WantEat: interacting with social networks of smart objects for sharing and promoting cultural heritage

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Abstract. *WantEat* is about interacting with everyday objects that become intelligent hubs for accessing and sharing the cultural heritage of a territory. Objects are smart in the sense that they share knowledge with users, interact with them in a personalized way and maintain social relationships with users and other objects. When interacting with an object, a user can share information with it and is also introduced to the social network of its friends; the user can explore this network to discover new interesting information, services, objects, people. The objects we consider belong to the realm of gastronomy, including food items, shops, restaurants, cooks, recipes, etc. On the one hand, this allows people to get in touch with the deep culture of a territory, making people aware of their traditions and supporting a sustainable gastronomy; on the other hand, the approach supports networking and the promotion of local quality productions and economy. In the paper we (i) present the framework and applications we developed, (ii) discuss the peculiar mix of AI technologies we exploited to create social intelligence and embed it into everyday objects, (iii) discuss the innovative interaction approach we developed aiming at natural interaction with no infra-structuring and (iv) report on the field trial we performed using the suite of applications we developed.

1 Introduction

Premise.
Slow Food and Terra Madre[5] are non profit, non governmental international organizations that aim at preserving the world biodiversity, creating a network of food communities and supporting the philosophy that a sustainable gastronomy relies on sharing cultural heritage, transforming consumers in co-producers and promoting *good, clean and fair* food[12]. In order to achieve these goals, SlowFood and Terra Madre follow various directions, including the organization of networking events, the direct support

[5] www.slowfood.com, www.terramadre.org

to local communities, dissemination, the support to local markets and to the consumption of local (km0) food, etc. Important magazines (such as Time in October 2004) recognized these initiatives as fundamental for a sustainable planet.

The SWIT framework

In the last few years, moving from experiences on adaptive and social applications and on human computer interaction, we started a project on a new approach for people interaction with smart objects and we developed the idea that in order to be actually smart, not only should the objects be able of managing knowledge and interacting with people, but they should also have social abilities. This means, in particular, the ability of establishing and maintaining social relations with other objects and people, the ability to share knowledge with them and the ability of socializing knowledge and relationships with the people interacting with them. We thus characterized what we called "Social Web of Intelligent Things and People" [4].

The Piemonte Project

The Piemonte project[6] originated from the idea of using SWIT to support Slow Food philosophy. The idea is that socially smart objects could play the role of gateways for enhancing the interaction between people and a territory and its cultural heritage. If objects could speak they could tell people about the world around them, the place in which they stay and its history and traditions. This world is made of relationships which involve people and other objects and which evolve along time, given the social activity of the objects. The objects we are interested in are those from the realm of gastronomy, including food products, market stalls, restaurants, shops, recipes but also geographic places and actors such as cooks, producers, shop owners, etc. Interacting with a food product (e.g., a bottle of wine) is a way of getting in touch with the cultural heritage behind that wine, made of stories and traditions and with its social network, made of a territory with its history and traditions, grapes, producers, shops but also people who talked of it or who liked it, recipes that are perfect to taste the wine with, other products (e.g., a cheese the wine is traditionally drunk with). Thus the idea is to build a new model of sustainable gastronomy, where people are aware of the territory they live in or visit, of its resources, history, traditions, of the good, clean and fair food coming from the territory and of the actors and the processes in the food chain; a model where biodiversity is preserved and where networks of actors can share experiences [12].

The project started in 2009 and will end in Fall 2012. It produced a number of significant results. In this paper we will discuss *WantEat*, a suite of applications that we developed and experimented in field trials. *WantEat* includes applications for stakeholders that aim at promoting their territory and products and at establishing short supply chain relationships with their customers; applications for end users that aim at living an enhanced ludic experience when visiting a territory, sharing information and knowledge and getting advice. In the paper we discuss briefly how social intelligence has been embedded into networks of objects and people to achieve the goals above; we also discuss the innovative choices we made in interaction design to make the user experience natural and engaging; we finally discuss the results of the trials we carried on. Before entering this discussions, however, we provide a short scenario of what *WantEat* habilitates.

