THE WALL METHOD - A NEW METHOD TO DEVELOP BETTER SOFTWARE

Matti Jamback
Kemira Oy, Helsinki, Finland

SUMMARY

The end-users are very seldom satisfied with the first version of a new application system. Something has to be added, something has to be changed and something is not necessary. This is very familiar to everyone who has worked in the software development projects.

There are a lot of reasons why software projects end like this, but one of the most common ones is the communication gap between end-users and software people. They have no common language.

In Finland a method called "The Wall Method", has been available in system design for over four years. The developer of the method is Kari Saaren-Seppala.

The Wall Method is a visual method that helps end-users and systems people work in teams and solve problems in a way that everyone understands.

The main characteristics of the wall method are:

- large, colourful, easily modifiable pictures on the wall
- the end-users, from different levels of the organization make the pictures in small, dynamically changing teams
- the working environment encourages creative spirit by visualizing the design phase in common terms.

DATA PROCESSING IS STILL YOUNG

Data processing has been done in large scale only about 25 years. Therefore, it is natural, that the system design methods are not as good and perfect as for instance in architecture. Yet, systems have been designed and some have succeeded and some have not.

WHY IS IT SO DIFFICULT TO SUCCEED?

The traditional way of designing application systems can be divided roughly in four parts:

1 Feasibility study, where the need and the benefits of the system are clarified.
2 System design, where the data content and the function of the system are designed.
3 Programming and testing.
4 Inauguration.

If you make big mistakes in part 1, e.g. you decide to make a system which is not necessary or the advantages of the system are not greater than the disadvantages, there is not very much matter what you do after, because the system will not satisfy the end-users.

If you make mistakes in system design, these mistakes can be corrected, but that costs often time and money which both are limited resources. To balance the budget and the schedule of the project compromises are made, but then the final target of the system is often lost.

The programming errors cannot be avoided but if these errors are caused by inaccuracies in the system design we are in trouble.

And finally, when the entire system should start, all the troubles begin. The end-users are not satisfied and a lot of corrections and changes have to be made until the system is satisfactory.

All the above mentioned is probably very familiar to those who have been designing application systems. There are many reasons why software projects don't succeed, some reasons are technical, some project management reasons and perhaps the most common ones are the definitional reasons. Usually it is the mixture of all these reasons.

LET THE END-USERS DEFINE THEIR OWN SYSTEMS

It is a fact that if you can't get the end-users to take part in system design the whole system is in great danger to fail.

Usually an inquiry is made for the end-users at the early phase of the system design. He is asked about the data content and the services he expects from the new system. After the proper answers have been received, the system professionals design the system and adp-professionals accomplish it.

The role of the end-user must not be just an object of the inquiries, but the area where they take part in the system design must be much wider. The end-user may quite well manage the design phase.

Four levels of participation for the end-user can be defined in the life-cycle of an application system.

Level 1:
- an inquiry is made about the present problems and about the proposal for the new system
- the facts that already are quite clear get clearer but the point of view of the end-users does not change.

Level 2:
- the plan for the new system is gone through actively and thoroughly in small dynamically changing teams
- the real material is used
- the end-users try to imagine the future form of their work
- ideas and experiments are made
- many rounds of improvements are gained
- when the work goes on, the point of view of the participants changes and gets wider and the end-users learn to know new features about their work.

Level 3:
- this level is mainly accomplishing and testing the nearly finished system
- the methods are about the same as on Level 2, but now the computer is also used
- the prototyping is very much recommended on this level
- the end-users learn to know the system which they have to use for the next few years and they can imagine the influences and changes the new system may cause to their work.

Level 4:
- this is the continuous use of the system which will last for several years.

Very often the end-users take part in the system design only on Level 1. Level 2, partly also Level 3 have been done by the system professionals. At this point the end-users have a rather limited chance to influence on the whole system.

The prototyping on Level 3 is very much recommended, because by using this method the end-users get almost a real impression about the system and a part of training is also taken care of.

