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Summary

In ubimedia, the service transforms according to the current context of the person. Also users and his or her co-users own actions effect to the content and to the user experience ubimedia can offer. The most typical device in today's ubimedia is mobile phone with GPS feature. The ubiquitous access to media alone does not make the service ubimedia.

One might consider screen and keyboard as essential elements of ubimedia. However, the current tendency for ubimedia is to leave screen and keyboard in order to interact really ubiquitously and fluently with the media participants. The goal of ubimedia is not to distract, but ease up and take the user to the flow with the combination of the actual living environment.

This report presents three ubimedia cases: Point-to-Discover, TreasureHunter and Babbage Cabbage. The developers of these projects applied in the Nokia Ubimedia MindTrek Award in 2008. They competed and won 44 other competition entries.

Point-to-Discover facilitates the efficient mobile interaction with digital resources in ubiquitous media environments. It suits especially for the travel industry since the application helps for example to point at a tourist landmark to get travel guide information. The location of the user and the direction of the user's mobile direct which content are shown.

TreasureHunter is a pervasive game played by two teams. Children in the age of 8-12 play it outdoor. The goal is to find and keep a given a virtual treasure. What makes it ubiquitous is that all players carry wireless game devices. They can monitor heart rate signals and to communicate during the game. The game is in the project phase tested by the kids.

Babbage Cabbage was the most experimental of the awarded Ubimedia projects. It represents a new form of empathetic living ambient media that shows social or ecological information in the very unexpected form of media: the cabbages instead of industrial display design. The idea of utilizing living organisms as part of a novel digital ambient media intrigues. If there can be the cabbage garden from a Graphical User Interface, GUI, what else could be rendered to ubiquitous media experience.

Ubimedia connects the real world with topographically organized virtual worlds.

Björn Stockleben, Project Engineer, Chair of the MindTrek Jury, Rundfunk Berlin-Brandenburg innovation projects, Berlin, Germany

The Ubimedia 2008 study was made by Gemilo Ltd in November 2008. The report presents shortly the three cases mentioned above. We will also evaluate the MindTrek competition entries (n 47) that competed to win the Nokia Ubimedia Award. In Addition, the jury members and the winners participated in an e-mail questionnaire and some of their answers are included to the article to visualize the ubimedia concept and its future.

Ubimedia was categorized in five main types: Share and display (36,2 %), Media and art (23,4 %), Games (12,8 %), Survey and locate (12,8 %), and Tech (12,8 %). One of the entries was categorized in Other since it did not meet the ubimedia requirements.

This report was funded by Digitampere.fi (<http://www.digitampere.fi/>).

Foreword

Each time I discuss ubimedia in national and international forums, the term tends to raise a number of questions. Increasingly, however, the various characteristics of ubimedia can be detected in multi-channel services and in the way the services are integrated into the existing operating environments, Internet and terminal devices that we carry with us.

Ubimedia is the future, and the future is not as distant as we might think.

The Nokia Ubimedia Awards gave us, the sponsors and members of the jury, an interesting opportunity to examine the status quo of the ubiquitous contents and user interfaces in 2008. Through this report, we would like to share our vision to anyone interested in this topic.

It is my sincere hope that this report will help the developers, researchers and other people in the fields of digital services and media to utilise the possibilities that the amalgamation of media into our living environment unavoidably creates.

This Ubimedia report was financed by Digitampere, a program of the Tampere Centre of Expertise. The Centre focuses on the research and development of services in whose core there are all or some of the following features:

Social media

users' own content production, sharing and interaction within online communities

Playfulness and entertainment

services provide experiences that enrich everyday life

Ubiquitousness

services make use of media content that interlinks with each other semantically, adapts to a range of operating situations and can be utilised regardless of time and location.

Warm thanks go out to the people and organisations who participated in the contest, the members of the jury and contest team, without which the contest would not have been the success that it was. I would like to especially thank the following people, who kindly contributed to the making of this report: Artur Lugmayr, Bjoern Stockleben, Robert J. Wierzbicki, Panos Markopoulos, Remco Magielse, Adrian David Cheek and Tim Merritt. I would also like to thank Frans Mäyrä for his comments on games.

For this report, the contest entries submitted to our co-operation partner, MindTrek, were surveyed. Commissioned by us, the report was compiled by a member of the Ubimedia 2008 jury, Creative Director Katri Lietsala, and Managing Director of Gemilo, Tomi Terentjeff.

MindTrek 2009 will showcase next year's trends.



Petri Räsänen

Development Director

www.digitampere.fi

Ubimedia at a glance

The term ubimedia is used to refer to media content that acquires meaning when it connects with other media content and the physical environment. Metadata links this content, and information that is related to time, location, object or person, for example, can be used to restrict, add or regenerate content.

In the early 1990s, **Mark Weiser** (1991) discussed ubiquitous technology, which in its simplest form can be observed in automated light switches, ovens, stereos and thermostats that are controlled by a computer.

In true ubiquitous technology solutions, however, computers are even more highly sophisticated.

According to Weiser, what is relevant is that the computer is aware of its location as well as all the details of the surrounding environment.

Creating technological solutions of this kind does not necessitate the use of artificial intelligence. However, computers might still react to the changes taking place in the surrounding space.

In Finland, **Vili Lehdonvirta** was one of the first to discuss ubimedia in his Tokion piiri blog in 2006:

"In a best-case scenario, ubimedia, like other ubiquitous services, will be integrated into everyday life in such a seamless fashion that they will nearly become an extension of our thoughts."

At its best, ubimedia will fuse into the existing environment and human experience at any given moment and in any given space.

