Opening Information Technology to Senior Populations

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Needs

Since the development of the Internet, we have recognized and made great strides toward bridging technological divides and closing the information gap between so-called have and have-not nations. As countries become involved in the growing global economy, modern information technologies are being deployed at a breath-taking pace in what just yesterday we called "third world" nations. And with the One Laptop Per Child initiative, we are at the brink of a truly historic moment in information technology and access.

However, bridging technological divides does not automatically translate into understanding or better access to unbiased information. In reality, each new technology that we implement creates a new divide. Quietly, there is a rapidly growing gap—not between nations and cultures, rich and poor, but within our own homogeneous communities. It is the gap between the young and the old. Middle aged and elderly people (senior citizens) in developed countries are being marginalized by the young drivers of information technology. With every new technology that the older generations are not able to grasp, their isolation increases.

Reasons behind the current digital divide between generations

Despite the pervasiveness of the Internet in workplaces, schools and some households in the modern, developed world, the potential of the Internet and information technologies is not being realized in many population groups. Of them, one group that requires a very specific approach is the population of senior citizens, roughly 55 years and older. This population may significantly benefit and improve its quality of life from effectively using services that the Internet and basic information technologies can provide for them.

Today's senior citizens, of course, did not grow up with computers and many never experienced computers in their work environments before they retired. Some may just have decided to ignore them, saying that "it's too late." What began with a simple lack of exposure and was exacerbated by ignoring or postponing learning about new technologies, has resulted in a significant gap that continues to broaden. Along with the rising need to access information and to communicate through the networks, seniors find it more and more difficult to jump on the fast paced train. Contemporary electronic devices, operating systems and applications—as well as websites and cyberspace in general—do little

to accommodate the special needs of older generations. They are not designed with seniors in mind.

The growing complexity and diversity of user interfaces, displays with higher DPI and tiny typefaces, undersized input interfaces (such as keypads on cell phones) are just a few of the design issues. Information overload, including exponentially growing numbers of advertising, spam (90% of e-mail traffic is believed to be a spam as of today, SME 2006), phishing threats and resulting identity thefts confuse and frighten seniors as potential learners. They become hesitant to use computers, because they feel they are "too complicated" and they "don't understand them." Even after taking special courses seniors struggle with basic tasks.

Understandably, many older people are reluctant or simply unable to adjust to fast paced technological change, and overcomplicated and unpredictable computer environments. In order for them succeed in adopting computers and start benefiting from unprecedented access to information and services, they must be provided with a simplified, unified, task oriented interface and applications specific to their needs and adjusted to their abilities.

Limited access to information for senior population

Today, still more and more information is exchanged electronically and growing portion if communication happens digitally through the Internet – but most of the senior population is left out of this networked world. That however does not mean computer illiterate seniors are not interested or would not benefit from having access to these information sources.

Recent statistics show that more than 33 percent of the population of the European Union has no basic computer skills; however, 65 percent of people aged 55-74 years do not have basic computer skills (Eurostat 2006a). Ability to master basic computer skills (such as using a mouse to launch a program) is related more to age than to level of education or employment status, although both of these indicators are also significant (39 percent of computer illiterate are unemployed). The fact that more than one third of the general population and nearly two-thirds of the senior population is deprived from the opportunity to actively seek and use information provided by the Internet clearly identifies a serious digital divide inside the developed states of European Union (EU).

Vanishing social interaction between generations

Young and economically active people have discovered and adopted new ways of communication. Cell phones, text messaging and instant messaging, along with upcoming video conferencing, VOIP and various chat adaptations have become main ways of synchronous communication. E-mail, newsgroups, blogs and social networks have replaced and greatly enhanced other asynchronous communication channels. Most of these, if not all, are not available to people without basic and

medium computer skills; that is, most of the senior population of the EU.

In the study "Usable Computers for the Elderly: Applying Coaching Experiences," Kantner & Rosenbaum (2003) observe, that "e-mail and children were primary reasons" why their senior subjects started to learn using computers. "In many cases, seniors bought their computer because they wanted to communicate with their peers and children and saw email as a faster, cost-effective way to do so—they were 'missing something' without it. In many cases, children purchased a computer for the parent because 'it's time to learn' or they wanted e-mail contact with the parent."

