**Systems Analysis and Design**
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**Lecture – 07**

Last time, we were discussing the life cycle of System Analysis and Design. And we looked at the first three steps in this, so called life cycle namely, requirement determinations, requirement specifications and feasibility analysis. We very quickly, we can recap the requirement determination is to design. What actually is the area in organization, which requires the assistance of computers and the computer based information system.
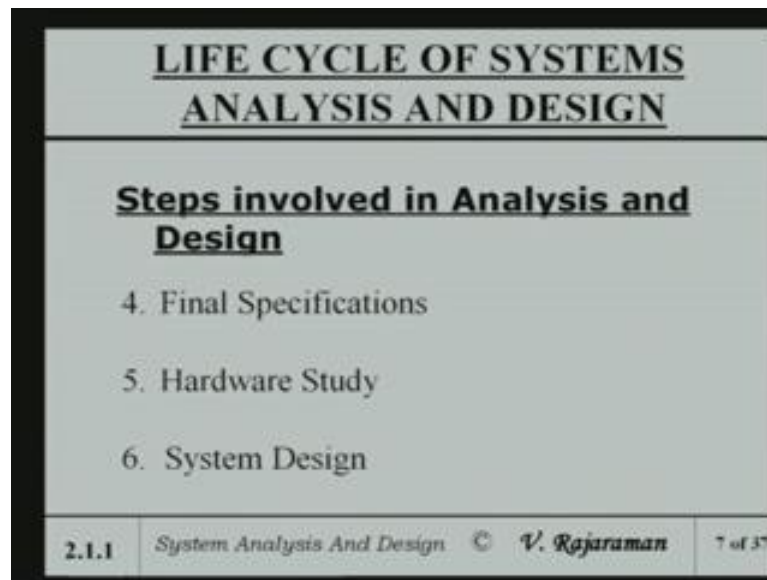
And the specifications, of course, talks about the actual details of, what is required and feasibility tells, whether, what is required, it can be really implemented in practice or not.

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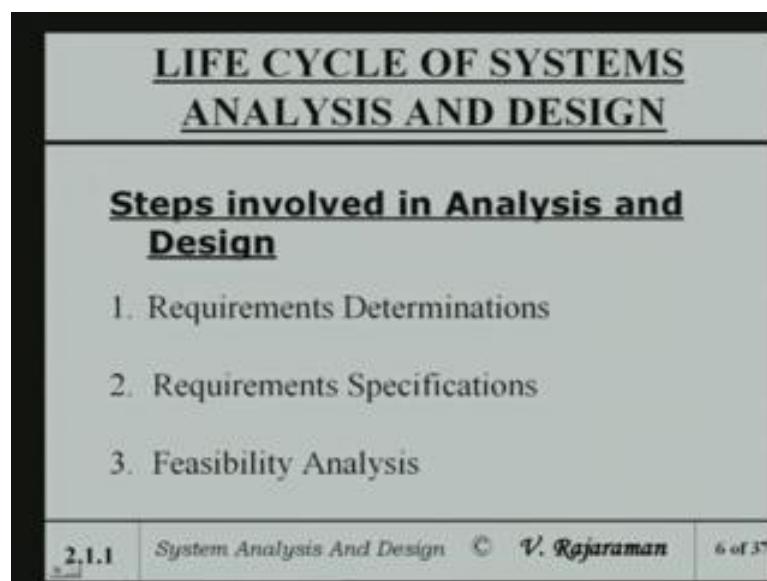


I am very briefly saying this, because, we look at each of these in much detail as you proceed.

The 4th step is called final specifications. In other words, the requirement specifications, which is arrived at, is preliminary requirement specification. And you have to look at the feasibility of meeting that requirement. And that requirement, may met in several ways. And we have to find out the best alternative.

And only after, we find out the best alternative, we drop the final specification of, what is going to be the final system, which should be implemented. And having decided that, you decide as a next step, what hardware, you require to be able to implement the system. Hardware specification used to be a very large area of work in the olden days. What I mean by olden days is about 20 years ago.

Today, that is not very important. As important, it is used to be, primarily because of the fact that, today almost everything is metal based. And PC's on the desktop computers are extremely powerful. Desktop computers are really connected to, every other desktop computers. So, hardware study today really means, how to implement it on a network. But, I cannot be very general, because a lot of transaction processing systems, which I talked about require very high processing power, huge amount of storage and very fast response.

Those types of systems are implemented by, what are known as servers, large servers. Large server are of many types. And so, there is still certain amount of relevance in

hardware study, because, the larger which provides servers particularly for banks insurance companies. They look at huge volume of processing.

Particularly, if it is online look at the class of machines, which are not the PC class of machines. What I mean by PC classes, Intel type, Intel Pentium and processors like, that type. They have machines like IBM's own line of server hardware. Similarly, HP have their own servers. Sun micro systems have their own servers. And so, they got different technologies and different specifications for that kind of a hardware.

So, the hardware study is, now relevant for very specialized applications. That is mainly high volume transaction processing applications. Particularly, things of that, like railway reservation system. It is a huge system or on line reservation, which again is a huge system. And all of these are at the background processed by the, what is known as main frame machines.

