

BUILDING PROJECTS AT DTU

PROCESS AND USER INVOLVEMENT

INFORMATION FOR USERS

As a user you can always find information about building projects at the DTU Portal.

All important information such as approved drawings and time schedules is uploaded to portalen.dtu.dk.

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BUILDING PROJECTS AT DTU - PROCESS AND USER INVOLVEMENT

The Technical University of Denmark (DTU) is currently working on a number of large construction projects that vary in nature, scope and complexity and range from small-scale refurbishment projects to large-scale projects involving extensive renovation of buildings or the construction of new ones.

It is DTU's ambition to involve users as much as possible in the projects. The level and timing of the involvement will vary, as construction projects differ a great deal, and the involvement will typically take place through participation in one or more working groups composed mainly of members of staff with particular insight into areas that are relevant to the project in hand.

This booklet outlines the general building project process with a special focus on user involvement. If you are an employee or a student and become involved in a building project at DTU, you can use this booklet to learn more about the following points:

- the evolution of a building project
- the roles and responsibilities of the parties in the various phases of a building project
- the framework for user involvement: how and when can you exert influence

This booklet was prepared by DTU CAMPUS SERVICE, 2014.



WHY USERS ARE INVOLVED

The daily users of DTU buildings are the ones who are most familiar with working practices and functions. Such knowledge is valuable in all building projects, and the main purpose of involving users is to incorporate their knowledge into a building project in a systematic and constructive way.

In addition, a successful user involvement process helps create ownership of the building project among staff and students, which is a prerequisite for ensuring that the finished building will be used optimally.

PREREQUISITES FOR USER INVOLVEMENT

The following prerequisites must be met to ensure successful user involvement:

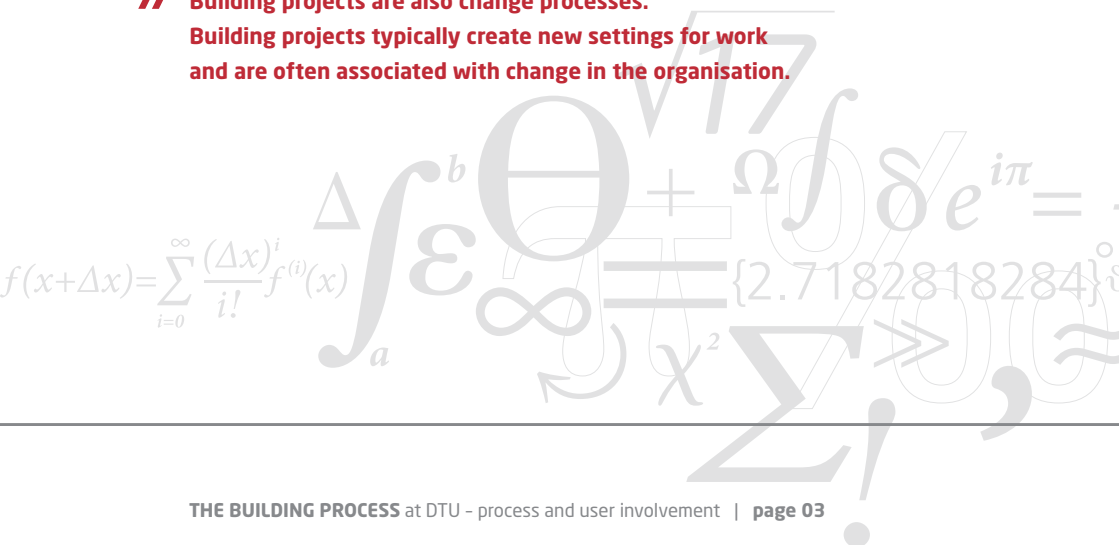
- The expectations of all parties involved should be thoroughly and mutually aligned.
- The management should understand and support the need for user representatives to spend sufficient time on activities related to user involvement.
- User group participants should have appropriate skills to collaborate with project managers and consultants. User groups act as representatives of other members of staff and play an important role in collecting and passing on information - from and to the people they represent.
- Roles and responsibilities should be clearly defined, and it should be clear when and on what users can exert influence.
- The focus should be on constructive options rather than on problems.

