

# Designing Convivial Digital Cities: A Social Intelligence Design Approach

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## **MOTS-CLÉS :**

*Conviviality, multi-agent systems, normative systems, social intelligence design, ergonomics and human factors, digital cities.*

## **RÉSUMÉ :**

*Conviviality is a mechanism to reinforce social cohesion and a tool to reduce mis-coordination between individuals, groups and institutions in web communities, for example in digital cities. We use a two-fold definition of conviviality as a condition for social interactions and an instrument for the internal regulation of social systems. In this paper we discuss the use of social intelligence design to model conviviality for digital cities, by first contrasting commercial with public digital cities, ergonomics with intelligent agents and then, social norms for conviviality with legal and institutional norms in digital cities. We show the role of the distinction among various kinds of use of conviviality, the positive aspects of conviviality and the negative aspects that emergent when conviviality becomes the instrument of power relations or in the absence of conviviality.*

## **INTRODUCTION**

The role of norms for conviviality is a condition for social interactions and an instrument for the internal regulation of social systems (Caire, 2007b); for example, in digital cities, “government regulations extend laws with specific guidance to corporate and public actions” (Lau et al., 2005). One view of social intelligence is that it may be “attributed to a collection of actors/agents and defined as an ability to manage complexity and learn from experiences as a function of the design of social structure. This view emphasizes the role of social conventions that constrain the way individual agents interact with each other” (Fruchter et al., 2005).

In this paper we raise the following question: How can social intelligence design be used to model conviviality? We approach this question focusing on conviviality in digital cities, by first contrasting public with commercial digital cities, then ergonomics with intelligent systems and, finally, norms for conviviality with legal and institutional norms in digital cities. Our main question breaks down into the following research questions: (1) what is a digital city as far as social intelligence design is concerned? From social intelligence design point of view, there seems to be a distinction between public and commercial private websites. Indeed,

main themes of social intelligence design are to use new technologies to “mediate human communication and collaboration across geographical and cultural divides” and to relate “people and technology in the full richness of human social and cultural life” (Fruchter et al., 2005). These concerns apply to digital cities as public websites and networks, and seem to be more difficult to ensure for commercial websites, that have, as primary goals, to generate revenues. We therefore discuss our application domain based on this distinction. (2) What does intelligent agent applied to digital cities mean? (3) What are social norms for agents in social intelligence design, in digital cities (Caire, 2007c)? And finally, (4) what is the role of conviviality?

Generally speaking, a convivial place or group is one in which individuals are welcome and feel at ease, but definitions in literature spread from individual freedom realized in personal interdependence, to rational and cooperative behavior, to normative instrument (Caire, 2007b). In the context of digital communities and institutions, such as digital cities, conviviality often refers to qualities such as trust, identity and privacy. One of the four themes of the European Community 5th framework program titled the *Societe de l'Information Conviviale* (User-Friendly Information Society, 1998-2002) promoted conviviality with broad programs, projects and initiatives. One example, the Convivio Net Consortium (2003-2005), fostered *convivial technologies* designed to be people-centered and seeking to address the growing challenges of digital cities: Need to support new communication and interaction paradigms, bridge the increasing digital divides between social groups and remedy nascent social fragmentation and isolation by increasing social cohesion and community identity. Originally an American phenomena, digital cities were first supported by the European Community in 1993 with Telecities Network and then in 2000, with a 30-year plan encouraging member countries to build their own digital cities based on a common vision and following a technological step-by-step approach: Currently systems interoperability, then Intelligent City Systems (2009), Ambient Intelligence (2013) and finally Smart Cities (2030).

By means of information and communication technologies, digital cities are virtual presences and extensions of our physical cities. They divide into five broad categories: Non-profit grass-root community initiatives from the early days; Municipal information and communication networks, eGovernments; Commercial city-oriented websites, AOL Digital Cities and MSN Citisearch; Virtual environments for virtual communities, such as communities of interest and finally information and communication technology (ICT) experiments. The main goals of digital cities are to create public space to exchange social information, explore vertical markets and innovate with next generation networks. Today, their principal objectives are to “transform and modernize local administrations in order to improve the level and quality of life of the population at both individual and community levels” (Ishida, 2000). Some example are: Provide 24/7 online access to administrative public services in order to reduce waiting lines in clerks’ offices and traffic congestion; Offer multilingual websites to reflect the linguistic diversity, facilitate inclusiveness process and reinforce social cohesion. In (Caire, 2007b), we identified the need for survey on the use of conviviality for digital cities.