[6] http://www.piemonte.di.unito.it/

2 A short scenario: Visting Valle di Lanzo

The "Valle di Lanzo" community (a mountain valley in the Alps) decided to adopt WantEat *for promotion. The tourist board uploaded information on the valley, its cultural roots with links to tourist attractions and cultural heritage information. The villages in the valley did the same. Mr. Rossi, a producer of Toma (a renowned cheese from the valley), decides in turn to register using the* WantEat Backshop *application (a back office application for stakeholders). As soon as he inputs information on his cheese, the cheese is connected to many other entities, such as "Viu" (the small village of Mr Rossi), "Toma di Lanzo", (the type of cheese), Mr Rossi himself and his farm, shops selling it, etc. Mr Rossi uploads information on his small enterprise, including the logo of his Toma.*
John is traveling in Lanzo and he is visiting a farmer's market with local products. He discovers Mr. Rossi's Toma and after tasting it he wants to learn more. Using his smartphone and the WantEat mobile *application, he frames the logo which is recognized by the application and a contact between John and the Toma is established. The Toma tells Johns about itself and introduces John to its social network, made of villages, producers, cultural information, tourist attractions, etc. John explores the network starting from the Toma and discovers interesting information about the village lifestyle and a museum he can visit in Viu. Information is personalized according to John's profile. John decides to share some information with the Toma and he add comments saying that it was very good with "Nebbiolo" wine and that it is similar to another cheese produced in the mountain valleys close to his own town. The Toma aggregates these new pieces of information, which become part of what it will tell to other people in the future. In particular, since many other people said that the Toma and Nebbiolo are a good coupling, the cheese and the wine become friends. John also learns that Mary (another user with a profile similar to John's one) and other people added information that the Toma is used by Restaurant "La Piola" for preparing a special dish. John discovers about the restaurant and connects to it for placing a reservation.*
A few weeks after, Mr Rossi connects again to WantEat Backshop *to read comments and feedbacks about his Toma and to discover its new friends. In this way he can establish direct relationships with the owner of "La Piola" restaurant and with customers (such as John and Mary). Moreover, the tourist board of Valli di Lanzo gets feedbacks about the profile of the tourist visiting its attractions and can prepare new marketing plans for promoting itself.*

From the scenario we can grasp the principles of our approach:

- Everyday objects become smart and hubs for accessing information and services offered by a territory and its cultural heritage;
- Smart objects are socially active, in particular they maintain friendship with other objects and people; they also share knowledge with people they interact with;
- Interaction is natural and there is no infra-structuring with sensors or QR codes; e.g., John get is touch with the Toma by taking a picture of its label.
- Objects interact with people in a personalized way.
- Stakeholders get feedback from the objects they registered into the system. The feedback can be useful to establish relations and shorten supply chains and for marketing purposes.

– Sharing knowledge and networking are the main goals with the aim of promoting sustainable gastronomy, according to the Slow Food principles mentioned above.

3 WantEat

WantEat is a suite of applications we designed for achieving the goals discussed above. It includes:

– *WantEat mobile*, a smartphone application for interacting with social networks of smart objects;
– *WantEat Web*, a web companion;
– *WantEat backshop*, an application for stakeholders;
– *WantEat video*, a tablet version of WantEat mobile, focusing also on multimedia information.

The applications connect to a *WantEat application server* where object intelligence is implemented. In the following we discuss the applications, focusing on the mobile one. We then discuss how object intelligence is supported in the application server. We close by reporting the results of the field trials.

3.1 WantEat-mobile

WantEat-mobile is a smartphone application that introduces a novel and peculiar paradigm for supporting the user interaction with social networks of smart objects. This interaction is made of two main phases: (i) getting in touch and (ii) sharing information with the object and exploring its social network. Before entering this discussion it is worth noting that we are not interested in distinguishing individual instances of objects for tracking them. We do not aim at distinguishing instances of Mr Rossi's Toma to track each wheel of cheese; we are interested in the concept of Mr Rossi's Toma to share information about it, its territory, etc.

Getting in touch A basic assumption of our project is that infra-structuring of the environment must be minimized. We aim at supporting interaction with everyday objects, with no embedded electronics or tags. Thus, we developed a number of ways of creating the contact between a user and an object (fig. 1(a)), including: (i) *Taking a picture*. The user frames the label of a product with the camera; the label is recognized (fig. 1(b)); (ii) *Geopositioning*; The user can also start the navigation by getting in touch with a place (e.g.,Viu village in the scenario above) and thus with the objects related to the place, i.e., the objects around him; (iii) getting a *Recommendation*; (iv) searching or (v) exploring bookmarks.

