

The Cooperative Mobile Telecommunication Consumer

Challenges of Economy and Identity in Wireless Mobile Grids

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Keywords

Wireless Mobile Grids, Communication Networks, Identity, Computer Mediated Communication, Social Identity

The advancing convergence of tethered and untethered communication and information application confronts the mobile telecommunication branch with massive problems. The cellular network structure will not be able to cope with the expected increase in energy and frequency consumption. This paper presents wireless mobile grids as a feasible solution which extends the cellular network with short-range links with the aim of preventing network overload and short battery duration of handsets. A model with the reference system of Manhattan is provided. Individual behaviour within a wireless mobile grid is the focus of the analysis. Identity concepts with a reference to normative behaviour under anonymity are discussed. A framework which proposes to implement a wireless mobile grid as a Web 2.0 application will be concluded upon as a basis for further research.

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1. The Importance of Mobile Telecommunication for Modern Societies

The telecommunication industry is in a state of radical transition. Within the last decade, mobile devices have become the most ubiquitous consumer electronic gadget ever invented (cf. Jaokar/Sharma 2010: 6). Up from five billion mobile users in 2010, it is expected that in 2020, most of the world's population will be connected by up to 20 billion mobile devices (cf. Deloitte 2011: 2-8; Bitkom 2010). However, too little is being done in order to stay abreast of technological changes. The evolution of cellular wireless standards from the first (1G) to third generation (3G) did not offer any significant new service for consumers. Now, a radical shift is taking place with the fourth generation (4G), drastically changing the telecommunication business model and allowing for a broader variety of services (cf. Frattasi/Fitsek/Prasad 2005: 281-290). Live streaming, mobile voice over IP (VoIP), video conferencing, simultaneous voice and data transmission: Mobile users expect plenty of new interactive and on-demand services which exploit high-speed data transfer and location-based capabilities (cf. Katz/Fitsek 2006: 467).

Communication systems are the general basis for the development of modern societies and the emerging world. A new communication era has begun with the change from information to mobile information societies (cf. Schwenker 2010; Günther 2005: 89). Herein the aspiration towards perfect communication mobility of mobile communication consumers can be satisfied to the greatest extent (cf. Clausen 2008: 116). Whereas free internet access enabled worldwide users to reach, create, consume and connect global information from a geographically fixed entry point, the usage of internet applications, with the help of mobile devices, has opened a new age of communication capabilities.

Efficient division of work, new business models and for example customer-specific products and services can be realised and are creating and saving economic and social prosperity. In lockstep with the evolution of modern smartphones, new ground-breaking functions and applications are popping up which are the hotbed for new innovations and business models. This creates a huge potential of economic and social problems concerning modern societies. At the end of the day, the increasing utilisation of mobile internet applications shows two sides of the same coin. On the one side, there are new capabilities and a higher level of wealth, and on the other side, there is a large number of problems which have to be solved in the future. From an economic point of view, there are two huge bottlenecks which impede increasing mobile internet usage: energy and band-width. The resource-driven view reveals another social problem of splitting the mobile telecommunication

into class-divided networks. As a consequence of scarce band-width resources, only privileged classes will get access to the mobile internet, entailing huge costs. Hence, the network neutrality will fall into ruins and e.g. innovative, financially weaker start-ups will not be able to use this new hotbed for business models etc. The original idea of the internet as an open distributed network will get lost in this mobile scenario.¹

With an increase of capability up to 100 times than UMTS, the mobile industry has implemented a mobile technology Long Term Evolution (LTE) as the 4th mobile generation (4G). At this rate of data-transmission, new applications are available in real time. This positive development will become a huge problem in the future as internet users' transmitted data will increase up to 767 exabyte per year in 2014. Based on the changing consumer behaviour e.g. live stream applications, the transmitted annual data will take up as much storage as 16 billion DVDs. Regarding the increasing convergence between tethered and mobile applications, this means that data transmission in mobile telecommunication networks will explode: Smartphones, netbooks and tablets will waste a huge amount of mobile resources and realise the divided-class network scenario.

This paper suggests Wireless Mobile Grids (WMG) as a feasible means of addressing upcoming problems of cellular technology (section 2). To achieve this aim, the shortcomings of cellular networks in dealing with this upcoming problem in mobile telecommunication are explained in more detail (section 2.1). Afterwards, we will outline the manner in which a WMG functions (section 2.2.1) and develop a scenario of a WMG as an extension to cellular networks via short-range links (section 2.2.2 and section 2.2.3). After analysing the economic benefits of such an implementation (section 2.2.4), the model will be questioned concerning assumptions about individual behaviour (section 2.3). The second part of the paper is dedicated to address how the environment of WMG can incentivise uninhibited behaviour (section 3). To understand this process of external influences on behaviour, we will outline the process of identity formation and the importance of contextual influence on it (section 3.1). This process is also placed in the context of the age of online communication where diminishing contextual cues complicate the establishment of a coherent self-concept (section 3.2). The anonymity inherent in WMG is presented as a cause of a process which hinders moral agency to an extent that it might endanger the functioning of WMG (section 3.3). To counter this process, the last part develops measures dependent on successfully existing

¹ Mobile devices are responsible for more than 5% of the current www-data traffic (8.2% in the US). Besides modern smartphones upcoming tablets are claiming a lot of data. First-mover Apple with its iPad is responsible for over 1% of data traffic in the www after only one year of market entrance (2.1% in the US)(cf. Handelsblatt Online 2011).

Web 2.0 applications which should be respected when establishing WMG so that it can function as a well-ordered community (section 4). We will end with a forecast on future developments and research questions that need to be addressed in the future (section 5).

2. Wireless Mobile Grids as a Future Network Approach

2.1 Upcoming Future Problems in Mobile Telecommunication

In the future, the 4G system will not only resolve the still-remaining problems of previous cellular wireless generations but will also provide a convergence platform that will offer apparent advantages concerning services as well as coverage, band-width, spectrum usage, and devices. However, there are still certain technological challenges that have to be solved before 4G networks can be established. One of the greatest challenges is the expected power consumption. The rapidly increasing energy demand of cell phones in the past years was not balanced by an equally fast increase in battery capacity.

The power consumption of today's cell phones is huge in comparison. It doubled from the first/second to the third cellular wireless generation. Of course, this is also a consequence of new built-in features such as GPS receivers, high resolution cameras or large touch screen displays (cf. Perrucci 2009: 2). However, up to 50% of the power consumption today still comes from the device's basic communications and signal processing capabilities (cf. Katz/Fitsek 2006: 480-481). This massive increase in energy consumption is not going to change in the 4G system unless new network designs are applied. In addition, it is not possible to sufficiently increase the amount of stored energy within batteries. Currently the battery capacity is doubling roughly every ten years, which is far too slowly for the application and service requirements. An enlargement of the battery is not an option due to the cell phones' form factor (cf. Perrucci 2009: i). New battery technology that could eventually provide enough energy is still experimental (cf. Haavind 2009: 10-12).

