IO Collaboration Environments

Handbook

DRAFT of Version 1.0

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ioCENTER
INTEGRATED OPERATIONS IN THE PETROLEUM INDUSTRY

Content

Content

1. Introduction

What are IO collaboration environments? And what are the features focused on in this handbook?

A matter of technology, workplace design or teamwork?

The simple definition of a collaboration environment would be a space where people collaborate. In IO, collaboration is often not colocated, and work is performed across distance and across time. The collaboration environments thus encompass a wide range of digital meeting places or means for information exchange as well as building and room layouts. This chapter presents the main types of collaboration environments treated in this handbook.

About this handbook

The purpose of this handbook is to summarize the knowledge and findings from the first phase of the IO Center research on Future Collaboration Environments that may be of use in preparing or improving design and use of collaboration environments.

Also in the second phase, useful information and lessons learned may be gathered, and this IO Collaboration Environments Handbook is thus version 1.0, and will be updated.

This handbook is not a guideline for creating collaboration rooms or layouts. Rather, it is focused towards identifying a number of issues that need to be considered and decided. Furthermore, a number of observed pitfalls or symptoms of something needed improvement are indicated as "Traps" in red text boxes. Some green boxes of "Tips" are also offered, based on solutions that have worked well in one or more of the organisations studied and/or trained in Phase 1. These tips may or may not apply to other organisations, and should be regarded as proposals for consideration.

Sometimes solutions are trade-offs, or questions need to be considered thoroughly before a good decision can be made. Such questions and dilemmas are indicated in the yellow "Dilemma" boxes.

Definitions or clarifications of what is meant by a term in this context are given in grey boxes.

Collaboration environment layouts

A work place in an IO organisation is in principle a large collaboration environment, and in situating of the different groups and departments, one needs to pay attention to the collaboration needs. Who needs to have the privacy of a separate office? Who needs to be seated close together? Which groups of people will profit most from having adjoining work areas?

Virtual collaboration areas

Collaboration environments do not need to be physical at all, and not even . Several meeting places are today purely virtual, in form of e.g. a

teamsite, an information system or a chat room.

Traditional collaboration rooms

Traditionally, collaboration rooms have been meeting rooms with a table and a projector screen, with or without video conferencing ability. These rooms are often separate areas, entered by a group of people at a fixed time, and left when the collaboration session is completed.

Other types of collaboration environments have also been in use for some time, where a group of people have their daily work area with access to video conferencing equipment. Examples of this can be production optimization groups and offshore controlrooms, where people mainly stay in place and contact each other at need.

Collaboration Rooms: Meeting rooms dedicated to collaboration sessions. Colocated participants enter at the start of a session and leave after their contribution or the session is over.

Collaborative work areas: Work areas where people work both individually and as a group during the day, and where video conferencing and shared large screen surfaces can be accessed at need.

Desktop collaboration environments: Surface and/or camera sharing from a regular work computer.

Ubiquitous collaboration tools: Tools that allows entering mediated collaboration outside regular offices or meeting rooms. Examples are mobile phones or pads.

Collaboration environment layouts: The layout of the work areas and rooms in a building, including positioning of different groups and departments relative to each other.

Future solutions

Desktop

Desktop collaboration environments have been available for a long time. In August 2003, the first public beta version of Skype was released. GoToMeeting was developed in July 2004, and WebEx started already in the late nineties.

However, it is during the last few years (2010-2011) that desktop solutions have reached a maturity that make professionals frequently use these for meetings with few participants, even when a traditional videoconference facility is available to them. It is likely that many companies will be able to utilise combinations of desktop and traditional collaboration rooms more actively in the next years.

Ubiquitous - pads, pods and mobiles

Collaboration does not need to take place in a dedicated room or work area. Smartphones allow people to be carry e-mail and other communication solutions with them at all times. Further softwares and tools have also emerged, allowing people tp enter mediated collaboration outside regular offices or meeting rooms. Examples are mobile phones or pads.

2. IO Collaboration

In order to make a good collaboration environment we first need to ascertain what the collaboration is meant to achieve. And what are the preconditions for collaboration?

Different types of IO Collaboration and settings in which they occur

The goal for collaboration needs to be defined to prepare a good collaboration environment. Different types of collaboration have different goals and requirements. Collaboration with co-workers in a project located at the same office has different requirements than if the team is distributed in geographical locations. Similarly, collaboration between hierarchical levels in the organisation will have different requirements than collaboration within the same level. We here outline some, but not all, types of collaboration settings and targets. The main focus here is thus not on what types of collaboration one should or should not use, but rather on how to assess the characteristics of your company's IO collaboration needs.

Types of meetings and work sessions

This chapter presents a set of typical collaboration situations. IO collaboration targets will vary between groups and between companies.

The patterns and plans for IO collaboration need to be based on - and enforce - company culture, the operational model and the governing work processes. The criteria for successful collaboration or excellent collaboration arenas are thus not the same in every company or even in every setting in the same company.

For most meetings there will be a phase of preparation, then the technology mediated collaboration and finally finishing. The extent and contents of these phases will however vary greatly based on setting and purpose.

Example: The main purpose of a traditional offshore-onshore morning meeting is status sharing. However, the meeting can also be used for going through last nights new events and schedule these for planning or to assign actions or agree on necessary meetings beween installation and onshore support organisation during the day.

When a meeting takes place on a regular basis, the key actors' preparations for the meeting are part of their routine tasks onshore and offshore, and very often much or all of the information to be communicated in the meeting is already available in some shared information system prior to meeting start.

The finishing of a meeting will depend both on purpose and collaboration culture. Some will complete their meeting minutes on the shared surface, including *key information points*, *actions* and *decisions* in the meeting. In this case the finishing phase will mainly consist of sending

the already agreed upon minutes to all participants, and then for these particpants to communicate locally and put into action the results of the meeting.

The key aspects of a collaboration session or meeting will form the collaboration requirements. Who needs to be there? What do we need to communicate and what do we need to document? I.e. what kind of communication tools, information tools and surfaces are we likely to need?

Tip

Consider what the likely aspects of collaboration sessions to take place in an environment are before starting to discuss the facility requirements:

- Information or status sharing
- Knowledge sharing
- Handover
- Assignment of actions
- Decision making
- Problem solving
- Informal meeting space

Common for all such meetings is that they have an owner. He or she does not have to be the meeting leader, but does have to shape the meeting to meet its purpose.

Participants and mandate

A good meeting needs to be well defined in terms of

- **The meetings purpose and mandate**
- **The competence required to meet this purpose and mandate**
- **The timing (frequency, time of day in relation to other work schedules, duration)**
- **Required preparations and reporting**

Based on this information, one can decide e.g. if a meeting room seating 3 or 16 is required, whether auxillary technologies like smartboard or document cameras should be available, and what kind of information systems all meeting participants will need access to in order to prepare for or finalize their tasks in the meeting.

