Creating Environments for Successful Interaction

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Summary

In the current economic climate many organisations will opt for the obvious response of focusing on reducing costs and under-cutting competitors. However, for some time in a world of off-shoring and copycatting and more so then ever now, it is innovation that gives businesses a competitive edge. Innovation is borne out of collaboration, invention and creativity, at which interaction and knowledge sharing is the starting point.

AMA Alexi Marmot Associates has recently completed a two year applied research project on how to promote and enhance interaction in the workplace. Field studies were carried in the offices of five diverse organisations, including a transportation company, charitable foundation, management consultancy, architectural practice and investment bank. The research included piloting seven new methods for investigating interaction, termed WorkWare® CONNECT; these tools were derived from the literature review and build upon AMA’s existing WorkWare® toolkit. The research initially focussed on the design and functionality of formal and informal meeting spaces but expanded to incorporate guidance on the purpose of meetings, meeting etiquette, and virtual meetings.

Some of the key findings coming out of the study include: more meetings take place in offices with more meeting space; collaboration spaces are less popular if they are of poor quality (assessed by QuIZ); on average meeting rooms are used only 37% of the working week; the quantity and quality of space is important but can not overcome cultural predictors of success; knowledge transfer is weakest at the organisational level; and much creative thought and productive work takes place alone and away from the office. The research also resulted in a calculator for determining meeting room numbers and sizes, a system for prescribing the most appropriate media for interaction, design guidelines for interaction spaces, and guidance on the planning and etiquette of successful meetings.

A new innovation economy

It is generally acknowledged that the Western World has undergone three key stages of industrial evolution represented by three economic sectors (Fourastié, 1954):

- **Primary** – relating to the and production of raw materials e.g. mining and agriculture;
- **Secondary** – involving converting raw materials into products e.g. manufacturing and textiles;
- **Tertiary** – providing services and information to customers e.g. financial, retail, media, technology, healthcare and education.

Approximately 70% of us work in the service industry and are referred to as knowledge workers, a term first coined by Drucker as long ago as 1959. Our proclivity for trade and seeking to reduce labour costs means that through the ages we have outsourced our main economic activity and then through innovation progressed to the next industrial age. In the early 20th century we lead the way in importing agricultural commodities, in the 1950s we moved away from heavy manufacturing and focussed on light industry and later in the 1970s onwards we off-shored to the developing economies in the east. More recently, Western companies have off-shored parts of the service industry to the East to gain a commercial advantage by offering the same services as their competitors at a reduced cost. However, the downside of setting up overseas is that eventually the overseas provider will establish themselves as credible in their new industry, then start producing their own products and ultimately trade directly thus missing out us, the
“middle man”. This was particularly evident with manufacturing, such as the car industry, and more recently with technology. Due to the World Wide Web information is ubiquitous such that “knowledge is not king”; it therefore follows that the service industry is particularly vulnerable to copycatting and undercutting. So to maintain a competitive advantage, businesses need to look towards the next economic sector.

The notion of a Quaternary sector of industry as been around for some time; it principally concerns intellectual activities such as handling information, providing advice, entertainment, culture, government, research, and information technology. Some economists argue that the quaternary sector is a sub-set of the tertiary one, but most seem to agree that there is an emerging creative and innovative economy. *Business Week* magazine reported “the knowledge economy as we know it is being eclipsed by something new – call it the creativity economy … the game is changing, it isn't just about math and science anymore, it's about creativity, imagination, and, above all, innovation” (Nussbaum, 2005). Basically, for our economy to survive just having good knowledge is not sufficient; it is essential that we are innovative, applying our knowledge, and it therefore follows that ideas and creativity are our real asset. The UK and USA have a long history of innovation but, bar a few niche products, it might be argued that we are not leading the way as well as we have done in the past. We believe that interaction, whether planned or impromptu, is a fundamental part of the process of innovation and Drucker commented that intermingling is important for innovation.

**Defining interaction**

There are many terms used around the subject matter of interaction and innovations. Figure 1 illustrates the circle of interaction to innovation and is our attempt to simplify some of the different terminology used.

![Figure 1 The interaction-innovation cycle](image)

Our cycle commences when some information, organised facts and data, is generated and refined by an individual ready for passing on, i.e. communicating, to others. If a person responds to the information, or if the same or other information is exchanged between two or more people, then an interaction has occurred; the idea of a two-way effect is essential in the concept of interaction, as opposed to a one-way causal effect. Receiving new information could be said to increase our knowledge base, but knowledge is more associated with acquiring a real understanding of and familiarity with related information. Knowledge can be gained through solo activities, eg web browsing, as well as interaction. However, at some point we need to interact with others to share our views and challenge each others views in order to test and improve our knowledge of a subject. We may choose to collaborate and work together to extend our knowledge further.
Through a combination of collaboration, sharing of knowledge, and through personal reflection and insight, we may create new ideas beyond existing knowledge. An invention is using novel ideas to design a unique product or process. The final stage is innovation, when an idea is implemented to make a radical change in thinking, or develop a new product or process.