Seniors who cannot communicate with their children and younger friends through the young peoples' channels of choice feel they are being left out and they indeed are. It is in the area of social interaction that the digital divide between generations is most visible and also most bitterly felt by seniors. Mastering new ways of communication will not only help seniors maintain or re-establish contact with their offspring, but also might increase and enrich communication and collaboration among their peers.

E-learning in life-long learning

Life-long learning represents an important feature of every modern society in the developed world. Continuous education and life-long learning help keep senior citizens active and happy by providing intellectual stimulation and social interactions.. Access to the Internet and e-learning could greatly enhance the life-long learning experience with more information resources, new opportunities for interaction between classes, and also by intensifying collaboration and peer-to-peer aspects of life-long learning. To open and fully explore these new ways of acquiring and sharing knowledge for older generations, we must provide seniors with a pleasant supportive computer experience that reflects their specific needs and has a very short learning curve.

Another benefit of incorporating e-learning and peer-to-peer education in life-long learning would be to enable providing education to more students at a time, cutting waiting lists (waiting lists of several years duration are not uncommon for life-long learning institutions around the world).

Rapid development of e-government in the European Union to benefit senior population

The deployment of e-government services in the EU is very uneven, but a general indicator of the availability of twenty basic services online jumped from 41 percent in 2004 to 50 percent in 2006. Some states, like Estonia, accomplished to have 80 percent of government services online. Austria's e-government skyrocketed from 20 percent in 2002 to 83 percent in 2006 (Eurostat 2006b). Driving rapid development are lower costs, higher convenience, greater flexibility and control.

Application of e-government brings mutual advantages for a state as well as its citizens. However, if a significant senior citizen population cannot and likely would never be able to access e-government services, investment into new infrastructure is not effective government spending. On the side of users, many seniors could benefit from e-government applications that would save them unnecessary trips and waiting lines in offices to obtain services.

The specific problem of e-government and seniors is a striking issue that requires changes on both sides. Not only do we need to bring seniors to computers, but we also must assure that e-government portals and applications are accessible and comprehensible for this population group.

Digital divide between generations: not addressed, long lasting and a re-emerging problem

We cannot simply resign ourselves and count on the assumption that the current senior generations, will die off eventually and the now-present gap will disappear. Based on the current age structure, level of education and computer skills of the populations in the EU (Eurostat 2006a) and United States (U.S. Census Bureau 2006a,b), the digital divide between generations will remain significant for the next twenty to thirty years. And, within that time, the problem will start repeating itself in the economies and cultures that are just being exposed to information technologies or will be in the future.

Target Groups

The proposed project is aimed at seniors with absent or dissatisfying previous computer experience, who live in developed countries that have adopted modern information technologies, in which Internet access is widely and affordably available. However, any country in which the digital divide between younger and older generations is significant is suitable for the deployment of the project.

The level of computer literacy is related to age and attained education level. For example, in the European Union, 65 percent of people 55 to 74 years of age have no basic computer skills (Eurostat 2006a), despite the fact that the number of households connected to the Internet has grown from 54 percent in 2004 to 62 percent in 2006 (Eurostat 2006c). In United States, there are over 45 million people (70 percent of people 55 years old or over) with no college or some college. Together with the unemployed, this senior user group has the highest rate of people with no basic computer skills.

The user environment proposed in this project differs significantly from the user interfaces in prevalent operating systems as we know them today. The aim is to provide a device, interface and services for retired senior populations who have no basic computer skills, to bridge the growing digital divide between them and the rest of society; to enable them to use modern communication channels,

life-long learning, e-government, etc.

The interface is not designed as a learning tool for people who need to acquire standard computer skills in order to start a new career where these skills are required. It might, however, be helpful in means of introducing the Internet and its basic services to any computer illiterate person.

Project Goals

The project aims to bridge the digital divide between senior population with no basic computer skills and the rest of the society. A key goal is to address specific issues and barriers senior populations face when they are trying to learn how to use computers and Internet services. The focus of the goal is to identify gaps invoked by the digital divide between generations and to bridge them by adapting the technology instead of people. Strategy is to provide seniors with one integrated solution: hardware, operating system, applications, online services and support.

In other words, instead of trying to teach senior citizens how to "simply use computers" and the Internet, the goal of this project is to make computers and e-services "simple to use" for seniors. To achieve this, the project must cover all aspects of the computer experience and respect the capabilities and ways in which the elder population acquires new knowledge.

Project goals can be structured as it is shown in the Tab 1.

Tab. 1. Structure of the project goals.

