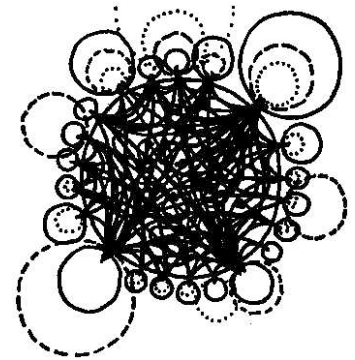

NODES AND NOODLES



Prof. A. van Randen

Inaugural lecture delivered by Professor A. van Randen on Wednesday 21 January 1976 on the occasion of his taking up the chair of Building Construction in the department of Building Science, Delft University of Technology. Originally published by Delft University Press 1976 under the title De Bouw zit in de Knoop.

Just imagine: 50, 100 or 200 families are given the chance to participate in the decision-making about the form their neighbourhood, their street, or their houses should have. They have a say in some of the choices to be made; others are left to them entirely. They have a say in determining the range of possibilities to be offered; and they are free to choose whichever possibility they prefer, in their own sector.

Just a few words, describing a very complex process, a real "business"

It's happening. Today. Still rather tentatively; but it is happening. Some of you may be aware that I am actively engaged in such projects.

Shifting decision-making 'from the expert's desk to the sitting-room table. Is that really possible? Is that what we want?

Another picture.

A new home en built, somewhere in Holland. Developed on the basis of the latest ideas about how to look after a special group of people. The result of 5 years of intensive collaboration.

But in the meantime, the "latest" ideas have been replaced by even newer ones - and it proves difficult or impossible to put these very latest ideas into practice in the "new" home. Ideas cast in stone: imprisoned, inflexible, out of date.

Ideas about life, standards, possibilities are changing. Fast. This state of flux is part of our lives today, something we wi11 have to learn to live with.

Do we take this element of change into account in our building? How far can we? Must we?

Yet another picture.

There is a committee on "dimensional standardization for facade elements" in the Dutch Standardization Institute. The manufacturers of facade elements have a big production potential. But this production is project-orientated. Each project involves new requirements sometimes completely different ones.

It goes without saying that the manufacturers are looking for possibilities of defining the limits of that "difference " somewhat more closely.

So that they themselves can have more say in the nature of their product, and thus realize a more efficient relation between product and production set-up.

A building supply sector which is slowly growing into an independent branch of industry, and is trying to find ways of making the best use of its potentialities. Will they find them? Should they?

Three examples.

Three developments.

And lots of questions.

Questions that can be summarized as follows:

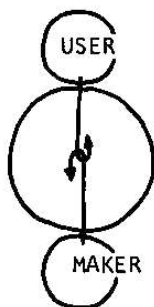
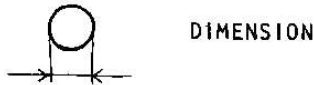
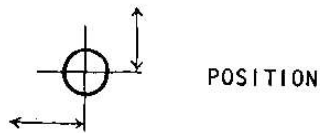
- What should we be building?
- Under what conditions?
- With what tools and materials?

Here in a nutshell we have that much discussed affair, the structural study of the building history.

The answers to these questions are of great importance.

They will also have a great impact on the tasks of to morrow's architects and constructional engineers - and hence on their training today.

I hope you don't expect to hear a complete answer to all these questions this afternoon.



We will restrict ourselves in this lecture to a few recent developments, which we consider to be of great importance - also as regards the questions just mentioned.

Developments in the creation process of our built environment, and in the process of modifying it once it has been built.

Let us have a closer look at these two processes.

If we plan to build or renovate a building, we always have to start by deciding which materials go where.

In other words, we always have to make binding statements concerning the "place, dimension and state of space and materials"

No more than that - but no less either. These statements form a central point in the building process. No matter what the considerations of the various parties involved in the building process may be, they will have to reach agreement about this point before they can go any further.

Now what are the considerations on which such statements can be based?

Roughly speaking, we can divide them into two categories:

- considerations of use
- considerations of production.

In other words, decisions have to be made in the force field between consumer desires and production possibilities.

Means and ends.

But also: profit and loss. What am getting? And what sacrifices do I have to make for it?

Decisions in that force field.

When the user and the maker are the same, the decisions are fairly easy to make.

If you are building your own hut, it is a fairly easy matter to solve the conflicts between your consumer demands and your building potential as you go along.

You improve and improvise on the basis of experience.

It may take generations... a slow evolution. Maker and product "grow" together.

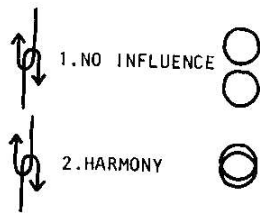
But where division of labour raises its head, user and maker are separated.

One of the first stages is a division of labour based on the development of a specialized tool, permitting more efficient use to be made of muscle power.

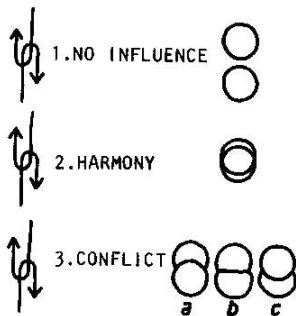
But the maker still designs the product himself. He decides on the basis of experience. In consultation with the user. And in direct confrontation with the creation process.

However, the dichotomy between considerations of use and considerations of production becomes more clearly apparent now.

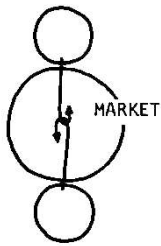
It may be that these considerations do not influence one another.