Traps

- Meetings tend to draw out beyond their scheduled time, or are ended unfinished because the participants in the next meeting are knocking on the door
- Participants have no or differing expectations to what a regular meeting is meant to achieve
- Results are not documented, or the same problem is solved from scratch over and over again

An additional aspect to keep in mind is the balance between the work sites. If one site has 16 people and the two others one or two each, involvement of the three remote teammembers can be challenging, and if collaboration skills are not high, they may end up spectators to somebody else's meeting.

Meeting ownership and leadership

Some regular collaboration sessions are outlined in the work processes and part of an organisations meeting plan. Others are series of meetings or work sessions set up by a manager to solve problems, share information in a group or for addressing team issues.

Dilemma

Deciding on the number of people to participate from land in regular work and status meetings with offshore is tricky:

- On the one hand, one wants as many as possible to have an awareness of the situation offshore.
- On the other hand, people are busy, and sitting around in meetings where one does not really have to be, may claim unnecessary man hours.
- Too many people on one location may disturb the balance in the meeting.

Traps

- Frequently, staff with necessary competence are unavailable when a decision should be made or a problem solved
- Many people are in the meeting without participating or receiving information they could not get elsewhere
- A meeting between several sites looses much time reaching consensus or sharing information on one site only

Culture and management philosophy

The role and form of regular meetings will depend on several factors, one of these the company philosophy. In some companies *involvement* and *empowerment* may entail managers inviting staff into active participation in decision making, in others it

will mean hearing everyone out and then announcing the decision later.

The chosen model will guide decisions on room layout, meeting purposes, meeting conduct and technology solutions. More on this is found in the next Chapter.

Making use of complemetarities: Collaboration in Integrated operations is about putting people with different backgrounds, knowledge and competencies together in order to achieve tasks and decisions that either of them could not easily have managed on their own.

Empowerment and involvement: Establishing collaboration on equal footing from all sites can be challenging also from a technical point of view, and needs attention.

3. IO collaboration environments

IO collaboration does not only take place in videomeetings.

The basis for development of a good IO collaboration environment is the IO way of thinking.

This chapter presents some principles for what is necessary to develop and design IO collaboration environments supporting the company operations.

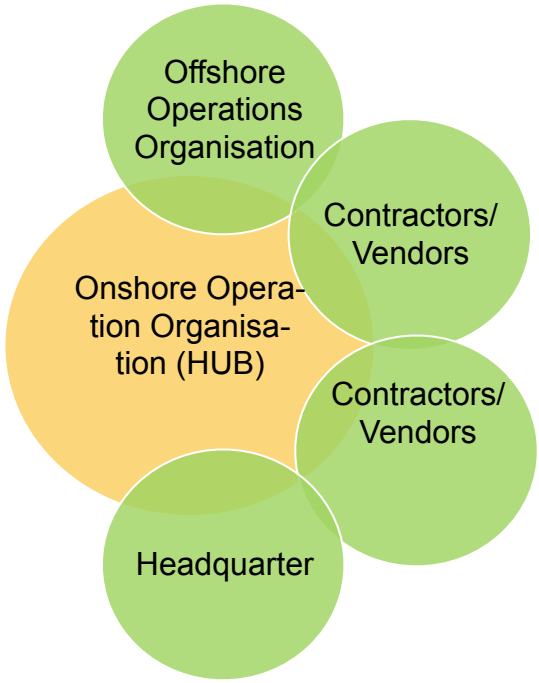
IO collaboration layouts and environments should support the company's operational model and philosophy. The geographical locations where operation will be conducted and the required or intended collaboration between these operations must be considered. How should the facilities layout be designed to support IO collaboration?

There is probably no answer to this question that fits all. But there are some processes and issues that almost all need to go through in reaching their design.

The IO way of thinking

To provide recommendations, overall processes of IO collaboration should be defined within each operational entity. This includes key resources within people, process, technology, governance and organisation. Based on this, recommendation can be provided on detailed layout, location of people, collaboration software and hardware, and other detailed technical specifications.

The figure to the left illustrates an example of the need for collaboration support for a manned offshore installation. In this example the onshore organisation works as a hub for the operation with support for collaboration with the installation, vendors and the company headquarters.



Tip

The design and layout of IO collaboration environments must be configurable; the needs and requirements may change and reorganisation might be needed as one get experience from using the environments during operation.

The basis for development of a good IO collaboration environment is the IO way of thinking and

working. It is necessary that the solutions support collaboration at individual, small group and large group level. The collaboration should support videoconferencing and possibilities for screen sharing between physical locations. Many physical rooms and meeting arenas can further be replaced by virtual rooms where the participants join a virtual meeting room from their desktop for collaboration. Several meeting places are today purely virtual, in form of e.g. a team site, an information system or a chat room.

Collaboration Environment (CE):-To allow for making better and faster decisions in a distributed organisation based on real-time quality data available, across disciplines, independent on location, and supported by new work processes.

Within physical locations, as for the onshore organisation, interaction and collaboration is needed between domains inside the hub for key processes. For example, the main activity for production optimisation may take place within the reservoir and petroleum group in close cooperation. In addition, the results from the reservoir and petroleum analysis and prediction will have to coordinate with the operation and maintenance supervisor before and during optimisation meetings. This represents a virtual collaboration environment between domains while personnel within each domain may be seated together.

Collaboration environments may consist of different types of room and areas at the different locations. Examples of such rooms and areas include collaboration and videoconferencing rooms, café areas, control and operation rooms, office spaces and silent rooms. Some rooms and areas may require extensive communication towards a number of cooperative partners and might need presentation of for instance live picture (from e.g. offshore deck) or information systems. The silent room on the other hand requires a quiet and relaxing atmosphere with little or no information screens.

Designing collaboration environments should focus on the individual's needs and accommodations. The requirements to the surrounding and environmental needs will differ if one is seated alone in an office compared to one who is in the field. Note that participants taking part in a collaborative environment will still have their individual needs, such as access to silent rooms, restrooms, and café areas.

The collaboration environment layout and solution will depend on the operational phases the organisation goes through.

The figure illustrates an excerpt of a collaboration environment.

Dilemmas

- Challenges for designing IO collaboration environments may differ if one plan a new facility compared to redesigning existing ones.
- Should one stream the shared surface and videoconference picture from a meeting to open/common areas if others also need or want to follow a meeting?
- Should people participate from their desk or from a VC room?