"Invisible technology is playing an ever more integral part in our lives. Technology should make people's lives and living easier. Ubimedia that is well realised is designed with this in mind; it adapts to the consumer's needs rather than forcing the consumer to adapt to the requirements of technology," explains the founder and director of the Ubimedia contest, **Artur Lugmayr**.

Lugmayr goes on to say that the Nokia Ubimedia MindTrek Awards was founded in order to help international artists and industry's intelligent media products gain internationally unique visibility.

"Ubimedia connects the real world with topographically organised virtual worlds," clarifies **Björn Stockleben**, Chair of the MindTrek Jury.

In topography, the earth's surface shapes are studied in detail. Similarly, ubimedia models the real and virtual operating environment, with their users, the activities of each moment and their consequences.

Instead of geographic information, ubimedia collects data on, for example, people's social networks, activities and, even, the emotions and physical reactions that occur in a chosen context.

It can also replicate background information on objects and how they operate. All of this produces a representation that is as identical as possible to, or an altered image of, all that is being documented,

Ubi, ubiquitous, seeming to be in all places.

which is in a constant state of change as the automatically filtered or independently generated data ceaselessly rewrites the end result.

Topography uses altitude contours, shading or colours as the means to present shapes on a map, which shows us whether the earth's surface is a forest or field, for example. Orienteers know that maps have individual symbols for rocks, swamps and knolls, among others. This type of method can also be utilised in ubimedia, the greatest difference being that, in ubimedia, the view, the map, is not static.

Let us take a practical example. When a user 'moves a stone', ubimedia can record the movement of the stone and by using sensors also the sensations that the user experiences, and then connect them to a larger network. Thus, the moment and the activities that relate to the moment can be shared

Picture 1.
Artur Lugmayr opened
the award ceremony
of the Nokia Ubimedia
Awards in Tampere.



with other users. The moving of the stone may also influence the views that are still to be generated. For example, it can usher the user towards a situation that would not have been available without the stone and without its location being altered.

Because this is ubimedia, the stone can be moved by a computerised application or a user that is not present at the location of the stone but rather moves it remotely; the media landscape then undergoes a change without the user or object ever having been in the same virtual space. If needed, the stone's movement will be stored virtually, and, consequently, you can return to inspect what has taken place in the real world, even if the actual ubimedia service were no longer available in the physical operating environment.

Ubimedia groups and structures react with the sensory data transmitted from the body and environment. Guided by the ubigraphy collected, ubimedia operates towards an appropriate purpose. Usually, a media designer or developer has defined the purpose, but the more flexible the system is, the more users there are; sometimes, even the gadget used, or the space and time in which events occur, may affect the outcome.

What is finally produced may also be a matter of the influence that a group of people exert, keeping the user interface and contents of ubimedia in a continuous state of transition.

Ubimedia content is collected by using data recording devices, such as surveillance cameras, GPS navigators to store location information, or watches to keep track of time. Apart from these, sensors are often made use of in order to gather data on the user's body, senses, positions, balance and movement.

The ubimedia observation device monitors the user's reactions: how does the ubimedia user

control his or her senses, co-ordinate movements, or co-operate with other users? The device may document how users fashion their actions to influence what is actually shown in the ubiquitous media solution. Tracked objects and their changing, changeable characteristics form a special case of their own.

As regards observation technology today, devices and tools are far from ubiquitous.

In the monitoring of emotions, much emphasis still needs to be placed on self- or group observations. When users report the needed data, they interpret their emotions, experiences and the data on all that has taken place and save their version into an ubimedia application.

Other players or participants of the same media application, too, may evaluate emotions and report them on behalf of others.

Users are often able to modify the view themselves: content that ubimedia offers next to the users themselves or to others in the same space who share the same media view either at that moment or later. The manner of representation may be transformed as well, as a result of user choice or automatically when the ubimedia service or a device attached to it proactively predicts what the user will probably do.

In ubimedia that offer gaming experiences, it may be appropriate to mix sensory data by adding to the lived reality new elements that take the real world closer to an imaginary one. In this sort of ubiquitous game, in fact, the virtual takes on more importance than the real: it is the primary object of users' attention, because this is essential for the gaming experience.

Ubimedia is often social media, as the user has a great influence on the final result, whether knowingly or unknowingly. Social media are open platforms where users share the content of their choice and then rework the visual outlook, rate of

content repetition and publicity level, for example, to their liking (Lietsala & Sirkkunen 2008). In a similar manner in ubimedia, the content and personal experiences of people—or those of others—are influenced.

When actions are purpose-driven, ubimedia becomes more accurate and efficient. Based on the fed data or the data collected by the devices, the devices can stimulate reactions in users, instead of merely observing information on what is taking place.

Errors in characteristics data may warp the user experience and impair the advantages that ubimedia would have for users. Problems may occur, for example, when a system attempts to predict how the user will act next. If the user interface or content are altered on a false supposition, the user is less likely to be satisfied with the final result.

The concept of ubimedia is a fairly new one, and it would seem that the clarification process of the concept is still ongoing.

Professor **Dr. Robert J. Wierzbicki** claims that a precise definition of the term cannot yet be given. Wierzbicki works at the University of Applied Sciences Mittweida, Faculty of Media, Interactive Division, in Germany.

"Some people consider ubimedia a cross-media focused on the exhaustion of technological possibilities of today, others tend to understand ubimedia simply in terms of 'disappearing computers' and modern 'human-machine-interfaces,'" says Wierzbicki.

Wierzbicki himself is of the opinion that ubimedia creates new innovative solutions to make our way of living more efficient and ease people's daily lives.

Ubimedia is also concerned with computer systems, with which we can have a dialogue that is easy-going and resembles human-human conversation.

Ambient media further adds to the terminological confusion.

