Reviewing the impact of virtual teams in the information age

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ABSTRACT

This paper provides an overview of virtual teams in the information age, focussing on the definition of virtual teams, their salient characteristics, the communication issues they face, (including information overload, geographic and social distance), the technical issues involved (linking this to theories of media use), the issues raised by cultural diversity in the teams (including identity, trust and conflict) and managerial implications. Suggestions are made on how to address the issues raised and omissions from pervious research are highlighted.

1. Introduction

Lipnack and Stamps claimed that we are now on humanity's fourth great socio-economic-technological threshold [1]. We have moved from the nomadic era of small group skills as hunter-gatherers to agricultural hierarchical models, onto the bureaucracy of the industrial age into what is now the Information Age. Networks, relationships and globalisation typify this. This has implications for our perceptions of time and place as well as the ways in which we do business. Electronic space, which coexists with geographical space, must be managed in order to maximise the opportunities it offers. This creates a fundamental change in the business environment as organisations now enjoy the flexibility of deciding who and what locate where. As Kimble *et al* state [2, p. 4-5] "By changing the nature of the friction of distance, the question of time and its significance in our work and everyday life is re-opened… [and] the nature and characteristics of 'place' have been radically redefined."

Team working and co-existing is the norm for people, who rarely work completely alone. The study of teams has been a topic of study for many years. Arguably, virtual teams (which we define below) have been in existence for centuries in the form, for example, of the Roman Empire or the Catholic Church. O'Leary *et al*, in Hinds and Kielser [3], recount the story of the Hudson's Bay Company which traded from its base in London to North America from 1670-1826. In all these cases, their communication technologies consisted mainly of hand-written letters, which took many months to deliver. Mantovani also points out that computer-mediated communication (CMC) is not a novelty as ARPANET, the first large computer network, was developed in the late 1960s [4]. However, it is the advent of the Web and the speed with which electronic communications now work that has revolutionised the business model.

In this paper we consider the nature of virtual teams and their benefits, and then consider some of the issues that arise in the use of virtual teams and the barriers to their success. There is some stress on the technologies that are used by virtual teams and some of the

managerial and cultural issues (that are all too often ignored) that arise from their use. Finally, the managerial implications are considered.

2. What is a virtual team?

Lipnack and Stamps explain that the word "virtual" can be traced back to a Latin meaning of "effective because of certain inherent virtues or powers." [1, p. 16] They put forward three contemporary meanings as follows:

1. "Not –real" but "appears to exist". Something that appears real to the senses but is not in fact. However, virtual teams are definitely real and not electronic representations of teams. Despite the efforts of one of us, the term "virtual library" has gained quite wide usage with this meaning in mind [5].

2. "Not the same in actual fact" but "almost like". Virtual teams do act virtually like a team, but with differences.

3. "Virtual" as in "virtual reality", a recent meaning invented for an emerging capability. This, they say, suggests future developments and digital realities.

The definition of teams is somewhat easier and, in general, can be described as "a group of people who interact through interdependent tasks guided by a common purpose" [6, p. 53].

Definitions of 'virtual teams' combine the above connotations and also acknowledge the role of information communication technologies as enablers. In this article, virtual teams are taken to mean groups of people who work across time, space and often organisational boundaries using interactive technology to facilitate communication and collaboration [1, 2, 6, 7, 8, 9]. Virtual team-working places organisational functions and processes above organisational location. Success involves the issues concerned with traditional teams alongside new communication considerations.

So, what is it like to work in a virtual team? Lipnack and Stamps paint the following picture: "You attend meetings in your pajamas, talk with people halfway around the

globe, use insomnia to catch up online, worry about head-set not car seat comfort, and partner with people you have never – and may never – meet face-to-face" [1, p. 4]. While this does highlight the day-to-day differences between traditional and virtual team-working, it does nothing to disprove Pauleen and Yoong's claim that "Most of the extant research on virtual teams has been anecdotal and descriptive with little in the way of systematic, empirical research." [10, p. 190].

In this article, we review research on the topic, together with the personal experiences of one of us (CG) who is a member of a virtual team.

3. Configurations and benefits

Duarte and Snyder note seven basic types of virtual teams depending on the nature of the task being undertaken [9]:

1. Networked Teams – working towards a common goal or purpose, often with diffuse and fluid membership according to the expertise required
2. Parallel Teams – for specific tasks or assignments with distinct membership
3. Project or Product-Development Teams – for non-routine tasks with specific or measurable results and a clearly delineated membership
4. Work or Production Teams – Regular and ongoing work in one functional area with clearly defined membership
5. Service Teams – support roles using differences between time zones to their advantage
6. Management Teams – across space and time (but not typically organisational boundaries) tackling issues as they arise
7. Action Teams – immediate responses, often to emergencies.

A slightly different approach is taken by Kimble *et al* [2] who use the coordinates of time, place and organisation to highlight different types of virtual team (see Figure 1).
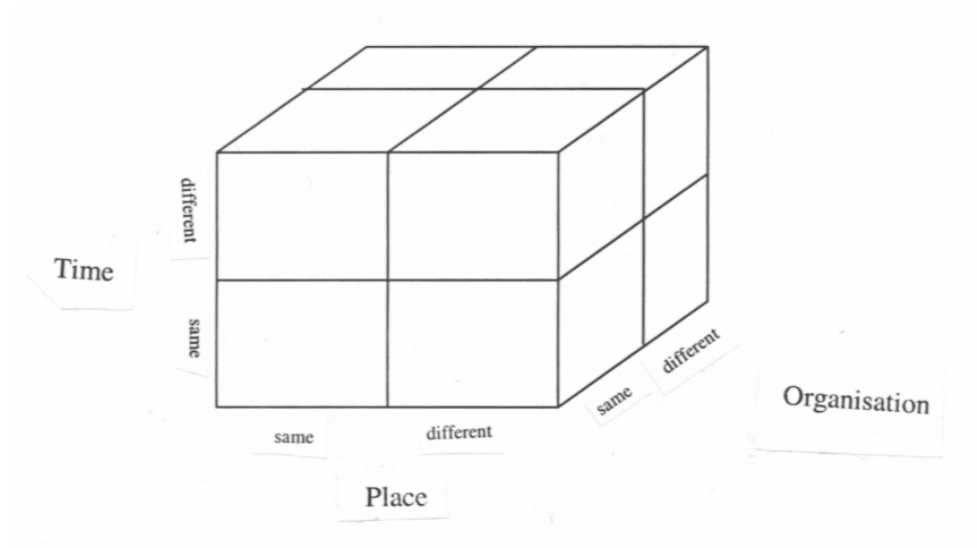
Fig. 1. Configurations of Virtual Teams