There is also a large body of research (eg Cross and Parker, 2004) which links social capital with increased knowledge transfer, where social capital relates to the number and strength of social ties ie previous interactions and relationships. Social interaction is therefore another mechanism for enhancing knowledge transfer and will accelerate the steps in the interaction-innovation cycle.

It is evident that “knowledge work is a highly cognitive and social activity” and collaboration includes bouts of solitary work and social interaction (Heerwagen et al, 2004). Research has also shown that each time we are interrupted when focussing on a task it can take up to 15 minutes to recover our “state of flow” or level of concentration (DeMarco and Lister, 1987). Psychologists, such as Broadbent (1958), have also reported that a natural reflex action means that we are always unconsciously listening and processing information, which can be counter-productive when the information being processed is irrelevant to performance of the individual or team. This may be why a noisy café can be less distracting than the open-plan office ie because the surrounding conversations are less meaningful and filtered out. Other psychologists (Altman, 1975) have noted the importance of controlling the level of interaction, or privacy, as too much interaction can lead to stress by feeling overcrowded and too little interaction can lead to feelings of isolation. We therefore acknowledge the importance of providing spaces for interaction and spaces for concentration and getting the right balance of such environments. We are also not proposing that open-plan environments alone will automatically lead to productive interaction between colleagues. However, our focus is on the conditions and environments required for good interaction, rather than for quiet and concentration.

The main focus of our research was on face-to-face interaction rather than virtual interaction. Again we acknowledge the benefits of virtual interaction, particularly in a world where we aim to reduce travel and the associated carbon, but believe there are occasions when face-to-face interaction is more appropriate and vice versa. Although the technology of virtual interaction has advanced tremendously it still does not convey well the “spatiality of human interaction”, which includes context/pointing, gesticulation, judging reactions and non-verbal communication. Barbour and Koneya (1976) famously claimed that 55% of communication is non-verbal communication, 38% is done to tone of voice, and only 7% related to the words and content. Non-verbal communication is complex and involves many unconscious mechanisms eg gesture, body language, posture, facial expression, eye contact, pheromones, proxemics, chronemics, haptics, and paralanguage. So, although virtual interaction is of use it is not a replacement for face-to-face interaction, particularly for initial meeting of individuals or teams. Furthermore, the increase in remote working has indicated that face-to-face interaction is important for motivation, team-building, mentoring, a sense of belonging and loyalty.

**Conditions for interaction**

A literature review (Fayard and Weeks, 2005) revealed that there are several key parameters for creating successful meeting spaces:

- **Proximity** – it is generally considered that the first law of geography is that “nearer things are more related than those further away” and research (Allen, 1984) found that the frequency of all forms of communication decrease with distance and significantly after 165 ft (50 m), thus the proximity of suitable spaces for interaction is key;

- **Accessibility** – ease of accessibility and the known availability of spaces for interaction is important, they need to be conveniently located with good visual access, so that signs of occupancy can be gauged, and their availability needs to be advertised or non-bookable (drop-in) spaces provided;
Privacy – the spaces should provide a sense of perceived visual and aural privacy, this is does not necessarily mean that an enclosed space is required for privacy, the spaces could have semi-partitioning, eg planting, or be distant from those who the meeting participants would not liked to be overheard by, eg a busy café;

Legitimacy – relates to having a valid reason for being in the space where interactions may take place, eg a copy/print area or stairwell/corridor, or general knowledge within the organisation that it is acceptable/preferred to meet and mingle in spaces other than meeting rooms, offices or desks;

Functionality – the layout and style of the furniture, the equipment provided (such as audio-visual), the environmental conditions (temperature control, air quality, light), the services provided (catering, AV support, room set-up) and the capacity all impact on the suitability for different types of interaction.

Independent of the existing architectural guidance on how to size and layout a meeting room is a whole set of literature on how to arrange and manage successful meetings (eg Harvard Business School, 2006). It appears that there is little overlap between the guidance on how to arrange and manage meetings and that on how to design meeting spaces. The key reasons cited for interaction are:

• Sharing information – new information needs to be passed on to colleagues, the information may be new and complex or an update of previous information;

• Making decisions – the key aim of some meetings is to draw a conclusion and sign-off an agreed set of actions or outcome;

• Generating ideas – groups may meet to brainstorm solutions to existing problems or generate ideas for new products and services;

• Resolving problems – this generally relates to resolving personnel issues and grievances;

• Socialising – it is acknowledged that meetings, albeit informal, are held for celebration or simply to catch up on non-work matters.

