A Normative Multi-Agent Systems Approach to the Use of Conviviality for Digital Cities

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Abstract. 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 normative multi-agent systems to analyze the use of conviviality for digital cities, by contrasting norms for conviviality with legal and institutional norms in digital cities. We show the role of the distinction among various kinds of norms, the explicit representation of norms, the violability of norms and the dynamics of norms in the context of conviviality for digital cities.

Keywords. Conviviality, multi-agent systems, normative systems, social computing, digital cities.

1 Introduction

The role of norms for conviviality is a condition for social interactions and an instrument for the internal regulation of social systems [1]. For example, in digital cities "government regulations extend laws with specific guidance to corporate and public actions" [2].

Conviviality is often reduced to be synonymous with user-friendliness as, for example, in one of the four themes of the European Community Fifth Framework Program titled "Societe de l'Information Convivial" (1998-2002) [3] and translated by "User-friendly Information Society". Indeed, the popular definition of a convivial place or group is one in which "individuals are welcome and feel at ease" [4]. However, the scientific literature defines conviviality as a more complex concept, with positive and negative aspects, tools and mechanisms to carry through user interactions. A socio-cognitive concept, conviviality is concerned with agent interactions, and frequently used in social sciences and applications of multi-agent systems in which artificial and human agents interact, for example, virtual communities, digital cities, social intelligence design and ambient intelligence. Therefore, we propose to add conviviality to the number of social concepts, such as trust, reputation, norms, organizations and institutions, already studied in multi-agent systems.

Moreover, similarly to a number of social concepts, such as trust, reputation, conventions, norms, power, coalitions, organizations and institutions, we propose that conviviality be studied in multi-agent systems.

In this paper we raise the following question: how can normative multi-agent systems be used to model conviviality for digital cities? We approach this question focusing on conviviality for digital cities, and by contrasting the use of normative multi-agent systems for conviviality with legal and institutional norms in digital cities.

Our main question breaks down into the following research questions: What are digital cities, what are normative multi-agent systems, what is conviviality and finally, can normative multi-agent systems be applied to conviviality for digital cities?

The layout of this paper follows these sub-questions. In section 2 we give a brief overview on digital cities, in section 3 we explain norms in regards to the legal and institutional aspects of digital cities, in section 4 we present a literature survey on the notion of conviviality and in section 5 we examine the use of norms for conviviality.

2 Digital Cities

Digital cities are web portals using physical cities as a metaphor for information spaces. They present various combinations of political, economic and social activities. The following examples show the diversity of the combinations:

- eCities, eAdministrations and eGovernments, such as eLuxembourg and eEurope are the official portals of cities and countries used as tools to improve local democracy and participation; they provide local social information infrastructures over the real city with public and administrative services to citizens and visitors; the activities are predominantly political and to a lesser extend, economic and social.
- eCommerce portals, such as MSN CitySearch and AOL Digital Cities offer commercial services, shopping, entertainment and more generally, local easy to find and search information; they provide practical resources for the organization of every day life and the support of local economic activities; the activities are predominantly economic and to a lesser extend social and political.
- social virtual worlds such as Second Life and the Habbo Hotel, provide a communication medium primarily to conduct social experiences through role playing while, at the same time, attracting advertisers and businesses by the size of their massive multi-player communities. "experiment with new forms of solving problems and coordinating social life" [5]. Activities are predominantly social and to a lesser extend economic and political.

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 [6] raises the question whether public digital cities can compete with

commercial ones. "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."

2.1 Goals of Digital Cities

Commercial digital cities started as local portals run by private companies, such as phone, web and airline companies, competing with each other. Nowadays, global companies such as Yahoo! and AOL offer city guides with services: Shopping, entertainment, local information and maps. Their business goals are geared toward vertical markets and their revenues are generated by advertising. Their general trend is to provide information, easy to find and search for, 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 advertising purpose.

Public digital cities started in the US with American community networks, inspired by a tradition of community-centered, grass-roots engagements emphasizing freedom of speech and activism. Their original goal was to create virtual information spaces, such as the WELL, *Whole Earth'Lectronic Link* and Blacksburg Electronic Village. However today, American public digital cities align with eGovernments and their main challenges are: the lack of synergy between community networks, private companies and administrations as well as the competition between profit and non-profit organizations.

