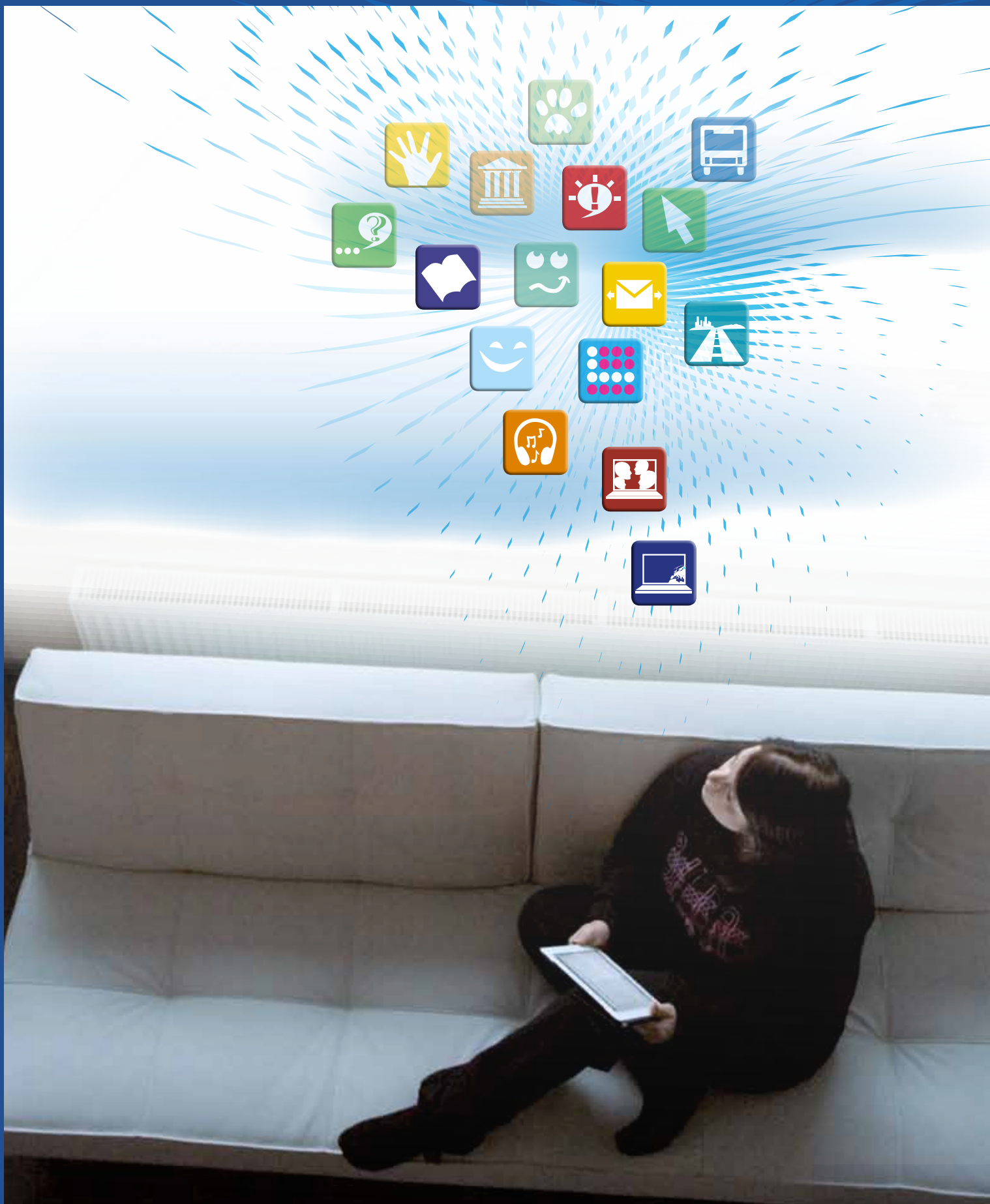
Cloud

Software Finland 2011



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Software cloud from Finland

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CLOUD SOFTWARE FINLAND

www.cloudsoftwareprogram.org

Tekes
www.tekes.fi

TiViT
www.tivit.fi

TIVIT a Finnish Strategic Centre for Science

Owned by 46 companies and public corporations, Information and Communication Industry Research TIVIT is one of the Finnish Strategic Centres for Science, Technology and Innovation (SHOK) funded by the Finnish Funding Agency for Technology and Innovation.

The centres provide top research units and companies exploiting research results with a new way of engaging in close, long-term cooperation. Cloud Software is one of TIVIT's programmes.

Feet firmly on the ground, heads high in the clouds

The Internet is becoming ubiquitous. The web is now accessible from more capable hand held devices and home electronics than ever before. The killer app of the future is the one which accesses web provided data from anywhere in the world.

