Zeitschrift: IABSE reports of the working commissions = Rapports des commissions de travail AIPC = IVBH Berichte der Arbeitskommissionen

Band: 31 (1978)

Artikel: Discussion

Autor: Takino

DOI: https://doi.org/10.5169/seals-24919

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Mehr erfahren

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. En savoir plus

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. Find out more

Download PDF: 20.08.2025

ETH-Bibliothek Zürich, E-Periodica, https://www.e-periodica.ch

II SESSION

DISCUSSION

August 31, 1978. Morning.

Chairman: TAKINO (Japan)

TAKINO - Now we want to discuss the contributions to this session, such as relations between program and engineering problems, or engineers and computers, the standardization of data in documentation, computer cost/benefit and education of engineers.
If you have any question or comment, please, raise your hand.

FANELLI - I have a comment to make on the contribution by Dr Tomino. One of the points raised by him was whether it is convenient for every design office to develop its own computer code. Mr Tomino' s view is that the writing of programs should be entrusted to professional groups, who could be completely extraneous to the design office. I agree that in some cases this is possible, but in other cases this is not feasible. In my opinion there are at least two extreme cases. Let us take, for instance, the case of a problem which is so well defined and so repetitive as to lend itself to systematization and so to the writing of a very specific program, such as, for instance, plane frame analysis or space frame analysis. It is evident that, in this case, one can define the problem so well that if each design office should write its own program it would be essentially a duplication of effort, and in this sense it is better to avoid it. The other extreme case is that of a very special structure where the designer cannot state his problem in so systematic way as to give it to some other people to develop the programs and there are, of course, many cases in between. But even in the first case there are draw - backs, because the first case, of course, usually deals with structures that, by their very nature are subjected to national regulations, which differ from country to country, and so there should be only one program for all the nations in the world.
In my opinion, the situation is so complicated and so different in every case that one cannot arrive at an absolutely general conclusion. The conclusion suggested was to avoid that each design office should develop its own programs; I see that this is applicable only in certain cases and with certain restrictions. Could you please comment on this, Dr Tomino ?

TOMINO - I certainly agree about it, however I am afraid that we will not, in the future, be able to develop our systems if we cannot find any other solution; we will not be able to develop any other software economically. If we can now afford to develop softwares by ourself, that is fine, but it is also a fact that new systems concern other design type of programs having large engineering data base and having many optional functions and very hardly dependent on human interactions. No engineering society, therefore, can afford to do software by their own money, their own investment, and thus we have to use the most of the existing or the past developed software as a component of such new system.

FANELLI - Thank you Mr Tomino. I appreciate your precise definition, and it seems that there is no great difference between what we intend. On the other hand, when you say that we should make fuller use of the existing systems, we run into troubles too, as Mr Taffs illustrated in his contribution about some problems that could not be solved effectively with existing systems, such as Nastran. I think that we should use all the means that are available to us, choosing each time the best tool we have. This is a real difficulty we come accross.

VOS - There is a question which really relates to a few papers, expecially those by Mr Shimada and Mr Taffs. We had to solve what has been shown by technical computer output and one of the thing Mr Shimada really did not tell us is what is the real purpose of this sophisticated development which they are carrying out. From personal experience I know that there are quite a lot of areas where computer interfaces can be used and where it is really used sufficiently. I would ask Mr Shimada and also Mr Taffs what is really driving them in developing difficult techniques and what can they expect from them in a near future. Can they really expect a better and faster view on what they are really doing?

SHIMADA - I am expecting in the future development of the hardware, such as cable computers; short program must be put in itemized computers and micro computers will be connected to more simple computers, such as the computers we are using now. In the future I think that hundreds or thousand of them may be connected in a computer, overcoming the computers with few-storey runs, and the programs must be planned to fit such property.

TAFFS - The question of hardware and also of software is based on a problem. As engineers using this equipment, we need, as far as we are capable, to develop our ability in how to simulate problems and how to take it. So we use the computer to communicate in a way that we can believe ratherly exact especially by means of quantities.
Another point is how the designer gets and handles information: well, the approach that we have taken is a framework of communication. If you have not a limit within which to work on a job and you let people work individual ly, you will have a variety of systems for as many persons as you employ. Each person has his own particular approach and his own ability, experien ce, and your own system will have to match that. This is no way in which we can achieve a global system. Moreover, these national efforts are pro ducing systems they are really a waste of time. The alternative is to aim at a series of sources, information, utilities, which people can pull out from particular designs and previous jobs, looking for the quickest and easiest way of generalization. The user will be able, by manipulating the utilities within the system, to say: " I wish to look at the bending moment around the beam on the 15 th floor", and so he will get a diagram, giving him the bending moments around the beam of the 15th floor, and it is the right way the designer must be in charge; he must know what he is looking at, and the information will be presented to him in a graphical form.

