Chapter 1

WHAT WE CAN LEARN FROM AVATAR-DRIVEN INTERNET COMMUNITIES

Case studies on two commercial applications

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Hiro's not actually here at all. He's in a computer-generated universe that his computer is drawing onto his goggles and pumping into his earphones. In the lingo, this imaginary place is known as the Metaverse. Hiro spends a lot of time in the Metaverse.

—Stephenson, Snow Crash

Abstract In this chapter we describe a commercial platform for the development of net environments, virtual spaces inhabited by avatars which have been created and are subsequently visited and instructed by users via the Internet. The platform allows extensive data collection. Which data are collected and the scope of analysis will be explained on a theoretical level and by examples from data sets collected from different applications.

Keywords: Evaluation methodology, case studies, avatar, Internet community, human-like agent, user modelling, virtual characters.

1. Introduction

In this chapter, we focus on case studies using data collected from commercial (multi-user) community applications on the Internet where the users are represented by avatars. These applications are on the one hand fun and constitute entertainment for the users. On the other hand they help sponsors to better get to know the interests and preferences of the users attracted by a certain community. The avatars are instrumental for both goals. As a side-effect, the analysis of usage of these applications provide information about the users who like this type of application.

In particular, we describe a platform, called sysis NetLife, and two of its applications, Flirtboat and derSpittelberg, which provided data for our case studies. The case studies cover a development and operation time-frame of about 2.5 years. During this period the analysis of the collected data was used to develop a classification scheme for data collection. The final classification scheme, as described in section 3.3, is backed up by 16 launches of 7 different applications in various countries. Flirtboat, for instance, has been customized for the Austrian, the UK and the Croatian market. Sample applications can be found under http://sysis.at/website/web/pages/portfolio/community/. A discussion of language and culture-specific customization of Flirtboat is presented in Krenn et al. (to appear).

With sysis NetLife, we present an approach to applications featuring virtual characters where the character is an integral part of the system and not an added extra to the interface, which has typically been the case in the (commercial) use of virtual characters on the web. See for instance the broadcasters Ananova (url) and Chase Walker (url), cartoon characters interfaced with a text-to-speech system so that they can read out news to the user. Another example are classical chatterbots such as Cybelle (url) which pretend to communicate with the user.

In sysis NetLife, the avatar is a vehicle for gathering data over a period of time. The applications typically have a runtime of three months. From the different launches of Flirtboat we have learned that the individual user on average logs onto the system on 33 days, and visits her avatar 34 times on average. In the present study, we employ the data to assess the patterns of usage, as well as the characteristics, preferences and attitudes attributed by the users to their avatar representatives. Such data only become available when the user is closely interconnected with the system via the avatar and returns to the application over a longer period of time. The assumption that long-term users do consider their avatar as their alter-ego is also of considerable benefit to the operator or sponsors

of the system, as the system can be used as a tool for online market studies. However, a word of caution is in order: It must be understood that the personal data accessible through NetLife applications cannot be sufficiently checked for their substance. People may or may not be sincere as regards their personal data such as age, gender, and so forth. What can be done, however, is to increase the incentive for users to be sincere, or to find a metaphor which fosters the identification of the user with the application and thus reinforces the tendency of the user to be sincere. In sysis NetLife applications, the avatar metaphor is used as a means of increasing identification of the user with the system. How far this assumption is valid cannot fully be answered, but there is evidence from informal feedback, and from a survey on user satisfaction based on the first launch of Flirtboat in Austria that users tend to understand the avatar to be their virtual representative. To fully answer this question, however, a series of qualitative experiments would be required; this is clearly outside the scope of the work presented in this chapter.

A further advantage of data collection via NetLife is that it provides access to a large group of users and at the same time makes it possible to focus on a specific target group via the theme and scenario of the particular application. Thus, major questions addressed in this chapter are which system functionalities are useful, how avatar profiles can be established and what types of data can be collected. In this respect, our work considerably differs from other work on the evaluation of applications with animated characters, such as the one described in Chapter by Morton. The reader must also keep in mind that data collection in NetLife originated from a clearly commercial perspective of market analysis. And even though one of the intentions of NetLife is to evoke an affective relationship between user and application via the avatar, the kind of data collected do not allow for an assessment of the human-avatar relationship. In our approach, the user and the avatar merge. Nevertheless, NetLife applications are a useful means for quantitative studies on user behaviour in avatar-driven, targeted web communities.

In sysis NetLife, virtual characters are referred to both as avatars and agents. The characters are avatars, because they represent the users who initially define and subsequently refine them. Apart from that, the virtual characters act autonomously like agents, driven by application-specific needs and desires. The platform has been developed by sysis from scratch, and the different applications have been built on the basis of this platform.

NetLife applications offer different types and qualities of data. Summing up, we have large amounts of data of various types, data from long term usage of NetLife applications (the runtime of a commercial appli-

cation is typically 3 months), data from Internet users under real world conditions (as opposed to laboratory experiments), data from different applications (Flirtboat and derSpittelberg), data from launches of an application in different countries (launches of Flirtboat in Austria, Croatia and the UK), data on usage and activity (see section 4.1.1), data on user generated content (see section 4.1.2), data on avatar characteristics as they have been attributed to avatars by their users (see sections 4.1.3 and 4.1.4), and, last but not least, avatar mediated data on user preferences and attitudes (see section 4.1.6). Note all data analysis is made on a quantitative basis. Nevertheless, especially the user generated content calls for qualitative analysis, which is a topic of future research.

Section 2 describes the NetLife platform and its applications, Flirtboat and derSpittelberg. Section 3 discusses data collection methods and strategies. Section 4 presents our evaluation strategies and shows evaluation results. It should be noted that in a commercial context it is not possible to disclose all data. We can therefore only show samples of the data analyses and where necessary they have been further generalised.

2. sysis NetLife: Platform and Applications

In this section, we first describe the platform on which the applications, Flirtboat and derSpittelberg, are based. We then present the specific characteristics of the respective applications.

2.1 General Characteristics of the NetLife Platform

Sysis has developed a platform which serves as the basis for a special kind of web community, which is avatar driven and focussed on bringing users together under different metaphors of community. The users are represented by avatars which are situated in a virtual location, engage in social relations (in Flirtboat and derSpittelberg making friends with others) and fulfill specific tasks depending on what is required of them in a given application. The user is able to design her avatar with respect to its graphical representation, i.e., the user can choose from a number of predefined characters. In Flirtboat, for instance, the user may select from 16 female and 16 male characters which differ in hair style, hair and skin color, and the way they dress. The user also models her avatar with respect to its socio-demographic coordinates age and gender, and its personality traits and interests.