The software industry is currently experiencing a paradigm shift from traditional installable applications to web-based software, where applications consisting of data, code and other resources live on the Web as services and can be located anywhere in the world.

In the future, cloud technology will represent a major part of daily life. Active use of Internet applications will become common practice when, for example, consumers store, use, and distribute material they have created themselves.

The Finnish Cloud Software program is a research co-operation initiative by Finnish ICT leaders and pioneers focusing on establishing software engineering principles to web development, creating superior user experience, and empowering innovative green software technology.

Cloud Software is open

Cloud Software is a project by Tivit plc., one of the Finnish Strategic Centres for Science, Technology and Innovation (SHOK), and is funded by the Finnish Funding Agency for Technology and Innovation (Tekes). Tivit was founded in February 2008 for the purpose of predicting the products and services of the future and is owned by 46 companies and public research communities.

The four-year Cloud Software Program was initiated in 2010 and now forms a partner network of 20 Finnish enterprises and 8 research organizations in Finland.

The project aims to generate breakthroughs in the field of cloud technologies, Lean enterprises and business models, integrating user experience and security as value-adding elements.

The preparation stage of Tivit's projects is open to all interested parties, and information concerning preparation stages already underway can be found on Tivit's website.

http://www.tivit.fi/en/contacts

Cloud technologies

Main goals of the technology in the cloud work package:

- Collect a compilation of best practices for cloud computing
- Develop toolbox for cloud computing application development
- Define & build an open cloud demonstration environment
- Define guidelines for openness in the cloud
- Develop sample applications that benefit from cloud computing and content mashupping

Lean software enterprise

Key tasks of the work package:

- Developing a framework for applying the Lean principles towards an enterprise transformation
- Conducting Lean Enterprise Transformation. Making Lean applicable in cloud software organizations
- Scaling Agile Software Development. Perfecting & automating the cloud software R&D engine
- Developing Integrated Software R&D Approaches. Seeking for competitive edge.

Cloud business

Principles for the cloud business model development:

- The cloud business models make use of open networks as the means to market and deliver software-based services on demand to the members of the internal and/or external value network.
- The business models make use of open interfaces, web technology, cloud platforms distributing processing and storage to the Internet, and also often open source software.

Safe, sustainable and open cloud ecosystem with superior user experience

In the software field, the most important competitive edges are operational efficiency, superior user experience, web-based software, open systems, data security, and sustainable software development.

The Cloud Software studies include research into what makes a product or service stand out and delight the user. Integrating user experience into software development throughout its life cycle is a basis for successful market development.

The cloud business models make use of open interfaces, open source software, web technology and cloud platforms.

Finland has pioneered research in Security Metrics, Vulnerability, Managing Complexity, Security as a Quality Aspect and Software Robustness areas. There is a desire to improve software and system development life-cycle efficiency so those efforts can drive security and security can support them.

Sustainable development is an emerging strong trend that is driven by the increase in price of energy and natural resources, consumer awareness and legislation.

Finland has always had a strong foothold in producing low-energy solutions and offers a good environment for the realization of green information technology: a cool climate, abundant water resources, good level of education, safety and inexpensive green energy.

The project involves investigation into how environmental friendliness can be improved with the help of software programs and algorithms.

Cloud – an invention or an innovation?

An invention is thought to be a novel composition, device or process. However, it may be based on pre-existing models or ideas, and still be a radical breakthrough. Moreover, inventing and inventions are socially and culturally embedded. They are created by people and stretch people's knowledge, experience and inspiration for the future.

Inventions represent valuable intellectual capital that should be exploited widely enough, but also invented only once, to save our invention capacity for other important breakthroughs. This is also why we have patents around, but also why we would like to see more innovations to produce invention-based economic, social and cultural benefits.

Thinking of cloud computing and its applications, one may question its status as a genuine invention. Computing machinery has existed at our disposal for a long time in centralized, distributed, dedicated and generic forms. Applications have been developed and used since the early number-crunching days.

From the viewpoint of the Cloud Software Program, I see the cloud phenomenon as a deep and innovative change in the way we can make use of computing and especially software. I would like to state that we do not yet understand the depth of the change. The same has been the case with regard to mobile computing, Internet and social media. The depth of the cloud effect comes from the fact that it is very pervasive indeed, as have been the other phenomena mentioned here too. Comparing, for example, to ubiquitous computing – smart open spaces, intelligent devices and so on, I expect the cloud to affect almost all of us.

Because we have already witnessed many new cloud applications emerging and being widely applied in businesses and by individuals, it is no doubt that the cloud is also an innovation. In the Cloud Software Program we have seen that the scope of cloud applications is expanding, from serving the core business processes through software-as-service implementations, to an order of magnitude wider domain. This includes many "small" applications and usage scenarios that have not been feasible during the software product era.

