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Re:Gossip - A social network of truths and lies.

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Re:Gossip is a project that originated in the Future of Fun II workshop during the Handheld and Ubiquitous Computing conference in Karlsruhe in September 1999. It arose out of our common interest in the connection between the invisible networks of wireless technologies and the invisible social networks that surround us in everyday life.

The goal is to make visible the hidden relationships that make up social networks and to transform these networks through wireless, handheld and internet technologies. Re:Gossip is both the real exchange of social data and the fictional game of storytelling. It is seriously fun.

We are entangled in a tightly woven social fabric of which many of the intersections and communication processes are hidden. The social structures made visible are those of governments, corporations and institutions. Other social structures that have no representation are trivialized as fiction or on a day-to-day-level, as gossip. Gossip is the most effective and compelling way of weaving the social reality. In Re:Gossip, the internet is both the representation and the communication process for the underlying and ad-hoc social network of gossip and social fiction.

Re:Gossip starts with a small group of friends and† associates. They may have only met once and may not "see" each other again. Re:Gossip can be used to stay in touch, to get to know each other better and to further develop their knowledge of each others life as fiction, fact or somewhere in the middle. 'Exaggeration furthers understanding.' When you join Re:Gossip you are given permission to exchange and embellish each other's social data. As community members you are challenged to both expose as "unvarnished truth" the social relations of other members while maintaining the vital bonds of the community. You are as free to tell stories about other Re:Gossip members as they are free to tell stories about you...

The heart of the system is the Re:Gossip server and the ubiquitous access to that server. The Re:Gossip system keeps track of all the pieces of gossip going around. Each piece of gossip has a unique identifier and the users should be able to pull out detailed information about the gossip (for example, the gossip body, the trail of the gossip etc.). The important part of spreading the gossip is to register to the database that you have received a certain piece of gossip. The registration can be done automatically (in case of e-mail and SMS) or via the Re:Gossip web site. When spreading the gossip all you have to do is to mention the unique Re:Gossip number and, of course, tell the gossip itself!

Perceived novelty of functions - a source of hedonic quality

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In the last decade, researchers have expressed the notion that there is more about (software-)product quality than mere usefulness (i.e. utility and usability, e.g. ISO 9241-11). In the Technology Acceptance literature, for example, perceived fun / enjoyment was found to contribute to software system acceptance (e.g. Igbaria, Schiffman, & Wieckowski 1994). In the field of software-ergonomics the rather narrow focus on task-related issues was challenged by designers / developers of consumer products (e.g. Adams & Sanders 1995) and broadened by introducing “emotional usability” (Logan 1994; Kim & Moon 1998).

In a preceding laboratory study (Hassenzahl, Platz, Burmester, & Lehner in press), we attempted to measure a construct coined “user perceived hedonic quality” (HQ, e.g. originality, impressiveness) and to determine its impact on judgements of appeal (APPEAL, e.g. good, attractive). Regression analysis showed an almost equal contribution of HQ and “user perceived ergonomic quality” (e.g. controllability, simplicity) to APPEAL. We concluded that the importance of a product’s hedonic quality aspects should not be underestimated, because it might be a potential source of increased product quality (let alone sales and acceptance).

With the present (case) study, we set out to isolate a potential source of hedonic quality of a technically oriented consumer product, namely a “home automation system” (HAS). It enables the user to configure, program and control her / his own sensor-actor connections, such as switching on the light when motion is detected. The “user interface design group” (CT IC 7) of Siemens was asked to outline the product and to design the actual user interface.

Method: Fourteen individuals (7 women, 7 men) participated in a diagnostic usability test of prototype versions of the HAS. They worked through a number of tasks. At the end of each session they were given a semantic differential (Hassenzahl, Platz, Burmester, & Lehner in press) and were asked to make an assessment of the product’s HQ. HQ is the mean of a 7 item scale (e.g. exciting – dull), running from –3 to +3 (Cronbach’s Alpha: .89). Computer expertise (CEXP) was assessed with a 5-item questionnaire. On the basis of the resulting sum score, CEXP was then dichotomised (median split) in either “low” or “high”. The participant’s job background (JOB) was classified in either “technical” (e.g. software developer, electrician) or “non technical” (e.g. estate agent, teacher).