SUCCESS CRITERIA FOR USER INVOLVEMENT

The building projects will be very different in terms of time, budget and resources. It is, however, possible to identify a number of overall goals and success criteria for user involvement:

- Users should be well informed and have a good overview of the building project from start to finish.
- Users should have real influence on the project design and should take ownership of it.
- User involvement should generate a common perception of the goal of the building project.
- User involvement should help users see the whole picture and new opportunities for optimisation of the physical framework in the built environment at DTU.
- Conflicts should be resolved as and when they emerge.
- Work should be based on a future-oriented, innovative and inquisitive approach.
- Construction costs, technical solutions and future operation and maintenance costs should be optimised.
- The final result should be the optimal result achievable on the basis of actual conditions.

» **Building projects are also change processes. Building projects typically create new settings for work and are often associated with change in the organisation.**



ROLES AND RESPONSIBILITIES IN BUILDING PROJECTS

A building project at DTU is a complex process that involves several parties. The main actors in this process will typically be:

- **A project manager from Campus Service (CAS)**
- **The management of the department involved**
- **User groups that will typically comprise representatives of the department management, members of staff and health and safety representatives**
- **Possibly a representative of the IT Department (AIT)**
- **External consultants and advisers: architects, engineers, client advisers**
- **External contractors, builders and suppliers**
- **Public authorities**
- **CAS Facility Management Department**

CAS PROJECT MANAGER

The CAS project manager represents DTU in its role as the building project client and manages and coordinates the building project from inception to close out. The project manager is responsible for the progress of the project and for its overall realisation. Once the building is ready to be put into use, the CAS Facility Management Department takes over all further responsibilities for the building. All communication relating to the project must go through the CAS project manager.

DEPARTMENT MANAGEMENT

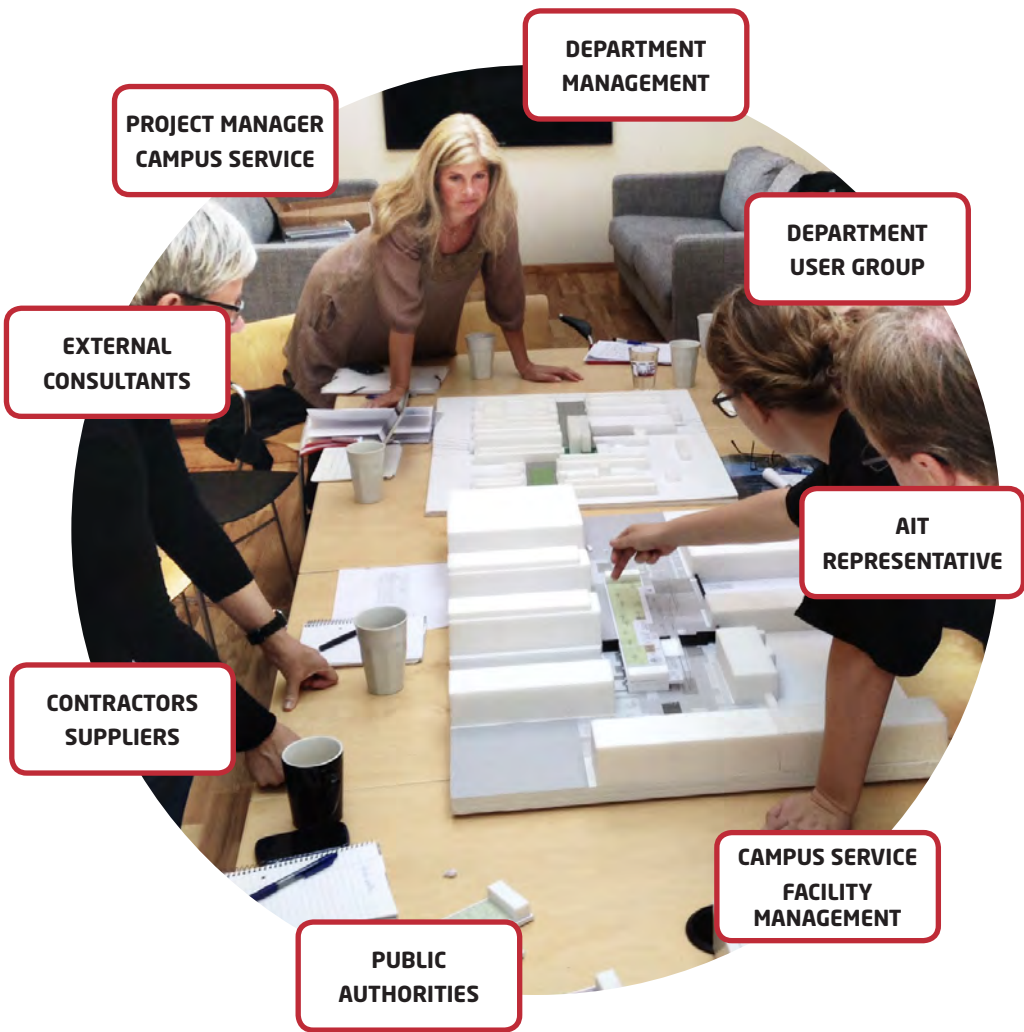
The department management is responsible for developing any internal change processes needed in connection with the building project. It is the responsibility of the department management to put together user groups with relevant participants and to ensure that the selected user representatives set aside time to carry out the work involved. In addition, the department management should ensure that the university's safety organisation is involved at all stages of the project. The management will participate actively in the process and will have overall responsibility for prioritising among any opposing wishes from the user group on the basis of the department's strategy on ways of working, assignments, staffing, etc.

