

# Small community media for sustainable consumption

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## ABSTRACT

This paper concentrates on the interplay between societal and environmental systems and describes an ICT development promoting sustainability.

Consumption patterns play a fundamental role in the complex issue of sustainability. While so called weak sustainable consumption focuses purely on optimizing products, strong sustainable consumption emphasises personal well-being, human relationships, communities and values. For achieving strong sustainable consumption, a mental change in stakeholders is needed. It seems that two factors, local communities and the media can play a central role in promoting this. Also, communities need to strengthen and increase practical cooperation.

This paper introduces a smartphone based framework helping the self-organisation of small communities with the aim of furthering the above goals. Part of the framework is a community radio system. Small community radios have proved to be useful in strengthening communities, and their effects are less debated than those of social networks. The framework also provides an infrastructure for the organization of diverse areas such as community supported agriculture or car sharing, and can be extended to include other relevant areas. The radio programmes include those of individual communities, available only for members, and professional radio programmes on selected topics such as community building, conflict resolution, or community supported agriculture.

The real strength of the approach lies in the unique combination of small community media and information services for self-organisation on a practical level and the ease of use of the system.

## Keywords

Small community radio, community supported agriculture, community based carpool, smartphone, community media, information services for communities.

## 1. INTRODUCTION

Sustainable consumption, translated into the mass of small, everyday consumer decisions is a key to environmental protection, including climate change mitigation and adaptation. This is reflected in the traditionally strong European legislation on the environmental: after directives covering major “traditional” environmental topics, an Action Plan on Sustainable Consumption and Production was prepared in 2008 [1]. More recently, European Environment Agency director Jacqueline

McGlade stated: “Continuing with current consumption patterns in Europe is not an option” (European Consumer Day 2012).

A closer look reveals subtle, though fundamental differences in sustainable consumption. There is a product oriented approach focusing on optimizing products and services. This approach is called weak sustainable consumption because – though there is an obvious need for such optimization – it has systematic weaknesses. In the strong sustainable consumption approach natural resources, responsible citizenship and the social embeddedness of behavioural decisions are focused on primarily, but product oriented aspects are also covered [2].

Studies in behavioural sciences, brain research etc. emphasize motivational aspects; the role of emotions, of interpersonal relationships, of communities, and of life’s aesthetic and spiritual dimensions. [3]. Communities play a special role in addressing issues to which a sole focus on rationality has proved inadequate. For mental, spiritual and practical reasons, community-based actions are seen as viable alternatives to consumerism. Taking a fairly distant example, Cuba is said to have survived its personal peak oil (following the collapse of the Soviet Union) not with new energy sources, but with a fundamental shift in the country’s economic mindset [4].

Also, there are a number of practical ways for making steps towards sustainability using the power of communities, e.g. carpooling or community based agriculture.

Smartphones are called the fifth major computing cycle and have a comparable influence on our societies, similar to that of the fourth computing cycle, the Internet. Indeed, smartphones bring very new possibilities for supporting sustainability and/or communities.

This paper describes a smartphone based, very novel system for communities. The system has two equally important sides that achieve their real strength in combination with each other. First, it is a community media with a holistic approach, which provides practical information, news services and various programmes aimed at promoting emotional well being. Second, it offers information services for small communities, ensuring simple and quick self-organisation in some key areas. The system is capable of increasing awareness and also helping practical steps.

## 2. SUSTAINABILITY AND COMMUNITIES

### 2.1 Introduction

Strengthening communities can support sustainability for sociological, emotional and spiritual, but also for very practical reasons. With decreasing natural and financial resources, and the need to adapt to a changing climate, interpersonal relationships within communities are becoming of primary importance providing mental and spiritual strength as well as practical help to its members.

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## 2.2 Sociology, Emotional and Spiritual Aspects

Concerning sociological issues, mitigation of climate change and/or adaptation to it, as well as rising energy prices lead to a shift in power structures [5]. Local leaders, organizations, personal connections and local economies will play a significantly larger role than in past decades. Locally produced food, local energy sources are increasingly sought after. Protection against weather extremes is also largely a local issue. Local issues are often very practical and transparent. In many cases (unlike on a global level), there is no need for reasoning about climate change, it is often enough to appeal to the common sense of citizens and the need for saving resources.