Jarvenpaa and Leidner wrote that virtual teams are characterised by their interaction mode, context and type of group [11]. This gives further possibilities for types of virtual team as illustrated in Figure 2.
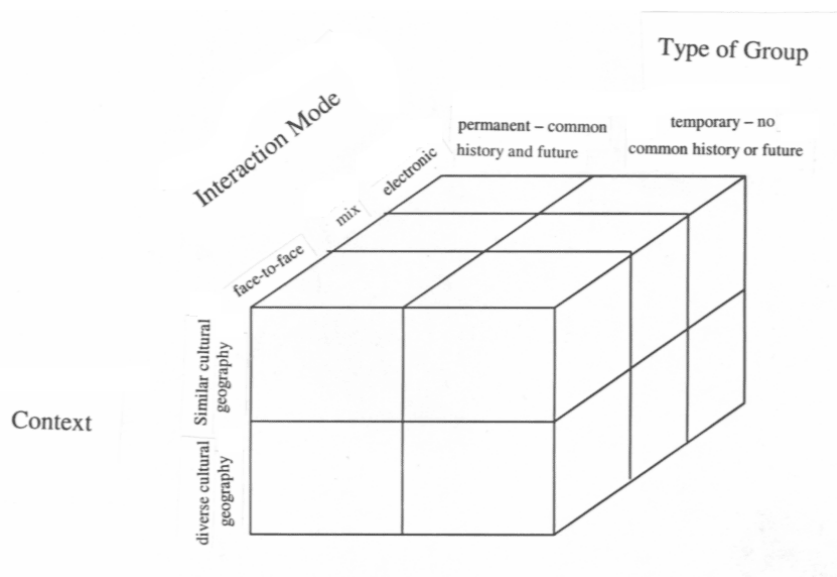

Fig.2. Configurations of Virtual Teams

This matrix of possibilities for virtual teams shows how the characteristics of teams can affect their potential strengths and weaknesses and may carry implications for how they should be managed [2, 9, 12].

Much has been written (see, for example, Jude-York *et al* [12]) on the perceived benefits of virtual teamwork. These can be listed as follows:

- Flexibility in balancing personal and professional life
- Cost savings on central office space
- Quick information gathering
- Shared accountability
- Increased knowledge base and accelerated learning
- Potential decrease in travel time and costs
- Dynamic team membership
- Use of new working technologies
- Development of best practices and leveraged learning
- Streamlined work processes and increased productivity
- Increased innovation through participation
- Teams of experts and best competencies
- Freedom and flexibility of team membership
- Increased team involvement and widened commitment to corporate-wide goals
- Opportunities for physically challenged people to work in a non-traditional environment
- Opportunities for team members to widen their experience and careers by working across cultures, organisation and on a variety of projects and tasks.

In addition to the benefits noted above, it is suggested by Duarte and Snyder that as teams allow us to achieve more than may be possible as individuals, virtual teams allow us to accomplish tasks that would previously have been impossible [9, p. 9].

4. Communication issues

An effective communication strategy underpins the success of all virtual teams. As Jude-York *et al* write, "At the heart of a virtual team is the challenge of sharing important information." [12, p. 10].

A number of issues surround the flow of information and knowledge in virtual teams:

- New Literacies

Members of virtual teams must be proficient in a new kind of literacy – that of 'documents' (non-prose formats such as forms, charts, graphs and maps) and also 'tools' (images, graphics, video and audio presentation of information).

- Distribution / Spread of Information

It is generally acknowledged that new technologies, and email in particular, have lead to an increase in both the volume and spread of work communications. Both positive and negative consequences of this have been noted. Cramton noted that unevenly distributed information is a common complaint of virtual teams [13]. Whether through oversight, technological error or deliberate choice, information is often forwarded to selected members of a team and not others. This can then lead to misinformed decision-making, duplicated work efforts, distorted perceptions of (in)activity and group size and feelings of alienation.

Clearly though, new technologies do have the capacity to disseminate information to a large number of people very quickly, irrespective of geography. This reduces the social isolation of geographically dispersed team members. It allows peripheral employees to become better informed, and have a greater voice in the core business of the team and also facilitate group culture and commitment. This has been dubbed the 'spill over' effect and, while its positive effects are considerable, we must not forget the ease and speed with which negative information – gossip, rumours and suchlike – can be diffused throughout a team and beyond.

- Overload / Volume of Information

Though it may be desirable to forward communication to the whole team in certain circumstances, members of virtual teams feel the disruptive impacts of heavy communications. Kraut and Attewell, as cited in Kiesler [14, p. 327] state that this can take two forms as follows:

1. information overload – an increase in the information received and / or requests for information
2. communication intrusion – an increase in interruptions of work by communications.

This theory suggests that, although much communication in virtual teams (especially email) is asynchronous, it nevertheless adds to the volume and creates feelings of being rushed, overwhelmed and stressed.

- Bureaucratic Record Keeping

Electronic mail is also used for purposes of task distribution, personal record keeping and scheduling, all of which has added to the volume of mail we send and receive. Markus, as cited in Kling [15, p. 515], takes this further and remarks that this has developed into "compulsive documentation" and "document mania". This includes the printing, saving, archiving and filing of emails and faxes and the logging of conference calls and videoconferences. Ironically this appears to detract from the very productivity it was designed to increase.

