

DISCOVERING PRACTICES AND TECHNOLOGIES OF NEW ICT-ENABLED TRANSFORMATIVE ORGANIZATIONS

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Abstract

Previous research on information and communication technologies (ICT) has documented multiple variations in technology acceptance, use and work practices. Reasons as diverse as historical and contextual background, differences in perception of affordances and constraints of material artifacts and new ICT-enabled grassroots developments were proposed to explain variations in technology practices and use. The variations, however, converge on a substantive background of recognizing the inherently social and symbolic character of ICTs. However, despite that many alternative and novel ICT-enabled practices are being exploited in business, medicine, and other areas, there is still a lack of understanding about the processes and potential impacts. We answer to this gap by studying the 16-year period of the mutual evolution of technology and practices within new ICT-enabled grassroots communities, called home local area networks (LANs¹). Based on extensive qualitative case-study we focus on the practice process of this mutual evolution to understand its surprising result: grassroots organizations were created and developed by people lacking significant financial and organizational resources, using resources at hand and in conditions apparently unfavorable for innovation creation. Nevertheless, home LANs incorporated thousands of people in Minsk and played a crucial role in the development of Internet infrastructure and innovative services that later became the prototype of national Ethernets standards.

Keywords: Symbolic Meanings of ICT, Grassroots Development, ICT-enabled Transformative models, Improvisation, Developing Countries, Belarus

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1. Introduction

1.1. Motivation for this research

Today dealing with unexpected effects related to contemporary ICT acceptance, implementation and use becomes more a rule than an exception. Among the reasons why these unexpected effects occur the following were proposed in the literature. First, it was argued that the process of technology acceptance and use should be seen as culturally, historically and contextually based with no “best” or standardized practices existing *a-priori* (e.g. Avgerou, 2003; 2005; 2008; Silva & Westrup, 2009; Walsham & Sahay, 2006). Second, the differences in perception of the same context (Hayes and Westrup, 2010) as well as the differences in perception of the same technology in terms of affordances and constraints that it provides when interlocking with human agencies (e.g. Chua, and Yeow 2010; Leonardi, 2011; Orlikowski and Scott 2008; Orlikowski, 2000) were proposed to have crucial influence on the ways that ICT-enabled practices are realized. Third, as some recent research has documented, the appearance of new actors of a digital economy different from the state, market and international organizations traditionally providing access to the technology could also contribute to significant changes in ICT use and implementation (e.g. Heeks 2010; Morawczynski 2008). Thus, Heeks (2010) introduced the notion of grassroots development that occurs from within poor communities as a result of ICT-enabled empowerment and appropriation of the technology to such an extent that they start to do new things with it. These grassroots organizations can transform the processes and structures of the digital economy by transforming (frequently through improvisation) those not previously having access to technologies from the victims to the innovators. This phenomenon intersects with recent studies on user-empowerment (e.g. Chen and Xie 2008; Doll et al. 2003; Kankanhalli et al. 2005; Sehgal and Stewart, 2004; Parameswaran and Whinston 2007) and social entrepreneurship that arises to solve the social needs not met by any public or private sector (e.g. Bornstein & Davis 2010, Leadbeater 1997).

The above mentioned three different reasons, however, have a common substantive background: they recognize the inherently social and symbolic character of contemporary information systems (e.g. Ågerfalk 2010; Allen and March 2006) with a need to treat them as social systems only being technically implemented (Goldkuhl and Lyytinen 1982). However, despite many alternative and novel ICT-enabled practices are being exploited in business, medicine, and other areas, there is still a lack of understanding about the processes and potential impacts of these developments (e.g. Aakhus et al. 2011; Heeks, 2010; Orlikowski, 2000) as well as why and how new entrepreneurial actors build new and transform existing institutions (Mair and Marti 2008). We answer to this gap by studying the 16-year period of the mutual evolution of technology and practices within new ICT-enabled grassroots communities, called home local area networks (LANs). These organizations were created by citizens themselves (as associations of private individuals) after appropriation of home computers in their everyday life (Compeau et al. 1999),. We collected extensive data to understand how technologies originally developed within these organizations for social computing, changed their social and symbolic meaning when home LANs were involved into the interplay between the government and private Internet providing organizations.

Our in-depth qualitative case study is based on the 16-year period (since 1995 till 2010) and process-theories approach (e.g. Langley, 1999) and aims to understand how these communities, lacking in significant managerial and financial resources, cooperating with other organizations and using technologies at hand developed an important part of Internet infrastructure, incorporating thousands of users, and innovative services that later became a prototype of national Ethernets standards. Based on over 50 interviews as well as archival and document data sources this research studies work practices underlining how home LANs were developed in conditions unfavorable for innovation creation from that normally accepted as necessary in the literature (e.g. Ein-Dor et al., 1997; Heavin et al., 2003; Trauth, 2000). For example, contradictory and even hostile government policy, lack of financial investments, and elements of coercive pressure all existed. Nevertheless, home LANs managed to develop their own infrastructure for Internet-access and to compete successfully with government monopolistic organization and private Internet-providers over a long period of time.