Level 4 is very often forgotten. Yet it is very important to collect feedback about the system from the end-users, because they are the everyday users and they know best the advantages and disadvantages of the system.

SOME REQUIREMENTS FOR A GOOD DESIGN METHOD

It is vitally important to get the end-users to take part in the system design, but how to cross the communication gap between them and the systems people? If the end-users and the systems people cannot use exactly the same language about the problems they are solving, it is not possible to get satisfactory results.

There are many nice ways to define a system very precisely but for an end-user it is very often difficult to understand the formulas and other abstract symbols which are used in these methods. Still, most of these methods are not suitable for team work, which is essential in designing systems.

Let's take a short look at the methods which are used in other fields that require making design and various kinds of descriptions.

When an architect makes the plans of a house, he makes drawings about it from different angles. In these drawings he also puts trees, people, machines etc. in order to get the drawing as real as possible. A miniature model about a house is also often made and that model can even be taken apart to get an idea about the inner constructions of the house. In industry a prototype is made about a new product and this prototype is then tested in as truthful conditions as possible in order to find out all the weaknesses. These are then corrected before the product is put on the product line.

In these two examples the keywords are visuality and truthfulness. the visuality helps to compare the design to the real world and to find out the drawbacks of the plan. If the design is concrete enough, it is possible to test various alternatives of activities against that design and to get new ideas also to the real life. Still, a truthfull design method gives a good basis for communication, because the conceptions and the language are of reality, not some gibberish that only trained professionals understand. It is possible to start working immediately without wasting time to clarify various kinds of conceptions. And last but not least, the visuality activates imagination. The word imagination gives an idea of seeing imagines. The visual images, pictures, help the individual or the team to look for and to find out new and better solutions.

Despite of being visual and truthfull the design method must be exact, it has to keep the general view about the system clear, it must be suitable for team work, the conceptions must be clear throughout the entire system and the pictures must be easily modifiable. Still, a good design method should be easy to learn and easy to use.

THE WALL METHOD

The Wall Method has been developed in Finland in 1981 in three application system developmen projects. The developer is Kari Saaren-Seppala. In the years 1981-1984 over 100 seminars have been held about this method. In Finland it has been taken very widely in use, e.g. 9 of the 10 biggest industrial companies use The Wall Method. Many software houses have adopted this method as a part of their own design methods. Also a book has been published and an English version of that book will be published soon.

The Wall Method is not a licensed product but it is an open method that is available to anyone.

HOW TO USE THE WALL METHOD?

The design of a new system can be divided into six phases as follows:

1 Survey of the system area
2 Description of the existing system
3 Survey of the changes
4 Definition of the data
5 Definition of the adp-tasks
6 Testing.

This list of phases is not an exact order of working but the three first phases can all be done simultaneously.

The next chapters present each of these six phases shortly and also a list of techniques, that can be used in each phase, will be presented. The more accurate descriptions of the techniques will be presented a few pages later.

SURVEY OF THE SYSTEM AREA

The description consists of all the factors that the system possibly will handle (e.g. the divisions and the departments of the company, the authorities, etc.).

All the factors are first collected together in any order. When this is done, these factors are then grouped in two groups, those which will be included in the system (marked with "+") and those which will not (marked with "-"). This process is iterative and new groups are formed and some groups are included and some not. Finally we have the group of factors that will belong to the system area.

The techniques that can be used are

- "the glass house"
- horizontal projection
- data flowchart
- organization picture
- large-scale picture.

DESCRIPTION OF THE EXISTING SYSTEM

The purpose of this description is to give to the members of the project and the teams a realistic and similar image of the starting point. This helps the further communication, because the conceptions are clear and the language is same.

The company and its functions are described so that it is possible to see it as a whole and the situation of the new system in this wholeness.

The description includes for instance the functions, the jobs, the material-streams, the equipment and the accommodation of the company. The end-users and their current tasks and the current data-processing will be described, too.