Once the avatars have been created by the user, they act autonomously. Driven by the needs built into the system, the agents search their habitat

for friends, food and drink, or sleep. The most urgent need will always be fulfilled first. The model output, i.e., the activities of an agent, the friends it has met and what has happened during such a meeting is represented in the form of template generated stories. In other words, the stories are written representations of the simulation parameters relevant in a certain application at a certain time. The presentation is supported by graphical representations in the form of still pictures showing the avatar in an application-typical environment. The user gives constant input to the system by choosing to look at particular stories, booking events, answering questions to refine the avatar's (or indirectly the user's own) profile, writing e-mail to the avatars of other users, or chatting. All input is by mouse and keyboard. The simulation of an application is 24 hours a day, 7 days a week. The application works asynchronously. This means, the avatar does not react immediately or directly to the user input, but the input of the user influences how the avatar proceeds in the community. The user can always access the stories representing the past life of the avatar in the community. All past model output is accessible for 35 days.

Apart from the user's own agent, there are also so-called *system avatars*, which are — as might be guessed — system driven and have been developed for two reasons: First, they are an important means for the designers to give more atmosphere to the application and transport the respective community metaphor. In Flirtboat, for instance, a typical system avatar is the playboy on board who approaches the user avatars and gives them flirt tips. Second, system avatars have been designed to pose questions about user preferences and attitudes. Thus they are one of the vehicles that allow longterm collection of user responses. In the commercial applications, they are used for market studies.

Other important features of the platform are the means offered for direct communication between users, i.e., internal mail system, chat, nickpage and guestbook. The usage of e-mail and chat will be addressed in section 4.1.2.

2.2 Flirtboat

Flirtboat is an application where avatars meet on behalf of the users on board a cruise liner with the aim of finding partners to flirt with, perhaps even of finding the optimal partner. With this aim in mind the avatars move around the virtual Flirtboat, meeting and assessing other avatars, making friends and reporting their experiences back to the user whose task it is to help the avatar become popular. Based on Flirtboat, we give a short overview of the most important characteristics

of a NetLife application from a user's perspective. In particular, we describe the steps a user typically takes through the application.

As a first step, the user creates her own avatar — which is conceived as a virtual representation of the user's self — by answering a number of questions about sociographic aspects and personality traits. Based on the user answers, the model generates an individual profile for each avatar which also contains the user's choice of appearance for the avatar.

The avatar profile can be refined throughout the runtime of the application as the user answers additional questions about the avatar's preferences and way of thinking.

A personality related question might for example be:

> Got up late, missed the bus, left my shoes at home. Do I go berserk or do I keep calm?

This particular question is aimed at the thinking versus feeling dimension of a Jungian type personality classification. (See page 16 "Personality" for more details.) Selection of the answer "I go berserk" is considered to belong to the feeling type whereas the answer "I stay calm" indicates the thinking type.

After creation of the avatar, when the user enters the community for the first time, she is shown an animated sequence where a helicopter takes the avatar to the Flirtboat. The user can now access all functionalities of the simulation, or in other words all areas of the avatar's life on the boat. The user might first look into her diary, where she will find a report on the arrival and first impressions the avatar has gained. In the course of the game the diary will be the central area of communication with the avatar, because it is the means of access to the stories where the avatar reports back to the user what has happened to her/him while the user was off-line. As part of these stories the user is asked to decide on the next steps, e.g. arrange a meeting with another avatar, send e-mail to another avatar, select a certain action the avatar should take during the next meeting/date with another avatar. It is also possible to cancel previously arranged dates. When the user logs onto the system the next time, she is informed by her avatar what has happened during the previous meetings/dates. All information is presented in a setting as shown in figure 1.1. In the middle of the screen, the avatar representing the user is shown at the location of a previous date. The current picture refers to a meeting at the 'Largo Amore pool'. The text underneath is a monologue of the avatar summarizing what has happened during the date. To be able to customize the wording and style of text to the particular application and the envisaged target user group, we employ a template-based approach to generation. The text in our example reads

> Hi!
> Imagine what happened! popeye_3rd and I had our second date at the Largo Amore pool. That's someone I wouldn't push off the edge of my bed! I invited popeye_3rd to another date on 28.06. at 19hrs with all my charm. We're going to have a game of pool. Bye bye lonely hearts

club!
What shall I do?

When the user klicks on the "What shall I do?" link, she is asked to select an action from a list of actions the avatar may instigate at the upcoming date. The user's choice influences the avatar behaviour at the date, which in turn influences the state of the avatar named popeye_3rd.

The middle frame at the left of the screen shot represents the avatar diary (see "My Travel Diary"). Via the links in the lower left frame the user can access pictures and stories representing past dates of the avatar.

The right upper frame provides access to "Pick-up Pete's Flirting Tips". Pick-up Pete is the playboy system avatar in the UK version of Flirtboat. For a country-specific customization of the playboy/playgirl type in Flirtboat see Krenn et al. (to appear).

Figure 1.1. User interface: Flirtboat

In NetLife applications there are usually more system avatars which try to talk to the user and tell her the latest gossip or ask questions about her attitudes or preferences. An example is the Reverend on the Flirtboat. One of his question reads like this:

> God bless you, my child! I've just spoken to Father Gregory. He's at home looking after the poor and deprived people on the streets. It's not an easy job. Have you ever helped out those in need or do you think the authorities are dealing with the problem well enough?

Potential answers are: "I pay my rates" or "I like to help". The question is targeted at assessing the social orientation of the user.

As an incentive for answering questions posed by the system, the users are awarded points for each question they answer. The top ten avatars which have acquired the highest number of points during one week are presented to the community as 'champion flirts'.

Another important area of activity is the avatar profile which is derived from the information given during registration and can be updated throughout the duration of participation. As this profile is presented to the other users in the form of an individual profile page (*nickpage*) it is important to keep it up to date. Apart from the data given during registration, except for personal data (such as real name, postal address and e-mail of the user, etc.) which of course are not made available, the profile contains user generated content such as, in the case of Flirtboat, a description of the partner of one's dreams, and any photograph the user might choose to upload. The nickpage is accessible via the right bottom frame ('Flirting Style').

Flirtboat was first launched in Austria in November 2000 via jet2web.at which is the Internet affiliate of the Telekom Austria. After two relaunches Flirtboat is still running in Austria at the time of writing and currently has 17.150 registered users.[1] Localised versions of Flirtboat were run in the UK (06/2001 – 03/2003) and in Croatia (12/2001 – 03/2002). In the UK, Flirtboat was hosted on iCircle which is the woman's portal of Freeserve, by that time the largest Internet portal in the UK. Freeserve is a subsidiary of Wanadoo. In Croatia, Flirtboat was launched via VIPnet which is a subsidiary of the Mobilkom Austria.

2.3 derSpittelberg

derSpittelberg has been developed in cooperation with an Austrian newspaper and was targeted at a young urban audience, for whom the context of flat sharing and student life is appealing. The newspaper is positioned in the high income, high education consumer segment, and wanted to offer an online community to its younger readers.

Thus this particular application is set within the context of student life, i.e., basically the flat shared with other students, university locations such as the library or the cafeteria and locations for going out such as the cinema or the dance club.