We also know that there are a wide range of types of interaction, they could be: planned (usually formal) or impromptu (usually informal), held locally or across locations, carried out between either two people or a larger group, and hosted virtually or face-to-face. When hosting a meeting, the reason for the interaction seems to be the logical starting point rather than, typically, considering the location and size of space required. A meeting room is only one possible option for facilitating an interaction and, depending on the reason for the interaction, not necessarily the best environment. Furthermore, even if a meeting room is considered the most suitable environment it is likely that it will need to be prepared and arranged to provide the optimal setting for the required type of interaction.

Methodology
AMA conducted a two year research programme part funded by DBERR with assistance from University College London (UCL). The main research objective was to investigate how to facilitate successful interaction by improving the conditions for interaction through better facilities and organisation. A secondary objective was to explore new tools for collating evidence on interaction and use of space. The new tools termed WorkWare^CONNECT were to supplement the existing five WorkWare tools: staff questionnaire, manager interview, workshops, Space Observation Survey (SOS) and space audit. Seven new tools were tested:

• Quality of Interaction Zone (QuIZ) – a checklist of five categories (accessibility, privacy, usability, comfort, quality) and 30 ratings which is used during an expert walkthrough to quantify the conditions for successful interactions;
• **Visual Field Analysis** – a means of assessing the percentage of desks and offices (i.e., occupants) which are visible to each other, our hypothesis being that greater visibility facilitates more interaction;

• **Space Interaction Survey** – an observation study, similar to Space Syntax, which traces movement and interaction throughout the space and identify key nodes of interaction, popular spaces, or dead spaces and unused routes;

• **Interaction Profiling** – a short interview was conducted with staff as they left a meeting or informal interaction, the questions focused on accessibility, choice, meeting etiquette, layout and technology; we also added questions on knowledge transfer and meeting success to our staff questionnaire;

• **Photosphere** – a workshop technique which uses 100 images of a mixture of spaces (e.g., meeting rooms, homes, beaches, parks, leisure spaces) to explore which environments are better suited for different types of interaction and solo activity;

• **Interaction Mapping** – a workshop technique for mapping the reasons for interaction with the various modes of interaction;

• **Social Network Analysis** – an abridged version of an established methodology where we use a few additional questions on our standard questionnaire to determine the extent to which colleagues associate with and establish central points of contact, our assumption being that knowledge transfer is greater between those who have a social tie.

Field studies were carried in the offices of five diverse organisations: a transportation company, charitable foundation, management consultancy, architectural practice and investment bank. We surveyed eight buildings and observed 350 meeting spaces and approximately 3,500 meetings with 12,700 participants. The data collated also supplemented our existing WorkWare database of 60,000 people in 250 buildings.

**Seven key findings**

Our first finding was that the higher the ratio of meeting spaces to desks the more meetings we observed were taking place. This sounds an obvious result but nevertheless is one that is often overlooked, so to encourage interaction provide the appropriate number of spaces for interaction to take place.

However, our second key result was that the utilisation of the meeting rooms we studied was only 37%, which is in-line with the 38% benchmark in our existing WorkWare database. If the capacity of the room is taken into consideration then the utilisation reduces to 19% as most rooms are only half-occupied even when used. Our results indicate that whilst, on the one hand, the number of meetings is related to the number of spaces provided the spaces are nevertheless under-utilised. The poor utilisation of meeting rooms is due to a number of factors, including the quality of the space and advertised availability, thus attaining the right number of meeting spaces is a critical success factor for the modern office. Based on our research and the data from previous design projects, we have developed a Meeting Room Calculator which uses utilisation and the expected frequency and size of formal and informal meetings to determine the number of meeting rooms required to support the organisation. We also found that the utilisation of less formal meeting spaces was lower than meeting rooms at 21%. Interaction Profiling and observation indicated that informal meeting areas were less utilised either because the design was not as well considered as meeting rooms, and they were poorly located with little privacy, or because the organisational culture meant that holding meetings outside of meeting rooms was not the norm.