Even, may the terminology today is not all that clear. But, they are different types of machines not desktops. They have got multiple processors sometimes in a very fast. And having come up with the hardware, which you want to implement and having come up with the specification, you go through the system design. System design is the area, where lot of work is done by system analysts, who draws up, the overall specifications of the, not only specification.

Based on specification, the various components, which will make up with particular system. So, system is an ultimate system, which will be implement.

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LIFE CYCLE OF SYSTEMS
ANALYSIS AND DESIGN

**Steps involved in Analysis and Design**

7. System Implementation

8. System Evaluation

9. System Modification

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So, having decided on system design, the next is implementation. So, you have designed the system, you made the hardware. Now, you have to implement, that means, write programs, write documentations, test the programs, make it operational, inform it on the machine, make it work and deliver the final product. Whatever, you promised to customer, the customer, so that the customer can start using that system.

And the whole idea is, it should by this stage, I have done have taken all the bunks out of the system. That is, all the errors out, by reasonably testing and so, the implementation would really give you as a none product, reasonably stable, something which can go on line and people to start using it. Once, they start using it, it should not get into all types of hang ups. And stuff like that, which will put off the customer.

In other words, the system is implemented and delivered. And then, at that time, it starts giving you error messages and suddenly stops and so on. While, you are using the machine, then of course, the entire confidence of whatever, you have done will be lost. And they will be, may be even think falling back the whole system. So, that should never happen. So, at the end of implementation, what you should deliver is a quality product. This quality is reasonably assured.

And now evaluation is the next step. Evaluation is not as soon you finish or implement. But, after system is being operational for a certain period of time, when people had an opportunity to use the system. And once, they use the system, they know, what the problems of the system are. In other words, they know at what points, the performance is not as fast as they wanted it to be or they found out the certain things, which they thought the machine will do or the new system will do the system is not doing.

So, there is a lot of, you might say within codes, dissatisfaction with the whatever system is working. Because, whatever you deliver 100 percent satisfaction will not come very quickly. And of course, the problems of the system will become only evident over a period of time. Because, computer based systems have a interaction of both programs, machines and men or human beings and it is not a a computer, it is a something which is intended for people.

So, people become a part of a loop and people have certain responsibilities like this in making system work effectively. What I mean by people of responsibilities or there are people, who are suppose to prepare data and giving it at right time. People, who are

suppose to be able to look at the reports and take actions. There is lot of people in the link or in the chain, you are starting with the raw data being given. And even with the actual use of the final report or whatever are produced by the machine.

So, humans, actually system is intended for human beings. So, it is got to be such system, which is got a good human computer interaction or good graphical user inter phase and human computer interaction. So, that the humans, who use the systems are reasonably happy with the system. I am using the terminology human, just to avoid the feeling, that if I say, either man or woman, today both men and women use machines.

In fact, many of the organizations, remain dominate in terms of number of positions in system design and so on. So, it is a neutral thing, I am using, even though, it looks somewhat artificial, say humans. But, we have, I am using that, with that general idea, that it is all people, all persons, regardless of their sex. And the evaluation, after a period of time, you create some period of evaluation report. And say, what you find or the draw backs in system or deficiency in the system and what way, it can be improved.

Once, that is known, then you go through a modification, system modification, that means, you improve the system. Sometimes, the modification, may just not be fixing bunks removing errors and so on or making the GUI or Graphical User Interphases, better. But, sometimes, you may even have to implement, newer applications, which are not thought of earlier.

So, modification not only means, it is correction of or correction of existing system, but even implementing something new. And no new system, particularly for software system, internet for organizations is ever static. Because, human system change, human requirements change. And people always say, that computer based system are used by managers to do that, grow up their minds. Because, they exactly did not know, what the machine can do and what the machine cannot do.

From the point of view of the companies, service companies as well as software development people in some sense, it is very nice. Because, once you deliver a system, if that system is going to be used continuously, no change, there is no more revenue for you. If the modification, every time you modify, you ask for more money. So, there is a revenuestry, money comes, goes on coming continuously.

Even though, you compile the project, that project would continue to give you some money in terms of so called maintenance and maintenance are of both types, both modification and correction. Correction of course, may not give you much money. They will give you some, but not much money. But, for modification, you have to say, that because, you asked for a modification, I am modifying. And so, there is certain amount of cost. So, this is important.

So, the system modification is continuous. And there is a good relationship between the provider of the system to the organization. And organization it iself and there is a good relationship, then the provider gets continuous revenue. And continuously, improves the system as and when the organization goes on changing. So, the organization, as I said are not static and so systems are not static. So, you consider consider system modification becomes a part and parcel of any software system.

In fact, the word software system it iself, implies, it is playable or it is changeable. And people think that, it can be changed at low cost and at low with low time, delay. But, it is not true, I mean all of us know any improvement or any changes of existing systems, does not only mean. That we have to put a more human resource on that to work on system, but also it requires time.

It requires a lot of effort and so the perception, when people, mangers and so on. That it should be easy to saying software is not always true. But, one thing of course, a software designer has to keep in mind is that change is going to be the order of the day. Change has to be planned. In other words, you have to assume, when you start designing a system, that the system is not going to be static. System is going to be dynamic.