Graphical information concern a vast amount of data, and there is no way that we have yet found for providing little processing facilities which will also enable you to communicate to other people in other centres. On your machine, you can play with it, you can get the response, you can get the panoramics of the visualization there, but if you want to send that information to somebody else, you have a problem.

TAKINO - Do you have any comment concerning the graphical display, or the communication ?

DUTERTRE - Just an information: has anyone heard of the work done in the Utah University? It is quite amazing. You can look at the results of finite element as if you were looking at an elastic model. It is quite unbelievable, it just gets a picture of your entire model, and you see the iso-stress, you see anything you want, and if you want to transmit it, you just take a picture and send it.

TAFFS - Do you have any question or comment? Yes, please.

ANDERHEGGEN - I have a comment rather than a question. Mr Taffs or somebody else could comment this. I think that the computer as a mean for communication between different organizations has not properly been stressed; however, I want to ask you the following question: when you build anything, there are different organizations which are involved in the building; that is the architect, the constructing firm, all those who supply the material for construction etc. Now, there is a very large number of information which travel from one organization to the other and come back, etc. This generally is done by post, or by talking to each other, but it might be more useful to have a file somewhere, with data which are provided by one organization and the same file used from another organization for another purpose. To make it clear, when you want to build a reinforced concrete structure, maybe you have a program which provides you a list of reinforcements and you put this on the file, and then the firm which sells you the reinforcements, which is a completely different organization, might use this file automatically for its internal need. Now, Mr Taffs, I think, has a very large organization.
My question is: "Do you have different clients who work on the same basis? Do they use your facilities as a communication instead of sending a letter or talking to each other?".

TAFFS - In the question of communication clearly the computer will play a very important role. This ability to use the computer yet as a mean of communication will depend upon the level of expertise of the organization which we are dealing with. About the difficulty we have in communicating through our computers, it depends from lack of standard organization within the industry. We waste hours, struggling with reels, electrical tapes, simply because we do not know the format is different. It is a disaster, and the computer industry ought to be more simplified.

OBENDORFER - The problem that you brought up is very serious, Mr Anderheggen, and in Austria we make some efforts to get this problem in our hands and to solve it. May I give you a little comment in which areas we tried and we got some success, the areas of communication between more clients working together on one building, on one construction. First we normed on highways, bridges and structural problems: the standardized descriptions are put on a magnetic tape like it has already been done in Germany, and the contractor gets these tapes and he can work out his tenders, his offers, using already the Ausschreibung. The second area where we made efforts and where we succeeded already is this area of roads, of surveying, road design and road construction. For instance, a surveyor takes the data of an area; the consulting engineer plans and calculates the road and the construction company gets the data and does the quantity survey, the quantity calculations. The quantity calculations are done in Austria by the company and not by the consulting engineers as in the other countries. A third area might be, and is already, the use of a common data base for time schedule analysis. You have a general contractor setting up his time schedule and he gives tapes files to subcontractors, and they use these. An other area is the administration; for instance, we also exchange data between the contractors and the social security, the institutes that take care for insurance, for the medical insurance for all employers. So we also have a data following in this direction. But I think we do not have a possibility to really share the hardware facilities since I think it is not possible. I think the only way we could follow is the exchange of tapes and disks, and so on, with relative files.

SCHWARZ - I should give just a short comment on this problem. I think we have a lot of professionality in the field of computing techniques, but in the field of data manipulation, data storage and communication techniques, there is a lack of professional experience; so this should be a problem of education too, since in most cases we have to manipulate large amounts of data in several different fields and I think this is what we have to learn: most of our application programs try to organize data storage and data manipulation for themselves, but it would be possible to use more general tools for this and to reduce the function of application programs to the special type of modification of data and to restore them in large storage systems. This is one of the most important teaching of integrating system, more important than the collection of different application programs in one. Thank you.

TAKINO - Do you have any comments or questions concerning the education discipline of the programmers or the engineers?

DUTERTRE - Why don't you have a course in program discovery, to teach the engineer how to tackle if he has got a problem? He has got programs all over the place. Well, they are lost usually; they don't know how to start reading a manual, how to criticize and how to test it. If you could set up a course I think we could achieve better results than a Fortran course.

ANDERHEGGEN - How many programs should we install on our computer? Should we install all of them or just a manual? Because if we have to install, let us say fifty programs that the students can use, it is a big problem. Otherwise, it is a good idea maybe; I don't know. Professor Werner can also say something; he is also in the teaching business , not the only one. We have been trying to use programs as much as possible I think it is a wonderful school. People wish to try to make mistakes, to strive after models, to have a choice.