USER GROUP

The job of the user group - which represents users in the individual units/departments that need a new physical framework - is to provide CAS and the team of consultants with input about users' needs, requirements and wishes in relation to the building project and to provide information to their colleagues or fellow students and pass on questions raised by CAS and the team of consultants. The department selects the individual members of the groups. Depending on the project in hand, it may be relevant to include representatives of different academic areas, a health and safety representative, students and members of management in the department concerned in the user group. The same people need not necessarily take part in the work of a user group from beginning to end: in order to make the process efficient and meaningful for everyone involved, it is important to ensure that the right people participate at the right time.

EXTERNAL CONSULTANTS

CAS will not be in charge of the actual design and planning, which will be carried out by external consultants such as architects, engineers and landscape designers. In some projects, different teams of consultants may be linked to different stages of the building project. In large-scale projects there may be both a client adviser and a team of design consultants. Consultants' work is always based on a consultancy agreement, and external consultants cannot make any decisions without consulting the CAS project manager.



EXTERNAL BUILDERS, CONTRACTORS AND SUPPLIERS

The actual construction and realisation of buildings is carried out by external builders, contractors and suppliers working to contracts that set out deliverables, prices and timelines. Users have no direct contact with the suppliers or the companies executing the work. All queries concerning the execution of works should go through the CAS project manager.

PUBLIC AUTHORITIES

Local planning and building authorities process DTU applications for planning permission and also issue permits for excavation and construction and eventually issue the certificate of occupation. The local authorities also approve fire and evacuation plans. Depending on the intended use of the building facilities, other permits may be required, such as permits from the Danish Working Environment Authority or the Danish Veterinary and Food Administration. Any required permits and authorisations relating to department-specific work and research must be obtained by the department in question.

CAS FACILITY MANAGEMENT

The CAS Facility Management Department is involved in the planning of the building project at an early stage so as to ensure that future operational requirements can be taken into account in the design in the best possible way. After the handover of a building, the CAS Facility Management Department assumes responsibility for the operation and management of the building.

HOW ARE USERS INVOLVED?

Your main opportunity to exert influence on the future building facilities will be through the representatives of your specific work area in a user group set up for the project. You may also personally be an active member of a user group. You can always obtain information about the project and provide input to it, for example at the Portal and at joint meetings for large groups.

BUILDING PROJECT ORGANISATION

A special organisation adapted to the scope and complexity of the project will be set up for each individual building project. In large-scale building projects, the organisation will typically comprise the following entities:

- **A steering group.** The steering group has overall responsibility for the content and budget of the project. It includes the department management and in the largest projects also a representative of the university's executive board.
- **A project management.** The project management is responsible for the realisation and continual progress of the project. Campus Service is in charge of project management.
- **One or more user groups.** User groups promote and protect user interests and present their points of view in relation to the building project. The department management is represented in user groups, together with relevant representatives of staff and students at the department in question.

In some large-scale projects a coordination group is set up to act as an intermediary between the steering group and the user groups, its job being to coordinate input from several user groups and to select and categorise proposals from the groups before they are submitted to the project management.