- Accountability

Alongside the continual striving to document all communication, there appears to have developed the tendency for team members to account for their actions and, especially, their role in teamwork. Markus, in Kling [15], explains that email is often employed to "cover your ass" and Hughes *et al* lament the emergence of a "blame culture" and "passing the buck" [6].

- Social Peripherality

In the same way that electronic communication can reduce geographical isolation, it has been argued that it can reduce the salience of the homogenised corporate voice and provide avenues of horizontal communication within teams. As Kraut and Attewell, cited in Kiesler [14, p. 327], state "electronic media may not reduce differences between centrally located versus peripherally located individuals but may even exacerbate pre-existing inequalities in communication and knowledge in an organisation."

- Knowledge Management

"Information becomes a greater asset if an organization can acquire, process, interpret and directly disseminate it." [16, p. 201] Virtual teams are, by their very nature, in an advantageous position to pool and share information and knowledge to not only prevent 'reinventing the wheel' but also to ensure that team members have quick access to the 'latest and greatest' information. Exactly how to go about this task is currently being explored and one solution put forward is that of Communities of Practice (CoPs). Kimble *et al* discuss the feasibility of virtual CoPs [2]. They concluded that CoPs could address many of the barriers faced by virtual teams in their quest for successful knowledge management. Further research is needed in this area.

- Negative Social Effects

Research has also been conducted into the possible negative social effects of belonging to a virtual team. Heavy use of electronic communication technologies could create social isolation by distancing users from relationships with others "external to the medium" i.e., people who are not regularly online. This can create a "them and us" culture where certain communication techniques are preferred over others. Computer-mediated communication has depersonalising effects and there are negative consequences stemming from the decrease in personal contact. These arguments have close links to the issues surrounding technology preference and communication, which are discussed below.

- Other Issues

Further issues concerning virtual team communication include the difficulty of conveying context and the salience of information and also interpreting silence. These, amongst other difficulties, can all potentially lead to ineffective communication, which may be detrimental to the virtual team. Miscommunication is addressed in further detail below.

5. Technology

As Lipnack and Stamps observe, virtual teams have evolved with the help of, and in response to, technology [1, p. xxiii/xxiv]

Jude-Yorke *et al* suggest that there are four main metrics of collaborative work [12]:
1. same time / same place – meetings, networked office computers, debriefings
2. same time / different place – online chats, video-conferencing, telephone
3. different time / same place – notes, bulletin boards
4. different time / different place – groupware, intranet, internet, email, post, fax, voicemail

Same time communication (as in points 1 and 2 above) is referred to as 'synchronous' and points 3 and 4 are classed as 'asynchronous'. It is important to note, however, that in some circumstances, asynchronous dialogue can take place so fast that it may almost be classed as synchronous.

The skills and technologies utilised by virtual teams are a blend of both the old and the new. All can be used for a variety of different tasks and come with their own advantages and disadvantages.

- Face-to-Face

It is generally assumed that face-to-face communication is vital to workplace dynamics. Existing literature is consistent in suggesting that, even if a team is never to meet again, they should do so at the formation stages. Not only does it allow more effective

communication due to synchronous interaction and expressive body language, tone of voice, and so forth but it gives a sense of personal contact and trust [10].

- Email

Email is used heavily in virtual teams for a variety of different purposes. These include sending digital information in its original form, distributing tasks and reminders, sending emails for proofreading and passing general information amongst others. It has many perceived advantages; it uses a universal platform, it's cost effective, accessible and easily learned. The messages are fast, succinct and can include attachments. Senders and receivers can choose the timing of the communication and it has also been suggested that email is effective in spreading organisational information to peripheral team members who may otherwise have a lack of informal communication. Email can also make cultural differences irrelevant since a lack of non-verbal clues, the uniform interface, and the eradication of accents can all increase perceived similarity [11].

Email is also adaptable. It is easy to create distribution lists and it is simple to cc or bcc for anonymity of other recipients. Reply, reply all and forward mean that 'for your information' e-mails can spread around the team quickly to keep everyone 'in the loop'. Emails can also be accessed remotely i.e., away from the normal office space. Team members can access their mail at home or abroad.

A disadvantage to email communication is its low context. The scope for miscommunication is likely to have made its way into the folklore of most virtual teams and care must be taken in composition. Often the purpose of an email can get lost amongst the text and subject headings can be misleading or omitted. The 'cc' feature can cause an increased volume of messages and overly long threads, which can lead to email overload.

- Telephone and Voicemail

Telephones are often viewed as the next best thing to face-to-face contact and a good way of building trust and relationships in virtual teams. It can also be used to forward

messages to others' voicemail services. Due to costs, organisations may not often use it to contact staff internationally, especially not for casual communication. Telephone calls may be made, for example, to check that an email or fax has been received.

- Chat

Chats are a synchronous electronic method of communication. They are cheap, spontaneous and informal. Importantly, they can also be logged for reference. Some team members may miss out on 'water cooler conversations' and this is the virtual equivalent. However, chat can be tiring and confusing, and users must be careful not to overwhelm each other when there are a number of people participating and there is a danger of a number of conversations overlapping.

- Groupware

This category of technology consists of customised environments or interfaces designed to enable synchronous communication, collaboration and coordination within groups or organisations. They will combine many or all of the following features: electronic mail, databases, discussion areas, bulletin boards, and calendars. Many of the individual components discussed individually below.

Groupware technology has been used within organisations with differing results. Orlikowski, as cited in Kling [15, p. 3] has noted that it is more likely to be used successfully in environments where there is an understanding of the nature of collaboration and where the sharing of information and ideas is encouraged or rewarded. Where these conditions are not prevalent, the technology is more likely to be seen as an extension of existing systems, which have a use only for individual work.