Tip

In order to create good collaboration environment solutions that support the IO way of thinking:

- Design new layouts for IO collaboration that builds on/support the work processes and operation.
  - Visions
  - Strategies and guiding principles
  - Capabilities
  - Processes and change management
  - Working environment solutions
- Use a thorough process to analyse your needs before building or refurbishing the premisses.

4. Designing Video Conferencing Rooms

The traditional way of arranging distributed meetings is through video conferencing in dedicated rooms. How should such rooms be in order to support easy and effective collaboration?

Challenges and opportunities in making and using video conferencing rooms.
Based on the characteristics of meetings and work sessions that a room is meant to be used for, a number of technical and practical aspects need to be addressed. Some of the questions one should ask when designing a good video conferencing room are pointed out here, also with a few potential answers. This chapter presents some principles for designing rooms for IO collaboration and video conferencing. We emphasize the understanding of the layout for videoconference rooms to support the meetings.

A well designed video conferencing room allows people to interact with other sites the same way as they would do when physically presented in the same room. video conferencing room is to be viewed as a dynamic room which will facilitate different types of meetings. Designing an optimal room for collaboration is an iterative process and reconfiguration should be expected.

Trap

Designing without flexibility

- High end videoconferencing facilities are expensive.
- Frequently, the expected requirements for a collaboration room at the time of acquisition turn out to be slightly different from the real life requirements.
- This can happen immediately after the room is put to use, or it can happen as a part of the further developments in the organisation.
- While failing to add adaptability of the rooms and buildings into the contract with the vendor might save money early in the process, it almost always costs significant extra money in the long run.

Video Conferencing Systems

There are basically two kinds of videoconferencing systems; dedicated and desktop systems.

Large group videoconferencing: Non-portable, large, more expensive devices used for large rooms and auditoriums.

Small group videoconferencing: Non-portable or portable, smaller, less expensive devices used for small meeting rooms.

Individual videoconferencing: Usually portable devices, meant for single users, have fixed cameras, microphones and loudspeakers integrated into the console.

Dedicated systems will have all the required components packaged into a single piece of equipment, usually a console with a high quality remote controlled video camera. These cameras can be controlled at a distance to pan left and right, tilt up and down, and zoom. The

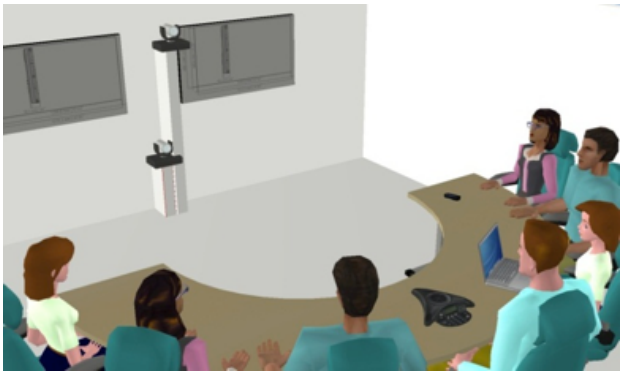
console contains all electrical interfaces and the control computer. Microphones are connected to the console, as well as monitors with loudspeakers and/ or video projectors.

There are several types of dedicated videoconferencing devices:

A) Large group videoconferencing is non-portable, large, more expensive devices used for large rooms and auditoriums.

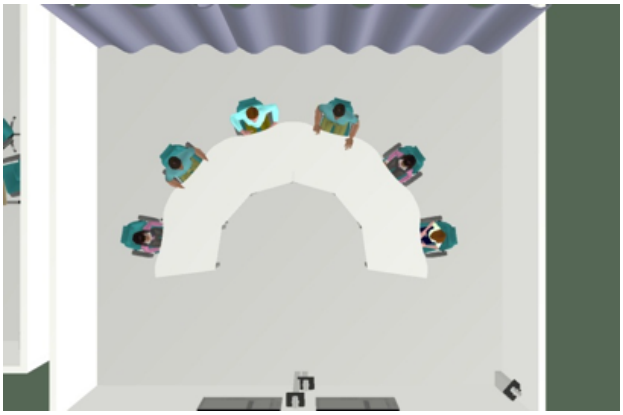
B) Small group videoconferencing is non-portable or portable, smaller, less expensive devices used for small meeting rooms.

C) Individual videoconferencing are usually portable devices, meant for single users, have fixed cameras, microphones and loudspeakers integrated into the console.



Desktop systems are add-ons (hardware boards, usually) to normal PCs, transforming them into videoconferencing devices. Videoconferences carried out via dispersed PCs are also known as e-meetings. We will come back to desktop and handheld systems in Chapter 5.

The remaining of this chapter focuses on dedicated videoconferencing systems installed in dedicated videoconferencing rooms.



Dilemma

Using existing meeting rooms as video conferencing rooms can be challenging:

- Which decisions have to be made in order to design/create a good video conferencing room?
- Are there any company requirements or restrictions that apply.

Designing the room

The design process should focus on the user's perspective to support them in their work processes. Rooms should be designed with a human-centred design process followed by technical requirements rather than around technical requirements only. Development and design of collaboration and videoconferencing rooms designed around technical requirements resulting may result in inappropriate rooms which are difficult to use.

Human-centred design is an approach to interactive system development that focuses specifically on making systems usable. It is a multi-disciplinary activity which incorporates human factors and ergonomics knowledge andtechniques. The application of human factors and ergonomics to interactive systems design enhances effectiveness and efficiency, improves human working conditions, and counteracts possible adverse effects of use on human health, safety and performance. Applying ergonomics to the design of systems involves taking account of human capabilities, skills, limitations and needs.

The human-centred design process should be applied regardless if one plans development of new rooms or whether an existing room is being redesigned for videoconferencing.

A number of decisions will have to be made in order to design a good room for collaboration and videoconferencing. The following can be of help to provide assistance with the design of dedicated videoconference rooms.

Lighting

It is important to minimize shadows and to create an evenly lit environment and to maximize the appearance of skin tones and to minimize shadows. The best lighting for

videoconferencing is diffuse fluorescent. Note that some fluorescent lights can interfere with the proper functioning of wireless keypads used for system operations.

Ideally, the room should not have any exterior windows. If it does, they need to be covered with room darkening drapery or blinds when in videoconferencing mode.

Acoustics

Audio quality is one of the most important contributing factors to a favourable videoconference experience, therefore good acoustics are important. One item of particular concern is reverberation - the effect of sound reflecting off of hard surfaces. One of the best ways to minimize the deleterious effects of reverberation is to coat floors, ceilings, and walls with sound absorbing material. In addition to minimizing reverberation it is also important to isolate the room from external noise sources such as fans and duct work from heating and cooling systems, water pipes, office machines, telephones, and street noise.

Coffee machines, water boilers and dispensers etc. should not be stationed in the VC room as they are source for disturbance.

