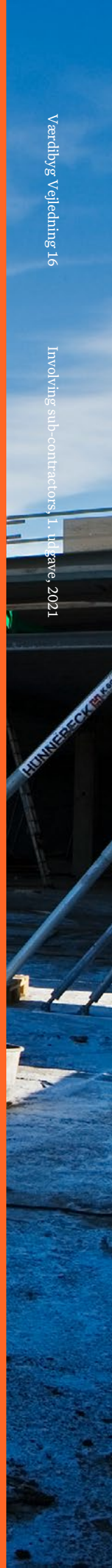


Involving sub-contractors



INVOLVING SUB-CONTRACTORS

We often have the best of intentions for involving contractors and sub-contractors in the project early in the building process. However, sub-contractors in particular are often selected on the basis of the lowest price and they enter the project late, when their skills and expertise are not able to enrich the project. By involving sub-contractors, contractors can optimise planning, health and safety and resource usage, while also creating commitment and a better building process.

Early collaboration between contractors and sub-contractors, with sub-contractors becoming part of the production team (perhaps as early as in the tendering phase) can bring real benefits – for the process, the working environment and the project costs. This results in interfaces, agreements and collaboration being in place before work on the site begins.

This guide is aimed at contractors and sub-contractors looking for better collaboration. Værdibyg recommends that sub-contractors should be actively involved early on and throughout the building process, and this guide explains how planning and coordination can support collaboration among contractors during production, where the skills of the sub-contractors make an active contribution to value creation in the process.

Værdiskabende Byggeproces (Værdibyg), 2013

Værdibyg is a partnership between:



INVOLVING SUB-CONTRACTORS

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APPENDICES CAN BE DOWNLOADED FROM WWW.VAERDIBYG.DK

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NAVIGATOR - TIDSPÅN FOR BLOK

PETERSEN A/S



Samarbejde



ABOUT THE GUIDE

It is hardly surprising that a lot of knowledge and many skills in the construction sector can be found among the contractors and sub-contractors who spend their days on the site. It is here, that we will find the most knowledge of how to produce buildable solutions and generally how to get the building erected. However, this knowledge seldom finds its way back into the process.

This guide identifies various ways of actively involving the sub-contractors' skills in the building process. The first part of the guide describes how contractors can usefully involve their sub-contractors early in the project. This could already entail close collaboration with the main or turnkey contractor at the tendering stage. It also describes how (kick-off) workshops and subsequent meetings can be used to agree on and coordinate the building process.

The second part of the guide describes various planning methods – both at start-up time and during the project. The planning involves the sub-contractors and provides for coordination and collaboration across all contractors.

The the guide is supplemented with a case-study describing how phase scheduling and weekly work plan are carried out on a specific project. The case-study has also been documented in two short films. You can find the case study and the films at www.vaerdibyg.dk.

The guide focuses on collaboration and coordination between contractors. Collaboration between consultants and contractors and suppliers is discussed in Værdibyg's guide to 'Supplier project planning and joint project design'.

We have chosen to use the term 'sub-contractors' rather than 'trade contractors' to avoid confusion with a specialised trade contract. The guide uses the term 'foreman', but this job title is sometimes called gang/crew leader, team leader or gaffer. The term 'construction management' is used for the main/turnkey contractor's project management team.

COLLABORATION AND EARLY INVOLVEMENT

It will rarely have the desired effect if sub-contractors are only chosen on the basis of the lowest price. In fact, competition on price alone can be a hindrance to good collaboration, with demands for extra charges to cover omissions, project changes and additions.

Instead, we recommend involving the sub-contractors as early as possible, to establish good collaboration, to bring the right knowledge into play and to reach a shared financial understanding. The sub-contractors can usefully play an active part in the early activities and in that way ensure that expectations and interfaces are aligned.

THE CONTRACTOR'S INVOLVEMENT OF SUB-CONTRACTORS

The contractor often selects his sub-contractors on the basis of price or relationships and previous collaboration. Most major contractors work with 3-5 'regular' sub-contractors from whom they choose, for their various projects.

THE CONTRACTOR'S SELECTION OF SUB-CONTRACTORS

Experience shows that it is often the good collaboration partners who are also most cost-effective in the long term. A contractor should therefore provide for a good process by focusing on something other than the lowest price when he has to select sub-contractors for a project.