In Europe, public digital cities evolved through the European Community leadership. The main goals are to share ideas and technologies between all cities in order to strengthen European partnerships, use information and communication technologies in order to resolve social, economic and regional development issues and to improve the quality of social services. The main challenge, shown by the relatively slow commercialization of services and information, is the difficulty to integrate grass-roots communities and commercial points of view.

2.2 Organizations of Digital Cities

Commercial digital cities aggregate urban information; They are well maintained, use proprietary software and rely on search engines, ranking interest links by sponsors, for business opportunities. Early on, commercial digital cities recognized the importance of usability and have done well to make their services usable by many.

Public digital cities seek to enforce the use of open systems. The lack of funds and the complexity of their partnerships caused many downfalls (Digital Amsterdam). Public digital cities rely on high speed networks tightly coupled with physical cities (Helsinki) and platforms for community networks (Bologna). They have multilayer architectures: Information, interface and interaction layers (Digital Kyoto). In Asia, public digital cities, called *city informatization*,

emerged as government initiatives to develop countries through technological innovations. There were attempts to integrate grass-roots activities and university driven projects in 1999 with Digital Kyoto and Digital Shanghai but the greatest challenge still remains their top-down approach based on administration activity.

2.3 Discussion

Commercial and public digital cities were originally very different but tend now to overlap. We summarize in table 1. Commercial digital cities depend on busi-

Table 1. Digital cities: Commercial vs. public portals

Type	Commercial	Public
Goals	For profit. Vertical markets (shopping, entertainment). Generate revenues (advertising, memberships).	Not for profit. Make government efficient, accessible. Improve local democracy. Accelerate economic development.
Technology	Well maintained with frequent updates. Proprietary software and multimedia. Search (ranked results), easy-to-find local information and maps, top-down filtered content.	Use open source, distributed systems and forums. Rely on high speed networks coupled with the real city (parking payments, ambient intelligence applications).
Organization	Business strategy based on fierce competition. Existing models: Organizational, functional, economic, games and artificial life.	Political agenda based on incumbent majority and leadership priorities. Complex consortia between administration, universities and companies.

ness models and strategies to fight competition for market penetration, gain new members and sustain existing members' loyalty; for example, members are less likely to go to a competitive site if they invest time and efforts to build their avatars and communities of friends. Public digital cities depend on political agendas to motivate progress for technological and social improvements; for example, in 1994, a progressive political leadership brought about innovations such as setting up online open spaces in *Bologna Iperbole* digital city, to allow groups of citizens to publish information and engage in public debates with their representatives; similarly, in 1996, the digital city for *Issy-les-Moulineaux* was developed into a one-stop administration that included online live interaction of citizens to town meetings.

In the US, for-profit businesses and non-profit organizations co-exist and compete; in the EU, attempts are to coordinate administrations, companies and citizens while in Asia governments pursue directed growth. The goals of European governments are to close geographic and social digital divides, with access to information and services everywhere and for all, to accelerate economic development, with business assistance, licenses and permits, and to make the governments of cities more efficient and accessible, for example with 24/7 only access to municipal services and multilinguism.

Existing models for digital cities are organizational, functional, economic, games or artificial life. Multi-agent systems are a promising methodology to develop digital cities, because they can bridge the gap between eGovernment concepts and system development. Moreover, the autonomy of users is central in digital cities and can be modeled using the autonomy of agents. Finally, interaction between artificial and human agents, and sometimes the distinction between them is unclear as the use of intelligent agents in some cities, or the use of avatars in second life.

The success factors for digital cities consist in achieving the participation of institutions and communities, in balancing top-down direction needed for technical infrastructure and bottom-up grass-roots initiatives necessary to insure citizens' cohesion and finally in finding equilibrium between economic and civic motivations. Research in this field addressed such issues in the proceedings of digital cities 2000 [7], 2002 [8] and 2005 [9] by focusing on concepts such as eDemocracy, digital divide and conviviality.

3 Legal and Institutional Norms in Digital Cities

In their introduction to normative multi-agent systems, Boella et al. give the following definition: "A normative multi-agent system is a multi-agent system together with normative systems in which agents on the one hand can decide whether to follow the explicitly represented norms, and on the other the normative systems specify how and in which extent the agents can modify the norms" [10]. We first discuss the distinction among various kinds of norms, we then discuss the implicit versus the explicit representation of norms, and finally the violation of norms. We illustrate our discussion with examples from digital cities.