Microphone placement is also an important factor influencing audio quality and for how well the participant's voices are captured. A microphone on the table might have more difficulties catching the speech volume of one participant lying backwards on his chair compared to one leaning over the table and being closer to the microphone. Microphone calibration should be easily done when required.

In future collaboration rooms, an indicator representing the actual sound level of your voice at the other locations could help to adjust and maintain a correct speech level.

Furniture layout and camera position

The conference table should be shaped to ensure equal access to the camera for each participant. Furthermore, the seating must be laid out so that all participants can be seen in the camera's room view if possible. Note that a good design and layout allows for good collaboration both within the room and cross locations with videoconferencing.

The next three figures illustrate three different table layouts used in videoconferencing.

The first figure illustrates a layout as one might expect in an auditorium or even a rocket launch control center:

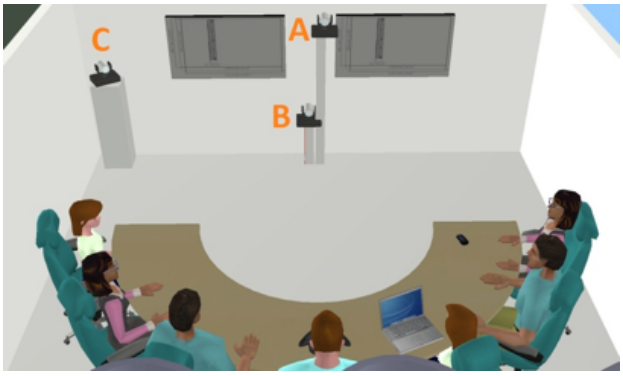
In the second figure a conventional rectangular meeting table is used. This is classic example on how a traditional meeting room is converted to a videoconferencing room by keeping the furniture and adding the technical VC equipment.

The third figure illustrates a room layout with tables forming a "V" where the camera is placed in the opening of the "V" shape.

These three table layouts and how they may influence the usage of the videoconferencing room are discussed in Chapter 4.

The camera position is important for providing a good picture to other locations. Examples of different camera placements and the effect of these are provided in examples next.

The figure below shows a room with cameras placed in three different locations A, B and C.



Camera position A:

From camera position A all participants can be seen and have easy access to the camera. The camera is placed slightly higher than the normal height of the sitting participants.

Camera position B:

In camera position B, the camera has been lowered compared to the position of camera A. In this position, objects on the table can more easily hide participants. The view angle suggests a "frog perspective" up at a meeting going on above.

Camera position C:

In camera position C the camera is placed in the corner of the room facing the participants. The participants closest to the camera are in side view and the closest person can hide the participants sitting next to her.

All three of these camera positions are frequently observed in Onshore-Offshore video meetings. With the furniture layout used in this example camera position A is recommended. This combination allows equal access to the camera for each participant.

Room Type

Any room designated for video conferencing should have good clearance to the ceiling to allow for changes in screens and projectors.

The cable gates in the floor, walls and/or in the ceiling must be easily accessible. Changes and reconfiguration of the room will be required.

Decor

The best decor is plain and simple. Keep the area within the camera's view uncluttered. Extraneous objects such as mirrors, artwork, plants, and fans cause the video compression algorithms to expend large amounts of processing resulting in less efficiency and reduced video quality. The best wall colour is a neutral non-white colour, such as light grey, light blue, or beige. Avoid wall treatments with patterns. These also can cause undo strain on the video compression system.

Hanging monocoloured textiles and curtains are useful, both for light reflection and for acoustics purposes.

Air quality

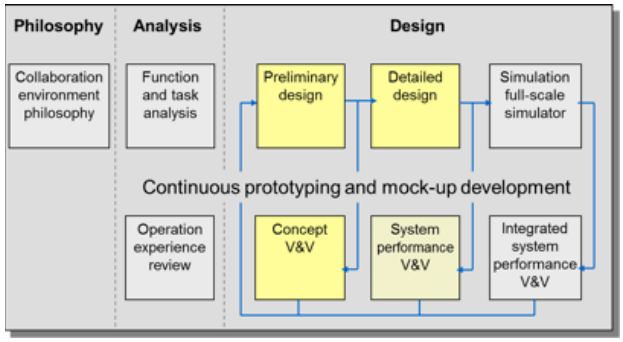
Good air quality and ventilation is important as for any work room. Note that the air condition system must be dimensioned for at least the maximum number of participants that will use the room. The fan and air conditioning sound level must be low and not to disturb the meetings.

Layout design and verification tools

There exist several tools for designing rooms. Such tools help the designers to communicate the layout of the room with others before the room is actually built. The layout can be discussed and optimized, and a wide range of stakeholders can be involved early in the design phase. Such tools also allow for comparison of different layouts at a low cost.

CREATE

For the exapmles in this handbook, the CREATE Tool, normally used for control room design has been employed. CREATE is a suite of tools for designing and evaluating room layouts. It supports an iterative design process with multiple participants and provides version management for tracking design iterations. The iterative process encourages design acceptance by enabling all relevant parties to contribute. It further enables designers to rapidly prototype and test designs against guidelines and recommendations.



Available online: http://www.ife.no/create.

With an extension of its library of furniture and equipment, the tool has been used to design the layout of collaboration environments. All video conferencing pictures in this handbook are made using this tool.

Using design and verification tools

Human factors and operational experience input should be included at an early stage in the system design to ensure usability. For continuity in the development and to achieve the best possible result, a virtual reality model should be created as early as possible in the design process. The use of such tools reduces the need for physical mock-ups and catch potential errors early in the design process by testing early.

Figure illustrating a person's view angle:

By studying a person's viewing angle from a given position one can evaluate whether objects and displays are within that persons attention.

Though a screen is in the persons viewing angle, the information on it may not necessary be readable. Different seating distance to the screen can be demonstrated and the readability

of the information on the screen can be evaluated from these distances.

Figure illustrating the seating distances 2 m, 3 m and 4 m to a screen on the wall. The area of readability of the screen text is visualised using a sphere. The text height on the screen in this example is 3 cm:

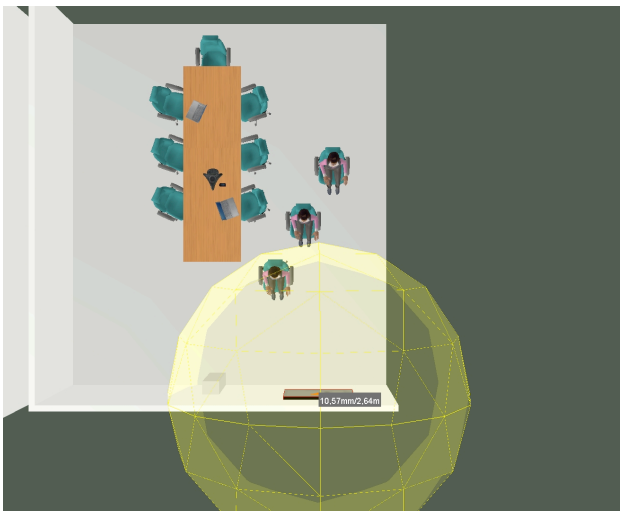


Figure illustrating the person's view of the screen from 2.5 m. The screen text with the height of 3 cm is barely readable:

This example illustrates that the room layout with seating of participants, screen technology and resolution, and the information displayed on the screen have dependent requirements. Seating participants further away from the screen without increasing the text size of the information displayed will make the text unreadable, making the room ineffective for videoconferencing and provide a poor user experience.