However, it is both natural and necessary for the contractor to choose to work with sub-contractors who offer competitive prices.

The contractor must be confident that the sub-contractors can deliver the agreed quality at the agreed time – and have the finances to do the job. It can be an unfortunate, short-sighted decision to focus exclusively on the sub-contractors who quote the lowest price. It will affect the contractor's finances if, at a later stage, the work suffers from many defects and delays or the sub-contractor goes bankrupt in the course of the work.

The choice of sub-contractors should be based on things like previous project collaboration or special skills for the job in hand (e.g. the award criteria specified by the client).

INVOLVING OF SUB-CONTRACTORS IN THE TENDERING PHASE

Contractors should draw on the sub-contractors' special skills early in the project and invite them to assist in planning and reviewing the project at an early stage, possibly even in the tendering phase. Benefits of involving the sub-contractors early on are among other things the options of clarifying interfaces and working environment issues and assigning the tasks where they fit best. This will prevent multiple sub-contractors including the same services in their bids. It also means that tasks and expectations can be aligned, thus helping to reduce the individual contractor's risk premium in the tender.



When the main contractor invites a sub-contractor to bid for a task, it is important for the main contractor to pass on all the information and materials he has received. At the same time, the sub-contractor has an obligation to familiarise himself with the task, ask questions and request further materials in case of doubt.

One condition of involving sub-contractors in the tendering phase is that the client needs to allocate the necessary time for the tendering process.

TRUST AND SOUND AGREEMENTS ARE CRUCIAL

To get the best out of a collaboration right from the tendering phase, there has to be trust between the parties. If a main contractor invites a sub-contractor to bid for a task (private/invited tender), it is important for the sub-contractors to know that the main contractor is serious and that they are not just being asked to calculate a benchmark bid.

The sub-contractor must be able to rely on getting the job if he submits a competitive quotation. Thus it should not be possible for a sub-contractor to contribute at the tendering stage and then later in the process to be replaced by a similar firm willing to join the project at a lower price. If a sub-contractor is to make a commitment, invest his 'heart' in a project and contribute really crucial ideas, he must also be sure of getting the job if the team wins. Too many tenders are submitted for anyone to invest their heart in all of them. If you have positive expectations you will also put more work into it.

Trust and collaboration can be created through kick-off workshops as described on page 10. But it is also important to have sound agreements between the parties.

Whether the collaboration is based on informal oral agreements or more formal written contracts, it should be viewed in a long-term perspective, as loyalty and good collaboration will bring more jobs in the future.

AGREEMENTS AND RESPONSIBILITIES

More effective involvement of sub-contractors does not necessarily entail any change in responsibilities or contractual conditions as generally specified in AB92. The contractor (and not the sub-contractor) bears the ultimate responsibility towards the client.

AB92 is normally applied to the relationship between contractors and sub-contractors too. The contractor must ensure that the tasks are clearly described in the invitation to tender for the sub-contract.

The sub-contractor should also be aware of his responsibility and be sure to have the resources and skills for the tasks he is responsible for.

Insufficient focus on the agreements often gives rise to conflicts in the case of delays etc. The contractor and sub-contractors should know the rules behind the agreements. As an example, the formal agreements will specify the project communication paths. However, it may be a good idea to supplement the formal agreements with a set of ground rules covering how you intend to work together on the project.

THE CLIENT CAN SUPPORT EFFECTIVE INVOLVEMENT

It is the contractor who chooses which sub-contractors he wishes to collaborate with on the specific project. In the tender documents, the client can ask to be informed about which parts of the work the contractor is planning to pass on to sub-contractors, and (where this has been decided) which contractors have been chosen. This prompts the contractor to think about his sub-contractors in good time.

At the pre-qualification stage it is the contractor alone who seeks pre-qualification, so the client only has to consider the contractor's capabilities. The contractor can choose to mention special skills from sub-contractors in the application if he demonstrates at the same time that he will have these sub-contractors at his disposal should he be selected and awarded the contract¹. In this case, the client will naturally consider the sub-contractors too. Likewise, in the tendering procedure, it is only the (main, major or turnkey) contractor who submits a bid.

If the client specifies that the contract will go to the financially most advantageous tender², a description of the production process may be used as an award criterion. By this, the client focuses on the process and also gives the contractor an incentive to focus on a good process when he enters into agreements with his sub-contractors.

