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Abstract

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Keywords

QDAS, CAQDAS, Propagation of QDAS, Social Networks, Invisible Colleges, Interactive Technologies, History of QDAS, Qualitative Data Analysis, Diffusion of Innovations

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The History of the Development and Propagation of QDA Software

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In the 1980s researchers began to develop software for the analysis of qualitative data. Since then such computer packages have transformed the nature and practice of qualitative research. This paper identifies and examines the processes that led to the development of a QDAS community from the perspective of social worlds theory. Based on interviews with developers and propagators of qualitative data analysis software (QDAS), this paper discusses its history and development, illustrating how a community emerged from the intersection of two social worlds, the computing world and the social science world. It shows use of QDAS spread to the wider social science community via informal and formal social networks, and the ways in which the simultaneous development of communications technologies enabled its further expansion.
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Introduction

Over the last 30 years qualitative data analysis software (QDAS) has impacted the nature and practice of qualitative research. Computers have often been treated with caution by qualitative researchers and, initially, programs for analysing qualitative data were met with some scepticism (Fielding & Lee, 1998). Yet, despite this concern, researchers saw the potential of using emerging computer technologies to support the analysis of qualitative data, and, for a number of interrelated reasons, began to embark upon the arduous task of software development. To explore this history and development, interviews were carried out with QDAS developers and propagators[1] who were involved from its early days of innovation to its commercialisation in the 1990s and its subsequent diffusion as internet technologies came of age. To date, little empirical work has been carried out to better understand the development of the QDAS community. Previous research has been carried out on users (e.g., Fielding & Lee, 1998; Mangabeira, Lee, & Fielding, 2004), but none has looked at the history and development of QDAS, particularly from the developer perspective and "early adopter" perspective. This paper will first provide a brief literature review on the concepts of social networks, diffusion of innovations and invisible colleges, followed by a description of the methods used to gather this historical account, and will conclude with a discussion of how two social worlds intersected to form today's QDAS community.

Review of the Literature

A "scientific community" is one in which scholars develop a shared paradigm to guide research and within which findings can be interpreted (Kuhn, 1962). Each scientific community produces knowledge as a result of its activities, which must then be diffused in order for the field to grow. Rogers (1995) in his *Diffusion of Innovation Theory* identified four main

[1] Propagator is defined as a distributor of software and knowledge about the software.

elements in this process: the innovation itself, the communication-channels involved, time and the social system. An *innovation* is an idea, practice, or object that is perceived as new. Information about the innovation is exchanged through the *communication channels,* or social networks. The process occurs over *time* and involves five steps; knowledge, persuasion, implementation, confirmation and adoption. The diffusion of an innovation can be affected by the structure and norms of a *social system*, and by the roles of opinion leaders and change agents, as well as the consequences of the innovation.

The rate of adoption of an innovation in a community is one indicator of how diffusion occurs – once a large number of individuals accept the innovation, the rate of adoption increases. Of the five adopter categories identified by Rogers ("innovators," "early adopters," "early majority," "late majority" and "laggards"), early adopters are relatively few in number. It is this group that takes the risk of adopting a new idea, product or behaviour before anyone else, whereas the majority of the population are late adopters and most reluctant to adopt a new idea or product, preferring to wait until others have tried it.

Informal social networks play an important role in fostering and sustaining new practices (Murdock, Hartmann, & Gray, 1995), serving as important communication channels. As Berge and Collins (1995) suggest, every field develops and depends on informal networks of colleagues with whom they share ideas and information. These informal networks can be referred to as "invisible colleges" (Crane, 1972, p.35) which can be characterised as "informal communities of scientific specialists" (Price, 1963) working on similar problems (as cited in Hess, 1997, p. 73). For example, an informal network may develop when a set of scholars get used to seeing each other at conferences and develop the habit of discussing each other's work and perhaps collaborating (Koku, Nazer, & Wellman, 2000).

Social networks and the impact of technological change and diffusion can provide insights around how the QDAS community has developed. In order to study this development, a *social worlds perspective* was adopted. According to Strauss (1991) in order to study a social world, the history of that world, its origins, and the changes it has undergone, as well as where it is headed, all need to be examined. Academic disciplines, specialties and research traditions are social worlds, making this an effective framework for studying the QDAS community.

