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Integrated digital communities: combining web-based interaction with text messaging to develop a system for encouraging group communication and competition

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Abstract

Digital communities are often portrayed as operating entirely within the confines of a single technological domain, e.g. a group of people in a web-based chatroom. In this study an integrated approach to digital communities is explored. It is proposed that members of communities employ a range of digital technologies to support their activities and sense of community. This paper describes a study that develops a community using combined text messaging or Short Messaging Service (SMS) with web-based interaction. An application based on this specification is built in order to develop and support a digital community based around the 2002 World Cup. Participants interacted with the system during the soccer tournament, chatting with other members and taking part in competitions. They successfully integrated SMS with the website. Participants reported feeling like a cohesive group and showed increased interest in soccer and the World Cup.
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1. Introduction

A digital community can be thought of as a group of people engaging with a community that exists within the confines of a technological domain, e.g. the web. These digital or

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online communities have developed within the online environment and use this medium as their primary form of group interaction. However, in addition to the primary medium, e.g. the web, it is proposed that members of digital communities use various technologies in support of their communication and interaction needs. In initial work, we found that web-based community members would often make use of email, telephones or written correspondence to keep in touch, or would make reference to gathering information from books, films, television, radio broadcasts, etc. In other words, these 'other' technologies are integrated into the activity of the 'web-based' community.

The notion of an integrated digital community is explored within this paper. A study of the effect of combining two popular technologies, Short Message System (SMS) and the World Wide Web, is presented. These technologies were selected simply on the basis of their prevalence as communication media for young people. The combination of the technologies is examined through a study that explored the development of a digital community. The specific questions to be addressed are, what part do the different technologies, both separately and in combination, play in shaping the group's interactions and the development of the members' sense of community?

This study aims to see if a community, with a specific focus on the 2002 Soccer World Cup, can be developed and supported for the duration of the tournament using a combination of SMS and web based interaction. It is recognised that such a focussed topic might not reflect *all* types of digital community, but we feel that it could capture many aspects of the 'fan-based' communities that spring up around books, films and sports. Furthermore, it is proposed that the findings can be applied to the development of integrated digital communities in the future. In order to develop such a community, the study recruited participants that were not all obvious soccer fans, or even particularly interested in soccer; one potential measure of success would, therefore, be whether the disinterested participants would become more interested in the focus, i.e. soccer. It is suggested that to follow all the action within such a major sporting event naturally requires multiple technology use and media integration. This is especially so given that the 2002 World Cup took place in Japan and South Korea. Thus, in addition to the technologies that had been deliberately integrated into the system, i.e. web and SMS, it was anticipated that participants would also make use of television, radio, newspapers and other media. The paper begins by outlining the ideas behind digital communities and then describes existing SMS and Instant Messaging (IM) applications before presenting a specification for an SMS-web application.

2. Digital communities

Within the social sciences, there is little agreement upon the definition of the term 'community'. Changes in its usage over the last few centuries reflect differences in terms of who is using it, when they are doing so and what their purpose is.

Hamman (1998) presents a definition of community that allows both physical and digital communities to be characterised. A community refers to (1) a group of people who, (2) share social interaction and (3) some common ties between themselves and the other members of the group and who, (4) share an area for at least some of the time.

Numerous detailed studies have shown that groups of people online can form and sustain social groupings which meet this definition of community. In online communities, members share an online area for at least some of the time (Rheingold, 1993; Baym, 1998; Preece and Ghozati, 1998). Indeed, one aspect of developing digital communities is to provide members with a shared online area in which to congregate and share ideas, opinions, etc.

Whilst provision of an online area for communication is an important component of digital communities, many studies of these communities have highlighted the importance that community members place on physical meetings (Ito et al., 1999). Indeed, communities and relationships that began online can successfully encompass offline communications as well (Parks and Floyd, 1996) and other technology, such as the telephone, become important in maintaining relationships (Wellman, 1996). Such studies indicate a blurring of the boundaries between off- and online communities, as well as emphasising the integration of media within digital communities.

It is common to find that one medium is used to arrange subsequent interactions via another medium. One example where this occurs is with the use of IM. IM is often studied within work settings (Nardi et al., 2000; Issacs et al., 2002) but in a study of IM in teen life, Grinter and Palen (2002) showed that IM sessions between friends are often arranged via email or face-to-face at school. IM provides a way of conversing with friends outside of the times and places that socialising is traditionally permitted (Grinter and Palen, 2002). With the promise of cheaper broadband Internet access in the UK, applications such as IM are likely to become more attractive to the home user. In Europe, mobile phones and SMS are used in a similar way to IM in that they are used to create additional opportunities to socialise. Studies of SMS use have shown that, as with IM, most SMS partners are well known to each other, (Ling and Yttri, 1999; Longmate and Baber, 2002a; Longmate et al., 2001; Carroll et al., 2001). SMS use appears to be based on an existing relationship and text messaging may not be an appropriate way of making first contact with someone (Benson, 2000). Studies of SMS use have focused upon friendship groups and in particular one-to-one interactions. Section 3 focuses on SMS and describes a specification for a SMS-web based system that could be used to support a digital community.