It is going to be a dynamic system; that means, you are going to build the system not for stability, but build the system for change. That is the basic difference between designing and certain types of engineering systems, like for instance power generating station or a building. When a building is build, it is not expected to be changed every year. It is something which is a structure, which is perpetually suppose to work, without any major modification, same with generating stations and so on.

There are engineering systems. The engineering systems, in fact are designed for stability over long periods of time. Whereas, software engineering systems, even though in engineering systems are not designed for stability in the same sense, just they have

built for change. That is in other words, we have to design system and the methodology of designing system, must be such as to make sure that change will be inevitable. And change is got to be created for and change is part of the design process.

So, all new methods of actually designing systems is using methods, such as, building blocks, where the number of building blocks are put together. And whenever, some requirement is made, you can remove one building block and substitute another building block or order some new building blocks. So, this is a kind of design, which one has to do. Take an example, which is familiar to you.

Nowadays, large number of buildings, particularly intended for software and so on. What they do is, they put a lot of pillars and make huge halls, with no walls at all in between. And then, the huge hall is made, then the company makes those cubicles or they in order put level partitions, nice looking partitions and they have a number of desk. Teak desk creating to one person, with a work station with some little moving place, some drawers and some place to put your books and stuff like that and notice board and stuff and all each one is designed nicely.

So, you got a number of desk made and tomorrow, if you want to kind of reorganize that space and add more desks and so on. You do not have to redesign the building. Only thing you have to do is, move on those partitions. So, the partitions moving around is not expensive. It takes time, does disrupt the operation, but the disruption is slight and it is not like breaking walls. It is bake nary walls, bakes and so on. It is much simpler.

So, that kind of a design is a flexible design and which is designed for change. Same way in software, every design, which will make, has to be made, keeping that in mind. So, whatever you learn in computer science, starting with programming, to system design, to object oriented system, what all. All the advances in programming and object oriented design and so on.

Have all the same objective are trying to be two things. One is, to make it easy to modify programs, modify systems. The other is to reuse. In other words, we able to not reinvent the every time, one of the things which engineers do in design is the make components. And then, they try to make assemble the components to make use of your system. And the same components can be used in several applications.

Same way, the computer people having trying over years to say, what are the components in software. And particularly, if you are looking for a whole set of applications, which are similar, there will be similar requirements. So, that, can you think of, what are the reusable block with which very little modification, very little changed can be reused again and again.

Any software company, which is able to make on build systems with good well tested reusable blocks is a one, which the long run, will make a lot of money or make a lot of profit. Because, you will not be redoing the whole thing again and again and again and they can finish projects faster and they can make it also work quicker. And it is all well tested and also to make the customer happy. Because, whenever a customer requires a change, you are ready for it, you are able to make that decisions.

So, these are the basic ideas, which every computer science students has to know. Because, when you do computer architecture, where you are talking about hardware design, there also to some extent, this is always used. In other words, all current computers are designed using integrated circuit chips. And each integrated circuit chips has a fairly large functional requirements, which it meets.

And though, there is a library or availability of a huge number of these chips and those chips are used on mother boards and so on, to make different types of machines. So, these are hardware rising chips. Similarly, people are being saying, why not make software chips in a similar idea. And have a library of software components and then, you put it together like for instance set of Building blocks or chips. And have a inter connection system, which will interconnect all these and make the system work.

So, even though, I am digest a little bit, from this the idea is so important, that it is worth emphasizing, again and again and again, in almost all courses in computer science. Now, let me go through each one of these in some great detail.

And requirement determination is primarily concerned with determining, what is pursued as the needs for an organization with ultimate goal of improving their operations, improving their profitability. So, it is not a question of only, day to day operation. There day to day operation get stream lined. That of course, is very useful. Besides that, they also want to have the information come out, for tactical and strategic decision making, which will be more profitable.

So, requirement determination, these are all read by among managers and not only among managers, you also normally have in the loop. The working people, the people, who actually are going ultimately, use this system and they are going to make or break the system. Because, they clients, who are suppose to give data, they are the one, suppose to effectively run the system and so on. So, those people confidence has to be taken into account. They are having lot of experience in the organization. They know, lot of things, which is important for you to gather.

So, that is part of the requirement determination and you have to set priorities, among all these requirements, because, there is multiple requirements and pick the high priority application. Let me give an example, which is very something which, all of you probably understand. Example of, suppose you want to build a house, you want to build a house, the first thing you do is that, you have to take a decision, whether you require a house or not.

Because, you may require a house build in a suburb, which is for away or you may right to buy a flat, which is right in the middle of the city. So, requirement determination is not one thing that you have decided to build a house. You have to have to find the resonance relevant. And based on the concerns among all the people in the family, you talk to all the family, some of them would say, I would like to be in the middle of the city. Some would say, does not matter, if I go out little bit, because it is quieter.

And I will have a lot of rooming space in the house. So, there is a requirement is there that I need a place to live. So, the question is in terms of various alternatives, which are there and priorities, you have to assign. And then, have not disturbing, what you are going to do, in the case of say a house, have not decided that, you are going to called a build your own house, which on particular path you take.