If the client decides to issue an early invitation to tender, it will make it easier for the sub-contractors to join the project early on and so contribute their skills to a greater extent than they would otherwise have done.

Furthermore, the client should be aware of the process taking place between the contractor and his sub-contractors. The client can support the involvement of sub-contractors by allowing sufficient time in the tendering phase and by producing tender documents that are easy to divide into sub-contracts. The client should also understand that late changes to the tender documents make it hard for the (sub-)contractors to produce a coherent tender and make a constructive contribution early in the process.

Late correction sheets can be avoided if the contractors are given sufficient time to draw up their bids. It has proved useful to have Q&A meetings and inspections about a week after the contractors have received the tender documents. This allows time for them to become familiar with the project and to ask good and constructive questions.

If the client supports early collaboration between the contractors, he needs to be aware that this will increase the tendering costs. The client should therefore limit the number of bidders with a sensible pre-qualification procedure.

1 For rules and good advices on selection, refer to Værdibyg's guide to 'Effective pre-qualification'

2 For rules and good advice on the award of contracts, refer to Værdibyg's guide to 'Quality as an award criterion'

***“NOW IS WHEN WE NEED TO
GET ON TOP OF THINGS – NOT
WHEN WE ARE UP TO OUR
KNEES IN MUD TRYING TO FIND
SOME STUPID SOLUTION TO
SOMETHING WE SHOULD HAVE
THOUGHT OF BEFOREHAND.”***

– QUOTATION FROM CASE-STUDY.

YOU CAN FIND THE WHOLE CASE-STUDY AT WWW.VAERDIBYG.DK

WORKSHOPS GIVES EVERYONE COMMON GROUNDS

Whether the sub-contractors are involved early or late in the process, a joint start-up/kick-off meeting can be used to get off to a good start – either right back in the tendering phase or typically after the contract has been awarded. A workshop is a good way of aligning expectations and organising the project before production starts.

We recommend seizing the chance to spend the time from contract award to start of project (often 20 days) systematically building collaborative relationships³, defining interfaces and coordinating among the contractors. This could take the form of a joint project review, a workshop or a shared project office.

At the workshop, the contractor defines the scope of the task and the collaboration with the project partners (both sub-contractors and any consultants). It is used to align expectations of the process, the collaboration and the working environment, while the quality standards within the individual trades should be agreed at the project review meetings. It is a good idea for the client to attend the workshop, as it is a forum for him to explain the background to the project and to communicate the project values. The sub-contractors should receive the project material well ahead of the workshop, giving them time to prepare for it. At the individual contractor there should first be a dialogue between the people who prepared the tender and those who are to do the work.

The agreements between the contractor and sub-contractors should specify who is to participate in which workshops (and meetings) and how often. It may be a good idea to repeat the workshop if many new participants join the project later.

Collaborative relationships are developed through working on the project. When practitioners meet, it is especially important to focus on the project and its production and to avoid exercises in collaboration which the participants cannot see the point of.

KICK-OFF FOCUSING ON THE PROJECT

- Presentation of participants
- Review of the project, project values and client's success criteria
- Where are the challenges and risks? (Including health and safety issues)
- How are the tasks broken down?
- Coordination and phase scheduling
- Who does what?

NO TIME FOR WORKSHOPS?

If no resources have been set aside to run an introductory workshop or regular coordination meetings (for one reason or another), it is still important for the client, consultants and particularly contractors to be clear on the influence of the working environment, site conditions and construction processes on the whole project. These are also topics to be regularly addressed in the various types of meeting within the project.

FOLLOW-UP

It is fine to get off to a good start with a workshop, but it is just as important to follow up with briefings on project status, ongoing evaluation, communication efforts, coordination of schedules etc.

³ For good advice on start-up workshops and on establishing collaboration, refer to Værdibyg's guide to 'Establishing collaboration'.

RISK MANAGEMENT

Wherever possible, risks should be identified early, and the responsibility for addressing/managing the risk should be placed where it will not give rise to conflict later in the process. The responsibility should be placed on the actors who have the greatest influence on the cause of the risk and are thus best suited to handle it. The main/turnkey contractor is responsible for complying with what has been agreed with the client, but the sub-contractors' expertise should be brought into the risk analysis in order to agree on how to handle a given risk.