Belarus was chosen as a research setting for a several reasons. Belarus is a potentially interesting research setting that has been largely unstudied in IS research. As argued by Tihanyi & Roath (2002) Eastern European markets are interesting for enabling huge opportunities in the global economy; for their low wages, yet high standard of education; and close geographical and cultural ties with Western Europe. Moreover, unlike similar home LANs existing in some other countries such as Russia and Ukraine, where they quickly underwent a significant transformation from their free origins to more commercially viable forms, in Belarus this process was greatly decelerated. In Belarus the creation and development of grassroots models and their transformation to more commercially viable forms lasted 16 years because of administrative conditions, a state monopoly on Internet channel sale and undeveloped marketing conditions. Such a deceleration creates a rare opportunity to study and understand the process of grassroots creation and development in depth. This makes Belarus a unique research setting for studying the phenomenon of grassroots models development.

The paper is structured as follows. First, we introduce the research question and the potential contribution of this study. Then, the theoretical background is provided. Section three describes our methodology, data sources and data collection and data analysis procedures. Section four presents the research context and the summary table of data analysis. Based on the findings, section five outlines main characteristics, working practices and potential impacts of new ICT-enabled grassroots organizations.

1.2. Research Question and Potential Contribution

The research question aims to understand: *What work practices and meanings behind them enabled the creation and development grassroots models and their transformative effects?*

By looking at the mutual evolution of technology and related working practices of home LANs of how and why new ICT-enabled grassroots organizations appear and develop as well as theorize their potential societal and institutional impacts as symbolic and social activities of people previously not having access to the technology turned into its consumers and even innovators and used this transformation for large-scale technology development phenomenon (Internet –infrastructure and Internet-services development incorporating thousands of users).

This research has several potentially important contributions. Broadly, it contributes to our knowledge about the processes and impacts of ICT-enabled transformative practices as those being created as a result of inherently social and symbolic character of contemporary information systems (e.g. Ågerfalk 2010; Allen and March 2006; Goldkuhl and Lyytinen 1982). More specifically, the research has five promising contributions: (i) It addresses the gap existing in the literature about the process of grassroots organizations creation and development as well as a lack of studies on their impacts (Heeks, 2010) as well about the lack of understanding how and why new entrepreneurial actors appear at the institutional arena in developing countries and intervene with existing institutions there (Mair and Marti 2008). This coincides with the argument of Orlikowski (2000) that our knowledge about the conditions in which practices alternative to those originally designed for a technology emerge is limited. (ii) The research contributes to our knowledge about the process and potential impacts of technology-enabled user-empowerment (e.g. Chen and Xie 2008; Doll et al. 2003; Kankanhalli et al. 2005; Sehgal and Stewart, 2004; Parameswaran and Whinston 2007). (iii) It contributes to technology studies in developing countries (e.g. Avgerou, 2003; 2005; 2008; Silva & Westrup, 2009; Walsham & Sahay, 2006). (iv)The research focuses on the consequences and use of computers at home. This has largely been overlooked in the IS literature with some important exceptions (e.g. Venkatesh & Brown, 2001) and describes the emergence of grassroots organizations as one of these consequences. (v) It can add valuable insights on social process underlining similar to the open-source software metamorphoses into more commercial forms (Fitzgerald, 2006). Grassroots development models are similar phenomenon in several ways: being alternative to traditional organizations; being created by citizens themselves and open to contributions from any volunteer; where the property in home LANs is collective; and where there has been considerable transformation.

2. Theoretical background

Factors influencing technology use and development.

Among research investigating the factors influencing technology development and use various perspectives have been proposed. Thus Lamb and Kling (2003) argue that social actors of IS have complex and multiple roles while adapting and using IS within complex social contexts. This coincides with arguments provided by Bailur (2007), Ciborra (2004), Compeau et al. (1999), and Sauer (1999) that people's concerns and anxieties can drive their participation in the technological change process. Some research (e.g. Metiu, 2006; Avgerou & McGrath, 2005; Gopal & Prasad, 2000) point on the important role of power, commitment and emotions in technology development and user-centered research while others (e.g. Venkatesh & Brown, 2001) underline the role of motivation in the process of technology innovation acceptance. These micro human-centered perspectives are supplemented with relevant macro and institutional perspectives. Thus Kogut & Zander (2003) and Hall & Soskice (2001) argue that the macro country environments may act as a manipulator of the micro level's incentives and knowledge of how to work, coordinate and share practices. However, there is a disagreement in the IS research here on how this manipulation can be realized. Some research support transfer and diffusion approach (e.g. Heavin et al., 2003; Trauth, 2000; Ein-Dor et al., 1997) and argue that ICT success builds on one best way of IS development and certain 'standard' common factors, such as demographics, culture, national and enterprise policy, etc. This contradicts with another approach (e.g. Silva & Westrup, 2009; Avgerou, 2008; 2003; Walsham & Sahay, 2006; Madon, 2003) that assumes historical path-dependency and social embeddedness of ICT development models. The authors position this research in the latter stream of research while also emphasizing the importance of studies on human agency motivation and commitment, as well as the studies on the processes of technology development.