"Basically, ambient and ubimedia mean the same thing: ubimedia is the American expression, ambient media the one used in Europe," Artur Lugmayr explains.

In this report, a study on ubimedia was conducted by surveying the nearly fifty ubimedia works that took part in the Nokia Ubimedia MindTrek contest in

2008. The international competition was organised by MindTrek, Nokia, the Tampere Region Centre of Expertise Programme's subprogramme Ubiquitous Computing and Tampere University of Technology's NAMU research group. The winning works were awarded prizes at the MindTrek conference in Tampere in October 2008, the cream of Ubimedia receiving awards worth 7,000 euros in total.

The aim of the contest was to find innovative

Apart from existing contents, changes in individual or multiple users and in the target, time and space of activities can be presented through ubimedia. Metadata is collected using a plethora of monitoring and observation devices. This background information is then published as media contents or it affects the navigation and narration, if it exists, of ubimedia.

ubimedia products and services. Contestants were asked to explain how their ubimedia solutions influence the broader environment that is created by different media and what the pioneering geographic information and context-sensitive media solution has to offer to its users.

Works suitable for entry included, for example, pervasive games, the ambient television and installations, ubimedia-based art and various prototypes and demonstrations.

Gemilo Ltd planned and drew up the Ubimedia 2008 report on a commission by the Tampere Digibusiness Centre in November 2008, studying the ubimedia works (n 47) of the MindTrek contest.

For the conclusion of the report, the jury (n 4) and winning works' creators' (n 4) answers, which were submitted via email, were studied.

The respondents were asked to define the concept of ubimedia, ponder as to who the primary developers of ubimedia are and give their thoughts as to for what purposes ubimedia should be adapted.

The questions encouraged the participants to reflect on what barriers technology sets as well as on the business and marketing challenges that ubimedia developers face.

The creators of the works were asked to explain what further plans they have for their works. The jury were asked to state why all three awarded works were considered research and development projects and not commercial services.

People and experts in the ubimedia field

Developing mobile maps and a wealth of recommendation systems, a majority of the companies utilising ubimedia are start-ups.

They constitute a foundation of the pioneering field of commercial ubimedia that integrates into business solutions, yet at the same time their features reveal that they are still in the very initial stage of ubimedia.

The more demanding application development work is carried out via university research, which can experiment and take risks far more liberally than the research that is conducted by companies.

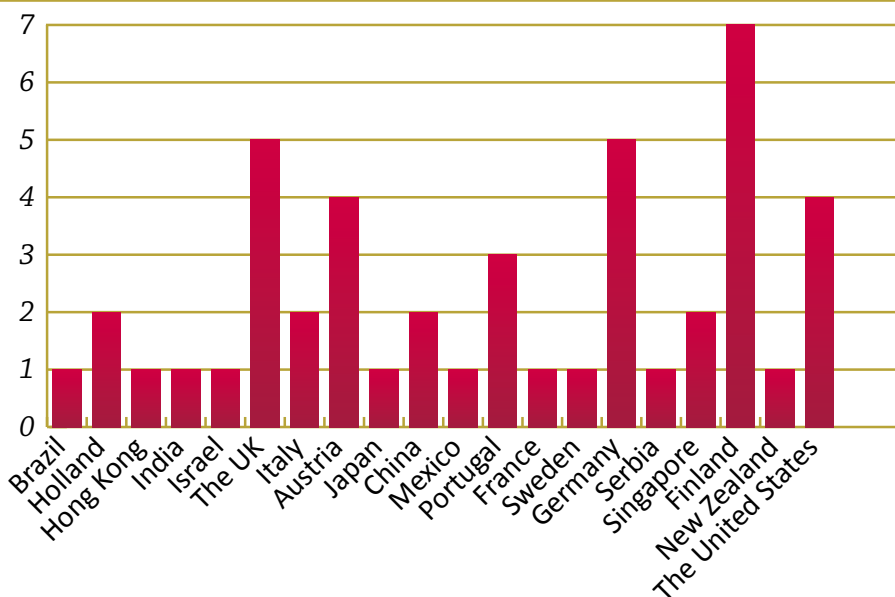
Judging by the award winners of MindTrek's Ubimedia category, universities and research

institutes led the way in ubimedia development. In devising the rules for the ubimedia category, this was a firm presupposition, as the organisers wanted to encourage experimental entries.

The largest number of works in Ubimedia 2008 was submitted from Finland, Germany and the UK.

However, these statistics do not necessarily shed any light on whether these three countries are the world leaders in ubimedia development; rather, the figures may merely indicate that the marketing of the MindTrek contest was especially successful in the said countries.

In total, entries from 20 different countries were received.



Picture 2.
Ubimedia 2008 participant countries and each country's number of entries.

Point-to-Discover

In the 2008 MindTrek contest, the Nokia Ubimedia Award was granted to Point-to-Discover (<http://p2d.ftw.at>). The users of this service receive on their mobile phones information on nearby restaurants, cafés or bars by pointing the phone to a desired direction. The application determines the user's location and that of the area towards which the device is pointed.

The creators of the service are planning to further extend Point-to-Discover in order to provide information on sights in the user's immediate vicinity.

p2d could also be developed to guide the user to a bus stop, metro station or local train station, for example, or display direction-dependent informative advertisements about the target towards which the device is pointed.

Point-to-Discover was developed by **Peter Frohlich, Rainer Simon, Erwin Wittowetz, Gerhard Obernberger** and **Matthias Baldauf**. They all work at the Telecommunication Research Centre, which is located in Austria.

The jury was impressed by the advanced combination of geographic information and motion capture, backed up by clear business potential.