- Video Conferencing

Video conferencing is an electronic form of synchronous audio and visual communication, which seeks to emulate face-to-face interaction between individuals or groups whilst also saving time and travel costs. Additional technologies such as an intranet, whiteboard and database facilities have been added to some packages over time.

These features, coupled with advances in the reliability of technology and falling costs, have led to an increased popularity over recent years.

This method of communication is not without its drawbacks, however. The technology itself can be difficult to set up and can be unreliable. People may be inexperienced with the medium and the differences between online and face-to-face communication, and so the potential benefits of the medium are not fully exploited.

This should not be a direct substitution for traditional meetings and so a new set of managerial and individual skills need to be employed. An awareness of which tasks are most suited to this form of communication is essential to avoid wasting resources. As Panteli and Dawson state, structured meetings, which deal with routine, well-developed and non-controversial issues may effectively make use of such technology whereas complex or relationship building aims may not be fulfilled [17]. This issue of task-related selection of technology is addressed in more detail below.

- Network

A shared network provides the whole team with access to the same technologies and resources to communicate and co-ordinate their activities. Networks can be used to store electronic files such as spreadsheets, word-processed documents, databases and so forth. Some of these may 'belong' to certain people and so cannot be edited freely and others are for general input such as the electronic calendar. The latter allows the team to minimise schedule conflicts [8].

- Portable Technology

When team members are out of the office or on the move, they can now carry portable communications technology.

- Discussion Boards

Message lists and discussion boards can be used as open forum for discussion within teams. They are useful for ongoing, steady debate. Participants may post anonymously if they wish and can raise any topic they desire.

- Remote IT support

By necessity, virtual teams should be well-trained in the use of IT and may be able to boast some well-developed and specialised skills. It may be possible, therefore, for teams to support each other's IT needs either directly or remotely using file transfer protocol (FTP) or PC Anywhere technologies. Additionally, teams can teach each other IT skills.

6. Selection of Technology

There are a number of issues to consider when examining the selection of a communication medium.

6.1. Information Richness Theory (IRT)

'Rich' media are those, which transmit a higher volume and variety of information including non-verbal cue, which serve to reduce uncertainty of meaning. Panteli and Dawson state that this is dependent on the following; the capacity for immediate feedback, the number of cues and channels utilised, personalisation and language variety [17]. 'Lean' media, in contrast, are more impersonal and rely on rules, forms, procedures or databases.

To a certain extent this theory does seem straightforward and explains why technologies seek to emulate face-to-face communication as the most 'rich' method of communication. However, it implies that richness as a quality is inherent in the medium itself with no accounting for its interaction in the personal and/or organisational environment. Van der Smagt makes the observation that IRT fails to address the social aspects of communication, which leads to a confusion between 'understanding' and 'trust' issues

[18]. Communication as a two-way dialogue involves not only technology but also the interplay between this, the task and the subjective processes. These last two issues are addressed separately in following sections.

6.2 Tasks

Teams encounter a number of different information and communication related tasks. It follows, then, that they can be matched to enable the selection of a media most conducive to the task in hand.

Duarte and Snyder claim that there are four main types of team tasks and offers suggestions for suitable methods of communication for each;

1. idea / plan generation, including data collection – data only media such as email, bulletin boards
2. solving routine problems – audio or video channels
3. solving ambiguous / complex new problems – audio or video channels
4. negotiating conflicts or building relationships – video or face-to-face [9].

It is interesting to note that information richness here is not regarded as inherently superior for all tasks. Indeed, it may even lead to the transmission of superfluous information which could mean a waste of resources or confusing team members who are more familiar with leaner media.

6.3. Record / Permanence

The communication medium chosen may depend on a need to log or record the communication process itself and not just points raised or decisions made. This can be seen as a technological minute taking exercise but may more comprehensive as it tracks the process itself, which is useful for self-reflection and analysis of the team's communication, processes. Video links will need to be consciously recorded before the event. It is important, however, to bear in mind that not all communication acts need to be recorded.

6.4 Symbolic Meaning

This refers to the context or meaning, which may be implied by the technology itself. For example, a handwritten letter has different connotations to a word-processed one.

6.5 Organisational Cultures

Some organisations may favour certain forms of communication over others. This may be due to resources available, tradition or personal selection.

6.6. Experience / Familiarity

People may become predisposed to certain technologies as their familiarity with them develops. Conversely, this may also mean that people become less inclined to use other forms of communication as, for example, an increase in the use of email may mean a team member is less comfortable using the telephone. Team members may find information rich media distracting and unnecessary if they are more familiar with lean media.

6.7 Resources and Training

Resources available include time, training and support in addition to the technology itself. Researchers have suggested that staff training and group commitment to communication technologies leads to enhanced communication [15, p. 289]. Staff need to possess 'intelligent information handling' skills such as cohesiveness and sharing information. If this is assured then the technology "becomes seamless to the virtual team members, almost like a natural extension of their human capacities" [19, p. 21].

6.8. Subjective Processes

In a cognitive approach, the way in which a new technology is received or used by members of a team can depend to an extent on the existing technologies. Orlikowski, as cited in Kling, states that there are two other influencing factors in addition to this [15]. The first of these is the information given to potential users prior to the introduction of the technology, in that users must be made aware of its potential functions and benefits. This may serve to decrease scepticism towards it and lessen resistance to its implementation. The second factor is an issue of training and how confident users are in operating the technology. Training should be customised according to team members' differing needs.

It seems, therefore, that the people or the technology alone cannot guarantee effective communication. Higgin and Jessop, quoted in Van der Smagt [18, p. 156] concluded in 1965, "an improvement in relationships between parties is likely to improve communications more effectively than any change in communication techniques."

7. Human and cultural issues

It has been suggested that managers could soon face a global uniform environment leading to the homogenisation of managerial values across cultures and a move towards a single, global management culture that is basically American [20]. However, other research suggests that national cultures will retain their importance and that different communication and business styles backed by each culture will come to the forefront [21].