1.	Research and identify major issues created by the digital divide between young and old, gain and pre-test knowledge about the barriers preventing seniors from using computers.		
2.	a.) Prototype and test maintenance-free computer device and interfaces specifically targeting the needs of senior population and aging-related disabilities.	b.) Adapt operating system and develop simple, unified task oriented user interface and applications so there will be short and easy learning curve for the seniors so they quickly can obtain what they need from computer..	c.) Integrate Internet services targeting specific issues of the digital divide (such as e-mail, instant messaging, voice-over-ip), online support and maintenance tools (automatic updates, backup and permanent online storage).
3.	a.) Implement interface that would allow approved third party providers to incorporate their specific services and	b.) Improve guidelines and support their adaptation in e-government and other portals so that they will be understood and	

solutions for seniors (e.g. health care providers, life-long learning institutions, e-government applications, etc.).	beneficial for the seniors.

Activities and Methodology

Identifying barriers in user interfaces and determining ways to cross them

Attempts to train late adopters in using computer technology are not new; however, in the past most of them were focused on improving teaching techniques. Observations from such training are useful for understanding the problems seniors face as they try to learn computer skills, as well as for hints about overcoming these barriers. One of the first general observations was that trying to bring senior population towards the information technologies, computers and the Internet is extremely difficult. Strong commitment from both sides, as well as motivation and enthusiasm, are essential. An important observation is that peer education compared with other ways provides surprisingly good results (Redding et al., 1998). This can be confirmed by many later-life educational institutions, as well as my own experiences from the E-learning in Later Life project, and it only strengthens the need to open online social interactions not only between young family members and their retired parents, but also between seniors themselves.

Understanding seniors' perception of computers and the Internet is extremely important, especially when designing a new dedicated environment for them. A good insight is provided from the study conducted by Kanter & Rosenbaum, 2003. Based on the core usability issues identified in the previous studies and their explanation we can suggest the way how a new system can help to cross barriers and provide easy to learn but sufficient solution, as shown in Tab 2.

Tab 2. Understanding most prevailing usability issues and seniors' perception of the problem / determining the way to bridge the barrier.

Activity/Problem	**Description / *Bridge***
Using operating system and applications	
too much information, too many ways	Information overload is the first thing that strikes senior users. Same task can by accomplished by multiple ways (using main menu, toolbar, contextual menu or keyboard shortcut) and there are multiple applications doing the same thing (Word / WritePad etc.). *Seniors would prefer having only one way of doing the same task, but that way should be persistent across the system and all its*

applications.

strange vocabulary

Most of the vocabulary used within applications for interaction with users is completely foreign for late adopters. Having no idea what most of the dialogs are trying to convey, nor why they appeared, makes it very difficult to make decisions. Adding "Are you sure?" at the end of the dialog brings users to a halt.

Also, the vocabulary used makes seniors feel the alien world of computers is hostile to them. They are also unable to make simple substitutions (looking for "any key" problem, Enter vs. Return, Ctrl vs. Control, etc.) and have difficulties following keystroke combinations (Ctrl+Alt+Del).

Wording must be changed, task oriented, simple, explaining not only actions but also consequences. Computer jargon must be introduced gradually and only to the extent of being able to communicate with outside world.

unfamiliar pictograms

Icons and abbreviations bear no meaning for seniors; they are unaware of any conventions and reasons behind them. Small, colourful squares and rounds are also hard to tell apart for visually impaired persons.

System must be de-iconized and emphasis put on using simple full text instead of abbreviations.

working with files and folders

It is very difficult for seniors to create a mental picture of how data stored and organized; they also are unable distinguish the different types of memory—RAM and hard disk are the same to them. Folder structure of an operating system is beyond understanding of seniors; looking for a misplaced file is a task they cannot accomplish without assistance.

Seniors feel most comfortable when they see their files on the desktop, which for them is more a file storage place than an application launcher. Given the fact that they often work with only a small number of files, desktop can be used as a "My Documents"

folder with only one level of subfolders that can store more files of the same kind. Sub-sub folders are very hard to understand by seniors and make navigation extremely difficult.

Backing up files is a separate issue. The system must provide a backup solution that works without any user interaction, stores documents on a remote location and offers action only when it is necessary.

too many options

Seniors usually have a clear idea of what they want to do and they expect to see a clear and easy way of how to accomplish it. Having 40 icons and 15 menu items displayed at the same time, with additional 100 in submenus and sub-submenus, is not necessary.