An aggravating factor is the fact that the market demands long operational times. Consumers expect especially long battery life from future all-in-one phone devices and network operators also want their customers to have operational mobile phones constantly available since they typically generate revenues only when their customers use their devices (cf. Perrucci 2009: D4). The integration and application of mobile networking into daily life cause another apparent problem of resource

scarcity. Radio frequency is becoming scarce due to the growing numbers of handsets and multiple mobile devices of individuals. Especially in congested areas, such as London or New York, the increasing usage of smartphones and mobile internet repeatedly lead to cellular network collapses (Bingham 2010). Current and future cellular networks will not be able to master the expected convergence of web usage and mobile communication. Mobile communication, as a substantial element of economic and societal development, necessitates concepts and innovations to overcome the apparent bottlenecks. Within the last years, the evolution of wireless technology (as well as computer networks) has lead to a shift in perspective in the telecommunication industry. Many new ideas addressing future mobile issues have started to take the user-centric view.

2.2 Wireless Mobile Grids

2.2.1 Functional Principles

Associated with the user-centric view, networks are evolving from centralised hierarchical systems with a centralised single management to decentralised distributed systems under the management of many (cf. McKnight/Lehr/Howison 2007: 679-697). Fitsek and Katz proposed in this context the establishment of Wireless Mobile Grids as shown in figure 1 (cf. Fitsek/Katz 2007: 31-59).

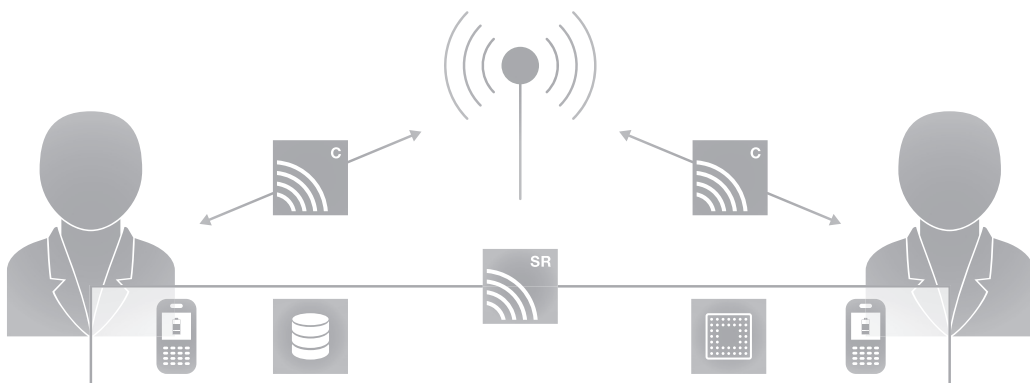


FIGURE 1: WMG COMMUNICATION ARCHITECTURE
(SOURCE: BALKE / DE VOS / PADGET 2011: 1093)

Due to so-called short-range communication links (SR) such as WLAN or Bluetooth, ubiquitous mobile devices are expected to build ad-hoc connections to share their cellular link in a versatile manner. Advantages in using SR to extend cellular networks are the ability to share resources such as energy, CPU, bandwidth, storage or content (cf. Fitsek/Katz/Zhang 2009).

For a better understanding of WMG technology, we focus in a first step on the personal-sphere of a single mobile consumer. The general assumption is that the single mobile consumer uses three web-enabled mobile devices – e.g. Apple’s iPhone, iPad and MacBook. To get his job done, he mandatorily needs web access for the three devices in parallel. Using WMG technology, the mobile consumer links all three devices via short-range link and subsequently needs only one paid-for web-access via cellular link; for example, the iPad and the MacBook are able to get web access via the iPhone.

In the public-sphere (shown in figure 1), we have multiple mobile consumers using their mobile devices, such as smartphones, tablets or netbooks, side by side. Following the private-sphere scenario, many users can get web access from one of their neighbours. Further examples could be e.g. parallel downloads and the sharing of desired data packages like video-streaming. The hybrid technology, merging cellular and short-range links, enables users with different capabilities to cooperate and share their limited resources for the benefit of the ad-hoc community. The advantages of this combination are the much higher bandwidth at the much less cost of power (cf. Balke/De Vos/Padget 2011: 1093). The idea of WMG follows the grid characteristics which evolved in the energy industry (cf. Schürmann 2010). In decentralised networks, every single user receives (and possibly injects) the resource which is in demand without knowing the point from which it was obtained. Users consume resources without noticing the grid technology (cf. Geiger 2006: 17).

2.2.2 The Wireless Mobile Grid Scenario

For a better understanding of the whole WMG proposal, we briefly present a scenario for use in the rest of the paper. The scenario is New York’s district of Manhattan, which is highly interesting from an infrastructure provider’s point of view, because of the high number of potential customers as well as the problems arising from the high density of mobile phone users. As a consequence, the network may easily become overloaded and the quality of service may deteriorate. The reason for this is straightforward: we may assume that some network users want to download video-streams in social networks or Wall Street’s financial news from a single base station, which uses

the conventional multicast technique. Thereby the bandwidth of the base station is divided into several sub-slots (“channels”) which are sent out sequentially within one time frame. Thus – up to a technology-defined maximum – each mobile phone is assigned one slot. As the total bandwidth of a base station is fixed, the more mobile phone users are assigned a slot, the smaller the bandwidth gets that can be allotted to a single channel (cf. Mansmann 2011: 119). Noticeable implications for customers can be seen on New Year’s Eve: annually, many users consume mobile services at the same time, but the enormous demand results in a network collapse.² As a result, in 4G networks with data transmission, download times increase, leading both to higher battery consumption as well as lower quality of the streaming service.

In contrast to the non-cooperative scenario, where a single mobile phone user would need to receive all sub-streams over the cellular link, resulting in the problems identified above, cooperation in the form of a WMG enables users to share the task by receiving a subset of the multicast channels over the cellular link from and acquiring the remaining parts over the short range link. Some areas can be identified where WMG is already used. First of all, possible operational areas have been identified in regions without infrastructure like developing countries or disaster zones. WMG can be implemented easily without large upfront investments. In disaster areas and war zones, the military uses related technologies such as ad-hoc networks for communication between the troops. One of the first projects using WMG in developing countries is called “one laptop per child” (OLPC).³ Hereby the non-profit organisation provides one laptop per child which is equipped with two short-range WLAN antennas. The children are able to build up a WMG to communicate and to create a social network (OLPC 2010). If there is no cellular link to get web access, the children are able to connect each other and a communication network arises. If there is one child with “external” web access, it supplies all other connected children. Additionally, first steps have been taken in the industrialised world. The technical basis is given by the modern devices which are equipped with WMG technology such as WLAN across the board. Regarding future problems in mobile communication, global enterprises as well as start-ups recognised the huge potential of WMG in modern societies as an expanding technology complementing cellular networks.