Methodology

This study was carried out using a grounded theory approach (Strauss & Corbin, 1998). Social worlds framework has long been associated with grounded theory and constitutes a "theory/methods" package rooted in symbolic interactionism (Clarke & Star, 2008). Twenty in-depth, open-ended interviews were conducted with developers and propagators from the full range of countries in which software had been developed (see Table 1, column 3). Developers who had been around since the beginning of QDAS development and were still active in the field were interviewed. Interviews ranged from 45 minutes to over three hours. The aim of the interviews was to obtain first-hand accounts of the history and development of QDAS. The first two interviews were transcribed and analysed in MAXQDA to identify broad themes which then informed questions in subsequent interviews. Codes from each iteration of interviewing were compared with the previous to further explore and identify recurring themes, consistent with grounded theory methods. Data collection, analysis and writing continued until "theoretical saturation" was reached (Strauss & Corbin, 1998).

In what follows, excerpts from the interviews are labelled with a letter and a number. The letter indicates whether the interviewee was a developer (D) or a propagator (P) and the number refers to a particular individual in the sample. The next section discusses the processes that led to the initial development of QDAS.

Initial Development of QDAS: The intersection of social worlds

Figure 1 shows a timeline of CAQDAS[2] development through the mid-1990s. This timeframe was selected because it shows when QDAS initially emerged as well as key stages in its development.

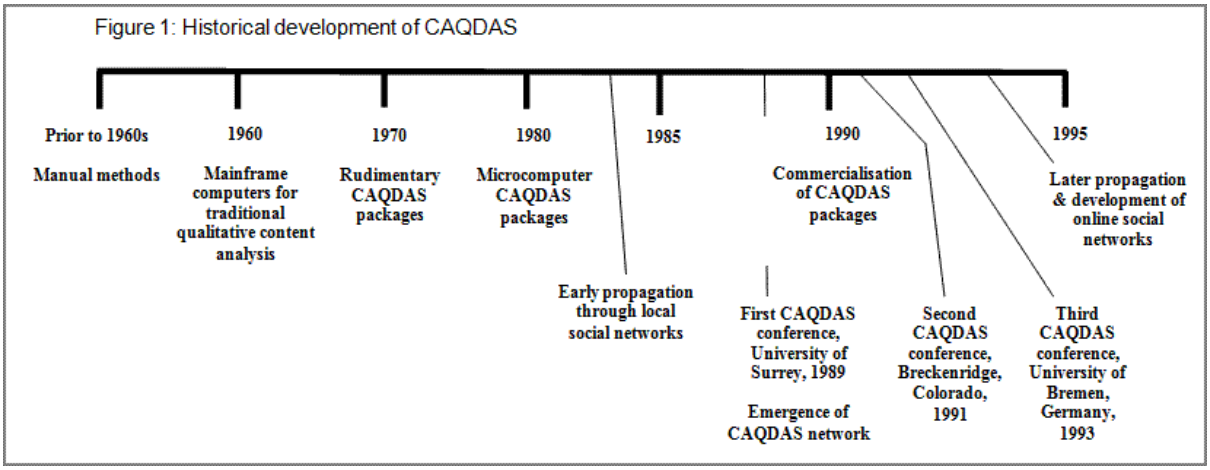

Figure 1. Historical development of CAQDAS

Prior to the 1960s, qualitative researchers tended to rely on manual methods to analyse their data. Many researchers developed their own techniques to support analysis such as using coloured pens and literal "cut and paste" methods in order to code data relating to each category in a separate file folder (Taylor & Bogdan, 1984, as cited in Kelle, 1997). As reported by Lee and Fielding (1993), biblical scholars dealing with very large bodies of textual material showed an interest in the usage of computers with non-numeric data (e.g., see Busa, 1980; Choueka, 1980; Moreton, 1980, cited in Lee & Fielding, 1993). When mainframe computers appeared in the 1960s, researchers interested in traditional quantitative content analysis (Fielding & Lee, 1998) began using them. In 1963, the first dedicated content analysis program was developed called *The General Inquirer* (Stone, Dunphy, Smith, & Ogilvie, 1966), which ran on a large mainframe computer.