3.1 Different Kinds of Norms

Several kinds of norms are usually distinguished in normative systems. Within the structure of normative multi-agent systems [11] distinguish "between regulative norms that describe obligations, prohibitions and permissions, and constitutive norms that regulate the creation of institutional facts as well as the modification of the normative system itself". A third kind of norms called procedural norms, have long been considered a major component of political systems, particularly democratic systems; Lawrence defines them as "rules governing the way

in which political decisions are made; they are not concerned with the content of any decision except one which alters decision-making procedures" [12].

Constitutive norms combine several aspects, among which the intermediate concept known as *count as* such as in "X counts as a presiding official in a wedding ceremony", "this bit of paper counts as a five euro bill" and "this piece of land counts as somebodys private property" [13]. As per Searle, "the institutions of marriage, money, and promising are like the institutions of baseball and chess in that they are systems of such constitutive rules or conventions" [14]. In digital cities, an example of constitutive norm is *voting* in the sense that going through the procedure counts as a vote.

However, the role of constitutive rules "is not limited to the creation of an activity and the construction of new abstract categories. Constitutive norms specify both the behavior of a system and the evolution of the system" [11]. The dynamics of normative systems is here emphasized as in *norm revision*, certain actions count as adding new norms for instance amendments: "The normative system must specify how the normative system itself can be changed by introducing new regulative norms and new institutional categories, and specify by whom the changes can be done" [11]. In the US today, government agencies are required to invite public comment on proposed rules [2]. Citizens are therefore encouraged to propose their changes to regulations. This is done via the digital city governement interface that allows revisions to be traced and searched.

Two other aspects of constitutive norms are organizational, how roles define power and responsibilities, and structural, how hierarchies structure groups and individuals: New norms are introduced by the agents playing a legislative role, and ordinary agents create new obligations, prohibitions and permissions concerning specific agents [11].

Regulative Norms, like obligations and permissions are often used to model legal systems. However, "a large part of the legal code does not contain prohibitions and permissions, but definitions for classifying the common sense world under legal categories, like contract, money, property, marriage. Regulative norms can refer to this legal classification of reality" [13]. A regulative norm expressed as an obligation in the digital city of Luxembourg, is that citizens must use the file format PDF rather than Postscript in order to access the administration documents on the portal.

Regulative norms also express permission, rights and powers. For example, computer systems access rights and voting rights: In order to be allowed to vote in Luxembourg, an agent needs to prove it has been a resident for at least five consecutive years or was born in Luxembourg.

Regulative norms are not categorical, but conditional, they specify all their applicability conditions [11]. In the digital city of New York City, To renew online a Driver's License it is stipulated on New York digital city portal that you cannot change your address during this transaction, you must have completed form MV-619 (Eye Test Report) and read all the requirements before you begin the transaction [15].

Procedural norms are instrumental for individuals working in a system: Examples in digital cities, are back office procedures and processes designed for administrators to do their work. Lawrence distinguishes two kinds of procedural norms: Objective procedural norms are rules that describe how decisions are actually made in a political system and specify "who actually makes decisions, who can try to influence decision makers, what political resources are legitimate and how resources may be used". Subjective procedural norms are "attitudes about the way in which decisions should be made" [12].

3.2 Explicit vs. Implicit Representation of Norms

The first property of norms in the definition of normative multi-agent systems is that norms are explicitly represented; *explicite* meaning formalized and verbalized by some authorities, *implicite* meaning tacitly agreed upon, not specialized nor codified. Often, norms are given as requirements to computer systems but only implicitly represented. For example, you are filling out a census form and one question is whether you own a pet, but no explanation is given concerning the purpose of the information; assuming your answer is affirmative (you do own a pet), the outcome could be that either you are required to pay a pet license fee or the amount of the fee is directly deducted from your bank account. The digital city of Paris presents an example of explicit norm representation with the stipulation that, to create online library accounts you must be over 18 years old, otherwise an authorization of your parents is required.