2 The characteristics of so-called breathing cells become obvious in terms of receiving high-speed bandwidth in between 4G LTE networks (Schiller 2003: 91). In a realistic scenario, 25 customers can be delivered with about 3 Mbit/s by a single base station. If there are more active users, bandwidth will be reduced for every single consumer (Mansmann 2011: 119). Grid collapses, which can be seen mainly in overcrowded areas, become reality as the extreme effect (Berke 2010; VDI 2010; Bingham 2010).

3 OLPC’s mission is to empower the world’s poorest children through education.

Toward the end of the past decade, big manufacturers of mobile devices already opened the devices' short-range link to get web access for neighboring units. An indicative step has been taken by the market leader for modern smartphones in 2011. Apple Inc. permitted all Apple users while downloading the current software system iOS 4.3 on their iPhone 4 to share web access with neighbored units via WLAN. This dissemination can be seen as a milestone for the evolution of WMG technologies. When Apple Inc., as a provider of an almost completely closed software system, opens the iPhone for routing web access, there must be a huge potential for short-range links and possible related business models. Furthermore, there are first steps from start-up enterprises in the field of using short-range links, such as applications which enable single smartphones to be used as mobile WLAN router and can be bought by users; therewith WMG can be implemented (cf. Aamoeth 2011).

However, despite the advantages, looking at the realisation of the WMG idea from an economic point of view, a problem appears that is very common to all open distributed systems in general: the network depends on the cooperation of its users. To fully analyse the complex field of WMG, a theoretical model and a reference system have to be implemented.

2.2.3 Model and Assumptions

To capture possible problems or future research questions, a model is introduced in the following sections. The model is called the WMG model and follows the basic assumptions of the so-called flat earth model (cf. Kotz et. al. 2004: 78-80). The flat earth model assumes that the earth is a flat slice and implies the important parameters "freedom from barriers" and "a closed area" which are both inevitable for the following contemplation to make the WMG work from a fundamentally technical perspective.

Further assumptions have to be made to ensure service quality at the level of a modern cellular network. To achieve service quality at a maximum level, enough users have to be in the closed area due to the limited coverage of short-range links. To make the WMG work, the following advanced assumptions have to be made:

- Net stability through adequate connectivity.
- Automatic participation inside the closed area.
- Uniform distribution of all users.

- Impossibility of withdrawal from the WMG.
- Web access via cellular link by every user.
- Data injection only via wireless access supplied by network providers.
- Homogeneous calculus of all consumers.

As a suitable reference system, the island of Manhattan, the oldest and the most densely populated of the five boroughs of New York City, has been chosen. This reference system contains most assumptions made in the model. Manhattan is nearly flat (highest natural point is Long Hill with about 77 meters) and demonstrates, as an island, the characteristics of the assumed slice. So both assumptions, freedom from barriers and closed area, can be seen as given. In figure 2, the Manhattan WMG is shown in a simplified illustration.

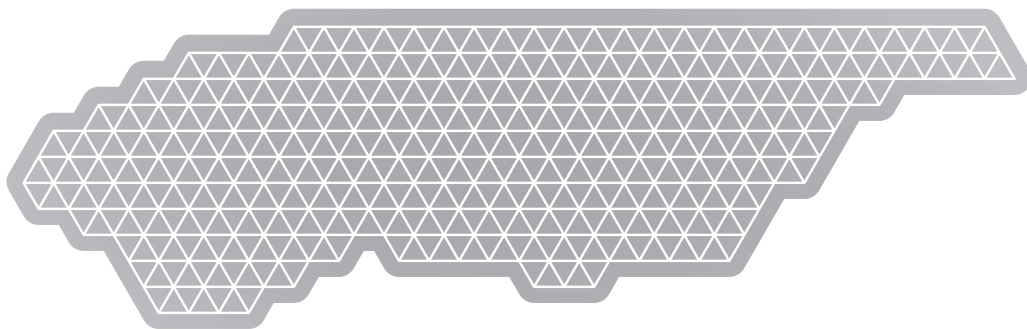


FIGURE 2: THE MANHATTAN WIRELESS MOBILE GRID (OWN SOURCE)

To establish the WMG the main goal is to implement a stable net which is unsusceptible to grid collapses. To reach this goal, high connectivity has to be given. In this context, high connectivity means that a single user can connect multiple users via short-range link. With about 1.6 million inhabitants and nearly 60 square kilometres, Manhattan features perfect conditions to implement a WMG. The implementation of a WMG requires at least 2,600 users per square kilometre to ensure its functioning.⁴ With more than 27,000 inhabitants per square kilometre, Manhattan is able to

⁴ Short-range link coverage of 30 meters assumed.

implement a high-grade fine-meshed WMG under the assumption of the uniform distribution of all inhabitants which are automatically users.⁵ With the slice characteristics of the island of Manhattan, the automatic participation and the impossibility of withdrawal can be underpinned,⁶ so the short-range link cannot be deactivated. Additionally, it is not possible in the contemplated model to shut down the used device. Every user is in the possession of several storage batteries and will change them immediately if needed. Furthermore, assumptions concerning individual web access are very important for the feasibility of the Manhattan WMG. So every inhabitant has to be a customer of a net provider, such as AT&T. With this assumption, it is ensured that every user is able to download data from outside the WMG. To observe the WMG as an expanded communication system, an advanced assumption is the restriction of downloading data only via wireless connections (cf. Fitsek/Katz/Zhang 2009: 142).⁷

The most critical assumption is made concerning the calculus of user data and mobile consumption. To converge to the potentials and possible problems of the WMG, the starting point has to be a homogenous calculus of the participating users. So in the first step, it is assumed that all Manhattan inhabitants wish to access the same data packets, such as online videos in social networks or live-streaming applications for e.g. the president's speech on Independence Day on the Fourth of July. In the space of the given reference system Manhattan, we focus on a simplified example of using the WMG. Every inhabitant of Manhattan wants to obtain the president's speech via mobile device which is broadcasted on the president's social network account. In this simplified example, only one user will download the live-stream and send it to his neighbours. In turn, his neighbours will broadcast the streaming until every user is satisfied in real time.

A further example is given through the purchase of downloading packets not available as live streaming. In case of the president's speech, every user will download the file an hour later from the homepage of the White House via mobile device. In the given example, the video data can be divided in 1.6 million slots. Each single user will download its single slot and share it with all the rest. Hence, every user has to download only one slot via cellular link and gets the rest of the president's speech from the Manhattan WMG.

5 Following these assumptions, Manhattan is able to introduce a WMG with short-range link coverage under 10 meters. To establish a 10m-WMG, approximately 23,000 users are needed. The data have been generated from a static perspective. Regarding the very high population density in Manhattan, dynamics through user movement are negligible. The model follows this assumption which is also given at public events such as public viewing, cinema, theatre, opera as well as in stadium facilities, lectures or conferences.