3. SMS interaction

As of February 2002 some 73% of adults in the UK own (or have access to) a mobile phone. This figure rises to 89% for 15–24 year olds (Oftel, 2002). In the UK and Europe, the capability of mobile telephones to transmit and receive text messages continues to attract attention. Text messaging or Short Messaging Service (SMS) is particularly popular amongst young people (Ling and Yttri, 1999). It allows the exchange of short messages up to 160 characters in length between mobile telephones. Messages are typed using the numeric keys, e.g. the numeric '2' key can be used to type 'A, B, C' (depending on whether you press the key one, two or three times), the '3' key can type 'D, E, F', etc. A limited number of messages can be stored on the phone but there is no provision for message threading. Despite the restrictions in length and the awkwardness of input, SMS is used for a range of communication purposes. People use SMS to plan events, to send short

pieces of information and reminders. Text messaging allows people to alter plans spontaneously (Ling and Ytrri, 1999) and to coordinate other forms of communication, e.g. sending a SMS message to propose a subsequent telephone call or email (Eldridge and Grinter, 2001). SMS is also used to convey social or emotional content. Mobile phone use and SMS in particular is becoming more expressive and social in character (Ling and Ytrri, 1999; Kopomaa, 2000). SMS messages can act as a reaffirmation of group membership (Eldridge and Grinter, 2001; Kopomaa, 2000; Wakeford and Kotamraju, 2002) and can support both existing and developing co-located communities (Longmate and Baber, 2002a; Longmate et al., 2001).

3.1. Extending the use of SMS

As noted above, the majority of SMS studies have focused on its use within existing relationships. More recently, however, SMS has been used in different ways. These include new ways of disseminating information to customers (Orange alerts), encouraging people to look at a main information source (Knowsley Council), making new friends on a one-to-one basis (Upoc and itextu) and encouraging collaboration through another medium (teletext). These new ways of using SMS, in particular using SMS with other media, suggest different methods for supporting the development of interest-based groups. These new uses of SMS are of two kinds. The first deals with one-way only broadcast messages in the form of alerts. The second is concerned with sending as well as receiving SMS messages and introduces group based SMS chat and the idea of integrating SMS with other media.

3.1.1. Simple alerts

Commercial alert systems are subscription services that broadcast information to subscribers. The major mobile phone networks offer alerts services that are tailored to customers' interests and cover news, sports and weather. Other companies such as Tiscali (http://tiscali.sms.football365.com) send out soccer alerts. These include details of goals scored, team line-ups and league table updates. Educational alert systems are also being pioneered. Garner et al. (2001) used SMS to send out three types of information to 67 1st year psychology students over a four-month period. Eight messages were sent out consisting of (a) course information, e.g. exam dates, (b) emergency information, e.g. cancelled lecture and (c) prompt information, e.g. please collect coursework. The alerts were favourably received by students, and felt to be convenient, immediate and personal.

3.1.2. Integrated alerts

Integrated alert systems function to direct the user's attention to the main source of information, often a website. The system alerts users to changes and updates on the website. The online hitch hikers guide to the galaxy (www.h2g2.com) is to launch a SMS service, which consists of Don't Panic Alerts'—general tips from the Guide, and 'h2g2 Alerts'—which let you know what's been added to the guide. A more advanced form of the alert exists in the Knowsley Council SMS Soap Opera Project (www.knowitall.org. uk). To relieve the stress of GCSE (General Certificate for Secondary Education:

examinations taken by 16 year olds in the England and Wales) revision, subscribers can keep up with the adventures of three teenagers—Kym, Jez and Abi. Every day on of the characters sends a message which goes to all the subscribers. Each of the characters has an online diary to supplement the messages, which is a way of getting youngsters to use the website and—it is hoped—to read the serious revision advice webpages.

3.1.3. Group based chat using SMS

A number of new SMS services allow interaction between strangers or between existing groups of friends. SMS based chat rooms, e.g. www.itextu.com allow users to navigate various interest-based rooms via SMS commands and to send messages to other SMS users registered in those chat rooms. The associated website allows users to see which rooms are occupied and to read the profile of potential new friends. Although usernames publicly indicate presence in the chat rooms, the system is based around one-to-one, private communication and SMS messages cannot be seen by anyone else. More group-based communication can be achieved using Upoc (www.upoc.com). People can register groups on the website and then use the service to send out broadcast text messages to the whole group. Existing groups can be registered or an individual can start up a new group and invite like-minded people to join.

