

E-Inclusion as the Next Challenge for Sustainable Consumption

Amon Rapp¹, Alessandro Marcengo², Marina Geymonat²,
Rossana Simeoni², and Luca Console³

¹ University of Torino – Computer Science Department, C.so Svizzera, 185, 10149 Torino
amon.rapp@gmail.com

² Telecom Italia – Research & Prototyping Department, Via Reiss Romoli, 274, 10148 Torino
{alessandro.marcengo, marina.geymonat,
rossana.simeoni}@telecomitalia.it

³ University of Torino – Computer Science Department, C.so Svizzera, 185, 10149 Torino
lconsole@di.unito.it

Abstract. In this paper we highlight how small producers of quality food, depositary of traditions that nowadays are running the risk of being lost, could be included in the benefits provided by digital technologies, through an interactive system that could enhance their old communication habits. Within PIEMONTE Project we adopted a co-design process to include these social actors in the design development. The result is an interactive system that, based on three technological pillars (a visual recognition algorithm, an ontology based knowledge manager, and a social network engine) and a vision of intelligent objects as a mean to promote the access and the interconnection in the world of quality food, tries to keep alive the cultural heritage of a territory.

Keywords: co-design, sustainability, gastronomy.

1 Introduction

Nowadays, a lot of the value, in terms of cultural heritage, tied to specific territories disappears because it is no longer financially affordable to “maintain” it. Globalization makes often unsustainable the maintenance of small productions, traditional methods, and shared knowledge, with the risk of losing the cultural and bio diversity developed over hundreds of years. The effects of this loss are already evident: “sustainability” is becoming a more valuable word everyday. In this work we want to orient the use of technology to ensure that sustainable consumption can be promoted and communicated by individuals, making the information society not an harm but an opportunity to regain visibility to practices that are running the risk of disappearing.

Telecom Italia, the Computer Science Department of University of Torino, Slow Food¹ and the University of Gastronomic Sciences of Pollenzo set up some years ago the PIEMONTE Project, to enhance the possibility of sharing the cultural heritage of a specific territory and support sustainability through a social network of smart objects.

¹ Slow Food is an Italian based non profit agency that support quality food.

The value of a territory is made by tangible and intangible elements which reveal their specific character: landscapes, buildings, artifacts and, last but not least, food. Imagine these things could speak: they could tell us about the world around them, their stories and traditions, enhancing our experience of any specific place. Technology could realize this kind of scenario. On the one side the miniaturization of electronic components and the increasing computing capabilities are enabling a gradual integration of digital content and artificial intelligence into things. On the other side the increasing easiness of use of the interactive system interfaces available on the market allows users, even traditionally excluded actors (e.g. small communities that use traditional methods to produce their goods), to manage their digital communication activities.

From these premises smart things can play the role of gateways, enhancing the information exchange between people and the knowledge included in a specific area. Physical things, within the PIEMONTE Project, typical of our everyday life, as human artifacts or even landscape elements, are able to “socialize” with people and other objects, sharing their relationships with other elements of the same area. Keeping track of what is going on to and around them, these “enhanced things” become able to tell stories and, through a direct interaction, to give people a richer experience during their stay in a specific place. Starting from this point of view, PIEMONTE Project created an interactive system with different entry points, in which a mobile application and a website for consumers interact with a different environment addressed to small food producers in need to gain visibility for their products.

2 PIEMONTE Framework

PIEMONTE Project developed a suite of applications named Wanteat which apply the idea of “smart objects” to the quality food domain [3]. Food is a fundamental part of the human life which is strongly related to the identity and the history of a territory or a community, and which plays a central role in our everyday activities. If food items could interact with people, they could tell us about the territory they come from, the people who produced them, the recipes which use them as ingredients, the other products that have similar organoleptic qualities, and so on. The basic idea of Wanteat is to make a product a kind of anchor for the territory: this gives visibility to other things beside the anchor that can be further explored, purchased, and visited.

Wanteat framework is based on the following concepts:

- **Smart Objects.** They are able to create and manage links with other objects and people, share knowledge about themselves and the world around them, structure, aggregate and synthesize contents and personalize their interaction with users.
- **Ubiquitous Interaction.** The interaction with smart objects allows users to access knowledge which is strongly related to the surrounding physical context and to their “here and now” experience.
- **No Infrastructures.** In order to make interaction as natural as possible and not to intervene on existing production and distribution chains.

