science the emphasis is 'how things should happen', more specifically: directing behaviour using regulations. Our statute, in this respect, is the most important documentation; the way things should happen is laid down by legislation, which is what 'by law' means.

The purpose of laws is to promote positive behaviour, to prevent or punish negative behaviour, to find resolutions for conflicting interests etc. This directing of behaviour by means of legislation is linked to the principle of legality that prevails in our legal system. This principle states that no other restrictions can be imposed on the civil liberties other than those which are equally valid for all, laid down in law by the parliament.

It is legitimate to talk about the 'designing of ruling', since the process has the characteristics of a design process. The term 'designing' often immediately evokes technical associations, but it should not be restricted to them, since designing is not only 'methodical thinking out', but according to its nature, a process of persuading and convincing as well.[c] The process giving rules and the one giving laws are comprising both elements: a set of coherent rules is being 'thought out', but those rules are also legitimised in a political process.

a   With legal precedents we mean: verdicts of judges.
b   Adriaansens, C.A. and A.Ch. Fortgens (1990) *Volkshuisvestingsrecht*, p. 3.
c   Schokker, J.T. (1996) *Wet en informatiesysteem in de maak: een onderzoek naar processen van wetgeving en systeemontwikkeling vanuit een taalspel-perspectief*, p.12,46.

9.2 EXAMPLE OF SCIENTIFIC JUDICIAL RESEARCH

The rather abstract circumscription of scientific judicial research from the preceding paragraph we clarify by way of an example. In the law-giving policy of the last years we are witnessing increasingly and more often that private parties (enterprises, lobbies, branch-organisations) are participating in the process of making rules. As an example one may think of the vast amount of technical norms or normalisation norms to which the Building Decree refers. These norms have been determined for the larger part by the Netherlands Normalisation Institute (NNI). What is actually happening in this respect is legally conditioned self-regulation: the phenomenon is termed 'normalisation'.

The motivation for the government to use normalisation law giving is found in enhancing support and effectiveness of these rules. In addition, because of it the law giving process can be simplified and accelerated. From a judicial point of view, however, the question remains whether it is permitted, on the level of state law, to refer to norms drawn up by private parties in public rule giving, with the aim to make these in this way into rules binding to all and everyone.[a] Another question concerns the intellectual property aspects of normalisation norms. Who owns it in the case of normalisation norms? What is the relation between the rights of the author and the requirement of the potential cognisance of law giving referring to norms, now that in practice the norms are available at the NNI only by way of purchase against commercial tariffs?

Both these questions have been studied by M.H. Elferink in her thesis.[b] She comes to the conclusion that normalisation norms are generally binding prescripts and that they have not come into being in a judicially valid way; since the state law requirement of public cognisance, that rules binding everyone should be published formally and officially in the *Staatsblad* or *Staatscourant* or one of its supplements.[c] The *Staatscourant* does publish the announcements of new NEN-norms, but not their text. This makes the potential to become aware of these rules, a legal requirement of our democratic law-abiding state, too vague.[d]

She also studied what the consequences of this could be for the building sector. Her conclusion is that suing claims of constructors and private persons who had to adapt or demolish buildings on the basis of the rule giving as recorded in normalisation norms might be successful.[e]

In addition she concludes that the normalisation norms of the NNI are not protected by authors' rights, since generally binding prescripts are at stake. By the same token everybody may make them public and copy them (as intended in the Authors' Law). On top of that, these norms should be provided to the users free of charge and should preferably be financed by public means.[f]

The first conclusion is one that must be put before the judge: is the judge also of the opinion – if the question should come on the agenda – that in the case of normalisation norms (like the NEN-norms) rule giving is concerned which has not come into existence legally. The other conclusion regarding authors' rights and the costs can also lead to new policy, if the Law (Minister and Parliament) would endorse this conclusion.

9.3 PRACTICAL JUDICIAL STUDY

Next to the scientific judicial study with respect to building, there is also the practical judicial study with respect to building. In our contribution we assume that the architect under the terms of the assignment carries out the practical judicial study.

For the architect the practical judicial research will take on a form in accordance with the obligations which the Dutch SR (Standard Conditions for the legal relationship between the architect and the client) formulates in this matter: "With the realisation of the assignment the architect must consider the public law regulations, the existence of which is considered to be common knowledge among architects."

a   If this would be juridically illegal, these norms could imply only a recommendation.
b   Elferink, M.H. (1998) *Verwijzingen in wetgeving: over de publiekrechtelijke en auteursrechteljke status van normalisatienormen.*
c   Bekendmakingswet.
d   Elferink, o.c. p. 265.
e   In connection with this questions were asked in Parliament to the Ministers of Justice and the Environment on the juridical status of normalisation norms.
f   Elferink, o.c. p. 273 a.f.