Sadly, the winning Austrian service that was introduced in Vienna is still in the development phase, just as in much of ubimedia, in general. p2d was launched in December 2005, and it was closed in May 2007. The contest runner-up was also in the experimental phase.

"The sad message is that you need money to develop ubimedia. This is why it is mainly research institutions and universities that can afford to be creative. The operators and media industry deliver hardware, systems and infrastructures, but the development of suitable application does not seem to be the mainstream there," sums up the MindTrek jury's German member, Robert J. Wierzbicki.



Picture 3.
The winning Ubimedia service helps tourists, especially.

TreasureHunter

The jury awarded the second prize of the MindTrek Nokia Ubimedia category to the student **Remco Magielse** and his children's game Treasure Hunter (<http://www.remcomagielse.com/portfolio/?p=293>).

Magielse studies Industrial Design at Eindhoven University of Technology in Holland.

The game is targeted at children 8 to 12 years of age. They can combine the treasure hunt in the virtual world with their real operating environment along with other friends who are playing the same game in the vicinity.

In TreasureHunter, two teams meet. Team members are randomly selected, and a player of one of the teams is given the virtual treasure in the beginning. To win the game, players have to find out who hid the treasure and then to re-hide it for as long as they can.

The game starts when the devices are powered on. After that, the players have 30 seconds to run and hide themselves.

In 30 seconds, they learn whether they are in the attacking or the defending team and whether running away was a wise decision.

Mobile devices can communicate wirelessly, and the players can follow the heart rate of other players close by.

When a player touches another player's device with his or her own gaming device, the player captures the opponent to his or her own team and, so, the defender becomes the attacker. In general, the game duration has proven to be rather short. If the opposing team does not find out who hid the treasure within four minutes, the defending team, the one with the treasure, wins.

48 children helped evaluate and develop the game, making paper prototypes and discussing the functionality of the game when it was first set up for testing in practice.

The TreasureHunter game is in the experimental phase, and eight functioning gaming devices with Xbee for wireless communication, LEDs, a vibrating engine, an alarm and a heart rate monitor have all been devised.

Unobtrusive merge seems to be a desired design principle in ubimedia projects. Devices are designed to favour something that exists outside the virtual world, rather than focusing on the centrality of the

device or celebrating virtuality as such.

For example, the developers of TreasureHunter aimed to create a game in which players do not need to stare at the device all the time, leaving more room for exploring the surrounding space and interacting with other players.

The making of TreasureHunter was supported by Associate Professor **Panos Markopoulos** (<http://www.idemployee.id.tue.nl/p.markopoulos/>) from Eindhoven University of Technology. He says that the most prominent companies in the Dutch ubimedia field include Vodafone, Satama, KPN and Philips. Magielse, for his part, names only one major name: Eindhoven University of Technology.

According to Markopoulos, TreasureHunter will be followed up with other similar research projects that contemplate ubimedia game development and how the TreasureHunter platform could be universalised to accommodate other games within the genre.

As for Magielse, the project has ended, but he is considering developing the game platform further. Whether the idea attracts commercial interest, which would render the game a sellable product, determines what Magielse will do with the idea in the future.



Picture 4.

In an ubigame, each player gets a personal gaming device.

Babbage Cabbage

The third prize in the MindTrek contest goes to Babbage Cabbage. The lead of the project, **Adrian David Cheok** (<http://www.adriancheok.info/>), defines his concept as empathetic biological media and a part of the so-called slow ambient media, in which living plants, or red cabbage in this particular case, reacts to the social and ecological information relayed by the people who use the medium.

Adrian David Cheok is Director of the Mixed Reality Lab and Associate Professor in the Department of Electrical and Computer Engineering, National University of Singapore.

Cheok's team comprises a total of 20 people, some of whom are researchers, some students. The red cabbage garden project was realised in Singapore, with the help of Keio University, Japan.

Babbage Cabbage digitally quantifies information on, for example, how much time people spend with their family or to stay in good shape. The information is used to control the pH values that, in turn, trigger changes in the colour of the red cabbage.

The cabbage garden reflects the whole spectrum of the colours of the life of its user, who keys in the values on a computer.

By using living media, the experiment aims to find out to what degree are care, social interaction and events connected with nature integral to

people's lives. Cheok and his group started with the premise that studying the consequences in a living plant of what people do and do not do offers greater possibilities than if this were done using a plastic replica, a copy or a real imitation, less likely to stir up emotions than a living organism, like cabbage, which decays and blooms, which is a fitting symbol of human relationships and desires.

The team has put forward the idea that a cabbage garden in an office environment could be used to remind people not of human relationships but of global warming or the carbon footprint that the office produces. Visualising concepts that would otherwise remain very abstract would help people understand the consequences of their actions. Cheok and his group also consider that the mere act of watching flora has a soothing effect on people.

The jury credited the project for possibly being ten years ahead of its time. Associate Professor, Director of the Mixed Reality Lab Adrian David Cheok and Tim Merritt, who is preparing his doctoral thesis, said that they will be exhibiting the project at new media events that have a focus on art. The research will continue, and they will also continue to attempt to try new ways in which plants make people's actions visible and envisage other forms of living media.



Picture 5.
Red cabbage transformed into a media display in the hands of the researcher. The cabbage changes colour as digitally collected data is fed into it.

Applications

Chair of the Ubimedia jury, Björn Stockleben, says that it is impossible to tell in what fields one should develop ubimedia.

“The question is too general in nature; it’s like asking the question of what are the key applications for the electronics industry. But if you ask in what field ubimedia might have an especially great influence, my answer would be ambient assisted living. Unobtrusive ubimedia services might play a central role in building bridges between generations.”