The real material, reports, file-descriptions, card files etc. is included, also, in this description.

After the completion of this phase all the problems of the existing system must be found.

The techniques are the same as in the preceding phase.

SURVEY OF THE CHANGES

If there is no need for changes in the existing system, there also is no necessity to make a new system. A need for changes that is strong enough, is usually the activating reason to start a system project.

There are many ways to collect the needs for changes. Meetings can be arranged where participants tell their needs, end-users write lists about their need etc. To go through the description of the existing system is a good way of finding out changes.

The material is then analysed and the working teams go the results through and divide the changes in two groups, those which will belong to the system and others which do not. The changes that were chosen to the system, will be a part of the test material.

DEFINITION OF THE DATA

In this phase the data and the logical structure of the data will be described.

First a conceptual schema will be used. The sure conceptions of the existing system form a basis of the schema and this schema is then completed by the new conceptions, that the changes possibly have created. The result will be a conceptual model which then can be completed by the data-items of each conception.

The final result will be the logical conceptual schema and the lists of data-items completed with the details, such as the length and the mode of the data-item, volume-numbers of data-sets, is a data-item a primary or a secondary key etc. This description is the basis for the final data-base.

The techniques are:

- conception schema
- data-item list.

DEFINITION OF THE ADP-TASKS

The data-processing of all the work stations is divided into adp-tasks. A task may be updating a data set, making a report, entering an inquiry to the data-base etc.

Of each task a number of things must be described:

- how the data is accessed
- the checkings and defauls of data-items
- calculations
- display lay-outs
- report lay-outs
- security
- menus and display-paths
- etc.

The result of this phase is a final manual model of the future adp-system. The end-users are able to test the system with the real material.

It is very useful to use prototyping in the critical or otherwise important tasks in order to give a more realistic impression of the system to the end-user. Using a prototype is also very good training for the future users.

The techniques are:

- prototyping
- cross-references
- lists of the tasks in a work station.

TESTING

The end-users use their own real material as the test material. The list of changes is a part of that material.

The testing with real material and look-alike manual system will reveal weaknesses and defects of the system. Yet, it is easy to make corrections and improvements. The adp-professionals, who will do the final programming, should be present at all the testing occasions in order to get a precise and realistic image about the system.

The testing phase may last for weeks, but it is worth using enough time so that all the end-user groups are able to test the system definition and get assured that their needs will be fulfilled.

HOW TO ORGANIZE A SYSTEM DESIGN PROJECT?

In order to guarantee enough special experience to the project group it is recommended that at least the following skills can be found from the group:

- project management
- knowledge of the system design methods
- adp-knowledge
- knowledge about the system-area from the end-user's point-of-view
- knowledge about a working method, which is systematic and creative.

It is not necessary to get the representatives of all the end-user groups to the project group. Depending on the part of the system which is to be described a team of end-users is collected to do that description with the project group.

The first three phases of system design do not necessarily require the presence of adp-professionals but after that it is essential that also analysts and programmers are present.

ABOUT THE TECHNIQUES USED IN THE WALL METHOD

Since The Wall Method is based on large and colourful pictures on the wall, there can't be an exact technique or way to make these pictures. Yet, some techniques and materials have shown out to be useful and easy to use and they can be called as "standards" in The Wall Method.

Below short descriptions of some of these "standards" are presented.

"THE GLASS HOUSE"

This technique is based on the facade pictures of buildings. The walls of the buildings are transparent, made of glass. The figures and functions that are to be described, are situated this house on their own places.

With this picture it is easy to show functions of the company. The material and dataflows can be situated in their right places, the work stations, computers etc. are all visible and the connections to the outer world can also be described in this picture.

