



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org



Distr.
GENERAL

ID/CONF.1/G.6
9 June 1967

United Nations Industrial Development Organization

ENGLISH ONLY

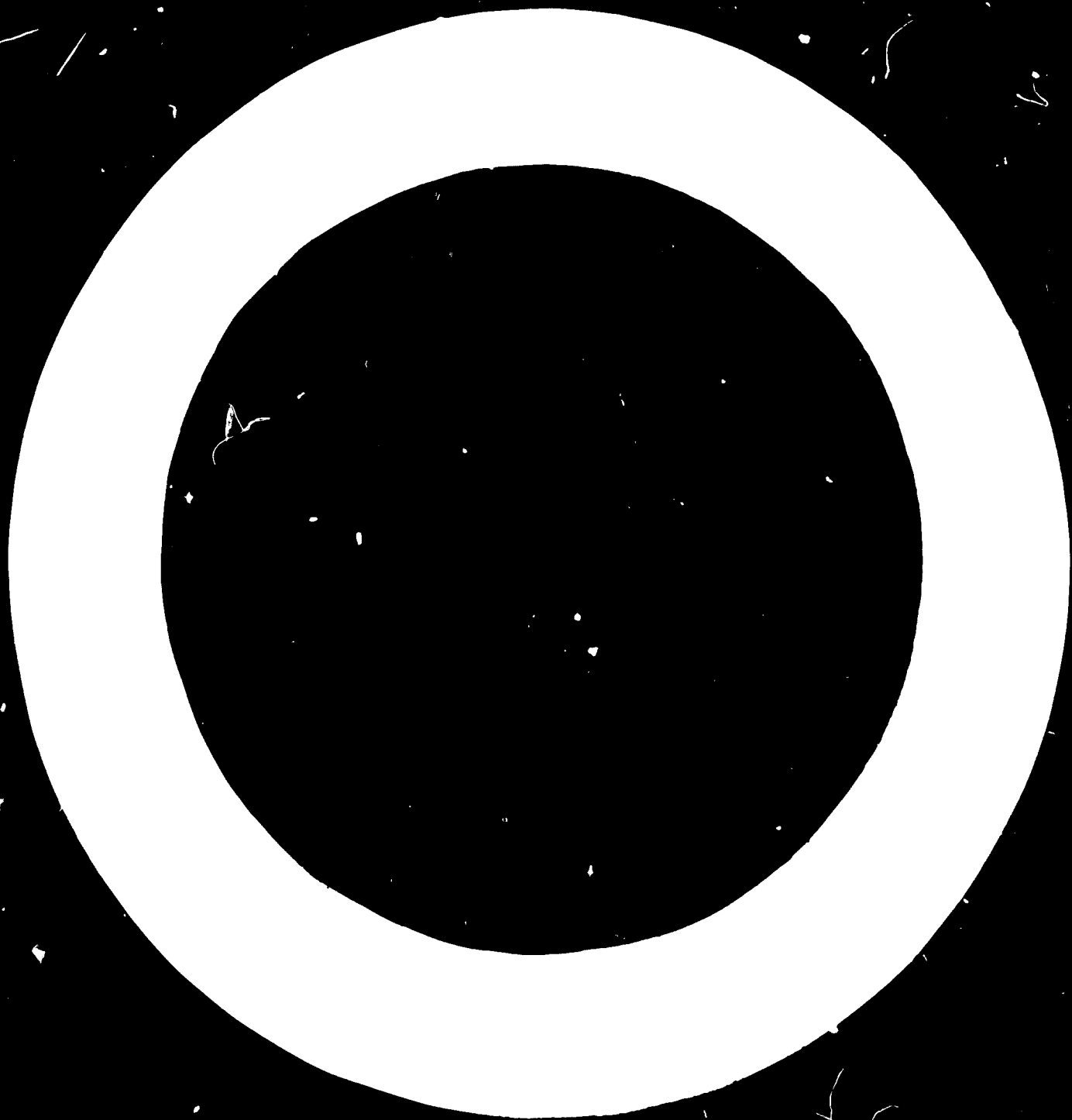
INTERNATIONAL SYMPOSIUM OF INDUSTRIAL
DEVELOPMENT

Athens, 29 November-20 December 1967
Provisional agenda, Item 4 (c)

THE DEVELOPMENT CYCLE APPLIED TO LOW-COST HOUSING

Submitted by
The Government of the Netherlands

D01730



Contents

	page
1. Low-Cost Housing: a vital, urgent and all but insoluble problem	3
2. A perfect Working Method a Necessity: the Development Cycle.	4
3. Dutch Experience with the Development Cycle	8
4. Decisions based on Reality: the Right Start for Developing Countries	13
5. Special Measures to Bridge the Gap	13
6. Training Course in Rotterdam	14
7. The Development Cycle: A New Movement?	17

157100

1. Low-cost housing: a vital, urgent and all but insoluble problem

The United Nations, 6 years ago, announced that the current decade would be called the Development Decade, and expressed the wish that many problems, including the housing problem, would be solved, in the first stage anyway, by the combined efforts of all concerned.

