

# Chapter 1

## Introduction

### 1.1 Background to the research project

*It's reliable, it's sharing terabytes of data and it's absolutely unstoppable...*  
(Chi, 2001).

Peer-to-Peer (“P2P”, for short) computing has recently emerged as a promising new paradigm for distributed computing, harnessing the latent power of scattered computing systems. In order to utilise this unlimited and as yet untapped resource, however, it is essential to determine the end-user’s interaction with P2P file-sharing systems on the Internet. A better understanding of this interaction, of the basic functioning of the P2P computing system, of the impact of P2P system performance and of copyright issues and the like, will help the Information Society at large to embrace and bend this computing phenomenon to its collective will. In addition, this will unlock the potential to develop and render new services and to improve existing ones in ways the “connected” world may not have imagined until now.

### 1.2 Rationale of the study

According to the literature surveyed, the rationale behind the construction of the Internet was that of direct communication (a network with no centralised point of control) and collaboration. During the initial developmental stages of the Internet, it was accessible only to scientists, researchers and engineers, but with the invention of the World Wide Web (the “WWW”, for short), the number of Internet users and the concomitant volumes of Internet traffic increased exponentially. Next, the client/server computing architecture was introduced in a bid to cope with the huge traffic volumes and the enormous demand for online resources.

#### 1.2.1 What is “P2P computing”?

According to Bricklin (2000), “P2P computing” refers to “the topology and architecture of the computers in a system, in terms of which each computer has equivalent capabilities and responsibilities” (Miller, 2001: 19). Today’s P2P infrastructure not only is the culmination of what was accomplished during the

inception years of the Internet but also constitutes the sum of the evolutions of these earlier experiments. The modern-day media hype around P2P computing can be accredited to the triggering and enabling applications within the technological revolution of the 21<sup>st</sup> century, with specific reference to Napster.

P2P computing is associated by many users with file-sharing, particularly with sharing MP3 music files, but, in reality, P2P computing entails much more, for example:

- instant messaging
- group collaboration
- distributed computing.

According to Vale (2000), one of the most undervalued yet biggest influences P2P computing has exerted over other areas is its indirect role as a pusher of the development and adoption of hard technology. The literature review will support this and will, indeed, show that P2P computing could well prove a potential model on which the future Internet could be based. The principal aim of this study is, therefore, to identify frequencies of and patterns in online student behaviour in the utilisation of P2P applications available on the Internet. As is to be hoped, a better understanding of how P2P systems are used will also ensure that system administrators better manage, control and plan Information Technology ("IT", for short) infrastructure.

### **1.3 Research problem and sub-problems**

The research problem of this study was formulated as follows:

**To what extent are the Rand Afrikaans University Information Science students utilising P2P systems as part of their information infrastructure?**

The following sub-problems were identified in a bid to solve the above problem:

- What kind of IT infrastructure is utilised when Information Science students connect to P2P file-sharing applications on the Internet?
- What are the utilisation patterns of this online student community when using P2P systems on the Internet?
- To what extent do ethics impact on these students' utilisation patterns of P2P systems?

## 1.4 Research methodology

A detailed literature study was deemed necessary in order to lay the foundation of a good reference point for the empirical research. The method followed to gather the necessary information was that of a quantitative orientation.

The participants in the study were sampled from the undergraduate-student population (registered for first-, second- and third-year courses) in the Information Science Department at the Rand Afrikaans University in Johannesburg, South Africa. In all, the sample comprised 377 students, who were required to complete a questionnaire made up of five different sections (see Appendix A). The questionnaires were then submitted for statistical analysis at RAU Statcon (the Statistical Consultation Service of the University), responsible for the administration and statistical analysis of the data collected through the questionnaires. The resulting frequencies and tables had been published in Appendix B, so as to provide the reader with a complete picture of the results obtained.

### 1.4.1 Literature review

As indicated in the previous section, the research design consisted of a literature review, which was used to lay the foundation of the empirical research. For that purpose, chapters 2, 3 and 4 were used to provide the theoretical framework for the study, discussing the various aspects, as well as their associated variables, that might impact on the solution(s) to the research problem.