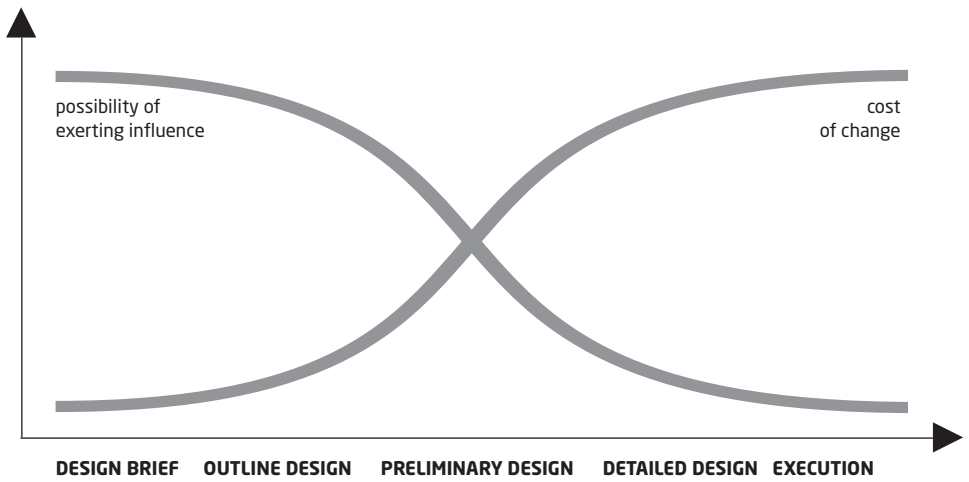
PARTICIPATION IN A USER GROUP

Participation in a user group means that you will be part of an interesting process that gives you insight into the planning of the project and detailed aspects of it. No special skills are required, but you need to set aside time for preparation and attendance of meetings. The department management should therefore understand and accept that you will need to spend some of your working hours on the project. As you participate as a representative of a group of users, you will be expected to play an active, constructive role and to keep the group you represent informed of developments and pass on input from that group to the project user group. You must therefore be willing to play an intermediate role that goes beyond your own interests, as well as having a good understanding of the principles governing the project in order to ensure that the user group's work will add value to the entire project process.

The work carried out within the framework of a user group is governed by terms of reference established for each individual user group. The terms of reference are laid down by the project management and describe the composition, roles and responsibilities of the user group, highlighting the need to respect the time schedule and budget adopted for the project.

» **Participation in a user group is interesting, as you gain insight into the planning and details of the project. In addition to a general interest in participating, the incentive for taking part should be that you will have unique opportunity to shape the future workplace for you and your colleagues.**





» Your greatest influence as a user will be in the early days of the project in connection with the preparation of the design brief and the outline design. All major decisions concerning the organisation and layout of the various room types are made in these stages.



THE STAGES OF A BUILDING PROJECT

A building project is divided into clearly defined stages. Projects often span a period of several years. Many parties have to be consulted and involved, legislation must be observed, permits must be obtained and drawings have to be prepared. In addition, a great deal of physical work is required.

The process is divided into four main stages similar to those applying to DTU's educational **CDIO** model:

CONCEIVE

- Pre-design/concept development
- Design brief

DESIGN

- Outline design
- Preliminary design
- Detailed design
- Tender documents

IMPLEMENT

- Site operations
- Handover

OPERATE

- Occupation
- One- and five-year inspections
- Operation

Users will be involved in the process at different times, depending on the stage of the building project. The next chapters describe the activities taking place in the individual stages.

PLANNING PRE-DESIGN AND CONCEPT DEVELOPMENT

The pre-design stage involves early general identification of the needs, vision and strategy of the project, and is also the phase in which fundamental aspects are determined, including the location of the building and the budgetary framework for the project.

The pre-design stage comprises mapping, analyses and conceptual design that form the basis for an optimal design brief. The ideas concept will typically include the following elements:

- Campus planning, masterplans and analyses of possible colocation of departments
- Mapping of the current premises, staff structure, collaborative relations, etc of the department in question
- Mapping of actual conditions such as the site, the time frame and the costs involved
- Analyses of possible future scenarios
- Volume studies
- Organisational chart for the building project, depending on how the building project begins

The design brief summarises the wishes and requirements that apply to the building project. It is one of the most important documents in the building project, as it sets out the scope and content of the project. The design brief preparation phase is traditionally the phase in which staff representatives/users are involved in most activities relating to the building project and in which most user meetings are held.