6 The closed area characteristic implies no way out of Manhattan.

7 Data purchase via tethered link is not considered.

2.2.4 Possible Economic Implications

The strict assumptions regarding the cooperative usage in WMG propose significant implications for all players in the world of mobile telecommunication. The shift from purely passive, consuming users towards active, cooperative users necessitates that noticeable benefits for all consumers have to be guaranteed. Assuming the WMG is implemented, obvious advantages from the perspective of the user can be found.

Regarding the addressed energy problem, the usage of short-range links decreases the energy consumption of mobile devices. For example, the battery power and CPU capacity needed on the short link are significantly lower compared to a cellular network structure, making the concept advantageous from a resource point of view (cf. Perrucci 2009). Lower energy consumption means lower mobile energy costs, which enables the consumer to use the handset for a longer time. The significantly longer usage time is directly connected with the network providers' concerns. A longer period of usage implies a longer period of potential consumption of offered services, which means increasing revenues and increasing net profits. Furthermore, a prevention of collapses in the cellular network stops additional losses in sales.

At the same time, the implementation could solve the resource problems of network providers, and grid collapses can be prevented based on an overall lower demand of frequencies. Huge savings can be realised concerning the up- and downlink frequency in modern cellular networks. Through the WMG solution, the same number of mobile services could be sold in association with a lower consumption of frequency due to the cooperation of users for the joint benefit. However, the presented solution for future problems of the mobile telecommunication branch is based on a theoretical model. But several very strict assumptions have been made to ensure consistent contemplation.

2.3 Softening Selected Assumptions

To implement the WMG within the real world, interdisciplinary research has to be done in the future. Several assumptions of the theoretical model and the chosen reference system are not to be found in reality. If we limit the application of a WMG to certain urban agglomerations, then the assumptions of local restriction and the sufficient distribution of users and mobiles are met in reality. These assumptions concerning the technological perspective and feasibility of a WMG will remain in the following analysis.

However, there is another dimension to the functioning of a WMG: a social challenge. The problematic assumption is the homogenous calculus of the users. This assumption includes two dimensions: Firstly, a homogenous calculus ensures the cooperation of users in terms of their participation in the WMG. This implies that people cannot withdraw from the grid and they have to participate automatically once in reach of other members. Only if a sufficient number of users participate can the constant connectivity be secured. This is far from being realistic as it will always be individually rational to defect in such a situation. Receiving data through the WMG is advantageous for the individual as it ensures fast download rates. However, participation comes at the cost of giving out bandwidth, which in turn decreases the battery life of the handset. A perfectly rational individual will therefore engage in strategic behaviour and only turn on the handset to receive data and refuse to give. If enough members follow this rationale, the grid is bound to collapse (cf. Balke/Eymann 2010). Although this is a very severe limitation, we will not attempt to solve it because much research has been dedicated to implementing normative mechanisms to ensure cooperation in terms of ensuring participation (cf. Balke et al. 2011a&b, Balke/Eymann 2010).

A problem which has been widely neglected by research so far is the second dimension of the assumption of a homogenous calculus. A homogenous calculus ensures every member will strive after the same data-packages. In other terms: members' online communication behaviour in the WMG will be the same or at least very similar. If we acknowledge the amount of research that tries to grasp internet behaviour in the face of a significant number of online offences, it becomes apparent that this assumption is highly problematic. An implementation of WMG entails similar risks as the internet. The problem even escalates in the fact that in a perfect WMG, without external links, users are completely anonymous in comparison to the internet. If established the wrong way, then the anonymity of participants may invite anti-normative behaviour as people take up characteristics depending on the context of action. The online environment takes a special position, precisely because it allows for the obscuring of basically all aspects which define the real-life self. The main question this proposes is how the context of WMG must be designed to counter a process of adapting anti-normative standards. Before being able to answer such a question, it must be understood how the anonymous environment one is confronted with when acting within WMG influences behaviour.

This sort of challenges must be answered with respect to identity formation and its connection to moral agency to explain how people react to contextual cues. It should be made clear that we are not attempting to clarify what normative behaviour entails but rather if the situation of acting

in a WMG destroys the capacity of being governed by internalised norms. This requires entering very different fields of research: philosophy, sociology and psychology.

3. Identity and Moral Agency in Online Communication – A Social Challenge of Wireless Mobile Grids?

3.1 Establishing Identity – Orientation in Complex Role-Systems

3.1.1 Sociological Theories

Identity refers to a person being a unique individual with a coherent concept of self. Two components play a major role for identity. The self-concept refers to personal beliefs about oneself. But being a unique individual also depends on one's perception by third persons (cf. Günther 2004: 23f.). Being recognised as a unique and distinctive person is of equal importance to determine a coherent identity; this concept will be addressed again later in the paper.

In its original sense, identity means sameness, yet people do not always act in a strictly consistent manner. This is because people are influenced by social context in their actions. This contextualised interaction will be referred to as role-playing in the following. It means adapting to certain situations and altering behaviour according to them. A central question of research in identity theory is how different behaviour across situations can be merged into one coherent pattern. Two prominent sociological accounts of identity theory have been brought forward by Ralf Dahrendorf and Erving Goffman who understand identity as the orientation within a complex role-system. Their analysis is based “in the area where the individual and society intersect” (Dahrendorf 1973: 5).

Dahrendorf believes roles to be the sum of expectations of society. Any social relation (like having a child or having someone who pays me for work) defines a social position (like being a father or an employee). For every social position, society holds certain attributes and expectations of how to behave. In this theory, a role is therefore the sum of expectations that society prescribes to certain social positions (cf. Dahrendorf 1973: 14-20). Society might expect a father to be caring towards children or to take responsibility for their actions. Fulfilling the expectations of society is a trade-off with personal freedom. The homo sociologicus is that fictional person that is dedicated

to all expectations that define his range of appropriate actions. His identity is fully stated through the fulfillment of all expectations that society imposes on him.⁸

Let us take Dahrendorf's famous example of Dr. Hans Schmidt to explain this. If we talk to Dr. Schmidt, we will find out that he is a father of two children and is a grammar school teacher, etc. For all these positions, we hold certain demands about attitudes and behaviour, and Dr. Schmidt might fulfill them. When talking with his children, he is loving and affectionate whereas these same characteristics he might not adopt when standing in front of a class trying to appear strict.

Erving Goffman even draws a more radical picture in his book "The presentation of self in everyday life", published in 1959. The main conclusion of his analysis is that we are all playing theatre. He would claim that Dr. Schmidt is performing to control the conduct of others. We will focus on the aspects of performance which he takes as the "activity of a given participant on a given occasion which serves to influence in any way any of the other participants" (Goffman 1959: 15). Performance is a medium to form certain desired impressions. In certain situations, individuals want to take on certain qualities and perform according to them, just like Dr. Schmidt wants to appear strict as a teacher. By this, people explicate certain facets of their identity. In other terms, they are playing a role. But, according to Goffman, people do not invent new roles for every situation but have a standardised repertoire. This repertoire he calls front (cf. Goffman 1959: 22).⁹ Identity is therefore stated through a front, a repertoire of roles that is influenced by expectations and how people want to be perceived. The way in which identity is stated evolves through external influences and internal influences. The individual wants to create a certain impression by resembling a front. The society influences this process as it forms certain expectations on how to achieve this impression.