Figure 1.2. User interface: derSpittelberg

A particular sociocultural context is set through reference to the Spittelberg area of Vienna. As is the case with all sysis NetLife applications, the whole front end, especially the verbal and graphical representation of the setting was designed for the target group. See Figure 1.2 for an example of the user interface in derSpittelberg.

In our study, derSpittelberg serves as an example for a market analysis based on lifestyle clusters which have been developed especially for sysis NetLife. The application was launched in May 2002 via the online version of the newspaper. It was conceived to run as a sponsor financed campaign with a previously fixed end, and had 4.500 users within three months. 12 sponsors took part in this project. The application also serves as the basis for one of the demonstrators developed in the European research project NECA (url). Here we have exchanged the presentation of avatars using still pictures, with movies of animated agents interacting with each other. At the time of writing, user studies are underway which aim at the evaluation the appropriateness of the communicative behaviour expressed by the animated agents.

3. User Data Analysis

In the following we will describe the general patterns of data types and data collection we have extracted from sysis NetLife applications. According to the basically commercial setting, initial data collection and analysis did follow the principles of empirical social research and market research, cf. Atteslander (1995) and Friedrichs (1990).

The data we refer to have been collected from three launches of the Flirtboat application and one launch of derSpittelberg. In the case of Flirtboat, we refer to three subsequent Austrian launches (if not stated otherwise AUT Flirtboat refers to the second launch of Flirtboat in Austria), one UK launch (UK Flirtboat), and one Croatian launch (CRO Flirtboat). In the case of derSpittelberg, we refer to a single launch in Austria.

3.1 Goals for Data Collection

When setting the goals for data collection in commercial applications, the requirements of three different groups had to be accounted for, namely

- the user, who wants to find entertainment in the application and access to other Internet surfers via the community platform.
- the operator, who needs to improve customer retention on her site and/or wants to know her customers better.
- the system developer, who needs to prove that the platform is accepted well by the users and supports the operator in achieving her goals.

Thus the motivation to collect certain data partially differs and partially overlaps for the three user groups.

Functionality of the operational core is relevant for all three user groups. Its assessment includes data such as which avatars have met in the application, what has happened in the meetings, what are the personality traits and interests of the individual users/avatars.

Commercial evaluation, for obvious reasons, is desirable for both the operator and the designer, in order to be able to evaluate the performance of an application. In NetLife applications this refers to questions on how many users are registered, how often users visit the application, etc.

Commercial benefit is of clear interest to the operator. In the early stages of NetLife, the commercial benefit consisted mainly of good performance, but as the market developed it became a necessity to find more benefits for the operator. The possibility of conducting market research in NetLife applications has turned out to be such a benefit.

To successfully connect users via an application the following goals must be met.

Individualisation: The user must be able to personalise her avatar, and thus present herself to the community as an individual. It was therefore necessary to offer a number of opportunities in the NetLife applications to distinguish oneself from the others. In particular these are the user defined avatar profile including age, gender, personality, attitudes, preferences, and looks (especially in Flirtboat), as well as the individual profile page which is created and maintained by the user on behalf of the avatar.

Communication: Users must be able to communicate with each other. In sysis NetLife this is achieved via e-mail and chat, as well as via actions. On behalf of their avatars users send e-mails to other avatars in the environment. Alternatively, users communicate directly with each other via chat. Moreover, actions can be selected by the users as advice/directive for the avatar on what to do in a specific meeting with a particular avatar.

Appraisal: Users want to be able to give feedback to other members of the community and also want to learn what others think. In der-Spittelberg, for instance, a means of appraisal is the election of the best nickpage by the collective of users via rating. This form of appraisal can be easily gathered automatically.

All data used for evaluation are automatically collected by the system and stored in a database. In the following, we will concentrate on those aspects of data collection that are motivated by user related goals.

3.2 Methodology

Before we go on with the discussion of the data, a few words are in order about general methodological aspects of data collection as well as NetLife specific features.

3.2.1 General Considerations.

Sampling: In the context of NetLife applications, sampling only has influence insofar as the operator defines the target group correctly and the final customisation of the application is compatible with that target group. Apart from that, a NetLife application is accessible for anyone with an Internet connection. This aspect alone accounts for the sample not being representative of the total population, but — based on the assumption that the application has been appropriately customized for a certain target group — theoretical requirements regarding sampling are fulfilled.[2]

Profiling: As explained, the user is represented by an avatar in NetLife applications. This raises the question as to how far avatar profiles actually correspond to user profiles, i.e., do users tend to give information on themselves or rather invent some fantasy character. Before we go into this issue in detail, it should be noted, that important parts of the user profile, especially the tracking of user activity and any conclusions drawn from that are completely independent from this question. Apart from that, we work with the assumption that users identify with their avatar and therefore give information on their actual personality, preferences and attitudes. The following aspects support this assumption:

- a survey performed after the first run of Flirtboat in Austria: users were asked directly if they felt well represented by the avatar, and 69 % said that their own personality had been embodied very well or well by their avatar. However, the response rate was rather low, with only 83 respondents.
- user response to the operators: user questions like "Where can I change my flat?" or "Why am I sometimes matched with people who are not in my age group?" indicate that users are indeed interested in presenting themselves to the community.
- user input in the discussion forum and in the guest books: people upload photos showing themselves and things that are important to them into their nickpages, they discuss current developments in politics and society, but also personal issues. Some users update their nickpage daily.

Our hypothesis is that people who construct a different identity from their own do not build a relationship to the community, and therefore do not return sufficiently often to be included in our data analysis. Based on experience from 16 launches of 7 different NetLife applications this hypothesis holds strongly enough to enable further development, especially from a commercial point of view. To back this up scientifically, however, a systematic analysis of user created content and a user survey still needs to be conducted. We assume that it is not possible for users to answer questions on attitudes and preferences consistently if the answers do not actually reflect their true opinions and feelings. A consistency test could easily be integrated into NetLife applications via the questions posed by system avatars, although we have not yet done so.

3.2.2 Collection Methods.

Technically, NetLife offers an ideal platform for extensive collection of data, since it

- can take data any time, i.e., the system is online all the time, thus the user can visit her avatar any time of day;
- works with a database and therefore collects data automatically;
- produces high quality data, i.e., maximum reliability in data acquisition is achieved as user input equals system output. Error rate is reduced as no human observer is involved in registration and interpretation of the data.

As regards the user, data are collected in three ways:

1 tracking of user actions: tracking investigates all explicit user actions and aims at deriving valid conclusions about implicit or underlying dimensions such as user preferences or interests.

2 collection of direct user answers to questions by the system: a major advantage of the anytime approach in NetLife is that the user gives answers over time, and whenever she wants. As a result the user tends to answer many questions. Another advantage is that the user answers questions on different days when she may be in different moods and situations. As input from the user is distributed over many days and times of the day, biases due to varying daily performance are statistically levelled out.