Now that the greater part of this period has elapsed, however, the sobering conclusion has been reached that the housing stock, instead of increasing, actually decreased in proportion to the rapid growth of the population. In developing countries "squatter towns" are seen to spring up everywhere as the normal outgrowths of large towns. An aggravated measure of social discomfort is the result and even public disturbances may be imputed to it, as they often have their origin in slum dwellings.

All this makes for social unrest, unstable governments and finally for a certain degree of disruption which will make further economic development impossible once and for all. What is needed are positive housing policies of the national governments and better national planning.

Economists used to be and often still are opposed to housebuilding activities on a large scale in newly developing countries. This attitude is understandable in so far as housebuilding means investing capital which is in very short supply for a long period of years, whereas investing in other directions makes it possible to earn the invested capital back much sooner while simultaneously enjoying a higher return in the purely economic sense. Even stronger objections are voiced when house building entails the use of foreign currency.

People have gradually begun to realise that the theory of the "Capital Coefficients" is one-sided and that persistently holding to this attitude can entail dangerous consequences. This is particularly true since house building, which already lags behind to a lamentable extent, now has to contend with the chaos caused by the rapid increase in the population and the (pronounced) migration from rural to urban areas.

If counter measures are not taken the ever-growing number of slum dwellings, in urban areas in particular, will seriously threaten the social system.

The down-turn in housing in developing countries just stated is attributable in the first place to the enormous population increase, and in the second place to the accelerated urbanisation and the fact that economic progress is too slow. The industrialised countries are indirectly blamed for part of this trouble as having rendered too little assistance to date, and a general appeal is made for large scale financial and technical help towards a concerted attempt to tackle the housing problem. The developing countries themselves may be blamed for diverting too large a part of the available building volume to prestige building projects.

The Rotterdam Bouwcentrum has been working for twenty years to an ever greater extent on the problem of low-cost housing both in the Netherlands and abroad. It is becoming increasingly more convinced that this is one of the most difficult of all contemporary problems, particularly in developing areas, and that all too often the cheapest building material namely human intellect, is forgotten as one of the means towards a solution. In the underdeveloped area of house building all things are based too often on opinions and too seldom on facts. There is too little systematic coordination in the work and there is a great lack of continuity.

What is required are:

- a positive housing policy as part of long-term development planning;
- basic decisions concerning quality levels founded in economic reality;
- a realistic policy in the spheres of saving and investment;
- physical planning to avoid waste in the use of land;
- a firm stimulation of building research, vocational training and the development of a building materials industry on the basis of local materials;
- a perfect working method in order to attain optimum solutions, in other words, to reach the highest possible level of quality for each price level.

2. A perfect working method a necessity: the development cycle

In the last 15 years, Bouwcentrum and Ratiobouw have been occupying themselves more and more with the evolution of a suitable method. This was done in practice as well as on paper, both in Europe and in other continents, for both house building in affluent countries and very low-cost housing in developing countries.

The method we developed was called the Development Cycle. It proceeds from the following starting points:

1. The combination of low building costs and relatively high quality presupposes a large production of a very limited number of housing types, thoroughly studied and prepared for realisation. To this end it will be necessary to form a combination of specialisations within one single organisational framework, in which all the essential aspects of town planning, function, engineering, economics and management are represented.
2. Plans for mass-produced dwellings are only socially and economically justifiable if they are based on a programme of requirements which corresponds as closely as possible to the prevailing and anticipated essential housing needs, simultaneously taking into account how much the people for whom these dwellings are meant, can afford.
3. The design must not only be attuned to the programme, but also to production, i. e.
 - a. the plans for mass-production of housing must be brought to development by a synthesis of various technical aspects and production techniques:
 - b. like programming and production, designing must be done with an eye kept on costs down to the most minute detail.
4. Efficient mass-production of housing is only possible if allowance is made for the requirements of an efficient organisation of production even in the design stage of town-plans and also in each subsequent preparation phase.