As part of the framework of the application for building permission the architect must carry out the required practical judicial research. Is a building permit actually required or is the work a structure for which an official notification is required? Do the zoning plans allow the intended construction to be built on site? If this is not the case, is it the intention of municipal administration to co-operate with the exemption of the zoning plans? Which on-site demolition regulations apply? Is a clear ground certificate for the construction a requirement? Are specific urban aesthetics regulations applicable? Which regulations incorporate the Building Decree for the intended construction?

Practical judicial research can cover many other judicial aspects. In this way neighbours rights and obligations issues can be presented, for example: can windows be placed on the sidewall of the building, overlooking the neighbour's property? How can an existing easement (for example a right of way) that obstructs the building plan be cancelled? Questions regarding compensation claims can also arise, for example if the municipality only wishes to co-operate to the exemption of the zoning plans under the stipulation that any loss resulting from government planning decisions incurred by the neighbours will be paid for by the builder. Can this be done just like that?

     Pursuant to the SR, it is not a 'standard' obligation for the architect to resolve these practical judicial questions, stated in this paragraph, for the customer. However, he can accept an (extra) assignment for this purpose.

     Various 'tools' exist, which are architecturally beneficial when carrying out practical judicial research. Besides survey work[a] the tools mainly consist of: checklists, models, guidelines, form letters and business forms, example solutions, standard contracts etc, satisfying judicial requirements. Without trying to attain completeness, examples are listed beside.

9.4   FROM CASE TO GENERAL RULING

The Dutch legal system can be found in 'sources of law'. The sources of law are: the statute, international conventions, common law and legal precedents. In this paragraph one source of law will be specifically examined: legal precedents. Based upon the legal precedent phenomenon, we will deal with the question: how can we (in the law) generate public knowledge based upon cases?

     As in many other sciences, law makes use of cases. With the term 'cases' we are referring to, in law: rulings by judges concerning disputes. There are various types of disputes: between individuals(private)/private organisations among themselves (example: not fulfilling a contract), between local authorities and private individuals (example: not granting a building permit) and between the authorities themselves (example: the municipality which does not want to co-operate regarding the construction of a motorway through a nature reserve). Each judicial decision regarding disputes contains besides facts, an imposition of a rule of law.

     In Holland thousands of rulings are made annually. For our considerations it is useful to divide the total of rulings into three parts: (a) un-published rulings, (b) published rulings and (c) standard rulings.

(a)   Un-published rulings

Most rulings are un-published. This means that a written ruling from a judicial authority was produced regarding the submitted dispute, but this ruling was not published in legal precedent magazines; the reason being that the ruling was not interesting enough for judicial sciences and practices.

(b)   Published rulings

A smaller number of rulings are published in legal precedent magazines; rulings of interest to judicial sciences and practices. There are different reasons as to why a ruling is interesting enough to be published. One reason may be that the ruling provides clarity regarding an issue

- Stichting Bouwresearch, ed. (without year) *Praktijkboek Bouwbesluit grotere bouwwerken; leidraad bouwaanvraag*
- Koning, B.M.G. de, ed. (1999) *Arbobesluit voor de bouw; Inclusief diskette met de modellen van het Kennisgevingsformulier, het Veiligheids- en Gezondheidsplan, het V&G-dossier en checklists.*
- Stichting Bouwresearch (1998), *Hoe te handelen bij schade*
- Stichting Bouwresearch en TNO Bouw (from 1992) *BSC Bouwregelgeving Consultatie Systeem.* (CD-rom).
- VROM (1989) *Bestemmen met beleid; nieuwe mogelijkheden voor het bestemmingsplan*
- Vereniging van Nederlandse Gemeenten (1999) *Bedrijven en milieuzonering* (inclusief diskette met afstandentabellen naar categorie)
- Schenke, H.A., W.D. Susanna *et.al.* (1996) *Contractvorming in de bouw; juridisch praktijkboek*
- Meijer Drees, F.J. (without year) *Handleiding Milieuwetgeving; deel 3, 3a Inrichtingen en procedures* (losbladig)
- Infomil (1999) *Informatiebladen regelgeving (Kantoorgebouwen, School- en opleidingsgebouwen enz.)*

a   For example: Recht en Techniek, Sectie (2001) *Recht voor ingenieurs.* Also: Berg, M.A.M.C. van den (2000) *Bouwrecht in kort bestek.*

upon which no ruling was in existence up until that point. Broad announcement by means of publication is then useful. Another reason for publication may be that the court of justice has made a ruling that deviates from the traditional course of previously published ruling in the field of law concerned. Published rulings are sometimes 'annotated', which means: provided with juridical comments. The annotator discusses the judicial aspects of the ruling that are of interest for the judicial sciences or practices, in his note.