Alternately, they may harmonize: coincide, partially or wholly.



But they may also conflict; and in that case, the question is who gets dented. Who gives way? The user, or the maker? Or both? It should be realized that such a conflict only arises when one of the parties, or both, departs from what is "usual" From what has grown up, often on the basis of years of use and experience. *Conflict is the child of change.*

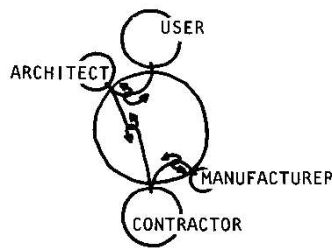


Who has to give way? When user and maker are separated, two more "parties" are created.

These parties interact via some kind of barter mechanism, or on some other basis. A "market" is created - literally and figuratively. On this market, a solution may or may not be found to a conflict (if there is one). The parties reach agreement. Or they don't.

It follows that the more "change" there is, the more activity is generated on the market. As we shall see in a moment.

Division of labour and specialization continue; the tempo speeds up - especially during the industrial revolution. The designer, the architect, enters the scene. Designing becomes more and more separate from making.



A separate party has appeared, between the user and the maker. He "represents" the user of the building to be made. And, all being well, his design will realize an optimum balance between profit and loss for the user. Between considerations of use and considerations of production - taking the market situation into account.

It is about this time that the production of building materials and carpentry in specialized workshops or factories makes its appearance.

Initially, all parties are still fairly firmly embedded in "conventions" in this situation. In generally accepted standards and customs. In "you do this like this", and "you do that like that". The regulating action of the authorities in technical matters was therefore still limited.

It is true, "conventions" change, but all parties concerned could keep pace with these changes.

Until the 1950's, "designer" and contractor still learned their "trade" from the same books. In the Dutch situation, this meant Wattjes. And later Jellema, Meischke and Müller. But that was the last standard textbook (albeit a very bulky one) which contained all the answers.

That simplified communications.

My father, who is 81 now, still built from a 1:100 scale drawing. That's all he had.

There were no prescriptions concerning standard details; all details were standard.

And then, in the '50's, the tempo of change began to rise, almost imperceptibly at first.

This was the start of what proved to be an almost explosive development of know-how and its applications. With all the attendant consequences in the social sphere.

On the "users" side, new ideas about living and working grew up.

On the makers' side, new materials, new equipment, new methods and possibilities.

On the market, new relations, new parties to the bargaining.

The changes were many and varied.

We will have to learn to build on this basis. "Building and indeterminacy" was the title of a recent degree dissertation.

Will things go on this way? Won't a stop to, or a drastic cut in, economic growth not have a stabilizing effect?
It could.

But it is unlikely that another important source of change science - will cease its stimulating activities.
And even fundamental re-thinking in this field would doubtless lead to a flood of changes.

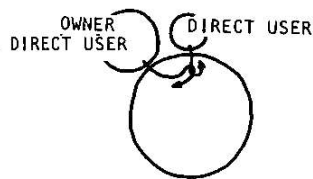
Look at the new thermal insulation standards. A drastic and radical change.

User - architect - contractor. That was the stage we had reached.
What is the situation now?

Let's have a closer look at the user first.

"The user ... it's not as simple as that any more. We are gradually being forced to recognize several categories of users. On the basis of different interests. The basic distinction is that between:

- owner
- and
- direct user

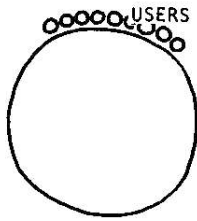


In the old days, often one and the same person. And even if they weren't, there were well established conventions governing the relation between them. Generally a patriarchal relation, with the owner- the landlord laying down the law. Now that things are changing at a high tempo in everybody's field of Interests, the contradictions are becoming apparent.

For example, the scale of exploitation and management of real property is increasing. While the direct user remains an individual though he may have difficulty in remaining himself, in not getting snowed under in the decisions made "for" him. He wants to have a say in his

own lot; and to take the decision himself in certain cases. He doesn't want to be a cog in the wheels. 100 families round the bargaining table. In the "market".

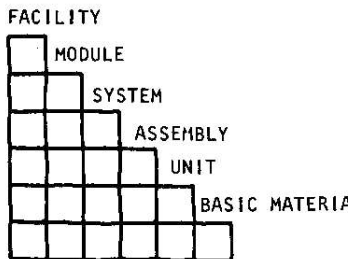
And there's yet another category of users. We could call him the "indirect user".



He's the one who has to live with the building, to undergo its influence, without being the owner (landlord) or the direct user. Literally the man in the street. Direct user of his own house; indirect user of that of his "neighbour" Herr again, conventions are being blown away. So once again, more chance of conflict.

Can his interests only be protected by the authorities? Or can he have a say in things too? Participation for the indirect user?

And now the makers' side of things.



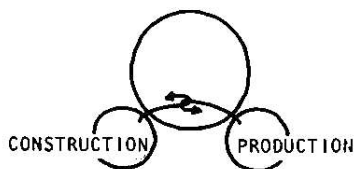
A dichotomy is becoming more and more apparent here. Between making on the building site and making in the factory.

A diagram was brought to our attention recently. It was an attempt by Sweets Catalogue to reclassify building products.

Just in case you didn't know, Sweets Catalogue is the American builders' catalogue system, with a place for every builders' product that comes on to the market. Building in America without Sweets Catalogue is unthinkable.