In order to achieve optimum results in fulfilling the above four conditions, it is necessary to ensure not only that the very extensive existing knowledge is put into practice wherever possible, but also that the considerable gaps in this essential knowledge are filled quickly. This requires the team-work of experts in the main disciplines supported by an active, integrated, internationally orientated research, development, consulting and information institute. Necessary account must also be taken of political interest and a close co-operation must be undertaken with professional circles and with the different types of potential client (central and local governments and private investors) in order to be able to organise the demand side.

To fill in the missing knowledge, Bouwcentrum is active continually in three specific directions:

- development of functional research, which defines the essential human needs and their spatial consequences;
- development of specific techno-physical research, which provides a better insight into the existing local technical possibilities and their necessary renewal;
- development of economic and organisational research, which examines the question of how the accommodation which is desired and economically possible is to be created.

The work should be done so systematically that the knowledge is injected in the right place at the right time and that by integration of knowledge and practice and by feed back of experience, mass-production of dwellings of optimal quality is prepared, developed and realised step by step. The application of new knowledge and new experience cannot be left to chance here, but must be organised. This organisation, or in other words the form in which, in mass-production, the steadily improving relationship between quality and costs is realised, is the Development Cycle (fig. 1)

The most important phases, wherein such basic decisions as, for instance, the answer to the question of what quality level is required, have been taken are:

1. The programme of requirements, in which are laid-down, on the basis of market research and functional research, the requirements the developed dwelling should meet, and in which it is established what the future user will be able to pay.
2. Functional Prototype, a specimen of the dwelling manufactured to full scale, but not yet in "actual" structural materials, to test the spatial quality of the functional design of the dwelling.
3. Technical prototype, an improved functional prototype made of "actual" materials to test the technical quality of the dwelling.
4. Experimental series, improved technical prototypes manufactured with the aid of the "actual" production organisation, to test the production technique (assembly methods, assembly sequence, timing of operations, etc.) and the tools developed and to train the labourers and their supervisors on the job. This may be done in the form of a pilot project.
5. Mass-production to realise planned quality and cost price.

6. Determination of use-value for the occupants of the mass-produced dwellings.

Through this systematic development of the standardised end-product and with the aid of investigation into needs, market research, and analyses of technical and economical possibilities of construction, execution and use, together with the building of prototypes, a dwelling type is evolved that lends itself to large scale reproduction. When the high cost of preparation is divided over many thousands of dwellings it appears that a large profit is made per dwelling and for very little initial outlay.

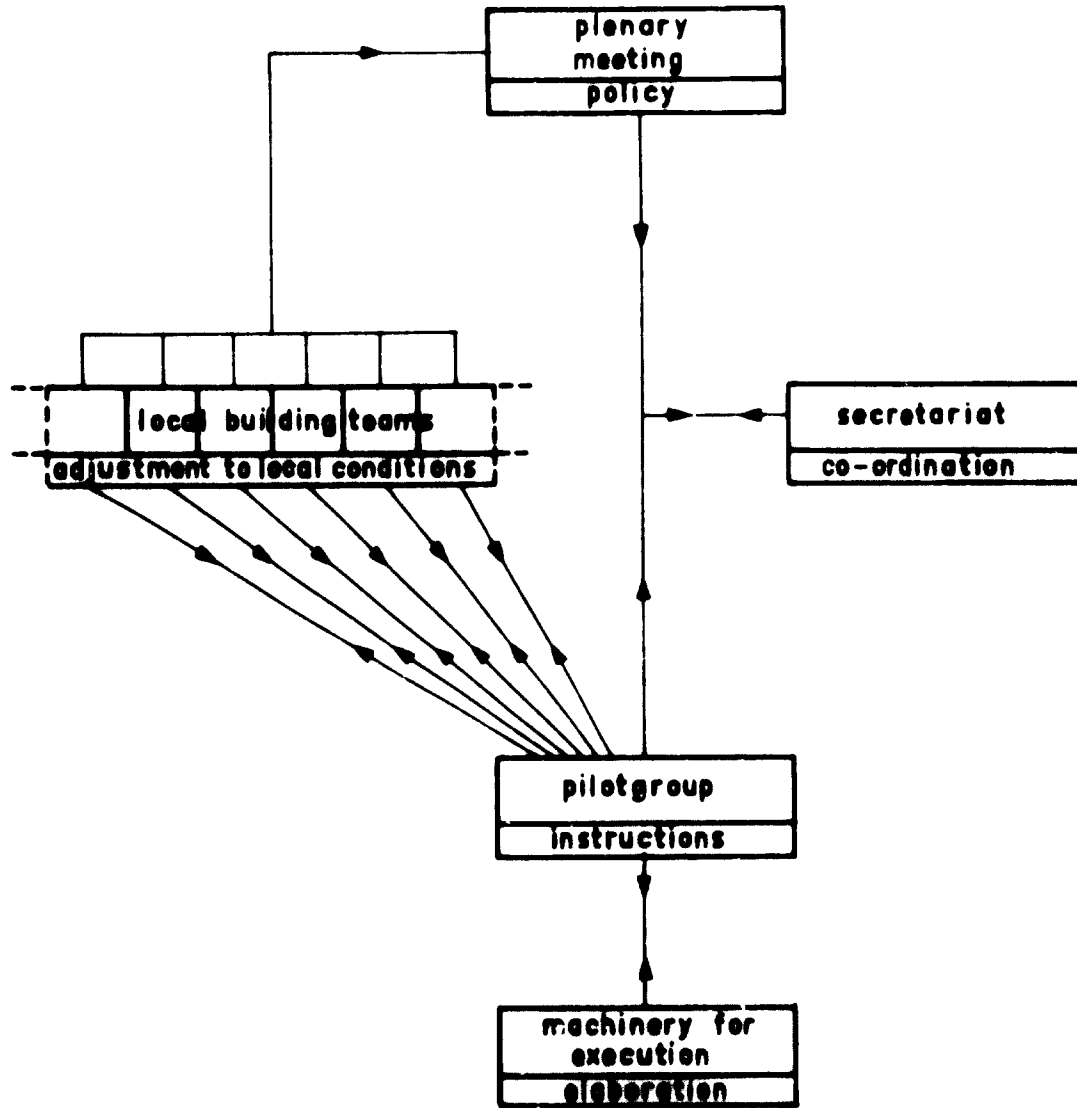
During and after the finishing stage a systematic analysis should be made of experience obtained in the construction and the use of the building, and this experience is then fed back to the programming stage, whereupon a new cycle may be started.