Neither auto hiding nor contextual menus represent solution to this problem. Seniors have only limited abilities to understand context of computer tasks. Dynamic menus reflecting user behaviour like the list of frequently used application in the start menu of Windows XP represent an ultimate barrier; if an item disappears from it, seniors do not know where to look for it.

The solution is to determine an application set and options that are absolutely necessary to accomplish set goals in accordance with the global aims of helping to bridge the digital divide—and to remove everything else.

using different versions of OS/program

The way seniors learn to perform a certain task is to write down and follow step-by-step instructions to accomplish it. Often they record individual keystrokes required to navigate to certain place (e.g. “arrow down, arrow down, arrow down, enter”). If during the process they experience the slightest change from these cues, they cannot proceed without help. Different versions of the same program or operating system, however, always contain slight changes, requiring users to constantly update their “cheat sheets” and re-learn what they thought they already knew. This is a major source of frustration. Seniors are uncomfortable nagging their advisor (often a close family member) with the same problem over and over; they

prefer to abandon the task.

Seniors must be provided with unified, rock solid interface that does not change over time and short, easy ways to accomplish their simple tasks. In contrast with other users, seniors do not appreciate frequent updates.

multiple windows environment

Although seniors understand they can cook, iron and watch TV at the same time, these activities occur in separate environments. However, computer applications share a single screen. It is difficult for seniors to focus on more than one application window at a time, switch between applications, and understand the difference between closing the application window and it application itself (the difference between "Close" and "Quit").

Seniors tend to use only one application at a time and the user interface must not interfere with this approach, although it should retain its multitasking ability. Multiple windows of the same application should be avoided and programs should operate maximized by default. User's abilities to chase windows around desktop are limited; in contrast, they appreciate less distraction by having only one window visible.

unexpected automatic actions

Seniors appreciate the command / action model of computer. Unless completely unnoticed, automatic actions make them feel stressed and put them out of concept. In the eyes of seniors, even simple things—like automatic formatting of bulleted text in a text processor—are distracting and unpredictable; sometimes they happen, sometimes they don't and users are unable to determine the action that preceded them.

Automatic actions like auto-format, auto-correction, pop-ups, should be disabled on the system for seniors.

Interacting with computer

screen/vision

As human eyesight deteriorates with the age so senior users have trouble reading small type or distinguishing icons on the screen. While scaling up a well designed webpage is easy, scaling icons and

textboxes is not.

Senior users need large screens and low resolutions in order to work comfortably with standard sized characters. However, as their sight defects vary, any part of the system should be fully scalable. Unfortunately, none of the current operating systems offer this feature seamlessly; however, it is expected in the upcoming version of the Mac OS X 10.5.

In order to avoid information clutter on the screen, regardless of its size, the amount of displayed graphics should not exceed the amount that would fit on 1024x768 pixels screen. CRT screen should be a monitor of choice for seniors since they can scale up resolution better than LCDs, offer brighter image, higher durability, and are cheaper and easier to get. As an ideal we can consider 17" or 19" screen with the resolution set to 1024x768.

keyboard/typing

Since most of the interaction between user and computer happens through the keyboard, ability to use it is an essential skill. However, that does not mean we cannot make the task easier for older populations. Senior users have trouble understanding keys with multiple functions (F-keys) or abbreviated names (PrtScr, Ctrl, Esc…), pressing keyboard combinations (Ctrl+Alt+Del, Ctrl+Shift+S) and keys altering the layout of the keyboard (such as Num Lock).

The best way to make the keyboarding task easier is to make it similar to using typewriter (with which some seniors might be familiar) and removing all unnecessary keys from the layout. Designing a dedicated interface would allow us to remove function keys (all F-keys, Print Screen, Scroll Lock, Pause/Break), alter the meaning of others (Insert) or add new (Help, Copy, Close). Control key is unnecessary because keyboard shortcuts should not be supported; seniors tend not to use them and, if pressed inadvertantly, shortcuts invoke unexpected actions.

mouse

Late adopters have serious problems, in general, understanding

different ways of using the mouse. Seniors are unable to determine when it is appropriate to use single- and when double-click, remember when it is necessary to use right-click to achieve the desired action. Many have difficulty performing the double click at all. This is an issue whether or not the individual also has fine-motor problems caused by degenerative age-related disease.