CAS and the client's adviser prepare the design brief in consultation with representatives of the department concerned. The design brief is subsequently used by the consultants as a basis for their design and to ensure that the original alignment of expectations is maintained from beginning to end. Any major changes to the scope of the project in subsequent phases will be decided by the steering group.

The design brief should set out the client's and the users' requirements and wishes for the finished building, including descriptions of the following:

- Functions (often illustrated as function charts; see example on the opposite page)
- Rooms, work processes and staff groups
- Technical and environmental quality
- Architecture
- Operations and maintenance
- Financial constraints
- Regulatory constraints
- Time schedule

Room schedules will typically be part of the design brief. Such schedules are used to identify the equipment, furniture and installations required in rooms for special purposes. The schedules also set out requirements concerning specific surfaces, installations, ventilation systems and special equipment.

USER GROUP AND USER MEETINGS

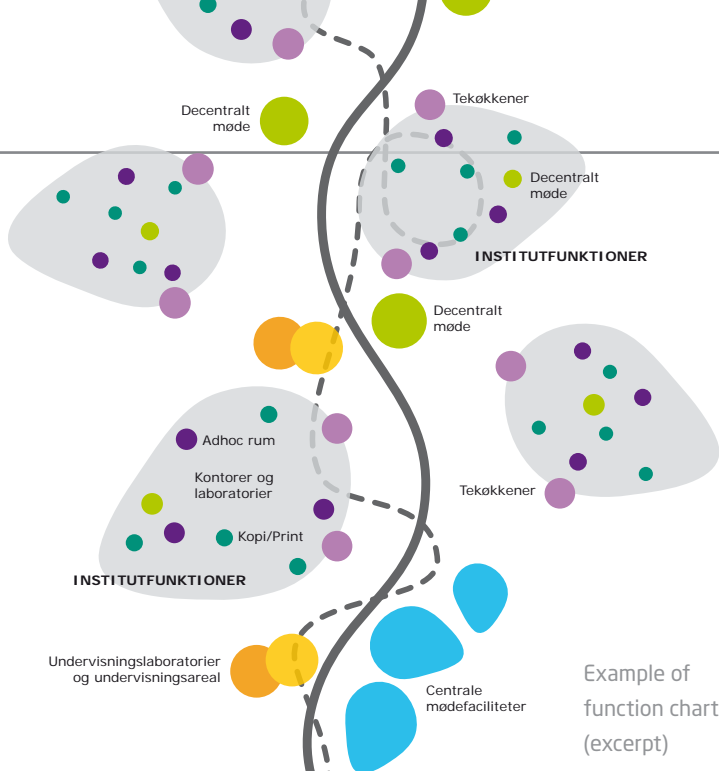
In the design brief phase, users are directly involved through the work carried out by the user groups. The users have the most accurate knowledge of the work processes and work flows of staff and students, and it is therefore the responsibility of the user groups - in collaboration with the CAS project manager and the consultants - to incorporate their knowledge into the design brief.

Together with the CAS project manager and the client's adviser, the user group will in particular focus on determining the following:

- The functions needed
- The correlation between room functions and staff work flows
- Good work processes and work flows for staff and students
- General requirements in the fields of quality, sustainability, health and safety at work, working environment and technology
- The consequences of changes

STUDY VISITS

Being involved as a user also means going on study visits, for example to another university, external laboratories, offices or other places that can serve as examples of best practice. Study visits can provide inspiration for the layout and design of the future building facilities, and it is very useful for users, consultants and client to see a number of reference projects that can help generate a common perception of visions and goals, and perhaps of better approaches to organisation.



ROLES AND RESPONSIBILITIES

Department / user group

It is the job of the user group to formulate wishes and requirements regarding rooms, functions, working environment and working processes on the basis of its knowledge of future work flows and assignments, including:

- Rooms broken down by function
- Work processes
- Management of work processes, exchange of information, goods, staff and student access routes, and the flows of people in the department area (open/closed sections)
- Student numbers
- Staff numbers and categories
- Vision for the future and new initiatives

CAS

- Collecting information and preparing the design brief in collaboration with external consultants
- Reviewing existing conditions
- Incorporating floor area standards, building regulations, flexibility requirements, etc
- Preparing sketches showing the future location and layout of individual rooms or function charts illustrating the interrelationship between the various functions
- Clarifying and summarising information in the overall design brief
- Preparing a project time schedule
- Presenting challenges in the form of ideas for and new ways of optimising floor space to ensure that the department will benefit optimally from the available floor area
- Ensuring the progress of the project

APPROVAL OF THE DESIGN BRIEF

The CAS project manager sends the design brief to the department, the steering group and facility management for review and proposals for amendments. The brief is finalised and approved by the steering group.