The men behind TreasureHunter, created at Eindhoven University of Technology, Holland, Associate Professor Panos Markopoulos and student Remco Magielse, foresee that ubimedia will be implemented in a number of different applications: games, education, services using geographic information, emergency control and healthcare.

“I strongly believe that ubimedia might enhance social relationships. Think about the features of Web 2.0 that will filter to the real environment,” says Remco Magielse.

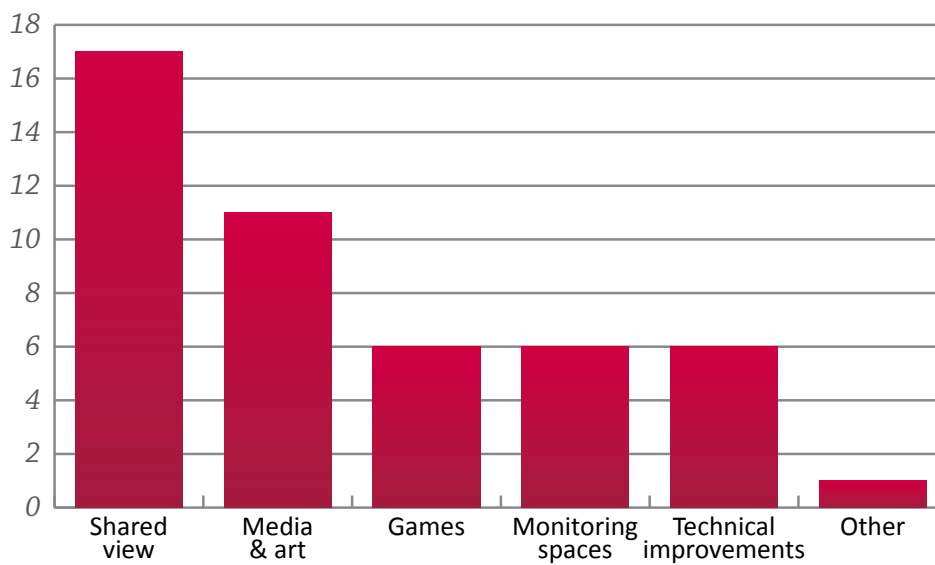
The most common ubimedia application is content sharing in, for example, a shared physical space, in which participants meet each other and use a public display or a combination of displays to share their contents via a mobile device. The works highlight the amalgamation of the virtual and the real as well as the participants’ desire to be able to share things easily with other people.

The question of applications was prominent in the works of the Nokia Ubimedia Awards category of the 2008 MindTrek contest. In total, there were 47 works, divided up in five categories based on the work descriptions that the entrants had submitted. One work that did not meet the criteria for ubimedia and that was closer to traditional art was placed in the ‘other’ category.

In establishing the contest categories, six themes were used to divide the entries into categories.

The following theme categories were created:

- shared view (36,2 %, n 17)
- media & art (23,4 %, n 11)
- games (12,8 %, n 6)
- monitoring spaces (12,8 %, n 6)
- technical improvements (12,8 %, n 6)
- other (2,1 %, n 1)



Picture 6.
Division of works
into categories by the
number of works in
each category.

Shared view

Ubimedia facilitates the sharing of contents that already exist or that a user or an application creates in a specified space. A view may be, for example, a public display, the contents of which a user adds to or modifies to his or her personal choice.

Of all the works in the MindTrek contest, 17 were placed in the Shared view category, by means of determining the degree of emphasis of each work set on view.

Typically, ubimedia is a shared view in public space, where a user displays his or her contents to others in the same space. The sharing of media contents may take place in festivals, pubs and discos, such as the **VieWALL Be in motion** service (<http://www.viewallonline.net/viewall.html>) by a group of Portuguese students.

Even the transfer of contents onto a shared display can be done in a ubiquitous fashion. **Jürgen Scheible** from the University of Art and Design Helsinki encourages us to try **MobiToss** (www.mobitoss.com) in order to learn how to transfer pictures onto a shared display by a tossing gesture of your mobile phone.

The Ubimedia contest works show that a display may be much more than the computer screen, the urban digital billboard or the tiny screen of a mobile device. The ubimedia cabbage garden serves as a prime example:

a plant, not an industrial design product, is the display, and the user's actions, the ubimedia application and the natural reacting of living organisms to changes in pH all affect the actual view.

Household equipment with ubimedia integrated in it may also function as a display.

Smart fridge poetry magnets (www.digitalstar.net/projects/smartpoetrymagnets), for example, learn without the user needing to feed

them information, as they recognise the magnets adjacent to them and the lexica installed in the adjacent magnets. As a result, they are able to create abstract poetry. The user can influence the choice of words by pressing a button on the magnet and by selecting the spot on the fridge door where to attach the magnet. The Swedish Future Applications Lab has been involved in the development of fridge magnet poetry.

Taken to an extreme, instead of being visual, a view may also be emotion-based.

Huggy Pajama (http://www.mixedrealitylab.org/index.php?option=com_content&task=view&id=400&Itemid=36) is a remotely controlled wearable hugging system, which was launched for parents who are in remote communication with their children to be able to actually hug each other. The system features a device with a hugging interface and a wearable hug reproducing jacket, which simulates the physical sensation of being hugged.

The hugging device is a small, mobile doll with embedded pressure sensing circuit that is able to detect varying levels of human force.

The device sends hug signals to the jacket, and the jacket activates air pockets, which simulates the feeling of being hugged to the wearer.

The Huggy Pajama jacket produces warmth that accompanies the colour changing display to indicate the distance of separation between the end users and the smileys linked to the hugs.