User interface for seniors should be adapted to a one-button mouse or trackball without the support for double-click. Scrolling wheel feature is proved useful for seniors, but it must be stripped of the middle-button functionality as it is often pressed accidentally.

freezing, crashes

Because of cost, seniors often inherit computers from family members as the younger people upgrade to new machines. This is a contributing factor to the frustration seniors experience with computers, because they are attempting to learn and do tasks on underperforming vintage machines keen on freezing and crashing.

Devices given to seniors must provide them with stable and seamless experience. "Paper notebook" does not crash nor lose your unsaved notes. Since a pre-determined set of applications and services is required to meet seniors' needs and accomplish tasks, a dedicated system-on-a-chip chip can be cost effective and long lasting solution.

Using Internet

understanding the concept

Senior users usually have problems understanding what Internet is. They do not distinguish between "web browser", "web page", "Internet service provider", "dsl provider", etc. For them, everything is online is Internet.

Instead of trying to break this concept, take advantage of it. If a single body represents device (computer), application (browser), connectivity (dsl/cable service), data (ISP) and part of the content (dedicated websites) everything becomes "Internet." Troubleshooting "problem with the Internet" becomes easier if you control all parts of the chain and this is also why delivering an integrated solution is so important.

browser navigation

While navigating the web, senior users rely heavily on the functionality of Back and Forward buttons. They prefer single-window experience.

Web browser should be set to enforce opening pages within the same window and block pop-ups. If for any reason a new window is open (e.g. user clicked on a link to a PDF file that is being displayed in a preview application), user should be notified what has happened and how to get back to the previous state.

website navigation

Seniors feel lost on complex portals with many sections and links. This unfortunately describes many e-government websites, which do not provide clear navigation concepts and task oriented classification of content.

The solution is to improve the design of the websites. The behaviour of later adopters on the Internet is similar to the behaviour that Jacob Nielsen described as lower literacy users. According to him, 40 percent of all users fall into this category. In his reports Nielsen identifies common usability problems that lower literacy users face (Nielsen 2006a,b).

evaluation of content

Seniors have trouble evaluating web content; distinguishing advertising from real information, processing search results, determining credibility and avoiding web forgery.

Modern browsers fortunately detect fraudulent websites and inform users about the danger, but the above mentioned problems will not disappear easily. These and other issues can be addressed gradually by utilizing the concept of online peer support, where multiple users help each other with the task of evaluating content, formulating appropriate search terms and processing results.

connection problems

Web site errors, dropped connections, and especially long lags and timeouts confuse senior users.

Application dealing with the Internet connection should keep user visually informed about the ongoing process as well as provide steps back.

Concept of an integrated product

Project builds on solution that integrates all aspects necessary to bridge the digital divide and integrate older generation into the information society. It aims to provide seniors without basic computer skills with a simplified, understandable and safe environment that will enable them to accomplish basic tasks and provide them information and services in a way they are able to use and benefit from. By integrating hardware, software and services we can provide users with unified, controllable experience designed in accordance with the needs and capabilities of the target group (Fig 1.). Today, this approach is being successfully used in extremely popular commercial applications such as Apple's iPod + iTunes + iTunes Store (device + software + content) combination.