» The outline design determines the overall distribution and layout of rooms. As a user, you can mainly contribute by presenting wishes for and views on the size and layout of rooms and on matters that impact day-to-day logistics in the building.



The outline design illustrates existing conditions and contains the first sketches and drawings. In the outline design stage, the decisions with the greatest impact on costs are taken and important overall choices are made. The subsequent stages provide limited opportunity to introduce changes to the project. The outline design is prepared in close consultation with the user groups.

The outline design is prepared on the basis of the design brief in close collaboration with the user groups. Together, the design brief and the outline design define the framework for the building project. The outline design includes the following:

- Plans showing the location of various facilities in relation to each other
- Considerations concerning basic structural solutions, materials and installations
- Cost estimates
- Considerations concerning divisions into stages and possible temporary relocation of activities
- Time schedule

Users mainly have influence on the location of various rooms in relation to each other and on logistic flows inside the building. In connection with the preparation of the outline design, the user group completes room schedules for the most important rooms and assesses whether the proposals submitted by the consultants meet the requirements formulated by the users and set out in the design brief. The design must be approved by the steering group. Once approval has been given, the outline design in combination with the design brief constitutes the framework of the project. In all subsequent phases, the various parties involved will frequently consult the brief to ensure that the objectives defined for the building project are met.

ROLES AND RESPONSIBILITIES

Department / user group

- Completing room schedules for the most important rooms
- Commenting on drawings and proposals. You should focus on ensuring the following:
 - The proper functionality of the work areas you represent
 - The location of individual rooms in relation to each other
 - The layout of important rooms
 - The potential for future flexibility
 - Surfaces and process-related technical installations

Health and safety representative

- Approving solutions relating to health and safety at work

Campus Service

- Ensuring that the material presented to user groups is comprehensible
- Assessing whether proposals are compatible with the project budget
- Assessing whether proposals comply with the design brief, both on an overall level and as regards all technical details, including for example the ease of cleaning rooms and surfaces, optimal internal circulation, disposal of waste, manoeuvring space for equipment, technical installations and facility management
- Assessing the ease of operating the proposed facilities

The preliminary design represents further detailing of the outline design and includes plans and drawings that can serve as a basis for obtaining a building permit and other regulatory approvals. In this phase, user involvement focuses on materials, furniture and equipment as well as details relating to layout, as the overall layout is determined in the outline design.

The preliminary design contains the following elements:

- Detailed tables for the individual rooms and determination of the layout of individual rooms
- Drawings illustrating the design in greater detail: plans, sections and elevations
- Decisions concerning the structures, materials and installations to be used in the building and concerning other matters that are crucial to the functioning and quality of the building facilities
- Technical installations, including fire protection systems, ventilation systems, systems for the conduit and discharge of wastewater and chemicals, electricity distribution systems and possibly systems for the provision of gases and the storage of inflammable liquids
- Time schedule for design and execution and proposals for division into trade contracts and tendering type

Together with the information about materials, equipment, installations and furniture required, the outline design room plans and detailed drawings will then constitute the final schedule of accommodation.

ROLES AND RESPONSIBILITIES

Department / user group

- Recording existing equipment and furniture and assessing what can be reused and brought along to the new facilities
- Formulating wishes concerning:
 - The layout of individual rooms, including the location of fixtures, fittings and furniture
 - Equipment, installations and furniture in new rooms and facilities
 - The location of special equipment
 - The location of computer sockets, power outlets, sanitary equipment, etc
 - Materials and surfaces of building elements, fixtures and furniture

Health and safety representative

- Approving solutions relating to health and safety at work

Campus Service

- Preparing the building permit application in collaboration with the external consultants
- Ensuring that input from the facility management department is taken into account
- Making sure that the material is presented to the user groups in a way that enables them to understand the content and make up their minds about it

APPROVAL OF PRELIMINARY DESIGN

The preliminary design including the schedule of accommodation and a proposal for furnishing is sent to the steering group for approval. The building permit application is sent to the local planning authority.