KLEMENT - I want to point out that I am not computer-man completely. It is now twenty years that I face with computers, but before I was convinced to do things with a computer. I did a lot of design hand-work, bridges, dams and so on, and I came to the computer since sometimes I spent more than two years to come to the final results by calculating all myself because I have made a lot of very complicate calculations by hand. But I don't use to do calculations only with computers today. There is a lot of work which you do much quicker by hand or using your small computer you have in your pocket, there are three possibilities to make a design of a bridge: if you have only one day, you can send by telex the price to another continent; if you have only one day time, no computer will be able to give you assistance for this price; only your own experience in having done this type of work 20 or 40 times will be able to give you an answer which is about ten per cent correct. If you have three weeks of time and you are acquainted to work with the computer, you will find a way to give such an answer, which may be is three per cent wrong only; but the dollar is going down and the Franc is going up, you find that the difficulties may be which arise due to the dollar cost are much larger than the difficulty of designing a bridge in three weeks. You have 43 weeks and you want to make a good offer for a bridge: you can have a good assistance from the computer only if you have a lot of statistical data which is easy to go to and you should not do it always with a computer but you should try to be yourself an engineer who tries to understand as well the designing process and the computing process. We should try to give the young engineer as much knowledge as possible of the simple methods so that he is able to look at the program and say "results are wrong".

LLEWELYN - Some problems here have already been discussed in an international conference, gathering industry managers and university teachers, held in the United Kingdom last year: the general conclusions there reinforced much of what has been said today. There is a very great gap between the needs of people and how to use the computers. Special attention has been paid to teaching engineers about systems, which we spoke about today and about new outputs: in many countries (e.g. U.S., France, U.K. , Germany) courses have been hold in order to teach people to satisfy industry. Industry obviously has a problem, because our generation is accustomed to know about the correct use of computer in industry, while the new engineers use it ten or twenty years before they get a practical experience of the systems efficiently. So, there is a gap To bridge that gap and to solve this problem we could use new techniques, T V, open universities, view data. I think we probably need paying attention to them. Thank you.

TAKINO - Just three or four minutes are left. We have time for another comment.

BLAUWENDRAAD - I was glad that Dr Llewelyn made a remark on the conference which has been held in the United Kingdom last year on education and computer in the design. One of the important things in education we should stress is that the engineers in the last ten years have been instructed how to produce programs instead of how to use them, and this is to be well understood because no programs were available and the teaching staff itself had to be acquainted with it, to solve systems of equations and to write FORTRAN programs. But now we have not only teachers 30-35 years old, but also 50 years old and they should be prepared, by their own experience, to stress the use of programs instead of making tools and to integrate the computer in their specific task in the engineering field. That is why I think we may expect a better situation in the future. Maybe it would be nice, Mr Chairman, if we could stress the point of standardization and uniformity in documentation because we must change mentality. Up to now, last five or ten years, a lot of people said the use of computer is a subject connected with mathematics and statics, and I think that is what we have to leave now. A specific example: in the Netherlands we have a concrete association which is organizing courses for engineers; in practice and up to now the instructions, the lessons in the finite element method are in line with computer courses instead of engineering courses, because up to now we told people how a finite element program is organized internally, with the flow diagram and algorithms; he just finds the results. What we have in the Netherlands, for instance, is that now the engineer can handle structures which he could not handle before. I think that is what we should think of in our education curriculum, that people may be instructed in the engineering task better than in the computing task. Our biggest problem, Mr Chairman, and this is my conclusion, will be that the biggest task may be how to teach the teachers themselves.

I I SESSION

DISCUSSION

August 31, 1978. Afternoon.

Chairman: TAKINO (Japan)

TAKINO - In this session, many interesting and valuable papers have been shown; do you have any other question or comment on these papers or discussions ?

TAFFS - I got through a number of papers. About documentation standard, there is now a general trend and a practice of documentation which allows the user to access to each component part of the system. The engineer wants to come up with a total solution which the program provides, but the user also requires his familiarity with the program. Perhaps the user would like to go and look for a component of the total package. We try to give him the availability to know all component part, not only a complete program and a total solution.

LANG-LENDORF - I would prefer we get free for the documentation. You do not have to look through the whole manual if you want to know some very special information.

ALCOCK - Dr Bengston's paper from Norway describes the requirements of a structure analysis program. Delighted to see that he stressed the importance of the simple problem being solved often rather than the finite element analysis once in a while or many times for one problem, but the majority of computer runs are on small or more modest linear analysis. It is very important that the programs are ready to use and I agree with him, but I see very few programs that are easy to use.

BLOM - First, I would say that Dr Bengston comes from Sweden, not from Norway. I do not want our neighbours in the West to take benefit of him. The reason why he did not mention the computation problem in his paper was, I think, a matter of simplicity. He would have the intention to restrict himself to those technical in-put and output. The documentation standard that he was pointing out was worked out in the 60's. It is still used by the most of the Swedish consultants. It is not so strict and you have the headlines as they were described.