Results: Figure 1 shows the mean HQ for different levels of JOB and CEXP. A 2x2-analysis-of-variance (JOB x EXP) revealed a significant main effect of JOB ($F=8.71$, $df=1$, $p<.01$): Participants with a non-technical job background perceived the HAS as more hedonic than participants with a technical background. No main effect of CEXP emerged. The JOB / CEXP interaction was only marginally significant ($F=4.58$, $df=1$, $p<.10$).

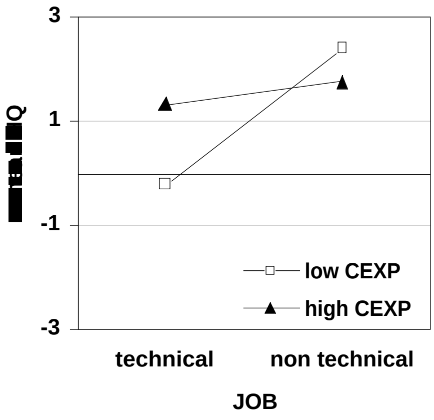

Figure 1: Mean HQ for job background (JOB) and computer expertise (CEXP)

Discussion: The HAS is perceived as less hedonic by participants with a technical job background compared to participants with a non-technical job background.

A possible source for this effect might be the perceived novelty of the system's functions. Presumably, it depends on the individual's standards and experiences, manifest in the job background, whether a function is regarded as new or not. Functions that seem to be common and boring for an individual with a technical background may be extraordinary and interesting for an individual with a non-technical background.

This interpretation has an interesting implication. A product's functions may serve a purpose beyond being useful – their mere perceived novelty can be a source of hedonic quality and through that contribute to the appeal of the product.

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Designing for TV based interactivity

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The age of digital TV presents the chance for TV to become interactive. This has introduced the concept that the TV and PC are converging . This paper addresses this issue and attempts to unravel the degree to which TV and PC design can be considered the same. It argues that interactive TV use represents a fundamentally new challenge to designers and producers, and to the HCI community. The BBC has been developing interactive services for some time. For TV-centric services (rather than BBC On-line), the BBC will offer Digital text, enhanced and interactive television (i-TV). To produce these, a number of pragmatic design decisions have been made.

TV use is fundamentally different to PC use. Industry leaders refer to the two activities as 'lean-forward' and 'lean-back' activities, and 'viewers' are now commonly referred to as 'users' (Draper, Earnshaw, Montie, Parnall, Tol, Wilson & Winter, 1999). This is a very simplified (perhaps over-simplified) description, but is essential to changing attitudes. PC use is typically characterised (in HCI) by a one-to-one relationship between user and machine, physical proximity to the screen, high-resolution displays, goal-based interaction and the use of graphical pointing devices and text entry tools (keyboard). This contrasts with TV, which is a many-to-one relationship between a social group and the machine, greater physical distance, lower resolution, entertainment-based interactivity and the use of a remote control. This has significant effects upon design.

The social nature of TV implies that most viewing must be 'negotiated'. Thus, when interacting, the *formation of intent*, *specification of the action sequence* and *execution* (to adopt Norman's terminology, 1988) are radically altered. Due to this compromise, we can no longer assume intention is always clearly specified. Perhaps more fundamentally, the nature and formation of the goals have changed. Whilst in PC use the goal is often precise (as in work demands), TV's concern with entertainment and with fun suggests goals may be poorly specified, or non-existent. Users have no internal 'goal formation', thus the intention is unspecified. This implies that the users become more susceptible to 'reactive' goal formation, where decisions about behaviour are the result of what is seen (perhaps in a manner similar to an 'elimination by aspects' process of decision making).

The design of the current generation of i-TV addresses concerns with the social nature of TV and the lack of goals, but also considers a number of further issues. Of great interest is how (or indeed whether) to maintain consistent design for the goal-based interactions (such as accessing schedules listings and news information services) and interactions with poorly specified goals (such as interactive programmes), and how any consistency will be achieved and managed.

The Technology Acceptance Model (TAM, Davis, 1993) has helped to understand the importance of designing for usability. Thus, the concepts of 'usefulness', 'ease of use' and 'satisfaction' are addressed. Where goals are unclear, usefulness seems less important, but ease of use and satisfaction gain much greater prominence. Designers face a fundamental difficulty in resolving the switching between goal-based and goal-less interaction, thus simplicity and transparency of operation are essential. i-TV is not intended for just PC 'savvy' users but the general public, who must be able to see *what* is available, and *how* to access it and so develop a usable mental model. The complexity of interactivity is further compounded by the restriction to a remote control, and the much poorer resolution.