Our methodology is a literature review. The layout is as follows: In Section 1 we contrast digital cities as public websites to digital cities as commercial websites and in Section 2, we compare ergonomics and human factors to intelligent agents. In section 3 we look at related works. In section 4 we analyze the role of conviviality by contrasting the positive aspects of conviviality to its negative aspects and in Section 5 we discuss results and summarize our findings.

# 1 DIGITAL CITIES: COMMERCIAL VERSUS PUBLIC WEBSITES

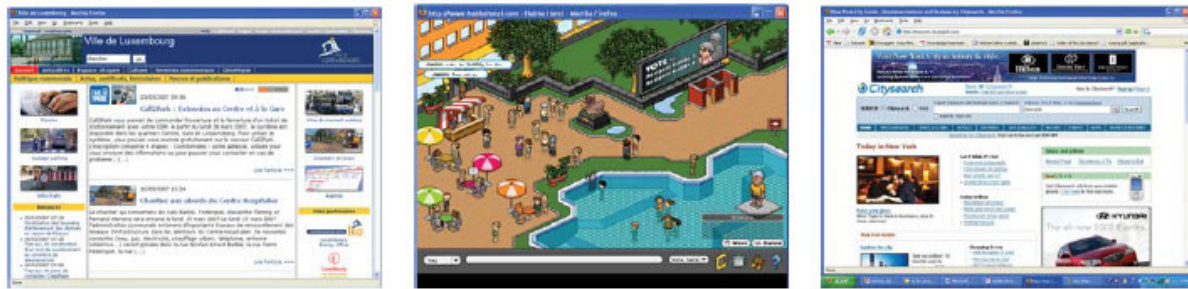


Figure 1: eCity Luxembourg, Habbo Hotel and MSN CitySearch

There are many ways to define digital cities (figure 1). “They can be seen as a local social information infrastructure, providing information over the real city to locals and of course to visitors of the real city. The digital city can also be approached as a communication medium, influencing the personal networks of inhabitants of a digital neighborhood. Another view is the digital city as a tool to improve local democracy and participation, in fact the basic idea behind the digital city in Amsterdam. Fourth, we can characterize the digital city as a free space to experience and experiment with cyberspace. Finally, the digital city can be seen as a practical resource for the organization of every day life. One can think of local electronic commerce, and the provision of online public services as a support of local economic activities. However, the digital city may also become an experiment with new forms of solving problems and coordinating social life. Where currently most activities are coordinated by the market or by the state, the digital city may become a tool that enables people to do things by mobilizing the available local resources, using existing and emerging social networks” (den Besselaar et al., 2000).

Observing that “Digital cities commonly provide both profit and non-profit services and have a dilemma in balancing the two different types of services”, Ishida raises the question (Ishida, 2000a): Can public digital cities compete with commercial ones? Indeed, “without profit services, digital cities become unattractive and fail to become a portal to the city. Without nonprofit services, the city may become too homogeneous like AOL digital cities as a result of pursuing economic efficiency. In any case, digital cities are forced to face competition with private companies, which provide only profit services.”

## 1.1 The Goals and Organization of Digital Cities

Digital cities as commercial portals started as local portals run by private companies, such as phone or web companies and airlines, competing with each other. Nowadays, global companies such as AOL and Microsoft offer city guides with services: shopping, entertainment, some local information and maps. Their business goals are geared toward vertical markets and their revenues are generated by advertising (AOL, MSN). Their general trend is to provide easy to find and search information, good maintenance of systems and frequent updates. They are effective in Asia, where they complement government agencies, but limited in scope by their top-down controlled and selected content, lack of two-way interaction with users and main purpose, e.g. advertising.

Digital cities as public initiative started in the US with American community networks, inspired by a tradition of community-centered, grass-roots engagements that emphasized freedom of speech and activism. Their original goal was to create a virtual information space

for example the WELL, “Whole Earth ’Lectronic Link”, and Blacksburg’ Electronic Village. Their main challenges were first, the lack of synergy between community networks, private companies and administrations and second, the competition between profit and non-profit organizations. Today they align with eGovernments.