5. Usage of Video Conferencing Rooms

How should video conferencing in dedicated rooms be used to support the work process and facilitate collaboration between distributed teams?

Challenges and opportunities in making use of video conferencing

This chapter presents some principles and guides which support good collaboration between distributed teams using videoconferencing rooms. Several of the key points in this chapter derive from two IO Center reports: IO MAP, "The Integrated Operations Maintenance and Modification Planner (IO-MAP)") and SOFIO, "Interaction and Collaboration at Brage".

Not all members of a team are fully comfortable with a video conference (VC) setting. Some feel that starting a conference is a challenge. If team members do not employ VC for ad hoc meetings because they feel unsecure using the technology on their own, this can reduce an organisation's flexibility and result in situations where VC is only available when the "right" people are available.

VC rooms often have several configurations or templates to select at start up. The system should be intuitive to use, especially when it comes to making calls, sharing content on the shared surface, adjusting camera and sound, and other room specific settings such as blending windows and adjustment of lights.

Tip

Give every participant a chance to learn video conferencing technology by doing to avoid situations where video conferencing is only available when people with technology experience are available.

Camera

The camera position and the furniture type and placement influence the visibility and inclusion of the participants in the meeting.

In the illustration below, a traditional rectangular conference table is used in a VC setting. The image illustrates the camera view.

In this scenario the participants in the room (the co-located participants) have good visibility to each other like in a traditional meeting room. However, when the same layout is used in VC, not all participants are clearly visible to the camera. The visibility of the participants in this layout depends on the number of participants. If only few participants are present the layout might work.

A different layout is set up of tables as in an auditorium, illustrated below.

Here, all participants are facing the camera, but cannot easily face all participants in their own room. In some situations this type of layout may create a feeling that it is "us against them". This type of layout will usually only work well if all information and knowledge exchange has been done in advance, and all co-located participants are now focused on the remote site only. This is however a rare situation, and it is preferrable that the participants in this location be able to look at each other and collaborate throughout the meeting.

In the next example, a curved table is used, and all participants have equal visibility to the camera and to each other in the room.

With only six participants, the video picture would in this case benefit significantly from people sitting closer together, so that the camera could be zoomed closer in to see their faces better. People with long expereince in videoconferencing will actually tend to sit closer to the next person in a VC meeting than they would in a regular meeting.

Regardless of room layout, each person should focus on making themself visible to the camera. And to obtain a feeling of eye contact, one should remember to look also into the camera and not only towards the shared surface or display when speaking to the participants at other locations.

If for technical reasons all participants are not visible to the camera, one person from each location can address this before the meeting starts so that everyone is aware of it. The person seated next to the control of the room could also swipe the camera to illustrate the entire room if the room is too wide for the camera angle. A good meeting requires a good camera and furniture layout to ensure that all participants have equal access to the camera. If not all participants are visible to the camera, the camera can be panned or people can move aside to include them when they contribute and speak in the meeting.

Trap

Discovering after half an hour that one or more persons have been part of your meeting all the time, albeit outside the camera view without you knowing it can be disconcerting to many. This may have negative effects on trust.

One should be aware that swift movements and gesticulations do not always come through well in video conferencing, and coordination with speech (though clear to those in your own room) may be lost in the transmission to others. This may add different nuances to the message across locations. It is thus usually a

good idea to go for soft and deliberate gesticulations.

Sound

We are often required to speak louder than we think we should – even if we hear our own voice well, it could be too weak for other participants. It is especially important to be aware of this when participating in videoconferences.

Though microphones can be adjusted loud (both automatic and manual), it would in practice not be sufficient compared to using voice modulation to communicate important messages. It is often necessary to vary the voice volume to underline central points in a speech, and automatic volume control will reduce the effect.

The volume and the voice impression is influenced by many physical conditions (room type, seating of the participants, number of participants, floor and wall materials, outside/inside, microphone technology, digital delays etc.). Various natural voices are represented differently when they are represented by and through technology. This can be compensated for with use of advanced audio mixing (e.g. compressor), but it is time consuming and resource demanding and is not yet a common technique in daily VC-based meetings. Besides, the participants in the (local) group should also be able to hear what's being said.

Tip

When participating daily at videoconferences, one should use default volumes and adjust levels based on local conditions, technology and other premises, as well as feedback from colleges and other participants.

A brief evaluation of the voice production and the understanding of speech at videoconferences should be a natural part of such meetings. With time, one would identify the best voice production for the individual and for the type of meeting.

Shared surfaces

A shared screen is a TV or a projector displaying the shared surface used in video conferencing.

The shared screen must be visible to all participants. It should be calibrated to display the colours as natural as possible and its content must be readable and visible from the distance the participants are seated in the room.

The desired effects of using a shared surface are:

- To share exact information across locations.
- To capture actions and decisions, and ensure that everybody know what they discuss and what they agree to.
- To communicate meeting results to people not present.

For IO collaboration to be successful it is important to share information on time, giving others a chance to prepare.

Surface content

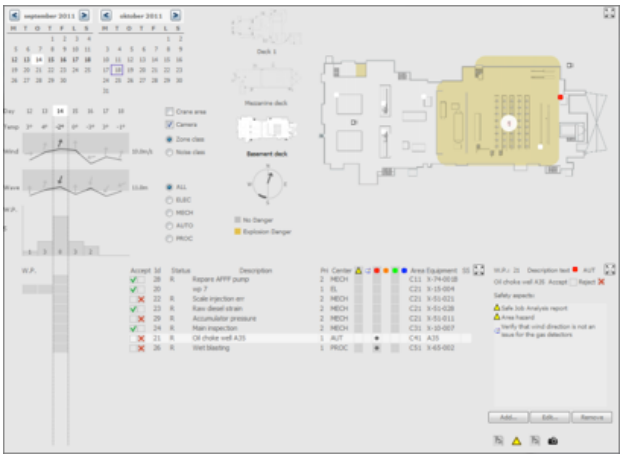
The content shared on the surface should be designed to support the collaboration session.