- **Playful and Entertaining Interaction.** Promoting curiosity-driven exploration, allowing final users to engage in a step-by-step navigation process starting from a first physical object.
- **Relationship Centrality.** Based on the possibility to discover related objects whenever a certain item is chosen as a focus of interest.

Furthermore, Wanteat consists in a suite of applications which target different categories of users.

- **Wanteat Backshop** is a Web application that implement our idea of e-inclusion for quality food stakeholders, such as small producers or shop owners, allowing them to register their products as smart things in the system. Moreover, stakeholders can visualize the stats of their products and their activities and know how people interact with their profiles, what tags are assigned to their brands, the votes and the comments that users applied to their goods.
- **Wanteat Mobile** is a smartphone application which targets final users such as tourists or foodies. It supports users in exploring the gastronomy domain, starting from a physical object recognised through an image recognition mechanism, and in exchanging information with smart things, offering a novel and peculiar curiosity-driven interaction paradigm.
- **Wanteat Web** is a web companion of Wanteat Mobile, supporting a continuum of experience with it. For example a bookmark made with Wanteat Mobile is available on the web and vice versa. This supports a seamless movement between real world (interaction with things with the mobile application) and virtual world (web interaction).

Wanteat has been designed as a partially distributed system where we distinguish: a “server side” which is in charge of the creation and the management of the network of objects and people and which contains the logic for creating an intelligent adaptive behavior; the “client side”, available on mobile smartphones and on the Web, that is in charge of managing the interaction between people and the networks of smart things. The system is primarily constituted by an ontology of the food and wine domain, defining the concepts and the relations among them. It includes a taxonomy of gastronomic products (e.g., different types of cheeses with different properties like the production techniques) linked to actors (e.g. producers or vendors) and to places. Hence, the system can associate inferred properties to objects. In fact, one way to create a link between two objects is deducing it from some properties they share in the ontology. A second important agent present in the system is the social network manager. It is in charge of managing links in the mixed social networks of things and people. Wanteat, besides, is an adaptive application which maintains an explicit user model and exploits a recommender system for selecting and ranking the information that has to be provided to a specific user based on her/his profile. Finally, the image recognition mechanism allows user to recognize physical object simply framing the label on a specific product, minimizing the infrastructures required and the intervention in the production and distribution chains.

3 E-Inclusion Vision in PIEMONTE Project

Information and Communication Technologies play a central role in supporting everyday life in the contemporary world. If e-inclusion means an inclusive use of technology to allow participation of all individuals and communities in the information society, enjoying the benefits of the digital communication means and the new interactive systems that are spreading all over the world, nobody has to be left behind. While nowadays the e-inclusion argument is mainly referred to the inclusion of older adults [e.g. 4, 7, 11], people with disabilities [e.g. 1, 6] and more in general people that either have or do not have access to ICT and either use or do not use ICT [9], it has not yet given sufficient attention to that social actors that play a fundamental role in the preservation of the cultural heritage of our society: these actors, since an insufficient access to digital technologies, cannot share their knowledge with a broader amount of people. The gastronomic domain is an optimal exemplum of this phenomenon: many small food and wine producers of quality goods preserve the traditions of their territories, but have some difficulties to share them and to promote sustainable consumption behaviors that are tied to their production techniques, since their communication habits are still tied to technology-free practices, such as word of mouth, or very traditional digital practices, such as mail and basic internet navigation. They also cannot compete in terms of costs, advertising, visibility with the mass production market, although they can compete and win in terms of quality: for these reasons they seem to be relegated to a marginal role in our world with a little effect on our consumption practices.

Nowadays, most technological projects in the food and wine domain try to trace and identify food products using the RFID technology: for example, Gandino [5] traces gastronomic goods in the food chain, while Bruser [2] recognize products with RFID tags and provide recommendations to customers in shops, with a personal assistant integrated in the shopping basket. These technologies, however, involve the adoption of a new technological infrastructure, since producers must incorporate within their products RFID tags. Considering that these actors suffer from a digital divide, it is very hard to think that they could adopt invasive technology solutions.