3.1.4. Group based SMS-TV chat

SMS-TV chat also allows communication between groups of people rather than one-to-one chat. It is a popular system in Germany and Scandinavia and involves subscribers sending SMS messages to a central phone number. These messages are then displayed on the television via teletext pages. The listing of messages is divided into areas of common interest such as motor racing or soccer and a monitoring team is present to ensure that all users stick to the rules of Chatiquette. In the UK similar systems have been used for specific television programs. Messages airing opinions about the programs can be sent via SMS and appear on a teletext page after the show has finished. Another SMS TV system is being developed in the UK. It allows friends to send each other text a message via the television and it is hoped will exploit those 'did you see that?' moments (Marks, 2002).

3.2. Specification for SMS-web based interaction

The review of SMS applications has shown that, at least so far, combining SMS with other media has made a range of interaction possible. However, interactions are limited by number of participants, the direction of messages and the presence of either chat or information but not both. This study proposes that combining SMS with a website may extend interaction between participants and furthermore to the development of a cohesive group of members. Previous attempts to link SMS with a website (as described in Section 3.2) have used the website as an area to display information rather than an area for group interaction, and the role of SMS is either to direct people to the website or to allow messages to be sent to other readers of the site via telephones. Systems that have incorporated chat, have failed to provide users with any other incentives to view the messages and become involved in the group. SMS-web based interaction needs to include the following features:

- Utilising SMS as a mobile technology, provide a simple way of sending SMS messages to the website.
- A website containing an archive of chat messages, with threading.
- The website would contain additional information and resources which can be constantly updated. This provides another incentive to view the website.
- The group need to be able to send messages to the website as well as being able to receive messages from the website.

Combining SMS with a website allows an archive of SMS messages to be stored and presented to the group members. The group can see a transcript of their collective messages, see when they were sent and by whom. They can follow group discussions and direct messages to the whole group as well as replying to individual messages using the threading facility. The website also provides a group wide accessible area for displaying additional information and resources regarding the topic of interest. Additional information on the website gives members another reason to view the website and engage with the group. SMS itself allows messages to be sent anytime from any location. It can be used as a broadcast medium for delivering ideas and information to the rest of the group. A SMS-web based system could also deliver SMS messages from the system to the group and if required could relay on individual members' messages to the rest of the group. Sending out SMS messages is useful when a quick response is required (Ling and Yttri, 1999; Longmate and Baber, 2002a).

This specification for SMS-web based interaction should allow the development of a common interest-based group. The conditions necessary for the development of such groups are discussed below along with a brief description of the aim of this study in terms of developing a community of soccer fans.

4. The application—the 2002 World Cup

The overall aim of this project was to see how a SMS-web based interaction system could be used to support and generate discussion around the topic of the 2002 World Cup. As a topic for discussion a soccer tournament has a definite beginning and end. Specific events such as this have been used before to create a compressed version of an online community (Boettcher, 1997). Also, the World Cup provides an opportunity to host simple competitions. In our study, group members will be allocated teams to follow in order to enter these 'fantasy sport' competitions. Fantasy sports are very popular and exist for a number of sports. In the UK, soccer in particular is a favourite fantasy sport. Sites such as the BBC's Fantasy Football Monthly (http://bbcfootball. fantasyleague.co.uk) allow users to create fantasy teams according to a set of rules governing player selection, team formation and transfers. The user's fantasy team then 'score' points for the user through player appearance, goals and clean record sheets in the real life soccer league games. Some servers provide one-way broadcast messages or 'alerts' pertaining to fantasy teams (see for example CBS Sportsline.com http://cbs.sportsline.com/u/wireless).

In this study it is hoped that through group discussion and through the competitions, members will report increased interest and knowledge in the World Cup and in addition, will grow to become a cohesive group.

4.1. Conditions needed to create online groups

Despite the increasing use of the web as a way of maintaining relations between like-minded people, there is growing recognition that online groups are unlikely to develop unaided. There have been numerous attempts at defining a set of steps that must be taken to build a successful online community. For example, Palloff and Pratt (1999) state that the group must have a clearly defined purpose and must have a distinctive gathering place. The group must also allow for a range of member roles and allow members to resolve their own disputes. Going beyond these general guidelines, some researchers have highlighted the importance of specific design decisions regarding online communities. Preece (2000) suggests that designer decisions regarding usability (i.e. the human–computer interaction) and sociability (i.e. the social interaction between group members) affect the character and to some extent the success of online communities. Usability issues are important in terms of online communities where designers create websites intended to foster social interaction. Threading, for example, encourages more interactive discussions (Longmate and Baber, 2002b). Sociability refers to the *people*, the *purpose* and the *policies* of the community. Designers must think about the potential members of the community. Will these people be young or old? Will they be experienced web users or novices? The purpose of a community can involve any or all of the following high-level tasks exchanging information, providing support, enabling people to chat and socialise informally and discussing ideas (Preece, 2000). It is hoped that the members of the World Cup group will come together to exchange information, discuss ideas and to socialise. The policies of the community concern issues such as registration and membership, security, privacy, moderation and free speech. Decisions about who is taking part, why they are taking part and how they should take part all affect usability issues concerning the design of the online community.