"One of the greatest challenges is to make it possible to experience technology in a non-technological way. I was very enthused about the Ubimedia project "Huggy Pajama", a hugging communication system by Mixed Reality Lab. It was a great example of how to make technology human," says Robert J. Wierzbicki, a member of the jury of the Ubimedia contest.

Applications that locate their users and pinpoint the contents that the users share on a map of an online service represent the more traditional ubimedia display, demonstrates **Stuart Gleave** from Brunel University, London. Similar Google Maps applications are plentiful. On the other hand, the concept of ubimedia being a relatively recent one, it is hard to say whether these applications are the initial stage of ubimedia or, rather, merely a collection of advanced social media.

David Troy, for example, has launched a number of mashup map applications, in which he combines contents from various other services.

Twittervision (<http://twittervision.com/>) displays microbloggers' messages placed on a world map. Flickrvision (<http://flickrvision.com/>) is a similar service for public photographs for which location information is available, published on Flickr.

New York's Museum of Modern Art (MoMA) introduced Troy's mashup services into the Design and The Elastic Mind art exhibition in 2008.

More often than not, applications of this type are categorised as social media mashups, not ubimedia, in spite of the fact that, in them, two services are fused into a single one.

Because ubimedia is all about digital contents, the concept of time can be rethought. Services may share experiences connected to a single location that are simultaneously lived in the real world but that, in ubimedia, can be shared at different times.

Media and art

The Media and art category featured those Ubimedia 2008 contest entries in which the service in some clear way resembles traditional media or whose main focus is on the artistic experience. The works

in this category included, for example, the first-ever German mobile TV (www.daserstedeutschemobil.tv) to broadcast a collection of live video streams.

As regards media services, the majority of the works had their emphasis on facilitating content sharing. In art, more innovative experimentalism could be found.

In **MobiSpray** (<http://mobispray.com/>), for example, users can paint light-based art by using their mobile phones as spray cans wherever and whenever they want.

In this mobile spraying, the movement of the artist's hand instantly creates a virtual streak of paint, and you can use a keyboard to change the colour and colour intensity.

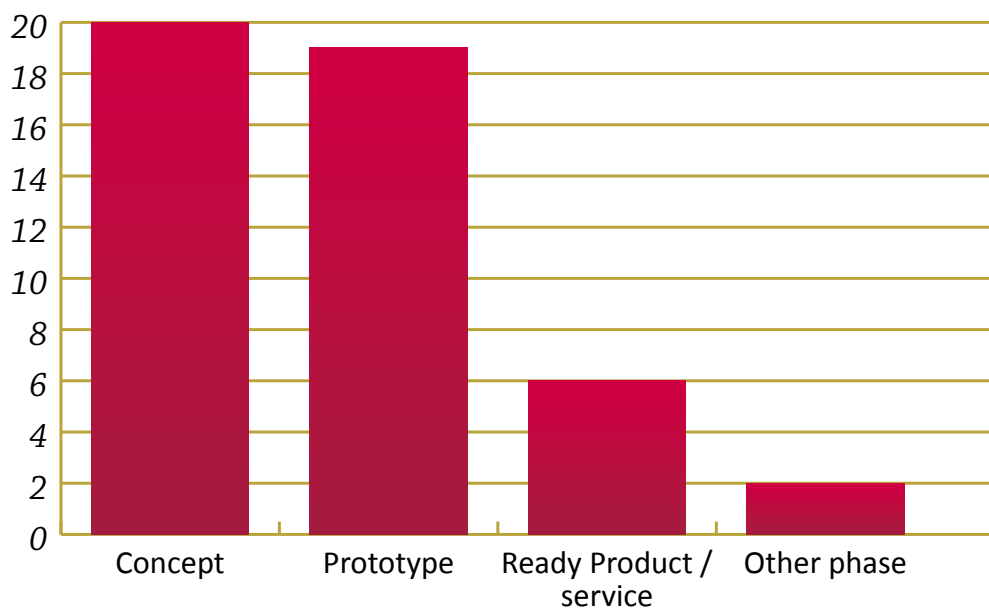
The service, which was designed by Jürgen Scheible from the University of Art and Design Helsinki, received a MindTrek honorary mention.

In the MindTrek contest, very few applications of ubimedia to education and learning were seen.

CampusMates of the Media and art category was the entry closest to a service of this type. CampusMates is a mobile service based on social networks. A student who needs help from other students can use CampusMates to find those persons with the appropriate skills and knowledge on a desired subject and who are located close by to help.

The developers of CampusMates say that the service utilises location and 'what is currently being done' as context information. On top of this, keywords that are typical of social media can be used in the service in order to make learning easier.

You can restrict a search to people who are near you or search by keying in a person's name. The request for help can be sent, for example, via a text message, in which the recipient may personally decide whether to accept the request or not.



Picture 7.
A majority of the contest works were still in the concept or prototype phase.

Games

In the Games category, **MotiVision Virtual Air Hockey** (www.youtube.com/MotiVision) swept the board with its equipment-free gaming; players play the game by moving their hands. This ubigame was developed by Motivision, CSE and ECE together with the Hong Kong University of Science and Technology.

Experts in the field should engage in a more profound discussion on whether games can be classified as ubiquitous media at all and whether they should be called ubigames instead.

Moreover, it should be noted that in game research the term used is pervasive game not ubigame.

"A global trend in digital game development today is that games are becoming more and more distanced from computers and that media reality and virtual realities are combined with the physical reality and the everyday," says Frans Mäyrä, Professor in the Department of Information Studies and Interactive Media at the University of Tampere, Finland.

In the MindTrek Ubimedia contest, the number of entries in the games category (n 6, 12.8%) roughly equalled that of those entries whose main theme was location, monitoring or technical development.