Interacting with the object and its world: The wheel Once a contact with an object has been established, the user can interact with it and access its social network. Since we aim at using objects as gateways for accessing the cultural heritage of a territory, we designed an interaction model which allows users to explore the world starting from a contacted object. We developed a **"wheel" model** (fig. 1(c)), where the wheel can be seen as the square of a village, i.e., the traditional place for meeting; in this place the

user can interact with the object and its friends, exchanging information and knowledge, being introduced to and exploring their social networks. The object the user is interacting with is in the centre of the wheel. The user can get in touch with it by simply touching it, which is an appealing and natural way of performing selective actions with a touch sensitive interface. The selected object tells the user about itself, providing both general knowledge and information synthesized from the interaction with other people (including tags, comments, ratings) (figure 1(d)). The user can, in turn, tell something to the object: in particular, she can add her tags, comments and ratings or can bookmark the object (figure 1(g)). These actions contribute to (i) adding the information to the object in focus and (ii) influencing the social relations between objects, as discussed in the following.

The object in focus is surrounded by a wheel (figure 1(c)) that provides access to the social network of its friends (both people and objects). Each friend belongs to one of four sectors; the partition into sectors depends on the object in the center. In the example in figure 1(c), the object in focus is a food product; the first sector "Territorio" (Territory) contains the friends related to the territory, the production and supply chain (e.g. producers, shops, production places, etc.). The sector "Persone" (People) contains people that are friends of the object in focus (e.g. people who bookmarked it or who wrote a comment on it); the sector "Prodotti" (Products) contains other food products that are friends of the object in focus (e.g. a wine that goes well with a cheese); the sector "Cucina" (Cuisine) contains entities related to cuisine, such as restaurants, recipes, and so on.

Each sector can be expanded by touching it; the expanded sector fills the screen and the items in the sector are displayed as small circles in a ring (see figure 1(e), where the "Territorio" sector is expanded), similar to the dialer in an old style telephone. The items are ordered based on the user model and on their type (maintaining items of different types and preferring those more suitable for the user). The items can be explored by rotating the ring, in the same way as dialing on the old style telephone. One item at a time is enlarged and the relation it has with the object in focus is highlighted in a small box. See again Figure 1(e), which shows that the object in the center of the wheel (miniaturized in the bottom right corner of the screen) is produced in ("prodotto in") the place ("Valle di Lanzo", i.e. Lanzo valley) enlarged in the sector. Information about the enlarged item can be displayed by touching it.

The user can continue exploration by changing the object in focus. This can be done by simply dragging the enlarged item toward the wheel miniature in one of the corners (figure 1(f)). At this point the whole wheel is recomputed and displayed to the user. In this way, using the metaphor of the wheel representing the square of a village, the user can explore the territory via the social network of the intelligent objects she meets: users can exchange contents and stories with these objects and explore the networks of their friends.

3.2 WantEat Web

WantEat Web is a companion of *WantEat Mobile*. It has two main functions: (i) it allows users to explore objects and their social networks and (ii) it allows users to re-live the experiences they made with the mobile application. The latter allows a user to explore

a time line of the actions she performed with the mobile application and, for each of them, explore the objects and their networks. This application allows users to maintain the relations they established with objects and territories.

3.3 WantEat Backshop

WantEat Backshop is an application for stakeholders. It includes two modules: a *Registration* and an *Analysis* module.

The *Registration* module allows a stakeholder to register herself/himself and her/his objects in the system. For example, a producer can insert her/his enterprise and products. This is done using a user interface that allows the producer to select the appropriate category for each product and to associate information and a logo to it. The objects immediately enter WantEat network (see the discussion on the application server in Sec. 4).

The *Analysis* module allows a stakeholder to get reports on what happened to the objects she registered into the system. It exploits data analysis and business intelligence techniques to create reports from the data logged by the application server on the activities of all the users. For example, a producer can

- explore statistics of what happened to a products: number of contacts, location of contacts, comments, votes, comparison wrt average of similar products, etc., profiles of users who liked the products, etc.
- explore details about the products and their friends. In this way she can learn about the people who interacted with the products, the other products that became friends of her/his products, the shops who sell them, the restaurants which use them, etc.