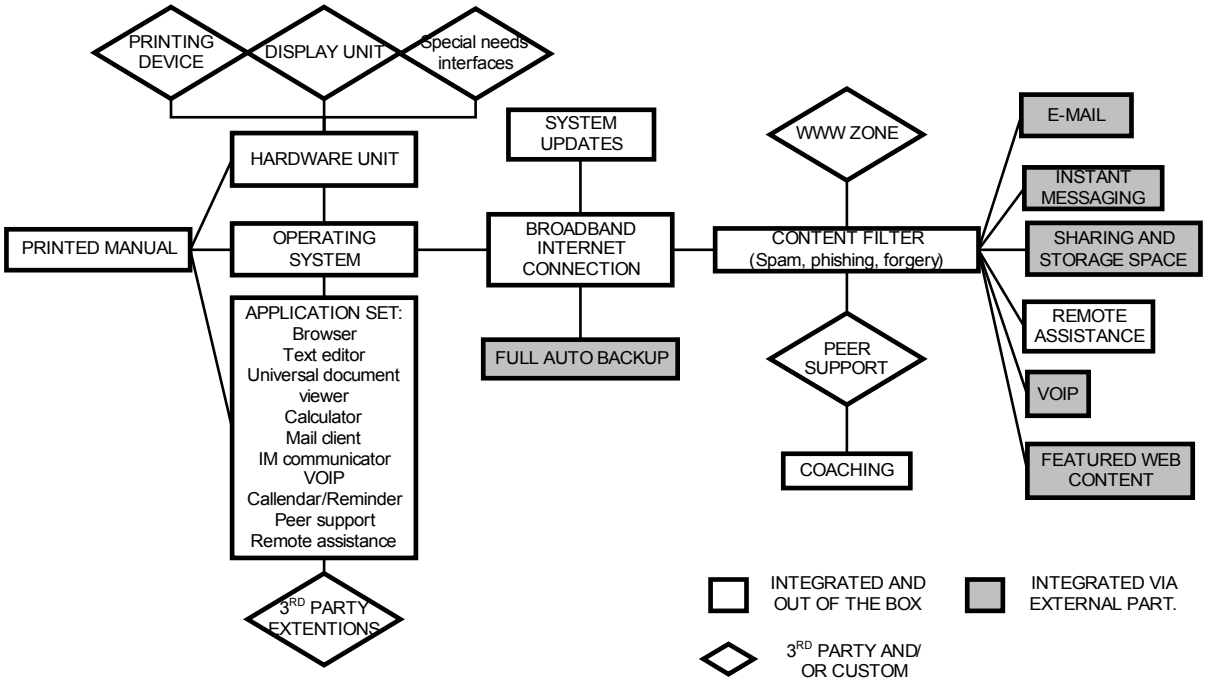

Fig 1. Model of an integrated solution of bridging the digital divide adapted for senior users.

Specific to the proposed model is instant-on always-online approach. Thanks to the low power system-on-a-chip platform and broadband connection, system can be running in the background and perform tasks where user interaction is not required—in this case, regular backup to online storage space and software and content updates. The aim is to achieve a maintenance-free device with self-repairing capabilities in case a problem does occur.

Hardware unit

Hardware unit is meant to be designed as system-on-a-chip solution (SoC) similar to the One Laptop per Child initiative (OPLC 2006a). There are, however, some differences: portability is not

desired, cost is a bit less of an issue, and we are aiming for a solution with longer life-span. Therefore slightly higher power chip is proposed along with more memory and permanent storage. Also, the display unit is external to allow adaptation to the various needs of the user (e.g. different level of visual impairment).

- CPU: AMD Geode™ NX (see AMD 2006 for references)
- Clock speed: 1250 MHz
- Power consumption: 6W
- Compatibility: X86/X87-compatible
- DRAM memory: 128/256 MiB dynamic RAM
- BIOS: 1024KB SPI-interface flash ROM; LinuxBIOS open-source BIOS; Open Firmware bootloader
- Mass storage: 1 GB flash storage with automatic full online backup
- Integrated custom keyboard (see Tab 2.)
- Integrated speaker and microphone for VOIP
- No rotating media
- Ethernet card
- USB interface for eventual printer or input devices for users with special needs (e.g. shake reducing mouse etc.)

To eliminate chances of hardware failure, the device does not support rotating optical or magnetic media. The idea is to store, share and move information online through the network. Since everything is regularly backed up and tied to a user account, the system can be updated or replaced without any data loss or even other action from the user side other than to log in. Also, the need for user to understand file storing principles is eliminated.

Operating System

The software side of the project is on an open-source platform that will provide stable and solid core while enabling flexible customization to fit specific user needs as well as hardware constraints. The design of a specific, simplified user interface with an easy learning curve is the cornerstone of the project. Based on previous research, we can identify and address problems the senior population experiences with computers more effectively than any training program, because we are adapting

technology to them and not the other way around.

The core of the operating system is projected to be open source Linux kernel embedded to the hardware SoC solution. This extremely light-weight system should be fully upgradeable from kernel to the applications without user interaction, and remotely manageable by authorized support personnel if necessary.

The philosophy behind new user interface is a “do-less” approach, simplicity and friendly human interaction. Single-task oriented environment addressing identified usability issues for senior users (see Tab 2.) should be equipped only with tools necessary to bridge issues caused by the digital divide and provide users with simple and straightforward way to use them.