Dahrendorf objects to this view as it would mean that every action is determined through the society's demands on how to resemble certain characteristics. In reality, men are not entirely socially defined but they exist in a "paradoxical relationship between the human being of our experience and role-playing homo sociologicus" (Dahrendorf 1972: 35). The individual is faced with the task of mediating the psychological man and the homo sociologicus. Connecting these two spheres is part of the process of establishing identity. Before turning towards the process of establishing

8 The homo sociologicus is only a radical model for methods of research, just like the homo oeconomicus (Dahrendorf 1972: 7). Nevertheless, it emphasises the strong influence that society can have on behaviour.

9 The front includes the stage on which people act, like a classroom. Secondly, there is the personal front of things such as status, clothes and thirdly, there is the social front that is similar to the expected patterns of society.

identity, let us shortly look at a more contemporary theory of psychological determinants which is also influential on identity formation.

3.1.2 Psychological Determinants

In psychology theory, the influences described above will be influences on what psychologists call characteristic adaptations. Characteristic adaptations are certain motivational, social-cognitive, and developmental constructs which are contextualised in time, place, and social role (McAdams 2009: 16). They include all those qualities that individuals alter according to sociological theories. It must be emphasised that there are not the same as certain roles. The list of characteristic adaptations includes motives, goals, projects etc. These characteristics are influenced and shaped by certain contexts and not the actual role that is being played. But there are also dispositional traits which are not dependent on social roles and still can have a highly normative character. Dispositional traits are those characteristics that cut across situations and contexts. They allow for psychological individuality and draw a sharp distinction between individuals even though they are confronted with similar situations throughout their lives (cf. McAdams 2009: 13).

It is important to note that both characteristic adaptations and dispositional traits carry strong normative weight. Especially on characteristic adaptations, the contextualised influence has an educating function for socially desirable behaviour. Lawrence Kohlberg (1981) proposes six stages of moral development that take place on the level of characteristic adaptations. He develops a model in which the first four stages of moral development, which usually take place during childhood up to young adulthood, are derived from the influence of reference groups, as during this phase, people adapt behaviour through rewards or sanctions imposed by external groups. During childhood, the family will be most influential and the context will widen during maturity to being influenced by groups of friends and later on even through legal standards. The last two stages of moral development are not a direct result of normative influence but of reflection on these influences. The motivation in these stages is not reward or sanction but an understanding and internalisation of the moral quality of norms. The last part includes a process of reflection which is one of the main determinants when establishing identity (cf. Kohlberg 1981: 17-28).

3.1.3 *Creating a Fit*

The great task everyone is faced with is creating a fit between dispositional traits and contextualised actions. In this phase, one will try to arrange all the different selves and merge them into a pattern. According to Erikson (1968: 128-135), this will take place during late adolescence and young adulthood.¹⁰ It is this time during which people start reflecting on their past, present and future in terms of questions like “what is life about?” or “where do I want to end up being?” etc. These are questions that arise from taking life as an object for reflection and shape characteristic adaptations so that they are consistent – thus establishing identity. Dealing with these fundamental questions is done in highly moral terms as one has to reflect on which virtues to accept, which roles to abandon and to what extent to fulfil expectations of society. To put it in Goffman’s terms: one has to reflect on how big the repertoire of roles can be to be consistent with a certain self-image.

In the optimal case, the result of this inner negotiation process is an individual with the ability to adapt to certain situations as well as including core qualities to govern all of his roles. The concept described above must be understood as an interdependent process that constantly continues to develop. Individuals reflect upon changing social relations and connecting experiences of who they were, what they wanted and the imagination of the future (cf. Erikson 1959: 51-100).¹¹ The big task is to realise a consistent image of oneself through keeping roles and traits within a realm that provides a satisfying self-image: identity.

3.2 *Identity Crisis in the Age of Online Communication*

Drawing a consistent pattern of one’s life has never been harder than in the age of new communication forms which allow users to completely obscure almost every aspect about themselves, even their core qualities. Sherry Turkle (1995) dedicates her work “Life on the screen – Identity in the age of the internet” to the challenges and chances of taking up different roles and creating new worlds and stories around them.

10 In the following, we will concentrate on implications for the identity of individuals at any age. At this point, it becomes evident that especially during and before the time of shaping an image of self, effects distorting a consistent pattern of disposition traits and characteristic adaptations may be very harmful towards establishing a ‘healthy identity’.

11 Erikson actually deals with a ‘healthy personality’, yet he stresses the importance of a unity of personality and the crisis that one has to overcome when trying to unify one’s experiences.

“In the story of constructing identity in the culture of simulation, experiences on the Internet figure prominently, but these experiences can only be understood as a part of a larger cultural context. That context is the story of the eroding boundaries between the real and the virtual, the animate and the inanimate, the unitary and the multiple self, which is occurring both in advanced scientific fields of research and in the patterns of everyday life” (Turkle 1995: 10).

The context of new communication forms differs strongly from traditional contexts, as the expectations that are supposed to guide behaviour become unclear. The online environment is an identity laboratory (Wallace 1999: 47). In this laboratory, people can put on masks and play masquerades much more easily than in real life. They can form new identities through taking up different personae¹² and abandon characteristics that define the real-life self, be it a multi-user-domain (MUD) like the online platform Second Life, in which one can create characters that meet other characters in online cafés and communicate with them, or just a simple chatroom where a user can decide to take up different gender, age and behavioural patterns. In Second Life, avatars can earn money by providing services as DJs or even sexual services. In the following, the sum of these roles will be referred to as the virtual-self, which is opposed to the real-life self – the sum of the roles people play in reality.

New possibilities of exploring every possible aspect of self propose a completely decentered, fluid self-concept in which constancy throughout roles seem to diminish. But even if adapting is certainly important, it is crucial to notice that embracing the idea of a fragmented, fluid concept may result in a lack of moral content (cf. Lifton 1993: 229-232).¹³ Alasdair MacIntyre (1993: 324-325) even holds that a divided self lacks the capacity for moral agency. Virtues such as integrity and constancy are lost, which results in an individual that loses any standpoint from which to evaluate standards to govern its various roles.

12 The term personae usually refers to characters in a novel or a play. In psychology, it refers to the facades and masks people use to adapt to certain situations. It must be distinguished from the inner personality.

13 There is a prevailing opinion which we share, brought forward most famously by Christine Korsgaard, following a Kantian argument dealing with matters of identity as necessary prerequisite for moral agency. It holds that moral obligations are self-imposed, giving us authority over ourselves. Through this, normativity is based in the human will. In a second step, Korsgaard claims that a consistent practical identity is necessary to be able to act as a self-legislative individual (Korsgaard 2003a&b).