» **The main focus of the preliminary design is on the layout of rooms and the choice of equipment and its location. It is important that your experience as a user of various types of equipment is taken into account at this stage.**

The detailed design is an unequivocal definition of the building project, representing the final solution adopted for the realisation of the building facilities. Users will generally only be involved to a very limited extent in the preparation of the detailed design.

The detailed design serves as a basis for the submission of tenders by a number of contractors competing for the work. The detailed design provides a detailed description of the approved project and the construction works decided. A detailed design will thus include the following elements:

- Detailed drawings and descriptions setting out the demands and requirements applying to materials, structures and execution

ROLES AND RESPONSIBILITIES

Department / user group

- The department and the user groups are rarely involved at this stage, but may be needed to assess certain details

Campus Service

- Location of the building site
- Coordination of work involving external consultants
- Approval of cost estimates submitted by external consultants
- Approval of project documents before tenders are invited

DESIGN TENDER STAGE

The tender stage is the period in which the detailed design is sent to contractors and the actual construction contract is signed with the contractor(s) to whom the contract is awarded.

Private, public or EU invitations to tender are issued for the realisation of the building project. The period granted to contractors to prepare their tenders depends on the type of contract and the scope of the project. Once the tenders have been received, they are reviewed and the winning contractor is selected on the basis of the criteria formulated. The CAS project manager sends a recommendation to the steering group for approval and, once approval has been given, the contract is signed and the actual execution of the works can begin. From then on, the budget is considered to be firm, and all changes to the project will therefore have consequences as regards total costs.

ROLES AND RESPONSIBILITIES

Campus Service

- Handling the tendering process in collaboration with the consultant



» The execution stage is the 'dirty' part of the project in which users will inevitably feel inconvenienced as a result of difficult access, parking problems, dust and noise. Good information, dialogue and flexibility on the part of everyone can help make things easier.



In the execution stage, the project is realised in accordance with the contract signed. Compliance with drawings, descriptions and the project time schedule will be checked continually. Users will inevitably be disturbed to some extent, but the impact of such disturbance may to a great extent be eliminated through adequate information and dialogue.

In the execution stage, the construction workers go into action. The first step may be to demolish structures and fell trees to make the site ready for the new facilities. If it is a greenfield building project, the execution phase begins with the turning of the first sod, which is a traditional ceremony in the construction sector that also involves festivities and speeches. At a later point in time in the construction stage there will be a topping-out ceremony.

In this stage all daily users should anticipate some inconvenience, for example because of dust, noise and vibration and the transport of materials and operation of cranes. The construction management will go to great lengths to keep the level of disruption to a minimum, but tolerance on the part of users will be required. A large number of construction workers, a site with welfare cabins, material storage areas, etc are natural parts of a building project. Parking facilities, access routes and path systems may be temporarily changed because the areas are used in the building process or inaccessible for safety reasons. The construction management will communicate as much information as possible about conditions, but there will be some disruption that cannot be announced in advance.

As the project progresses, a number of site meetings will be held to provide information about the progress of construction, future activities, anticipated disruption and safety measures. The project manager will pass on relevant details from such meetings to the user groups to ensure that users are well informed and involved. Visits to the site, which is normally completely closed to users, may be arranged in this stage. Towards the end of the construction period, fixtures and furniture will be installed. The premises will be cleaned and prepared for occupation. Before the users can move into the building, a certificate of occupation must be obtained from the local authority, and the building must be inspected by a fire safety expert. It is up to the department concerned to obtain all necessary permits relating to research functions.

ROLES AND RESPONSIBILITIES

Department / user group

As the works carried out in this stage may cause disturbance and disruption to staff, the user representatives and the health and safety representatives are important players in the execution stage, as they can assist CAS and the consultants in devising temporary measures or pass on information from construction management concerning forthcoming activities and the disruption they may cause. At the end of the execution stage, the users should have a good overview of the organisation, layout, equipment and furniture of the building.

Campus Service

- Participating in site meetings and client meetings
- Informing the department about forthcoming activities and anticipated disruption
- Following up on time, costs and quality
- Ensuring the regulatory compliance of the building (certificate of occupation)
- Arranging the sod-turning and topping-out ceremonies

When the building works are completed, a building defects inspection is arranged to record and assess any defects in the building. The CAS project manager determines whether the extent of defects is such that DTU can take over the building and put it into operation.