If you decide, if you are going to buy readymade flat, then it is not much of a future decision, you have to take, except that, you have to decide, where to take the flat, which area, it will be, what size, it will be, how much do they afford, stuff like that. So, then, that is a different issue. First is, question of determination is essentially determined that, I need a house and where that house will be.

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The requirement specification is the next step. That is how to determine the requirement. There could be multiple requirements. For instance a company, may say that, I require, let me take again a simple example. You take say a shop, a small medical shop and

question about the requirement of determination of own would be, do I require a computer or do I not require a computer, can II continue with my manual process.

So, determination at that time to make a decision between the two and both decisions of course, you will consider a lot of things. Machine is going to cost me money. Whether, it requires power, continuous power. It requires certain knowledge about operating the machine and so on. So, do you have that, knowledge, do you have the money. What is the profit, which is going to come out of that, by use it? If you do not use it, what is the advantage? So, all that has to be considered at the back of the mind, before you determines, that the machine is required.

And you also know, many choices, whether to buy a laptop machine or a desk top machine, whether to buy a low cost desk top machine or a higher desk top machine. So, all these things also again depends on the, what use ultimately is going to put to. Then, you may ask the question do I need an internet connection or you do not need an internet connection. If I am going to have the internet connection, it is going to cost me money.

What is the return, I am going to get from that. Am I going to use that, at all? I am going to use it, then it is worth, otherwise it may not the worth putting it. These are the questions, which shop keeper has to definitely ask himself, before the requirements determination. So, at the end of the requirement determination phase, he may decide, that he wants to buy a laptop. The reason may be that, during the shop hours, you will have the laptop. The laptop of course, has certain back up power.

So, it does not have a separate UPS, in connection to the mains, powerful for about 20 minutes and so is not disrupted. So, you continuously use the machine and you can always connect a printer and all that for it. If which is one of the requirements, normally in a shop, because, he has to give a bill and he can decide that, he can order medicines by internet by e mail. So, you may decide to have a connection to e mail system and you may decide that, little accounting package package is required.

So, that, you can make an accounting and at the end of day, you may decide, the reason why, they may have gone, whether laptop or portable is there ((Refer Time: 33:02)) day he can carry the portable home and use it for other purposes. The children, may not use it for playing games for all we know. But, whatever it is, something which is not locked up in the shop and you also may think, that if we takes it home, it is safer.

That is put in the shop and the shop is locked up, it may be, you know somebody may take it away at night. So, because laptops are it is a very attractive items for thieves, along with cell phones and so on. So, one he may decide, that is better take it home and use it even for the fact that, he can take it home and complete accounting job. He has done all the collection and he need not sit in the shop and do all the final calculation.

The final collection of the day, you can get from machine at home and and compare with, what the cash collection it he took and you can re concern and all that. That can make over all true, which you can do it at home after the shop is shut. So, these are issues, which individually the person has to decide. And that is what is mean by, requirement determination.

So, the determination at the end of it, can decide what what machine to buy and what applications, you are going to put up. And why, you want to put those things and what you will use it for. Now, having done that, you are through with specifications. The requirement specification in a sense of a large company, may have lot of different types of requirement, which the company may have, like, pay roll may have as I said many functional areas, which you looked at.

Each functional areas as a requirement for a information system. Among these functional areas, specific companies may decide that, they may not look at all functional areas at one go or they may look at some of them or they already existing system in the organization. And there are satisfied sub odd systems, some of the functional areas, they may decide to only go for that functional area.

So, these are all specifications, we laid down in terms of the, what is to be done in greater detail. At this time, you do not worry about, how it is to be done. You only say, what is to be done. And this specification arrived at by user's requirement of discussion with lots of users and it will encounter to several applications and several requirements, which are originally looked at.

**LIFE CYCLE OF SYSTEMS ANALYSIS AND DESIGN**

**Step 2 : Requirements Specification**

- Arrive at the specifications of the users' Requirements after discussions with the user
- A system may encompass several applications

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Let me again go back to my house example; assume that the house owner has decided that, he is going to build a house of his own. And he has decided to build the house in own for some reasons, may be he has a plot, which is lying idle and he would construct a house there. He has decided at the end of the requirement determination phase, requirement determination phase said that, they have to take reservation. So, the reservation was ultimately decide that, you want to have a house for your own.

So, having decided, he has to come up with a specifications of a house. What is a specification of a house? You know, it is a plan. So, he normally, what does he do, whether he has decided to build a house. He normally calls an architect, architects idea are different from architect engineers in the civil engineering field. Civil engineering architects are the ones, who are suppose to look at the needs of people, who are going to live in that house.

The civil engineer or contractor is suppose to actually build the house, using the whatever materials are available at the cheapest cost and deliver the house to you. So, he is more in implementation part, rather than the system requirement, specification part. Requirement specification, in this case, again has to be arrived at by consequences. Because, the architect may come up with a plan for a house and it will be a preliminary plan.

But members of family may have different requirements. The the grand father and grandmother, may ask for a large pooja room. The children may ask for a set up children's play area or a children's room. The mother may like to have a separate room for music or whatever. And they may like to have a fairly good kitchen, fairly large kitchen.