3 input from other users / voting by all users: user content can be rated by other users (in the case of NetLife the personal nickpage), in other words users may give their opinions on other users. Voting is used to find the collective opinion of the community on a certain topic.

The above three way distinction has formed the basis for what we call the generalized avatar profile, a classification of data collected via NetLife applications. All data apart from tracking and user generated content are acquired by means of multiple choice questions. The results are aggregated automatically by the system over all answers per person.

3.3 Generalized Avatar Profile

The avatar profile (which, as decribed earlier, is assumed to reflect the characteristics of the user) constitutes a very important component of the application as a whole. Most of the dynamic content of the database can be related to individual users, and the user avatars are the central driving force of the simulation. Figure 1.3 gives an overview of the generalised avatar profile as it occurs in sysis NetLife applications. The individual aspects will be explained in the following sections. The picture shows the connection between data collection methods (tracking, direct user input, ...) and the data types acquired (usage and activity, user generated content, ...). In addition, example classes are presented.

Shaded fields with text in italics indicate areas that are part of the user profile concept but have not been fully analysed up to date.

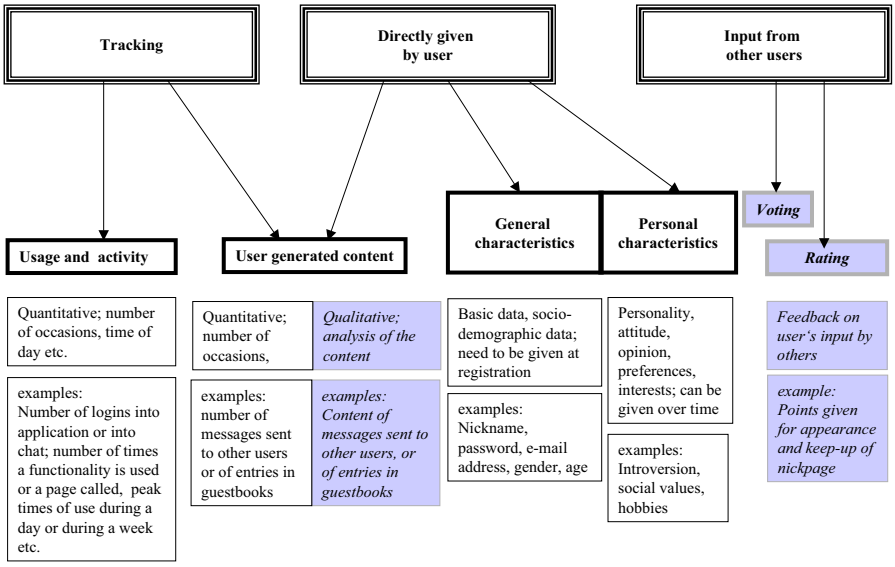

Figure 1.3. Generalized avatar profile

Usage and activity: Analyses of usage data, usually performed in combination with data from the 'general characteristics' class, help to assess user attraction and persistence. Parameters representing the 'usage and activity' type of data are the number of registered agents over time, and number of user visits (logins) to their avatars. Parameters representing 'general characteristics' are avatar age and gender. These are used for cross classification with the usage data, see section 4.1.5.

A very specialised item is 'visits to locations', i.e., the number of times a specific location has been visited. As locations can be branded by sponsors, this is a particularly vital piece of information for the commercial evaluation part. Additionally, the mere counting of user generated content items allows conclusions as to which functionalities of the platform work particularly well for the user. In section 4.1.1 we will give figures on the number of registrations, the visiting rate of users to their avatars and the number of daily logins to different launches of Flirtboat.

User generated content: The user has four ways of adding personal content.

1 **Creating and maintaining a nickpage:** The nickpage contains free descriptions of, for example, the partner one is looking for or the things the user hates most etc. Each item can be counted and assessed for its degree of user acceptance.

2 **Taking an action at a date:** When instructing her avatar to seek a date with another avatar, the user can specify an action that the avatar should take at this meeting. Basically, actions are predefined and parameterised which enables the other avatar to interpret the action as something to be considered positive or negative. As parametrisation takes place during the production phase with the main purpose of adding more of a game feel to the simulation, it must be acknowledged that actions might not be considered equally positive or negative in all cultural circumstances and by all users, but indicators used in this area are highly aggregated and can safely be assumed to even out statistically. Moreover, they are chiefly used in customisation projects to assess number and types of items needed so as to create an entertaining application. In addition, at each date the user can enter a message that her avatar will give its counterpart at the meeting (and which will then turn up in the accounts of both avatars). Number and content of such messages can also be used to guide further development especially as regards the game aspect of the community. In the context of the work presented, we only use number of actions and action type as indicators.

3 **Asynchronous communication:** The user may write e-mails on behalf of her avatar to the avatar's friends or partners. As an indicator we use the number of mails sent.

4 **Synchronous communication:** The user may directly engage in communication with other users via the chat facility. Indicators are how many users use chat during a day, at what times and on which days.

In section 4.1.2, we will give a quantitative analysis of Flirtboat data concerning the usage of actions, e-mail and chat. Assessment of the content of such messages, however, is outside the scope of the work presented in this chapter.

General characteristics are static and are given during registration and mainly cover socio-demographic data. Thus they are different from personal characteristics which develop over time. In our studies the general characteristics, avatar age and gender, are used as the determinants of primary cluster analyses.

It must be noted that the distinction between general characteristics and personal characteristics has been made primarily to facilitate working on and with the NetLife platform and less for theoretical reasons.

Personal characteristics: Most of the questions a user will answer during participation in the platform will be targeted at her personal profile, or more specifically the avatar's personal profile. In particular these questions relate to personality, opinions and attitudes, preferences and interests.

1 **Personality:** The personality model — together with a need model which controls the agents — forms the core of the virtual life in Flirtboat. The model is based on the Jungian theory of personality, Jung (1937). In particular it is an adaptation of the Myers-Briggs Type Indicator (cf. Keirsey and Bates (1984)), a paper-and-pencil personality test, according to which personality is modelled along the dimensions extroversion – introversion, intuiting – sensing, thinking – feeling, and judgment – perception. Combinations of these dimensions lead to 16 personality types.[3] This particular approach has been chosen, because it can be easily adapted for the matching and dating mechanism underlying the applications, and also for the assignment of personality to the avatars by means of an online questionnaire which is presented to the user as part of the registration process. The model provides precise indications as to the personal relationships each personality type may have with any of the other types and how they are expected to develop over time, see Socionics Relations (url). Question-answer lists in the style of Flirtboat texts have been designed for each personality type by a psychologist addressing several areas of (the users') lives such as social behaviour, partnership, career etc. The answers to these questions are used to attribute individual Jungian dimensions resulting in personality profiles. See Boeree (url) for an online description of the Myers-Briggs types. Examples for question-answer pairs as presented in the UK Flirtboat are given in Table 1.1.