The goal of European digital cities is to integrate and coordinate private, public and voluntary sectors toward better regional and local information system. The European Community first launched the Telecities program in 93 later evolved with large scope programs and projects such as Eurocities, Intelcities and e-Agora. For the European Community, the goal is to share ideas and technologies between all the cities to strengthen the European partnership. For cities, the goal is to use information and communication technologies to resolve social, economic and regional development issues and improve the quality of social services. Their characteristics today are to be networks generated within and for specific regions, to form complex communities based on collaborations between citizens, universities, city administrations and private companies, and to emphasize social inclusion. Their main challenge is the difficulty to integrate grass-roots communities and commercial point of views which appears in the relatively slow commercialization of services and information.

Commercial digital cities are for-profit whereas public digital cities are non-profit. Public digital cities set up complex consortia with universities and companies that seem easier to manage in the US than in Europe. Asian digital cities, called *city informatization*, emerged as government initiatives. Their goal is to develop their country through technological innovation. There were attempts to integrate grass-roots activities and university driven projects in 99 with Digital Kyoto and Shanghai but the greatest challenge still remains their top-down approach based on administration activity.

## 1.2 Summary

Commercial and public digital cities were originally very different but seem to be more overlapping today. Commercial digital cities tend to depend on business strategies, such as merging, acquisition and delocalization, creating tough competitions for market penetration and users’ loyalty for example between MSN Citysearch, AOL City Guide and Yahoo! Local. Public digital cities tend to depend on political agendas to motivate progress for technological and social improvements, for example, Bologna Iperbole, with the impulse of progressive political leadership, innovated in 1994 by setting up open spaces to allow groups of citizens to publish information and engage in debates with public officials, while Issy-les-Moulineaux started, in 1996, to develop its successful one-stop administration, including online live interaction of citizens to town meetings and interactive maps.

However, as yet, no one model has been identified. In the US for-profit businesses and nonprofit organizations co-exist and compete, in EU the attempts are to coordinate administrations, companies and citizens while Asia pursues government directed growth. Governments’ goals for digital cities consist to help close geographic and social digital divides, with access everywhere and for all, to accelerate economic development, and to make the governments of cities more efficient and accessible. Pluralism and participation are combined with multi-disciplinary approaches, synergy between administrations, companies and citizens and, most importantly, a shared vision between all stakeholders.

The success factors of digital cities consist in achieving participation of institutions and communities, in balancing top-down direction, needed for technical infrastructure, and grass-roots initiatives, necessary to insure citizens’ cohesion and in finding equilibrium between economic and civic motivations. Ultimately, digital cities need to deal with the same complexity as real cities to attract and retain usage, and to function as entities that augment their physical counterparts.

## 2 INTELLIGENT AGENTS APPLIED TO DIGITAL CITIES

”One concept of the digital city is to provide infrastructure for networking local communities and to promote social interaction among people who visit or reside in a city” (Azechi et al., 2000). A number of strategies can be used to meet these goals. As ”the most profound influence of the social intelligence design approach can be felt in the studies of online communities, where mediated communication is a key vehicle for creating and maintaining social contact” (Fruchter et al., 2005), we will look at intelligent agents approaches and contrast it with ergonomics and human factors approaches.

### 2.1 Goals of Ergonomics and Intelligent Agents

Called ergonomics in Europe, while in the U.S. it is referred to as human factors or more recently user experience, this discipline is concerned with the design and evaluation of hardware and software; we opted here to refer to this discipline with the term *ergonomics*. The goal of ergonomics is to optimize the relationship between technology and humans by increasing usability, efficiency, performance, and acceptance by users in healthy, safe and comfortable manners; It is about the ”capabilities and limitations of humans to improve the design of systems and devices” (Lund et al., 2005).

Ergonomics designers study how humans behave physically and psychologically in relation to particular environments, products, or services, and, based on users’ reactions and preferences in relation to visual and other sensory stimuli, make suggestions on how to redesign, for example, a website to meet its users’ needs, or give general guidelines. Human characteristics, such as height, weight, and proportions are considered, as well as information about humans’ preferences such as hearing, sight and temperature; for a website design, for instance, consideration to be taken into account are: content strategy to define what media should be included and the tone-of-voice, style; information architecture to elaborate primary and secondary navigations of the site; user interface to design widgets activating functionalities; And visual design to experiment with layouts, font sizes and colors.