The client, consultant or main/turnkey contractor can kick off with their views of risks to be addressed. The sub-contractors may then supplement this with their own experience and expertise. The risk analysis need not take a long time, and the time will generally be well-spent. It may be helpful to use drawings as a common frame of reference when discussing how the risk relates to the actual project, but the contractors must also consider the process, the work specifications and any special conditions affecting the project.

It is necessary to focus on risks and responsibilities right back in the tendering phase, as this often has a direct impact on the price (and possibly on the intention to submit a bid at all). But risk identification and management are activities to be focused on throughout the project. It may therefore be helpful for the contractor and sub-contractors to have project review meetings along the way, where they look forward and try to identify the areas that could cause problems later on.

It is important even at this stage to focus on relevant working environment issues identified in the project design phase. As an example, has the right scaffolding been selected for the project, and have preinspections been carried out for harmful substances such as lead, PSBs, asbestos, contaminated soil etc.? If health and safety issues are not under control it will often have a direct impact on the process and planning.

An example of a template for risk analysis and management is given in Appendix 1.

Type	Risks – Identification	Likelihood	Impact	Risk score	Strategy and action plan	Activities – preventive	Responsible (preventive)	Activities – corrective	Responsible (corrective)
Operational	Deliveries – defective logistics, lacking or wrong delivery	3	5	15	Focus on planning, follow-up and communication				
Operational	Lack of resources – time	1	3	3					
Operational	Bad weather	2	2	4					
Operational	Resourcing – illness, hard to get the right people etc.	3	4	12					
Technical risks	Project basis is wrong	2	5	10	Thorough review				
Technical risks	Incorrect production	2	5	10	Bring the right skills into play	Always technical consultation concerning instructions prior to production			
Organisational	Unclear interfaces	4	4	16					
Organisational	Authorities – Missing permits, new legislation etc.	2	4	8					
Organisational	Replacement of employees, project team members	2	5	10					
Organisational	Decisions not taken in time	3	5	15			PL		
Organisational	Conflicts of interest – power struggles – poor personal relations	2	4	8	Use tools to establish and maintain collaboration				
Organisational	User complaints	3	4	12	Strategy for user management	Proactive dialogue			
Financial	All services not included in the tender	3	4	12	Buffer to cover unforeseen events				
Financial	Bankruptcy	2	5	10					
Financial	Client does not pay on time	1	4	4	Clear agreements				
Other	Press	1	2	2					
Other	Other stakeholders – trade union, other customers etc.	1	3	3					

MEETING TYPES AND CONTENT

In a building project there is a continuous need to agree on and clarify activities. This is often best done in various types of meeting. Some meetings can usefully be combined (e.g. planning and health and safety), while it makes sense to keep things separate in other areas – for example meetings on production and progress should be kept separate from financial discussions.

Early in the process, the meetings to be held are defined, including their content, participants and frequency. An overview of the different meetings can be drawn up using a template, as shown in Appendix 2. The meeting overview can make it easier for new sub-contractors to get into the project.

The number, scope and content of meetings will naturally depend on the size of the project, and particularly on the complexity of the works. Complex building projects will often need more ongoing coordination among the parties.

START-UP (KICK-OFF) WORKSHOP

A workshop for everyone involved in production. On the workshop an introduction to the project and the client's success criteria is given, and the parties in the project agree on roles and ground rules for the work onwards. The workshop may be repeated if many new companies join later. Kick-off workshops may usefully be combined with the statutory start-up meetings concerned with health and safety.

If it makes sense, they could also be run as an extended event or seminar. On a smaller project with few participants this could be 'just' a couple of hours one afternoon. Read more at Page 10.

PROJECT REVIEW MEETING

The project design team hand over the project (broken down by contract or as a whole) to the implementing contractors. There is an opportunity to ask questions on the selection of solutions, technical matters, working environment issues and interfaces to other contracts and areas.

The contractors should be well prepared for the meeting, having familiarised themselves with the project material. The meeting should be used to resolve all sorts of uncertainties and confusion on the project. It

may be a good idea for the contractors to be able to return with questions at a later date.

PHASE SCHEDULE MEETING

The sub-contractors review the project together, prepare the activity plan and coordinate interfaces and sequences of events where several trades are to work in the same area. This is described in more detail on page 14.