Of course, she will say lot of time; I am spending in the kitchen and want to have a good kitchen. And the father may have like to study, where he sit down and does study and so on and leads, through a living area and dining area and all that. So, each one has a lot of requirements. And if you put down all the ideal requirements and put together, if they become a palace for which either you have the area nor, you have the money.

So, now, what you have to really do is to sit down in consent and arrive consensus, saying that, look here, I cannot do it, because of this reason. And generally, people are reasonable. And you come up with the consensus, based on the agreement, among all the people at what is the priority. What is the highest priority in all and how to move that priority?

So, you prioritize, your requirements and having prioritized the requirement, you draw your own rough plan. And you give it to the architect, this is my rough plan. And it may be a 2 storied house, where I require bed room downstairs for my older people in my family and so on. So, that requirements are all met fairly with consensus, among people. And based on this rough plan, the architect takes that rough plan and makes up a modified drawing.

And modified drawing is again given to the family and they look at the modified drawing. They may suggest changes here and there and make a 3rd modification. 3rd modification is the normally is the time, when architect and the house owner sit together and arrive at a final plan. And now the final plan is arrived at that is only a general plan. Besides that in any house, you want to have a looks and feel.

People would like to say that, from from the road, if you look at the house, it must look pretty, in some sense. And there is a kind of the view of the house, perspective view a house. Perspective view in terms of plan as well as the two dimensional, whereas perspective view are three dimensional. The architect may make even a model with card board and so on.

And the view, the card board model of the house, so that, you look at it from all sides and how it looks like. And you are generally again, there also are some people like certain looks, some other people do not like certain looks. But finally, they again come up with the consensus and decide on a particular type of design, for the house at that time you gel it.

Of course, nowadays modern architect also use computers. So, they provide a walk through, through that house on a three dimensional computer like design nice package. And that package will zoom and change and so on, that will give you a virtual reality feeling of walking through the house and looking at the house from outside. So, all these things are now become the applications of machines by architects.

Of course, normally for a house, they do not go through all all that elaboration. But, you are building a huge office building or a new software campus like all companies are building all the time. Then, you know the architect may give you, even that the entire campus lay out and walk through the campus and stuff like that. So, these are all done nowadays.

So, at the end of that, you are reasonably clear on what you are going to ultimately get. So, the one advantage at this of civil engineers at least is that, once having decided that plan on elevation and all that, you gel it. And you know the house is also build, you are not going to able to change it. So, it is a fixed one. So, you are very careful at that stage, you need a proper specification. Whereas, unfortunately in software systems, people are always not all that clear, because, they are already false impression to some extent.

That things can be changed at the drop of heart and things can be changed, just like that. Because, in software, I derived in spite of time at the time of deciding in the requirement specification, assuming that, they can take a decision later on, which is not always true. So, it is the duty of the designer system analyst to point out to the customer, that, this is reasonably gel at this stage. That is not easy to change it.

To change it later on, change your mind is going to cost you money. So, there is a system requirement specification document, this kind of at least original document is put up at the end of this step.

Now, having put up these specification document, you see, they could have the requirement from making different ways. So, system requirement only says, what is the requirement going to meet? But, how you are going to do it, there could be different alternatives.

So, you can have three different alternatives and look at the feasibility of each of these. Feasibility means, what is the priority, which you have put, which priority does it meet, at what cost, does not it meet. Is there any cost benefit of the system? Among the three alternatives, which is the most cost beneficial? Coming back to my favorite house example, having come up with the house plan and so on.

Now, you have number of alternatives. Alternative is for an instance, where to use a mosaique floor or a granite floor or whether to kind of put marble in the bath rooms. These are number of alternatives, different types building materials become available. So, you can look at 3 or 2 different designs in terms of materials But, if your architecture is very cooperative look at 2 or 3 different looks for the house.

And each of them, look at the cost of them and benefit by putting this new type of a material for pouring. That is going to be more expensive. That is going to last longer. Is it worth it, do I have the money to invest it at this stage. So, really walls to be painted, so many types of paints, available today, cheapest paint or most expensive paint. Now, what

is the advantage of each? Even, if I find the best paint, has an advantage of 10 years; I do not have to do anything. I may not have the capital to invest it, at that time.

So, the question arises that the best alternative may not necessarily be the one, which is feasible, because I do not have the money. Same way in a system, the system has to look at alter alternatives, their major look at the alternatives and say, which alternative, they look at.

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In the case of computer based system, what are the resources are available. Human resources, time available, equipment, cost of each alternative, benefit and find the best alternative. And then, the feasibility analysis become the best alternative, among the various things.

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Then, you drawn up the final specifications. So, the final specification is something which is signed by both the customer, who gives you the requirement. So, first SRS, it is called SRS document, final SRS document or else system requirement design document. Specification will say, what the system will achieve, what will do the implement. After implementation of what will be the operations of computer of your organization may be improved. And what benefits will you get out of this.

And you create a SRS document, which more or less explains in more detail, system which will be implemented. And nowadays, there is also a method called photo typing. What is photo typing is somewhat equivalent to the model, which an architect makes. The card board model, which the architect makes for you look at is not the final house. It is only a proto type of, what the house is going to look like.