In for instance a morning meeting, the agenda for the meeting should be visible to all participants and the cursor on the shared surface used actively to identify the agenda point currently being addressed.

The meeting leader or those who have the need to share additional information should prepare the information to support the shared surface. This involves/includes to:

- Ensure that the text is readable with large enough font size, font colour and font type.
- Ensure that graphics are understandable and are displayed at an appropriate detail level. Use the cursor to point at the parts being discussed.
- Avoid flashing and fast moving graphics, this can both remove attention and focus, and can also be undetectable at other locations due to delays in the communication.

An example of content designed for use on shared surfaces is the IO Maintenance and Modification Planner (IO-MAP) prototype tool displayed in the figure below. The information and how it is presented has been carefully designed to support usage in collaboration settings.



Traps

Avoid flashing and fast moving graphics on the shared surface, this can both remove attention and focus, and can also be undetectable at other locations due to delays in the communication.

Tip

Always make sure that all participating locations have an updated view of the shared surface. This can be done by simply asking for their confirmation on this.

A good meeting leader can actively tell what he or she is doing, for instance opening a new view, this way participants at other locations can expect a display change in the shared surface.

Pointer/ mouse cursor

In IO collaboration, where parts or all of your team is situated elsewhere, the mouse of your computer is often the only ball you can play to channel people's attention and get your visual message across in a shared surface. Use the cursor to point at the parts being discussed.

When using the mouse cursor to point, in a table, a figure or a text, you need to point to the same area for at least 4 seconds before moving the cursor again in order to make the pointing effective.

When displaying information, check that all participants can see the shared screen well. During discussions, make sure that surfaces and cursor follow and support the verbal communication.

Other Hardware

Document cameras and smart boards are technologies often available in videoconferencing rooms. It is worth learninghow to use these technologies the same way everyone should be familiar with using the videoconferencing room. Document cameras and smart board are shared on the shared surface.

The principles for good mouse gestures also apply when using other technologies to illustrate or point at something. When using for instance a document camera to show, say a book or a machine part, one must then remember to show the object for at least four seconds, also to those that are in the same room.

Correct usage of such devices is important in order not to disturb and move focus away in the meeting. As an example, a person that needs to show an object to the others, who is not familiar with usage of a document camera, can use the VC camera instead. The person might zoom into the object to make it to enhance it. Note that camera control involving zooming in as much as required in this case moves away the camera from capturing all the participants in the room to the object. By using the document camera instead, the object would have been shown on the shared surface while all participants were captured in the room, making it easier to discuss the shown object while possible to have eye contact with the other teams.

Tip

The desired effect of pointing is:

- *To catch the participants' attention and channel this towards a point or small area in a larger and complicated picture while at the same time giving a verbal comment or explanation.*

The area of pointing and the verbal information must therefore be coordinated.

6. Collaboration on desktop and handheld solutions

In the first generation of Integrated Operations, dedicated videoconference facilities have been key. In further generations, personal solutions such as desktop computers, pods, pads and smartphones will likely play a larger role than before. We will here outline some of the actors and applications available that may contribute to new collaboration concepts in the near future.

Challenges and opportunities in making use of desktop and handheld devices for videoconferencing.

Based on characteristics of dedicated and proprietary videoconferencing systems and traditional off the shelf systems, a number of practical and technical aspects of using such devices for videoconferencing are discussed. This chapter presents some principles and differences between proprietary and off the shelf systems for videoconferencing and point on benefits and challenges related to desktop and handheld devices supporting videoconferencing.

Desktop collaboration

Desktop systems are add-ons (hardware boards, usually) to normal PCs, transforming them into videoconferencing devices. Videoconferences carried out via dispersed PCs are also known as e-meetings.

Video conferencing equipment used in dedicated system or used as add-ons to other systems is usually proprietary and closed systems. This means that other systems based on off the shelf equipment such as web cameras and standard microphones and off the shelf software such as Skype cannot be connected to the proprietary videoconferencing systems.

For participants to join a video conferencing session, dedicated devices are required. Desktop collaboration is normally between two or several computers on different locations communicating through internet.

Tip

Technologies will fail from time to time. So will technology users. Remember then that desktop and handheld solutions are backups when using dedicated VC facilities:

- Make sure that the staff knows how to use not only the high end system, but also a range of backup solutions
- Agree beforehand on
  - How much time to spend on trying to trouble-shoot the main system before switching to backup
  - Which systems or solutions to use for backup
  - Which to try first

Off the shelf equipment and software are, however, widely used in desktop collaboration. Any computer system with a camera, internal or attached, with a microphone and internet connection can be used in desktop collaboration. Note that the computer cameras do not have the same quality as new VC cameras and are more prone to backlight. Try

out different settings from where you are seated with respect to light settings, shading and camera angle by simply evaluating the image captured from your own camera. Make sure that your face is in focus and lit compared to the background. Though one normally works alone on a desktop, several participants can gather together around one computer as well in desktop collaboration. One challenge is then to allow all participant equal space and inclusion in the camera and simultaneously allow equal access to the computer screen where information and camera picture is displayed and shared.

One often recommends using a headset with microphone for communication.

Different software tools for video conferencing include GoToMeeting, WebEx, and Skype. Such tools can share the captured camera picture as well as a shared surface. When collaboration is setup between several locations, the camera picture from each location is displayed as it would in a video conferencing room.

In contrast to existing videoconferencing rooms where the screen resolution can be restricted, desktop screen normally provide higher resolution. This allows more space and pixels in the shared surface. Since the participants will be seated closer to the screen, the information text size can be smaller, as is for traditional programs, allowing more information to be presented on the screen. Note that such screens of information will not be equally readable if shared in a videoconferencing room with lower resolution and where participants are seated further away.

Desktop or laptop computer supporting video conferencing can be as back-up if the videoconferencing system in dedicated VC rooms fails for a reason.

Different scenarios:

- One is unable to share content in the videoconference room: Share screen and content with use of for instance GoTo Meeting. One invites the other locations to join a collaboration session and shares the screen locally at each VC room (on the TV or projector in the room).
- Unable to contact or make any calls with the videoconferencing system: Dial up the different locations with phone and then agree to set up desktop collaboration for both verbal and sharing of information screens or use the phone for verbal communication.

Ubiquitous

Handheld devices such as phones and pads are getting smarter and feature both camera and microphones. With internet connection such devices can also facilitate videoconferencing for those on the run. The screen resolution would normally be very low, limiting the screen to display either the camera picture with whom you are communicating or a shared screen. It can be expected higher resolutions on pads in the future.