In the case of a WMG and of the internet, the core source that proposes a lack of moral agency is anonymity. It is anonymity that allows for playing roles that are drastically altered in fundamental characteristics and it is anonymity that takes away incentives for moral behaviour.¹⁴ Through the ability to alter everything characteristic about themselves, people are enabled to play roles which are far away from the very core source of identity. This may include giving up moral convictions that guide the real-life identity. The problem in the WMG is simply that a user is anonymous or, more precisely, he may choose to be completely anonymous. Even on the internet, where we are not exactly anonymous, the eroding boundaries between physical, social and virtual realities “make us feel less inhibited, less likely to be detected, and a little less under the superego’s thumb” (Wallace 1999: 39).

Probably the first one to deal with incentives through anonymity was Plato with his legend “The Ring of Gyges” in 380 BC (Book II. 359a-II 360d). Gyges finds a ring that gives him the power to become invisible when adjusting it. This power he uses when reporting to the king to murder him and to seduce the queen. Glaukon, discussing with Socrates, claims that not acting according to one’s wishes if there are no consequences would be individually irrational. As soon as the sanction is removed, the character evaporates and the social construction of justice collapses. Socrates meets this challenge with the words:

“One who is just does not allow any part of himself to do the work of another part or allow the various classes within him to meddle with each other. He regulates well what is really his own and rules himself. He puts himself in order, is his own friend, and harmonises the three parts of himself like three limiting notes in a musical scale – high, low, and middle. He binds together those parts and any others there may be in between, and from having been many things he becomes entirely one, moderate and harmonious. Only then does he act” (R 443d-444).

14 Uninhibited behaviour is usually referred to as flaming. Flaming was originally understood as incessant talking but came to be known as antisocial behaviour on computer networks. There is no universal definition of flaming and there are several critiques of all different attempts as flaming differs from face-to-face communication by definition. Nevertheless, flaming as a keyword for antisocial behaviour in networks shall be sufficient for our purpose (Wallace 1999: 110-130).

This answer transports the main connection of anonymity and identity formation. Socrates explains that unity is essential if one is to act justly as a person, as a single unified agent. There are more examples that dealt with this exact problem. In the Hollywood-movie *Hollowman*, a scientist injects himself a serum that causes him to be invisible. In a famous scene, he is wearing a visible mask – so that he can be identified by others – and watches a woman undress herself. Clearly excited by this, he tries to stop himself from acting against his conviction with the words: “Don’t even think about it.” A few seconds later he stands in front of mirror, takes off the mask, realises that due to his invisibility he cannot be sanctioned and adds, “Who’s gonna know?”, takes off the mask and leaves to seduce the undressing woman. Both these stories transport the fundamental problem of anonymity. As behaviour is largely influenced by contextual action, people are more likely to behave in ways which might even work against their convictions.

To describe the influences of anonymity on behaviour of the virtual-self in the WMG, one must distinguish between social communication and data-communication. We use an unusual definition of both terms, as from a technical viewpoint, every form of communication online or through a WMG is data-communication. We define the latter as file transport in which no actual communication with another person in written or verbal form is included, meaning that there is no social influence on actions. To keep it simple: the down- and upload of files. Social communication is the interaction between individuals through the medium of a computer, cell-phone or other objects that allow social interaction via transmission of data. In social communication there is still a responding corrective through other persons. This separation is necessary because as we have seen, there are two main channels through which morality can be induced: personal conviction of norms and external influences, such as sanctions which usually work through reputation mechanisms. The latter can be easily influenced; personal governance of norms, however, is a question of identity formation.

3.3 Deindividuation in the Online Environment

3.3.1 Social-Communication

Computer-mediated-communication (CMC) under various stages of anonymity has been the focus of a considerable amount of research. There are different models which explain why the virtual self adopts different norms than the real-life self. The model that has widely been agreed upon is

the deindividuation model to explain the process of people altering not only characteristics about themselves but also norms guiding their behaviour.¹⁵

Deindividuation is a state of decreased self-evaluation which results in people embracing anti-normative behaviour. In this state, the perception of self and others is distorted which results in the “violation of established norms of appropriateness” (Zimbardo 1969: 251). There is agreement on this psychological state (cf. Postmes/Spears 1998). However, the conditions to release it are subject to disagreement. Whereas Zimbardo (1969) focuses on anonymity as the salient factor, Diener (1980) focuses on the aspect of losing self-awareness. Both theories do not find sufficient support that a loss of identity leads the individual to anti-normative behaviour (cf. Postmes/Spears 1998).

In the 90s, however, a reconceptualisation of deindividuation took place, which held that anonymity and a lack of self-awareness marked a transition from individual identity to social identity, shared by members of the crowd. This Social Identity model of DEindividuation (SIDE), developed by Stephen Reicher (1984), received remarkably little criticism. It finds that within groups, anonymity can increase responsiveness to group norms. The reasoning is that since deindividuation hinders reflection and acknowledgement of internalised standards, it opens the individual to external influences. Consequently, the abandonment of established personal norms can also promote the acceptance of group norms. The model is based on a distinction of the self-concept between social identity and personal identity: social identity encompasses group classifications of individuals. Tajfel defines it as “that part of an individual’s self-concept which derives from (...) knowledge of (...) membership of a social group together with the value and emotional significance attached to that membership” (Tajfel 1978: 63). Social identity is stressed if a person’s action is strongly motivated through membership of a certain group. A fan of a football match who is cheering for his team will be in a situation where his social identity, as a member of the fan community, is salient. His actions are guided by the characteristics of being a member of the group. Usually he may not be the kind of person that openly yells at the referee for a bad decision. But as a member of a community, he characterises himself as a fan for which this is an appropriate action. Personal identity relates to all idiosyncratic characteristics and contingencies of an individual (cf. Turner 1982: 18). If a person is at the same football match but is not a member of the fan community or does not feel drawn towards the group, his actions will be dominated by personal characteristics, such as being

15 For an overview of the research and the agreement on the deindividuation model cf. Joinson 2003: 25-51.

a calm person or an aggressive person. Usually people are characterised by both forms, although different situations can promote the salience of personal or social identity.

The SIDE model holds that anonymity in CMC favours the salience of social identity, as under anonymity, interpersonal differences diminish and personal features are obscured. There is less awareness of personal characteristics but more awareness of those characteristics that are common to those communicating with each other. Therefore they are more likely to accept existing group norms. This only holds if the social identity is salient. This can create different effects as behaviour in group communication is largely dependent on the norm that is dominant within the group. Obviously, the moral quality of norms differs widely, depending on members, context and the explicitness of the norms that are dominant within the certain group. In a forum of a scientific journal, the norms will be rather civilised, whereas in the bigger part of online communities like chatrooms and MUDs, flaming occurs more often, as communication norms are placed on a lower moral threshold.

There is a particular weakness of the SIDE model. It does not sufficiently explain why people abandon norms which usually guide their behaviour when personal identity is salient. This problem stems from the fact that the SIDE model is only concerned with group communication. It asks the question: What happens when personal identity is salient within group communication? It does not explain why there is less self-awareness without responding groups, as is the case in data-communication.