Apparently the old classification was no longer adequate. And that shows that something's wrong somewhere.

Sweets started as a catalogue of building materials. And that's how everything was classified until recently; as building materials.



But more and more composite products are appearing on the market. So Sweets makes its new diagram to deal with them, arranged on an increasing scale from basic material to facility. With the unit, the component and the module in between.

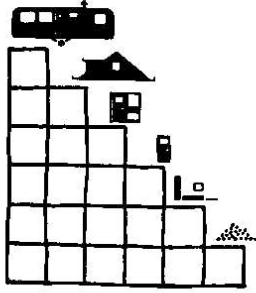
Making on the building site.
Making in the factory.

Two manufacturing sectors, each with its own possibilities and impossibilities. And, we think, that's reason enough to make a verbal distinction between them. Between *construction* and *manufacture*.

"Construction" - putting the building together on the site. "Building products" - everything brought to the building site for the construction work. "Manufacture",

making the building products.

Building products from a pile of sand to a mobile home and everything in between.



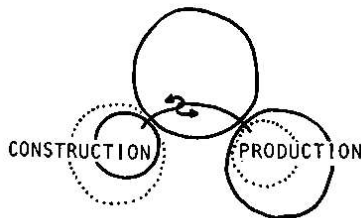
Building products thus have a very wide range of properties especially as regards the value added during the construction process. To make a building from its components.

Manufacture and construction.

The production process may exhibit the characteristics we regard as typical for industrial production. The construction process cannot - at least as long as we take as one of the basic features of industrial production that the product moves. Past the means of production.

The idea of "industrial construction" does not fit into the conceptual framework we have developed here. Of course this does not exclude the possibility of a certain degree of industrialization of the construction process.

This degree of industrialization of the construction will increase as the value added during the production phase increases relative to that in the construction phase.



A dynamic equilibrium. Dependent on many different factors. An equilibrium that should be able to adjust itself as flexible as possible to changes in circumstances. In both directions.

The construction sector.

Tied to a given place. Tied to a given project. A travelling circus. With its own typical possibilities and impossibilities. In the interests of cutting costs, it may be advisable to employ building products which involve little added value during construction: assembly kit construction. This may be advisable; it's not inevitable.

The manufacturing sector.

There are possibilities for industrial production here the - more so as the initiative for production becomes less tied to a given project.

No wonder more and more "off the hook" building products are appearing on the market. Generally "finished" products, embodying many different design decisions – more so as more functions and facilities are integrated into the product. Decisions which used to be made by the designer of the building, and which he now has simply to accept. Or not use the product.

It will at least be clear, in our opinion, that we have to take the production sector seriously.

It may well be that the manufacturing sector now determines the design possibilities much more than the construction sector.

Feedback between design and construction. The burning topic of the 'sixties. Because of the higher tempo of change. Both in design and in constructional techniques.

Have we reached the stage where feedback between design and manufacture (in both directions, of course) is possible? It's about time it was.

Construction and manufacture. Another two parties who have to learn to live with one another, and who certainly haven't mastered that art yet. There's too little effort to see how the other half lives (and works). Still too much tendency to pass the buck instead of concentrating on the other man's possibilities and problems.

Another development on the makers' side: DIY (do it yourself).

Part of the "construction" sector in our picture. User and maker the same. Small-scale demand coupled with small-scale construction work.

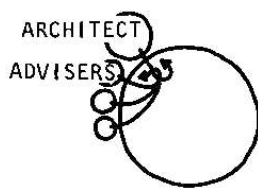
In parallel with this, we have a bit of the production sector: DIY building products. The sale of these products has achieved an enormous turnover: 1500 million guilders (about US\$ 600 million) per annum at present, and currently growing by 15 to 20% per annum.

These DIY developments have even had their effect on "normal" building. I recently read an interesting claim in a Dutch Ph.D. thesis:

Products typically developed for the clumsy do-it-your-selfer will come to be used more and more by the skilled building worker'

How about the architect?

Until the 'fifties, he was likely to be assisted by at most one adviser, for the support constructions.



What's the picture today? Division of labour and specialization have proliferated under the influence of the enormous explosion of knowledge and the creation of all kinds of new experts.

Here are just a few of them: sociologists, social psychologists, educational experts, costing experts, organizational experts, glazing experts plastic experts, insurance adjusters, environmental experts. You name it, there's an expert for it.

Partial knowledge. How do you integrate it?

Besides, in whose interests are the experts working?

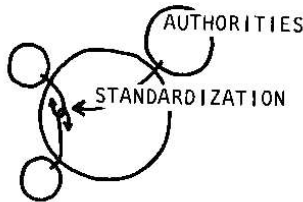
Moreover, the experts add their own dimension to these interests, reinforcing or attenuating them by their expertise.

The use sector divided up between various parties, each with its own interests.

The manufacturing sector divided into two parts, each with its own typical interests.

In the design sector, a great many sub-sectors and partial expertises - and the whole no longer embedded in conventions. In a constant state of flux, due to the high tempo of change. Interactions in all directions.

Within the building process, but also in interaction with the circumstances "outside" the building process. Slowly but surely, a most complicated interplay of forces has built up. Is it any wonder that the authorities have become more and more involved in this whole set-up? In order to maintain a "proper" balance between the various interests involved.



But are there any conventions about what is "reasonable" here? Views on this subject are in a state of flux too. In constant development. In the last analysis, this is always a political matter.