Intercultural teams are bound to have definite effects on managerial and leadership styles. Values are standards of criteria, which individuals use to guide their attitudes and actions [20]. There are a number of frameworks for the conceptualisation of cultural variability [22] provides a good overview.

These perspectives explain cultural variability using observable behaviours as well as cognition held by the actors within distinct cultures. They are summarised in Table 1 below:

Theorist / Year	Attributes	Attributes
Hall 1976	Low context – explicit info required	High context – implicit, shared info, long-term relationships
Glenn 1981	Abstractive – factual, inductive, explicit information required	Associative – shared patterns and meanings
Servaes 1989	Western – direct, explicit, rational argument emphasising the end product	Asiatic – indirect, implicit, emotional exchange valued and harmony emphasised
Hofstede 1980	Individualism	Collectivism
Levine 1985	Direct - certainty, clear	Indirect – ambiguous
Weber 1990	Competence values	Moral values

Table 1. Summary of Theories of Cultural Variability.

The next logical step is to classify certain cultures according to these headings to use as examples. This is not a difficult task as this area is well researched and documented using comparative studies. Bhagat *et al* use Glenn's concept of abstractive and associative attributes to place Germany, USA, Switzerland, France, England and New Zealand in the former category and Japan, China, Greece, Spain and Indonesia in the latter [23]. Further to this, Gudykunst *et al's* research used the terminology of low-context, individualist and high-context, collectivist [24].

These frameworks are not without their weaknesses, however. As Tayeb, in Mellahi [20], notes, national culture is not limited to the strict borders of a nation and regional influence can be strong. This could lead to the existence of subcultural or multiple classifications of values, which are as prevalent as national cultural values. Another

consideration is that, in reality, individual situations must be assessed, as individuals themselves may not adhere to the values portrayed by their culture.

It would seem, therefore, that these typologies are useful are useful mainly as a starting point and should be considered alongside specific situations. Managers themselves need to become more competent in cross-cultural management and build-up knowledge of and sensitivity toward cultural diversity. As Canen and Canen conclude, this implies examining power relations and dominant cultural values in societies and "deconstruction and challenging of stereotypes and assumptions associated with cultural plurality" [25, p. 4].

8. Language

From Table 1, we put forward the following suggestions:
- In cultures, which are high-context, tone and gesture may signify important aspects of communication, which may be screened-out in low-context areas.
- Japanese and Chinese cultures (classed as high-context) have far more allusion, proverbial phrases, analogies and inference. This is contrasted with the direct, 'no-nonsense', Western approach [21]
- Rhetorical styles may differ between languages. As Hinds, in Bloch and Starks [26, p. 84] summarises, "English arguments tend to go from general to specific, the specific to general association is more typical of many Asian societies." [27; 21].

This list is by no means exhaustive.

Language is one of the most salient markers of identity and noticeable differences between national cultures. It is not only the language you speak that may be culturally specific but also the way in which you use that language. That is to say, good communication takes both grammatical and socio-linguistic competence:

8.1 Grammatical differences

There are a variety of examples whereby users of the same language, but from different linguistic backgrounds, may use a common language differently. Some of these, such as non-use of the article, e.g., 'I go to hotel now' will not impede communication.

Other examples may cause comprehension difficulties or unfavourable attitudes towards a speaker, such as the use of an invariant tag 'is it' in Malaysian English regardless of the subject of the sentence [26].

8.2 Socio-linguistic differences

'Code-Switching' is a linguistic feature, which McArthur, in Bloch and Starks [26, p. 82] states is common in some cultures where individuals use more than one language to create a hybrid. For example, "In northern India, educated, professional people use English and Hindi, in the Philippines, English and Tagalog and along the Texan-Mexican border, Spanish and English, known as Tex-Mex and border lingo."

Within spoken communication, 'turn-taking' refers to the shift from one speaker to another in a conversation. This appears to be culturally specific and does not necessarily transfer when a speaker changes language. For example, Tannen found that Americans pause longer and interrupt less than Greeks, which could be perceived as boredom and disinterest or as rude and obtrusive depending on the perspective [28]. Morita found that Japanese speakers interrupt less and then, mainly for the purpose of agreeing [29]. In English, however, interruptions and overlapping speech are acceptable for both agreeing and disagreeing with an interlocutor [26].

Miscommunication is common in cross-cultural situations and can have many manifestations. "It is natural but dangerous to have a false sense of security and assume that because the other party is speaking the same language, that they must be thinking

along the same lines." [26, p. 84] They go on to outline four main areas of miscommunication:

1. total lack of understanding – zero communication

2. distortion of the message – it is understood only partly, which may lead to major errors or offence

3. inappropriate formulation and cultural insensitivity – the content is understood but the message is not presented in a way that is acceptable in terms of etiquette and politeness

4. insufficient vocabulary or use of idiom – the speaker knows more or less what to say and how to say it, but a vital linguistic element is missing

As this list shows, virtual teams need to be aware of the effect language can have on their communication. This will involve not only cross-cultural training to enhance communication skills but also changes in attitudes towards non-native forms of languages and ideas of 'correct' or 'superior' uses of language.

9. Trust

Studies in the area of virtual teams have suggested that trust is vital to prevent geographical and organisational distances from becoming psychological distances [30, 11, 1]. As much of the work to develop trust would normally take place in a face-to-face situation, virtual teams must find alternatives to collocated strategies.

The benefits of the successful development and maintenance of trust are those, which have been associated with traditional, collocated teams. These include alignment of work efforts, quick exchange of information and ideas, collaboration on work tasks and process improvements, employee job fulfilment and pooling of shared resources. In the case of virtual teams, however, we can extend this to claim that trust can also enable the team to fulfil the inherent potential they hold through being virtual as discussed in Chapter Two.