4.2. Factors affecting interaction

In fan-based groups, the discussion is very susceptible to the influence of events and activities associated with the shared interest. Activity within such groups is also affected by the introduction of new features or items such as new topics for discussion, short quizzes and votes (Malhotra et al., 1997; Harrington and Bielby, 1995; Rheingold, 1993). Some design guidelines have failed to recognise the strength of member adaptation within developing communities. In many cases members have adapted the technology and the community rules to meet their own needs. This has included developing special codes and norms, moving the focus of discussion away from the prescribed topic and integrating the online environment with other media (Longmate and Baber, 2002a; Baym, 1998).

5. Aims and objectives of the study

The overall aim of this project is to see how a SMS-web based system can be used to support and generate discussion around the topic of the World Cup. The study addresses a number of specific research questions:

- Can a cohesive group be developed using the SMS-web system?
- Can increased interest in the topic of soccer and the World Cup be generated?
- What is the impact of the facilitator on involvement and discussion?
- What are the similarities and differences in how the two elements of the interaction system are used?

In addition a number of predictions are made concerning interaction behaviour, message content and group perceptions.

1. Activity within the group will be affected by the stage of the World Cup
2. People are more likely to reply to a SMS message, relayed message or alert
3. Threading will make messages posted after reading the website more interactive
4. Interest in soccer and the World Cup will increase over time
5. Cohesion and sense of belonging will increase over time

6. Method

6.1. Overview

The study ran over the course of the World Cup 2002 (May 31st to June 30th 2002).

The nature of the World Cup means that external events feeding into the community discussions are constantly changing. Teams get knocked out of the tournament and issues rise and fade. The inherently evolving nature of groups also makes activity subject to change. This change was managed to some extent by using a number of facilitator interventions at set times during the study. The study was run in four blocks, each block consisting of one week. Each weekly block focused on an intervention. The repeated use of questionnaires, for example, was one way of managing the change within the group. Table 1 shows the weekly interventions.

6.2. Participants

Sixteen people took part in the study 10 female and 6 male participants It was felt that, for a study of this nature, maintaining a set of participants for the duration of the study would be important and that the activities required to maintain the group might have proved problematic if we had opted for a much larger group. The participants ranged in age from 18 to 42 and the median age was 25. The participants were chosen on the basis of two requirements. Firstly access to the Internet and ownership of a mobile phone. Secondly, some degree of interest in the World Cup. Background demographics

Table 1
Schedule of interventions over the course of the study

Week block	Focus of week block	Main interventions
1	Open questions, practice	Questions to stimulate discussion, encouragement to practice posting
2	Novice/experts questions	Invitation to experts to explain facts and rules to novices (culminating in a competition judged by a novice member). Encourage novices to ask questions of experts. Questionnaire 1 posted
3	Sharing teams	Allowed members to share teams. Members had to request to join another team, both teams offered double points. Questionnaire 2 posted
4	Relaying messages	SMS messages sent by members relayed to other members of group as well as appearing on website. Questionnaire 3 posted

questionnaire revealed a range of interest and knowledge levels. Participants were not paid for their involvement but two small cash sums were offered as prizes for the competitions.

6.3. Task

Participants had to take part in a SMS World Cup soccer group. The purpose of the group was twofold. The first aim was to engage in discussion about the World Cup. The second aim was to take part in two World Cup competitions. Participants were invited to send SMS messages to a website and to follow the soccer games in order to take part in the competitions which spanned the four weeks of the tournament.

6.4. Procedure

Each participant was assigned two teams to support. The first team was taken from the higher ranks of the competition and the second from the lower ranks. Each participant was identified on the website by the ISO standard codes representing their teams, e.g. BR/ZA (Brazil and South Africa). Each player was also assigned two player numbers. Each combination of player numbers was used twice. Therefore two participants held, for example, the numbers 9 and 17. Participants could make a claim to the wins table every time either of their teams won, lost or drew. Participants gained three points for a win and one point for a draw. Participants could also block the opposing team from earning points by registering their own team's loss first. Participants were encouraged to send at least two chat messages a week to the message board and as many claims to the league table competitions as they wished. To differentiate competition messages from chat messages participants used a pre-determined format for competition messages. Two examples are shown in Fig. 1. Participants were given a membership card detailing their access details and conventions for claiming wins and goals.
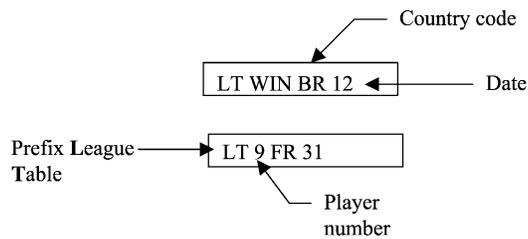
Fig. 1. Format of SMS messages for claiming wins and goals.