In multi-agent systems an agent is defined as ”a computer system that is situated in some environment, and that is capable of autonomous action in this environment in order to meet its design objectives (...) Agents are capable of flexible (reactive, proactive, social) behavior” (Wooldridge, 2004). This capability is crucial for digital cities since it allows agents to cooperate, coordinate their actions and negotiate with each other; It is also fundamental to social intelligence design since ”conventionally, social intelligence has been discussed as an ability of an actor/agent to relate to other actors/agents in a society, understand them, and interact effectively with them” (Fruchter et al., 2005). Intelligent agents, with their artificial intelligence capabilities can assist users and act on their behalf. They adapt and learn while performing non-repetitive tasks. It is a multi-disciplinary field that includes for instance, socio-cognitive research, psychology, linguistics and pedagogy.

### 2.2 Domains of Ergonomics and Intelligent Agents

Ergonomics is divided in three broad domains: physical, cognitive and organizational. With systems becoming increasingly complex and pervasive, trends in ergonomics have been to increase the usability of systems with the design of interfaces that allow users to interact with the systems control commands and mechanisms, in a manner referred to as natural and user-friendly, using menus, icons, keystrokes, mouse clicks, and similar capabilities. This is made possible with the application of engineering psychology, a research branch of psychology theory applied to the design of systems.

Intelligent agents systems, however, use cognitive psychology, a different branch of psychology "concerned with mental processes (as perception, thinking, learning, and memory) especially with respect to the internal events occurring between sensory stimulation and the overt expression of behavior" (Merriam-Webster, 2006), emphasizing human thinking and processing of information.

### 2.3 Applications for Ergonomics and Intelligent Agents

Ergonomics practitioners develop design specifications, guidelines, methods, and tools to ensure that systems are compatible with the characteristics of the human who operate, maintain or otherwise interact with them.

The **digital city of Luxembourg**, for example, while creating a one-stop administration, chose to start with the declaration of a new born baby, a key procedure for its citizens, and a complex operation for the administration as it requires the interoperability of several municipal branches, such as the hospital where the baby is born and social security to create a new identity number for the new born citizen. Therefore, the application of ergonomics results in ensuring the citizens going through the declaration process on the digital city website, a seamless navigation from one environment to the other. Ergonomics practitioners ensure that conventions and constraints, such as multilinguism and attention to cultural characteristics, are respected (Norman, 1999) and that heuristics and guidelines are followed: for example, applying consistency and simplicity rules throughout visuals, features and functionalities to ensure effective and positive user experience. Guidelines also recommend selections for number and types of menu items and usages of check boxes versus radio buttons. Furthermore, ergonomics aim at improving software operability and maintainability of systems, for example in using file formats for quick loads, templates, style sheets and non-proprietary software.

Ergonomics application to a product, such as wearable computer for example, improves the usability, comfort, safety and health characteristics of this product; Ergonomics application to a head mounted display for virtual reality environment, maximizes the effectiveness of human user, system and device, while reducing potential for error and injury.

The **intelligent tutoring system** proposed by Gomes et al. provides a recommendation service of student tutors for computational learning environments. "Each agent pupil represents a pupil logged onto the system. One of the functions of the system is to be the client for an instant message service. Through its agent pupil, any pupil can communicate with other pupils in the system. Another function of the agent pupil is to pass information on the affective states of the pupil. This information can be inferred by the agent or be adjusted by the pupil itself." (Gomes et al., 2004)

The authors' claim is that "convivial social relationships are based on mutual acceptance through interaction" hence on reciprocity and in this case students helping each other. A utility function takes as input a student's social profile and computes the student's affective states indicating if the student needs help; if s/he does then the system recommends a tutor. Remaining challenges are with defining utility function inputs to compute recommendations, presently a set of random values, and to automate inferences of students requiring help. This exposes the need for further research in evaluation methods and measures for concepts such as mood, sociability and conviviality. Heylen et al. look at interpersonal factors that have to be taken into account when designing such systems: "The emotionally intelligent tutor agent that we are developing is trying to construct a model of the mental state of the student and is knowledgeable of the potential effects of tutoring acts on the mental state. These insights are used to determine the appropriate action sequence and the manner of executing the actions". (Heylen et al., 2003)

These critical challenges point out the ethical issues raised by the possible development of such systems: Preserving pupils' privacy, securing the information gathered to create their social profiles, deterring possible misuse of pupils' affective states and system errors concerning the data. They also point out the importance of developing and using guidelines, similarly to the European Privacy Design Guidelines for the Disappearing Computer (Lahlou and Jegou, 2003) established to "implement privacy within the core of ubiquitous computing systems" (Lahlou et al., 2005). A number of research addressing these issues are for example, socially translucent systems characterized by visibility, awareness, and accountability (Erickson and Kellogg, 2000) and studies of place-based presence and trust evaluation (Hofte et al., 2006).