Processes of technology use and development.

Bourdieu (1990) argues that agents construct and transform the field (the IS technology and its appropriate constructs in our case) through their practices and actions based on the capital that they possess. This approach was extended by Orlikowski (2000) practice lens to study technology in organizations. According to this, the same technology in practice can be a variety of technologies-in-practice. Factors that influence the variations of technology-in-practice are the following: users' influence and motivation, interpretive conditions (level of users' technical knowledge), technological conditions (technological properties available to users), and institutional conditions (social structures of the larger social system, type of organizational culture). In particular, Orlikowski (2000) argues that improvisation technology-in-practice occurs when users are highly knowledgeable about technology and highly motivated to use it; when institutional conditions include a strong team focus, cooperative culture, and a strong commitment to ongoing learning; and where people choose to use the new technology to substantially alter their existing way of doing things. Numerous research has also emphasized the link between technological innovation and improvisation (e.g. Brown & Duguid, 2000; Weick, 1998; Moorman & Miner, 1998). It is argued that improvisation can lead to successful ICT innovation because of its main characteristics: adding unique, unplanned, and novel features to something performed (Cuhna & Cuhna, 1999; Weick, 1998; Miner et al., 1996) spontaneous, on the spur of the moment and intuitive, builds on previous knowledge, experience and sustained practice over time (Vera & Crossan, 2005; 2004, Weick, 1998). However, despite numerous research and significant achievement in the area, our knowledge of how practices that are alternative to those originally designed for a technology emerge and proceed is limited (Orlikowski, 2000).

Meaning and symbolic character of technology-mediated activities.

Some research has underlined the importance of inherently social and symbolic character of technology (e.g. Ågerfalk 2010; Allen and March 2006). In particular, Goldkuhl and Lyytinen (1982) argue for a need to treat technologies as social systems only being technically implemented. These arguments are based on the recognition of the fact that technologies today more and more become

inseparable part of all human activities which finds multiple reflections in information systems and organizations studies. Thus, recently proposed perspective of sociomateriality of technology and organizing suggests that humans/organizations and material artifacts do not possess inherent properties independently from each other but only acquire them in the process of their mutual entanglement (e.g. Orlikowski and Scott 2008; Leonardi 2011; Leonardi and Barley 2008; Pickering and Guzik 2008). The diversity of research on technology user-empowerment documented influences and knowledge creation in Web 2.0 social computing communities (Parameswaran and Whinston 2007); user-empowerments in ERP systems use (e.g. Doll et al. 2003; Sehgal and Stewart 2004;); electronic “world of mouth” and its growing importance in online consumer reviews (e.g. Chen and Xie 2008; Kankanhalli et al. 2005); ICT-enabled and grassroots developments and their diverse influence on more traditional organizations (e.g. Ciborra 1991; Hayes and Westrup 2010; Heeks 2010). Furthermore, research in organization studies acknowledge the worldwide appearance of new entrepreneurial actors that develop to fill the needs not being addressed by the existing institutions in developing countries (Mair and Marti 2008). Consequently, we argue that in order to understand how and why new ICT-enabled transformative organizations appear the above mentioned insights should be taken into account.

As mentioned in the previous section this research aims to understand how and why new ICT-enabled grassroots organizations appear and develop as well as theorize their potential societal and institutional impacts as symbolic and social activities of people previously excluded from technology access and later turning into its consumers and even innovators.

