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## **ICT and rural municipalities: are their websites the cores of the local social networks?**

### INTRODUCTION: THE BACKGROUND

The research project TIROLS, outlined in the present paper, brings together several streams of thought, which relate to the areas of (i) the *ICT* as represented by the *world wide web*, the internet, and specifically the websites, focusing on the *websites of local (self-governmental) administration*, (ii) the *local networks*, perceived similarly to *social networks*, and the potential link to (iii) the *level and dynamics of the local socio-economic development*.

TIROLS tries to assess the span, density and “topological” character of local networks, formed by the links realised through the web, starting with the website of the municipal administration (LAU2 = NUTS5 in the EU nomenclature). Assessment of these local networks is then juxtaposed with data on local socio-economic development so as to check whether there is a connection, and if so – what is its nature. The results are expected to show not only interdependences of local reach, but, supposedly, given a relatively representative character of the units investigated, of broader significance. These results should add to cognition and practical assessment of the junction between ICT on a local scale, web-based networking and socio-economic development. It is also hoped that policy-oriented recommendations could be formulated on the basis of these results.

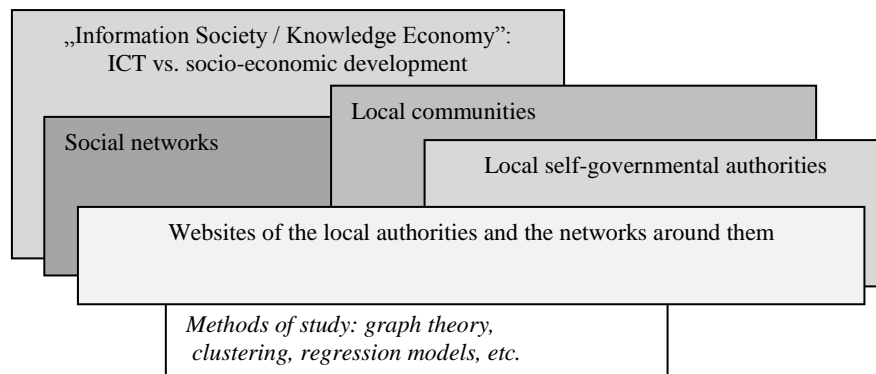
### THE RATIONALE: A NARRATIVE

As mentioned, there are several component elements of the thought background and methodology that form the rationale of the project. They are schematically presented in Fig. 1, and then commented upon from our perspective.

#### **Information Society? Knowledge Economy?**

The slogans of “information society” and “knowledge economy” are now so popular that hardly any thought goes any more into their actual meaning. Definitely, if *information is a property of a message related to its unexpectedness and usefulness* (in line with Shannon-Weaver information theory), and *knowledge is a verified set of rules (models, theories,...) that can be applied to*

make decisions and drive choices, then an additional effort would be required to prove that we live in an information society and our economies are based on knowledge to a higher extent than at any time before.



**Fig. 1. Scheme of the component elements behind the rationale of the project**

What proportion of messages constantly received via various media exceed the threshold of unexpectedness & usefulness? Do we really dispose of better rules of deciding and choosing (also among the messages...) in business, government, science, and life at large, than before?

Several hundred years ago a free European peasant, even if illiterate, had to master and use in a flexible manner, depending upon weather, past conditions, time budget and other activities, well over one hundred technological processes of wide diversity, ranging from flax processing, through preparation of organic fertilisers, to house building. Women had, perhaps, to master an even broader scope of technologies, including, besides child bearing and rearing, fieldwork and animal husbandry, all those related to clothes making and repairing, as well as food processing. This knowledge was much beyond what an average high school graduate in modern civilisation hears about and can practically grasp.

Yet, there is another deep qualitative difference, which can be expressed through two notions: *change* and *speed*. Knowledge tends nowadays to be superficial just because of these two features. Actually, the aim tends to be *learning to learn*. In older times, a lot had to be learned, which, however, stayed valid for the lifetime. Now, it is lifelong learning that becomes a must, while at the same time the technical possibility of realising it relatively easily has appeared.

Speed and change impose the need of *managing knowledge* in a dynamic setting (see, e.g. [26], [42]), as knowledge is no longer a steady resource that one has or not. It is now managed so as to be gained and used effectively by the “information society” in the “knowledge-based economy”. This is the gist of considerations of various aspects of the “new civilisation”, and the precepts thereof, like those in [7], [11], [12], [19], [32], [44], [48], [51], [56], [57], or [60].