During the 1970s, as computer technologies were advancing and becoming more affordable, rudimentary QDAS packages were beginning to emerge through experimentation by qualitative researchers. According to Fielding and Lee (1998) these experimentations involved crafting do-it-yourself approaches using word processors and text retrievers. As explained by one QDAS developer:

> From the very beginning I had always used computers, and I'd never been trained in software, I just developed the skills, because in the early computers I had, there wasn't any word-processing software. So I learnt how to program and I wrote a little word processing program and that's how I got to start writing software. (D3)

These do-it-yourself approaches led to the realisation of the options and feasibility of computer support for qualitative research. The initial development of QDAS was predominantly for

[2] QDAS and CAQDAS (*Computer Assisted* Qualitative Data Analysis Software) are terms both used in the field to describe qualitative data analysis software

practical reasons. The majority of those interviewed said that they thought that there had to be a more efficient way of analysing data than by using manual methods. One propagator explains:

> It was always in the back of my mind, this idea, that if there was a better way of doing it, I would want to know about it. (P1)

However, it was not until further technological developments, such as disk operating systems (DOS) which replaced tape-based systems, and the diffusion of microcomputers in the early 1980s, that qualitative computing was able to emerge in a serious way (Fielding & Lee, 1993). The release of Windows influenced further development of existing packages, as the operating system used a graphical interface which made the software user-friendly. One developer explained:

> Changes in technology have certainly played a role in development; back in DOS, it was a whole different ball game, you had to number the lines, have hard returns and all kinds of things. It makes a huge difference having Windows, which is pretty well established and has lots of interface. (D6)

It was at this time that the pace of development picked up and a number of dedicated qualitative computer packages appeared. Table 1 is a partial timeline of QDAS package development. For some programs, development stopped after the initial stages.

Table 1 *A partial timeline of QDAS Packages*

Software	**Date**	**Developer(s)**	**Country**	**Operating System**
LISPQUAL (no longer available)	Est. 1980	Kriss A. Drass	USA	Mainframe
Intext (no longer available) TextQuest TextQuest 4.2	1980 1987 1989 1999 2005 2013	Harald Klein	Germany	Mainframe PC – MS DOS Commercial release Windows
Code-A-Text CI-SAID No longer developing, however programs are still being maintained	c.1980 2003	Alan Cartwright	UK	MS DOS Windows
The Ethnograph E6	c.1980 c.1982 1985 c. 1990 2008	John Seidel & Jack Clarke	USA	Mainframe PC Commercial release Windows
NUD*IST NVivo NVivo 9 NVivo 11	1982 c. 1982 c.1989 1995 1999 2010 2015	Tom & Lyn Richards QSR International formed	Australia	Mainframe Commercial release Windows Macintosh

MAX WinMAX WinMaxPro MaxQda MAXQda2 MAXQda 2007 MAXQda 10 MAXQda 12	1989 1994 1997 2001 2004 2007 2010 2015	Udo Kuckartz	Germany	MS DOS & commercial release Windows Macintosh
Atlas.ti Atlas.ti v. 5.0 Atlas.ti 8	1989 1993 2004 2017	Project Atlas – Thomas Muhr & others Thomas Muhr	Germany	DOS Windows
HyperRESEARCH HyperRESEARCH 3.7.3	1989 1991 2015	Sharlene Hesse-Biber, T.Scott Kinder & Paul Dupuis Researchware Inc. Formed	USA	Macintosh Commercial Release
Qualrus (no longer available)[3]	2002	Ed Brent	USA	Windows
Dedoose Dedoose 7.0.23	2010 2016	Eli Lieber & Thomas S. Weisner	USA	Web-based
Quirkos	2014	Daniel Turner	UK	Windows Macintosh

As can be seen in Table 1, development of the earliest programs occurred in the early 1980s and as such the development of QDAS can be seen as a process of "multiple discovery" (Brannigan, 1980)[4]. Initial development occurred simultaneously in a number of different countries using the same operating systems and the technologies that were around at the time. Several developers recognised that there were developments going on elsewhere, for example:

> There was this process of simultaneous invention, several people in different parts of the world came up with the same essential idea and tried to implement it. (D4)

However, other researchers were unaware at the time that there were others doing the same. For example, another developer noted:

> Unbeknown to us, there was a whole group of other people that were doing the same, but we didn't know about it, we were just going about our way of doing it the way we were. (D5)

Based on the interview data, initial development of QDAS seemed to be the result of three interrelated processes: previous experiences, existing knowledge about computers, and acquired knowledge. Knowing about qualitative research, computers and programming together provided the formula for QDAS creation, whether this was done by one developer or in collaboration with a computer scientist.