3. Research Methodology

3.1. Research Design

We design this research as a qualitative single case-study. Below we provide the reasoning for this choice. Following Yin’s (2009) recommendations on when a case study can appropriately be a form of social inquiry, we design this research as a case-study because the context and circumstances are crucial to understanding the work practices and meanings of people creating and developing grassroots models, and because this understanding can only be reached based on multiple sources of evidence. As general guides to the research design we use Myers & Avison (2002), Denzin & Lincoln (2000) and Silverman (2000) as well some suggestions on how to manage interpretive research in information systems by Walsham (1995). The novelty of the phenomenon, the importance of the context and process, and the need for nuances and interpretations imply that this research could be designed based on qualitative approach. We position this research as a single case study because it presents an intensive study of a single case of the phenomenon of grassroots development (Markus, 1983). Based on the reasons given above we argue that Belarus provides a unique research setting for this phenomenon. Given that there is a lack of solid research in the area (Heeks 2010; Mair and Marti 2008) we argue that an in-depth and detailed study of the grassroots phenomenon should be conducted. Further research, however, can contribute to our knowledge of grassroots phenomena and their impacts by making a comparative case study of Belarus with Russia and the Ukraine or elsewhere.

3.2. Data Sources and Data Collection Procedures

This research is based on multiple sources of data (Creswell 2007) as described in table 1. The data collection period lasted for 16 months, from middle December, 2009 till middle April 2011.

Table 1. Data Sources
<p>1. Interviews from the field: interviews with administrators and users of home LANs lasting from 20 minutes to 1.5 hour each, with the majority of interviews being about 40-50 minutes long;</p>

54 Interviews with administrators and users of home LANs: more than 40 home LANs in total (31 interviews with administrators of home LANs; 22 interviews with users of home LANs);

2. Documents:

Official websites of “Beltelecom” and private providers for investigating their mission, strategy, news, technology, and services (<http://www.iptel.by>, <http://www.aichyna.com>, <http://www.telecom.by>, <http://www.ADSL.by>, <http://www.beltelecom.by>, <http://www.byfly.by>, <http://www.anitex.by>, <http://www.solo.by>, <http://www.bn.by>);

More than 30 pages of noncommercial IT portals providing news and discussions on Internet development in Belarus on daily basis (<http://homenet.tut.by/>, <http://it.tut.by>, <http://www.interminsk.com/>) <http://providers.by/>, <http://techlabs.by/>);

Websites of some home LANs with their news and blogs about their practices, development, and services (<http://dom15.narod.ru/>, <http://slepianka.at.tut.by/help.html>);

Example documents of home LANs financial and Internet-channel accounting and control; Home LANs maps created by their users; Home LANs statutes and regulating documents;

Photos and videos of home LANs creation, renovations, regular offline events, improvisation technologies, technical support practices.

3. Archival data:

Government laws of Internet regulation in Belarus;

40 minutes video recorded interview with administrator and specialist Konstantyn Scherban in home LANs by the Belarusian News Portal “Tut.By”;

40 minutes video recorded Interview with lawyer Dmitri Matveev providing his opinion on home Ethernets by the Belarusian News Portal “Tut.By”;

80 minutes video recorded and transcribed debates with representatives); Articles in newspapers related to home LANs news and stories (e.g. <http://dom15.narod.ru/images/article.jpg>)

Interviews. We carried out a series of semi-structured interviews aimed at building a picture of how the interviewees thought about their roles and practices. They are or were administrators and users of grassroots models and employees of private and state organizations providing Internet access. The interview protocols for administrators and users of grassroots development models can be obtained from the authors on request. Before the data collection process has started, a pilot project was conducted in January to March 2010. Findings from the pilot study and the researcher’s previous experience of being a user of one of the most developed home LANs in Minsk, were useful in determining the initial protocols and the most appropriate actors to be interviewed. We also used the guideline of Myers and Newman (2007) to help us structure the interviews. A snowball sampling strategy was used to choose individual informants for the interview. The other sampling strategy was by means of a notice about this research and finding administrators’ contacts at relevant websites. In particular, the www.homenet.tut.by website were the contacts of the majority of the home LANs are presented was used. Details of the interviews can be provided by the authors on request

Documents. These include websites of home LANs, and related discussions of home LANs in various forums. In order to follow the principle of triangulation, this type of data is planned to corroborate the evidence from other sources.

Archival records. These include documented and recorded opinions of experts and politicians on grassroots creation and development, and articles in newspapers and journals, and related government laws of Internet-access regulation.

Sampling strategies for the interviews included publishing a notice about our research, and finding administrators’ contacts on relevant websites, and snowball technique. In particular, major website of Minsk home LANs community, the <http://homenet.tut.by>, contains the contacts of the majority of administrators and the possibility to discover whether any home network existed at a particular address. Our main sampling criteria were the date of a home LAN creation, its number of users and types of inter-organizational relations with private and government ISPs. In order to ensure rich and

detailed data on all the 16-year period of home LANs development we were aiming at finding people who were the pioneers of home LANs initial creation, further development and strategic merges with private ISPs as well as those who currently administrate the networks (we succeeded to identify groups of people who created and participated in the biggest and oldest home LANs in Minsk). For these reasons and also to ensure trust (home LANs were announced as illegal organizations according to the law from July, 2010) the snowballing technique was used. Sampling strategy for Internet providers included interviewing all the organizations mentioned in the interviews with home LANs. Sampling strategy for the documents and archival data included search on initial data categories as home LANs, Internet providers in Minsk, and government laws and policy of Internet, electroconnection and informatization in Belarus.