2 **Opinions and attitudes:** Questions on opinions and attitudes aim to identify the respondent's value system. Attitudes are defined as "an organismic state of readiness to respond in a characteristic way to a stimulus (as an object, concept, or situation)" whereas opinions are described as "a view, judgment, or appraisal formed in the mind about a particular matter".[4] In short, attitudes are more generalised and consistent over time, while opinions refer to a specific issue that may only be relevant at one point in time. In NetLife applications, these questions are asked over time. In part they are needed to

refine avatar profiles for matching with other avatars, in part they are used to profile the data for lifestyle analysis.

3 **Preferences and interests:** Preferences and interests are the main indicators used in life style analysis. Two types of questions relating to preferences and interests are used: 1) general questions that follow the lifestyle analysis concept described in section 3.4 and are employed for assigning a lifestyle type to the profile, and 2) specific questions which are asked by a concrete sponsor and relate either to the sponsor's products or to sponsor-specific segmentation criteria.

Data on gender, age, and personality traits of the avatars in Flirtboat are presented in sections 4.1.3 and 4.1.4, respectively. The assessment of opinions/attitudes and preferences/interests is of relevance for the analysis of lifestyle, see section 4.1.6.

Table 1.1. Examples for question-answer pairs for the assignment of avatar personality

Imagine your date is keeping you waiting. How long does it take before you start to feel annoyed?	5 minutes 10 minutes 15 minutes 30 minutes
What would you say sounds more like you: "Hello, here I come!" or "Lets wait and see."	Hello, here I come! Lets wait and see
Are you a dreamer or more of a practical type?	Dreamer Practical type
Are you a rational or an emotional person?	Rational Emotional
Do you like to keep everything in good order or are you inspired by chaos?	Order Chaos
How do you feel when you are in a crowd?	Relaxed Tense
What do you think about visionaries?	They're tedious They're fascinating
Be honest: Are you likely to be impressed by an emotional speech or will only hard facts convince you?	Emotional speech Hard facts
Do you like to check things out first or do you act on the spur of the moment?	Investigate first I'm impulsive

Rating: We talk about rating if users give an evaluation of user generated content, such as for example the nickpage. It is a means for the community to manage its standards itself. In Netlife, ratings are used for the nickpages and are simply given on a scale from 1 to 5, according to whether users like or dislike them.

Voting: Technically, voting follows the same mechanisms as rating, but has a slightly different focus and outcome. As opposed to rating which refers to personal topics such as the individual nickpages, voting refers to general topics in the particular community. Voting is neither implemented in Flirtboat nor in derSpittelberg.

3.4 Lifestyle Analysis

During the conceptual work on derSpittelberg, an additional user profiling-module has been developed and integrated into the NetLife platform to carry out market segmentation based on lifestyle questions. As sysis provides avatars equipped with personality traits, it is a consequential extension to undertake lifestyle classifications. Information about lifestyle group-affiliations is very useful for commercial applications as well as it serves for matching purposes, especially user-to-user or content-to-user matching within applications.

On the basis of theories on lifestyle (Hartmann (1999)), lifestyle and identity and the relevance of lifestyle classifications for marketing purposes (Mitchell (1983)), and socio-scientific research on different dimensions of behaviour that make up the frame for each lifestyle-concept (Bortz and Döring (2002)), the following three main dimensions (a priori typology) were formulated to classify avatars/users in derSpittelberg leading to 8 lifestyle types.

- Spare time behaviour (active versus passive) investigates the principal preference for spending one's sparetime, i.e., relaxing or looking for action, organising or participating in events.
- Buying motivation (usefulness versus prestige) investigates the principal preference in buying goods, in terms of what the main motivation is when a customer decides among similar products.
- General mindset (conventional versus unconventional) investigates the principal attitude and perspective of a person when judging or decision making.

To determine lifestyle segment affiliations of users, a set of related questions is used to assess the position of a user on each dimension. All questions are formulated dichotomously reflecting the two opposite perspectives. The predominant perspective is used for the assessment of each dimension, undecided cases are omitted from further statistical analysis. Due to practical needs or application constraints the number of questions used for lifestyle type assessment must be variable: e.g. for derSpittelberg each dimension was covered by a maximum of eight questions. In addition, sponsors were given the possibility to pose questions concerning their products. As a tribute to the entertaining character

of the application, most questions were randomly presented and users could skip answers if they wished. This led to a relatively large number of missing values in the data-set.

In the following we present two examples for questions that survey the lifestyle type of a user in derSpittelberg. A question to test egotism versus social attitude was:

> You and your friend suddenly feel ravenous for something sweet but there's only one of your favourite chocolate bars left. What will you do? — eat it in private versus share with my friend.

A question to test status orientation was:

> Which would be your holiday hire car? — stretch limousine versus compact car.

4. Data Evaluation

Generally, one must differentiate between quantitative analysis of the data, i.e., counting the times a user has logged onto the system, or the number of items in all nickpages and the like, and qualitative analysis of the data, i.e., an analysis of users, their motives and use of the community. User generated content, for instance, would be an appropriate resource for qualitative analysis. A qualitative approach, however, is out of the scope of this study. In other words, all evaluation results presented in section 4.1 are based on quantitative analysis.

The following main aspects were addressed when analysing the data collected:

Performance should be watched closely as it is the main determinant deciding about the further fate of a community. Typical questions are:

- How many logins occur per day?
- How often do users return?
- Which functionalities are most widely used?

Typical conclusions are:

- measures to retain users,
- development of the functionalities most used, or of functionalities undersized etc., depending on qualitative conclusions.

Cross classification is relevant to answer questions such as, what are the characteristics of the avatars being visited often or rarely, or more indirectly who are the users logging in often/seldom? (males? young? etc.). This serves as a mechanism to check if the target group defined prior to the application development has been reached or to

adapt promotion measures to sharpen the definition of the target group if it was only defined very broadly beforehand.

Lifestyle modelling is a further means to support matching of users in the community, as lifestyle stands for an expression of one's personal image on the basis of given living conditions, and for a means of sustaining one's identity. It has shown that people tend to participate in groups with similar lifestyle characteristics. Items and actions with a distinct symbolic meaning are used to communicate lifestyle-group affiliation to others, see Mitchell (1983). In derSpittelberg lifestyle clusters are used for market analysis, see section 4.1.6.

4.1 Evaluation Results

As already stated, we can only give some samples of the evaluation performed within the methodology described in the previous section. We believe, however, that these samples show well what can be achieved by collecting and analysing data in the way described above, both in terms of commercial sustainability and further development. All data presented in sections 4.1.1 to 4.1.5 stem from Flirtboat applications. The data in section 4.1.6 originate from derSpittelberg.

4.1.1 Usage and Activity.

Number of registrations: AUT Flirtboat had a total of 11,053 agents registered, 4,233 (38.3%) of which were inactive, i.e., the user visited her avatar (i.e., log into the application) only on one day. For comparison, UK Flirtboat had a total of 22,681 agents registered, 12,421 (54.8%) of which were inactive and for CRO Flirtboat 6,718 avatars were registered, with 2,126 or 31.65% inactive.