Similarly, nowadays, what people do is, it is too late to kind of change things, after you implement the system. So, what you do is, try to come up with a model or a smaller version. Though, there are implement, so called proto typing things available on computers, where try to kind of create the look and feel of what you ultimately get. In terms of graphical user inter phases, how the users are going to interact the system. How will the data things flow and so on.

So, this kind of a thing is called system prototyping. And prototyping is a useful method nowadays is available and you show proto type. And the once, you show prototype that

becomes a bench mark that, which you compare to the final system. So, you are something to compare against, just like, when a gives a building card board model. That card board model is one which is going to compare, against the final house, which you are going to get and they should resemble one another.

If they do not resemble; that means, that something gone wrong completely. So, effectively, you are committing, both sides of committing for something. So, at this time, uses agreement on this SRS document is reached. Saying that, the user believes his what is going to get, I guarantee this is what I am going to give. So, the SRS document is one of the most important documents, which are signed by the contractor. In this case, system provider and the user or organization to whom it is given.

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So, the SRS document also gives, the cost estimates and time estimates. How much time, it is going to take to build the system. How much it would cost. What is the benefits and so there is a contract. And this contract is considered a kind of a secret contract like a dealing contract. So, it is a something which is, which will even stand up in court normally gives in arbitration.

There is a disagreement, after you deliver this disagreement between you and customer. Then, you have to go to umpire, for the umpire to decide, whether who is not correct. So, if it is a good documentation, then the arbitration person has also something to look at. And is ((Refer Time: 53: 08)) also there, something which is evidence. We can look at

before deciding of, who made a mistake and whether there is a change, you made and so on.

Of course, one hopes, that one will never get into that stage. Because, that is a very uncomfortable stage for any company, both the company and organization get into. And one would like to avoid it by normally trying to read the consensus between the customer and the provider. And ultimately, some negotiations take place they cannot in detail. Otherwise, you get into all kind of problems.

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Now, of course, I talked about hardware study. What is the hardware and software required to execute the application. Are you going to make use readymade software. Are you going to build special software for this. What languages are you going to use. Are you going to use java. Are you going to use c + + and these are questions, which you have to decide. Response time and volume of data processed, frequency of reports, all these things imp inch on the type of hardware, you require.

And type of software, you are going to use it. Is it going to be a web page system, in this case, may be java type programming may be more useful. So, there are number of issues in terms of the method of hardware and software, which you to do.

And software system design, that is the step, where you do a logical designer system. And you write your, what I would say is structured program in English and stuff like that. So, program structure, you write a functional, you write some kind of a pseudo English programs, you may use decision tables and so on, at that stage. So, logically look at the programming aspects. And you are going to use object oriented programming identifying objects, which will go into the system.

And data base, look at the data base design. What kind of design, you will have, overview of these things.

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LIFE CYCLE OF SYSTEMS
ANALYSIS AND DESIGN

Step 6 : System Design

- Program Specification drawn up
- Implementation Plan Drawn up
- Test Plan

2.2.4    System Analysis And Design    ©    V. Rajaraman    17 of
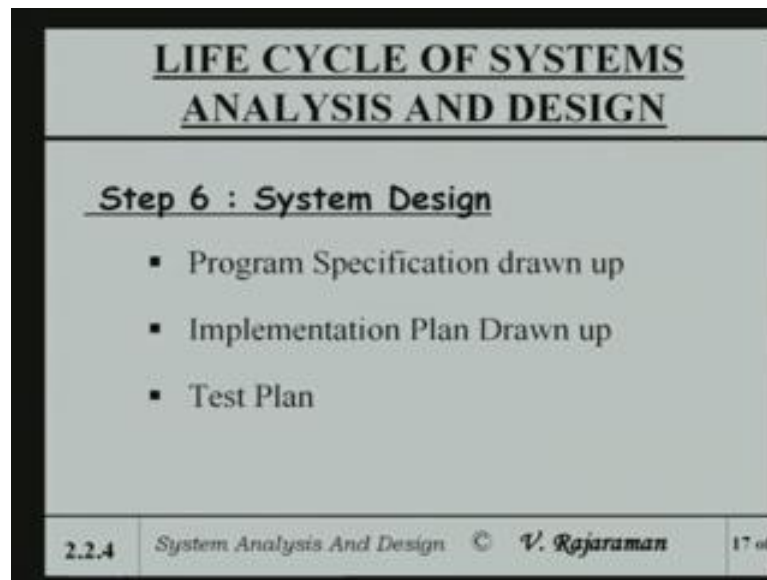
And program specification is drawn up. So, that, you have a set of programmers, start programming it. You design have an implementation plan to implement the system. In other words, implementation plan is again some kind of a chart, which will say, how much time is assigned for each of these task. So, you always work backwards. You contracted with the organization, that you finish the job in 8 months.

So, if you have to finish the job in 8 months, you work backwards, something called a pad chart or CPM chart. And you look at all the task, starting from 0 to the end. You also find out, what task can carry out on parallel. What task will go on and series and how much time will each task take. How many people, you have to put on each task. So, all these things are partly designed.