**Conversational agents** can have many qualities, for Sadek et al. they are convivial, that is, rational and cooperative. Furthermore, the interaction with the agent is convivial "if the agent presents, jointly and at all times, one or all of the following characteristics: Capacity for negotiation, contextual interpretation, flexibility of the entry language, flexibility of interaction, production of co-operative reactions and finally of adequate response forms." Finally, conviviality, as "the essential and global characteristic of services, emerges from the intelligence of the system and not from a set of local characteristics that vary depending upon the application context and the types of users" (Sadek et al., 1997); consequently a list of criteria will by itself not suffice. Additional critical factors to consider are: on the one side, the relations that bind the criteria together and on the other side, the way these relations are perceived by individuals. These communicative capacities and social intelligence based on emotional intelligence are crucial to enhance agents' ability to interact with users.

Cassell's Rea system demonstrates that "embodied conversational agent interfaces are specifically conversational in their behaviors and specifically human like in the way they use their bodies in conversation; capable of making content-oriented, or propositional, contributions to a conversation with human users". (Cassell, 2000)

Finally, **reputation** as an "indispensable condition for the social conviviality in human societies" (Casare and Sichman, 2005), illustrates intelligent agents capabilities. Reputation makes information transparent, as all group members receive the same information about their peers and ensures conviviality for the group. In this system, everyone is aware of anyone's behavior, that is anyone's compliance or not to the rules of the group. A functional ontology of reputation for multi-agent systems is defined whereby "roles are played by entities involved in reputative processes such as reputation evaluation and reputation propagation."

The authors' claim is that "concepts of the legal world can be used to model the social world, through the extension of the concept of legal rule to social norm and the internalization of social mechanisms in the agent's mind, so far externalized in legal institutions". In their system, the agents actual behaviors are compared to the social norms observed in their world. The process, however, presupposes an initial reputation profile of users that agents can then update in real time. Reputation acts as a communication tool, ensuring complete social transparency throughout the system. The strict application of norms to reputation however may be difficult and suffer from rigidity, and one can wonder about the ethical issues, such as privacy, raised by this type system.

## 2.4 Summary

The recent and large scale development of intelligent interfaces combines computing power, adaptive and dynamic systems for more natural and invisible interactions between users and computers. The ultimate steps still occur at the interface level, between the input and output hardware devices, and the software that determines and presents the information to the user for example, on a screen. As technologies develop and user's expectations grow, the field of

human-computer interaction broadens to encompass a greater number and variety of fields that intertwine in more intricate and complex ways such as computer science, psychology, cognitive science, human factors, ergonomics, sociology, and artificial intelligence; All concurring and contributing to the creation and enhancement of optimal and seamless user experiences.

Human-computer interaction great broader as technologies develop to encompass more fields such as computer science, psychology, cognitive science, human factors, ergonomics, sociology, and artificial intelligence with each a contribution to make. Markopoulos et al. identify four critical challenges to human computer interaction research for ambient intelligence components (Markopoulos et al., 2005): Designing ambient intelligence systems and environments so that they can be perceived as socially intelligent; designing intelligence that will support human-to-human cooperation and social interactions; how to evaluate social intelligence? what are the benefits of social intelligence? Answer to the last question would appear to be a requirement for the evaluation of social intelligence and for designing intelligence that will support social interactions. Markopoulos et al. experimenting with the iCat, a research platform that exhibits a rich set of human-like behaviors for studying social robotic user-interfaces, further state that for the ambient intelligence research community, the challenge ahead is: "the need to make systems capable of understanding and relating to people at a social level, timing, and cuing their interactions in a socially adept manner". This are some of the challenges social intelligence design aims to address with "methods of establishing the social context, embodied conversational agents, collaboration design, public discourse, theoretical aspects of social intelligence design, and evaluation of social intelligence" (Nishida, 2001).