This means that an analysis has to be made of the balance between the various political forces involved - at least insofar as they are of influence on ends and means in the building world.

No one can deny that the authorities are deeply involved in the interplay of forces in the building world. At most, one can differ about the extent to which this involvement is desirable. And that again is a political matter.

This is particularly true of the question as to how far the housing market should be controlled. The land market, what may be built and what may not, price controls, who is to get served first in case of shortage, who is to get subsidies, who is to be protected, etc., etc.

A balance of forces. Lots of government regulations which represent the crystallization of decisions concerning that balance.

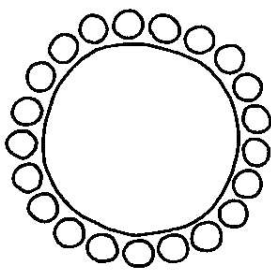
In fact, these are all design decisions which have been brought before the public eye (and decided by the public's representatives. With a very important bearing on design possibilities.

The regulations we have to follow.

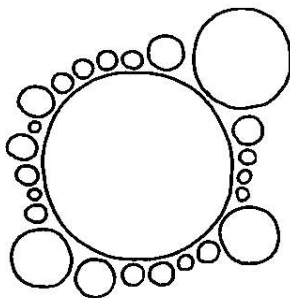
Most of these regulations arose in the time when the increasing rate of change in social affairs was causing chaos. As a result, they by no means form an ordered whole. Indeed, they sometimes conflict with one another.

In any case, they do not form an adequate framework for change ... all too often, they obstruct change.

What is the over-all picture of the decision-making process in the housing field that arises from the above considerations? We could characterize it as follows:

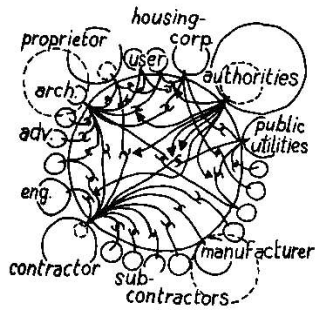


- *a multiplicity of interests*

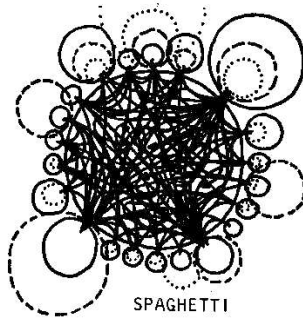


- *varying weight of these interests*

- a multiplicity of relations between interests of varying weight.



- intensive interaction between the various Interests, with some considerations and decisions often being tossed to and fro several times between the parties involved.



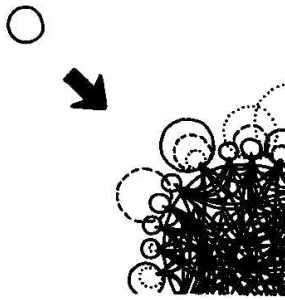
Decision-making, A complicated process of weighing up conflicting interests. You could say that the decision-making process currently runs a risk of pollution being clogged up - which makes it a very expensive matter.

taken.

We call this the spaghetti effect. If you pull on the end of one piece of spaghetti, you get movement at the most unexpected places on the plate. Once you start noticing it, you can hardly stop. Maybe that is the beginning of wisdom. Insight into how to reduce the spaghetti effect. We'll come back to that in a moment:

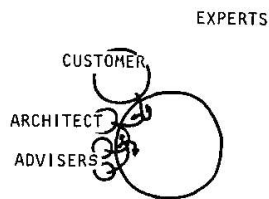
One thing is clear, anyway:

Apart from the "user" and the "maker": the decision-making process in housing has become an important independent factor which has to be taken into consideration. Considerations about decision-making. Considerations which help to determine the aspect of the finished buildings. A possible source of restrictions. Or inspiration.



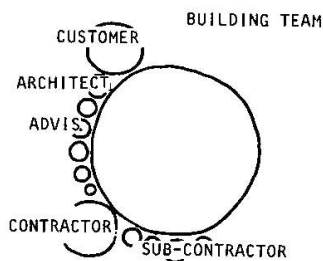
We have come a long way from our starting point, where user and maker were one and the same person. Is there any way back, without losing all we have gained? Combining small-scale needs and small-scale building with large-scale needs and large-scale building.

Possible ways out of this situation. Before we say any thing about that, It is worth while spending a moment considering what we are doing at present. How we keep the situation In hand today.

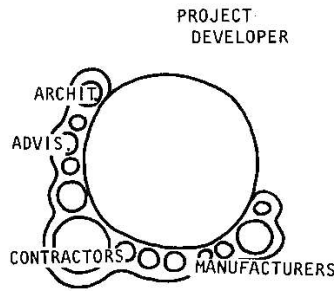


A few examples of ways these attempts have developed.

- The customer surrounds himself with more and more experts. Sometimes the architect occupies a central position here, and sometimes he doesn't. But the explosion of knowledge and changes makes this an *expanding* universe.

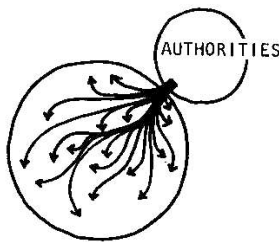


- The building team. Arises when the gap between the changes In use (and hence in design) and those in building becomes too great. Not a solution in itself.



The "all eggs in one basket" theory.

Often used as an argument for the project developer or conglomerate, where project development, financing, construction and manufacturing are all under the control of one party. Basically, however, this does not solve the problem sketched above. Incompatibility of considerations, spaghetti effect and all their consequences just make themselves felt within the conglomerate.