The PIEMONTE Project, instead, do not intervene on existing production and distribution chains, trying to include these social actors with an interactive system that could easily be introduced in their daily routines, since it is based on a playful interaction and on the direct contact between consumers and producers. Let see how through a usage scenario (Fig. 1).

PRODUCER SCENARIO - Mr. Giorgio, a cold cuts producer, registers for Wanteat using Wanteat Backshop, indicating that he produces various types of cold cuts, among which is “Salampatata”, a traditional pork and potato salami (a). Tourists who meet Mr. Giorgio’s “Salampatata” (for example, at a local farmer’s market, at a restaurant, or in a shop) could interact with it using Wanteat mobile application: in this manner they can add to it stories about the territory it comes from, well-matching wines, recipes which use it as an ingredient. Besides, they can know what Giorgio has to said about his product and discover other elements that are related to it, since they belong to the same territory. They can also comment on the product and its stories,



Fig. 1. Small producer scenario

tag, rate or bookmark them (b). As a result of users' social actions, new relationships can be established among Mr. Giorgio's "Salampatata" and other things in Wanteat system: for example, "Salampatata" can be related to a new restaurant, if several users said they tasted it there (c).

Accessing Wanteat Backshop again, Mister Giorgio can now examine what users said about "Salampatata": he can read all user comments, access statistics about user actions which refer to "Salampatata" and examine its relationships, thus discovering that it is served in a restaurant he was not aware of (d).

4 A Co-design Process

Through all the PIEMONTE Project we adopted a service design user-driven approach. Thus, we performed a serie of evaluations starting at an early stage in the project.

The whole suite, named Wanteat, has been developed and tested involving territorial agencies, institutional stakeholders and users of the system through an effective co-design framework. Co-designing ensures, through the understanding of the application context and the constant comparison with the domain expert view, the success of the system developed in terms of acceptability and user experience. The aim of all the co-design activities is to provide a solid foundation for the system through the identification of the objectives and needs of the reference users and to obtain feedback on the validity of the choices made. This process started from the first day of the project and the final step was conducted in October 2012 when the system was presented and tested by a wide public. During this period all the elements of the suite were evaluated and designed with their final user: the mobile application, for example, was tested in different contexts, from laboratory tests to field trials in huge gastronomic events [8, 10].

The part of the system with the aim to include the small producers of quality food was instead evaluated and developed in their everyday contexts, starting from a series of contextual interviews in order to understand their needs and desires and enrich early requirements. The final evaluation phase was carried out with an extensive field trial, involving both producers and consumers. More specifically, Wanteat was introduced to, and tested by, a wide public at “Salone Internazionale del Gusto 2012”, a huge event dedicated exclusively to the exposition and tasting of high quality food from all over the world, organized in Torino every two years. During the five days of the international fair the application has been used by several hundreds of casual users, and to a large sample of producers exposing at the fair (one hundred) were asked to take part in the last step of system design.

4.1 Step 1 – As Is Analysis and Requirements Definition

At the beginning of the project a phase of “As Is Analysis and Requirements Definition” has been carried out with the objective of outlining the list of actors and relations that could characterize the world of small-scale production of quality food. We selected two types of production (small wine producers and small cheese producers) according to the different production processes and techniques, and two production areas (Langhe and Asti region in Piedmont), differentiated by the type of the local economies and the development opportunities. In total 12 contextual interviews were collected, 3 for each sector of the matrix resulting from the intersection between the production types and the production areas. The interviews were focused essentially on the production practices, the actual communication habits, the daily routines and the most common means used for the distribution and the advertising of the goods produced.

The results highlighted that small producers aim to preserve and increase the quality of their products, maintaining their own distinctive individuality and using the word of mouth as central mean for their brand promotion. Cheese producers expressed the need to monitor the performance of their goods on the market, but without changing their packaging, carefully designed to evoke the tradition and the natural processes used: for this reason the hypothesis to introduce RFID or QR code technologies was refused. The wine producers of the Langhe area expressed the need to safeguard the message of tradition and authenticity on which they built their success, earning the trust of their customers with a direct relationship based on a face to face communication. The possibility of introducing an E-Commerce system to expand their market was firmly rejected, since the perception of a possible risk of depersonalization during the purchase process. Instead, the wine producers of the Asti region emphasized more strongly the desire to emerge on the market thanks to the new communication technologies, sharing the knowledge related to their territories even using digital means. From these insights we began to develop a first prototype that could encounter needs and perceptions of these social actors, in order to include them in the benefits that an interactive system could give to their work.