3.3. Data Analysis Procedures

In this research the unit of analysis is the home local area network and its working practices. For each home LAN, its main characteristics and work practices are examined. Characteristics include size (number of users); motivation for development; the type of technology used (cable lines, fiber-optic lines, etc.); inside architecture, etc. According to the data found, the working practices of home LANs are compared and contrasted to ensure preliminary theoretical findings about the practices of new ICT-enabled grassroots organizations as well as the context of their creation and potential influence.

The data analysis procedures are done in several stages. The first stage is the pre-analysis. All interviews were transcribed as text for further detailed analysis. Further stages of analysis (developing coding schemas, categories and making connections between them) are planned were developed in line with recommendations from Strauss & Corbin (1998) and Mason (2002). We triangulated all data evidence (Eisenhardt, 1989) in this research as well as used the fundamental principles of conducting interpretive field studies as proposed by Klein & Myers (1999) when making data analysis.

4. Data Analysis

Research context

The research setting of this study is represented by the grassroots development organizations, called home local area networks (LANs), that appeared in Minsk within communities of citizens which formed one of the main forms of Internet-access and resources-sharing for 16 years, incorporating thousands of home computers. The main actors of Internet-access in Belarus are the following: state telecommunication company; private Internet providing organizations, and home local area networks created by citizens themselves to get cheap and quality Internet-access and resource sharing. While the first two actors, represent traditional actors providing Internet-access technologies, the latter, home LANs, represent transformative ICT-enabled grassroots organizations. The state telecommunication company, called “Beltelecom”, possesses a monopoly patent for selling the Internet channel. It sells the Internet to its direct users and to private Internet providing organizations. We illustrate the relationships between the main actors at figure 1.

Because of high prices, and low quality Internet-access based on telephone cables, users’ access to the Internet was complicated and their need for this service was not satisfied.

Private Internet- providers include a number of companies, such as “Solo”, “BelInfonet”, “Atlanttelecom”, “Aichyna”, and “NICS”. These companies were interested in building a new effective infrastructure of Internet-access (with cables, fibro optics, etc.) and in providing the Internet to as many users as they could. However, they had to buy the access to Internet –channels at the very high prices that the monopoly state “Beltelecom” company had established, and so they could only sell the Internet for high prices to their users. All this made the access of the majority of citizens to the Internet difficult. At the same time, Belarus is characterized as a country where a number of people with a computer science and engineering background are high (Global Outsourcing Report, 2005: 46). Given that a home computer was owned by thousands of users, the citizens need for the Internet was

high and therefore the number of people able to build the Internet-access and the infrastructure for it from the grassroots was also high. As one of the administrators of home LANs describes it:

“First we bought computers and wanted better equipment facilities so we could play games together, share resources, etc. In those times the Internet was very expensive and hard to buy. So we decided to build it together with a friend of mine.”