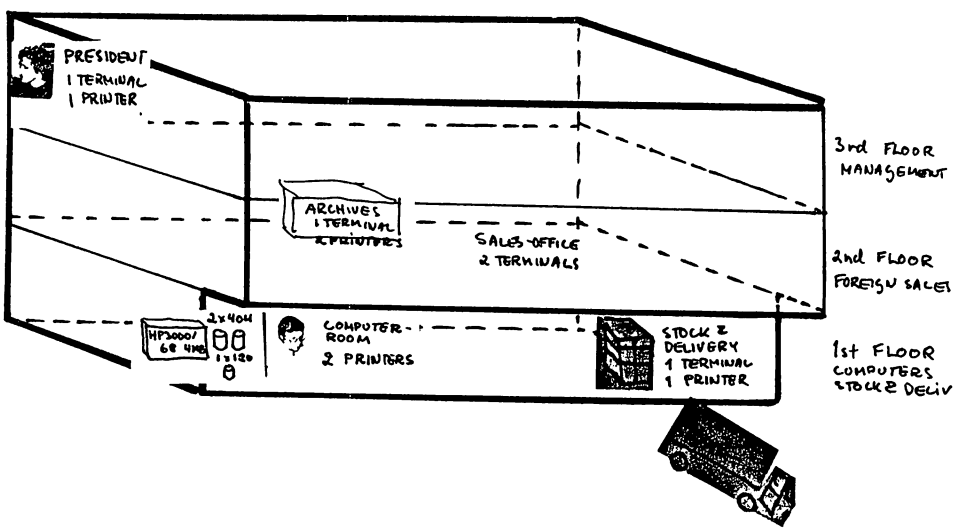

Figure 1. The Glass House.

HORIZONTAL PROJECTION

This picture is a horizontal projection about the building. It is used like "The Glass House".

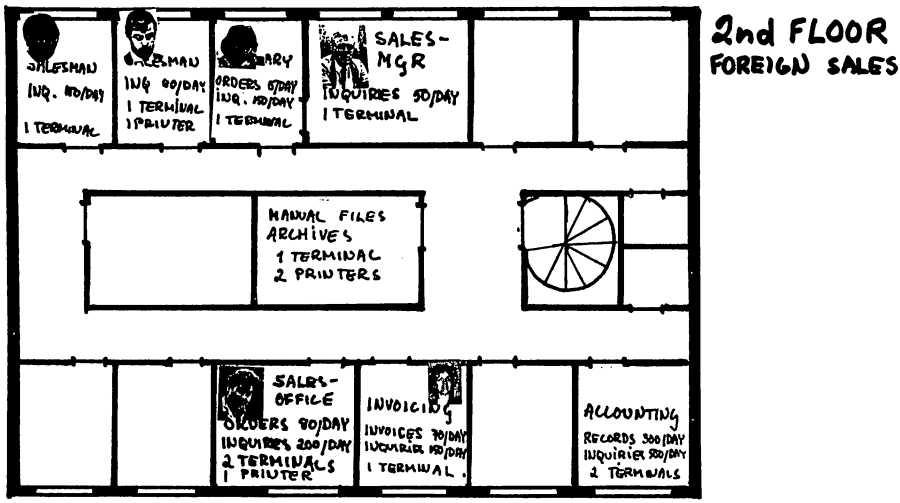

Figure 2. Horizontal projection.

DATA FLOWCHART

This picture is a reduced picture about "The Glass House" or the horizontal projection. Only the data or material flows are left.

It is also possible to make a flowchart that is combined of different types of pictures, "The Glass Houses", horizontal pictures etc. The pictures are connected to each other by arrows, which show the direction of the flow.

LARGE SCALE PICTURE

This picture is a combination of all the pictures which are already mentioned.

The large scale picture gives a general overview about the system when it is looked at from a far distance. When the observer steps closer, smaller and smaller details appear.

ORGANIZATION PICTURE

This picture describes those parts of the organization which will use the system.

It is useful to combine to this a cross-reference, which describes the responsibilities of the data administration.