The advantage of co-operative working in the manner as described above, lies in the fact that the consortium of specialists employed means that scientific-technical knowledge of the highest order can be brought to bear on the project. The work, moreover, is performed within the framework of projects whose execution is necessary at relatively short notice. Practical necessities preclude interminable theorising and dictate rapid and firm decisions. The development cycle is not a research cycle but a building cycle.

3. Dutch experience with the Development Cycle

The application of the Development Cycle in the Netherlands commenced in 1965. A national development group was created for the purpose with the aid of the Ministry of Housing and Physical Planning. The group had the task of developing a dwelling in a multi-storey block of flats which would be suitable for realisation in the sector of low-cost housing. The central development of the dwelling design was finished at the beginning of 1966, after having been tested on the basis of a functional model. The experience gained from this model caused some alterations to be made in the design. By this procedure a result was achieved that was gladly accepted by all participating towns, because in the matter of quality it stood out very high above dwellings prepared at the same price by traditional means. (see figure 2). Subsequently, on the basis of an integrated application of the ground plan of the dwelling, the local building teams prepared building plans that were adjusted to local conditions.

Figure 2



In January 1967, the first of these plans, which comprises 748 dwellings, was put into execution. It is expected that about 5000 dwellings of the first type will eventually be built in the 8 participating municipalities. The experience gained in local preparation, execution and occupation will be fed back to the national development group. During the execution the building firms will use, inter alia, a system of quality control in order to keep tight hold on the production process. An example of the results that may be achieved with this system, which was specially created for house building, is given below (see figure 3).

In mid-1967, after a period of internal preparation lasting some six months, a new type of dwelling will be taken in hand (one-family house). Using the experience gained with the first type of dwelling, the following organisational approach will be used for the work on the principle of the Development Cycle.

The task and composition of the various groups in this schedule are as follows:

Pilot group

This group gives instructions, on the basis of the objective decided on in the plenary session, to the working machinery for the elaboration of the following stages of the work:

1. detailed study of the fundamentals (functional, technical and economic);
2. preliminary design and its verification against fundamentals and functional model;
3. final design based on experience gained from the functional model;
4. standardisation of materials and organisation of their supply.