Monitoring spaces

Modern monitoring and surveillance solutions are faced with all the challenges that contemporary operating environments pose.

The area under monitoring may be very large in size and full of action, for example. Some activities can be predicted, others may be surprising, and the duration or the consequences of the actions are in continuous change.

To meet these requirements, well planned and functioning technology to monitor actions in real-time, rain or shine, in spaces where the lighting conditions vary from bright to dark are all needed. Development in this field is curbed by the fact that manufacturers use a wide range of sensors with non-standardised features. In the absence of standards that manufacturers could rely on, developers must brace themselves for compatibility issues. (Remagnino et al 2007).

In the works selected for the Monitoring spaces category (n 6, 12.8%), monitoring and connecting ubimedia with space, whether a room, building or city environment, were emphasised.

Among the works participating in the 2008 Ubimedia contest, there were no solutions that would actually have helped people avoid monitoring and positioning; the concentration was heavily placed on collecting detailed information on people and their movements. A Madeira-based service, for example, tracks when people get on and off the bus and another, **SmartSpace** (<http://userwww.sfsu.edu/~swilson/art/smart/smart-space.htm>), uses RFID to monitor who are in a given space at any one time. SmartSpace, designed by **Stephen Wilson**, is intelligently programmed to load contents on a display based on the preferences of the people entering the space. If more than one person inhabits the space, a collage of images will be created on the display.

Wilson claims that SmartSpace provokes and shakes up the people who enter the space, unlike

more conventional ubiquitous technologies, which alter lighting, music or temperature using information on those present in the space. SmartSpace was first introduced in San Francisco in September 2008.

Adapting media as effectively as possible to each individual user's liking and environment, which is the case with services such as SmartSpace, in turn renders ubimedia pleasant and satisfying. On the other hand, control, surveillance and, ultimately, the loss of privacy are common themes in ubimedia.

Professor **Stephen Graham** (2008) claims that militarism and consumerism might be real threats for ubimedia, while reminding that the monitoring and hegemony of safety are not evils as such, at least not before they reach the level of witch hunts or exaggerated fear, when monitoring is no longer a tool but rather warfare.

Fortunately, ubiquitous technology enables the growth of a new type of civic activism.

"There is no reason to avoid discussing important subjects and say hey, this is too scary. After all, this is an immense opportunity for artists and others," Graham has noted.

Technical improvements

The Technical improvements category contains those contest works (n 6, 12.8%), which foregrounded the technological side of ubimedia or were generic platforms without any actual content.

For example, users can use the **ElectricalHand** software, developed in China, to administrate the contents in a Nokia N95 mobile phone by simply shaking the phone. The Italian **Domotic OSGi Gateway** solution (<http://domoticdog.sourceforge.net>), for its part, automates the home.

Generally speaking, ubimedia technology appears to develop in one-off projects that have not yet been brought to the commercial market—they are more about experimentation and the subsequent results. This was very common for the MindTrek Ubimedia contest works, most of which were still only concepts or prototypes.

Either finalised products have not yet entered the market or none were submitted to the MindTrek contest. For sponsors and developers especially, this is a key finding.

What should be done in order for more ubimedia services to become products in active use after the one-off projects have ended? How can one make ubimedia into a profitable business?

Profit models

Most often, ubimedia services are considered premium services that yield extra profit. When ubimedia technology will take its place alongside other standardised means of communication, there will no longer be any legitimate reason for charging high extra costs for it.

“Certain services will be part of the basic communication infrastructure like telephone and DSL are right now, thus not generating extra cash but assuring that your communication services will be chosen by users at all. The overall economic boost of population-wide access to ubimedia services might well exceed individual companies’ profits with proprietary services for some premium users.

This is where politics come in - and just as they plan public transport and motorways, they should consider how to give incentives for the deployment of ubimedia services that do not give immediate individual return of investment,” says Björn Stockleben, a member of the Ubimedia jury.

Most of the works in the Ubimedia contest have not developed a model for making profit at all.

Furthermore, the models that were proposed are not very advanced but only appear to be exploring new opportunities to make profit.

None of the people who participated in the contest have secured clients for their products or services as of yet.

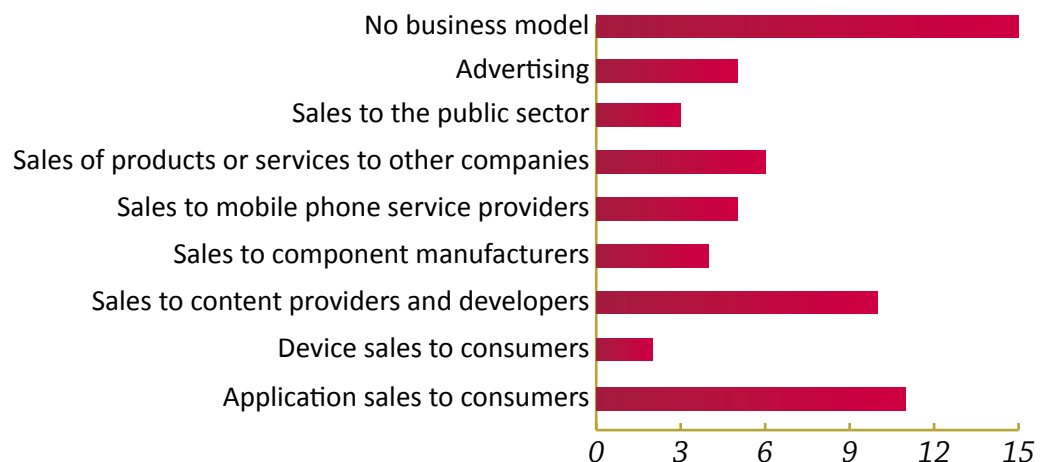
The most popular profit model is the sales of applications to consumers. These applications were distributed and charged for online or via the mobile phone network.