Implicit representations are opaque to users and prevent governments to fulfill the democratic promise that transparency and explicit representations deliver. The representations of norms have to become more explicit and personalized to meet users' expectations as their needs for explanation and understanding of rules and regulations grows. Explicit representations of norms is also in the interest of governments and can be addressed with the development of mechanisms for knowledge representation and reasoning.

In digital cities, efforts are currently in-between implicit and explicit representations of norms by providing tools for text representation and retrieval, more advanced ontologies, semantic links and search capabilities. In 2006 for example, the US government added a branch to its business portal to help small businesses comply with Federal regulations; a need that was not being met by any other Federal government program [15].

3.3 Violations of Norms

The second property in the definition of normative multiagent systems, norms can be violated, is also seen as a condition for the use of deontic logic in computer science: "Importantly, the norms allow for the possibility that actual behavior may at times deviate from the ideal, i.e. that violations of obligations, or of agents rights, may occur" [16].

If norms cannot be violated then the norms are *regimented*. For example, if in access control, a service can only be accessed with a certificate, then this norm

must be implemented in the system by ensuring that the service is only accessible when the certificate is presented. Regimented norms correspond to preventative control, as norm violations are prevented. When norm violations are possible, control is detective as behavior must be monitored and norm violations must be detected and sanctioned. "Social order requires social control, *an incessant local (micro) activity of its units*, aimed at restoring the regularities prescribed by norms. Thus, the agents attribute to the normative system, besides goals, also the ability to autonomously enforce the conformity of the agents to the norms, because a dynamic social order requires a continuous activity for ensuring that the normative systems goals are achieved. To achieve the normative goal the normative system forms the subgoals to consider as a violation the behavior not conform to it and to sanction violations" [13].

In digital cities, disincentive is often the mechanism used to prevent users from infringing the norms. For example, the digital city of Issy clearly stipulates that malicious intruders into the digital city will be prosecuted. There are normative multiagent systems in which norm violations are possible and can trigger new obligations, the so-called contrary-to-duty obligations. With contrary-to-duty obligations, there is not only a distinction between ideal and bad behavior, but there is also a distinction between various degrees of sub-ideal behaviors.

3.4 Dynamics of Norms

In many electronic institutions, norms are fixed and cannot be changed within the system, even though in many organizations there are roles defined within the system. The questions are whether digital cities are a collection of electronic institutions, whether manipulations and changes are allowed within the system. The US Regulations' office may be contributing to bring answers to this questions as it now provides on its site *Regulations.gov* a national forum for users to comment on existing and pending federal rules, therefore encouraging a more dynamic process for the modification and expliciteness of their rules and regulations.

4 Conviviality

First, we note that the many definitions of conviviality remain vague and not technical (table 2). We further note that the concept can be related to other non technical socio-cognitive concepts, such as trust and power, that have aquired more technical interpretation in multi-agent systems. We think current research is useful to develop *user-friendly* multi-agent systems.

4.1 Conviviality in Social Sciences

First used in a scientific and philosophical context [20], in 1964, as synonymous with *empathy*, conviviality allows individuals to identify with each other thereby

Table 2. Definitions of conviviality

Etymological and Domain Specific Definitions
15th century "convivial", from latin, convivere "to live together with, to eat together with". *French Academy Dictionary* [17]
Adj. Convivial: (of an atmosphere, society, relations or event) friendly and lively, (of a person) cheerfully sociable. *Oxford English Dictionary* [18]
Technology: Quality pertaining to a software or hardware easy and pleasant to use and understand even for a beginner. User friendly, Usability. By extension also reliable and efficient. *Grand Dictionnaire Terminologique* [19]
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* [19]

experiencing each other's feelings, thoughts and attitudes. By extension, a community is convivial when it aims at sharing knowledge: Members trust each other, share commitments and interests and make mutual efforts to build conviviality and preserve it. A convivial learning experience is based on role swapping [21], teacher role alternating with learner role, emphasizing the concept of reciprocity as key component and creating concepts such as learning webs, skill exchange networks and peer-matching communication, later expanded by Papert and the Constructionists with concepts such as *learning-by-making* [22].

Conviviality is then described as a social form of human interaction, a way to reinforce group cohesion through the recognition of common values. The sharing of habits and customs, for example the sharing of certain types of food or drinks, create and reinforce a community through a "positive feeling of togetherness"; individuals become part of the community which in turn, reinforces the community's awareness of its identity. The physical experience of conviviality is transformed into 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" [23].