4.2 Step 2 – Prototype Evaluation

Once developed the first prototype the co-design phase continued with a second round of contextual interviews. At this point it was possible to evaluate and use the

first version of the system in order to gather additional requirements. We came back to the same small producers interviewed in the first phase of the project, showing them the functionalities of Wanteat and discussing possible improvements and new requirements. Producers underlined the need to highlight personal communication with their customers to inform them about events, promotions and new products. It emerged that a key feature to push the adoption of a new interactive system was the possibility to develop a personal relationship with and between their customer, first promoters of their products, enhancing the old communication habits based on the word of mouth.

The inclusion of traditional producers in the information society passes even through the demonstration that digital technologies does not drain the “authentic” face to face communication, but can provide opportunities to develop long-distance relationships based on trust, sharing their knowledge about the tradition behind their work and their territories, and expanding the market for their potential customers in areas that could not be reached in any other way. The statistical functionalities of the system could be seen under the same point of view: knowing how the consumers consider the goods produced, what could be improved in terms of quality, what they think about their production techniques, and which are their socio-demographic characteristics can be considered as a new way to receive feedback about their work, decreasing the distance that separates them from their customers.

The playful interaction that mobile application of the system promotes, allowing customers to navigate through a social network of people and things, following their curiosity and their willingness to discover, appears at the producer eyes as a manner for giving visibility to their work, giving them the possibility to differentiate their products from that of the industrial production: the connection that the system establishes between products, people and stories is seen as a way to keep alive the traditions of their territories. Even the "image recognition" feature was rated highly, since it does not require to change the product packaging or mechanisms during the production and distribution chains. Then, the overall acceptance of the system was rated very high, confirming our hypothesis that for including this kind of actors it is necessary to offer new technological means that could be inserted smoothly in their daily routines, presenting them as a way to enhance their communication habits and not to completely change them.

4.3 Step 3 –Field Trial at Salone Internazionale Del Gusto 2012

The last phase of the co-design process for including small producers in Wanteat system was carried out at Salone Internazionale del Gusto 2012, between 25 and 29 October 2012. In this occasion we had the opportunity to confirm the results gathered during the contextual interviews of the previous phases and to get useful insights about the economic sustainability of the project. 100 of the 700 producers present at the fair were interviewed, presenting them the final application of Wanteat, and asking them open (with a contextual interview) and closed questions (with a questionnaire structured in 10 point likert scales). The research investigated the economic model that could sustain the adoption of the system by the producers and gave us the perception about its acceptability and its possible integration in their daily routines.

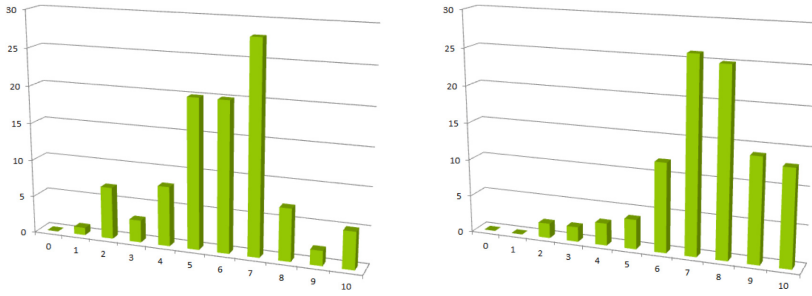


Fig. 2. Wanteat (a) to increase the proceeds and (b) to enhance brand visibility

The research about the perception of the system by the producers highlights how the value of this interactive system is located not in the possibility of increasing the proceeds (Fig 2 (a), average of 5,9), but rather in the opportunity of enhancing the brand visibility (Fig. 2 (a), average of 7,4).