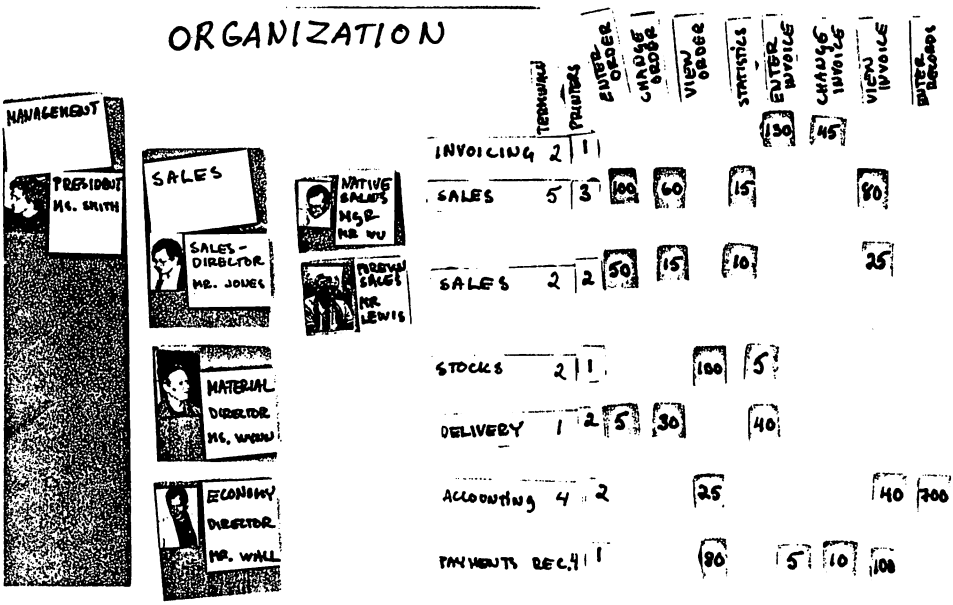

Figure 4. Organization picture.

CONCEPTUAL SCHEMA

This picture describes the logical structure of the data. When the lists of data-items are combined to this picture, there is a basis for creating the data-base.

The logical data groups of the system are at first grouped into data conceptions and then the relationships are defined between those conceptions. This is the logical structure of the data. The data-items of each data conception are then listed and the necessary information about each item is added.

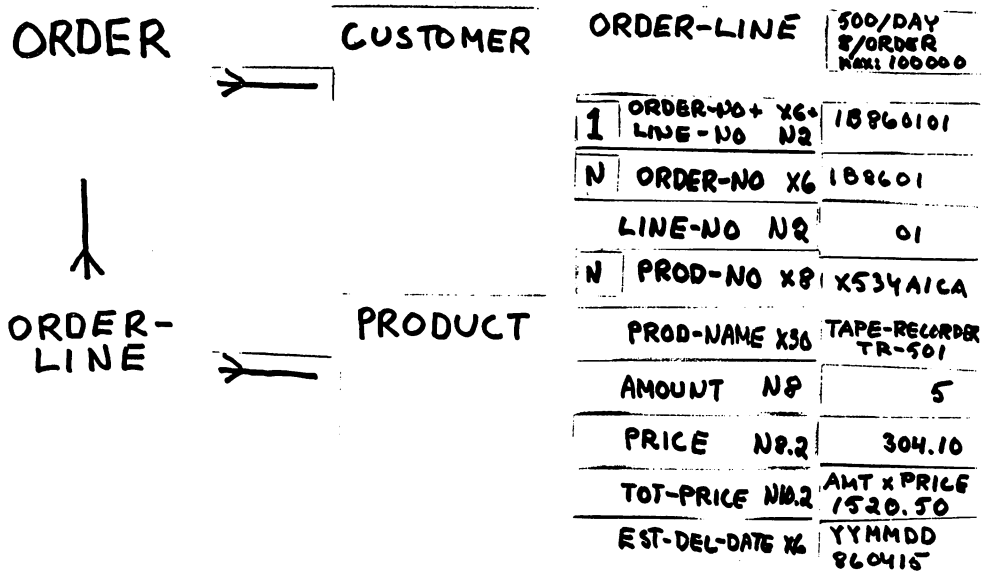

Figure 5. Conceptual schema.