For example, a common feature amongst developers was that they all had previous experience in coding, either through previous roles such as engineers, as researchers or teachers of quantitative methods, or as a result of childhood experiences, "Going back to my childhood

[3] At the time of writing, the website of Ideaworks/Qualrus was not working, suggesting the software is no longer available

[4] It is believed by some in the community that the first software to be developed was LISPQUAL by Kriss Drass in 1980. Unfortunately, I was unable to interview Kriss Drass who died in 2001.

does have a role to play. I was an electronics geek and played with transistors and built little radios." (D4) Researchers who didn't already have coding experience were not likely to be part of the development of QDAS.

In terms of existing knowledge, a number of developers had used computers in general or for statistical analysis whilst an undergraduate or postgraduate student. One interviewee shared:

> From the very beginning I had always used computers and I'd never been trained in software, I just developed the skills, because in the early computers there was no word processing software, it was very basic and so I learnt how to program, and I wrote a little word processing program, followed by a stats program and that's how I got into writing software. (D3)

Therefore, previous experience and knowledge stimulated an academic-driven interest in what was happening with the onset of computer technologies and this became a means for experimentation. For some, developing software became something of an obsession, a welcomed chance for innovation.

As a result of this interest, some began to study computer science and learned new programming languages in order to develop new knowledge and skills, something which was necessary to solve the puzzles of programming, as early programming languages were rather restrictive and new ones were emerging rapidly. Thus, learning new programming languages coupled with understanding other developments in computing (i.e., the transition from DOS to Windows) was increasingly necessary to proceed with product development. For these developers, the challenges that came with software development were seen as welcoming and inviting, as described by one developer:

> I don't mind sitting in front of the computer for hours on end. Programming to me is this great adventure in puzzle solving, and every once in a while, you win, you figure out how to make it work or suddenly it's not working right and it's incredibly frustrating, you spend hours trying to figure it out and then suddenly there's elation when you discover how to fix it. (D4)

While a number of languages that emerged in the 1980s made programming less cumbersome, by the 1990s these had become more advanced and as a result more complex. Developing a product increasingly required the expertise of more than one programmer, an issue discussed by one developer:

> Back in the 1980s anybody could become a programmer, there were lots of books that you could buy that helped you to teach yourself. Prior to that with the mainframes there was no useful documentation, you learnt a cryptic secret language. We're getting back to that in terms of programming, it's becoming so complicated that you go to the bookshelves and you don't find much. We have to hire specialists and work with them in order to do these things. At one point one person could write a very powerful word processing program and one or two people could do it themselves, today you need more people because of the complications that have been built into it. (D4)

Once the software had been developed, the next stage was the process of diffusion to a broader audience. This occurred in two main ways: at first via informal networks and then secondly, via the World Wide Web. The propagation of QDAS is discussed next.

Propagation of QDAS

The Early Years of the 1980s

Initial propagation of QDAS tended to be inadvertent and was largely through word-of-mouth. As software was largely developed for one's own needs, the majority of developers had no intention of promoting and selling the software commercially. This was adamantly explained by a number of developers:

> More people became interested, although at this stage there was no idea of selling or producing software. That came later when more and more people had personal computers, and so therefore it was possible to move these ideas about software for qualitative data analysis to the personal computer, and at this point more and more people became involved. (D7)

Though not yet pursuing commercial ventures, developers were sharing what they were doing with within their own local networks of colleagues. This led to the emergence of the 'early adopters' (Rogers, 1995) after which QDAS knowledge and use spread from the developers' own social networks to the early adopters' networks. For example,

> It was not something which was much communicated in the scientific community, it was something more local, people in my department knew about it. But, maybe two years later, a quite well known colleague at another university was working on a project and asked if he could use it. It was at this time that I came outside of the department with this idea and more people became interested. (D7)

This "word-of-mouth" diffusion is a dominant way that information is conveyed within informal networks. As a result, a core group of early adopters emerged and would be the most influential in the propagation of QDAS and in the creation of a social network of users, an "invisible college" (Crane, 1972). These early adopters of QDAS became propagators and some became consultants with their own companies and were highly influential in the development of the QDAS community.

An early adopter and core propagator who was viewed by multiple interviewees as one of the most influential in the history of QDAS was the late Renata Tesch[5]. She was of German origin but had lived and worked in the United States, which allowed her to develop valuable network connections in both countries. Through her company, Business Research Management, she provided consultations on using computer packages, as well as distributing software and organizing seminars and workshops on QDAS both in Europe and in the United States. She wrote the first book, *Qualitative Research: Analysis Types and Software Tools* (1990), describing the different types of qualitative software that were around at the time. Originally Tesch had ideas of developing her own software until she met John Seidel, who had already developed the Ethnograph. He encouraged her to look at other software, to contact other developers and to form a consultancy that would address all the products.