(c)   Standard rulings

A subset of the published rulings propels it to standard ruling. These are rulings from the 'supreme judge' in a specific judicial area. In civil law the Supreme Court, in administrative law the Department of Administrative Jurisdiction from the Council of State and in (one category) building arbitration cases, the Arbitration Board for the Construction Companies in Holland. In a standard ruling a Court of Justice makes a ruling considered to be of significant importance for judicial sciences and practices. There are various reasons why a ruling receives the status of standard ruling. One reason may be that the highest court of justice clarifies conflicting rulings from a lower court of justice (district courts, courts of appeal), with its ruling. Another reason may be that the Court of Justice 'fills' a lack of clarity or a deficiency in the law. Another reason may be that the Court of Justice returns to other rulings from the same Court of Justice. It is then said that the Supreme Court (or another Court of Justice) 'switches round'.

Standard rulings are not only published and annotated; they are also collected in special ruling volumes used in practice and education. Standard rulings are also used in judicial handbooks and loose-leaf judicial commentaries.

An interesting aspect of them is that they are strong determining factors for rulings in comparable situations brought before the lower courts: these District Courts and Courts of Appeal will not deviate from the regulations as formulated in standard ruling. Also in practice the parties will not be able to get around them. We see here the interesting phenomenon that public knowledge is generated using an n=1 situation. The legal rule as formulated in one case which was ruled upon by the Court of Justice, becomes a general ruling. We have gone from case to general ruling. More importantly, standard ruling can lead to amendments of the existing law in agreement with the standard ruling. In these cases, this is casuistry resulting in laws.[a]

A standard ruling has a wider purport than an individual case wherein a ruling is made, the condition being that the new cases are comparable with the original situation. Or vice versa, unless there are special circumstances at issue, the lower Courts of Justice (just as the courts of justice which made the standard ruling) will not deviate from the regulations of the standard ruling. This is an important area of work for the legal profession. If the regulations of the standard ruling do not satisfy his client, an attorney will argue, (a) that in this case the circumstances are not comparable with the standard ruling and, therefore, (b) the regulations of the standard ruling are not applicable in this case.

An interesting parallel can be seen for standard ruling with the art of building. Designs and/or buildings can also offer a 'solution' that extends further than the individual building concerned. Likewise, deviations of these solutions can be argued.

The rôle of cases is in Anglo-Saxon countries (United States, Great Britain) even larger than in countries with a continental judicial system like The Netherlands, Germany and France. This is due to the fact that, in the countries stated, a comprehensive system of legislation is in place (Civil Code, administrative laws, criminal legislation, etc.), whereas Anglo-Saxon countries do not actually have a code of law. Their laws are almost fully based upon judicial precedents (cases). In addition, they work with, for example, extremely comprehensive con-

a   Also a special variant of this situation occurs in practice: the standard verdict is (politically) undesirable and the Minister responsible tries to neutralise the standard verdict by a change in the law. An example of this is the ruling of the 'Hoge Raad', the highest legal authority in the country of September 1994. The verdict was that Shell was not responsible for damage in the soil of the Zellingwijk neighbourhood in Gouderak by pollution during the fifties. The Minister of Ecological Affairs, being very disappointed by this ruling, next made an effort to adjust the jurisprudence on soil sanitation in terms of responsibility to the old pollution. This proposal proved to meet with serious opposition in the Senate; and, in the end, the Minister did not get his way as intended.

tracts, for which regulations have been laid down in legislation in Holland. These regulations are applicable in Holland, unless the parties agree otherwise. Therefore Dutch contracts are much more concise than in the United States, for example. In Great Britain the rulings of the supreme courts of justice are used as precedents: the lower courts of justice are formally bound to the Supreme Courts rulings. In Holland, on the other hand, there is no formal (however, there is a practical) commitment.

9.5   EXAMPLE OF STANDARD RULING

In this paragraph we clarify the phenomenon 'standard ruling' on the basis of an example in the field of construction and building. The case concerns the *'Graafstroom* question*'*.

The Monument Law of 1988 gives to the Municipal Executive the right to give permission for intervention in state monuments by way of monument permits. However in order to be able to use this right, the Municipal Executive must obey a condition: the municipality needs to comply with a Monument Ordinance, in which co-operation with a committee for the care for monuments is organised advising the Municipal Executive on the monument permission that is applied for (article 15 of the Monument Law). The Monument Law does not state specific requirements with regard to the number of committee members or to expertise!