Brain scientists argue that emotions play a vital role in mental processes such as learning or memorizing. Also, there is evidence that for the survival of animal populations a certain balance is needed: the social contacts the brain is capable of tracking and the sizes of the populations have to be in the same order of magnitude. This community size favours selfless behaviour, which, in turn, is necessary for the survival of that population.

Conflicts are natural in communities, and a conflict itself is value-neutral. However, the way we deal with conflicts can be positive in that it makes the community stronger. Conversely, it can also weaken the community. Acquiring proper conflict resolution skills is therefore vital for individuals as well as communities.

Behavioural science findings show that mental health and our social interactions within the community cannot be separated from each other. Also, while extrinsic values are mostly related to “things”, more stable, less vulnerable intrinsic values are often related to interpersonal relationships [6].

Practically all experts emphasize the role of emotions, art, music etc. in the healthy functioning of communities.

## 2.3 Practical Level

Communities can play an important role in achieving sustainability on a practical level. According to ecological footprint calculators, there are four major areas of consumption: housing, food, travel and other. Except perhaps for housing, convincing community-based solutions already exist.

Community supported agriculture (CSA) [7, 8] is a locally-based model of agriculture and food distribution. Producers, local farms and the local community are in direct contact. There is often a subscriber-based mechanism, providing safety and capital for the producers and affordable good quality food for the consumers. For community based agriculture a rethinking must take place in many areas, among others in what we eat and how we cook. Also, there is some organizational overhead (organizing food delivery or payment).

Car pooling (the sharing of car journeys, with more than one person travelling in the car) can work with a single, large pool of users or in small communities building on personal relationships among the users. The advantage of the latter is confidence within the small community and, due to common destinations and schedules, a higher chance for matching journeys.

The exchange or giveaway of used products often takes place in communities. Often, people try to give away surplus objects in the closest community, gradually widening the circle of those asked.

## 3. COMMUNICATION IN SMALL COMMUNITIES

Electronic communication in small communities is often, wrongly, associated with social networks, just as scattershot postings on a Facebook wall are often confused with authentic communication [9].

In our personal experience, strong small communities do not often use social networks for internal communication. There is a good reason why experts in behavioural science tend to ignore social networks when studying communities: well-working communities rarely use social networks. Social networks are more used for supporting less intensive links within a larger group of people where, partly due to the time expenditure of using social networks, real life connections, real community bonds often get looser.

In a small, non representative survey carried out at our university, involving a total of 15 small Hungarian communities to which, between themselves, three Faculty members belong to, it has been found that, at least in these cases, well working communities prefer to use mailing lists and/or mobile fleets to communicate with each other.

Small community radios are very small radio stations typically with a rather low-powered radio antenna and, at least partly, local programmes. The exact form and the organisation of small community radios differ from country to country, but such radios are used from Africa through Europe to the United States. Generally, in most cases they seem to have a positive impact on communities. Studies show that they can help change (media) consumers into active participants in local communities. Also, news is not “made” for small community radios, but rather just “picked up from the street”, typically reflecting the day-to-day life of the community [10].

## 4. RELATED WORK

There are a number of related works on ICT applications for sustainable consumption, concentrating mainly on the issue of efficiency [11]. A recent, high level overview of the field [12] presents arguments that support the approach taken in this paper, namely, that concentrating on resource efficiency by ICT alone will not produce sustainability. The strength of our current, wide-angle approach is twofold: It provides an efficient tool, a new type of media, for strengthening communities and it also offers information services making related day-to-day organisational work much easier.