Average number of visits: The average number of visits to the application per registered user was just under 35 in AUT Flirtboat, with average time on board amounting to 36 days. In UK Flirtboat on average an avatar was only visited 21 times over a duration of 27 days. In CRO Flirtboat avatars were visited on average nearly 47 times during a period of 37 days. In AUT Flirtboat, 25% of the users had a time on board of more than 60 days, visiting their avatar more than 34 times. The duration is the same for the top quartile in CRO Flirtboat, whereas the number of visits (more than 52 for the top user group) is the highest of all three countries. In the UK, the quartile with the most visits had over 20 visits and an average duration on board of more than 42 days. The fact that the median (50% quartile) of visits is much lower than the mean, and only the 75% quartile is about as high as the mean, leads to the conclusion that among the top 25% of the users the number of visits is actually well above the mean. In fact, the maximum number of

visits by an individual user in AUT Flirtboat was over 1,000. In CRO Flirtboat it was 1,174 and in UK Flirtboat over 800.

Daily logins: After approximately one and a half months of runtime, daily logins were established at a fairly constant level for all three applications, see Figure 1.4. The average number of logins per day amounted to 2,734 in the UK, 1,941 in Croatia and 2,265 in Austria. As we learn from AUT Flirtboat 3, the application with the longest runtime of all NetLife applications up to date, the number of daily logins eventually stagnates at a considerably lower level.

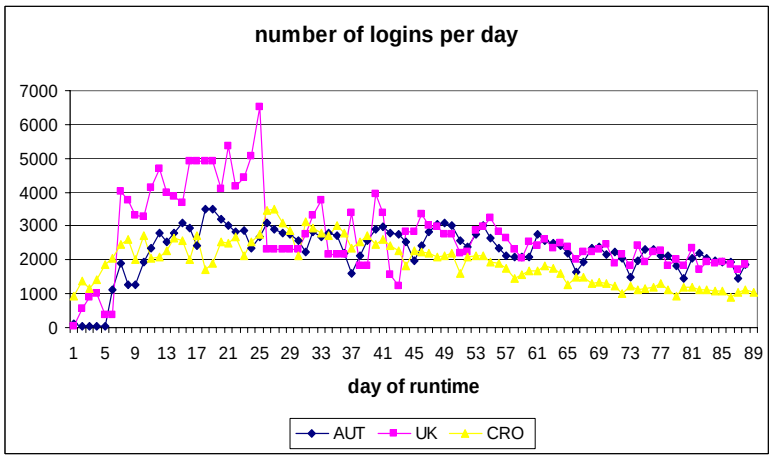

Figure 1.4. Flirtboat: daily logins

4.1.2 User Generated Content.

Actions: In AUT Flirtboat 1, one out of ten meetings were accompanied by an action. 80% of these actions had a positive character, and 4% were negative actions. The picture changed in AUT Flirtboat 2, where the number of actions decreased (only 8 out of 100 meetings were accompanied by a user-defined action), and the percentage of negative actions

increased to 28%, mainly replacing neutral actions, which decreased to 2%. In UK Flirtboat, 50% fewer actions are taken by the users than in AUT Flirtboat 2. However 60% of these actions are accompanied by text input, and 80% of all actions have a positive character. In all applications, utterances accompanying an action are typically quite short, i.e., 38 characters on average.

E-mail: While in AUT Flirtboat 1, on average 19 mails were sent per avatar. The average number of mails per avatar was almost halved in AUT Flirtboat 2, i.e., there was an average of 10 mails per user. For UK Flirtboat there was only an average of 8 mails per user. This may be due to the chat facility available in UK Flirtboat and AUT Flirtboat 2. The average length of a mail in AUT Flirtboat 2, however, considerably increased from 191 characters in AUT Flirtboat 1 to 295 characters in AUT Flirtboat 2. Mails are even longer in UK Flirtboat, 374 characters on average.

Chat: The data from UK Flirtboat and AUT Flirtboat 2 have shown that the frequency of chat usage was different on different week days with the most intensive use on Sunday in the UK and on Monday in Austria. The chart of logins per time of day also shows clear differences with peak- and off-peak times largely corresponding in both countries. The only time with hardly any chat traffic at all was between three o'clock and eight o'clock in the morning, the absolute high lies between 21:00 and 22:00. Surprisingly the youngest age group (13–19) in both countries had the lowest mean for chat login frequency. At the other extreme, in the Austrian sample the highest mean for chat logins was observed in the oldest age group (above 50). Generally, the chat facility was used more by English users, not only in total numbers, but also in relative numbers (logins per user), and UK males use the chat slightly more frequently than females. Chat content was not logged.

4.1.3 General Characteristics.

Age groups of avatars: Age is grouped into five broad classes ($\leq$19, 20–29, 30–39, 40–49, $\geq$50), and the users assign one of these age groups to their avatars. Comparing the Austrian and UK Flirtboat, we find that the age distribution of avatars is fairly similar in the three countries. Differences are particularly small in the Austrian and the UK application. See figure 1.5 for illustration.The majority of avatars belong to the group of under 30s, whereas the over 40s are strongly underrepresented, and there are even fewer avatars in the age group over 50.

Avatar gender: Female avatars outnumber male ones in UK Flirtboat and CRO Flirtboat, with 51.5% versus 48.5% and 53.2% versus 46.8% respectively. In AUT Flirtboat, however, the distribution is in-

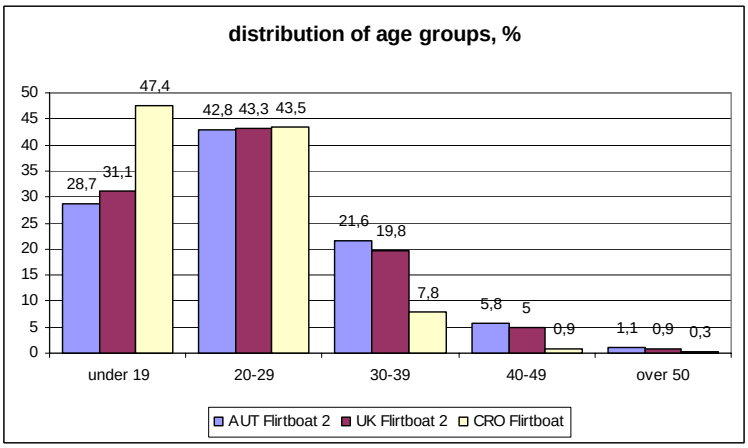

Figure 1.5. Flirtboat: distribution of age groups among avatars

verse, with 58% male avatars versus 42% female ones. These data refer to avatars visited more often than once.