CLIENT MEETING

This involves the client, the safety coordinator, consultants, and relevant contractors and suppliers. This forum can be used to discuss project-specific challenges in order to address them quickly and with the greatest possible value creation for the project. The meetings are often held when required, typically on large and complex projects.

SITE MEETING

The site meeting is traditionally held every or every second week in order to let the master craftsmen or supervisors from the different trades discuss the project, agreements, responsibilities and finances. If there are other forms of planning meetings taking place at the same time, you can have fewer site meetings, or the discussions can be transferred to other meetings. Site meetings are described in e.g. AB92.

COORDINATION MEETING

Also known as weekly meeting/lean meeting/foremen's meeting/team leaders' meeting.

Weekly work plan meeting where the foremen/team leaders from each trade coordinate the coming week's work and agree on internal interfaces in regards to space, health and safety, machinery and sequence of activities. This is described in more detail on page 18.

SAFETY MEETING

Safety meetings should be held every other week and should be attended by all contractors doing work in the period concerned. The contractor and his safety representatives review and discuss the current safety and working conditions on the site. It may make sense to combine safety meetings and inspections into a walkabout meeting scheduled before the site meeting. This will bring both meetings up to date and ensure that the coordinating working environment issues are identified and addressed.

***“IT IS ALMOST INDISPENSABLE
TO COME TO THESE MEETINGS.
THIS WAY I ALWAYS KNOW WHEN
THINGS NEED TO BE READY.
THAT MAKES IT MUCH EASIER
FOR ME.”***

**– QUOTATION FROM CASE-STUDY YOU CAN FIND THE WHOLE
CASE-STUDY AT WWW.VAERDIBYG.DK**

JOINT PLANNING AND COORDINATION

A good method of identifying the interfaces between the different contractors and of building good relationships and collaboration between the trades is through joint planning. Apart from drawing on the knowledge and skills of the sub-contractors, this also provides for much better coordination, commitment towards the working schedule and better internal agreements between the sub-contractors.

The planning meetings are an important forum for contractors and sub-contractors to discuss production and the progress of the project. They have a common interest in this, as good planning leads to good production, which leads to good earnings – but the planning meetings are not a forum for financial discussions. This is dealt with on the site meetings (or meetings between the main contractor and individual sub-contractors), but there is of course a link between the two – particularly where decisions affecting finance have to be taken.

In practice, joint planning works through planning at three levels:

- Phase scheduling
- Look-ahead plan
- Weekly work plan

In addition to these, there is the main timetable for the project, which is the overall schedule on which the principal milestones and the contract and hence the joint planning is often based. The planning meetings cannot be taken for granted, and before starting, it is important to ensure that all the contractors are participating. Participation in planning meetings should therefore be laid down in tender specifications, agreements or contracts.

WHAT TO DO IN PRACTICE

This guide is supplemented with a case-study and two short films showing how phase scheduling and weekly work plan work in practice. You can find both under 'Guides' at www.vaerdibyg.dk.

PHASE SCHEDULING

The purpose of phase scheduling is to reach agreement on the forthcoming process and identify and discuss the sequence of activities across the trades. It leads to a focus on and debate about the interfaces between the

trades. This joint planning helps to establish collaboration between the trades before work starts, and gives the trades a sense of ownership of the timetable. People will be more willing to adhere to a schedule they have contributed to themselves than to one handed down by construction management.

The phase scheduling typically involves a master craftsman or a supervisor from each trade, but it could very well involve experienced foremen – preferably those who are to do the work afterwards. It may be a good idea for the consultants to attend if questions are raised that they need to respond to. It is important for the individual contractors to be prepared by thoroughly familiarising themselves with the project material and their own contracts.

According to AB92, the contractor is required to provide for coordination when he puts sub-contracts out for tender. Phase scheduling does not alter neither this nor the parties' roles or agreements. On the other hand, the phase scheduling may help to involve the sub-contractors and qualify the timetables that may have been prepared ahead of the project start-up.