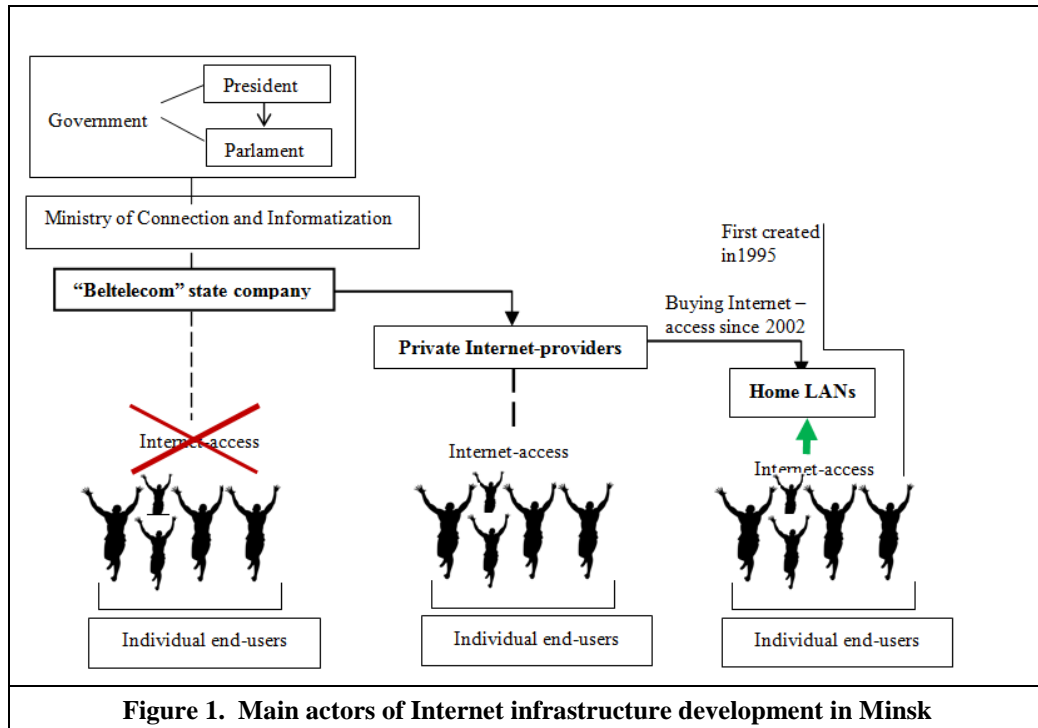


Figure 1. Main actors of Internet infrastructure development in Minsk

Home local area networks were the main form of Internet-access and resources-sharing for 16 years in Minsk. They included thousands of members and covered all the city areas, giving their users cheap Internet access, network resources sharing, online and real social communication opportunities. As one of the specialists of home LANs described it:

“In Minsk home computer networks are everywhere. I think more than 90% of all home computers are currently connected to them. Networks merge with each other and the bigger the network the more people join it...” (Konstantyn Scherban, specialist in home networks, to the Belarusian News Portal “Tut.By” (2.03. 2010), <http://news.tut.by/162645.html>).

Below we present working practices and main characteristics of ICT-enabled grassroots organizations identified at the stage of analysis.

1. The role of key people: administrators of home LANs (people who created, maintained and developed the network) and their active users (people from the network who developed innovative services and help to build it physically, like cable connection between the houses) played a crucial role in home LANs development. As one of the administrators puts this:

Services were developed by users. As administrator I did not have time for this. People usually came to me during the offline meetings and proposed things like a search service to find files in the media gallery, another organized a network radio station. We usually tested these services on the users’ computers, and, if everything was fine, integrated them into the network.

2. Community-based collective activities:

Community-based collective activities - administrators and users in home LANs who developed the network together as associations with their own statutes, rules, values, financial and accounting

documents, map of the home LANs participants; regular offline meetings of administrator and users where they decided on the important questions. A structure and services of a typical home LAN are illustrated below.

Home LAN

ADMINISTRATOR

NETWORK SERVER

MODEM (SINCE 2000)

HUB

Coaxial cable (direct, by air, or underground) or optic fiber

USER USER USER USER

Home LAN services:

- Multiparty games playing
- Chats
- Files sharing
- Media gallery
- Network radio
- Map of the home LAN
- List of users and photos
- Off-line meetings
- Internet (~since 2000)

Structure and innovative services of a typical home LAN

Photo of a "network football" – competition between the member of two neighboring home LANs

Social offline activities- regular offline social events like “network beer”, “network tea”, a “network football”, “network snowballs fights” etc., - events which were regularly organized by the network members for themselves outside and were gathering up to 30- 50 people. A photo of a “network football” is presented.

The initial incentives of members were computer resources for sharing, chat, on-line games. However, after people joined the network social communication and expression was becoming the most highly valued resources for many of them. As some users describe it:

“I joined the network because there was a lot of new information available to download. Afterwards, however, this ability became a background one and social opportunities became important... If in that time I was asked what was the most important thing for me in the network, I would answer that it was a communication.”

3. Central role of artifacts and technology-mediated activities: technology and artifacts included personal computers, hubs, cables and modems (dial-up and ADSL Internet access architecture) and also the architecture that facilitated home LANs creations like (multistoried buildings). Below we provide illustration of some these technologies.

<i>Cable connecting two multi-storied buildings</i>	<i>Hub with 24 ports</i>	<i>FTP server of a home LAN</i>

The following picture of a room of administrator in a home LAN provides clear insights about the central role of technology in maintaining and developing home LANs:



4. The role of context and institutional background for the “habitus” (e.g. Bourdieu, 1990) of home LANs creators: many come from the generations of Soviet engineers (historically, Minsk was one of the main Soviet centers of engineering, electronics, computer science) with “technology” being their main toys, and also home LANs creators – computer generation, those who wanted to play multi-party computer games and share files but did not have a possibility because of expensive and low quality Internet-access. One of the administrators described his experience of home LAN creation and the role of “others” in the following way:

Initially, my father who worked in the telecommunication area was our main consultant of how to extend cables, understand technical documentation, etc. Our friends already studying or working in BSUIR² helped a lot with software setups and understanding things a bit more complicated than TCP/IP protocols, like the NetBIOS for example.