Satisfaction, or the aesthetic design elements, becomes crucial as the design will influence enjoyment. Furthermore, maintaining engagement by users of I-TV is vital. Interactivity can create interruptions to the narrative 'flow' (Green, 1998), but this is an essential component of storytelling that has made TV so successful. To address this, work studying the role of pace and interactivity for games (e.g. Neal, 1990: Malone, 1982), drama and individual engagement (Jagodzinski, Turley & Rogers, 1999), and of course fun are being used to help design.

In conclusion, the anticipated convergence of TV and PC seems unlikely to occur in the manner expected. Designing for human interaction with TV is a new design paradigm that deserves much greater attention of the nature being discussed at conferences such as 'Computers and Fun'.

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Joke telling as an introduction and a motivator to a narrative-based communication system for people with severe communication disorders.

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Children with severe communication disorders miss out on the experience of actively telling their own stories. Good communication is an interactive experience of listening, responding and turn taking, not something that is easily achieved with voice output devices. Pre-programming sentences which may or may not reflect the individuals real thoughts has been one way in which the non-speakers voice can be heard. A musical analogy can be made here - with practically zero knowledge of how to read or produce music, synthesiser technology has enabled the most tone deaf, musically illiterate person to produce pretty amazing sounds by simply pressing a button. Give the same person a traditional piano and we have a very different scenario - the point being that he or she is still musically illiterate. Wherever possible, the ideal would be to give the individual a real understanding of the underlying processes taking place.

Interactional conversation (Cheepen, 1988), which is characterised by free narrative and phatic communication (greetings, farewells, etc), allows us to go beyond casual acquaintance into firm friendship and meaningful relationships. The need to engage in story telling led to the development of a story based communication system called Talk:About™ (Waller et al, 1999).

The Talk:About™ software package allows the user's own pre-stored written material to be used in interactive conversation. Stories are given appropriate "topics" and "people" tags which can then be used to retrieve specific material. Frequency and recent use are also used for retrieval. Fast greetings, needs and wants are handled by a Quick:Chat™ feature which provides an icon based interface. Talk:About™ is complemented by word prediction software.

A recent evaluation of the system by a multi-disciplinary team of researchers has shown positive results in increasing non-verbal children's interactive communication skills (Waller et al, 1999). An important aspect of the research was how the idea of story telling could be introduced in a way which would motivate the user to learn the system.

Introducing the concept of story telling to a non-speaking child who often has not had the opportunity to develop language naturally is a problem. One solution was provided by a Talk:About™ user. CH (a young girl) indicated that she wanted to copy a book of jokes into her system. All children, of all abilities, appear to love nothing better than to tell jokes - old jokes, new jokes, variations, puns and riddles - the language of the playground! CH was able to experience this stage of development when she was able to relate jokes by herself using the speech synthesiser.

Jokes are a special type of story and many jokes have a set form and structure (e.g. 'Knock-knock' jokes). This has led us to investigate the development of a system which will provide user support in both the creation and narration of jokes. Such a system will allow the user to produce jokes and puns - both as an introduction to the idea of story-telling and experience of the conversation aid itself. Interaction will also be facilitated as telling a joke is a two-way process (what would be the point in keeping it to yourself!).

Researchers at Edinburgh University have developed a computer program, JAPE (Joke Analysis and Production Engine, see Binsted et al, 1997), which generates simple punning riddles. Using a computer programme inspired by JAPE, the concepts behind using stories for interaction will be introduced with the help of the automatic introduction of jokes and riddles. The JAPE researchers note that human-assisted pun generation is possible by prompting the user for typical associations, such as asking the user what a bomb typically does (explode?), rather than relying on a lexicon. It is envisaged that such a system could form the basis of a 'joke assistant' which would provide non-speaking children with access to interactive conversational material.

The preliminary ideas behind using joke-telling for story development will be discussed followed by demonstration of how a joke generator component in a communication device would be used - fun as both an educator and motivator in the social development of individuals who may have previously “not got the joke”.

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Riding the wave of the reckless explorer

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There has been considerable success towards the goal of making computers more accessible. However the playful, exploring user has been rather overlooked in the rush to help timid novices.