Navigation and application launcher should be purely task oriented (e.g. “Call a friend” instead of “Skype”) and get get inspiration from Button Fly interface, used for demonstrations in now discontinued Silicon Graphics operating system IRIX. Emphasis is put on auto update and auto repair functionality with full automatic backups requiring no human interaction.

Applications, scalability and iIntegration of third party solutions

The core application set is subordinated to the main goals of bridging the divide (see Fig 1. for list of core applications). The aim is to simplify interfaces and reduce options to the base functionality while still maintaining document compatibility and good usability. Adapting the applications to the needs and capabilities of the target group is along with the user interface design the most difficult task that would require a lot of research, usability testing, heuristic analyzes and card sorting tests.

The key application and the gate to scalability is the Mozilla Firefox based browser. In might happen that users will after time outgrow the simplified system, however with broadband connection secured and always-online approach, they can seamlessly move to more advanced online solutions of office applications, text editors and more.

Inclusion of external partners and providing them a way to integrate their solutions helps to better communicate information to the seniors and bring them additional services they need. It leverages the overall value of the projects and opens opportunities for additional funding. Since the whole system is online centred, the best framework for these applications could be concept that takes advantage of it, such as Adobe Flex or similar.

Online services

Integration of online services is the key element and makes this project proposal unique. Zero setup online services (see Fig 1.) complete the puzzle and they actually make the bridging of the divide

happen. They also allow maintenance tasks to be performed remotely and without user interaction.

Online services should come together with the hardware device and among other include broadband Internet connectivity, protected IMAP e-mail account, space for public sharing of the data and files (web and file hosting), automatic online backups and restoration of the whole mass storage chip (with encryption), so that system can be updated or replaced without any data loss or even other action from the user side than to log in.

The inclusion of online services as a part of the package requires involving commercial partners in the project. For them it gives them opportunity to address new target groups, for the project it might bring more funding and credibility, for the users, however, it means easier adoption, greater opportunities and most importantly, more independence.

Implementation and Timeframe

The implementation and timeframe of the first deployment of the project spans for three years – that is after team of core project partners has been established first grants received. After each phase of the project there is a space for an extensive user testing and evaluation.

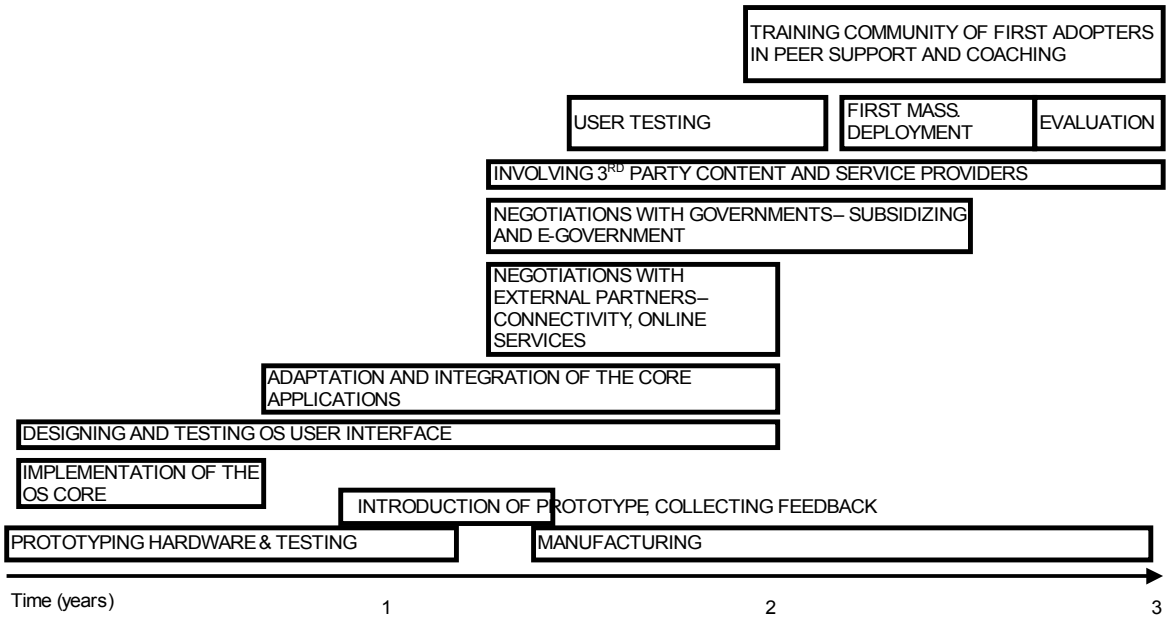

Fig 2. Implementation and timeframe.