PHASE SCHEDULING MEETING

The process planning meeting may proceed as follows:

- 1 Introduction to phase scheduling:
- 2 Each trade writes its own activities in the project on coloured post-it notes. Each trade has its own colour.
- 3 When the activities have been noted down, the post-its are put on the wall in the sequence in which the participants think the activities should be performed.
- 4 While doing this, they talk about the sequence and placing of the post-its. The trades are only allowed to place their own activities, and it is not permitted to move the other trades' post-its. If somebody believes that activities need to be moved, then he gets hold of the person from the trade concerned to agree on this.
- 5 The phase scheduling is complete when all the post-its have been placed and everybody agrees on the sequence in which the activities are to be performed.

PHASE SCHEDULING

**MAIN CONTRACTOR INTRODUCES
THE DAY'S PROCESS PLANNING**

This is the part
of the timetable we
will focus on

**EACH TRADE NOTES ITS OWN ACTIVITIES
ON COLOURED POST-ITS**

We also need to
remember the interim
outdoor lighting

**THE POST-ITS ARE PLACED
ON THE BOARD**

Should I have
laid cables before
you pour concrete?

**DISCUSSING AND MOVING
TASKS AROUND**

Yes, that looks good

That's how
we do it

IT BRINGS UP A LOT OF IDEAS

**REACHING AGREEMENT ON
THE FINAL PLAN**

The process plan may be prepared for a total project, but one can also focus on a stage or sub-process which is to be repeated many times and is therefore crucial. Completing the phase scheduling typically takes 2-3 hours.

FOLLOW-UP ON THE PHASE SCHEDULE

After the phase scheduling meeting, the contractor and/or sub-contractors should estimate how long each activity will take. Based on this, the plan can be typed into e.g. MS Project, with durations.

It may be necessary for the trades to meet again (1-2 weeks later) to complete or optimise the plan – e.g. by changing the resourcing or by running several activities in parallel thus allowing the agreed plan to be im-

plemented within the specified deadlines/milestones. The Phase schedule is finished when everyone feels that the plan and the specified deadlines can be adhered to.

When the final amendments have been entered, the plan should become the working schedule to be followed subsequently (however with further detailing at the weekly meetings).

LOOK-AHEAD PLAN AND WEEKLY WORK PLAN

The initial planning and interface definition is a good starting point, but during the production there will always be unforeseen events and changes that affect

ACTIVITIES PLACED FOR THE NEXT 6 WEEKS

THE 7 FLOWS, WHICH ARE OK?

WHAT ARE THE OBSTACLES?

LIST THE FORTH-COMING ACTIVITIES

WHO IS RESPONSIBLE FOR REMOVING THEM?

PERIODIC PLAN			Project name, Week 36							Obstacle analysis						
Description of the activity			Obstacle analysis							Nature of the obstacle						
Type	Repetition	Activity	Responsible company	Week 37	Week 38	Week 39	Week 40	Week 41	Week 42	Preceding work	Materials	Equipment	Workforce	Information	Space	External factors
		Erection of scaffolding, east side	Joiners							✓	✓	✓	✓	✓	✓	
		Erection of scaffolding, south side	Joiners							✓	✓	✓	✓	✓	✓	Temporary shelters
		Installations	Electrician							✓	✓	✓	✓	✓	✓	
		Walls in flats	General labourers							✓	✓	✓	✓	✓	✓	
		Floors to bathroom and covering	General labourers							✓	✓	✓	✓	✓	✓	
		Disassembling of e.g. roof structure	Carpenters + Bricklayers								✓	✓	✓	✓	✓	Weather Requirements for shelters and type (agreed no flashings)
			Bricklayers							✓	✓	✓	✓	✓	✓	
			General labourers							✓	✓	✓	✓	✓	✓	
			Joiners							✓	✓	✓	✓	✓	✓	Contractual basis
		Shelters on scaffolding, south	Joiners							✓	✓		✓			Contractual basis
		Cleaning facades	Special contractor							✓	✓	✓				
		Changes in roof structure	Carpenter							✓	✓				✓	

the process. Hence, a continuous follow-up on the schedule, planning and coordination is necessary.

This is done throughout the building process, with representatives of each trade attending meetings both to plan ahead (look-ahead plan) and to plan in detail and to coordinate the work for the coming week (weekly work plan).

The work on the look-ahead plan and the Weekly work plan is designed to provide for regular internal coordination between the contractor and subcontractors. The weekly meetings are a place for the sub-contractors to discuss challenges and for providing contributions to the process.