It has been suggested there is a broad pattern of exploration styles (Thomas 1998):

The *timid* user tries out a few things and then possibly settles into a very restricted pattern of activity

The *systematic* explorer exhibits a small number of explorations followed by a period of no new trials and then explores a little more and so on

The *over-eager* person rushes in, tries many new things but quickly becomes overwhelmed and gives up, perhaps never using that interface again.

Analysis of Mason's data (1986) reveals these trends for discretionary users. Similarly Carroll and Carrithers (1984) found the *plodder* and *reckless* styles, which loosely correspond to the timid and over-eager types. The plodder adopted a low-risk strategy, preferring to read and reread the manual until sure of the outcome of an action. Although this behaviour had relatively few errors, recovery when an error did occur was problematic. In contrast the reckless explorer spent much time recovering from the many errors, read the manual superficially and sometimes chanced upon solutions. Both these styles were about equally successful in learning the system but below the best performances.

It is likely that neither style exhibits c-flow (Draper 1999) – a deep, but effortless experience with immediate feedback on tasks that can be completed. However perhaps the systematic explorer approaches it.

Identification of Styles

An exploration can be defined (Thomas 1998) to have occurred the first time a command is used. The curve of cumulative explorations over time may be estimated given knowledge of the frequency distribution of command invocations. The series of *waiting times* for the i^{th} command serves this purpose[1].

Given an estimate of the exploration curve for a general population of users, an individual's profile can be classified as *damped, balanced* or *under damped* depending upon whether the actual exploration curve is below, the same as, or above the estimated curve. These correspond roughly to our three styles.

Accommodating Styles

Exploratory environments provide the user with opportunities for exploration and learning by doing within the context of an acceptable level of uncertainty (Carroll 1982). We suggest that the mix of these factors can be adjusted to suit the style of user.

We hypothesise that to increase fun - in the broader senses described by Draper (1999) – the positive traits of the extreme styles should be supported while the negative aspects should be avoided if possible. Thus the affordance of objects could be varied, as can the number of opportunities presented at any time. Errors might be reduced for the reckless by slowing responses, biasing random variables to safe ranges and applying easy defaults. Special hints could coach the timid in error recovery.

The following table shows desirable adjustments for each style and possible means to those ends.

[1] Thanks to Alan Dix for this insight

Style	Desirable adjustments	Means available
Reckless	Reduce errors	Reduce response times
		Bias random variables to safe ranges
		Use easy defaults
		Reduce STM load when possible
	Make exploration fun	Increase opportunities
		Reduce affordances
Timid	Improve error recovery	Provide recovery hints
	Make exploration safe	Inflate affordances
		Reduce opportunities
Systematic	Promote c-flow	Fine tune opportunities, affordances and STM load

Users appear not to like interfaces whose adaptive component is hard to understand. Certainly changing a game's response times or defaults to suit an exploration style could be confusing. For games, though, it ought to be possible to have sets of states that are entered via a combination of actions consistent with a style of interaction. Thus the game would not change and the interested user could explore and understand all the behaviours of the system.

Conclusions

An approach to the measurement and control of damping to enhance fun has been outlined for discussion. Research is required to verify some of the assumptions and hypotheses, for example that the over-eager are motivated by the presentation of many slightly obscure options but dislike errors. If we can understand the principles perhaps it will be possible to stretch or constrain the system so that interaction is more fun and more deeply in harmony with our inclinations.

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Learning Computer Science through Games and Puzzles

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Many children's games have similarities to the structures we teach in Computer Science and those structures are chosen for similar reasons. For example, standard race game boards are lists - processed from start to end. More interesting games use more interesting structures. A circular list is found in Monopoly: the game could never end. Snakes and Ladders uses a directed graph. A treasure hunt is a traversal of a linked list. Stacks are so important that they abound in childhood, from the toys consisting of poles and rings we give to toddlers to the Tower of Hanoi puzzle. The similarities are not surprising since abstract data types model structures from the real world, as do games.