### **3 RELATED WORKS**

The Companions that Wilks envisions are persistent software agents attached to single users (Wilks, 2004). They act as intermediaries for all information sources that users cannot manage. For instance, Companions for seniors provide company to senior citizens who feel lonely, they act as technical task assistant to search the web for travels or keep track of events their owners forget. Conversely, Companions for juniors provide assistance with teaching, explanations-on-demand and advices.

In a rather new area of research called mixed-initiative interaction "people and computers take initiatives to contribute to solving a problem, achieving a goal, or coming to a joint understanding" (Horvitz et al., 2004). A critical element is how users focus their attention: "Attentional cues are central in decisions about when to initiate or to make an effective contribution to a conversation or project" (Horvitz et al., 2003). Mixed-initiative research aims at developing software that filters appropriately incoming information to shield users from incoming disturbances such as emails and phone calls. The filtering of incoming information is achieved through measuring user's keystrokes and scrolling activities, recording the number of opened windows, analyzing content, checking events in calendars, location and time of day and so on.

The goal, to design interfaces that are closer to the way human think than the way machine operate, raises questions such as: "What is, at this very moment, the user's state? What does s/he want, like, need, wish? Is s/he alone, at home, in family, with friends, at work (Gross, 2001)? In the context of such spontaneous interactions, innovative approaches based on dynamic notions such as conviviality, trust and behavior are required. Furthermore, in the area of the disappearing computer, "the shift from information worlds to experience worlds" (Streitz et al., 2005) is particularly significant (Caire, 2007a). As stated by de Ruyter and



Aarts, user experience for ambient intelligence must be based on: "(i) safeguarding the privacy of the home environment, (ii) minimizing the shift of user attention away from the actual content being consumed and (iii) creating the feeling of being connected when consuming content over different locations" (de Ruyter and Aarts, 2004). From individual social assistants to communications facilitators, numerous research directions in HCI exemplify the interest for cognitive and social input to address issues as wide apart as information clutter and digital divide. We believe that conviviality can be an important concept to help address the broad challenges of digital cities, by providing mechanisms for adaptive user interactions, while preserving the granularity of human experience.

## 4 THE ROLE OF CONVIVIALITY

Looking at some definitions shows that the meaning of conviviality depends on the context of use (table 1): In sociology, conviviality typically describes a relation between individuals and emphasizes positive values such as equality and community life.

Table 1: Definitions of conviviality

Etymological and domain specific definitions of conviviality
Origin: 15th century "convivial", from latin, convivere "to live together with, to eat together with". (French Academy Dictionary)
Adj. Convivial: (of an atmosphere, society, relations or event) friendly and lively, (of a person) cheerfully sociable. (English Oxford Dictionary)
Technology: Quality pertaining to a software or hardware easy and pleasant to use and understand even for a beginner. (Adj.) User friendly, (Noun) Usability. By extension also reliable and efficient. (Grand Dictionnaire Terminologique)
Sociology: Set of positive relations between the people and the groups that form a society, with an emphasis on community life and equality rather than hierarchical functions. (Grand Dictionnaire Terminologique)

A less common view of conviviality emerges when it becomes an instrument to exercise power and enforce one point of view over another (Taylor, 2004). Conviviality is then experienced as a negative force by the loosing side. We summarized, from different sources, positive and negative aspects of conviviality and present selected examples (table 2): The emphasis is on sharing of common grounds and inclusiveness for positive side, on division and coercive behaviors for negative side.

Table 2: The different aspects of conviviality

Positive aspects ( <i>Enabler</i> )	Grey aspects ( <i>Ignorance</i> )	Negative aspects ( <i>Threat</i> )
Share knowledge & skills	Ignore cultural diversity	Crush outsiders
Deal with conflict	Hide conflict	Fragmentation
Feeling of "togetherness"	Promote homogenization	Totalitarism
Equality	Political correctness	Reductionism
Trust	Non-transparent systematic controls	Deception

### 4.1 From Individuals to Groups

By allowing individuals to identify with each other, empathy provides a way to acquire personal knowledge by experiencing the feelings, thoughts and attitudes of an individual. (Polanyi, 1974) further describes a community as convivial when it aims at sharing knowledge: members trust each others, share commitments and interests and make mutual efforts to build conviviality and preserve it.

A convivial learning experience is based on role swapping, teacher role alternates with learner role, to emphasize the concept of reciprocity as key component to conviviality (Illich, 1971). Building on Illich learning webs, skill exchange networks and peer-matching communication concepts, the Constructionists emphasize "learning-by-making" (Papert and Harel, 1991).