Illich further develop the concept of conviviality with his notion of "individual freedom realized in personal interdependence" [24]; Conviviality should then be 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". Conviviality is then seen by Putnam as an enhancement to social capital, a condition for the civil society where communities are characterized by political equality, civic engagement, solidarity, trust, tolerance and strong associative life [25], therefore tightly linking the performance of political institutions to the character of civil life [26]. These ideas are further developed by Lamizet who caracterizes conviviality as both "institutional structures that facilitate social relations and technological processes that are easy to control and pleasurable to use" [27]. An important use for convivial-

ity today is for digital cities as a mechanism to reinforce social cohesion and as a tool to reduce mis-coordinations between individuals [28,1,29].

However, a negative side of conviviality emerges when it is instrumentalized, one group being favored at the expense of another. Ashby argues that "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 [. . .] Conviviality is achieved for the majority, but only through a process by which non-conviviality is reinforced for the minority" [30]. Taylor further add to this negative side the idea that conviviality can be used to mask the power relationships and social structures that govern communities. Taylor asks the question "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" [31]. In table 3, we summarize the different aspects of conviviality.

Table 3. Different aspects of conviviality

Positive aspects (Enabler)	Grey aspects (Ignorance)	Negative aspects (Threat)
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

4.2 Conviviality in Multi-Agent Systems

In multi-agent systems, "agents are capable of flexible (reactive, proactive, social) behavior" [32], this capability is crucial for the use of conviviality since it allows agents to cooperate, coordinate their actions and negotiate with each other. Following are examples of multi-agent systems applications that use different aspects of conviviality.

Embodied Conversational Agents (ECA) are autonomous agents with a human-like appearance and communicative skills. They have shown their potential to allow users to interact with the machine in a natural and intuitive human way: the conversation. To be able to engage the user in a conversation and to maintain it, the agents ought to have capabilities such as perceive and generate verbal and nonverbal behaviors, show emotional states and maintain social relationship [33]. In Cassell's Rea system, Embodied Conversational Agents are "specifically

conversational in their behaviors and specifically human like in the way they use their bodies in conversation", they are capable of making content-oriented or propositional contributions to a conversation with human users [34]. Conversational Agents must be endowed with *conviviality*, that is "be rational and cooperative" [35] and 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. Conviviality is the essential and global characteristic that emerges from the intelligence of the system, not from a set of local characteristics that vary depending upon the application contexts and the types of users. Consequently a list of criteria will by itself not suffice to express conviviality, additional critical factors are the relations that bind the criteria together and the way these relations are perceived by individuals. Building on this work, Ochs et al. distinguish felt emotions from expressed emotions noting that "a person may decide to express an emotion different from the one she actually felt because she has to follow some socio-cultural norms" [36]. This is particularly relevant to the study of conviviality in multi-agent systems where agent communication distinguishes between private beliefs and goals and public opinions and intentions.

In the Intelligent Tutoring System proposed by Gomes et al., "convivial social relationships are based on mutual acceptance through interaction", on the reciprocity of students helping each other [37]. Students communicate through their agents: Each agent represents a student and has the function to pass information on the affective states of the student, this information can be inferred by the agent or adjusted by the student. 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 it is the case, 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. Further looking into interpersonal factors, Heylen et al. propose emotionally intelligent tutor agents that try to construct a model of the mental state of the student while being aware of the effects of the tutoring acts to determine the appropriate action sequences and the way to execute them [38].

Computational mechanisms for trust and reputation in artificial societies are widely researched [39,40] greatly relevant to conviviality. Reputation is the "indispensable condition for the social conviviality in human societies" state Casare and Sichman [41]. In this system, every agents are aware of every other agents' behavior and of their compliance, or not, to the rules of the group. A functional ontology of reputation is defined whereby "roles are played by entities involved in reputative processes such as reputation evaluation and reputation propagation." Concepts of the legal world are 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. Reputation acts as a communication tool, ensuring complete social transparency throughout the system. However, the strict application of legal norms to reputation may suffer from rigidity, and one can wonder about ethical issues, such as privacy, raised by these types systems. Research addressing such issues are for example, Erickson and Kellog's socially translucent systems, characterized by visibility, awareness and accountability [42], and ter Hofte et al [43] studies of place-based presence and trust evaluation.