- Call in the organizational consultants. Of course, they have their work cut out in this complicated situation: the more complicated, the more work for them. But they rarely do more than organize the *status quo*.
- The authorities intervene in the decision-making process. We've just been talking about that.

ROOM FOR:

-CHANGE
-DIVERSITY
-DIRECT USER
-PRODUCTION SECTOR
-CONSTRUCTION ↔ PRODUCTION
-DO IT YOURSELF

A few thoughts about more effective ways of directing our sights towards the situation in the building world we have just sketched.

In our opinion, room needs to be created for:

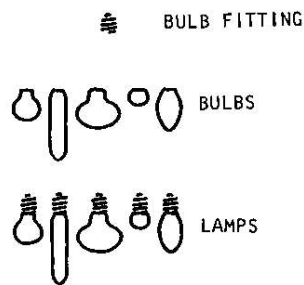
- *change*, flexible procedures for adapting both decisions and buildings to change in circumstances.
- *diversity* in demand and supply
- more say for the *direct user*
- more scope for the *production sector* to make its production decisions itself
- *a dynamic equilibrium between construction and production*, with flexible adaptation to changing circumstances in both directions
- the *DIY enthusiast*, and other forms of small-scale building enterprise.

Six desiderata. One choice. And hence one standpoint, which determines the direction of our search. All these desiderata have one requirement in common:

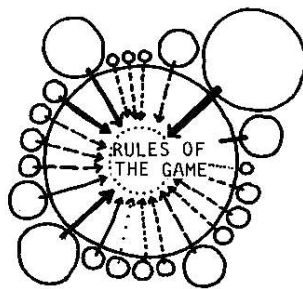
the need for fragmentation - splitting up - of the decision-taking process ... and hence of the object about which the decisions are taken.

Divisibility. That's only possible if the spaghetti effect can be reduced, i.e. if decisions can be uncoupled ~ from one another, so that unpredictable side-effects can be made predictable.

Uncoupling decisions from one another.



Paradoxically enough, this can only be realized by coupling certain decisions together by agreements; by deciding on the "rules of the game" beforehand and keeping them. Rules about the matters common to the various issues about which decisions have to be taken. Rules which fix the degree and manner of coupling of one group of decisions with another. In other words, we want *ordered divisibility*.

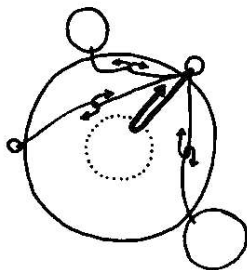


But:

The rules of the game should fix as little as possible, freedom of decision should be left at a maximum. And the number of rules fixed should be no greater than strictly necessary: economy of agreements.

We need agreements about the bulb fitting, but not about the bulbs. Where we need agreement is at the interface, the boundary regions.

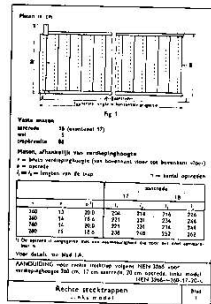
It is in these "rules of the game" that the different parties find a common ground. Accept obligations. They have to reach agreement here so that via the conventions they agree on, the restrictions they accept, they can leave one another free to go to work as independently as possible.



Because each party (in cases where many parties are involved) can get the information it needs out of the of agreements.

In our opinion, it goes without saying that the authorities - the most central decision-makers - have a key role in getting such rules of the game, such a system of decentralized decision-making, off the ground. But in the last resort, political choices will have to be made here.

Let us take one example.



NEN 3266

Some of you will know that wooden stairs for subsidized dwellings are standardized, i.e. there exists a standards sheet where the specifications of these stairs are accurately laid down.

For example, there are straight stairs and stairs with a quarter turn.



STRAIGHT STAIRS



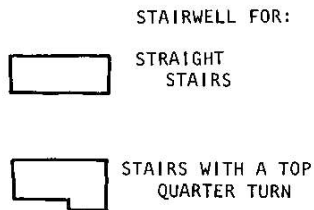
STAIRS WITH A TOP QUARTER TURN



If we compare the standards for these two types of stairs, we see that there is a slight but definite difference between the space requirements in the two cases. The newel and the top tread of the staircase with the quarter turn project somewhat beyond the space required for the straight staircase.

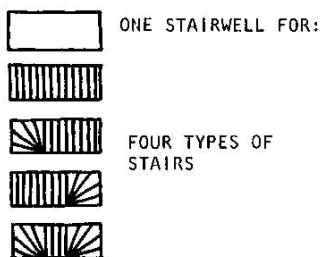
A slight difference; but one which means that the stairwells in the two cases must be dimensioned differently. And the dimensioning of the stairwell has certain consequences for the floors.

This means that e.g. decisions about the floor elements cannot be taken until it has been decided which type of stairs will be used.



Now suppose that we want to leave certain decisions about the layout of the dwelling to the occupant; or we simply want to postpone these decisions. And the over-all layout of the dwelling determines which type of staircase will be used. And the type of staircase determines the form of the stairwell. Then the layout of the dwelling must be determined (e.g. by the future occupant) before we get to the stage where decisions have to be taken about the floors. Moreover, we can change things later if we want to.

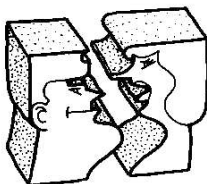
Now this standard was only drawn up in order to permit the making of cheaper ready-made staircases, and not with a view to decision-making. For uncoupling decisions.