3.3.2 Data-Communication

There has been surprisingly little research on the sociology of online data-communication. Although legislative systems are trying to gain control over illegal data traffic, such as child pornography and violence-glorifying videos, the effectiveness of these policies remains doubtful. If we analyse the case of the internet, we find that there is nothing like a social corrective that could induce conformity on the virtual self, as online communities might be. If someone enters an illegal website and downloads illegal content, then the context in which it takes place is the internet itself. This might sound rather abstract as one is obviously still an existing person undertaking this action.

To understand this, let us assume for the moment that this connection does not exist anymore. How could the circumstance of downloading files induce expectations towards the virtual self? It becomes clear that the only channel through which the internet as social context can produce

expectations is the threat of being sanctioned for illegal activities. People must accept that they can be held liable for their actions if they are identified by their IP address. There is an expectation of society brought forward through the threat of being sanctioned. This “last” source of external influence on actions is lost in the WMG. The possibility of being sanctioned cannot be induced effectively. The reason for this is the fact that mobiles are not linked to a certain person, like an IP address. The virtual self is, differently than in the internet, completely anonymous like Hollowman or Gyges. Consequently, the online environment of data-communication in a WMG cannot induce morality. One must remember that the assumption claiming that there is no connection between real-life and virtual self is far from realistic. If this is the case, then there is another source for regulating behaviour, namely personal internalised norms. That the situation cannot induce external guidelines does not mean that everyone necessarily starts acting immorally, but rather that the internal norms are decisive for this process. The likeliness of immoral actions is then very much dependent on two parts: the personal convictions of a user and the strength of the tie between real-life and virtual roles, meaning the probability that one is actually guided by personal norms in such a situation.

To sufficiently address the first part, one would have to explore humankind in all its facets to grasp how strongly people are dedicated to moral convictions. Obviously, this is not possible. Yet, it is possible to describe a tendency without slipping into mere assertions. As said before, Kohlberg describes six stages of moral development. However, he claims that only in the last two stages are people actually driven by internalised standards.¹⁶ Also, the process of adapting normative convictions is driven by external influences and it has been explained in detail that within new concepts of identity formation, this process is becoming continuously harder. Hence, every individual who has not reached level five or six is without incentive to act morally, and thus a WMG is a space free from moral learning concerning data-communication.

Still, a problem exists concerning the tie between the real-life and virtual roles. Even if people usually adapt high normative standards, they are in a state of deindividuation. This means that the decreased self-awareness favors anti-normative behaviour even though people usually follow certain norms for their own sake. The dilemma that the establishment of a WMG brings along is that the inherent advantage of it is connected to a structure of a peer-to-peer network. People share

¹⁶ This approach seems especially important if we think of potential users of a WMG. The six stages are achieved in an order determined by time, meaning that only (young) adults can actually achieve the highest levels. It seems accurate to assume that a WMG would mainly attract youth and young adults, which makes the problem more severe.

data directly amongst each other through downloading chunks of other participants. But the two main problems of data-communication remain: Firstly, how can we externally impose a context in the context-free environment of data-communication, and secondly, how can one support being governed by internal norms instead of abandoning them?

We hold that both are possible to a certain degree, firstly by embedding data-communication into a social context through establishing a WMG as a community. To keep the advantages of a WMG (efficient data communication) without running into the same problems of peer-to-peer networks, it must be structured in a way that users perceive themselves as a member of a community. Secondly, to support the governance of internal norms, a user's identity within that community must be closely linked with his real-life identity to hinder the process of losing self-awareness. Imagine a person walking through Manhattan who wants to upload child pornography. He cannot be identified by a legislative institution as he only connects to other mobiles directly without the intermediate of an antenna. Yet other members of the crowd can sanction him if he has an identity which they see once he confronts them with the videos. This must be the starting point of implementing a WMG: make people willing to show who they are in the grid instead of staying anonymous and make them act as this one person and not with several identities!

4. A Framework for Establishing Wireless Mobile Grids

The establishment of a new form of communication imposes a whole variety of tasks for it to be successful. There are many ways in which this technology can be used. Up to now, research only suggested WMG to be an alternative way of transmitting data. This approach results in services similar to the internet but using fewer resources than the momentary network structure. The situation for the demand side has not drastically changed in this scenario. We follow a different approach which is based on the growing segment of Web 2.0 services. The overriding idea is to use the technical structure of a WMG – transmitting data-packages via mobiles around you – to implement a social network with the feature to communicate with those around you by means of those around you. Integrating a WMG as a Web 2.0-based service instead of simply changing the transmission structure seems to be an appropriate approach to include the consumer's perspective and to address the risks of an implementation.

The following approach must not be understood as a complete design of a WMG but rather as a framework within which an actual business case can develop. This framework represents the conditions that should be in place within the given restrictions so that a WMG can develop as a well-ordered community. To see how such a framework can be realised, some restrictions of this approach must be acknowledged. It follows directly from the assumptions of the scenario that an implementation of a WMG is limited to urban agglomerations. Also, a secure connection necessitates a hybrid structure including WLAN hotspots or a cellular network. The characteristic of a hybrid structure can in turn be used to reinforce liability of users. From the legal perspective, the optimal case would be if an actual sanction would be possible in the sense that mobile numbers should be connected to a passport number and therefore individually identifiable. However, this would certainly not work out due to data-security and due to the fact that mobiles within the WMG connect directly to each other and this connection cannot be entered easily from an outsider.

A step which is certainly possible and makes some form of control easier is registration and verification through an e-mail address. The usual procedure when registering for any online community can also be used as a channel to enter the WMG. With this measure, a situation similar to the internet could be reached. Admittedly, this is probably a very weak form of incentivising certain behaviour, as people can always use fake addresses for certain behaviour and the situation has not really improved concerning the problems that have been dealt with. The only real advantage of people entering a WMG would then be free connection with others through the grid, which does not seem as attractive in times of flatrates becoming cheaper. Still, it is a first step that allows further affirmative action.

Creating an Interface

As a second step, it is necessary to design the WMG so that one acts within the grid in one role only. This can be achieved through creating a profile as a channel to enter the grid. This aims at creating the impression of being one certain personae when acting within the grid. The purpose is to unify all of the different roles that can be played in the grid. The important feature, however, is that every action within the grid is undertaken under this one role. In the internet, it is possible to be a different person in different communities. This should be prevented. Every function of the WMG – no matter if it is posting in a forum or just downloading slots – must be accessible only through this one channel. A demand for such an inclusive approach of functions seems to

exist. Facebook recently started cooperating with Skype to allow video calling within the platform (Facebook, Inc. 2011). Members can also share blogs, news or videos which they find interesting for their friends. Videos can even be launched within the Facebook page. This can be realised similarly in a WMG as a social platform; a discussion of this will follow.. From a theoretical perspective, this channel, as a means of entering the grid, is created as a basis that allows measures to increase self-awareness. However, increasing self-awareness also necessitates the profile to resemble the real person. In other terms: this one role must be characterised by the most basic traits of the individual to strengthen the core part of identity.