5 Use of Norms for Conviviality

"Norms are cultural phenomena that prescribe and proscribe behavior in specific circumstances" state Hechter and Opp [44]. They are considered to be responsible for regulating social behavior: Interaction and exchange between strangers could hardly be imagined without norms. The law relies on norms as well but, as seen in section 3, legal norms differ form social norms. We summarized from various sources and present some excerpts in table 4.

Table 4. Legal norms versus social norms

Type	Legal Norms	Social Norms
Kinds of norms	Consitutive, regulative and procedural.	Consitutive and regulative; rarely procedural.
Norm representation	Exactly specified in written texts.	Unwritten, thus their content and rules are often imprecise.
Norm violation	Linked to distint sanctions, enforced by specialized bureaucracy.	Enforced informally, but can be a matter of life and death.
Norm modification	Created by design, generally through deliberative process.	Spontaneous, of uncertain origine.

5.1 Norms for Conviviality

There is no common definition of social norms and no agreement on how to measure them. A large body of research suggests that social norms regulate such diverse phenomena as cooperation [45], collective action [46] and social order [47]. Hechter and Opp [44] distinguish two types of definitions for social norms:

1. Norms that entail a moral imperative, a sense of oughtness, of duty; a social norm behavior that people believe must be performed without concern for

its consequence for the agent. For example, a man who was engaging in duels was ready to die to save his honor. The sanction of an *oughtness norm* does not depend on the dectection of the violation because violators internalize this type of norm, therefore its violation entails some internal sanctioning: the experience of guilt or shame.

2. Norms that generate social expectations without any moral obligations, basically behavioral regularity; a certain behavior is identified as a social norm if deviating from that practice incurs a cost imposed on an agent. For example, a person questioned by a police officer is expected to behave respectfully otherwise he of she may be prosecuted.

In digital cities, a number of security issues like identity management, authentication and authorisa- tion can prevent users to *feel at ease*. Some problems are new, for example, in contrast to the physical world, malicious users can create new agents repeatedly to lure beginners, insult them and take advantage of them. These unconvivial behaviors show mechanisms that differenciate social norms from conviviality norms. From personal powers to social dependence, sociality presupposes a *common world*, hence *interference*: the action of one agent can favor (positive interference) or compromise the goals of another agent (negative interference) [47].

5.2   Representation of Conviviality

Conviviality facilitates and regulates agent interactions, and therefore contributes to agent coordination. For example, digital cities can separate systems for beginners and experienced users, since beginners are frightened by the complexities of the real system, whereas experienced users are bored by the simplifications developed for beginners. However, since beginners and experienced users have to participate to the digital city at the same time, this introduces various challenges: when civil servants working for the digital city are confronted with a user, they have to adapt their behavior with respect to the experience of the user.

Dynamic aspects of conviviality , such as the emergence of conviviality, occur from the sharing of properties or behaviors whereby each members perception is that their personal needs are taken care of.

5.3   Violation of Conviviality

It is always possible to violate social norms and therefore conviviality. Ignoring cultural and social diversity is violating conviviality as it creates conviviality for a group at the expense of others. In digital cities, as in physical cities, being ignored when asking advices to a city administrator represents a conviviality violation as it breaks the bilateral form expected from these communication acts to only allow for unilateral communication. Excluding, ostracizing, an agent that does not comply to the norms of the city when interacting with other agents from the city is a ditributed mechanism that enforce the norms as in [48]

Other violations would be to promote homogenization, fragmentation, totalitarism, reductionism, deception, to enforce exclusion and to crush outsiders.

6 Conclusion

In this paper we contrast norms for conviviality with legal and institutional norms in digital cities. We consider the following issues. First, the kinds of norms typically distinguished in legal systems can be distinguished for norms of conviviality too. Second, norms for conviviality are often implicit, and we believe it is an important question when such norms should be made explicit. Third, the issue of violation of conviviality and ways to deal with it is of central concern in web communities like digital cities. Fourth, norms concerning conviviality should be able to change over time. Fifth, norms for conviviality can come from a wide variety of sources.

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