The composition of the pilot group, during the design stage at any rate, will be:

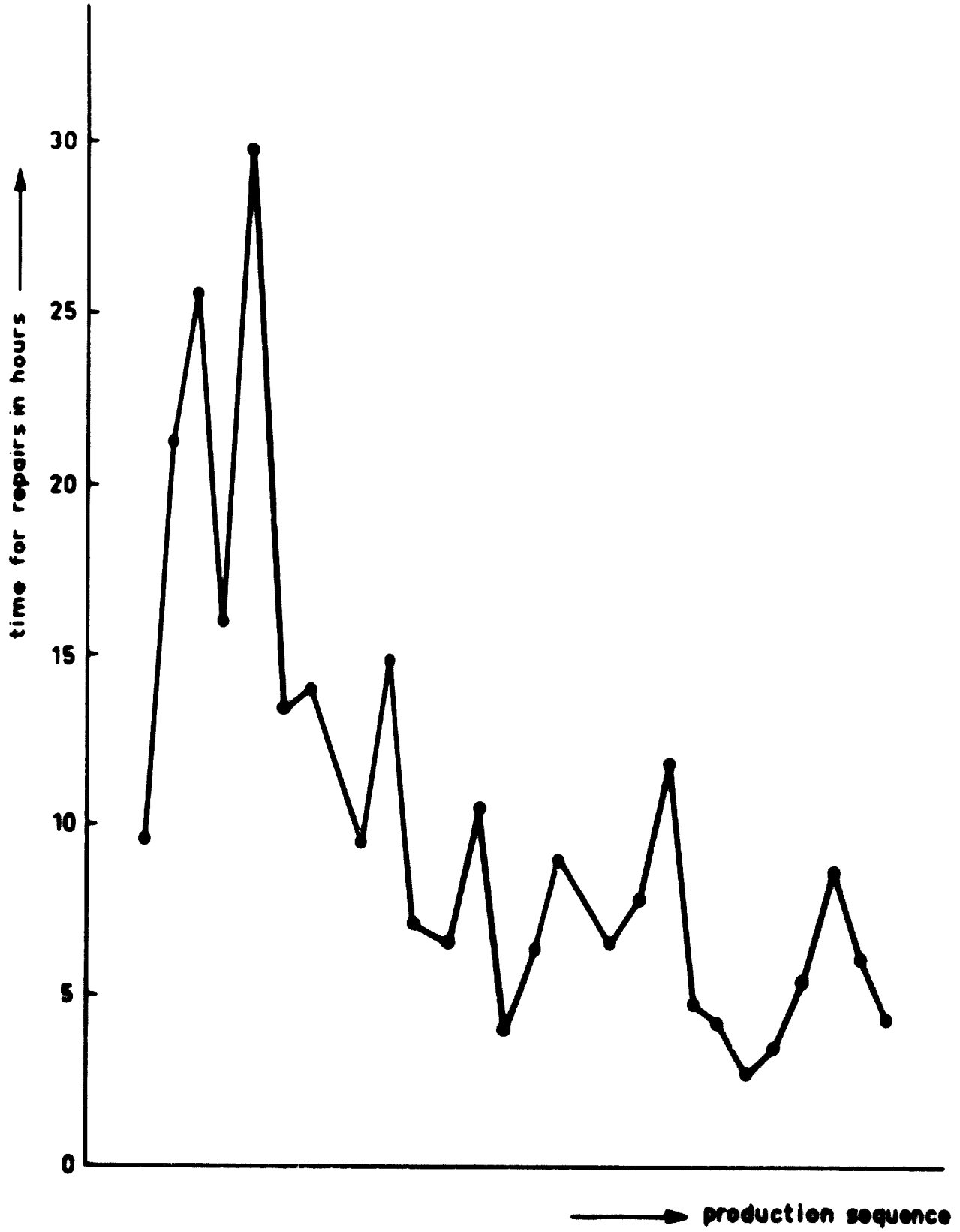
- 1 representative of the users
- 1 town-planner
- all the architects of the local building teams
- 1 functional expert
- 1 technical expert
- 1 economic expert

Working Machinery

The task and composition of the working machinery depend to a great extent on the nature and volume of the problems which have to be solved. In any case there will

Figure 3

TIME NEEDED BY PAINTER FOR REPAIRS,
PER 8 DWELLINGS



have to be available a designer (architect) and experts in the functional, technical and economic fields.

Local building teams

The results of the work, at the end of each of the stages mentioned in the section headed Pilot Group, are submitted to the local building teams. The latter give their comments from the point of view of local conditions.

These comments are worked out by the Pilot Group in so far as this is possible. The local building teams also have the task of developing, on the basis of the central dwelling design, a house-building plan which is attuned to local needs.

To this end they should at least comprise the following members:

- representative of the local authorities
- building owner
- town planner
- architect
- contractor
- organisational expert.