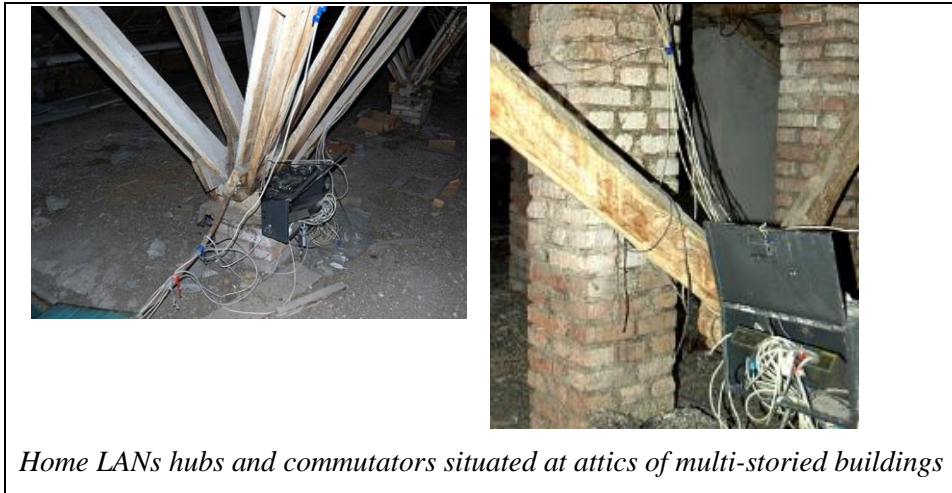
5. Institutional voids and social meaning of technologies:

As described in the research context above, home LANs were created and developed in the conditions of institutional voids, i.e. when market mechanisms were undeveloped or suppressed (Mai and Marti 2008). In particular, before 2006 the state telecommunication company “Beltelecom” was keeping the prices for the Internet extremely high for individual end-users while providing only low-quality dial-up access. Moreover, before 1999 no Internet-access for individual users existed at all in the country (note: first home LANs were created in 1995, i.e. four years before). At the same time, private Internet providers, though proposing ADSL-Internet access (i.e. better quality as compared to dial-up) to their users, had to buy the Internet-channel from “Beltelecom” for monopolistically high prices. As a result, they could only sell it to individual end-users for high prices which significantly limited their profit and client base. The vicious circle was broken when users of home LANs and private providers started to cooperate with each other: private providers offered the users of home LANs significant discounts for ADSL Internet access, as well as bonuses for administrators and free modem while end-users became the users of a certain provider. As one of the administrators described it:

“Our government is monopolist in allocating the Internet channel. They earn about 1000% profit per month on this, I guess. In Moscow, for example, you can buy an unlimited Internet-access for 20 dollars per month and it has existed for a long time. In Belarus in the time when we were creating the network this was just impossible. Recently the government has created “ADSL” [Internet-access type] that costs 60 thousands [25 U.S dollars approx.]. But this is of a rather bad and vulnerable quality and not all people can afford to pay this money for the Internet... In our network you pay 11 thousands [4 U.S. dollars approx.] for Internet-access per month and the quality of it is not worse and sometimes even better compared with the one provided by the government organization.”

Moreover, many home LANs tried to keep independence from being connected to a particular provider only and offered their users and opportunity to choose by having agreements with several providers. As a result, home LANs technologies had a symbolic and inherently social character – they were not only collective activities through networking computers but also a mean to get high quality Internet-access and all its benefits for a reasonable process.

² - Belarusian State University of Informatics and Radioelectronics, the leading National university in the field of computer science, <http://www.bsuir.by>.

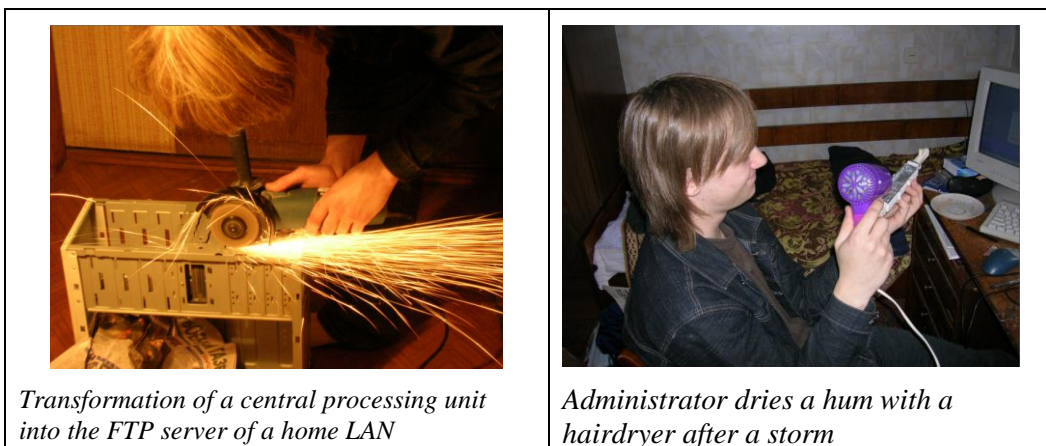


7. Bricolage technologies and working practices of pragmatic improvisations: bricolage, i.e. made from resources “at hand”, technologies and improvisation-based working practices were important activities of home LANs development. We provide examples below.