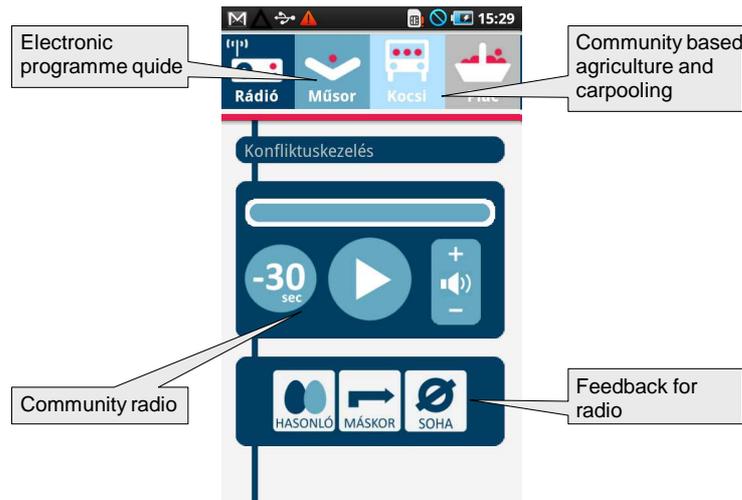
## 5. APPROACH

### 5.1 Overview

The current work has a number of different phases and aspects, such as the exploration of the users’ view; the creation of editorial programmes on community related issues; the creation of a relatively complicated software architecture; the software development process and testing with potential users.

### 5.2 User’s View

In this chapter, we introduce the system from the user’s point of view, concentrating on the major functionality. Basically, it involves a framework based on smartphones and mobile internet, in which small community radios can be configured in a matter of



**Figure 1. End user view, Android app.**

minutes. The radio programme is not a linear one, the only possibility with traditional technology; it is customized instead.

The customization of the radio programme is based on the community memberships of the user, his profile showing his interests and his current context. Communities can have their own news and radio programmes (e.g. speeches or presentations) and there is a central pool of news and radio programmes.

The radio is also extended with electronic services – helping communities to self-organise themselves.

There are two major accesses to the system: a Web portal and the smartphone client application. The former is intended for less frequently used functionalities requiring a larger screen, the latter for frequently used functionality, also working on small smartphone screens or without a screen.

The smartphone application (Fig. 1) contains an action bar at the top, allowing selecting between the major functions: (1) listening to the radio and radio programme, (2) carpooling, (3) community based agriculture.

On the radio screen, the title of the current programme is displayed, and the major functionality of the radio – rewind 30 seconds and pause – are shown. At the bottom of the screen, the feedback buttons – “similar”, “other time” and “never” – are placed. The radio programme screen shows the (individually customized) electronic programme guide.

The carpooling and the community based agriculture screens accommodate the corresponding functionality.

The news and radio programmes are of the following categories: (1) Internal news and radio programmes of a single community, only available for the members of the community; (2) Central news and radio programmes for all communities.

Central news bulletins and radio programmes are prepared by a small editorial team. Community related topics, however, take up a large part – which we see as a key element for success, i.e. that a potentially high number of users use it and it contributes to

sustainable living. Community related topics such as community building, conflict resolution, different types of interpersonal relationships or even cooking using community supported agricultural produce are covered. Such topics are handled partly explicitly, e.g. in the form of expert interviews, partly implicitly, by showing positive examples, life styles and behavioural patterns.

### 5.3 Architecture

The architecture is presented in Fig. 2. There are several integrated smartphone apps that the users get in touch with directly.

The requirements for handling structured, database data and audio data are very different. Therefore, the server side was split up in two major parts: one for serving the front-end and the mobile app via an interface, and another for audio data management.

The server side also includes several special modules with high algorithmic complexity:

1. Audio data processor (e.g. normalising and quality checking of audio data);
2. Recommender system for preparing personal playlists;
3. Routing system for allowing advanced geographic capabilities for the car pool system.

All three components use standard, open source software. However, due to our special requirements, extensions and modifications of the standard components were necessary.

Taking the recommender system as an example, it is based on the standard recommender system Apache Mahout. However, a number of additional steps were necessary, such as considering “hard rules” for playlist assembly, or aggregating the feedback into a single number. Also, the standard approach for recommender systems has to be extended for handling communities, rather than just individual users and making serial recommendations, instead of recommending a set of single items.