4.1.4 Personal Characteristics.

Personality: Even though avatar personality is modelled along the four dimensions of the Mayers-Briggs Indicator only data related to the dimensions extroversion – introversion and thinking – feeling showed significant results. In Austria and the UK, more than half of the avatars were created with introverted personality, and more than half of the avatars were created with a feeling type personality. In other words, Flirtboat attracts the introverts and the emotional ones.

Comparing the personality types assigned to the avatars in the Flirtboat applications in Austria, the UK and Croatia, we find that there is little variation in the most frequently assigned personality types in all three counties. Note that the names used for labelling the personal-

ity types are standard terminology, cf. for instance Keirsey and Bates (1984). In particular we found

ENFJ (extroverted feeling with intuiting) is the most frequently assigned personality type in UK Flirtboat (10.64% of the avatars) and in CRO Flirtboat (17.51%), and it is the second most frequently assigned personality type in AUT Flirtboat (11.22%);

INFJ (introverted intuiting with feeling) is the most frequently assigned personality type in AUT Flirtboat (11.41%), the second most frequently assigned personality type in CRO Flirtboat (12.18%) and still the third most frequently assigned one in UK Flirtboat (9.48%).

Considering the least frequently assigned personality type, we again find similarities, with ENTP (extroverted intuiting with thinking) being assigned to 2.37% of the avatars in AUT Flirtboat and to 2.42% in CRO Flirtboat. ENTP is the third least frequently assigned personality type in UK Flirtboat (4.08%). In Boeree (url), these personality types are described as follows:

> These people are easy speakers. They tend to idealize their friends.
> (ENFJ)

> These are serious students and workers who really want to contribute. They are private and easily hurt. They make good spouses.
> (INFJ)

> These are lively people, not humdrum or orderly. As mates, they are a little dangerous, especially economically.
> (ENTP)

4.1.5 Cross Classifications.

Apart from the analysis of single avatar characteristics, cross classifications are analysed, in order to see if there are differences in usage between the basic sociodemographic user clusters gender and age.

Logins and avatar gender: The question investigated is: Do females use this application more than males? As regards gender, there are hardly any differences between the UK and the Austrian application. In general the average number of visits is slightly lower for males than for females, but the difference is less than 1 average visit. The difference in the average duration of visits in days to female and male avatars is four in the Austrian sample and three in the UK sample. Again, male avatars are visited less often than female ones. CRO Flirtboat shows a different picture. Here male avatars on average have 9 more visits than female ones, although the average time on board is slightly higher for female avatars (39 and 37 respectively).

Logins (visits) and avatar age: Does this application appeal more to the young or to the older audience? The average number of visits

is highest in all three samples among the 30 to 39 year olds. In the Austrian data the difference is more pronounced than in the UK data.

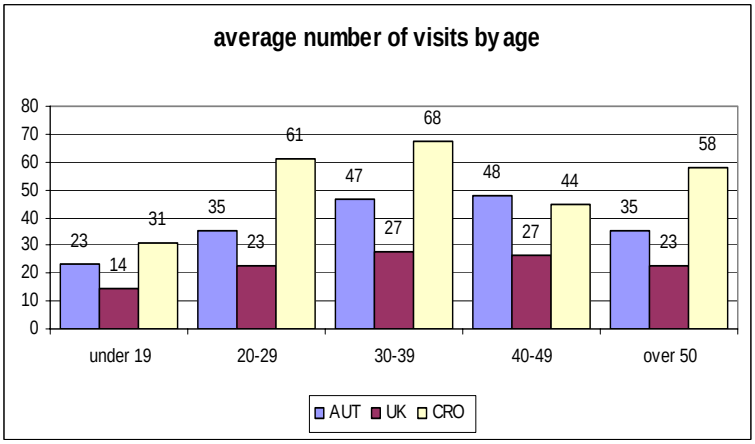

Figure 1.6. Flirtboat: average number of visits by age

Avatar gender and avatar age: How well balanced is the community in terms of the basic characteristics. This question is particularly important for a dating platform like Flirtboat where the vast majority of users prefer to be matched with people of their age group. In connection with derSpittelberg it was important for the operator to know if the prespecified target group had been reached, i.e., students between 18 and 25, and ideally males and females in a 50:50 split. The predominance of male avatars is particularly interesting in the UK version of Flirtboat, as it is hosted on a women's channel. The Austrian data reflect the gender distribution of Austrian Internet users as reported in the Austrian Internet Monitor (url). The distribution of (avatar) gender over (avatar) age groups is comparable for the Flirtboat applications in the UK, Austria and Croatia. In all three launches female avatars clearly outnumbered the male ones in the age group ≤ 19. For all other age groups in all

launches the tendency is reversed, i.e., male avatars outnumber female ones.

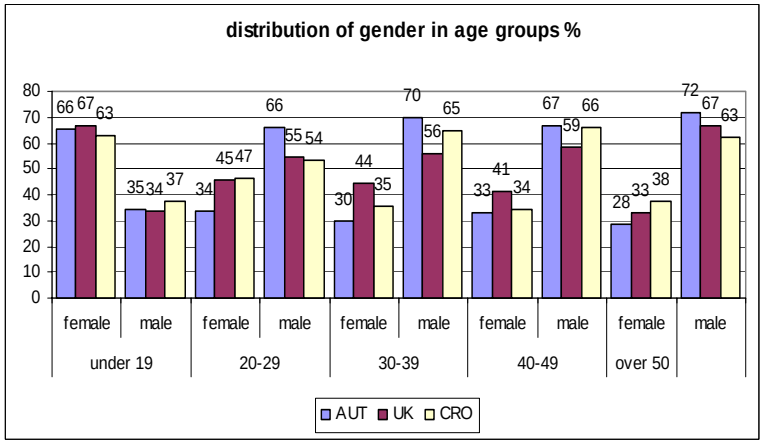

Figure 1.7. Flirtboat: avatar gender and age cross classification

Gender and Personality: When we separate male from female data, we find more divergence of the most frequently assigned personality types of male avatars, i.e., INFJ (introverted intuiting with feeling) in AUT Flirtboat (10.48%), ISTP (introverted thinking with sensing) in UK Flirtboat (10.35%) and the generally high scoring type ENFJ (extroverted feeling with intuiting) in CRO Flirtboat (14.68%).

Looking at female avatars, we find ENFJ as most frequent type in AUT Flirtboat (14.37%) and CRO Flirtboat (20.18%). It is again the UK sample which clearly differs, with INFP (introverted feeling with intuiting) as most frequently assigned personality type (13.49%).

Interestingly much more convergence can be found for the least frequently assigned personality type, ENTP (extroverted intuition with thinking) which was assigned least in five of six clusters in total, namely in AUT Flirtboat (1.99% of the male avatars, 3.00% of the female

avatars), CRO Flirtboat (2.43% male, 2.41% female), and UK Flirtboat (3.34% female). In Boeree (url) we find:

> These people are action-oriented and fearless, and crave excitement. (ISTP)

> These people are idealistic, self-sacrificing, and somewhat cool or reserved. They are very family and home oriented, but don't relax well. (INFP)

Age and Personality: In AUT Flirtboat the proportion of avatars designed as introverts is particularly high among those specified as aged above 40. While in the Austrian sample the proportion of introverts in the different age groups varies between 52% and 67%, in the UK the variation is small (ranging from 53% to 57%).