6.5. System architecture

There were a number of system requirements including:

- Automatically retrieve and upload messages
- Automatically update competitions
- Authenticate access to website and recording of page requests

6.5.1. Webserving

The webserver (supporting jsp, filters and servlets) was Tomcat (Fig. 2). The Enterprise Java Bean (EJB) server was Jboss, handling the pooling of connections and controlling the bean resources. The Jboss and Tomcat combination eases creation of a scalable authenticated database driven website such as this.
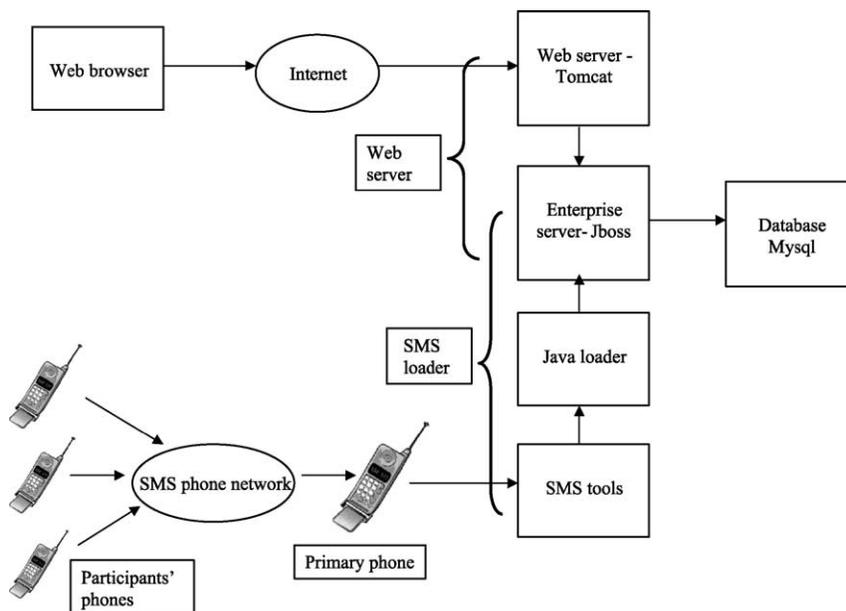

Fig. 2. SMS-web architecture.

6.5.2. Loading of text messages

The 'SMS tools' (Frings, 2002) package was used to send and retrieve the messages from the phone. The retrieved messages were put into a queue and loaded by a java application via an EJB within Jboss.

6.5.3. Website

The website (Fig. 3) consisted of four web pages: a message board, two competition tables, one for the wins competition and one for the goals competitions and a games table. The games table listed all fixtures and results. The website although small and simple was designed and checked according to usability heuristics (Nielsen, 1994) and web specific usability heuristics (Instone, 1997).

6.6. Measures

Measures of community activity were taken in weekly blocks. All activity on the website was logged. Website activity was recorded as the total number of hits to the website. A hit was recorded every time a member viewed a page on the website. All chat messages and claims to the two league tables were recorded. The content of the chat messages was analysed. Following the approach of Preece and Ghozati (1998) each

Fig. 3. Screen shot of the Home page.

message was examined holistically and was classified in one category only in terms of the overall tone of the message. An online questionnaire was posted to the website three times during the study period.

7. Results

One member had to be excluded from the study when unforeseen work commitments meant that she was out of the country for much of the study period. The results from the remaining 15 participants are presented below. The results are divided into three sections. The first reports on interaction activity. This includes website activity, messages and claims to the league tables. The second section contains an analysis of message content. The third section examines the results of the questionnaires.

7.1. Interaction activity

In terms of messaging activity the web-SMS application was deemed a success. In total 317 messages were sent to the website. This included 119 chat messages, 84 claims to wins table and 114 claims to the goals table. In terms of the competitions 58/64 of the matches were claimed for and 40% of the 286 goals were claimed.

The summary data in Table 2 suggests that the stage of the World Cup affected activity on and off the site (i.e. posting behaviour). There was increased activity whilst members' teams were still in the tournament and surrounding all the England matches. There were activity dips between games and reduced activity towards the end of the tournament. Claims to the competitions fell dramatically towards the end of week 3 as the number of matches decreased. During the main portion of the competition, weeks 2 and 3, there was an increase in the hits to the website. The questionnaires issued during these weeks do not seem to have overly influenced hits, accounting for only 6% of the total number of hits to the website.