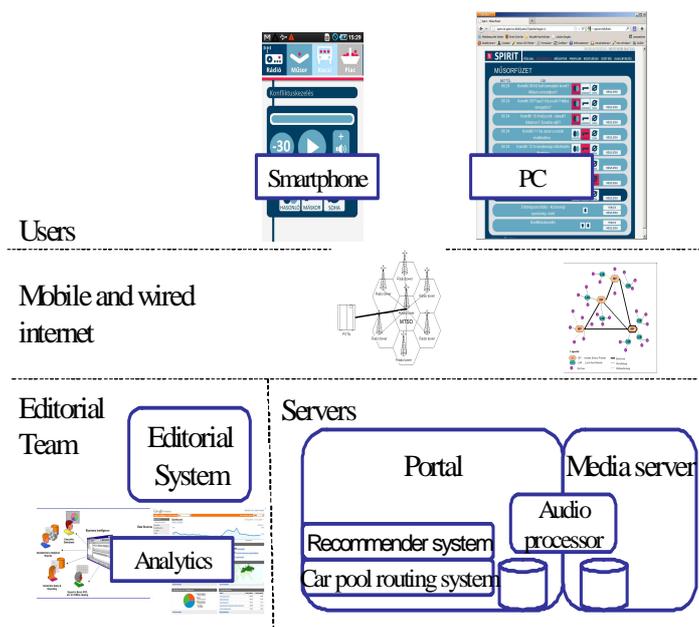


Figure 2. System architecture.

The monitoring of the system and usage analysis is also provided by several modules. The usage of the Web-portal is monitored by an open source Web analytics system. Data on listening to the audio material is put into a Data Warehouse – thus allowing the editorial team to get direct feedback.

## 5.4 Software Development

The system is being developed in very close cooperation with communities. Potential users have been involved in the conception and testing of the project from the very beginning.

Developing such a system with a group of university students has been a challenge as in such environments it is not necessarily typical to build software systems with real industrial strength. Our current experience shows that by involving industrial partners, working in a team and using the infrastructure typical for an SME while creating a motivating environment, it is possible to develop quality software, while also giving students important industrial experience in a motivating setting.

## 5.5 Technical Challenges

There are a number of technical challenges in building the system:

- Scalability of the system, especially that of the audio data handling and the routing engine;
- Recommender system for profile learning, activity recognition for context recognition;
- Audio data processing, automatic quality checking and improvement;
- Voice generation.

## 5.6 Testing with communities

Combined technical and societal innovation typically has a larger potential than innovation in just one of the two areas. Furthermore, the traditional product development cycle with

separate conception, realisation and user testing, is too slow in such areas.

For these reasons, an exchange of ideas with potential users, both individuals and groups from different communities was initiated at a very early stage of the development. As a result, considerable feedback from users has been accumulated.

Up to now, the radio part of the system was tested with about a 100 users from 5 communities. Test users were from all age groups between ca. 18 and 70 of age, with very different educational backgrounds. Communities included students of our faculty, religious communities, the nation-wide civil organisation Association of Large Families and persons from a village with about 2000 inhabitants some 50 km from Budapest. The fixed test programme was edited for each of the communities, and for this mobile internet connection was not necessary. Feedback was collected both by the application (explicit feedback using the feedback buttons and implicit feedback by logging user's activity), by paper based surveys and face-to-face discussions and interviews.

Questions we sought answers for included:

1. General impressions on the usefulness of the system
2. Age group of potential users
3. Priorities with regard to the topics of the radio programmes.
4. Generating ideas for potential applications

First trends can already be observed, although the evaluation of the feedback has not been completed yet. In general, there is very positive feedback to the idea of the radio as it is seen as the medium which allows various activities, such as travelling, household work etc. Interestingly, although our original target group was the age group up to about 40 years, a number of (partly

significantly) older users also came along with smartphones and appreciated the new possibility.

Concerning the radio programme, community news and programmes were the clear favourites. Also, editorial programmes related to different aspects of community life were also very much appreciated. Concerning music, individual tastes obviously vary on a very large scale, even in a single community.

Concerning information services for community organisation, car pooling, community based agriculture and second-hand market were all considered important. In some communities, there are also special needs, e.g. the Association of Large Families handles a large number of last-minute tickets to concerts and theatres.

## 6. SUMMARY AND OUTLOOK

In this paper, we presented a smartphone based platform for small community media and information services for community self organisation. Considerations and insights offered by various branches of science and a complex, multi-level approach have made the development of the system possible, and ensured that the outcome (with over 100 test users currently) has been very positive.

The framework requires relatively complex technical solutions, with functionality for the end users and the editorial team.

Future work is planned on a range of different issues. Substantial further software development is needed to round up and integrate the modules of the system. Technical research is required in several areas, such as automatic playlist assembly or social network measurement and benchmarking. Testing of the system with a growing test group in real life situations also has high priority.

## 7. ACKNOWLEDGMENTS

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