The bandwidth and internet connection with the handheld device might be one weak link if a wireless network is not available. Streaming camera and shared screens over 3G or Edge can provide poor user experience. New technologies such as 4G are however not far away and provide higher bandwidth.

The use of handheld devices connected with dedicated videoconferencing systems can allow inclusion of experts in the field to more easily be included in a meeting.

Sharing of information

To be able to include vendors and other parties that or not part of the company in collaboration, it is recommended to use standardised technology and equipment in the collaboration environments. Note that you do not want to share all information available in the information system of your company. Information and technology security issues must be addressed.

Some companies might have parts of the surveillance of equipment outsourced to their vendors and suppliers. This puts additional requirements to sharing of information and information system solutions.

7. Training and Mindsetting

IO collaboration is not really about technology, it is about people.

Building skills and mindsets for collaboration in Integrated Operations

Several of the key points in this chapter derive from the so-called SOFIO method. The details of SOFIO are given in a separate IO Center report ("Interaction and Collaboration at Brage").

Building work process collaboration roles and placing people in the same virtual rooms is an important step, but will (on its own) not ensure collaboration. We need something more: IO Collaboration skills and attitudes.

IO Training

Sometimes it is useful for people to be told that they do something in a wrong way, or even that they keep doing something that they really shouldn't.

Examples of situations where such feedback can be fruitful is if somebody is unaware of aspects of the technology: "Don't rustle with paper near the microphones"; "Don't speak two at a time"; or in group behaviours and habits like: "Don't create another meeting in the meeting by holding mumbling conversations in one site".

However, many techniques for improved distributed collaboration, like the techniques from SOFIO, are also on a more individual level, and people may need to correct their own behaviour, or even to some degree their attitudes. In this case, the best way of teaching successfully may well be to catch people red-handed in doing something exactly right and enhance the fruitful things they do or say by giving them focus.

Furthermore, collaboration is not an exact science of one way of doing it fits all, and training is often about offering a set of recommendations to chose from, with each person adopting what works for him or her.

IO is to most companies not a fixed solution that one implements and completes, but rather a continuous improvement process.

DEFINITIONS

Integrated Operations are: Improved ways of working together enabled by employment of emerging and proven technologies

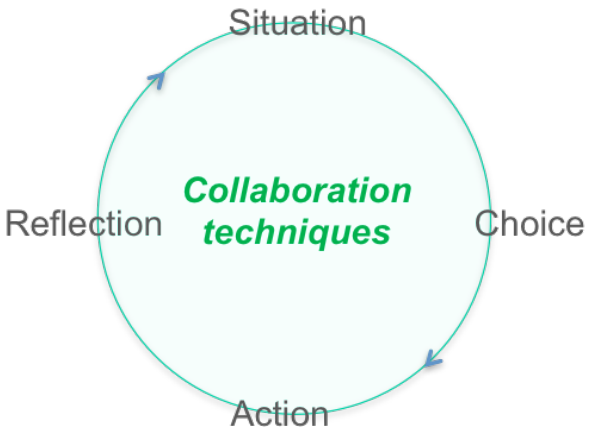
IO Collaboration is: Bringing together people with complementary skills to achieve high performance

This means regular improvements of technologies and physical environments, and it means continuous improvement of the ways people work together.

On the job training and concurrent learning

On the job IO collaboration training is about helping a team or an organisation to develop proficiency of IO collaboration during their every day work, and raise the whole team's consciousness, willingness and capability to continue self-education within all collaboration teams as they perform their daily activities.

In SOFIO one focuses on continuous improvement of collaboration skills in a group of people by establishing a learning loop:



The SOFIO learning loop of collaboration

In order to achieve this, a number of practical techniques are offered, and one seeks to create a common language for nuancing and articulating these as tools for reflection.

Dilemma

Learning to sucessfully use new technologies in a team will take some time and effort:

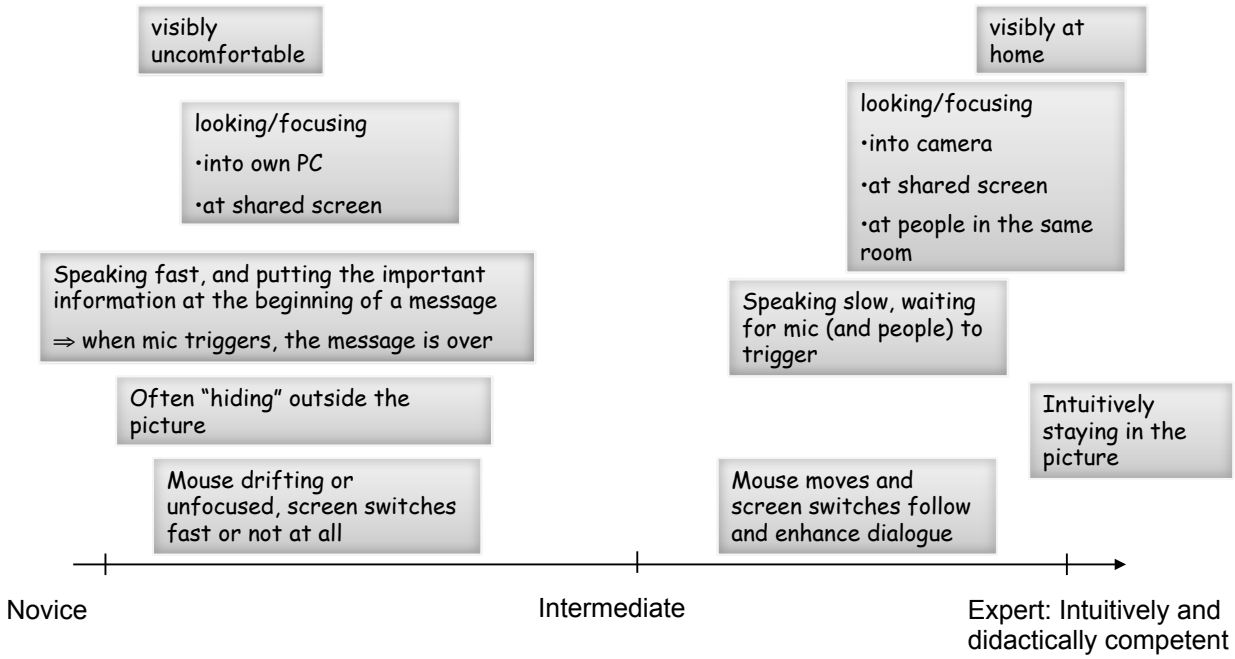
- Important user groups may experience significant time pressure in their regular workday.
- There are many courses and certifications, and several employees may experience training fatigue.
- Those who do not receive training may lose terrain in everyday collaboration, and new technologies and ways of working may impair rather than empower them.