Table 2
Summary data of activity within the SMS soccer group

	Week 1	Week 2	Week 3	Week 4
Total chat messages	40	29	32	18
Number sending a chat message (out of 15)	10	11	10	8
Total claims to wins table	35	30	12	7
Proportion of matches claimed for	22/23	21/25	10/10	5/6
Number sending a claim to wins (out of those eligible to claim)	13/15	12/15	9/10	5/6
Total claims to goals table	41	52	16	5
Proportion of goals claimed for	41/100	52/128	16/42	5/16
Number sending a claim to goals	12	11	7	2
Total hits to website	336	455	350	232
Average number of hits per day	42	65	50	26

Table 3
Summary of intervention observations

Week	Intervention	Observations
1	Open questions	Members responded to facilitator's questions and started to engage with one another
2	Novice/experts questions	Previous non-posters posted for the first time
		Novice judge became knowledgeable and took more part thereafter
		Other novices approached judge for explanations and discussions
		Disputes following judging of the competition
3	Sharing teams	More one-to-one conversations
4	Relaying messages	All relayed messages answered within five minutes
		Members rated this their favourite intervention

Observations were made with respect to the different facilitator interventions over the four weeks. These are shown in Table 3.

The speed of response and the response rate to a question or comment sent by the facilitator varied depending on whether the message was posted to the message board or was sent via SMS (Table 4). Three direct comparisons between the two media were made. The same question was posted to the website and sent out via SMS simultaneously. Across all three questions more people responded to SMS messages, and more people responded within five minutes of the message being sent. There was also a persistent effect of SMS with some of the questions still being responded to 2 days after they were sent.

7.2. Message analysis

A general overview of the messages revealed that messages were highly informal in style, this may be due to the small and secure nature of the group but could also be due to the nature of the medium; it is difficult to send formal text messages (Longmate et al.,

Table 4
Response times to questions posted simultaneously on the web and via SMS

Question	Number of responses		Time to respond							
	Web	SMS	Web				SMS			
			<5 min	That day	Next day	2 Days	<5 min	That day	Next day	2 Days
1	3	5	1			2	3	2		
2	2	9		1		1	4	2	1	2
3	2	6		1		1	3		3	
Totals	7	20	1	2	0	4	10	4	4	2

Table 5
The number of different types of messages sent to the website

	Content category					
	Opinion	Information	Chant	Running commentary	Personal narrative	Other
Week 1	21	3	12	3	0	1
Week 2	9	10	4	1	1	3
Week 3	10	10	3	1	3	2
Week 4	13	1	2	1	4	2
Totals	53	24	21	6	8	8
% of total messages	44%	20%	18%	5%	7%	7%
Proportion of total threaded messages	18/23	1/23	3/23	0/23	1/23	0/23

2001). A content analysis was performed and a taxonomy of six types of content was developed: opinion, information, chant, running commentary, personal narrative and other. Classification according to the taxonomy produced a high inter-researcher reliability of 93%. The content types are explained in more detail below and the results are shown in Table 5, which shows that the majority of messages were opinion based.

Opinion. Concerns expressing personal opinion or speculation
Information. Message is concerned with asking for or providing information to the group
Chant. Message is like a soccer chant, e.g. come on England
Running commentary. Provides a comment as the match is being watched
Personal narrative. Message is personal and provides brief insight into sender's life
Other. A catch-all category including technical problems

7.3. Questionnaire results

Table 6 shows the results of the questionnaires relating to identity and interest. Three online questionnaires were placed on the website during the study. One questionnaire was posted during week 2, another during week 3 and the final one during week 4. The results from the online questionnaires are compared with the pre-study questionnaire that was administered to the participants prior to the start of the World Cup. The results were analysed using the Wilcoxon Signed ranks test. A sense of social identity and affiliation with the group was measured using Chin et al.'s (1999) perceived cohesion scale. Although cohesion fluctuated over the course of the study the mean summed cohesiveness score across the three assessment points was 30.1. This is moderately high for a group that has never met. By way of comparison, Salisbury et al. (1997) reported a mean summed cohesiveness score of 31.6 in a group of co-located students (who met on a weekly basis) collaborating on a task over a three-week period. The participants in the current study also reported the existence of a moderate sense of community (4 on a scale of 1–7, where 1 is not at all and 7 is to a very great extent). Table 6 also shows how interest in

Table 6
A summary of the means and significant differences between the longitudinal measures at each measurement stage

	Questionnaire			
	Pre-study	1	2	3
Interest in soccer	3.2	3.7*	3.4	3.3
Interest in World Cup	3.8	4.6*	3.9*	3.9
Level of group cohesion	NA	31.1	28.9*	30.3

*Significant difference from previous score at $p < 0.05$ level.

soccer and in the World Cup fluctuated over the course of the study. Interest in the World Cup and in soccer itself did rise significantly between the pre-study questionnaire and the first online questionnaire but then fell again to pre-study levels.

The sense of being part of a group was even more evident towards the end of the tournament when fewer teams were left. There were calls for which team the entire group should be supporting in the finals:

(156) **20:00 28/06** (15th post by **it/tn**)
WE HAVE GOT TO SUPPORT BRAZIL. GERMANY R SUCH AN ORDINARY TEAM.
IT WOULD BE A TRAVESTY IF THEY WON IT.