So, the visions of McLuhan, [32], and the Tofflers, [52], [53], came true through the flood of *messages* and the onset of the *new media*, constitutive elements of a new civilisation. This global media civilisation appears, though, to create a new barrier to both equitable and effective development, the *digital divide* (see, e.g., [10], but also [5], [6], [13], [24], [30], [49]), implying the existence of those left out from the development processes in both active (creative participation) and passive sense (acquiring added value or just being perceived).

### **The new era and the (rural) space**

The promise of the “information society” has been particularly attractive for rural areas, especially for the marginal and peripheral ones. The new media and infrastructures, starting with the “prehistory” of radio, telephone and TV, followed by the web and new communication devices, were supposed to overcome the friction of space, at a much lower cost (both socially and in market terms) than borne by providing for physical mobility. This concerned, essentially:

- distance learning, to allow for catching up in education with urban areas,
- distance work, to allow for moving of jobs (far) out into the countryside, even to the periphery (see, e.g. [47], on this and the preceding aspect),
- e-administration, facilitating administrative functions, especially in thinly populated areas,
- marketing to the end customers, not only rural tourism and leisure ([61]), but also health food, regional products, anything that countryside can offer,
- business-to-business marketing and networking, allowing for effective cooperation across farther distances than otherwise, also within broader business communities.

The spatial friction was partly overcome, but the promise was not truly fulfilled. A part of the blame went to the digital divide, but it was also “discovered” that there are things that happen uniquely, or sufficiently effectively, through direct interpersonal contact, [22]. Some friction also persists in terms of cost considerations, [6], motivation, skill, and other differentiating factors.

It was soon noted that whatever the ultimate impact and take-up (effective use) of the new infrastructure, its presence and quality follow the well known spatial pattern of wealth and development. Thus, rural space would enjoy more of and better use of the ICT in the more developed and wealthier areas, with special emphasis on suburban, peri-urban and urbanising, even if formally rural.

Evidence has shown existence of a positive feedback, realised through the functions listed above: *general socio-economic development* → *ICT penetration and uptake* → *general socio-economic development*, with the respective multiplier effect depending upon the starting point (for a discussion on relation between ICT and development, see [9], [14], [15], [16], [21], [25], [27], [28], [39], [40], [42]). Hence, additional stimulus appeared to be necessary to set the positive feedback in real motion, wherever the original setting had not provided for

it. This is the basis for numerous efforts at, e.g., the European level, aiming, in particular, at “broadband for everyone”, meaning countries, regions, as well as local differentiation, although it is obvious that the gist of the matter is in use, and availability is just a necessary condition.

### **The local authorities and their websites – functionality and role**

With the above in mind, in development of “information society” emphasis was put on provision of functionality and information on the web by the public bodies. This concerns, first, e-administration and e-government, meant to serve the public purpose – the citizens at large, institutions and businesses. Many programs have been put in motion, aimed at establishment, development and improvement of the public body websites and web services, including respective legal stipulations ([5]). Monitoring and quality evaluation surveys were launched on national and international scales, [10], [13], [17], [24], [33], [50], [54], [58].

For the majority of European countries this development stage is still underway. Although some countries reached the level at which most of the functions that could “in principle” be realised on the web actually are, but even there a lot remains to be done. The instances are related to electronic signature and its substitutes, functionalities for the handicapped and the security issues.

The role and significance of local authority websites appear as far more pronounced in rural, especially marginal and peripheral areas. This applies to both external and internal functionality of the websites, i.e. as perceived from the outside and the inside of the area. The cause is both in relative scarcity of other (web) nodes providing similar service (obvious for administrative functions, but less so for the other ones) and in relative scarcity of easily recognised signposts of the area that are a facile hit for the outsiders (the presence of such foci, tourist attractions or industrial developments, being a major step away from rurality).

As it is assumed that in rural areas local authority websites play a special role, higher requirements on the expected quality and functionality of these websites are put, while, at the same time, given the expected lower level of skills and resources available, there may be definite difficulties in satisfying these requirements (for some empirical studies and more in-depth analyses, see, e.g., [1], [31], [39], [40], [46], [55]). This opposition is coupled with the issue of the (functional) level and magnitude of the respective administrative units, the latter expressed primarily in terms of population numbers. In conditions of rural communities the role of local authority websites becomes particularly important for the establishment and strengthening of attachment, feeling of identity, networking and the like imponderables, essential for the proper functioning and the development of the community as a whole.

### **Local networks, other factors and socio-economic development**

Existence and effectiveness of *networks* has been seen as an important factor in local development since long. Importance of *networks as a factor* was noted

particularly for rural areas, where the action of agglomeration factors is nonexistent, and networks, to some extent, substitute for it. There is, however, yet another dimension to existence and effectiveness of networks, especially the informal ones. It is, namely, a sign of a *definite degree of trust*, considered to be the crucial component of *social capital*, necessary for sustainable local development. So, networks form one of fundamental factors in local socio-economic development, while the local authority, and the websites of this authority may play an important role in creating, maintaining and strengthening such networks.