LOOK-AHEAD PLAN

In the Look-ahead plan, meeting representatives from each (sub-)contractor/trade systematically discuss the coming week's activities and possible challenges and interfaces. The look-ahead plan indicates the activities for e.g. the next 6 weeks, and is used to analyse the activities for possible problems (see box with the 7 flows). If there is something standing in the way of a future activity, it is agreed who should be responsible for removing the obstacle, with a deadline for this. It

may happen, for example, that many people need to be on site at the same time, that materials need to be ordered or that drawings or specifications of forthcoming activities need to be obtained. If there are obstacles that cannot be dealt with before the activity starts, the participants try to move the activities around in order not to make the trades impede each other.

The look-ahead plan and the forthcoming activities are typically addressed at the normal site meetings attended by master craftsmen or supervisors from each trade. This could also take place at the weekly work plan meetings with the foremen. In any event, it is important to coordinate between the two meetings and groups to have both master craftsmen and foremen contributing to the future planning and being aware of what has been agreed for the next 6 weeks.

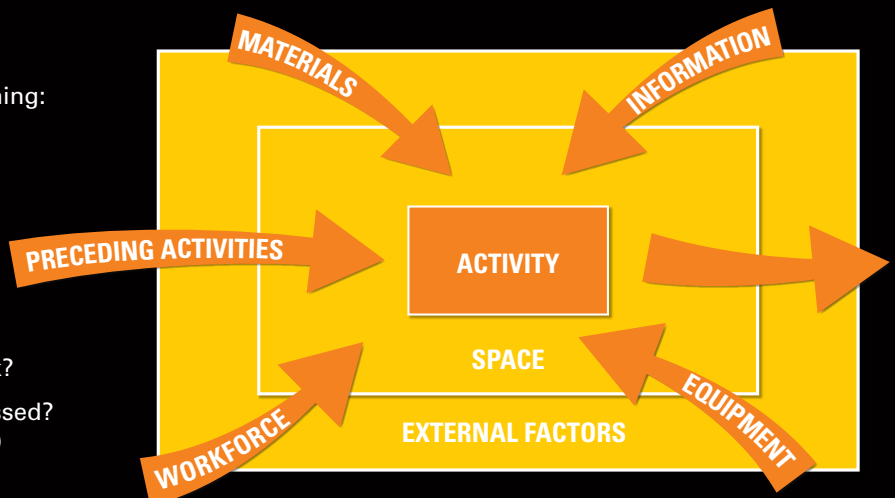
The meeting may also identify interfaces to consultants (requests for project materials or clarifying questions) to be addressed after the meeting – or at the meeting if the consultant is present. This could also stimulate the consultant's learning process and commitment to the project.

See example of a look-ahead plan in Appendix 3.

THE 7 FLOWS

Forthcoming activities analysed concerning:

- Preceding activities completed?
- Is the workforce ready?
- Is the equipment ready?
- Are the materials ready/on order?
- Is there information on the task?
- Is there space to carry out the task?
- Have external factors been addressed? (E.g. contracts and authorisations)



WEEKLY WORK PLAN

The weekly work plan is a detailed working schedule for every trade/team on the site. For the weekly meeting, the trades (foremen) will have prepared the tasks they are to carry out during the coming week as well as the sequence of these activities. At this meeting the foremen coordinate the work in a dialogue with the other trades and the construction management. The interfaces between the tasks are clarified in order to prevent several trades from being in the same place at the same time, or e.g. to prevent that the mason has to wait for the electrician before he can move forward.

This planning and coordination pulls the sub-contractors into the project and involves their capabilities. It gives a sense of ownership of the project and the work, and makes operations more functional.

On large projects, it may be an idea to have separate weekly meetings for different parts of the project, to keep them relevant and effective for all participants.

It is important for the construction management team to understand that they have a facilitating role in sup-

porting the individual trades to manage and optimise their activities, so the trades coordinate among themselves to gain ownership of the planning.

The weekly work plan, which is a simple schedule, is the basis for the coordination and dialogue that take place during weekly work plan.

See example weekly plan in Appendix 4.

DIGITIZE THE PLANNING

IT systems cannot substitute dialogue on the site, and if the IT systems are not used correctly, they can be a barrier to planning. You cannot just send information through the IT systems without involving the sub-contractors' knowledge and expertise. On the other hand, if the plans are solidly rooted in the right IT systems, this can be a big asset to joint planning.