So, implementation plan design and who are the experts, who know java very well. If you design it on java, you may have in the company, lot of java experts. So, you put those java experts. And so, in fact, the human resource department normally has complete data base of so called skills and inventory. And based on skill inventory also decide they have some kind of a record on the availability of people. What projects are they working on currently, what projects they earlier worked on.

So, you try to see, from this data base, who are the best people to work on this. Are they available, when, will be they become available, because they may be on a different project. But, they may become free after some time; at this time allocate them here. So,

all these issues are part and parcel of the implementation design implementation plan and then, you also have a test plan at that stage.

So, in other words, as I pointed out, when the system is delivered, that delivered system should work without any kind of a break down. If it breaks down at that time, it is extremely bad from the point of view of the organization as well as the provider. So, you have to be fairly careful about deciding on what kind of a test plan going to have. And this testing is got to be extensive, both system testing as well as program testing.

And for companies are there now, which specialize in testing. In other words, they will give a 3rd party test. You will give a system to them and they will take a 3rd party test. So, you must have some plan for that test. Internal test what will you do, external test what will you do. And the test plan becomes an important part and parcel of your system design.

So, it is a system testing, program testing, testing with wrong data and all that part, what is called exchange of testing. And as I pointed out with, now companies are there, which will do it for you.

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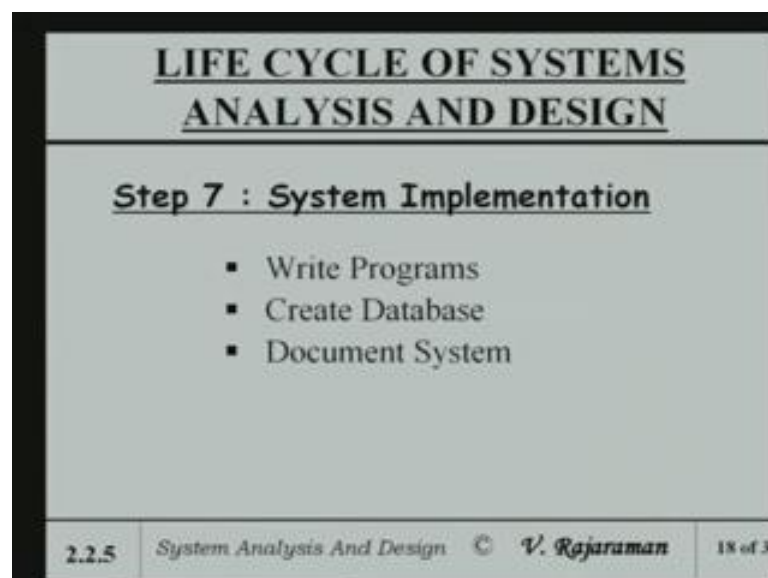


And then, test plan as I said is even right, even before the programs are written. Because, the test, even if you write the program, if you have a clear test plan, after the program is written, you know, how to test it. If you have a test cases, the program has to work. Test

cases are very useful for a programmer also. Because, person can write program and their out through it and these have to test it. So, at the end of it, it does not get into a great problem.

There is also question of many methods of programming are there. In terms of, you know when you write the programs, you ask somebody else, look at their program. And team programming, extreme programming, there are 100's of techniques, people talk about about making quality programs. And so, I am not going to talk about these things. But, there are many, many things and create data base and document system.

Documentation are the implementation system, extremely important. The reason why documentation is important is because as I said, no system is static. System is going to become dynamic. System becomes dynamic; that means, it requires change. If you have to change the system, unless there is documentation of what the whole system did, you cannot change it easily.
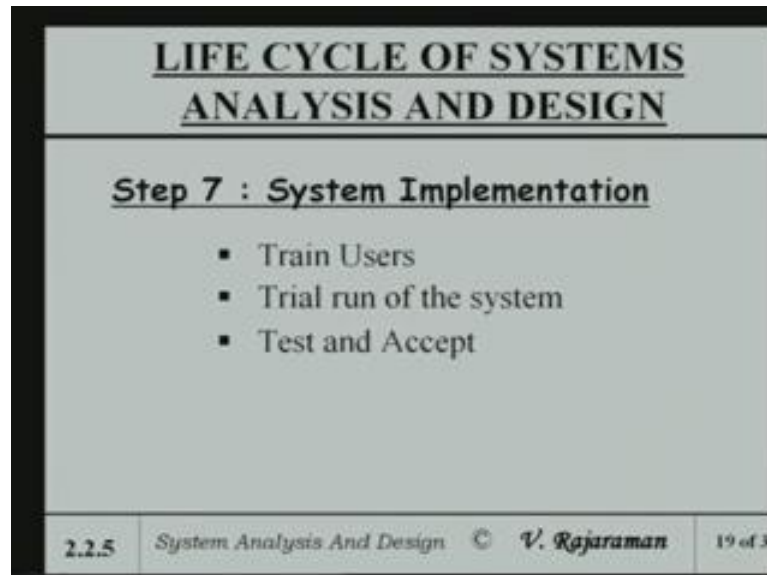
And all these software organization turns out, that there is a lot of people leaving and coming. New people coming, earlier people leaving, so called turn over. 15 to 20 percent of the people, leave any company, every year. That means the human resource is not a stable human resource. So, because of that also documentation is extremely important. And very often companies do not pay attention to documentation, because it is considered as something which is to be done at the end.