MATERIALS

When using The Wall Method, the following materials can be used:

- a lot of empty wall space
- black felt tip pens (various gauges)
- pencils
- tape
- a kind of adhesive for fastening the cartons and papers
- large papers
  - white paper
  - white squared flip-paper, square 5 x 5 cm
- coloured cartons (about ten light colours)
- tools
  - scissors
  - photographic cutter for cutting cartons
  - ruler for cutting paper

HOW TO USE COLOURS?

The coloured cartons must be used throughout the system so that one colour always means the same thing.
The nex recommendation has shown out to be good:

- light blue: an end-user, a group of end-users, a department
- light green: a task of an end-user
- yellow: a data, a conception, a data-base, anything that accompanies to the data
- bright green: raw materials, products, all material
- gray: display lay-outs
- all red colours are alarm colours

HOW TO DOCUMENT?

The system description which is made by using The Wall Method, can't be moved from one place to another as easily as a description in the covers. So its is important that the room in which the work is to be done, is reserved for that use long enough. It is also recommendable that the room can be locked in order to prevent unauthorized persons from seeing the description.

The back-up copies can be made by photographing the wall from time to time. If a video-tape camera and recorder are available the walls can be taped and that tape can be used in training the end-users.

SUMMARY

The Wall Method got started, when it was realized that in system design the concrete pictures are better understood than the abstract figures and formulas. Such materials are for instance the real reports, forms, photographs, etc. When this material was used, the pictures became large and it was natural to take the empty wall space in use.

The big size of the wall pictures requires an own room for the project. So it is natural, that the members of the project gather in one team to work together in that room. The work becomes effective and creative when the result is continuously visible to everyone. Since the pictures are easy to modify, all kinds of experiments are possible and new solutions are easily tested.

The training of the end-users actually takes place while making and testing the description.

THE ADVANTAGES AND DISADVANTAGES

Like any method The Wall Method is especially strong in some cases, neutral in others and it also has some weaknesses.

Advantages are:

+ efficient common language for the end-users and systems people, it is possible to talk about the problem itself, not about the technique
+ the method is easily learnt
+ the whole system can be seen as a whole
+ the state of readiness of the system can be seen all the time
+ the testing is easy
+ suitable for team work
+ cheap and easy to use because all the equipment and materials can be bought from the nearest stationer's
+ since the method is based on various degrees of accuracy, the system can be presented to the management from different levels of the organization.

Disadvantages are:

- part of the pictures must be transferred into ordinary paper documents
- security may be difficult to arrange
- the room must be reserved for the project for a long time.

Finally, if you are satisfied with your present system design method, use it by all means, but if you feel that The Wall Method might give you something new, try it first in a minor scale as a part of your present method. It may not be wise to abandon a method that you may have used for years but to take a new method in use as an alternative and having got some experience you can make the choice.

The preceding chapters have described The Wall Method only as a system design method but the method can be used in many other cases, too. All kinds of descriptions can be made by using The Wall Method and some pictures of the system description can be used also for other purpose than system design. Since the method gives a concrete view about the things, it can be used anywhere, where it is necessary to show or demonstrate various cases.

THANKS

I want to thank Kari Saaren-Seppalä for the valuable advise he gave to me while I was doing this presentation. I also used his book as literary sources.

BIOGRAPHY

Matti Jamback has been in adp-business for over 13 years as an analyst, project manager and system manager. His current position is in Kemira Oy, Fertilizer Division, Helsinki, Finland. He is System Manager, with responsibility for coordinating and designing systems for that division. He has been using The Wall Method starting from the first projects, where it was developed.