It should be noted that we speak here not of any kind of networks that may exist in “cyberspace”. Such networks, established through social portals may have little bearing on the capacity and facilitation of socio-economic development. We mean the networks offering: (a) useful information (service), (b) business opportunity. Thus, even if we might speak of the “old-boys-networks”, it is in the context of their actual use for practical purposes. TIROLS concentrates on networks traced through the web-based links and references open to the public. The study is oriented at the references (active links, web addresses, e-mails, etc.) offered through the websites, starting with the local authority website.

Regarding the connection between local networks and local development, the study shall also account for other factors of development, and their synergy, or interrelations, with the networks and the associated aspects, including, especially, trust and cooperation. We should also add that we believe that there are both correlation and synergy between certain development factors, and, which is very much to the point here, they are, in particular, the ones linked with networking, on the one hand, and knowledge and education on the other. A broader hypothesis would imply a cultural syndrome, involving trust, networking, education and knowledge (see [2], [4], [8], [20], [29], [35], [36], [45]).

We are not suggesting that networking and connectivity are absolute safeguards, that their growth must lead to better and safer development. One might hypothesise that there is an optimum, both in terms of quantity and the structure, beyond which additional risk may arise (see the recent financial crisis, e.g., [3]).

### **Social networks and their analysis**

In recent years there has been a very high interest in the study of *social networks*. This interest arose, on the one hand, from new paradigms in domains that hitherto referred to different types of analysis, relying to a higher extent on formal relations and structures, especially in management and organisation sciences. Analysis of the actual social networks in an organisation and at the workplace was to uncover the true processes and to direct the efforts towards more effective and efficient solutions. On the other hand, such studies were made possible (or at least facilitated) by the new technological developments in the domain of telecommunications and the web.

The studies of social networks try to establish their essential features, including the nature of structures, the focal points and their character, and the substructures. Specific notions and measures were developed for the study of social networks, originating from computer science and graph theory. Identification of the characteristics of the networks analysed implies definite characteristics of the counterpart organisations, communities, or other human systems, and, so, also the respective remedies, if needed, see, e.g., [43], [45].

A comment apart is due on the use of *webometrics* (see, e.g., [18]) in analysis and assessment of social networks. These methods, based on direct information from the web may, namely, also serve to characterise the respective structures, emerging from such data. TIROLS shall not directly use methods of webometrics, although some experience from this domain shall be referred to.

### SOME ASPECTS OF METHODOLOGY

As mentioned at the outset, the study brings together a number of aspects of both substantive and technical character. The essential elements of study are:

**The object of study.** The study is carried out for the municipalities, the lowest, self-governmental administrative level in Poland (NUTS5 = LAU2 in EU nomenclature). These units form counties (“poviats”, NUTS4 = LAU1), which are also of self-governmental character. At the third level there are 16 provinces (NUTS2), which are of mixed administrative-self-governmental character. There are some 2,500 municipalities in Poland, roughly 1,600 of them, formally, rural. Population in a vast majority of rural units ranges between 5,000 and 10,000. These units are composed of a couple of villages, with a bigger one, or a very small town, being the seat of the commune. Population density ranges from less than 20 persons per square kilometre to more than 400, mostly between 30 and 100. With such dimensions, we can speak of local communities, which, on the one hand, feature a certain whole of functions of administrative and social character, and, on the other, allow for relatively good cognition of the area, main activities, businesses, organisations, and individuals across the commune. Hence, formation of effective (cooperation) networks is also possible.

**The ICT aspect.** We start with the websites of the communal authorities. The team has been involved in the study of communal and county websites since 2003 ([39], [40]). So, significant experience has been gathered in measuring the functionality and quality of the local authority websites. Within TIROLS, though, we will be looking more into the links, provided via these websites, to the local businesses, institutions, organisations etc. We shall also take a look at the websites (if any) of these entities that are referred to on the local authority websites. Thereby some basic features of the thus formed networks would be identified. Note that we do not mean such measures

commonly used in webometrics, as the number of visits, clicks time spent, etc., but, instead, the information provided, its correctness, ampleness, and reciprocity.

**The sample, the dimensionality and the effort.** For technical reasons, empirical work cannot be done by automatic means (agents, crawlers), but has to be done “by hand”. This means quite an effort on the side of the team. Let us only note that in a previous study of web-provided information on the area as many as 70 binary attributes were assessed per website, which, given that some 25–30 units were analysed, means some 2,000 scoring decisions, while the work had to be done within a specified time frame (e.g. a week), to preserve comparability.