Tip

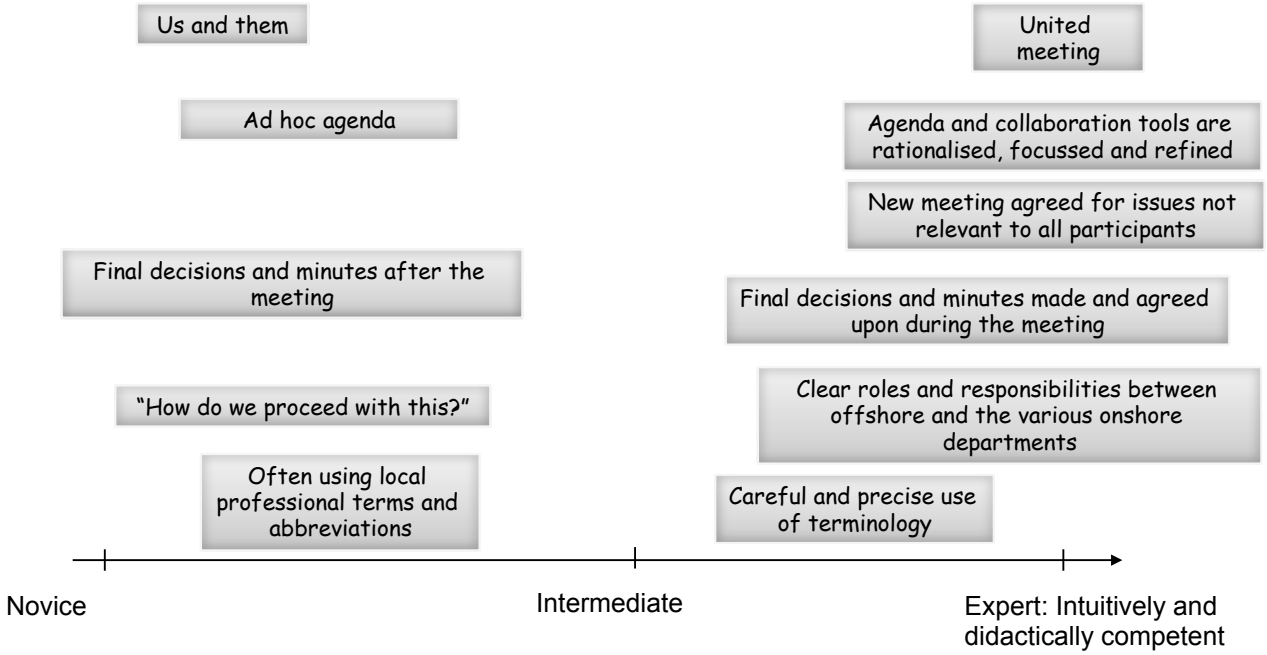
Train people on the job to train each other:

- Offer training and couching during regular work and collaboration
- Build a common responsibility for performance and an awareness of the team performance depending on all participants
- Use reflections in the actual working situation to identify the useful techniques, technologies and behaviours in collaboration, and to "play each other better" in these.
- Help colleagues to help themselves: Talk them through doing things they find tricky, do not do the task for them.

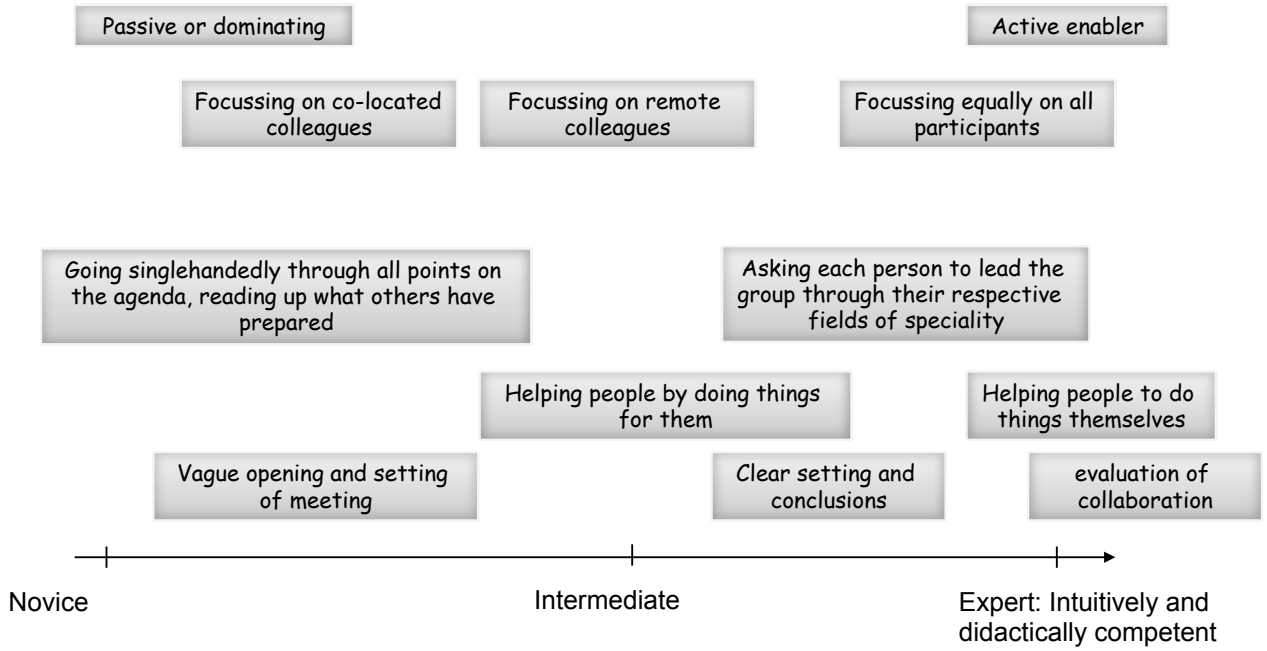
Example of training effects on technology literacy



Example of training effects on IO way of thinking



Example of training effects on meeting leaders



Terms and Abbreviations

Collaborative Environment (CE)

To allow for making better and faster decisions in a distributed organisation based on real-time quality data available, across disciplines, independent on location, and supported by new work processes.

Individual videoconferencing

Usually portable devices, meant for single users, have fixed cameras, microphones and loudspeakers integrated into the console.

Integrated Operations (IO)

Improved ways of working together enabled by employment of emerging and proven technologies

IO Collaboration

Bringing together people with complementary skills to achieve high performance

Large group videoconferencing

Non-portable, large, more expensive devices used for large rooms and auditoriums.

Small group videoconferencing

Non-portable or portable, smaller, less expensive devices used for small meeting rooms.

VC

Video Conferencing

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