The tools work similarly for other stakeholders. These functions are interesting for several reasons. On the one hand, they allow stakeholders to get feedback about themselves and their objects. This can be also useful information for marketing purposes. Second they can establish direct links with customers and other stakeholder and this contributes to the goal of networking people. For example a producer can get in touch with a producer of a similar product from another region (as an effect of the fact that the two products became friends) or with restaurants that serve the products (creating a link that can shorten the supply chain).

3.4 WantEat Video

WantEat Video is an application for Apple iPad, similar to *WantEat mobile* but focused on providing videos related to objects. This is, in fact, an important issue in preserving cultural heritage.

4 Object intelligence: the application server

Object intelligence has been obtained by combining in an appropriate way different AI technologies, ranging from ontologies to user modeling and adaptation to automated. generation of social relations.

Five main modules constitute the server side of *WantEat*: (i) a knowledge base manager, (ii) a social network manager; (iii) a user profile manager; (iv) a recommender and (v) an interaction manager.

The *knowledge base manager* exploits an **ontology** of the application domain, defining all the concepts in the domain and the relations among them. For example, it includes a taxonomy of gastronomic products (e.g., of types of cheeses based on different properties like the type of milk and the production techniques), linking them to actors (such as producers or market stall owners) and to places in a geographic ontology. The ontology is expressed in OWL and we use OWLIM/Sesame as reasoner. Inferences on the ontology allow the system (i) to associate inferred properties to objects; (ii) to create links between objects. The former are part of the description provided to users; The latter contribute to the creation of social relations between objects, e.g., linking objects originating from the same place or being produced in similar ways or sharing ingredients. Other links may be created by rules added to the ontology, expressed in SWIRL. Examples of these rules are those that associate wines and foods, based on their properties (e.g., red old wines with meat dishes).

Dynamic information is associated by users to a object in the form of ratings, tags, comments. The system aggregates these pieces of information in different ways.

We are presently exploring techniques for aggregating user comments according to different criteria as for example user similarity or user friendship. For the aggregation and synthesis of comments we are in particular investigating"digital storytelling" techniques.

The *Social network manager* is in charge of managing networks of objects and people. The links between items are computed in two ways: (i) links derived from inferences in the ontology (e.g., linking products and places or linking products with similar properties) and (ii) links deriving from the behavior of users:

- *User-to-user links*. Links between users are either created explicitly by the users as in traditional social networking services.
- *User-to-object links* are based on the user's actions, i.e., a user is linked to the objects she bookmarked, commented/tagged/rated positively/visited.
- *object-to-object links*. These links are created by the system based on the analysis of the users' behavior and interaction with objects. An item X is linked to another item Y in case, for example, X has been mentioned as a tag or in a comment on Y, or in case X and Y appear frequently together in the bookmarks of several users, or in case X and Y have been visited frequently on the same occasion by several users. These links are create tracking and analyzing the actions performed by the users and looking for significant correlations between objects.

The system we designed is **adaptive** and provides information and services tailored to the specific user and context of usage [2]. The **user modeling** module maintains a model of each user which reports the user's interests with respect to the concepts in the domain ontologies. The user model is thus conceived as an overlay over the domain knowledge. The model is built and updated analyzing the actions performed by the user and inducing her/his interests from her/his behavior (similar to the approach in [3]).

Our system exploits a *recommender* which in turn exploits the user model and the context of interaction (e.g., the location or time of the interaction) and suggests poten-

tially interesting objects to a user. Moreover, whenever many items have to be presented to the user (e.g. in a wheel sector or after a search), the system makes a selection in order to show as many different types of items as possible (for example, at least one product, at least one producer, etc.) and for each type selects the items according to the ranking given by the recommender.