### **Chapter 2 (*The Internet as information infrastructure*)**

Chapter 2 is used to introduce readers to the basic functioning of the Internet, thereby ensuring that they grasp the full extent of the evolution that information technology has undergone. The chapter starts off with a basic overview of the history of the Internet, which is presented in three stages. Following this historical background is a discussion on some of the applications that have evolved from the Internet (including that of e-mail, the World Wide Web, newsgroups, electronic commerce and P2P computing). This is followed by a brief comparison between the Internet and the World Wide Web.

Building on the afore-mentioned historical background and subsequent definitions, the researcher then embarks on an examination of the salient features and attributes that set the Internet apart from other information networks, so that readers will fully comprehend the part that the Internet plays in the P2P computing environment. The latter part of this chapter is used to speculate on the possible future of the Internet.

### **Chapter 3 (*The online community and the global village*)**

Humans live in an intricate web of relations vital for their health, growth and development. In addition to this, humans need a milieu that will provide mutual respect, assistance and empathy for their collective wellbeing. For this reason, chapter 3 is used to look at the impact of the technological revolution on modern society, with specific reference to the convergence of the online communities on the Internet.

The main objective of this chapter is to familiarise readers with the notion of an “online community” and a “global village” by revisiting the social-community concept and by analysing the impact of technology on the traditional community. Building on these basic concepts, the focus shifts to how the online community should be conceptualised and defined, thus ensuring that readers understand the nature of social interaction in a virtual environment.

### **Chapter 4 (*Peer-to-Peer (P2P) computing*)**

The preceding chapters provide the foundation of and a background to a discussion on P2P computing. The basic idea and/or concept of P2P computing has, in fact, come into existence with the inception of the Internet, though it should be noted that a confluence of various historical experiments culminated in modern-day P2P applications.

In order fully to appreciate the highly advanced modern-day P2P application, chapter 4 is used to focus on the historical foundations (among which direct exchange, distributed processing and online collaboration) at the core of the P2P computing evolution and revolution. Building on these historical foundations, an in-depth analysis is undertaken of the definition and salient features of P2P computing (for example, definitions, objectives, architecture and applications) in its capacity of a driving force behind the second major technological revolution.

#### 1.4.2 Empirical research

This section is used to focus on the empirical research undertaken, along with the findings uncovered and the subsequent recommendations made.

Chapter 5 is devoted to a review of the theories underpinning empirical research. In addition, this chapter is used to sum up the preceding chapters and to present readers with the results obtained from the research.

The first part of this chapter is used to provide readers with a basic overview of and background to the research. This is followed by definitions for some of the aspects pertaining to the new research paradigm. Expanding on these core aspects, the research approach adopted for this study is classified under Pasteur's quadrant (being "use-inspired basic research") of Stokes' research classification quadrants. It should be noted that this type of research is devoted to solving problems in a bid to finding solutions that would improve people's lives. This research study falls into Pasteur's quadrant, for its principal aim is to uncover new facts about and to gain new information on the utilisation of the P2P file-sharing application.

The nature of this study lends itself to quantitative research and an in-depth description of the methods and procedures of data capturing, collection and processing used. Building on the description of the methods and procedures of data capturing, collection and processing, the latter part of the chapter focuses on the analysis and interpretation of the questionnaire results. The principal aim of the said questionnaire is to determine the infrastructure utilised in file-sharing, the P2P usage, the ethical issues surrounding file-sharing and the frequency with which file-sharing takes place.

### 1.5 Conclusion and recommendations

Chapter 6 is devoted to a discussion on the conclusions drawn from the findings presented in chapter 5. The latter part of chapter 6 is used to focus on the recommendations based on the conclusions to the study, among which that

- the ethical and legal aspects of the digital domain must, henceforth, form part of the curriculum for all students
- usage and placement of ICT infrastructure within the tertiary environment must, henceforth, be planned and managed with greater circumspection.