As described by a number of interviewees, Tesch was soon travelling, attending numerous conferences and seminars and meeting other developers. Before long, she had set up an extensive network of contacts, and inspired not only developers but also other members of the research community. As a result, she was seen by many in the community as an invaluable

[5] Unfortunately, Renata Tesch passed away in 1994 and I was therefore unable to interview her.

propagator during the early development of QDAS. Both developers and propagators discussed how significant her role had been in the early development of the community:

> She certainly was a very influential person, she had the special ability of networking, letting acquainted with people and supporting people in their work and encouraging them to go further in developing these programs. She went to a variety of conferences, making these programs known to people. This was at the beginning of the development of QDAS which was extremely important. Her idea was that it could really be a community with some sharing between developers. (P5)

In addition to Renata Tesch, other early pioneers came to form the core of the community and became influential in the propagation of QDAS. These included propagators such as Nigel Fielding (University of Surrey), Udo Kelle (University of Bremen), Raymond Lee (Royal Holloway University of London) and developers such as Udo Kuckartz (WinMax and MAXQda), Thomas Muhr (ATLAS.ti), Tom and Lyn Richards (NUD*IST and NVivo) and John Seidel (The Ethnograph).

These early community members began to publish and present their experiences at conferences. By appearing in academic journals, these papers brought QDAS to a wider audience. An example of an early publication on QDAS is the 1984 Spring/Summer edition of *Qualitative Sociology* which was dedicated to "an explanation of the new relationship between personal computers and qualitative data" (Conrad & Reinharz, 1984, p. 3, as cited Fielding & Lee, 1993). Since then *Qualitative Sociology* as well as other publications continue to publish new work on QDAS and related matters[6]. Thus, publications served as a way by which knowledge began to spread beyond the local networks.

These core pioneers were to meet at a number of international conferences. Although some of the initial contact was at general conferences, such as the ASA (American Sociological Association), early meetings dedicated to QDAS were instrumental in bringing a core group together and were an important factor in establishing an international community. The impact of the conferences is discussed next.

QDAS Conferences – 1980s – 2016

The first conference dedicated to QDAS was held at the University of Surrey in 1989 and was organised by Raymond Lee and Nigel Fielding. It is with this conference that a QDAS international network began to emerge. Although a few developers may have known about each other, either through Renate Tesch or some other means, it was only really at the Surrey conference that they were able to meet in person and have the opportunity to exchange information and knowledge. The conference proved to be a huge success and it was subsequently decided amongst the group to hold a series of conferences, thus leading to further development of social networks. As explained by the following propagator:

> At that stage it was very friendly, very open, a lot of camaraderie about it and we decided in the end that there should be another conference. (P1)

As a result, two more conferences dedicated to QDAS took place, one in 1991 at Breckenridge, Colorado, organised by John Seidel and the other in Bremen, Germany in 1993, organised by

[6] For a comprehensive list, see https://www.surrey.ac.uk/sociology/research/researchcentres/caqdas/resources/bibliography/

Udo Kelle. The Bremen conference was the largest as it lasted for three and a half days and it was at this conference that the acronym C.A.Q.D.A.S. (Computer Assisted Qualitative Data Analysis Software) coined by Lee was first publicly used. He explains how he came up with the acronym and why it wasn't until the third conference that it was used:

> When we did the conference at Surrey, we had to call the conference "Qualitative Knowledge and Computing" and I think [it was because] was a session looking at artificial intelligence. I actually remember lying awake one night and suddenly thinking "there's an acronym here, C.A.Q.D.A.S."

The conferences supported a dual process of diffusion: first, it enabled the community to meet and the developers to introduce and share their products, and secondly, it diffused knowledge to a wider audience and in doing so enabled intellectual discussions to emerge concerning epistemological and methodological issues. For example, frequent topics included: the impact of software on the transformation of qualitative research methods; the appropriateness of using computers for analysis; and the implications of adopting software. Some of these discussions have remained to the present day (see Jackson, Paulus and Woolf, this issue).