5 Client side

The client side of *WantEat mobile* has been implemented on smartphones (Apple iPhone, Android) and is in charge of (i) managing the interaction between users and objects and (ii) creating the interaction environment discussed in the previous sections (the "wheel"), sending requests to the server and processing the answers to generate the appropriate way of presenting them. Taking a picture is the main method provided to users for getting in touch with objects. The picture is sent to a server which stores in a database all the images uploaded into the system with their associated object. The server returns the identifier of the recognized object. If more than one logo is included in the picture, all the identifiers are returned. We chose this method because it supports a natural interaction and does not require adding any tag on the objects. This is very important especially since we targeted small quality productions It is worth noting that the amount of information to be exchanged by the server and the mobile device is limited and can be easily managed using standard web service approaches and 3G mobile telecommunication.

The other applications have been implemented as Web ones and particular attention has been paid to interaction design in order to make them very simple and natural to use for stakeholders.

6 Evaluation with users

We adopted a user-centered approach in the design of the interaction mode involving end-users since the early stages of the project. First of all, stakeholders have been involved during the requirement phase. In the early phases of requirement elicitation we involved 12 producers of our region (small, medium, and large producers) and people involved in the promotion of the region. We learned from them some of the priorities they have for promoting their products and their territories. We tested with them the first mockups of the application, refining progressively their functionalities.

A first prototype of *WantEat mobile* has been tested with 12 users who have been asked to perform a number of tasks, ranging from object recognition to navigation with the wheel. Results have revealed that on average soft users (users less familiar with technology), especially in the age group 36-60 years, have found more difficulties than hard users (users more familiar with technology). As an example of the critical points for soft users, the drag functionalities showed a low level of intuitiveness (average of 2.1, with SD 1.4, range 1-5). However, pleasantness and innovation of the application gather more favorable ratings among soft users (average of 4.6 against 3.4 for hard users). Hard users have proved on average to be more critical of soft users, in particular with regard to the interaction logic and information architecture.

In September 2010 we populated *WantEat* with information about the "Provincia di Torino" (Turin region) and its gastronomy (including about 30 types of quality products and hundreds of producers, shops, restaurants).

In October 2010 the system has been presented and tested by a wide public at the Salone del Gusto[7]. We collected 684 questionnaires from users who experimented the system. The structured interview was divided in two parts: "basic statistics" and "evaluation". The statistics part had the aim to gather socio-demographical information (e.g. age, place of residence, etc.) and to determine the user's familiarity with new communication technologies. We classified users according to two dimension: Young/Old - based on their age with a cutoff at 35; Hard/Soft based on their familiarity with technologies. This evaluation part was aimed at gathering the overall level of acceptance of the application, measured through four different dimensions: ease of use, comprehensibility, pleasantness, and usefulness. Each dimension was measured by means of a 4-points Likert scale, where 1 means "not at all" and 4 means "very much".

The results of the evaluation, summarized in Tables 1 and 2, show a very high level of acceptance with respect to every tested dimension (Y/H = Young/Hard, Y/S = Young/Soft, O/H = Old/Hard, O/S = Old/Soft).

Dimension	**Y/H**	**O/H**	**Y/S**	**O/S**	**Total Sample**	
					avg.	s.d.
Ease of use	3.49	3.57	3.44	3.24	3.42	0.68
					avg.	s.d.
Comprehensibility	3.5	3.64	3.43	3.32	3.46	0.67
					avg.	s.d.
Pleasantness	3.42	3.49	3.44	3.38	3.43	0.67
					avg.	s.d.
Usefulness	3.01	3.30	3.13	3.09	3.12	0.84

Table 1. Evaluation Results: Average and SD of the 4 dimensions.

Dimension	**1**	**2**	**3**	**4**
Ease of use	1.02%	7.31%	38.74%	52.63%
Comprehensibility	0.44%	8.48%	35.67%	52.19%
Pleasantness	1.17%	7.02%	39.62%	55.34%
Usefulness	4.53%	16.81%	41.08%	37.57%

Table 2. Frequency of answers for each point on the 4 points scale.

WantEat Backshop was presented to the producers of the products involved in the experimentation (notice that none of them was involved in the early interviews for requirement analysis). During the Salone del Gusto they had the opportunity to assess the testers' feedback. All of them were positively impressed by the system and in particular

[7] Salone del Gusto (*www.salonedelgusto.it*) is an event organized by Slow Food in Torino every two years, with about 200000 visitors.

by the possibility of analyzing the performance of their products, Almost all of them would use the application since they would benefit from (i) the comments and statistics, and (ii) the possibility of getting in direct contact with consumers and with shop owners and restaurants, using the system as a support for shortening the supply chain. The interface was evaluated positively by all of them, even if only half of them were familiar with the use of Internet and the Web.