It is envisaged that the minimum number of communes actually analysed would be in the teens, the maximum not exceeding 30–40 communes. It can be assumed that a single communal website would provide information on 20–40 other bodies within the area, and hence so many websites of these other bodies would have to be assessed. For just 15 communes this amounts to thoroughly checking “by hand” some 500 websites.

The minimum number envisaged results from the consideration of the requisite variety within the sample, from two points of view: (1) leading functions of the commune (farming [possibly forestry], residential & service, urban [within the suburban areas], leisure & tourism, industry, peripheral [i.e. “no distinct economic function”]); (2) diversity of the economic situations (as expressed through a small number of indicators, such as value of personal income tax per capita, number of businesses per capita, etc.). It is assumed roughly that it would suffice to account for  $5 \times 3 = 15$  respective communal situations in order to have the sample fully representative.

**Techniques of network analysis.** In analysing the web-based networks, a set of formal tools shall be used, originating from several domains. First, simple indicators of the *network magnitude*, *density*, and *connectivity*, shall be calculated for each of them. Distinction shall be made of *inward* and *outward* connection characteristics. Even though the networks analysed are by definition centred on the commune authority websites, some of the notions from *social network analysis* shall be used, as well.

The characteristics of the networks shall be assessed via the *graph theoretic methods*, with orientation towards connectivity, existence of substructures, cliques etc. Since the strength of links shall also be assessed, the techniques of *cluster analysis* shall be applied for individual communes to assess the potential existence of more than one cluster in the respective networks, and for the entire sample of communes, to identify the potential clusters of similar communal networks. The techniques to be applied are largely the ones developed by the team. It is intended to apply novel techniques, related to *asymmetric similarities and distances* to the networks obtained.

## PRELIMINARY TEST RESULTS AND CONCLUSIONS

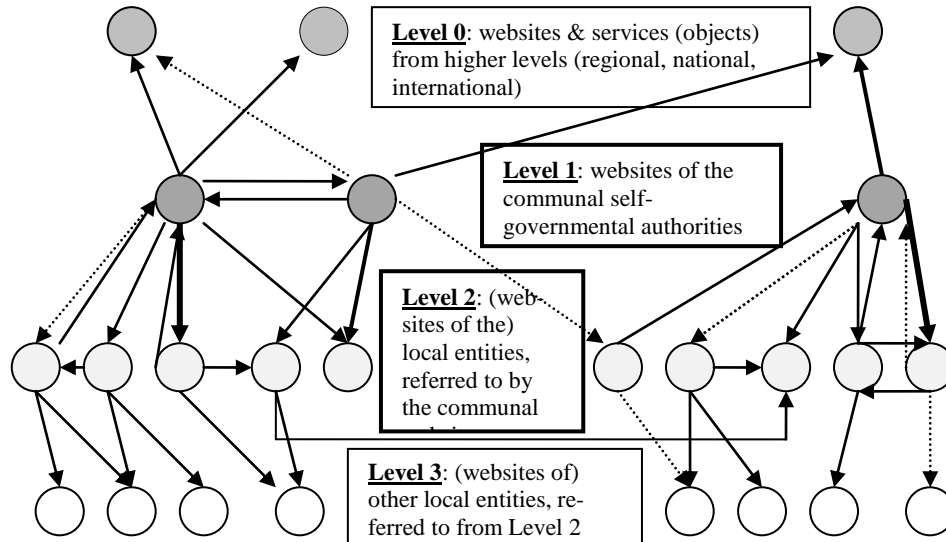
After the initial sample of communes was defined, their websites were investigated, primarily as to the links they provide to other local entities. Attention was focused on services of local character, largely remaining (or supposed to be so) in connection with local authority, due to their public mission. A simple scoring system was applied, whose results are summarised in Table 1, in terms of overall scores for the websites, in decreasing order of scores.

The scores reflect volume and quality of information provided by the respective websites, regarding other local entities, in terms of “connections” – links, e-mail addresses, locations, telephone numbers etc. The negative scores result from the inclusion in the scoring system of lack of or mistaken information. The information compiled for each website concerns more than 20 categories of local entities, related to different spheres of local service, social infrastructure and other types of activity. For each category scores reflect various kinds of potential connection-related information (its presence or absence, and correctness), altogether some 10 positions per category. Thus, we deal, for the whole sample, with quite an ample set of data, resulting from this initial stage of work on the project (altogether a table with roughly 7,000 entries).