We suggest that the following statements are true:

- people from individualistic cultures may be more willing to trust others via computer mediated communication than individuals from collectivist cultures due to a willingness to respond to ambiguous messages
- in low-context cultures, members are less likely to take the time in business to build relationships and establish trust
- team members in collectivist cultures may have a heavier reliance on formal controls and may respond well to a team management approach

Again, this list of suggestions is not exhaustive, and even its accuracy can be questioned. However, it can serve as a starting point for examining what values and behaviours may facilitate trust and effective control in virtual teams.

Much has also been written on the theory of 'swift trust', which is thought to be of use to virtual teams. Meyeson, Weick and Kramer developed this theory for teams who, due to limitations of time, space, expense and so forth, may have little time to build relationships [31]. Under this theory, members import expectations of others based on past experiences, other settings of which they are familiar and category-driven information processing to form impressions of others. Trust is then reinforced through action in a self-fulfilling fashion.

This theory is useful for its concept of action reinforcing trust, but it is not without its weaknesses. It relies heavily on well-defined role divisions and the occasional face-to-face meeting of team members. Table 1 states that many cultures are less concerned with self-categorising and group membership and so may be less ready to form opinions along these lines.

Other studies in this area have investigated what behaviours appear to facilitate, develop and maintain trust in dispersed teams. One study is particularly worthy of note here. Jarpenvaa and Leidner conducted an experiment using 350 postgraduate students from 28 universities from every continent except Antarctica [11]. They were split into teams and given two assignments to complete over a specific time span. Their behaviours in

relation to trust and group effectiveness were then observed as they undertook the task. Hofstede's scale of individualistic versus collectivist cultures was also used. This experiment drew many conclusions. Nine trust facilitating communication behaviours and member actions were identified. Jarpenvaa and Leidner break these down into useful four categories as follows:

1. Communication behaviours facilitating trust early on

    - Social communication – integrated into otherwise task related messages. Care must be taken not to use social dialogue as a substitute for progress on the task

    - Communication conveying enthusiasm and encouragement

2. Member actions facilitating trust early on

    - Coping with technical and task uncertainty – not blaming technology for human-base issues. Structuring task goals and developing coping systems

    - Individual initiative – pushing the project forward and adding richness of details to ideas. Suggesting rather than asking for suggestions and volunteering instead of asking for volunteers

3. Communication behaviours maintaining trust later on

    - Predictable communication – not so much the overall level, more the organised and equal input of team members

    - Substantive and timely responses – ensuring explicit and prompt replies which are then thoroughly read and evaluated

4. Member action maintaining trust later on

    - Leadership – ineffective and/or negative leadership exacerbates the culture of the group

    - Transition from procedural to task focus – moving beyond setting rules

    - Phlegmatic reaction to crisis – remaining calm to overcome hurdles

Jarpenvaa and Leidner point out that there are few cultural effects in the results of the study, i.e., although participants were international and a note was made of their cultural background, no differences in behaviour were observed along these lines. This they put down to the fact that participants were similar in age, functional background and

educational level. However, it could also be interpreted as further weakening the arguments of trust being culturally specific.

10. Conflict

As with traditional, collocated teams, the management of conflict may prove to be a major factor in determining the success or failure of virtual teams. Mannix et al, in Hinds and Kiesler [3, p. 213] define conflict as, "an awareness by the parties of differences, discrepancies, incompatible wishes, or irreconcilable desires." They broke this down further into:

1. relationship conflict – an awareness of interpersonal incompatibilities such as personality clashes, animosity, annoyance. This can be detrimental to individual and group performance, member satisfaction, and the likelihood of future teamwork

2. task conflict – an awareness of differences in viewpoints and opinions pertaining to the group's task. Moderate levels of task conflict can be beneficial to group performance by synthesising perspectives and opinions.

Recent research undertaken by Duarte and Snyder has shown that perceptions of the above conflicts are often highly correlated and misattribution is common [9]. Mannix et al, in Hinds and Kiesler [3], state that the existence of trust serves to break this association by enabling correct diagnosis of conflict and also by helping to resolve it when necessary.

We make the following claims regarding conflict and cultural difference:

- indirect communication common in high-context or collectivist cultures is caused by a conscious effort to avoid confrontation as this is manifest in ambiguous and equivocal verbal communication

- members of low-context (individualistic) cultures may use a confrontational solution-oriented strategies in conflict situations

This typology doesn't carry any presumptions of which approaches are better than others. However, Mannix et al, in Hinds and Kiesler [3, p. 216-223], do focus on the two main challenges regarding conflict and virtual teams and they also state 'propositions' for how positive conflict can be used productively and negative conflict be avoided respectively. These challenges are lack of common social identity and increased compositional diversity. The propositions are as follows:

- A common social identity will be more difficult to achieve in distributed work teams, potentially decreasing beneficial task conflict and reducing performance when compared to traditional work teams

- Limited previous interaction among distributed team members will have the potential to increase detrimental conflict and make it more difficult to resolve. Due to their lack of relationship, distributed team members are likely to have more difficulty distinguishing task conflict from relational conflict, thus decreasing team performance

- demographic diversity has the potential to create higher levels of relationship conflict in distributed work teams when compared to traditional teams

- distributed teams with more informational diversity (attributes such as work experience, education, functional background, etc) will have more potential for creative and high quality decisions, but make take longer than more homogenous teams to resolve conflict, reach agreement and implement those decisions

- Distributed teams that have enacted swift trust will be more willing to interpret conflict as task based rather than relationship oriented. As such, conflict will be beneficial, improving both team process and performance

- strong team culture, fostering open conflict norms, will enhance the ability of distributed team members to interpret conflict as task based, improving team process and performance

- distributed teams are more likely to have difficulty in developing transactive memory than groups where members work together

- transactive memory is a precursor to team potency, increasing the ability of team members to see how each might contribute to accomplish the task. Distributed

teams that achieve team potency will more easily engage in task conflict, increasing their level of performance

- distributed teams that develop psychological safety are more likely to experience team potency than those teams who do not. In general, teams that develop psychological safety and a sense of the team's potency are likely to increase the distribution and discussion of relevant information, thus facilitating task conflict and avoiding relationship conflict

11. Managerial Implications

Various elements in virtual teams need to be managed including trust, cultural difference, identity, information flow, and technology. Early literature in this area concentrated on the technology employed, though it is now generally accepted that managing a successful virtual team involves the consideration of the additional issues. Managers should be prudent in their selection of staff and strive to develop team processes, relationships and reward systems. However, there are areas in which virtual teams require a unique set of individual and organisational competencies in order to promote their effectiveness.