If it's efficient decision-making we're after, it would be better to standardize the stairwell. The place where the stairs meet the floors. And to standardize it so that several different types of stairs can fit in one stairwell:

straight stairs
stairs with a quarter turn at top or bottom
stairs with two quarter turns.

PENETRATIVE JOIN



You see:

changing the objectives changes the specifications, which in turn changes the standard.
What we want to do is standardize the technical boundary conditions and not the product. Not the "solution".

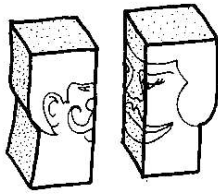
Fix the boundary conditions. Leave the product, the solution free. Free to adapt to developments in demand and technical possibilities. Within the boundary conditions. A balance between freedom and restrictions.

A simple example. I hope it means something to you.

Two important boundary conditions proved to be: space requirements and joints.

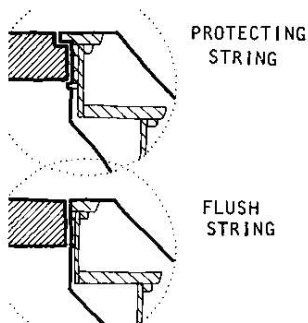
Space requirements. Where you already got something, you can't put something else. Agreements about this you concern the place of a given element and *dimensions*, its size.

FLUSH JOIN



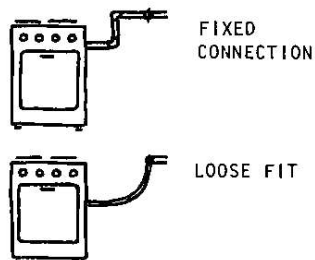
Joints. The fewer agreements the better, as we already said. One consequence of this is that we should not make penetrative joints if we can help it. What we call Jack and Jill joints. Flush joints are better. Make Jack and Jill flush.

As regards the staircase, this means that we should not make the strings project into the floor. It should be *flush* with the floor.



We can go one step further. Avoid joints altogether if you can. There are many cases where a loose fit will do just as well.

The gas cooker is a good example. Building regulations used to specify a rigid connection using metal tubing; now we can use flexible rubber (or synthetic) tubing with a special coupling. Maybe water taps could be connected up in the same way?



Sometimes surprisingly simple. All it needs is a change of approach. Especially from the "experts"

Many of the changes we need in this field are very simple, obvious things. We just never saw them before - before we put on our spaghetti-uncoupling glasses.

When we do put on these glasses, we will notice that the spaghetti effect is often "built into" the product. To the disadvantage of both parties. Even with standardized staircases, as we have just seen.

Parallel divisibility of decision-making and product, we said before. And we saw that this means dividing the dwelling up into segments

This is taken as the starting point for the new draft of Dutch standard NEN 2880, on modular coordination. If our view is correct, the importance of this standard can hardly be over-estimated. On both a national and an international scale. And even though it still has a lot of rough edges which still have to be smoothed down.

This makes it very difficult to understand why the Public Housing Council has advised the minister of housing to leave this development out of consideration when drawing up the new Rules and Guidelines for the building industry.

So that - if that is the way the minister decides - we can just go on talking about standardization of products in the "good" old way - on the basis of a concept of modular co-ordination which in no way lends itself to structuralization of decision-making,

It would be even more difficult to understand if the minister doesn't realize that a political, and not a technical, decision is needed here. What is involved is nothing more or less than a piece of restructuring of the policy-making apparatus. And that means, among other things, more or less participation for the user.

But this is by the way.

In the new draft standard, the building is divided up to a number of "element groups", each of which can be assigned its own place with the aid of "tartan grids"

How are these element groups defined?

" set of elements with the common characteristics"

What are the common characteristics? An interesting question.

What characteristics are important from our viewpoint, that of restricting the spaghetti effect? Here are a number of possibilities:

- *simultaneity* of decisions. Can all decisions about element group be taken at the same time?
- *period of validity* of decisions. Are the decisions all elements of the group valid for roughly the same length of time?
- *interested parties*. Is the number of interested parties as small as possible?
- *production*. Are there possibilities of efficient production for the various elements of the group?

A proper balance will have to be reached between these and possibly other characteristics of the group.

That was a brief look at the new concept of "element group" introduced by the new draft standard.

Modular coordination rather than standardization of dimensions. Aimed first at the process, and only then at the product. every significant shift in approach.

These considerations lead us almost imperceptibly to another concept that is going the rounds, viz that of decision levels.

These decision levels, among other things, are dealt with in the thesis "Measuring with two dimensions", with which a future colleague of ours, Dr. M. F. Th. Bax, gained his doctorate here in Eindhoven last week.

This concept covers much more than the building. It could be used as a basis for restructuring the whole decision-making process covering everything from umbrellas to urban agglomerations, to bring it more into line with the new situation sketched above.

Theoretical investigation will be needed to develop a comprehensive, consistent framework of concepts here. Prof. N.J. Habraken devotes a series of lectures to this subject here in Eindhoven, shortly before his departure for America.

But apart from theoretical definition of the concepts, the purpose for which the levels are to be used will determine the content to be given to each decision level. Practical experiments are being carried out in this direction. For example in Lunetten, a new suburb of Utrecht, where (at the suggestion of the architects) user participation is structured on the basis of decision levels.