General lessons about algorithms can also be found in games. For example, the aim of Patience is to sort a pack of cards. Are its rules an algorithm? It illustrates why finiteness and determinism are important properties of algorithms. The importance of choice of representation can be demonstrated by, for example, the games of Spit- Not-So and Nim. In Spit-Not-So 9 cards are placed face up. Each has on it one of the words: Spit, Not, So, Fat, Fop, As, If, In, Pan. Players take turns to pick a card. The aim is to be the first player to collect all cards containing a particular letter. For example, Spit, Fop and Pan form a winning set as they contain all the Ps. This game is equivalent to Noughts and Crosses/Tic-Tac-Toe [2]. Changing the representation to a 3-by-3 grid with a word in each cell makes the game suddenly easier. Nim consists of three piles of matches. Players take turns to remove any number of matches from one pile. The winner is the player who takes the last match. Winning moves can most easily be identified if the piles are represented using binary numbers. Winning moves are ones where the addition-without-carry of the three numbers of the resulting position is zero. Choose a good representation and you win the game.

20-Questions illustrates why binary search is faster than linear search. Would you start by asking "Is it Michelle Pfeiffer?" or would you ask questions such as "Male or Female?" that halve the number of people left whatever the answer? The most successful players are the ones who come up with a series of questions that approximate a binary search.

We can conversely design new games by starting from Computer Science. For example, let us invent a game based on Heaps. In Patience, the seven stacks of cards are arranged as an array. Cards can be moved between any of the stacks. In our newly invented "Heap Patience" the stacks are arranged as a binary tree. Cards can only be moved to the top of their parent's stack. In addition, the face up part of any stack can be exchanged with its parent, provided the top card is greater than the top card on the parent stack. The stacks thus act together like a heap with high cards moving to the root of the heap. Playing it provides the basis for an understanding of Heaps. Rather than teaching it to undergraduates, teach it to children.

Childhood is an excellent training ground for computer scientists. By this we do not mean that good games players will make the best computer scientists. Rather we suggest that the world of games and puzzles is full of hooks upon which the learning of computer science can be hung. Bell et al. [1] demonstrated a similar idea, developing activities for children that teach computing without using computers. We suggest that existing games use the same underlying structures as the data structures of Computer Science, their aim is often similar to the aim of common algorithms, and in some cases the best play is that which most successfully approximates the best algorithms. The more games and puzzles a person knows, the greater the foundation upon which the teaching of data structures and algorithms can be built. Games developed from Computer Science can both be fun and provide the foundations for learning the subject. We have looked at links between games and data structures and algorithms. It may also be possible to identify or design games with links to other aspects of Computer Science. We are currently using games to teach data structures and algorithms. With a longer-term view we should be designing new games that have deeper relationships with Computer Science concepts. We should be teaching them to children to provide the basis for them to learn Computer Science in the future.

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Engaging the audience in games, narrative and digital media

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Entertaining an audience relies on the process of drawing in and psychologically immersing the audience in an experience. For simplicity this paper will refer to this process as engagement. Keeping a participant engaged in a digital interactive narrative is often a problem. Audience or participant engagement seems to be more easily sustainable either in traditional narrative forms e.g. the novel, where the author is in control, or continuously interactive media e.g. real-time combat games (like Quake or Doom), where the participant drives the experience. In interactive narrative the control must be shared, the author must have some say in what occurs in order to relate a story, but the audience must also have some control, in order for the experience to be interactive. Giving a measure of, but not complete control to the audience creates problems. Also the more successful forms of interactive narrative are limited in the types of experience they provide. This paper will describe a detailed examination of the process of engagement in narrative and interactive forms, in order to better understand the problems and limitations of digital interactive narratives.

For example engagement in sports and games is goal oriented. Games encourage competitive behaviour; inciting the desire to overcome, to win. We become engaged through the process of honing our skills and possibly collaborating with others in order to achieve our goal. Games cover many kinds of experience, they can be physical or intellectual or both. There are however rarely emotional in their engagement, this is not to say that we do not experience emotions when we play, but they do not engage us through our emotions, but our desire to achieve a goal. In contrast the narrative process can instigate several types of engagement, e.g. intellectual engagement provided by the context and deep meaning, and emotional engagement with the characters and their situations. Through the narrative process we come to empathise with characters as it evokes their subjective experience within us.

Interactive narratives are part game and part narrative, as such puzzle solving tends to provide the central source of engagement. Puzzle solving is a major contributor to the narrative process in which pieces of the plot are presented in such a way as to encourage us to work out what is going on, obvious examples of this process are who-dunnit novels. The detective genre of narrative transfers well into interactive narrative; the audience plays the role of the detective who has to solve the mystery, hence providing the goal aspect necessary in games (e.g. BladeRunner Westwood Studios 1997). However these types of experience are generally limited to plot and action biased stories, and tend to lack emotional engagement that is so important for most narrative experiences.