In the final questionnaire, members reported that they had enjoyed taking part and felt that they had got more out of the World Cup by being involved in the group. Two-thirds (10/15) of the group felt that being in the group had greatly increased their interest in the World Cup. Members had watched more matches involving their assigned teams than they would have done otherwise. Three-quarters of the group (12/15) had watched many more or a few more soccer matches in general because of their participation in the group.

7.4. Summary of main findings

- High levels of cohesion were reported for a technology mediated group.
- Interest in the topic increased (at least initially).
- Involvement with the group was heavily dependent on external activity.
- Threading led to interactive discussions.
- Both components of the system, i.e. web and SMS, were used. Participants integrated the two components well and integrated the system with other media. However, there were differences between the two components in terms of speed of response to messages.
- The facilitator interventions led to interesting and observable events.
- A variety of message types were sent including opinion, chant, information and personal narrative messages.

8. Discussion

This study has developed and demonstrated a SMS and web based interaction system. The main aim of this study was to try and develop a digital community based around the World Cup using SMS in conjunction with a website. The results show that this was achieved to some extent. The mean level of cohesion was quite high and comparable with levels reported in face-to-face groups. All participants thought there was a moderately high sense of community between members.

8.1. Type of community

Although this community only existed for a short period of time, it did possess characteristics present in much more developed and sustained communities. The messages sent to the website showed an understanding of the shared history of the group and a strong sense of social identity. Members produced a lively community discussion and the different levels of interest and expertise in the topic helped promote a range of friendships and interactions.

8.2. Generating interest

Interest in the topic of the World Cup showed an initial increase as the competition got under way. Members reported that their participation in the community had increased the number of matches watched, as well as their enjoyment and engagement with the tournament. In general the system was well liked and well used. Members generated considerable discussion around the topic of the World Cup and actively took part in the competitions (as can be seen in Table 2)

"I have enjoyed the extra interest that the SMS web site gave the world cup. In particular an interest in teams other than the usual European teams that are so often the focus of these events." (Female 19)

Given the finite nature of the study and its topic of interest it is perhaps not surprising that interest did not continue to grow over the four-week period. Participants were most interested when they had a stake in the competition, i.e. whilst both of their teams were still in the competition. Interest in each other, however, continued to grow over the course of the study. Although the system was only intended to last as long as the World Cup, several members were still keen to post messages after the end of the tournament. During the last week, with the competitions already decided and very few games left to play, chat messages continued at a reasonable rate.

8.3. Nature of discussions and facilitator interventions

The messages sent to the website reflected an interest in both the assigned teams and the tournament as a whole. Chant type messages were specifically related to assigned teams whilst opinion messages related to all aspects of the tournament. As the tournament

progressed (and more teams were knocked out), the incidence of chant messages decreased, but people were able to critically discuss the merits of certain matches and players, and began to spot like-minded people or the opposite and responded accordingly.

Observations regarding interventions were made during the study. The prompting questions posted by the facilitator during week 1 were useful in getting the members to start posting messages. Although supplying new and interesting information is important, the community members themselves need to be the ones generating the discussion. In the second week members were encouraged to interact with each other through novice and expert questions. Members were invited to submit their own explanation of the 'offside rule'. The best explanation as judged by the novice member won a few extra points. The offside competition facilitated discussion for many members, as well as providing a role within the community for the novice and increased her subsequent participation as she reported in the post study debriefing:

"The judging became an opportunity for me to get involved." (Female 26)

The introduction of team sharing in week 3 encouraged members to communicate directly with each other. During this week there were noticeably more targeted messages in which Members had to manage sharing arrangements. Team sharing increased the sense of closeness between some members, as expressed through their messages of condolence when their teams were eliminated.

(140) **18:39 22/06** (12th post by **es/uy**)
What did the linesman think he was playing at? Sorry jp—out so soon.

The majority of participants commented that they would have liked to have been sent all the SMS messages directly to their mobile phones in addition to having the messages appear on the website. Reasons for this included not wanting to miss out on interesting or controversial discussions, particularly during week 3 in which the teams were allowed to join together to earn more points. Participants noted, however, that the interruptions posed by the continual relaying of messages would not have been acceptable had the group been any larger in size. If they were at their computer when they received a SMS alert, the participants indicated that they would look at the website straight away. Involvement in the study, however, did not appear detrimental to the participants' work and studies.

8.4. System use and integration

The two components of the system were used in different but complimentary ways The SMS medium proved to be a natural way of commenting on soccer matches and expressing opinions regarding players and results. SMS supported short informal messages, which were sent from many different locations, often in direct response to watching a match. The SMS component allowed alerts to be sent out to all the members ensuring that they continued to feel included and involved in the group. SMS also ensured rapid responses from group members. SMS broadcasts proved a faster and more reliable method for obtaining feedback than messages posted on the website. The fact that SMS

elicited more responses may be due to the fact that people feel obliged to respond using this medium. The medium is quite intrusive and can interrupt other activities. As an asynchronous medium, however, it is not vital that an instant response ensues.