CARPENTER'S TASKS FOR THE COMING WEEK

ON WHAT DAYS WILL THE WORK BE CARRIED OUT?

COMMENTS – POSS. RELATIONSHIP TO OTHER TRADES

Lean construction Ugeplan

Entreprise: _____
 Ansvarlig: _____
 Uge nr.: 28
 Sted: _____

Tidsplan for den kommende uge:

Aktivitet:	Sted:	Uge PPI 17:0							Forhindringer / bemærkninger
		M	T	W	T	F	S	S	
gredke D									
Rest arbejde D									
Rolten loft D									
udhæng D									
facade D									
udvendig Kapsel søjler pelje D									
Hjørneliste D									
Indhængs Ryltråls Skorstø D									
SKYGGELISTER									

Side 1 af 1

WEEKLY WORK PLAN MEETING

MAIN CONTRACTOR INTRODUCING THE WEEKLY PLANNING MEETING



THE LAST WEEK'S WORK IS REVIEWED

Have the mini-piles been marked out?

Yes, they are in place



I will have the access roads finished on Wednesday

AGREEMENTS MADE FOR THE COMING WEEK'S WORK

Are you going with the leca in the gables?

Yes, and we will need another week

THE NEW WEEKLY PLAN IS FILLED IN AND PRINTED, SO ALL THOSE INVOLVED HAVE AN OVERVIEW OF THE WEEK'S WORK

COLLABORATION AND COMMUNICATION IN THE CONSTRUCTION PHASE

Once the project is under way, it is important to follow up on the good collaboration between the (sub-) contractors. This will happen naturally at the (planning) meetings, but it should also be supported on the site locations. It is important for everyone on the site to feel that they are part of the overall project, and joint activities can be a valuable way of maintaining day-to-day well-being and coordination between the sub-contractors (e.g. lunch together, Friday barbecue, football games etc.).

It is also important to ensure regular communication during the production phase, with the construction management team arranging for keeping all sub-contractors updated on the project and on changes and status from site meetings or meetings with the client and/or consultants. This can be done with centrally positioned notice boards or on weekly lunchtime meetings for all craftsmen.

Quality assurance is extremely important – e.g. on how the work is to be handed over to the subsequent contractor and on the quality level to be expected from the preceding contractor. Good knowledge and application of quality assurance will promote confidence when phase scheduling, periodic and weekly work plan meetings are held.

It is also about mutual respect between the contractor and sub-contractors. Collaboration will be more motivating if it is based on trust rather than the contractor flexing his muscles and dictating ‘collaboration’ from the outset. If trust is undermined it should of course be clear that there will be consequences.

DIGITAL COMMUNICATION

Good examples are showing that simple forms can be actively used on either a tablet (iPad or equivalent) or a mobile phone. These make it easy for the trades to report back when they are in the middle of or have finished a task, enabling them to work even more closely one after the other and to notify other trades quickly about accessibility to their workplace. IT also enables faster communication, allowing pictures and inquiries to be sent either to the construction management team or to consultants without needing to have the respond-

ent on the site. The use of simple digital solutions can also make it easier to order materials and to find instructions and project documents etc.

The technology has reached the point where much more information can be shared in such a way that the sub-contractors can find it for themselves. Hereby the construction management team does not become a bottleneck for information, and communication runs more smoothly. It also promotes commitment among the sub-contractors as they feel even more involved in the project.

THE CONCLUDING PHASE

At the time of handover there is once again a need to focus more on coordination across the different (sub-) contractors. Here the contractor needs to confirm that deliverables from the individual sub-contractors work together and that the completion process allows the contractor to have the handover meeting with the client without (many) errors and defects.

Some projects produce so-called ‘Sub-project declarations’, in which the sub-contractors themselves review and report their own work as complete to the main/turnkey contractor.

A good and defect-free handover is based on active quality assurance and dialogue between the parties throughout the project.

APPENDICES

- 1 RISK ANALYSIS TEMPLATE
- 2 MEETINGS DURING THE BUILDING PROJECT
- 3 PERIODIC PLAN
- 4 WEEKLY PLAN

RETRIEVE THE APPENDICES AND CASE-STUDY
FROM WWW.VAERDIBYG.DK