SCHWARZ - I want to come to the question Mr Dutertre rose this morning, why the Universities do not teach the students to justify the programs, to decide, what programs are to be used or not. This is how I understand the question. I think that this is a very difficult problem, since you cannot decide the quality of your program without knowing to what purpose you use it. You can only see what the program might do, but if you want to decide whether the

program might do, but if you want to decide whether the program is good or not for your purpose, you have to know what you want to do with this program, and this is a problem for the student. Because he hardly knows what he would do professionally, and I think it is a vacuum in the field of education of civil engineer students.
It might be possible to teach them to read the documentation and to decide whether a program is more or less good documented or has been written in a sophisticated way, but the decision whether they can use the program in a given situation or not is a leader knowledge about the professional in detail and I hope we will be able to teach more in this field in the future. This overtime is now used to teach mechanics and different matters of civil engineering.

BOEKELER - Coming back to the question how to standardize documentation, we have written some users' manuals and we have found it is very useful to have those guidelines like a checklist. We have used those in such a way as to write those documentation like a checklist and you have serious framework, and I think that this is a very very good step.

TAFFS - The guidelines, yes, but the sequence can become different. There is the change from one system to another. All the components are quite important for the sequence. About selection, if there is a lot of programs, we attempt to consider their number apart from the point of view of the user : perhaps have a program for every kind of design. Well, previously we would identify separate users and then separate programs. A man works better when he finds he can select first the possible program he's looking for. The reduction of the number of the program seems to be a possible answer to the selection problem.

WINIARSKI - The emphasis is now shifted from the calculation phase into the preparation phase. I would like to say a few words how we do the teaching at our University. First of all, the under-graduates attend in their second semester a course on computer programs, and this is held by mathematic departments and has nothing to do with the design. They simply learn the FORTRAN basic and compose simple programs. Then, they come back in the fourth year of instruction to the department for a short course on computer and they have to solve several problems of analysis or using the programs available at our center. Now, this has some advantages, for instance for people who develop systems, because when you have several groups of - let's say - 20 student each, running through a program, they can make all the possible mistakes and also some impossible mistakes. It is quite unbelievable how impossible mistakes can be made. So, that's the normal course of study. Then, the students or the graduates take different roles. Most of them go to design organizations or contractors, but some of them just stay at the computing center and develop programs. But these people will never become engineers, neither mathematicians. Of course, on top of them we have the graduates, who attended studies in computer design and specialized studies in structure design, road and bridges design, management and organization work.

DUTERTRE - Just on teaching again: I still believe it is important to teach how to use a computer too, from the engineering side; how to tackle a load structure, how to use finite element analysis, how to select, how to choose sub structures and if you want them or superelements. Engineers coming from University do not know that all this exists. It is a whole field of problems which come into the picture when you select the program and use it. Now, as for cost: how do you compute the cost of a program and the different bills which a service bureau send to you ? How do you read a contract to see how much does it cost ? This is the matter.

BZYMEK - I should like to add one more comment to Mr Winiarski' s one. At the end of our courses we keep a post-graduate course in which we recommend the programs that are available in Poland at that time. One more comment on how it is difficult to teach manuals, how to use manuals because they follow different philosophies of structure analysis: so we agree with one philosophy and perhaps we do not with another one and some groups of people think that their philosophy is better than the other's philosophy. So, I think it would be a good job for some international organization to do some evaluation of the systems which are, let's say, recommendable for the design of bridges and structures. Furthermore, it would be nice to have some international program recommendation book - well, this could be only recommendation - and we could keep contemporarily lists of such programs and then have some information. Of course, I realize that there are some difficulties, but perhaps some international organization could undertake such a task. About the communication between systems, we thought on this problem for some years. We were dependable on a computer manufacturer but now we could choose the computer that does not give us any hardware problem. We could solve the software problem addressing firms which have special managing packages: thus the problem is transferring this package from one system to another one, and all the systems should be taken automatically.

KLEMENT - I think that only a few of the present people have learnt about computers at school, even if you are all specialists in this field. At the University we have to teach what gives a University student the possibility to do the work tomorrow and the work which is to be done today. He must feel to be able to work in practice with the people who are doing the same kind of job today. If, in a school, you teach the things as you exactly have to do, this is an engineer school, and not a University. You are unable, in 20 or 40 disciplines, to give all the knowledge you use in practice. You can only give a very good theoretical basis and I think the theory is for the practice much more important that the practice itself. Theory can be correct even in twenty years, i.e., the theory will be a good foundation, but the practice of today may be bad in ten years or even in five years. What is written in our manuals can change in a very short time: we must transmit theory to the students, since practice is not so good. Of course, the teacher must have also practice, but my teaching is mo re devoted to theory.

TAKINO - Now the discussion is over. Thank you very much.

Leere Seite
Blank page
Page vide