There are three clear differences between traditional and virtual teams which impact on managerial strategy:

1. Organisational structure

Virtual teams often enjoy a flatter organisational structure than traditional teams [12; 32]. While there may still be a hierarchy for formal purposes, functionally, people will work in clusters of empowered teams rather than the traditional pyramid structure. "Individuals no longer take decisions from a job description or a supervisor. Signals now come from the changing demands of the project and the team." [32, p. 372]. Kling suggests that communication technologies serve to "reduce the barriers of communication between people at different levels of hierarchies." [15, p. 283]

In a virtual team, all members must share the accountability and responsibility for achieving team objectives. This includes investment in the team's leadership and performance. Jude-York *et al* count this in their top four key ingredients for virtual teams and state that, "virtual teams need *all* members paying attention to team processes, as well as completing team tasks." [12, p. 28] Because of this, leading a virtual team is different to leading a traditional team in that it is less to do with direction and more concerned with facilitation, coaching and consultation [10, 12, 19, 32, 33]. The leader's role is far from static and will alter according to the demands of both the team and the project.

2. Active communication

Jude-York *et al* summarise this nicely; "Virtual team members must learn to excel as active communicators [12, p. 37]. Their survival depends on an ability to exchange critical information despite the challenges of time and place." This necessitates virtual team members being particularly aware of both their own communication styles and also those of others. They must anticipate the needs of other team members. This might involve checking that a sent mail has been received and understood and generally going the "extra mile to help each other by sharing information, adjusting to time zone challenges, working extra hard to build rapport and establishing clear communication practices" [12, p. 33].

3. Building team relationships

As opportunities for casual communication are few, not only does formal communication need to be made official but also casual communication needs to be strategic. At the very least, individuals should enjoy sufficient harmony to be able to work together, but the aim is to facilitate co-ordination, trust, information exchange and increased task performance. Research by Warkentin and Beranek, Warkentin et al, and Lau et al, as cited in Pauleen and Yoong, has demonstrated the existence of a link between team member relationships and team effectiveness [10, p. 191].

12. The role of the leader(s)

Kimball has devised a matrix (see Table 2) for a leader's roles in the communication practices of the virtual team [34].

	Autonomously	Interdependently
Emerging	LOOKOUT	FACILITATOR
Static	DEFENDER	MANAGER

Table 2. Matrix of Leader(s) roles in Virtual Teams

As a Defender, the leader's role is to act as a buffer between the team and the rest of the organisation. The Manager role calls for classic management techniques for coordination. As Lookout, a leader will act as a 'helicopter', scanning the horizon for indication of problems or change. As a Facilitator, a leader will collaborate and engage with the team to maximise performance.

Leading a virtual team, therefore, is a role, which may necessitate a spectrum of skills at varying times. However, there are certain preparations, which can be made when developing and implementing virtual teams, which may help to ensure firm foundations. Cantu outlines six such areas, which are discussed below [35]. While the headings themselves are hers, the points within are taken from various papers, as indicated. The four roles noted by Kimball [34] above can be traced throughout the six phases as the team develops.

13. Six areas of virtual team management

13.1 Organisational Design

"Organizational design refers to the overall direction teams will take, the structure of how they are configured, and the systems that support them." [35]

- Design a team with attention to the purpose requirements of team roles.

- Create an infrastructure, which is mindful and supportive of the concept of virtual teams and wary of the potential barriers. For example, make efforts to overcome the mental hurdle of the lack of a physical work site.

- Define the business goals of the wider organisation, within which the team will operate

- Keep ties with the larger organisation clear to allow two-way communication and be sure to keep the parent organisation informed of the virtual team's progress and activities.

- Identify all potential resources

- Outline channels for maintenance and support

13.2 Job Design

"Job design is a profile of what team members are expected to do in their "no walls" world of the virtual team." [35]

- Roles and job descriptions within the team need to be as tangible as possible. Lurey and Riasinghari [19, p. 19] agree that it is vital that "the individual team members' roles… be explicit and not simply assumed."

- Individuals must be made aware of the challenges of being part of a virtual team. This links with the point above in that job descriptions need to include anticipated negative, as well as positive, aspects.

- Design job accountability to clarify the input of individuals and, likewise, the boundaries of their involvement.

- Decision-making authority should be given to the team to enable them to make more timely decisions.

- Compensation issues, often a delicate matter, become more pertinent in virtual teams as involvement and responsibility vary. These need to be carefully planned.

- Employee feedback and recognition processes need to be formalised so that they do not become marginalized.

13.3 Team Design

As mentioned above, accountability and responsibility is often shared, meaning that no one person has control over these points below.

- Build the team around the purpose to allow the inclusion of experts.

- Create an identity for the team.

- Create a statement of purpose and agree to maintain (and focus) on a clear understanding of missions, aims objectives and expectations.

- Name clear, measurable goals. Identify 'milestones' to acknowledge progress.

- Develop strategic human resource policies to recognise and reward 'small wins' and interim goal achievement. When the occasion calls for celebrating, strive to involve all team members.

- Promote ongoing training and education to develop management and decision-making skills within the team.

- Make connections – ensure that team members are aware of each other and have the resources available for them to communicate. This should include facilities for storing and retrieving team knowledge to enable scheduling, planning and synchronisation.