After Bremen, there was a conference in 1996 at the University of Essex organised by the International Sociological Association Research Committee on Methodology. Later on, large-scale international conferences about software became infrequent, although the topic was regularly a theme at methodology conferences around the world. While there were a few small conferences on software, it wasn't until 2007, 14 years after Bremen, that a conference was held dedicated to QDAS. This was organised by the CAQDAS Networking Project at Royal Holloway University of London. In 2010, a QDAS Conference was held in Utrecht, The Netherlands, organised by KWALON, the Dutch Platform for Qualitative Research and in 2014, another conference organised by the CAQDAS Networking Project, was held in Horsley Park, Surrey. In 2016, KWALON organised another conference in Rotterdam, (the source of the papers for this special issue). Increasingly, some developers such as ATLAS.ti and MAXQDA have begun to organize their own user conferences.

As conferences have expanded and the years have gone by, the community is not the same as that small core group that first met at the Surrey conference in 1989. The relationship between the developers has changed and became what Tunstall (1971) calls a "competitor-colleague" relationship. For some of the developers, the friendships have remained but for others the relationships became more conflictual, competitive and less friendly. It is at this point that the next development occurred: the period of commercialisation, which is examined next.

Commercialisation – Early 1990s

By the early 1990s, new QDAS development had slowed. In response to growing user demand, developers concentrated on making their products more user-friendly and thus more commercially viable. In order to survive, some of the products needed to become commercial. Project Atlas is a good example; had it not been salvaged and further developed by Thomas Muhr, it likely would have disappeared. Redmond (2004) identified the role of market competition in the process of diffusion and argued that although word-of-mouth and observation remain relevant for later adopters, advertising has an important and continuing role in positioning the innovation to potential adopters. Advertising, being considerably longer in

duration and wider in terms of direct influence, greatly aids commercialisation (Redmond, 2004). This occurred when Sage Scolari[7] began distributing software.

Commercialisation within QDAS took place for a number of reasons; developing software was time-consuming and while most developers had full time day jobs, there was a need for some financial return. For those that did leave their academic posts, it is evident that they needed to become commercial in order to make a living. For some, it was a difficult, but progressive direction and expansion. Sage Scolari, distributing the software, assisted with the transition. For example, one developer explained:

> We had reached a point where we had cool ideas that were crudely implemented into technology and we started selling these things and we became software hucksters, and we had this problem of being competitors. And yet, being competitors, we had to deal with that. You have the problem of being the promoter and entrepreneur versus being the qualitative scholar and academic. You go out there and you try to convince people to buy your product, so you cross the line into advertising and that's hard to do. (D4)

Sage's role was pivotal as it enabled software to be distributed to a larger audience. A representative of Scolari explained the reasons for opting to sell and distribute the software:

> We were forming the company that was best placed to reach people using qualitative and quantitative research methodologies and therefore it looked an attractive prospect for us to see if we could actually build a profile in doing software publishing in the same way that we had built a profile of doing book and journal publishing. So, we ended up setting up Scolari, in order to trial that kind of business model and see where it would take us. (S1)

The response within the community to Scolari's involvement was a mixed one. Although Scolari was aware of other software packages, the first software to be signed up was NUD*IST, chiefly because it was perceived as being a viable marketable product, "Our decision was really a commercial decision and one about having to try to build a business that was viable and starting with a product the most likely to succeed." (S2)

This created a problem with some of the other developers who saw NUD*IST as receiving an unfair advantage. However, after a couple of years, Scolari sought to expand further and began distributing other software. For some developers, this proved to be a profitable working relationship, whilst for others the relationship was less rewarding. For example, as one propagator explained:

> There was a lot of dissatisfaction in how they handled it and a lot of people thought that Scolari was favouring NUD*IST over other programs and not doing their marketing properly. (P6)

Representatives of Sage explained their response to the developers' anxieties and explained why they thought some developers (understandably) might have felt the way they did:

[7] A publishing company from the United States with a UK publishing arm, first began to publish books on CAQDAS but decided later to distribute software through its partner company Scolari. There was already a company in the U.K. called SAGE that sold accounting software and so they needed to use another name. However, Sage Scolari no longer exists as developers now use their own website for distribution.