But, a good practice is to create documentation as you go along. So, lesser, it becomes last minute hurry, hurry job. It also useful to thing about the methods you have to buy separate documentation is not required. Documentation becomes part and parts of your programs. This is the method, which you use for design, when it becomes part and parcel of a program, then documentation is does not become chore at the end.

So, there are methods, which one has to follow of the standards, which companies have, so called documentation standards of programs. While, you write a program, you kind of give plenty of commends and how to write commends and stuff like that. And then, of course, system documentation, these are parts, which are part of you are going to learn as you along and documentation is very important.

Then, as part of implementation, you also have to train users. Ultimately, the people, who are going to benefit of a system are users.

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LIFE CYCLE OF SYSTEMS
ANALYSIS AND DESIGN

Step 7 : System Implementation

- Train Users
- Trial run of the system
- Test and Accept

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Like for instance, if you are planned new computer based system for a bank, then the person, who is going to use it day in and day out of the terminal is the clerk or the teller in the bank. And the teller has to know, what are the graphical user inter phases. What buttons, what keys to press for what. What functional keys, you have to press for what purpose.

So, training is important for that person and the system should be designed in such a way. That operational people like clerks and so on, who are not computer literate, find it very user friendly, day by day, without much of a learning period very quickly. There also the problem arises. People are in leave in any bank. So, they have to kind of re deploy, take some other person, put it in a place, where a person is working. And that person should very quickly be able to understand, how to operate that computer there.

So, it should be more or less, self, what I would say, self learning kind of a thing. In other words, it should be possible. So, that, without any reading any manual, you should be able to start using it, as soon as people do not re manuals. They try to attempt things and then, they learn. So, when you attempt things, if something goes wrong, system should not get into a hang, state or loop and stuff like that. It should be able to gracefully recover and not do something very damaging.

So, these are issues which are very important. That is you have to train users. And why you train users, you understand user's problems. So, that, you modify, you might say, weakness or knowledge or lack of knowledge whatever. So, you have to very clearly understand, that today computers are used universally by all types of people. That whatever, you design must be absolutely full proof.

So, any person with reasonable amount of common sense, should be able to use the system, without much of a difficulty. So, you also do a trial run. What is meant by trial run is, that there are two types situations, which may arise. One situation is, ((Refer Time: 1:07:08)) you are doing it. What is meant by ((Refer Time: 1:07:10)) previously there is no computer based system was there, only manual system was there.

And you may go to a computer based system. You run both the computer based system and manual system, concurrently or parallely for some time. Like in the carries shop, he has buy a lap top, you put all the programs everything to in it. Before, he becomes comfortable, he will continue to use his own system. And he will also try to use the new system. And he finds, after say some days, that the new system, he can rely on and his out goes system are better, then you will go to new system. This is called parallel run.

But, if suppose, while using the new system, if I find some problems with it. Then, at least, he can fall back in the old system, whole place is not coming to standing halt or grinning halt. Same way organizations, which are new and implementing new things, they try to kind of have a parallel run. The other situation is, what to do a computer based system is running and you are replacing now with a better system.

Again, they will run both the systems and match the results. And see, whether the new system at least gives you, what all the old system is giving and more. What is promised and it is doing much faster, is the response time better, is it giving you better thing. At least it should give me old things, without any change. So, that conviction has to come. If that conviction comes, then of course, you have a tendency test.

Then, you have to testing with test and accept. Test the system, because this trial run, already will be a test situation and you get an idea of that. And evaluation, find out for the user, system users, which is specified requirements, which I said again, after running it for some time.

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List areas of dissatisfaction and find the reasons, why they are dissatisfied. Suggest, if there is any improvements, which can be possible, which can come from the user also. Because, he used it some time. Taking back the house example, only after you start living in a house for 6 to 8 months, you may what is all wrong with that house. And you can tell your friend, how not to build a house. The size, they have build, I am not satisfied, because of the following reasons.

So, when you build a house do not do this. Of course, in a case of a house, he has to bring and bare it. I mean, there is nothing, he can do about it. Because, close you know, other than just breaking it up, breaking it down, which is impossible. Whereas, in computer, it is a soft system and they can change it. So, you know what all wrong with the system or the kind of change the system and suggest any improvement can be made which you can implement.

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Finally, you modify fix errors, add delete, new features, tune the system and continuously monitor and assess performance. And there is after evaluation, you modify. And this course after a period and then, this is always continuous in the sense; it is not something which is 1 time. It is a continuous thing, which you do. That is every 6 months; you may have review and have a system modification plan. And modify the system, because every 6 months as I said human system may change.

Your requirements may change a little bit. So, to what extent, you want to modify only, what is running or to have go back and reach redo everything and so on. These things, are taken at this stage. Normally, people do not modify every 6 months. They let it run for a few years, 3, 4 years. And then, may be change it, because human systems have a much longer time, constants than computers.

So, we really are satisfied, because we have put up with it and later on, we slowly improve it and continuously improve it and optimize it. So, that kind of concludes an overview of the steps in systems analysis and design.