- Allow, support and encourage connectivity between team members. Continually strive to improve team relationships including the development of trust.

13.4 Coordination of work through technology

Virtual teams must harness communication technology to support their teamwork. Aside from focusing on the technologies themselves, this will involve issues such as selection, training, group commitment, personal preferences, and intelligent handling skills.

13.5 Design of interaction with stakeholders

Efforts should be made to maintain links with the wider or host organisation. This could perhaps be done best through a designated team member.

13.6 Virtual team re-entry

Re-entry requires planning from both sides:

a. From the organisation to allow capture and utilisation of g knowledge and skills.

b. From the virtual team member to allow documentation of lessons learned and accreditation for contributions to the completed assignment.

As virtual teams are often formed on an *ad hoc* basis, there are often insufficient resources to invest in their planning. As Pauleen and Yoong highlight, this is certainly illustrated by the lack of formal company or human resource policies on virtual teams [10, p. 191]. We argue that the planning phase is crucial if a team is to learn, improve it's functioning and sustain itself over time. This is one of the three measures of effectiveness as laid out by Lurey and Riasinghari [19].

14. Conclusions

There remain areas, which are in need of further exploration. The role of technology has been well documented, but the emphasis has been placed on the capabilities of the media alone. As Lurey and Raisinghani write, "The interesting question for a technologist… is would a good team perform better if it had better technology?" [19, p. 21]. Although attention needs to be paid to the development of technologies to enable virtual teamwork, we must first discover what "better technology" might mean. Whereas the first virtual teams may have used whatever resources were available to them, technology now needs to be designed with specific communication needs in mind [19].

Many authors claim that electronic communication can break down hierarchical barriers and increase vertical and horizontal communication in an organisation. Further investigation in this area would complement that already undertaken and would be of value to the topic as a whole. Another area, which would benefit from further research, is

the convergence of cultural factors and technology, as Yavas and Yasin have argued [36, p.12].

Another issue is that of interpretation of time. Korac-Kakabadse *et al* argue for use of what they term monochromic (M-time) mode and polychronic (P-time) mode [22]. This has implications for information processing and media use.

There is general agreement that trust is a vital element in the success of virtual teams. Future research should continue to address this topic. Jarvenpaa and Leidner encourage exploration on cultural diversity and trust, environmental circumstances, leadership styles and knowledge management [11].

Finally, the area of leadership and management of virtual teams is worthy of sustained investigation. Studies examining cultural identity and leadership would enhance the body of literature greatly.

Virtual teams pose new questions and present new challenges. There is a need for the careful review of the relevance and applicability of old communication theories, paradigms and models [16, 2, p. 13]. To this end, Lipnack and Stamps have developed a Periodic Table of Organizational Elements, which they put forward as a contribution to what they call "A System Science of Virtual Teams" [1]. Using the elements of Purpose, People, Links and Time, they generate a taxonomy (see Figure 3), which constitutes the basic architecture of a virtual team.
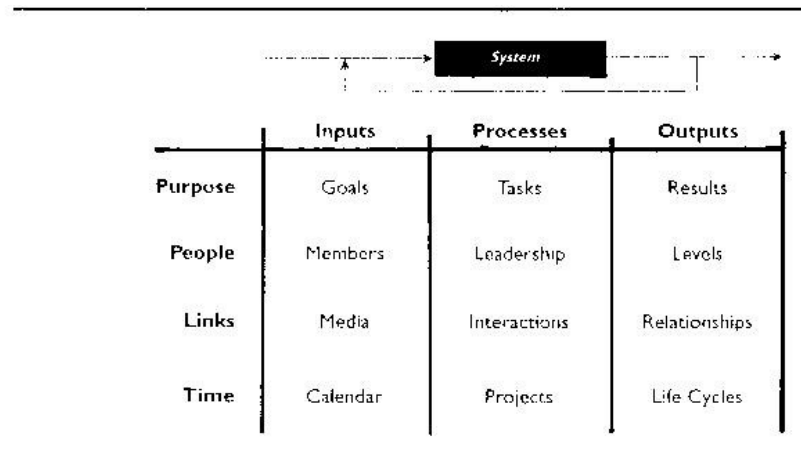
Fig. 3. Periodic Table of Organizational Elements

This brings process to the fore. The Periodic Table is a more scientific representation of codifying a team's mental models, which are readily apparent in the everyday processes of virtual teamwork such as memos, agendas, decision-making and so forth. The act of making these workings explicit is, in essence, the basis of recommendations, which we have listed below:

- Virtual teams should ensure they are well informed of the issues facing them and should not assume that success in traditional teams will translate into the virtual workplace
- Use should be made of the various websites, consultancy services and training material which provide sources of information and guidance
- Team workings should be explicit and shared. Self awareness should be continual
- Policies and practices, for example, with regard to communication strategies, should be developed and adjusted throughout the virtual team's life span
- Team training and support should be ongoing in a continued effort to strive for excellence.

Much of the research still asserts the usefulness of face-to-face contact and encourages this wherever possible. This seems rather pointless when many teams are (and have, for

a long time, been) conducting purely virtual business. The success of virtual teams does not threaten the existence or hail the end for traditional, co-located teams. Kimble *et al* warn us that utopian views of the 'end of geography' are often based on limited empirical evidence or naive futuristic predictions about the potential impacts of technology [2]. These claims include Pauleen and Yoong's comment that virtual teams will form the nuclei of twenty-first century organisations [10] and Meyer's claim that they will soon be seen as "an elite sector within the traditional work force…a positive place that employees strive to join" [7, p. 12]. We believe that the parallel existence of co-located and virtual teams is the most likely scenario for the immediate future.

15. Note added in proof

A well-known characteristic of the Web is the transient nature of some URLs. Unfortunately, some articles cited in this text are no longer available. This applies to references 11, 13 and 31.

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