> Each of them negotiated differently and had different concerns and so on, and ultimately they are not all going to be happy, but some of them can be very emotional and that was partly because of their dedication and it's the nature of who they are and what they do. Sage never wanted to take advantage of or treat any of them unfairly and I think that some of them felt that probably they were, a bum deal, or didn't get what they wanted out of Sage, but I don't think Sage behaved unprofessionally or discourteously to anyone. I think it boils down to one thing really, that each of the developers wanted to be special, wanted to be the package, wanted theirs to be the leading thing, which is quite reasonable. (S2)

What is evident is that Scolari did provide a number of benefits for the developers, most notably by aiding the process of diffusion. Firstly, Scolari was able to reduce the concern of promotion and advertising away from the developers, which meant that they had more time to focus on developing their products further, "I think that Scolari gave people the possibility to concentrate a bit more on programming and not on packing and shipping." (P6)
Secondly, as discussed by several developers, Scolari acted as a key component in the commercialisation process and that without Scolari, most diffusion would have remained word-of-mouth[8], "Scolari was the only real channel we had other than word-of-mouth." (D8)

However, despite this, as Fennel and Warnecke (1988) indicate, diffusion does not always reach all potential adopters. While communication networks can be effective in linking scientists, some are less involved in these networks and, consequently, their work is less visible to their colleagues in other countries. However, global diffusion of QDAS was ultimately facilitated by the emergence of the internet, which permitted expansion and diffusion well beyond informal networks and invisible colleges. The next section examines the impact of the internet on furthering the development of the QDAS community.

Later Propagation and the Development of Online Worlds

It was not until the internet and the personal computer had been widely adopted that the diffusion of QDAS could spread to a wider audience. The impact that the internet had on the relatively small QDAS community was far greater than its members could have anticipated. This influence fell into three areas as evidenced by the interview data. First, the internet facilitated further development of the software. Secondly, it facilitated diffusion of the technology to a larger audience. Third, it permitted the breaking down of boundaries of invisible colleges.

Facilitating further software development. The internet encouraged the development of QDAS in two ways. First, it made the competitors' offerings much more visible to the developers. Any changes made in one product is easily viewable online, whereas previously any changes could only be seen during demonstrations at a conference or through purchasing the product. "Creeping featurism" is a common occurrence in software development (see Evers, this issue). If developers did not keep up with new features, they would run the risk of their product becoming obsolete. Further, designing new features may be what motivated developers in the first place – they enjoy play around with new ideas, as explained by one propagator:

[8] It is unknown at which point precisely Sage Scolari ceased existing, however contracts with developers ended around the time developers began to form their own companies and distribute their own software, something that they could do as more easily as a result of the World Wide Web.

> Since developers are often sort of "fiddlers," that's what programmers do, fiddle around with packages and try to make things work, and say "what if I did this and wouldn't it be fun to have that." So, in the work of programming there are pressures towards adding features anyway. (P1)

Second, as well as visibility of new developments, the internet also provides sources of data. This necessitates the software to provide features to help work with this new type of qualitative data (e.g., social media data.) As such, the internet opened up new analytic opportunities in qualitative research that could be met by software developers adding features to their programs. For example:

> I think in a direct way the internet has contributed in the sense that there are resources that are available that the developers want to be able to embed in their software. Some software now provides the possibility of capturing any online phenomenon. For example, if data is on-line and if it's electronic it can be held anywhere and it's not such a cost as having a lot of paper files in someone's library. (P2)

New methods and transformations of existing methods include content analysis of online phenomena such as emails, discussion lists, websites, online questionnaires and interviews and focus groups.

Facilitating diffusion. The internet has also facilitated the rapid dissemination of knowledge and information about QDAS throughout the community and beyond. Testing and distribution can happen much more quickly, in that users are able to download demos and software directly from the internet. Trial downloads of the software are available on developer websites so potential users can "try before they buy," a feature synonymous with most software packages, not just QDAS. As a result, it has provided an easier and more effective way to distribute and sell the software. Previously, distribution had been problematic in that users were not always certain who they should contact and the process itself could take a while. Although trial CD-ROMS were available at conferences, these were not as easy as downloading from the internet.

The internet has also made technical support more accessible and readily available for existing or novice users, an issue discussed by both developers and propagators. Prior to the internet, seeking help and advice could take some time and was generally only available by contacting the developer(s) directly. Now, support is available in a number of different ways, directly from the developers but also from propagators (consultancies) or through various user discussion lists and social media that might be software specific or not.