"In a basic sense, conviviality is a social form of human interaction" says Schechter (Schechter, 2004) who binds interaction to physical experience and recognizes the social dimension of conviviality, as a way to reinforce group cohesion through the recognition of common values. "Thus the sharing of a certain kind of food and/or drink can be seen as a way to create and reinforce a societal group through a positive feeling of togetherness (being included in/or part of the group), on which the community's awareness of its identity is based." The physical experience of conviviality is transformed into a learning and knowledge sharing experience. "To know is to understand in a certain manner that can be shared by others who form with you a community of understanding". "Conviviality is achieved for the majority, but only through a process by which non-conviviality is reinforced for the minority" states Ashby (Ashby, 2004), who further denounces the instrumentalization of conviviality when one group is favored at the expense of another, "truth realities about minorities are built from the perspective of the majority via template token instances in which conflict is highlighted and resolution is achieved through minority assimilation to majority norms".

## 4.2 From Groups to Institutions

For Illich, conviviality signifies "individual freedom realized in personal interdependence" (Illich, 1974); it is the foundation for a new society, one that gives its members the means, referred to as tools, for achieving their personal goals: "A convivial society would be the result of social arrangements that guarantee for each member the most ample and free access to the tools of the community and limit this freedom only in favor of another member's equal freedom". In (Putnam, 2000), conviviality is considered as an enhancement to social capital and seen as a condition for a civil society, one in which "communities are characterized by political equality, civic engagement, solidarity, trust, tolerance and strong associative life"; While, according to Lamizet (Lamizet, 2004), conviviality describes both "institutional structures that facilitate social relations and technological processes that are easy to control and pleasurable to use". Taylor (Taylor, 2004), however, argues that "Conviviality masks the power relationships and social structures that govern communities". She further explores the contradiction between institution and conviviality, questioning "whether it is possible for convivial institutions to exist, other than by simply creating another set of power relationships and social orders that, during the moment of involvement, appear to allow free rein to individual expression (...) Community members may experience a sense of conviviality which is deceptive and which disappears as soon as the members return to the alienation of their fragmented lives".

## 4.3 Summary

On one hand conviviality allows individual expression while, on the other hand, contributing to the standardization and uniformization of representation systems. No one has considered the range of safeguards needed to protect individuals. The negative sides of conviviality reveal mechanisms that indicate pitfalls and point toward the safeguards needed to protect individuals, groups and institutions. For digital cities, such issues raise ethical questions that must be addressed with, for example, the set up of guidelines and best practices to enforce the inclusion of all groups' points of view. It is worth noting that the positive sides of conviviality contribute to promote values such as social cohesion, inclusiveness and participation, all coinciding with social intelligence values, and can therefore genuinely benefit from social intelligence design approach.

## 5 CONCLUSION

In this paper we consider the use of social intelligence design to model conviviality for digital cities. We look at the following issues: First, we distinguish commercial digital cities from public digital cities and note some complex overlaps. Second, as ergonomics has become an integrated part of design, intelligent agents technology is key to the development of conviviality. Third, related works show a number of complementary areas such as mixed-initiative interaction. Fourth, the issue of negative sides of conviviality and ways to deal with it is of central concern in web communities like digital cities. Fifth, the role of conviviality as a mechanism to reinforce social cohesion and as a tool to reduce mis-coordination in digital cities can be facilitated with a social intelligence design approach.

Moreover, we note that intelligent interfaces allow instant interactions and thereby create strong needs for coordination and regulation mechanisms. These needs have to be addressed to ensure the safeguard of individuals against abuses, such as privacy intrusions and identity manipulations. Therefore, it is crucial to build into the application designs of digital cities, the necessary protection mechanisms against the potential negative sides of conviviality, such as deception, group fragmentation and reductionism. Best practices and guidelines for designing social intelligence systems, must include aspects such as ensuring all party's points of view, in order to avoid the crushing of one side by another. The concept of conviviality allows taking into account social and cognitive factors as well as ethical issues raised by large scale development of digital cities, it also points out the negative sides to be prevailed over.

From individual social assistants to communication facilitators, numerous research directions in social intelligence design exemplify the need for cognitive and social input to address issues as wide apart as information clutter and digital divide. We believe conviviality to be a crucial coordination and regulation mechanism for digital cities. We therefore emphasize the role of social intelligence to design convivial digital cities.

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