Plenary Meeting

The plenary meeting, which is responsible for the overall policy, at least should comprise the Pilot Group and all local building teams in the composition described. When the starting points have been established, the task of the plenary meeting is to take a decision, after the rounding off of each stage, as regards the results of the work done by the Pilot Group, after this work has been adjusted according to any criticism put forward by the building teams.

Secretariat

The Secretariat is in charge of co-ordination, process control, cost and reportage.

It is reasonable to expect that this set-up has reduced the problems of co-ordination to a minimum. Furthermore, the combination in an early stage, of centralised thinking and local action may restrict the time of preparation before the local execution begins to the greatest possible extent.

4. Decisions Based on Reality: the Right Start for Developing Countries

One of the most difficult decisions to make in the sphere of housing is the one based on reality. After having analysed the world situation ¹⁾, Bouwcentrum has become convinced that only a realistic policy will be able to provide a better future for the hundreds of millions of people living in slum dwellings. What is necessary in this respect is that the following six points are kept foremost in mind when decisions are being made concerning the housing policy in developing countries:

1. the conditions of the great masses of the population can only be improved if the greatest possible simplicity per dwelling unit is observed;
2. the use of foreign currency will have to be avoided wholly or at any rate as much as possible (local materials, local labour);
3. an optimal use will have to be made of land which is so often in short supply;
4. the aim from a town planning point of view should be to minimise the sum of housing cost and cost of necessary transport;
5. finished emergency building is a less satisfactory solution than permanent structural work that may be subject to improvement later;
6. tenant education is indispensable.

Politicians in these backward areas must have the courage to direct their housing policy to the achievement of a primary quality level for everyone, which may be said to be composed of the following very essential functional elements:

1. land on which one can live,
2. a roof under which one can live,
3. cooking facilities,
4. water of adequate hygienic standard,
5. sewerage and sanitary facilities.

5. Special Measures to Bridge the Gap

It will often appear impossible without special measures to achieve a sufficiently large production, a very low cost-price and an acceptable quality per unit. It is possible, however, to deliver the dwelling more or less complete to the occupant and to finish or to enlarge it later. It is also possible to apply various degrees of self-help. If we take four degrees of completeness of the dwellings and four degrees of self-help, sixteen different possibilities emerge.

- 1) "Towards a Habitable World" J. van Ettinger, - 11 - Amsterdam, 1960, Elsevier Publishing company

The following table shows these sixteen possibilities:

Building with decreasing measure of completeness on occupation

		one-family dwelling (complete)	minimum dwelling (expandable)	core dwelling (to be finished and expandable)	Land plus facilities
		a	b	c	d
Building with increasing degree of self-help	Contractor builds 1	a1	b1	c1	d1
	Contractor builds, occupant finishes 2	a2	b2	c2	d2
	Occupants build (aided self-help) 3	a3	b3	c3	d3
	Occupants build (self-help, or mutual aid). 4	a4	b4	c4	d4

6. Training Course in Rotterdam

In keeping with the opinion voiced in the first chapter, Bruwcentrum has conducted since 1957, a series of International Courses on Building - I. C. B. with the intention of promoting the quality of 'building intellect', which is after all, the cheapest and possibly also the most important building component.

The course is of post-graduate standard and intended for building practitioners, i.e. architects, engineers, physical planners and economists, in short, for qualified personnel in the spheres of housing, building and planning.

In the nine courses staged to date 175 participants from 38 developing countries have acquired an increased measure of knowledge of benefit to the solutions of the building problems in their respective countries.