See the Real Me

Only if users are willing to show their face can data-sharing be embedded in the context of social sharing. In other words, the task is to reconnect the virtual worlds with real life. The impact on identity formation is simple: it re-individuates people. Giving them a face is a measure to increase their self-awareness and their perceived anonymity.¹⁷ Also, it reinforces expectations towards other members as they know that they are dealing with an actual person. Recalling the example of Hollowman, this approach refers to putting the mask back on his face with the additional feature that the mask resembles his actual face. Users still play a masquerade but they dress up as themselves.

Google took up on this idea by launching their social network Google+ with the slogan: “real-life sharing rethought for the web”. In the official google blog they claim: “the subtlety and substance of real-world interactions are lost in the rigidity of our online tools” (Google Inc. – The Official Google Blog 2011). This message is obviously directed at attracting consumers. However, there is truth to this sentence concerning the differences in behaviour in real-life and online interaction. Linking the online-identity to the real-life identity is an effective measure to incentivise normative behaviour. But Google+’s slogan uses the phrase real-life sharing, implying the idea of a community which is nonetheless important for establishing a WMG when remembering the lessons from the SIDE-model.

17 Diener and Wallbom (1976) conducted an experiment in which college students were placed in front of a mirror and listened to their own voice, whereas the control group was placed next to a mirror, listening to another person’s voice. This setup should reflect self-aware and self-unaware persons. They were given the chance to cheat on an anagrams test and already the simple measure of placing a mirror in front of them resulted in lower cheating rates compared to the control group.

A Local Community

Making the WMG a community is by far the most important step to induce well-ordered behaviour and also to make it attractive. While peer-to-peer networking is continuously diminishing, social sharing platforms still experience growing user numbers (cf. Mochalski/Schulze 2009). By now, 40 million people in Germany are already members of social networks. This amounts to 76% of internet users with increasing numbers (cf. Bitkom 2011). Facebook alone gained 7.9 members per second in 2010 (Social Bakers 2011). Google recently launched a new social networking platform, and also social sharing platforms such as Tauschring.de or Snapgoods.com are gaining members rapidly (cf. Google Inc. – The Official Google Blog 2011, Grimm/Kunse 2011: 22). The demand to connect does not seem to know an end. However, to enforce the salience of social identity, a common identification is needed. Such a shared social identity is necessary to establish credible expectations towards behaviour. In the process of creating a community, there are two pathways to form a sense of shared identity: a deductive and an inductive approach.

The deductive approach explains how a shared identity can be derived by members from knowledge of their group within the social context (cf. Postmes/Swaab/Spears 2008: 167-169). A political party can be the source of a shared identity if categorised by its members as being left or right in opposition to the respective outgroups. The local restriction of a WMG provides a good starting point to deduce such shared properties. The WMG being locally restricted, like the WMG Manhattan, provides a sense of identification with a large social group. This perception of being a member of a community is most importantly changing the perception of mutual anonymity within a WMG. Even though a user does not actually know from whom he is attaining the data, he must perceive it as asking the community if they share his interest. Not knowing who transmits the data package does not mean that users cannot know if other members already have a required package. On the contrary, such a feature could be a very attractive feature to strengthen the common interest. This could be established similar to Facebook's status page where users can show a chosen subcircle of members, videos or articles which they find interesting. It is nevertheless very important that this social group of Manhattanites must be stressed as a group of real-life individuals who interact online. This ensures that the norms which members deduce from the social group correspond to existing norms. The platforms aiming for real-life interaction are the ones where the members actually need to show a profile to benefit of the services from the community. For example, Couchsurfing is a platform where people offer others the opportunity to stay on their

couches for free when traveling. Frankie, a user from Tel Aviv states in his profile: “If you aren’t willing to completely fill out your profile, then don’t even contact me” (Grimm/Kunse 2011: 23; translated by the authors). Users are also rated by people they met. The community is able to react if someone takes advantage of the collaboration.

Such a shared identity, which is deduced from a real-life contingency – being from Manhattan – does not only have an effect on an individual’s behaviour but it ensures the functioning of a WMG. Not only does it exclude certain data from being shared but it also reinforces a common interest in certain data-packages. It is a crucial step to ensure the functioning of a WMG when remembering the assumption of a homogenous calculus of the participating users. If users are interested in completely different data-packages, then the advantages of a WMG are not realised as everyone still has to download his preferred data via an external link. Only the common interest allows the data to be distributed amongst each other and hence the realisation of economic advantages.

5. Forecast and Future Questions

Within the assumptions and these three steps in place, a WMG could be established with an unlimited variety of features. It could include creating subcircles of friends in order to follow their recent activities and see their interests comparable to a local Facebook. But also it allows for local phone calls, including videos, marketing of events in Manhattan, location-based services etc. Even sharing platforms which offer to share taxis, cars, housing or simple hardware with people close to you could be established. All of these services can be realised within in the context of the close local surroundings instead of having to filter the internet for information on services close to one’s location.

Business models can be realised without wasting resources. Imagine a band launches a new album and the data package for the recording is sold for a fixed price, say \$1.6 million. This price is shared by every grid-user who attains one slot. If all 1.6 million users in Manhattan want to attain one slot, then everyone pays one dollar to get the whole album as it is distributed throughout the WMG afterwards. Suppose the CD has 650 MB, then only these 650 MB are fed via an external link into the WMG, compared to 1,040,000,000 MB in a traditional cellular network structure to provide the music to the users. Such creative ways of using WMG as business cases also touch

upon the very relevant fields of copyright issues. This seems a real challenge when implementing WMG for the purpose of faster data-traffic only. The proposed design offers a structure on which intellectual property can be secured through intelligent adaptations such as the given example. Similarly, the music could be downloaded by one member only and for every other user who downloads the data from him, he gets a small amount of money. Such an approach was already realised by the rock band Kaiser Chiefs. They launched their recent album online before selling hardcopies. Fans could choose 12 out of 20 songs for their personal album and could earn one British pound for each one of their personal album sold. Business of this sort can be revolutionised within a WMG using fewer resources and connecting it with a social network approach (Universal Music Operations Limited 2011).

However, there were several issues concerning an implementation which we did not consider. All we showed is that a WMG is a possible and intuitive approach to react on apparent bottlenecks. We highlighted very specific problems a decentralised network structure might have on individual behaviour and provided a framework as a basis to tackle such risks. At the end of the day, it must be acknowledged that even though technologically quite advanced, the WMG research is still in an early phase concerning the socioeconomic problems. Future research must specify how participation within a normative framework can be fostered. This includes further interdisciplinary analysis. Copyright infringements and data-security are probably the most salient factors concerning legal requirements. From a philosophical perspective, it might be necessary to inquire what normative and responsible net-based communication actually entails. Only if the WMG-technology gains more attention in other relevant fields of scientific research can an implementation on the large-scale be successfully administered.

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