Another major source of income is the sales to application developers and content providers. Primarily, this is about innovations that will function as a component of something larger: they would not work alone but are rather functional when a part of a larger application. For example, content providers are offered devices and applications, for which they create content that is subject to a charge and, then, pay a certain commission on the material distributed.

Some developers list several profit models for their work, in which income from advertising is often listed as number two among these.

A common reason for the lack of profit models may be the fact that most of the works are still at their concept or prototype stage, and this may be why well thought out profit models had not been tested in practice or devised at all.

Picture 8.
Business models of the
contest works



Prospects

When asked to compile a short elevator pitch to sell their idea, a majority of the MindTrek Ubimedia contestants pinned their faith on terms such as mobile media, information, system and art.

The use of words such as innovative and new in describing their works comes as no surprise, but it is interesting to note that natural, human, social and real were the most common adjectives, all emphasising humanity instead of the words most frequently used in the context of technology. Most of all, ubimedia is urban.

However, can ubimedia not be associated with anything else but the urban cityscape? If judging by the works submitted, it cannot.

"Efficiency should not be the focal point in developing ubimedia and ubiquitous environments. There are so much more (humane) goals that ubimedia should embrace, like joy, engagement, pleasure, well-being and so on," says ubimedia game developer Remco Magielse from Eindhoven University of Technology.

Along with communication, the question of a paradigm featured prominently in the contest works. The

linking of technologies to networks demands a specific mindset, something that must be understood before services can be developed.

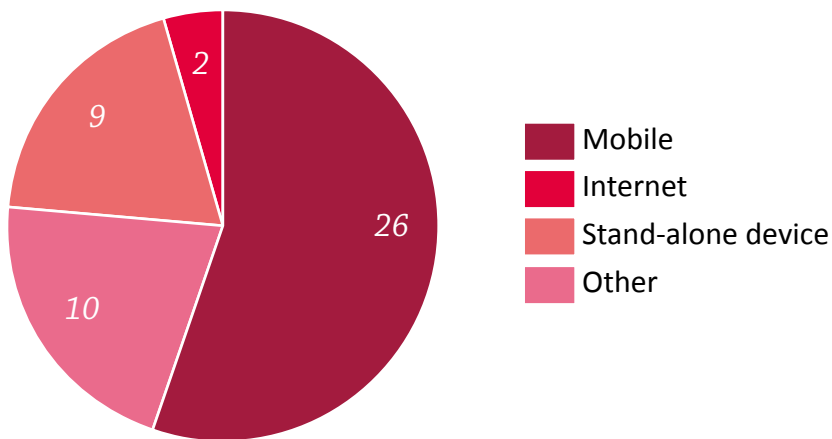
Moreover, the change will be social in nature. The way people take ubimedia as a part of their lives is not necessarily obvious—will they welcome ubimedia at all, even if technology and services make this possible?

"Computational power will increase, while physical properties, such as size, will decrease in the coming years, making it possible to access content everywhere, anywhere. The greatest challenge will be how to make a natural transition to such a society," comments Remco Magielse.

The mobile communication channel is clearly the most crucial one, in which the phone is also mentioned a number of times.

However, the competitors might have underlined the mobile features also because a global mobile device manufacturer's name was mentioned in the MindTrek Ubimedia contest's name.

The ubimedia displays link to environments with also devices developed specifically for ubimedia.



Picture 9.
The mobile was the most commonly used publication channel of the contest works, followed by the Internet.

These devices, sometimes also the displays, too, can still be in the prototype phase when introduced to the users.

As displays are the integral part of ubimedia concepts, it is worth to notice that the display should be more like 'a lens' than 'a channel' to support the pervasive experience.

"Ubimedia services that are designed for small displays capture too much attention. We should develop more unobtrusive interfaces in order to make reality and virtuality one continuous experience, maybe more in the direction of augmented reality. In the long run, I do not want services to force me to decide whether I pay attention to my mobile phone or my friends around me," says Björn Stockleben, chair of the Ubimedia jury.

In ubimedia, location is first and foremost public, not private. Interaction, emotion, narration and fiction are the foundations on which content is created. As regards time, a moment would appear to be more central than a day or time in general.

Rather surprisingly perhaps, image outdoes video. Why this is so should be studied. Is video secondary because suitable mobile devices with advanced enough video capturing properties are not in wide use? Do ubimedia developers shun video in their projects or is video transmission from a personal device to somebody else's screen still too

cumbersome, slow and expensive?

In the developers' elevator pitches, various technologies play a major role. Ubimedia is delivered as installed applications and systems. Notwithstanding the fact that most projects are experimental, the creators refer to them as services and products. Bluetooth was the dominating open standard.

According to the contest entry pitches, ubimedia brings about certain changes, and it exists in the domains of experience, life and living.

In the material studied, control and tolerance seem to feature in roughly the same proportion. Perhaps they were not considered an especially attractive subject to discuss with a prospective sponsor. It may also be the case that developers see control, liberties and the setting of boundaries as themes that are not fundamental to ubimedia, interesting enough for some other reason or too complex to explicate in a short introduction of a hundred words only.

The space reserved for the elevator pitch was indeed rather limited.

No doubt in the hope of winning a prize, the language of the work descriptions is intentionally positive. The reader should remember this when going through the Ubimedia 2008 word cloud or the conclusions as set forth in this report.

The conclusions primarily apply to the contest works in the MindTrek Nokia Ubimedia Awards category, and they cannot be generalised extensively to ubimedia in general.

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