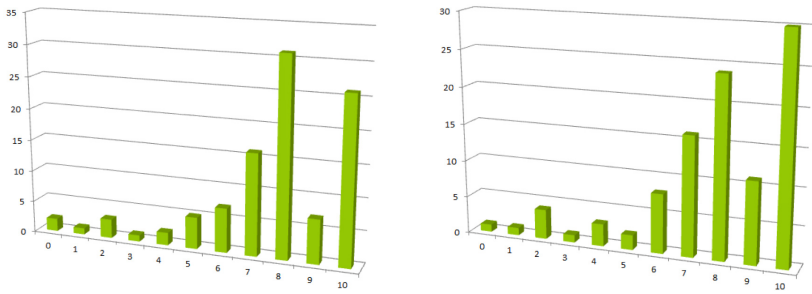


Fig. 3. Wanteat (a) to better understand the customers and (b) to get in touch with customers

Another important value of the system is the possibility to know the preferences of consumers, their desires of improvements, their opinion and their critics: the statistic features of the system are the most appreciated, since they could give to producers a better knowledge of their customers (Fig 3, (a), average of 7,2). Besides, Wanteat allows producers to get in touch with their clients, notifying them in real time where they could find their products, events, fairs, sharing information about their production techniques and stories behind the territories in which the production processes take place (Fig. 3 (b), average of 7,8).

Hence, the results of the last evaluation phase confirmed the insights gathered in the previous steps. Wanteat could be adopted easily by small producers focusing on its ability to not replace in a whole new way their communication habits but improving them thanks to the features provided by digital technology.

It was more difficult, for the producers, to individuate a sustainable economic model for this service. The pay-per-click model seems to be the most acceptable one.

5 Conclusions

In this study, closely conducted with all the stakeholders of the quality food supply chain, it has been addressed a declination of E-inclusion. In all the system design phases the project aimed to find ways for producers, today at serious risk of disappearing, to participate in the global quality food marketplace. The technology was therefore not considered an enemy augmenting the distance with bigger competitors but rather an opportunity to regain a worldwide visibility. What has emerged as a critical point of the research is the need of a preliminary phase of information and education, addressed to the small producers, about the opportunities that technology represent in an e-inclusion perspective. One aspect that should instead be considered in future research are the business models that will sustain this proposition. It is probable that the perceived value of the system and therefore its marketability is linked to a well conducted preparatory education phase about its benefits on the long term.

References

1. Bryant, D., Bryant, B.: *Assistive Technology for People with Disabilities*. Pearson Education, Boston (2003)
2. Buser, D.C.: Context-based recommender systems in conventional grocery—an economic analysis. In: 40th Hawaii Int. Conf. on System Sciences. IEEE (2007)
3. Console, L., et al.: Interacting with Social networks of intelligent things and people in the work of gastronomy. To appear *ACM Trans on TIIS* (2013). Short version in *Proc. of ENTER 2012, eTourism Present and Future Services and Applications*. Springer Wien (2012)
4. Doyle, J., Skrba, Z., McDonnell, R., Arent, B.: Designing a touch screen communication device to support social interaction amongst older adults. In: *HCI 2010, The 24th BCS Conference on Human Computer Interaction*. ACM (2010)
5. Gandino, F., Montrucchio, B., Rebaudengo, M., Sanchez, E.R.: Analysis of an rfid-based information system for tracking and tracing in an agri-food chain. In: *Proc. First Annual RFID Eurasia Conf.* IEEE (2007)
6. Hollier, S., Murray, I.: The evolution of e-inclusion: Technology in Education for the Vision Impaired. *History of Computing in Education* (2004)
7. Leonardi, C., Mennecozi, C., Not, E., Pianesi, F., Zancanaro, M.: Supporting Older Adults Social Network: The Design of e-Inclusion Communication Services. In: 6th International Conference of the International Society for Gerontechnology, ISG 2008 (2008)
8. Marcengo, A., Rapp, A., Console, L., Simeoni, R.: Evaluating WantEat: A social network of people and objects. In: Rebelo, F., Soares, M. (eds.) *Advances in Usability Evaluations, Part 2*. CRC Press, Taylor & Francis (2012)
9. Marien, I., Van Audenhove, L.: Embedding e-inclusion initiatives in people's daily reality: The role of social networks in tackling the digital divide. In: *Digitas Conference, Sibiu, Rumania* (2010)
10. Rapp, A., Marcengo, M., Console, L., Simeoni, R.: Playing in the Wild: Enhancing User Engagement in Field Evaluation Methods. In: *Proceedings of Academic MindTrek* (2012)
11. Zajicek, M.: Aspects of hci research for older people. *Universal Access in the Information Society* 5(3), 279–286 (2006)