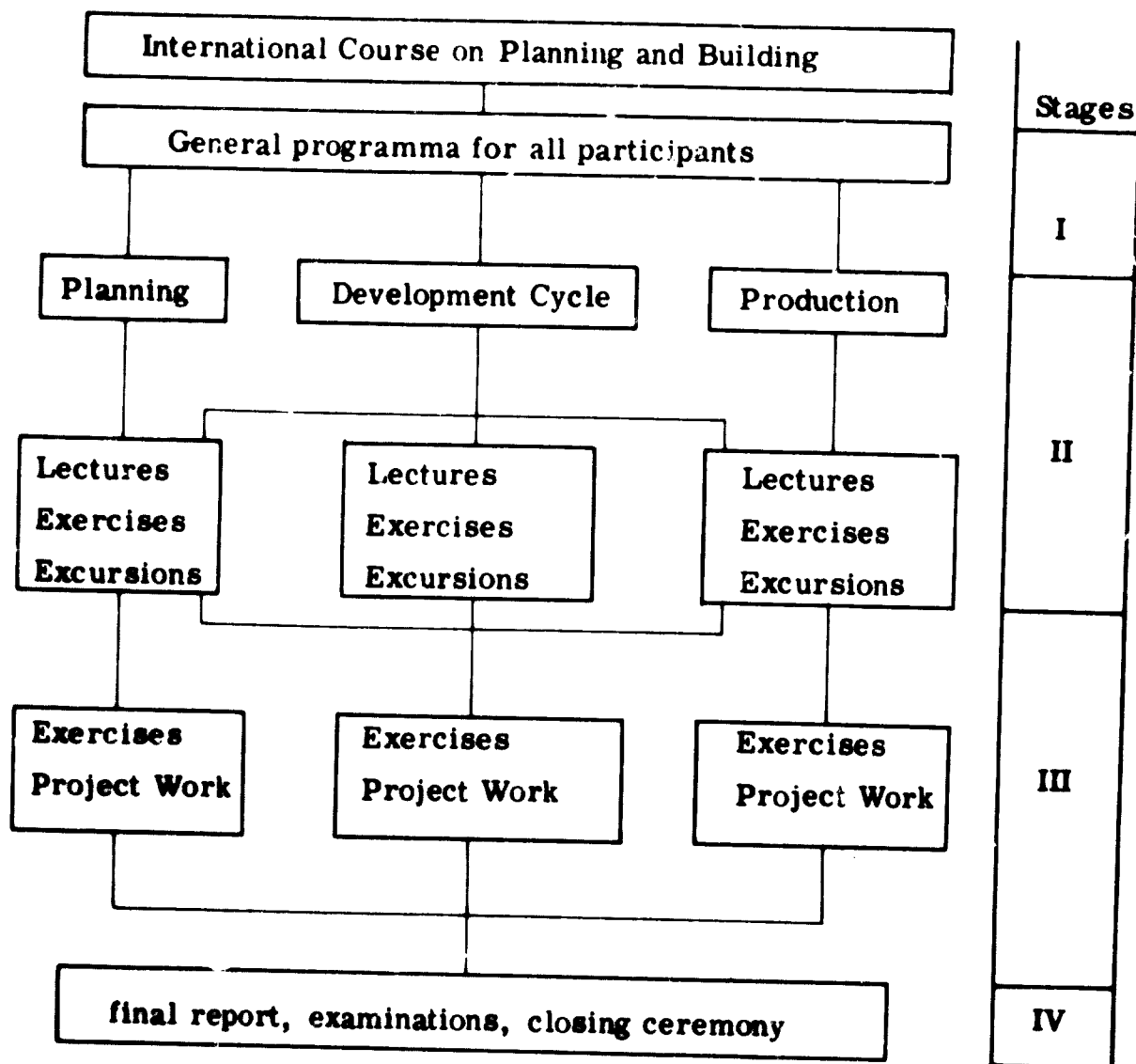
As from the beginning of the 11th course in January 1968, the International Course on Building will be transformed into the International Course on Planning and Building, which signifies a basic change in curriculum to correspond with the increased emphasis which developing countries rightly attach to physical planning at the most appropriate safeguard for their prospects of a decent standard of living for the future.

The new International Course on Planning and Building will comprise three separate specialisations:

- A Course on Planning - Town and regional planning, new principles and approaches.
- A Course on the Development Cycle - solutions to housebuilding problems through team-work integrated research, programming, design and manufacture which ensure a continuous and efficient production. Feed-back guarantees that all experiences gained in the process will produce subsequent improved series of houses.
- A Course on Production - production of building materials, new construction techniques, cost calculations, efficiency of production.

The following diagram indicates the general set-up of the courses. The Course on the Development Cycle, which constitutes something of an innovation, will train groups of participants who, on their return to their own countries, will establish national building teams or Development Cycles.

Such teams should comprise the main disciplines of building as represented by the policy maker, the city planner, the architect, the contractor and the organisational consultant. These five principal executives participate in the course on the Development Cycle as shown in the following diagram. However, in the second stage each team member may also have to attend a number of the lectures given on Production and Planning.



Stage one: two weeks: general introduction to main principles for all participants, to familiarise them with related disciplines

stage two: six weeks (or longer): depending on the level of knowledge of the participant

stage three: ten weeks (or shorter) depending on the capability of the participant and the desirability of his working on a project. A decision as to the latter will be taken by the Course Management in co-operation with participants in all three courses. The participants in the Course on the Development Cycle will at any rate have to work on a low-cost housing project.