Resources and Project Organization

Finding resources for such a complex project is not an easy task; fortunately, different areas of the project can provide financial support for each other and target different sources of funding. Although it

is too early in this stage of project to provide actual estimates, it is possible to sketch possible sources of funds for each stage of the project as they are developed (Tab 3.).

Successful application of the project can be proclaimed public interest and will have direct and indirect economic benefits for the society at national level of participating states, so many public and private institutions would have motivation to support it. The proposed platform creates space for authorized commercial third-party service and solution providers. The aim for this capability is to increase overall value and usability for target groups as well as to secure long-term sustainability of the project. These other bodies are expected to be represented by health care providers, insurance companies, life-long learning institutions, social-service providers, or any other partners that could benefit from communicating with their senior target group at an advanced level.

Besides financial resources, the project also requires human resources. The dedicated development team is projected to be kept small at all stages because the project relies, rather, on collaboration with the open-source community, external partners and service providers. This helps to boost dynamics in development, provide better integration with external content, maintain sustainability, and provides the potential for diverse sources of funding.

Tab 3. Human and financial resources for various areas of the project.

Project goal	**Resources before launch**	**Resources after launch**
Development and production of hardware unit	H: academic research institution, commercial partner(manufacturer) F: research / academic grants, manufacturer	H: academic research institution, commercial partner F: research grants, income from selling the device to customers (sales and/or governmental subsidizes)
Operating system and user interface	H: core development team, open-source community F: research / academic grants, donations	H: core development team, open-source community, localization partners F: Research grants, sales, donations
Applications	H: core development team, open-source community F: research / academic grants,	H: core development team, open-source community, third party providers

	donations	F: research grants and donations for the core set, sponsorship from the third party providers
Broadband Internet connectivity	–	H: commercial partner F: government funds and/or monthly subscription fee, part sponsorship from provider
Online services (e-mail, storage, etc.)	H: core development team and service provider (development and integration) F: research / academic grants, service provider	H: commercial partner or governmental body F: service provider
Support	H: core development team, open-source community to develop / integrate the tools F: research / academic grants	H: core development team and open-source community for updates; 2-level network of peer support (volunteers + trained advisors) F: sales, governmental grants

H: human resources

F: financial resources

Evaluation

The global evaluation will based on comparing the main project goal – bridging the digital divide between young and senior populations and removing the marginalization of older citizens in information society. This can be accomplished through interviews and surveys scaled according to the size of the project. If successfully passing through the early stages it will be possible also by observing global markers such as growing computer literacy in target groups or their involvement in peer social interactions, e-learning and e-government. During the deployment of such a large scale initiative it is

however necessary to perform evaluation more often, after each step in evolving the project. Along with extensive user testing as it is projected in the timeframe, one of the crucial indicators that the project is going the right direction will be continuous availability of funds and sponsorships as well as successful negotiations with governments and other external partners on which this initiative also relies.

Special Considerations

Despite the need to overcome marginalization, the first issue that will need to be faced is scepticism of the target group towards computers. Here the success of the project relies on the support of local community centres and family members. Improving user experience with computer games specially designed for seniors to improve their motor skills or abstract and critical thinking brought certain promises in the past experiments (Whitcomb, 1990). The design of the project also introduces some controversial issues, such as involving commercial partners for providing certain services. This outsourcing is however essential for the success of the project. The solutions will be to select credible partners and chose more open and flexible solutions. Also, these partners can and need to be diversified which results from the nature of the project – if deployed globally, each national implementation team would have to choose their own external partners as content providers etc.

Project also brings some security considerations. The existence of large number of identical computer systems, which are on default manageable remotely and operated by rather naïve customers leaves space for speculation on possible exploitation of eventual security holes. The open-source nature of the project should help to eliminate such threats. One of the last issues is remote storage of all the user data. Even when data are encrypted, this task requires involving trusted and credible partners. It must be decided if it would be better to involve different partners for each national deployment or rather associate with one global partner such as Google.

Last but not least there is an issue with availability of on-line content usable by seniors. Recently, new initiatives emerged under the wings of usability movement to optimize websites for senior recipients and guideline drafts are being sketched. If websites such as e-government portals are not be optimized for the use by lower literacy populations, the inclusion of senior populations into information society cannot be complete.

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