Our third finding was indeed that the quality of the space matters. Expert walkthroughs, incorporating QuiZ, of 84 meeting spaces in three buildings in the study revealed that there is a significant correlation between the observed utilisation of the space and the QuiZ score, see Figure 2. The observed relationship means that we can predict the uptake, and implied success, of existing and new spaces for interaction using QuiZ. Further analysis, backed up by observation, revealed that the key factors are accessibility and privacy. Whilst the spaces need to be conveniently located, such as near primary circulation routes, they also need...
to offer a level of privacy, especially if located on the primary circulation routes. We repeatedly found under-utilised informal meeting areas which were simply a cluster of furniture placed on circulation routes in clear view of passing colleagues. The Interaction Profiling also revealed that people do not like to travel a long distance to interaction areas and are likely to stay local unless the spaces entice them, for example by offering good refreshments, a pleasant ambience or a place to retreat. More successful interaction spaces offered a balance of being conveniently located but offering a degree of screening.

Our fourth finding was that only 20% of the interactions in meeting rooms used any form of technology. We are not absolutely clear if this is because the technology is not required rather than it is not available. The Interaction Profiling and QuIZ indicated that meeting rooms with better facilities, including technology, were the first choice of meeting organisers. However, some responses also indicated that technology was not used in meeting rooms because there was uncertainty of what technology was available or it was simply too difficult to set it up. We also found that many of the meetings taking place in meeting rooms did not require the formality of the meeting room but it was expected to use a room for all meetings. The “meeting room culture” of organisations is difficult to break and requires provision of a range of different spaces for interaction and training/encouragement in when and how to use them.

The Space Interaction Survey and Social Network Analysis allowed us to identify the people who were most visited by their colleagues and the ones with the largest number of social ties. Our fifth key finding was that there is a strong correlation between the number of social ties and satisfaction with how the space supports teamwork and informal meetings, supporting the literature review conclusions. Although key people were identified, and overlaid with key interaction nodes, we found that their role was key importance and they would be visited regardless of their location. There is some logic in placing key people centrally where they can be easily visited but located so the regular interactions do not disturb others. We also found that knowledge sharing is highest at the team level between co-located colleagues and weakest at the organisational level. Assuming that the various teams within an organisation have a common high-level objective, then it seems important to look for ways to use the workplace to encourage cross-team interaction.

Our penultimate finding is that although space matters it cannot alone overcome organisational predictors of successful interaction. The Interaction Profiling revealed that the success of formal meetings was largely
due to good meeting etiquette. This involves appropriately arranging and managing the meeting; see Figure 3 and details in the Recommendations section. Our respondents complained of too many meetings, particularly regular repeat meetings to which they have little input but feel obliged to attend. Interestingly, the respondents also thought emails were over used and detrimental to relationship building. There appears to be an increasing trend of copying people into emails and inviting them to meetings to satisfy a perceived need to canvas the opinion of all potentially interested parties, but this appears to create more emails and meetings and prolongs any decision making.

**Figure 3** Physical and organisational factors for successful interaction

Our seventh and final key finding is that much creative thought and productive work takes place alone and/or away from the office. In our Photosphere exercise we asked the participant to select images which represented where they: are most creative, can concentrate best, prefer to meet, and are most productive. Unexpectedly, none of the participants in any of our workshops selected images of desks or offices and only a few selected images of formal meeting rooms. The participants recognised that their best work is achieved outside of the normal office environment but felt that the bulk of their work, ie the processing of information, requires a desk or office and occasional meeting room. If we want our workers to remain as process workers then that is all well and good, but if we want them to advance through the interaction-innovation cycle then clearly the balance of spaces in office buildings is not quite right. At this stage in our economic development the best solution is to provide a choice of environments that facilitate the different types of interaction but also support solo work requiring quiet and concentration.

**Recommendations**

Our research has lead us to the conclusion that *Creating Environments for Successful Interaction* is as much about the organisational factors, such as arranging and managing meetings, as it is about the design and facilities of physical spaces. The first step to successful interaction is to educate office workers that there is a range of ways of interacting and the meeting room is not the only option, see Table 1. The most appropriate method of interaction is dependent on whether it is planned (formal) or impromptu (informal) and whether it is a one-to-one or a group interaction; virtual and face-to-face options are available for these two key variables.