What happened in the case of the *Graafstroom* municipality? It had appointed the existing committee of the council of the municipality for Public Works, Housing and Environment as the committee for monuments as well. According to the municipality the members of this existing committee were in their expertise sufficiently equipped to function as members of the monument committee, while they all lived in the community and by the same token aware of the situation surrounding the state monument in jeopardy.

The Council of State (*'Raad van State'*), highest judge in the field of policy law, had to rule in the final and highest instance in a conflict between the municipality and an interested lobby association, 'Bond Heemschut'. The lobby had appealed against a monument permission given by the municipality; it implied demolition of the monument. The Council of State was of the opinion that the composition of the municipal monument committee (members of the Public Works committee) was well under par and ruled that a monument committee may comprise admittedly some members without specific expertise, "provided that the expertise on the field of the care for monuments has been warranted sufficiently by the appointment of other members."[a] In other words: the committee may include members without expertise, but then the expertise should be guaranteed by the presence of other members who can be considered experts.

Although the Law has formulated no requirements with regard to the composition or expertise of a municipal monuments committee, the judge does formulate them. So the judge is complementing the law. The complementing requirement demonstrated by this ruling does not only apply for the monuments committee of the Graafstroom municipality, but for *all* monument committees in The Netherlands. The ruling in this single case has a general effect.

The ruling in the Graafstroom question established new jurisprudence: before this the Council of State had made no statements on the composition of municipal monuments committees. Given its national importance, the ruling quickly got publicity.[b] The ruling was also published in a journal on jurisprudence.[c] In a loose-leaf comment on the Monument Law the ruling is discussed.[d] Finally the ruling is dealt with in educational material.[e] All taken together, we may call it a 'standard ruling' in monument legislation.

An interesting comparison may be made, here as well, between judicial science and architecture. Also in architecture, buildings that may establish a new 'standard' are getting publicity, are being commented on and treated in education. However, it is our impression, that the documentation infrastructure in judicial science has been institutionalised and professionalised

a   Ruling Chairman Legislation Department Council of State, November 27th 1991. Published in Administratiefrechtelijke Beslissingen 1993, 133.
b   Cate, F. ten (1992) *Monumentencommissie met alleen gewone raadsleden is niet deskundig genoeg.*
c   See footnote a.
d   Zundert, J.W. van (1994) *Artikelsgewijs commentaar Monumentenwet 1988; Artikel 15, aantekening 3.*
e   Hobma, F.A.M. (1997) *Monumentenrecht.*

better than in architecture. In this respect architecture has something to learn from judicial science.

9.6 SCALE LEVELS IN RULING FOR BUILDING

Just as in architecture, we may discern in ruling for building scale levels; the 'spatial interface' of rules for building may differ on different scale levels.

- As an example the Physical Planning Act recognises (among others) The Netherlands as a whole as interface: structural outline plans may be made going through the Physical Planning Key-Decision[a] procedure. These structural outline plans are making spatial statements in national level.
- The same law is encompassing also the regional level as an interface: regional plans may be formulated with spatial statements on regional level.
- For the level of agglomerations rules exist as well: the Frame-work Law Policy in Change obliges seven specifically named agglomerations to formulate a structure plan. In such a plan the locations of projects important to the individual agglomeration have been recorded.
- For (parts of) the municipal scale level land-use plans can be formulated, pursuant to the Physical Planning Act.
- Urban Renewal Act enables that for certain neighbourhoods an environmental ordering is formulated in terms of well-being.
- On the level of the separate building the rulings of the Building Decree apply, pursuant to the Housing Act. On the basis of the Environmental Control Act an extensive system of general rules for 'facilities' applies there as well.

Although it is possible, therefore, to order rulings for building according to scale level, the ruling for building has not been designed generally with spatial scale levels for point of departure. This does not make consulting rulings for building by architects any easier. Ruling for building is by its very being, quite extensive and thereby hard to consult. Technical and constructional rules exist, rules for materials, rules for urban planning, environmental rules, rules for working conditions of the workers themselves, rules for historic buildings, rules for bidding, rules for professional conduct, rules for judicial relationships between parties in the building process: and so on, and so forth. In spite of many efforts to attain deregulation[b], the rule giving for building remains a vast complex. For judicial scientific study of the building profession this entails, - see also paragraph 1 – that, amongst others, study will continue to be done with respect to the length of the arm of the law-rules and to harmonising conflicting rules. For the practical judicial study on the field of building itself – compare paragraph 3 – this entails that architects and those who build do well to use the tools available to lead the commission in suitable channels.

a   Planological Core-decision. Examples of structural schemes are the Structural schema Traffic and Transportation and the Structural Schema Green Space (with the Ecological Main Structure).
b   'De-regulation' is understood to be here alleviating the pressure of rulings on industry and citizens, particularly as materialised in lessening the number of rules.