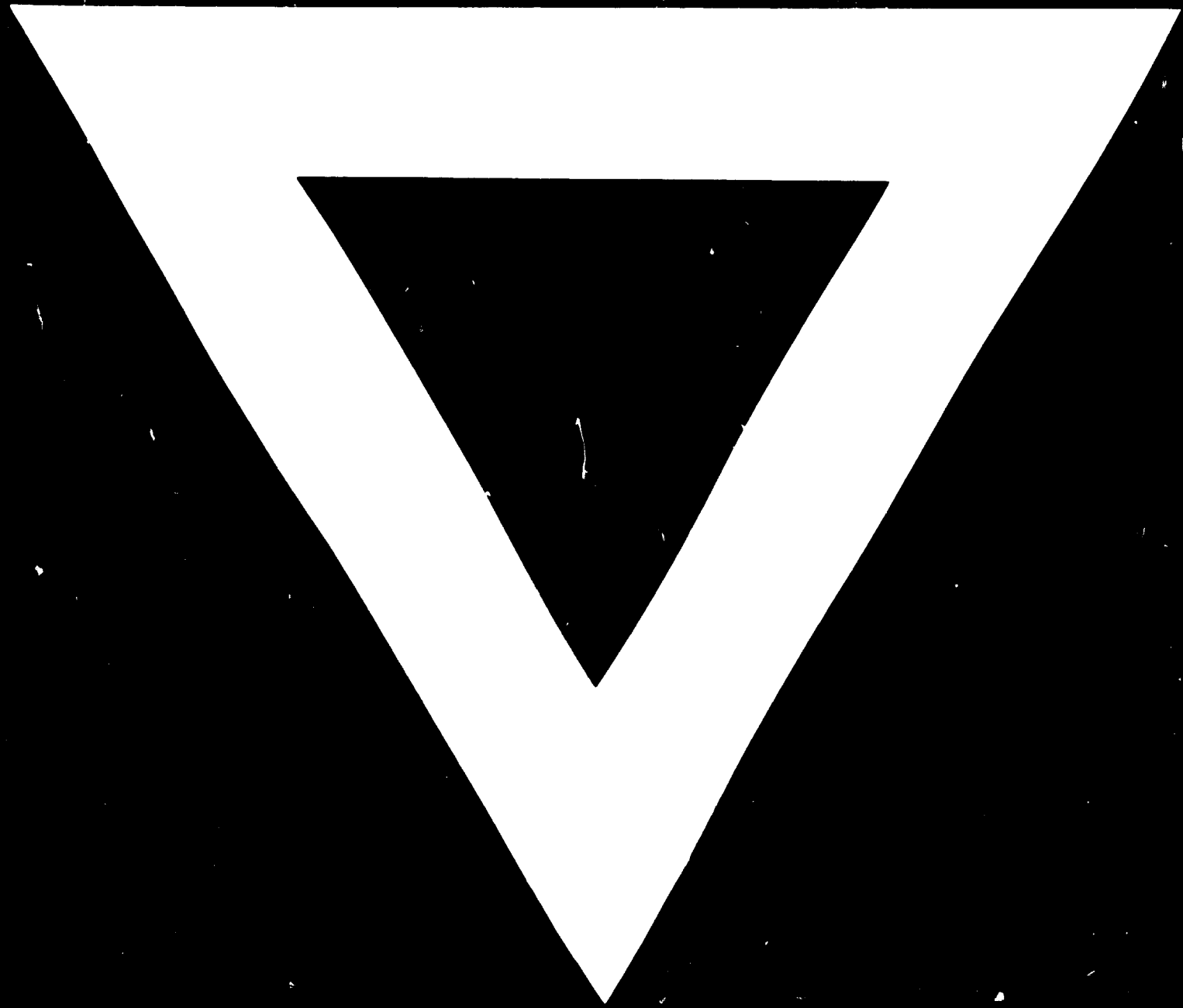
Project work will be undertaken as far as possible by all three courses.

stage four: two weeks. The Final reporting may be done in consultation with the tutors of the course.

7. The Development Cycle: a New Movement ?

Low cost housing, one of the most urgent problems of our time, can only be solved by a team of highly specialised experts using a perfect method of product development. The teams to be trained in Rotterdam constitute only a very small part of what is really necessary. For this reason the task of the team will be in future to train many other teams. Bouwcentrum can only train the trainers. By multiplying in this way the transmissions of knowledge, the Development Cycle may become more than a perfect building method only, it may even become a movement which might realise one of the most vital human rights i. e. a simple and decent home for every human being.





11. 6. 71