Although Table 1 is just an illustration, it allows for drawing of some important conclusions, especially against the background of the entire set of results:

- the scoring system developed and the actual content of the websites checked yielded a wide diversity of total score values; this is insofar important as enabling a true comparison (in a similar context, the assessment of e-administration-related quality of county websites, conducted since 2003, brought already in 2007 a very even level of scores close to maximum, so that little room has been left for either comparison or development);
- the score-based ranking is quite distinctly organised into groups of similar qualities: very high, with scores between 53 and 35; medium high, with scores between 28 and 22; medium – between 15 and 7; low – between 4 and -8; and very low – from -15 to -23;
- the scores are relatively strongly correlated with the general quality and functionality of the same websites, as evaluated through the standard WAES (WAES, no date) or the extended WSOSI systems, see [39], [40];
- likewise, there is a definite correlation of scores with the location of the communes; as shown in Table 1, quite a share of the best ones are situated next to the city of Warsaw, largely within its metropolitan area (5 out of best 10); yet, there are also clear exceptions to this regularity (Raszyn, and, notably, Izabelin); certainly, additional factors, associated with the human factor, come into play.





**Fig. 2. Schematic view of study scope.**

Level 1 & 2 websites thoroughly studied; those of Levels 0 & 3 listed. Arrow style shows nature/strength of links/references.

All in all, the preliminary, exploratory study allowed for (a) definition of the pragmatic methodology of data gathering in the subsequent stages of research, and (b) formulation of additional, more specific study hypotheses.

**Table 1. Scores of commune websites for information on other entities (November 2009)**

Commune	Score	Commune	Score
<i>Jabłonna</i>	53	Nowe Miasto	11
<i>Nieporęt</i>	50	Sanniki	10
<i>Nadarzyn</i>	49	Raszyn	8
Łochów	44	Leoncin	7
Żabia Wola	44	Grudusk	4
Karczew	40	Stara Biała	4
<i>Lesznowola</i>	35	Jedlnia Letnisko	0
Belsk Duży	28	Przyłęk	-4
Korczew	24	Rzekuń	-5
Klembów	23	Zakrzew	-7
Kłwów	22	Rościszewo	-8
<i>Michałowice</i>	15	Szulborze Wielkie	-15
Olszanka	15	Kuczbork Osada	-16
Ceranów	14	<i>Izabelin</i>	-19
Łąck	14	Wieczfnia Kościelna	-23

*italics* denote the communes located next to the city of Warsaw or closely connected with it

The study here outlined tries to grasp several substantive and methodological threads in the research on the advance and meaning of the ICT for local development, involving, in particular, the analysis of local (social) networks of specific, inter-institutional character. It is rooted in the experience, gathered by the project team within the particular fields of this project, such as, in particular, assessment of quality of the local authority websites, graph theory and cluster analysis. This body of experience, along with the results of preliminary studies, allow for hoping that the investigations shall bring tangible results in terms of identification of local web-based networking structures, and the nature of their interrelations with local development.

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### Summary

The paper presents the prerequisites for and the initial results from the TIROLS project, financed through a grant from the Polish Ministry of Science and Higher Education, concerning local connections through the intermediary of the websites. The work constitutes a continuation of the earlier research, conducted since 2003, in the domain of evaluation of the local authority websites. The purpose of the work presented is to collect the data on the connections of the municipality websites and the analysis of these connections from the point of view of characteristics of networks thus produced, as well as an attempt of juxtaposing these characteristics with the socio-economic features of the local units. After presentation of the prerequisites for the project, the paper gives the initial results of research, indicating a broad range of features of communes in the domain considered, implying the need for a deeper insight into the role of the municipality websites with this respect.

### IT a gminy wiejskie: czy ich strony internetowe są jądrami lokalnych sieci społecznościowych?

#### Streszczenie

Artykuł przedstawia założenia i wstępne wyniki badań w ramach projektu TIROLS, finansowanego przez grant MNiSW, dotyczącego powiązań lokalnych za pośrednictwem stron internetowych. Praca stanowi kontynuację badań, prowadzonych od r. 2003, w zakresie oceny stron internetowych samorządów lokalnych. Celem pracy jest zebranie danych na temat powiązań stron internetowych gmin i ich analiza z punktu widzenia cech wewnętrznych tworzonych w ten sposób sieci, a także próba zestawienia charakterystyk tych sieci z cechami społeczno-gospodarczymi badanych gmin. Po przedstawieniu założeń projektu artykuł prezentuje wstępne wyniki badań, wskazujące na znaczącość cech stron internetowych gmin w badanej dziedzinie, co stanowi poważny asumpt do głębszego zainteresowania badaną rolą stron internetowych samorządów.