It is also important that office workers recognise the main purpose of the interaction: sharing information, making decisions, resolving problems, generating ideas, and socialising. The best setting is dependent on the purpose of the interaction, see Table 2.
### Type of Interaction

<table>
<thead>
<tr>
<th>Type of Interaction</th>
<th>Virtual</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formal or planned</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-to-one</td>
<td>Skype, web-cam, Email, Letter, Fax</td>
<td>Office, Quiet/huddle room, Restaurant</td>
</tr>
<tr>
<td>Group</td>
<td>Tele-conference, Video-conference, Webinar, Email, Letter</td>
<td>Meeting room, On-site conference suite, Off-site conference suite, Brainstorm/war room</td>
</tr>
<tr>
<td><strong>Informal or impromptu</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-to-one</td>
<td>Telephone, IMS, SMS, Twitter</td>
<td>“60 minute” room, Breakout space, Stairwell/corridor, Coffee/tea point</td>
</tr>
<tr>
<td>Group</td>
<td>Tele-conference, LinkedIn, ning, Facebook, Bebo, MySpace, Second Life</td>
<td>Café/restaurant, Informal meeting area, Social/sports area</td>
</tr>
</tbody>
</table>

### Table 1 Means of interacting

<table>
<thead>
<tr>
<th>Interaction media</th>
<th>Sharing information</th>
<th>Making decisions</th>
<th>Resolving problems</th>
<th>Generating ideas</th>
<th>Socialising</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting room</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
<td>?</td>
<td>✗</td>
</tr>
<tr>
<td>Conference suite</td>
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<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
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<td>Off-site hotel/conference</td>
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<td>✓</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Brainstorm/war room</td>
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<td>✓</td>
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<td></td>
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<tr>
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<td>?</td>
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<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Informal meeting room</td>
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<td>✓</td>
<td>✗</td>
</tr>
<tr>
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<td>?</td>
<td>?</td>
<td>✗</td>
<td>?</td>
<td>✓</td>
</tr>
<tr>
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<tr>
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<td>✗</td>
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<tr>
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<td>?</td>
<td>✗</td>
<td>?</td>
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<tr>
<td>Video-conference</td>
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<td>?</td>
</tr>
<tr>
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<td>✗</td>
<td>?</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
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<td>✗</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LinkedIn/ning</td>
<td>?</td>
<td>✗</td>
<td>?</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Facebook/BEBO/MySpace</td>
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<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Second life</td>
<td>?</td>
<td>?</td>
<td>✗</td>
<td>?</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ = best media, ? = useful media, ✗ = unsuitable media

### Table 2 The main purpose of interaction
To illustrate how to select different spaces to match the purpose of the interaction, in our opinion some of the better environments are as follows:

- **Sharing information** – new and complex information will need explaining by the creator either in a local meeting room, with good projection facilities, or by webinar when the recipients are geographically distributed; the information can be sent out by email in advance but the recipients should be given the opportunity to respond in a shared forum rather than through numerous emails;

- **Making decisions** – although some decisions involve a large number of stakeholders, in general decisions are made more quickly within smaller groups; consider locations which minimise interruption and keep the focus of the group for example a discrete meeting room or off-site conference room; consider the layout of the room and the where the participants should sit;

- **Generating ideas** – brainstorming and flow of ideas can benefit from taking place outside of a formal setting; consider different and stimulating spaces and ensure there is good equipment for capturing ideas and breaking out into smaller groups if required;

- **Resolving problems** – the office, especially if on view, is not always the best place to resolve personal problems; consider a quiet café or restaurant, the key is to not be overlooked by colleagues;

- **Socialising** – spaces offering food and rink and recreating the “watering hole” are best; also consider meeting outside of the office building to clarify the break from work.

In terms of the physical space itself, some of the main design issues are:

- lack of temperature control and poor air quality,
- poor daylight, and control of daylight if projecting,
- poor acoustics, transmission of sound between rooms or noise from outside,
- clumsy and inflexible furniture that can not be easily reconfigured,
- insufficient circulation space, within and outside the room, or poor room size/shape,
- lack of technology, or insufficient instruction and training in how to use it,
- poor cable management, and non-seamless technology,
- lack of colour and inspiration,
- lack of wayfinding, poor location and labelling.

Once the venue is selected it is also important that the meeting is well organised including how it is arranged and managed. Some key factors for planned meetings are:

- purpose – confirm the need to meet, draft and issue the agenda and draw up a list of key participants,
- arrangement – determine the most appropriate location and time that allows key participants to attend,
- control – appoint a chairperson to ensure the meeting runs on time and follows the agenda, the chair should also be capable of controlling the input of the participants,
- action – appoint someone to take minutes and ensure all actions are captured and followed up before the next meeting.
Conclusion
AMA Alexi Marmot Associates believes that innovation is vital to our economic development and that interaction is a fundamental step towards innovation. Our two year research programme employed a variety of new methods to explore the conditions required for successful interaction. We discovered that successful interaction is dependent upon both physical and organisational factors. Educating office workers in the purpose of interaction and the different media for interaction is as important as the provision of the right number of well designed spaces for interaction. Our literature review informed us that innovation involves bouts of interaction and solo activity and so it is critical that offices offer a choice of spaces to support the various work activities.

References