The evaluation at Salone del Gusto was performed on our smartphone; users had the opportunity of using the system for a short time. For such a reason we planned a second evaluation to be performed at Cheese 2011 (in Bra, September 2011), a food fair focusing on cheese with several hundreds of producers from all over the world and about 250000 visitors. We planned a *game* for end users, involving them in a competition to become the "WantEat guru". They could earn rewards by using the system and in particular by exploiting its social networking and social web capabilities. Moreover, they were involved in a sort of "treasure hunting" to find the cheeses and producers covered by the application. During the three days of the experimentation we installed *WantEat mobile* on about 150 smartphones (Apple iPhone only) of randomly selected users that were visiting the fair. We then collected 50 post-hoc questionnaires. The main findings are described in the following. Almost all the users found the process of recognizing labels by taking a picture very simple, quick and natural. Users exploited a lot the social web actions (tagging, voting, comment) offered by *WantEat* (an average of 50 actions per users, with peaks over 130). Users have proven to be more interested in leaving comments rather than reading them. Social networking features, such as messaging and geo-positioning other users, were found not particularly interesting (average of 2.4 with SD of 0.8, range: 1-4). Great appreciation has received instead the quickness with which it is possible to insert tags, comments, and ratings (average of 3.64, with SD of 0.56).The application was considered especially attractive for the possibility of (i) getting the opinion of other users (77.8%), (ii) exploring the cultural heritage of the territories starting from food products (82.1%) and (iii) its educational role about the local food heritage (67.8%).

In summary, all the evaluations were quite positive and encouraged us to plan a real field trial of the applications.

7 Related work

Our project carries on innovative research aimed at providing users with an immersive experience where they can interact with objects as living entities and access a variety of information in an easy and natural way. For this purpose, the project merges recent research from different promising areas like embodied and natural human-computer interaction, mixed reality, ambient intelligence, augmented memories and location based systems.

It is related to the concept of *embodied interaction*, according to the definition proposed by Dourish in early 2000s: "*an interaction with computer systems that occupy our world, a world of physical and social reality, and that exploit this fact in how they interact with us*" [5]. In his vision, *tangible computing* is a central concept that refers to the augmentation of the everyday world with computational power, in order to allow

entities to manifest natural behavior corresponding to their environment and to users activities. While this gives people the opportunity to interact directly through physical artifacts [10], in our project we also want to investigate a new way of interaction with smart objects, which beyond their physical behavior have to naturally manifest enhanced behavior. Tangible computing has inspired two categories of systems: *natural interfaces* and *smart spaces*. Examples of natural interfaces are: the *digital desk* [15], a computationally enhanced desktop supporting interaction with both paper and electronic documents; the *Stanford Interactive Workspaces* project[8], which focuses on augmenting a dedicated meeting space with technology such as large displays, wireless/multimodal I/O devices, and seamless integration of mobile devices; the MIT's *Intelligent Room*[9], a highly interactive environment that recognizes human activities, users' actions and emotional states; *ReachMedia* [7], a system supporting on-the-move interaction with objects by means of a gesture interface.

We exploit ideas from *mixed and augmented reality*, which propose to overlay the real-world environment with digital objects. For example, *Magic Book* [1] visualizes virtual 3D models on the page of a physical book, which acts as a handle: moving the book, models can be moved and observed from different points of view. Other interesting applications of augmented reality can guide visitors inside a building [13] or guide tourists in a city [6]. The latter is an early example of mobile augmented reality that, due to the recent advances in capabilities of handheld platforms, is gaining significant interest. In this area, a relevant application is *Wikireality* [8], a system exploiting GPS data and live camera to query Wikipedia through photos of the surrounding landscape.

Our project can be seen as an evolution of *augmented memories* systems, which enrich the human capabilities in recording and organizing experiences. *SharedLife* [14] shows how the sharing of personal, augmented memories automatically built from context information may support users in different situations. Our approach focuses on the interaction with intelligent objects that record experiences and non-linear stories explicitly added by users, and on the social communication that can be stimulated by similar experiences.