This paper will conclude with recommendations for the design of new techniques for digital interactive narratives, which we hope will enable the creation of richer more emotionally engaging interactive narratives.

Getting physical: what is fun computing in tangible form?

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Traditional experiences of computing have been anchored in the 'work-station': a single-user device with a standardised interface, used to accomplish serious tasks. This has led to an emphasis within human computer interaction on the design of a very limited range of human-computer interfaces which are 'easy to use' for specific tasks.

In this paper we explore the interaction of two kinds of design moves away from this paradigm; making the computer un-easy to use for more frivolous user experiences and radically altering the interface to make computing resources more physical (see Figure 1).

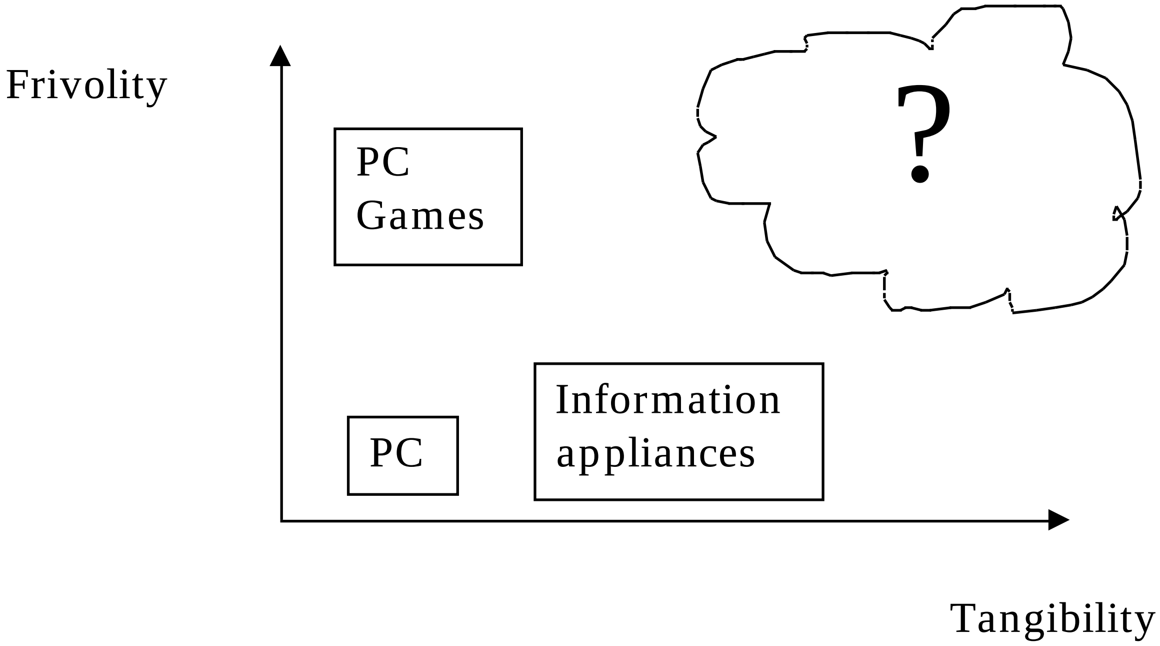

Figure 1. Design dimensions for fun computing

We perform this exploration, not analytically, but practically through the presentation of three cases studies of design in this area:

Case 1. Musical phone - a phone that is more like a string instrument in appearance. If the user needs to make a phone call, the phone number has to be plucked out on the product like a short tune. If a call comes through on the phone then it plays out the tune of the callers phone number.

Case 2. Digital butterflies - a 1 metre high installation with a water filled glass bottom tank sunk six inches from the top. Real lilies float on the water while butterfly images are back projected onto the flowers. When a user approaches the installation the butterflies become agitated and cluster into the middle of the lilies. If the user bends down to smell the flowers the butterflies fly away.

Case 3. Smart pills – pills containing radio transponders that represent different moods. The user would swallow the appropriate pill to represent their mood that day. If a friend of the user had also taken the same mood pill, their home phones would ring simultaneously and put the two empathetic friends in touch with each other.

Our paper concludes by offering up for discussion, some of the elements which make for fun in these situations. These include uncertainty in how to use the device, some initiative on behalf of the device itself, an element of surprise and delight, intrinsic enjoyment in the process of interaction, and some poetic license in how user actions are translated into effects.