The limited length of SMS messages did not appear to restrict members' messages. Members had no difficulty explaining the offside rule in a single SMS and there was just one example of a comment running into two text messages. The majority of messages contained standard, English words and phrases and there was little 'text speak'. Recent research suggests that text speak may not be used as universally as it was once thought (Döring, 2002; Shortis, 2000). The paucity of 'text speak' may relate to the relative lack of member familiarity but may also relate to the fact that Members may have felt it more appropriate to enter their messages as if using a qwerty keyboard because of the fact that their messages appeared on a website.

Whilst the pre-defined SMS formats used to send claims to the system were designed to be intuitive and easy to remember, previous work (Stone and Briggs, 2001) had suggested that people found such formats difficult to use. To minimise difficulties we allowed a number of permutations on the pre-defined format to be recognised by the system. For example, as well as recognising the country code 'BR' it also recognised the lower case 'br' and the word 'Brazil' itself. The administration interface allowed us to check on any errors with the formatted codes. Previous studies had led us to expect that some problems would be encountered. In contrast to the Stone and Briggs study in which they found that only 44.2% of the codes were correctly entered, we found only two mistakes out of the total 198 claims made (99% correct).

The use of the formatted codes for claims led to another interesting element of the system's use, that we had not foreseen. The system was designed to cross-match a participant's mobile phone number with their assigned teams and numbers. In addition claims for a certain match were looked up in the database to ensure that the match in question was actually being held on that day at that time. One participant, however, attempted to cheat the system by trying to predict the outcome of a fixture in which the two teams were quite unevenly matched. She sent in a claim for her team's win before the match had even started. The opposing team had sent in a claim for the loss seconds after the end of the match and so was surprised to see the updated leader board. The opposing team then sent a SMS message to the notice board querying the result. An examination of the administration area revealed the 'cheat', the points were removed and a notice posted on the website reminding participants of the rules.

The website provided two main functions. It provided a communal space for the community. This space included the match fixtures and results and the competition scoreboards. The website also provided a threaded archive of all the groups' messages. In combination with SMS a communal memory of the group was built up. This allowed the group's activities to be played out in front of its members allowing them to become involved in its history. In addition, the members responded well to the notion of group texting. They sent messages directed to the entire group as well as messages directed at specific individuals. Despite the fact that members knew they were sending messages to an automated system they 'texted' as if directly to another person, yet were also able to cope with the notion of formatted SMS messages for the competitions. The group integrated the two components, SMS and the website, very well leading to a community that contained

both spontaneous messages that captured the moment as well as more reflective and in-depth discussion. Finally, the members of the digital community that developed used the system in conjunction with other technologies. These included the radio, television and other websites as sources of information. This is perhaps not surprising given the activity of the community and its relation to real-world events. Members did, however, integrate other communication technologies into their community in order to carry out their activities and strengthen their sense of community.

8.5. Implications for future designs

The study has led to a number of implications regarding the development of future integrated digital communities.

- Fan communities in particular are heavily dependent on external activity. A community topic must provide enough general activity to allow discussion to take place and must be sustained enough to allow time for personal relations to develop.
- 'Community Technology' is used in conjunction with other technologies. These included the radio, television and other websites as sources of information. Members integrated other communication technologies into their community in order to carry out their activities and strengthen their sense of community.
- Utilise the benefits of each medium:

  SMS provides a means of rapid communications from anywhere, in relation to specific events, and for receiving 'community alerts' to enhance membership and ensured rapid response from members, i.e. SMS broadcasts proved a faster and more reliable method for obtaining feedback than messages posted on the website.

  The website provided a communal space for the community. The website also provided a threaded archive of all the groups' messages. Members responded well to the notion of group texting. They sent messages directed to the entire group as well as messages directed at specific individuals.
- Media integration can be improved in a number of ways. Directly linking together the media components of the system, for example, by using SMS alerts to encourage people to look at the website, is one way. Alerts remind people that they are part of the group, whilst viewing the website allows people to engage in the history of the group.

  Including links on the website to other media sources also aids integration. Designers can incorporate their own links as well as recommendations from the members themselves. Additional media sources such as radio, television and teletext enrich the members' posts and provide them with more shared, common experiences.

9. Conclusions

SMS has already proved a popular medium for one-to-one communication between friends. In this study text messaging has been successfully combined with a website using the soccer 2002 World Cup as a focus. Members of the SMS soccer group combined

the two components to discuss soccer and the World Cup and to take part in two competitions. Involvement and engagement in the tournament increased and members reported moderately high levels of cohesion. There were no problems associated with the concept of group texting. Combining the features of SMS with other technologies in this way has enabled the formation of a digital group within a limited time span.

Acknowledgements

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