Space requirements, connections, coordination of place and dimensions, element groups, levels. All concepts which could help us to give a new structure to the decision-making process.

Now a few words about design methods.

So far, the development of these methods has been mainly an activity for the architect. No wonder that the stress has come to fall mainly in two regions:

- considerations of functional and aesthetic value
- the generation of solutions (the "creative phase").

Two fields of particular interest for architects. They have never been all that interested in communication. Yet, as we have seen, that's an important problem too.

Could this be a "missing link" in the development of design methods?

Statements about the *place, dimensions and state of and materials*, we said at the start of this lecture. That is the point where everyone, and all considerations, meet. A possible starting point for further considerations about design methods?

Apart, of course, from the objectives you are aiming at when you use a particular method. For methods are never neutral.

Statements about the place, dimensions and state of *materials*.

The subject of our professional field: building methods and finishing constructions.

A breakdown in communications between the various parties concerned is sure to lead to trouble here. You can agree to differ about ideas. Space is sometimes flexible. But you can't try to put two *things* in the same place without accidents. And you can't spend your money twice over.

Two facts which fully explain our interest in the spaghetti effect.

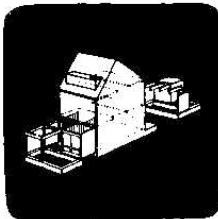
Look at the drawing entitled "A not uncommon division into elements". A simple house, split up into parts. That's the way we do it. That's the way it's done. Someone makes the floors, someone else the walls, and so on. Not all that complicated.

Or is it? Have a look at the next picture, entitled "services in a single-family dwelling". Spaghetti. A maze of pipes and wiring connecting various parts of the house.

Uncoupling decisions.

In our professional field, that means taking an interest in the building nodes. The points where the various parts come together. Where the various decisions have been made. Including decisions already embodied in concrete products.

Not a simple matter.



As students discovered in one of our practical projects. Where the task set was to convert the spatial design for a bare dwelling without finishings, by the architect Haaksma, an assembly-kit dwelling where units could be built in or on, into a material design. Using only ready-made prefabricated products on the market. A casco-system, and so on. It's all there. And arranged so that future occupants can modify the set-up if they want to.

What a problem to fit it all together!
In the building nodes.

Problems of use, of production and of construction all demand attention.

The various builders' products are hardly designed to match. There is a serious lack of information about connection possibilities, adaptation possibilities.

A nice practical example of the spaghetti effect. A decision about the guttering joints has side-effects reaching to the foundations, or the roof ridge line. Or both. The secret lies in the building node.

We had another project of the same type. Each student had to observe what went on round a particular node during actual construction, on the building site. From start to finish. What an experience. What a lot you can learn from that. The spaghetti effect and the building node.

What a reality. There's no doubt about that.

A real eye-opener, to see what you can achieve in a building project with participation, when a team of good people works together well, when people are happy in their work and get on well together... it is incredible.

I was involved not so long ago in an 85-dwelling project. Eighty-five families had had a say in the design. Each house was different, within the framework allowed by the participation, just as no two families are alike. And still not expensive. That meant a challenge to the builder. Do you know what he told me recently? He only had one problem. The men who make these houses had told him that they would never go back to a "dull" old project with 100, 200 or 300 identical houses. They'd had such fun building these houses. And that went for everyone connected with the project. Not least the occupants. Make people free to participate, and you've solved half of your problems.

We have not had time to give more than a few ideas, a few suggestions, this afternoon.

We hope that this will nevertheless be enough to stimulate your imagination, to get you thinking along with us. About the nature of the spaghetti effect. About the possibilities of uncoupling decisions. Because we really need your contribution too.

From people who are occupied with other aspects of design. Such as town planning. Or design methods.

But in particular from people working on the practical, constructional side of the building world. From the production sector too, and the users' sector; and the authorities to mention but a few.

We hope you will know whose door to knock on if you have ideas about this subject that you would like to share. And that we may call on your cooperation if we need feedback from the practical side of things. Some of

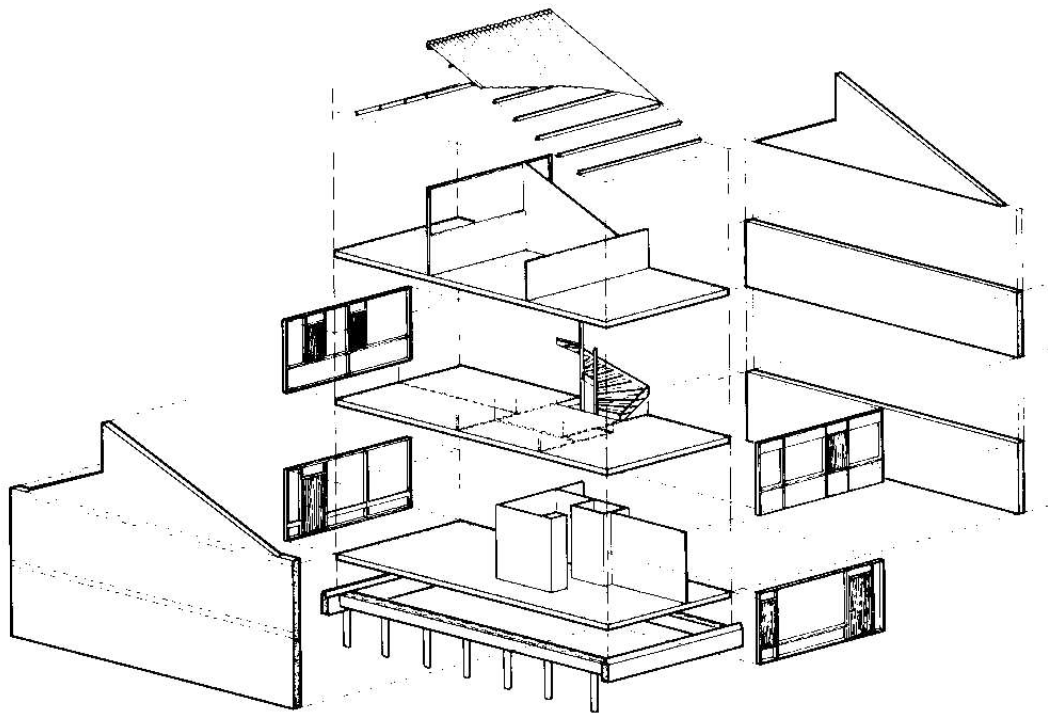
you have already helped us in this way; and I would like take this opportunity of thanking you.