- *bricolage-made technologies:* developed by citizens themselves, home LANs technologies combined professional equipment with bricolage technologies and use.



- *working practices of pragmatic improvisations:*



8. Learning from practice and peers -to-peer sharing: the know-how of administrators and users were coming from using the background provided by books, forums, discussing with each other and then trying to implement some activities or searching the Internet for a piece of code and then developing it.

9. Personal interest, enthusiasm, flow and intrinsic motivation:

- *intrinsic motivation of administrators and active users* to develop their home LANs and make it convenient, well-developed and comprehensive.

It all started with an interest: what was inside the computer and how to use it. Me and two my friends had computers and we wanted to share files and to play games together... So we built a network to link the three of us. Later, people from other stairwells joined so we became more than 10. In a year, we merged with another network in the neighboring house that was bigger than ours and had about 100 computers already. [administrator of a home LAN created in 1995]

- *the role of emotions and “youth ambitions” to create “something special”* was also important.

“When we were making the network it was also a part of our youthful ambitions: before this we were just students of the Radio Technical College, and afterwards we became administrators of the local network!” [Administrator of a home LAN]

- *absence or symbolic month fee in home LANs*: there were symbolic, very small fees for the users as compared with government and private organizations. When new equipment has to be bought or when old equipment needed to be repaired its cost was shared amongst users.

Some administrators despite that they were getting no or very small money from home LANs still put enormous amount of their time and efforts in the network development. Some even treated it like their “child/creation”) while also having other jobs. As one of the administrators who devoted more than ten years of his life to developing his home LAN puts it:

Some have a daughter or a son. As for me, I had my home LAN to bring up.

10. Change in rules: home LANs changed the way of home people access to the Internet: 1) cooperating with private Internet –providers and using one modem for collective (individually-distributed) Internet-access they delivered the Internet to hundreds thousands of people who previously had to use expensive and low quality dial-up access from government provider or extremely high individual ADSL access from private providers; 2) active users and administrators of home LANs also developed a number of innovative services (media gallery, online game servers, network chats, radio, etc.) that later became the prototype of the national standard of Ethernet services of private and government providers. Currently, Internet providers in Belarus do not provide Internet –access without these services.

11. Institutional pressure and control: home LANs operated in the conditions of high institutional pressure and control: for the first 10 years, no law existed for a home LANs so they could not legally register. Then, government law appeared first restricting and they prohibiting home LANs as organizations and putting a pressure on them to register as individual entrepreneurs or private providers so many home LANs, that did not have money to legalize (about several thousands of Euros) or did not want to lose their collective nature have to continue as underground organizations.

12. Later commercialization of community-based entrepreneurship: some home LANs, though originally developed as collective grassroots organizations and associations, later turned into private Internet providers or individual entrepreneurs thus returning to more traditional organization forms.

Findings and Conclusion

Based on our empirical and theoretical analysis, we outline the following background characteristics influencing the working practices of ICT-enabled transformative grassroots organizations:

1. They develop as a result of community of technology-users but are created by key people, i.e. an active minority.

2. Though often building on bricolage, resources and hand and improvisational practices, ICT-enabled grassroots organizations require certain institutionally established and advance-level background at least to some of its key-members or their “significant others”.
3. Technology-mediated (and often “technology-inspired”) learning, peer-to-peer sharing, flow, intrinsic motivations and community-pragmatic innovations are among the most important working practices of ICT-enabled grassroots organizations.
4. Technologies, innovations and their related practices appearing in ICT-enabled grassroots organizations as having specific symbolic and social meaning are often institutionalized and reproduced (with some changes) by more traditional institutions and organizations.
5. ICT-enabled grassroots organizations have a potential to transform the way “thing are done” by traditional institutions in their area. However, the scale and a particular impact of this transformation depends whether and how new ICT-enabled grassroots organizations communicate to more traditional institutions.
6. Though originally emerging as free/open-source/community-property/unprofitable/etc. organizations, ICT-enabled grassroots tend to transform into more commercial forms with the lapse of time.

Further research should empirically verify these findings across different contexts and empirical cases.

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