Several developers and propagators believed that without the internet, diffusion of QDAS would not have been possible. One developer signified the importance of the internet for the diffusion of his software over other methods:

> The internet has played a very important role, because when I first started selling [software], the internet wasn't really available then as it is now, and so trying to sell programs like this, we would put ads in the back of magazines and we would do mailings to professional associations, but it costs a lot of money. I thought that the internet would make it much better for marketing, and I think it has, we get a lot of hits every week on our site and people download the demo, probably many people hear about it through the internet. We ask how they heard about it, and in many cases it's a search on the internet, if it wasn't somebody that they knew. (D6)

However, others (both developers and propagators) thought that diffusion would have been possible without the internet, though different. Diffusion would not have been as widespread but rather more clustered and concentrated in specific areas, more localised and centralised. For example:

> It would have been possible without the internet; the internet hasn't been crucial to the whole thing. . . I don't think it's played a critical role in this, everything that in terms of the shift towards using this kind of technology, would have been perfectly possible in a traditional environment, a lot of sales take place by other means, than through the Web. (P11)

A third way that the internet has impacted the diffusion process is by breaking down the boundaries of traditional invisible colleges.

Breaking down and expanding boundaries of invisible colleges. Both developers and propagators emphasised the internet's importance in connecting and interacting with those outside the initial small QDAS community. Indeed, the internet is permeates traditional disciplinary boundaries, expands invisible colleges, provides visibility and promotes interaction. Being able to make contact with potential conference delegates makes conference organisation easier. For example, one developer discussed how prior to the internet, organising a conference was a lengthy process, "If you were organising a conference, ten years ago, you had to use normal letters and it took you a long time and nowadays it's all done by email within hours worldwide." (D1) A propagator claimed that, without the internet, it would not have been possible to find all the attendees that they wished to invite, "We would never really have been able to do those conferences without email. It's just transformed the nature of academic communication, it allows you to just set things up and work with things." (P1) As a result, collaboration could occur with others around the world regardless of background, thus changing the boundaries of invisible colleges, as discussed by one propagator:

> I think the most important impact is that it really brought us together. I have had visitors from so many countries and I am in contact with so many people all over the world. I can learn a lot from this and I can plan collaborations and we can share our resources. So, these boundaries are decreasing. There are different parties involved and they are looking over the borders. Today, I am in contact with most mainstream researchers, and we started to talk and to establish joint projects, and I think this would not have been possible without the internet. (P10)

Initiatives such as the CAQDAS Networking Project (CNP)[9], a dissemination network, can also contribute to the breaking down of the boundaries within invisible colleges. The CNP was set up to take advantage of the internet's tools, to specifically meet the increasing demand for knowledge and advice that early adopters found themselves inundated with. Interviewees noted that without the internet, the CNP would not have been possible or would have existed on a much smaller scale. As one propagator observes, without email, the structure of the CNP and the conferences they organised would have been different:

[9] The CAQDAS Networking Project was set up in 1994 in order to provide assistance and advice to users of QDAS through workshops and seminars, as well as providing a discussion list "qual-software" for the community to interact and discuss issues surrounding CAQDAS. Originally funded by the ESRC (Economic and Social Research Council), the CNP since 2011 no longer receives funding and instead is self-financed by providing training. For details see: https://www.surrey.ac.uk/sociology/research/researchcentres/caqdas/

> It came along at just the right time, if it hadn't been around we would still have had an international network, but it probably wouldn't have been as well developed. It would have depended on people writing letters to one another, making phone calls and so on. Without it, it would have been slower, and more difficult and harder to get in touch with people. So, it helped to and allowed the international networks to grow. I suppose we're the first generation of people that have been able to use the internet for academic network building processes. (P2)

The CNP discussion list has been a vital influence in disseminating knowledge about QDAS. Through the list, users were able to obtain advice on a number of different issues, ranging from software selection recommendations to specific technical questions about a particular package.

Therefore, through providing visibility, connectivity and interactivity, the internet helps to break down the boundaries of invisible colleges at a much faster rate. As a result, knowledge of QDAS is extended not only to those already involved in that scientific community but to other interested parties accessing information online.

Conclusion

To summarise, this paper has outlined the processes of how the intersection of two social worlds, qualitative research and computing, came together to form a QDAS community. The development and propagation of the social world of QDAS was the result of two stages. In the first stage, a process of simultaneous, partly serendipitous, multiple discovery resulted in innovation. This innovation was a mix of previous experience, previous knowledge and acquired knowledge in order to solve the puzzle of how to computerise manual data analysis methods. The second stage involved the propagation of the innovation, where diffusion occurred alongside continued development and sophistication of the software. Scientists shared knowledge through both informal and formal networks. Propagation occurred informally via word-of-mouth and formally through normal activities such as publications, seminars and conferences. With the arrival of the internet, the CAQDAS world became an online world, which resulted in rapid diffusion and further developments. These are continuing yet today.

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