We hope further that our collaboration within this University of Technology, with the Department of Civil Engineering, and with the Department of Building Science of the University of Technology in Eindhoven, will continue to grow.

Our running-in period is behind us now. In this paper, we have presented you with some of the ideas that developed during this running-in period. Ideas about problems which will certainly influence the teaching of building methods and finishing techniques in the years to come.

We look forward to even more intense inter-action with the other members of our Department of Building Science. Because inter-action between people is what counts. In research and education. And on the building site too. Together with 50, 100 or 200 families.

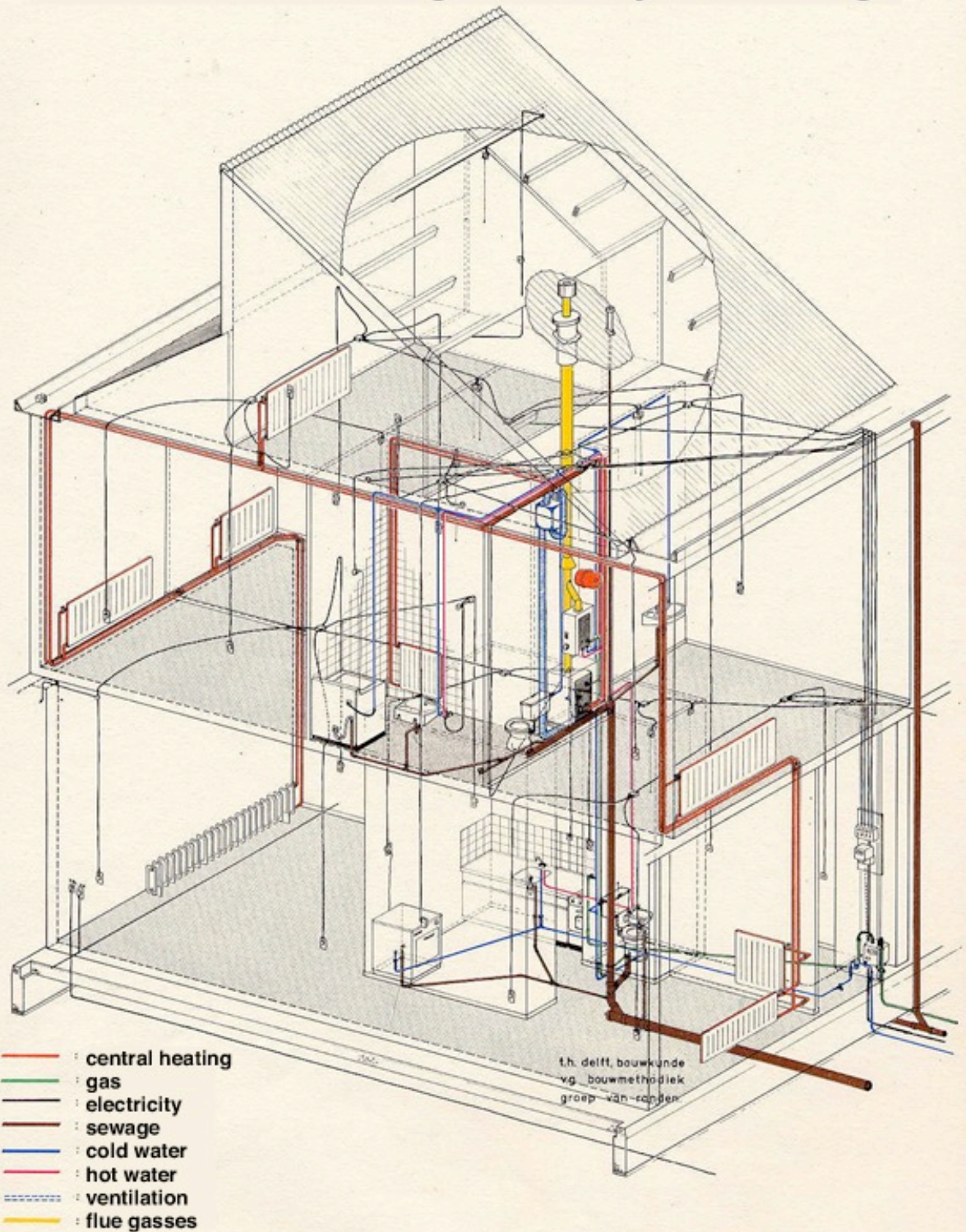
a not uncommon division into elements



simple ?

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services in a single family dwelling



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