4.1.6 Lifestyle Analysis.

In Table 1.2, we present the distribution of derSpittelberg users across the eight lifestyle types defined at sysis. Absolute and relative frequencies of valid cases are listed.

Table 1.2. User lifestyle classification within derSpittelberg

	Life-style Type	Buying Motivation	Spare Time Behaviour	General Mindset	Freq. %	Valid
Valid	A:	prestige	active	conventional	13	3.7
	B:	prestige	active	unconventional	38	10.7
	C:	prestige	passive	conventional	6	1.7
	D:	prestige	passive	unconventional	7	2.0
	E:	usefulness	active	conventional	70	19.7
	F:	usefulness	active	unconventional	149	41.9
	G:	usefulness	passive	conventional	36	10.1
	H:	usefulness	passive	unconventional	37	10.4
	Total				356	100.0
Missing	System				3964	
Total					4320	

We see that type F (usefulness active unconventional) is overrepresented (41.9%) whereas Types A, C, and D are underrepresented (3.7%, 1.7%, 2%). A result which meets our assumptions about the target group of this application.

From evaluation of the lifestyle typology, we see that types A,C and D can be neglected for the analysis of product related questions of sponsors due to their insignificant representation within the community. Thus for investigations into specific consumer behaviour only user types B, E, F, G and H are taken into consideration.

5. Conclusion

In this chapter, we have presented sysis NetLife — an application platform for the development of avatar-driven multi-user Internet communities — and two of its applications: Flirtboat and derSpittelberg. The most distinctive feature of NetLife applications is that users are represented and integrated in the community via their avatars. Thus the avatar is the principal means or metaphor for data collection.

We have presented a way of classifying the data collected by NetLife applications, and have discussed in more detail those data which stem from the users' activities in creating, visiting and supporting their avatars. In particular these are data on usage and activity, user generated content, and general and personal avatar characteristics.

As regards usage and activity, the data from Flirtboat show high user retention, i.e., almost two thirds of the users return to AUT Flirtboat, and more than two thirds do so in CRO Flirtboat. User retention is less strong for UK Flirtboat, here just under half of the users return to the application. Moreover, data on the average number of visits strengthen the evidence that user retention is best in CRO Flirtboat, closely followed by AUT Flirtboat, and less strong in UK Flirtboat, i.e., users of CRO Flirtboat visit their avatar 47 times over 37 days, users of AUT Flirtboat do so 35 times over 36 days, whereas users of UK Flirtboat on average visit their avatar 21 times over 27 days. Another valuable insight from usage data is that the interest in the application levels off after a certain period of time, for example, approximately after one and a half months for the Flirtboat applications. In other words, after a certain period of time a core user group is established. This core further reduces with increasing runtime. We consider such cores of particular value for qualitative studies on the impact of community applications with virtual user characters (avatars).

Our evaluation of user generated content can also be subsumed under usage and activity, because the results presented stem from quantitative analysis, such as how frequently are e-mail and chat facilities used, compared to a such indirect means for communication as the actions that can be selected to accompany a date.

As regards avatar characteristics, for example, the distribution of age groups among the avatars in Flirtboat shows that in all three countries most avatars belong to the group of under 30s, whereas the distribution of female and male avatars differs between UK and Croatia on the one hand, and Austria on the other hand, with more female avatars in the application for the former, and more male ones for the latter. This knowledge may be used for further design decisions, e.g. to improve the

work on male or female avatars, to set new incentives to balance or, on the contrary, to sharpen the gender distribution, depending on the goals pursued with the application. As regards personality, we find that there is little variation in the most frequently assigned personality types over the applications in Austria, Croatia and the UK. We conclude that certain types of users can be reached particularly well by the application.

From a cross classification of items we get insights at a more fine grained level, e.g. we learn that even if the most prominent group of avatars belongs to the under 30s, older ones are more frequently taken care of than younger ones (under 19 year olds). Given we accept the assumption that avatar age reflects user age, the data reveal that older user groups are more engaged in the application. We also learn that in all cases (all age groups and all Flirtboat applications) except for the under 19s, male avatars outnumber female ones. Also lifestyle analysis (presented and analysed from a commercial point of view in the context of derSpittelberg) is of more general interest for avatar-based applications, especially its potential for user-to-user and content-to-user matching.

In this contribution we have shown which possibilities such avatar-driven communities open up for data collection across large populations. As the users interact with the system over a longer period of time by creating, modelling and influencing their avatar representatives, these communities are suitable testbeds for the evaluation of different types of animated characters.

Acknowledgments

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Notes

1. The figure dates from June 2003.
2. Sampling methods are described in Atteslander (1995) and Friedrichs (1990).
3. See also Socionics Types (url) and Socionics Profiles (url), respectively.
4. Cf. Merriam Webster (url).

References

Ananova, URL: http://www.cnn.com/2000/TECH/computing/04/18/ananova.launch/

Atteslander, P. (1995) *Methoden der empirischen Sozialforschung*, Walter de Gruyter, 8.Auflage.

Austrian Internet Monitor, URL: http://www.integral.co.at

Boeree, C.G., URL: http://www.ship.edu/~cgboeree/jung.html

Bortz, J., Dring, N. (2002). *Forschungsmethoden und Evaluation*, Springer.

Cybelle, URL: http://www.agentland.com/

Friedrichs, J. (1990) *Methoden empirischer Sozialforschung*, Westdeutscher Verlag, 14.Auflage.

Hartmann P.H. (19990 *Lebensstilforschung. Darstellung, Kritik und Weiterentwicklung*, Opladen.

Jung, C.G. (1937) *Psychologische Typen*, Rascher, Ges. Werke, Bd. 6.

Keirsey, D. and Bates, M. (1984) *Please Understand Me: Character and Temperament Types*, 5th Edition, Prometheus Nemesis Book Co.

Krenn, B., Neumayr, B., Gstrein, E. and Grice, M. (to appear) Life-Like Agents for the Internet: A Cross-Cultural Case Study. In: Payr, S., Trappl, R. (eds) *Agent Culture: Designing Human-Agent Interaction in a Multicultural World* Lawrence Erlbaum Associates.

Mitchell, A. (1983) *The Nine American Lifestyles*, Warner Books.

NECA, URL: http://www.oefai.at/NECA/

Socionics Relations, URL: http://www.socionics.com/rel/rel.htm

Socionics Types, URL: http://www.socionics.com/main/types.htm

Socionics Profiles, URL: http://www.socionics.com/advan/prof/

Chase Walker, URL: http://www.cnn.com/2000/TECH/computing/04/18/ananova.launch/

Merriam Webster, URL: http://www.m-w.com/home.htm