The contractor and CAS agree how defects should be remedied. Once the defects have been remedied, the actual handover from the contractor to the client takes place, after which responsibility for the building rests with the client (DTU). The contractor hands over the keys to the building, and the signed handover document is thus an important document in terms of responsibility. Once the keys have been handed over, the users can move into the building.

ROLES AND RESPONSIBILITIES

Department / user group

- Helping pack items that are to be moved to the new facilities and arranging the actual move

Campus Service

- Arranging the preparation of user manuals
- Following up on defects
- Arranging the handover of the building
- Handing over the project for occupation and operation

OPERATION **MOVING INTO THE NEW PREMISES**

The occupancy stage is the period set aside for moving furniture and equipment that are not part of the contract to the new facilities and to put everything in place. In addition, IT and AV equipment is installed. Locks and access cards are adjusted.

All department-specific equipment is connected in the occupancy stage. The time between the installation and connection of the equipment to the start-up of actual work depends on the type of equipment, the level of cleanliness required or the need to calibrate the equipment. Users and facility management staff will be instructed in the operation and maintenance of the new building facilities. Depending on the scope of the building project, an opening ceremony with speeches and refreshments will generally be held.

ROLES AND RESPONSIBILITIES

Department / user group

- Participating in the packing and unpacking of items in connection with the move to the new facilities
- Managing the move of furniture, IT equipment and telephones (department coordinator in collaboration with CAS)
- Arranging the opening ceremony, if any

IT Department

- Connecting telephones, computers and AV equipment

Campus Service

- Managing lock system and access cards
- Participating in the installation of equipment and furniture in collaboration with the department

Minor defects are often discovered after the users have moved into the new facilities. CAS will therefore inspect the facilities together with the external consultants, the contractor and a representative of the department one and five years after the handover date. It is important that users report any functional or other defects discovered in connection with the use of the facilities prior to those inspections.

The contractor must issue a five-year warranty for the building. This warranty will be reduced to 10% at the handover of the building, to 2% after the one-year inspection, and will lapse completely after the five-year inspection. That is why one- and five-year inspections are held.

Users prepare a list of defects, unforeseen wear and tear and similar shortcomings and do so on an ongoing basis to ensure that the defects are systematically recorded. Additional defects discovered will be listed in connection with the inspections, and a special document called a schedule of defects will be prepared. The contractor must then remedy the defects by an agreed deadline. If the users discover serious defects after they have moved into the new facilities, for example that the heating system does not work adequately, that there are large cracks in the floors or walls or that the windows or doors do not close properly, they should promptly report such defects and not wait for the one-year inspection. If such defects are not remedied on a timely basis, the quality of the building facilities may deteriorate considerably because of additional wear and tear and, if they are allowed to escalate, the defects may lead to considerable disruption when they are later remedied.

Some problems may be caused by the operation of the facilities, while others are due to genuine defects. The contractor who performed the work will also be responsible for remedying defects in the five-year warranty period, which is why other builders and craftsmen are not allowed to remedy defects in the warranty period.

The CAS Facility Management Department takes over the building after the one-year inspection.

ROLES AND RESPONSIBILITIES

Department / user group

- Recording defects systematically and assessing whether the nature of the defects is so serious that their remediation cannot wait until the one- or five-year inspection
- Participating in one- and five-year inspections

Campus Service

- Contacting the department well in advance of inspections to ensure that all defects discovered will be listed before the building defects inspection
- Organising the one- and five-year inspections and inviting relevant parties to attend them
- Following up on defects recorded in connection with the inspections

» **No buildings are free of defects. Users play an important role in relation to defect inspections, as they can draw attention to functional defects and other shortcomings of the finished building.**



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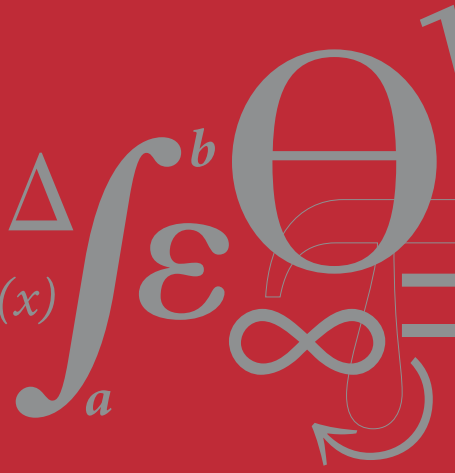
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