As regards the enhancement of physical object behaviour, the SmartProducts[10] project aims at embedding proactive knowledge inside complex products, such as a car or a kitchen. The goal is to enable products to talk, guide, and assist designers, workers and consumers dealing with them. While in these cases the focus is on objects' intelligence and interaction capabilities, so that things are indeed proactive in their relationship with people, they do not exhibit any social intelligence in creating connections among themselves, nor there is a web or social networking support for the users that establish a contact with them.

Finally, the project is related to *adaptive systems exploiting user models* [2], providing a new area of application for these systems. It is also elaborates on the notions of social networking, extending it in different ways with respect to the *social applications* that are attracting growing attention in the literature. We are innovative with respect to the literature in the fact that we create mixed networks involving people and objects (of

[8] http://iwork.stanford.edu/

[9] http://aire.csail.mit.edu/

[10] http://www.smartproducts-project.eu/

different nature) and thus objects assume an active role in establishing the networks. Moreover we deeply exploit ontologies in the management of the networks.

Ontologies have also been proved valuable instruments for augmenting objects intelligence: in this sense our work has similarities with those that exploit Semantic Web in order to represent the objects' knowledge. However, the overall goal is different as we aim at managing a web of objects, while other projects such as SOFIA [11] or [9] exploit ontologies for creating context aware smart objects.

8 Conclusions

We introduced the idea of interacting with a social web of smart objects and we discussed an interaction paradigm for supporting this idea. A prototype in the field of gastronomy has been implemented and tested in a real world trial. AI technologies played an important role and were critical for the sucess of the application. On the one hand, the focus on natural interaction and the design of a playful interaction model were appreciated by all the users; on the other hand, the mix of technologies we adopted in order to make objects socially smart contributed to the richness of the interaction between people and objects. In this sense we think that our application can be regarded as a model of the use of advanced AI technology for supporting sustainability of a territory, favoring the participation of all the actors and contributing to preserving cultural heritage and to networking people, which were the initial goals of our trajectory.

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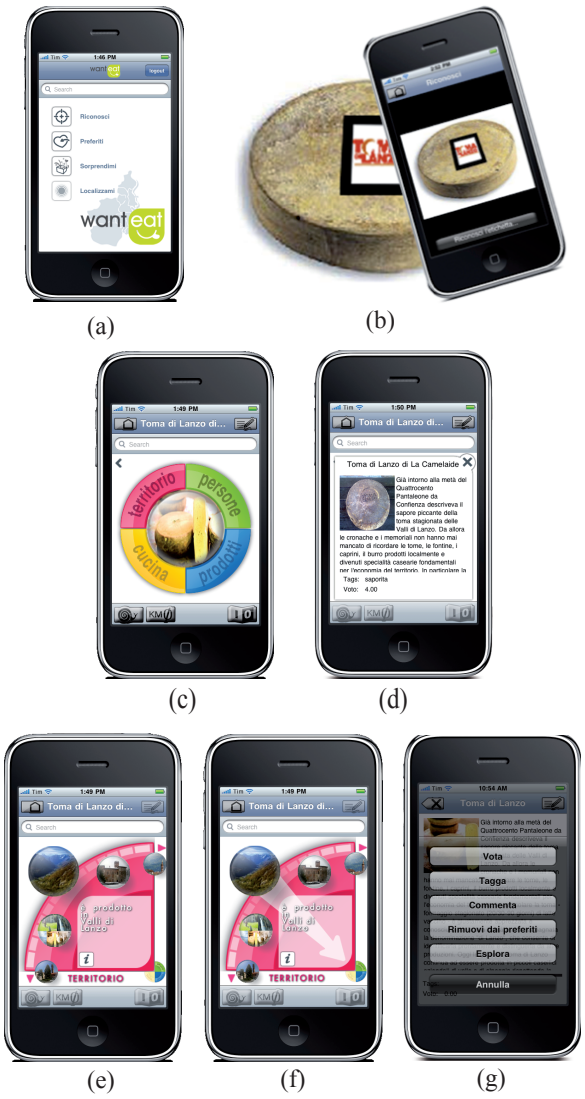

Fig. 1. Example of the wheel on an iPhone.