An important enabler for this development is the cloud backbone - a scalable, secure and usable computing infrastructure. In the Cloud Software Program quite a big emphasis has been placed on these features, also in terms of their development methods, processes and tools. Again, one may ask if the focus of research and development should be more on the innovation results than processes. However, after having organized the whole program in an agile and lean manner, perhaps as the absolute forerunner in this regard in the whole world, program participants and also external experts have realized its importance. It is not only the question of the old wisdom that the journey matters more than the destination.

"By investing into infrastructure and process research it can be assumed that cloud applications can be developed for a fraction of present costs, and in particular with very little up front costs."

The small threshold for setting up and delivering cloud services should encourage small businesses to develop new services and thus increase the total volume of available services.

This should, in turn, enable new kinds of ecosystem innovations and out-of-the box thinking also in the more traditional businesses, if I dare to call them such. The potentially disruptive innovation behavior of the new and smaller players should also increase agility in the sense of shortening the cycle from ideas and inventions to innovations and profits. However, in order to make the full use of the cloud phenomenon, even the "small" services – and perhaps particularly them, have to be usable and secure, or they will not find all the potential users.

Having said all this, it is obvious that cloud is more than an invention or an innovation. It is a paradigm shift that deserves to be investigated, understood and adopted. This is exactly the journey which has started in the Cloud Software Program.

Veikko Seppänen

Veikko Seppänen, Dr. Econ., Dr. Tech. is the academic coordinator of the Cloud Software Program 2012-2014. Dr. Seppänen is Director of Martti Ahtisaari Institute of Global Business and Economics at the University of Oulu, and a professor in Software Business at the university.

The Finnish Cloud Software Program speeds up the software industry

At the start of the year 2012, the four-year Cloud Software Program is at its midpoint. This TEKES-sponsored industry-driven research program includes 20 industrial and 8 research parties with F Secure as the driver company. Its volume for 2011 was 170 person-years and with a budget of 18 million euros it is the biggest ongoing activity of Tivit Ltd, one of the Finnish Strategic Centers for Science, Technology and Innovation.

The quest for ensuring the competitiveness of the Finnish Software industry has already produced some remarkable results. The ongoing global paradigm shift in cloud technology is dramatically changing ICT as well as software business and structures - and we are prepared for it. Perhaps counter-intuitively it is not only cloud technologies that need to be mastered in the new era. The Finnish Cloud enables new business models, facilitates collaboration and generally speeds up the clock rate for the whole software industry. Hence, the Cloud Software Program tackles the different aspects of future competitiveness building new cloud businesses, lean software enterprises and open cloud software infrastructure with a special focus on integrated security and superior user experience.

"New software development tools have been a decisive factor."

Vaadin Ltd, in collaboration with Tampere University of Technology and Åbo Akademi University, makes software development using the Arvue tool so easy that applications will spread and develop quickly into even more advanced versions. The applications are created and published in a browser-based visual editor. They can be published at the press of a button, and they can be embedded onto any website. Vaadin achieves this lean software development by using its visually attractive and simple software development tool based on open code and the cloud platform environment. By locating both development work and server space in the cloud, software development costs can be dramatically reduced, as well. Application developers from 170 countries have already taken part in developing the tool.

New ecosystems have also been established during the program. Ixonos Ltd. has created an open and secure cloud business solution which is particularly well suited for product development and electronic services. Ixonos Elastic Cloud offers a product development platform in Finland with unlimited scalability. The platform is being used to produce the next generation of Ixonos City Online municipal services. City Online cloud services provide a new way to develop, deliver and obtain electronic municipal services. For example, registering for school and applying for afternoon activities can be done reliably online.

Larger companies in the consortium, such as F-Secure, EB, Ericsson and Tieto, have started to apply new thinking (Lean) and new software production methods (Agile) on a large scale, which has increased their ability to compete in global markets.

For example Ericsson Research & Development Center Finland has set up twenty software development teams and completely reshaped its organization and the way of doing things and making software.

In summary, 2011 was a very productive year for the Cloud Software program. See the results in more detail in this magazine and at the Cloud Software website (www.cloudsoftwareprogram.org) and tune in to the related RSS channels to be the first to know of progress made in year 2012.

Janne Järvinen

Director
External R&D Collaboration
F-Secure

Focus Area Director
Cloud Software Program

Today's Research Management in Cloud

Constant Change requires Agile, Collaborative and Transparent Approaches

Constant change and new innovations in Cloud have created the need for more effective approaches that go beyond traditional project management models. The Cloud Software Program's adoption of new planning and project management approaches for their research efforts have allowed the Program to be more agile, more collaborative and more transparent. In addition, the Program has been more successful in achieving its primary goal of developing enablers for globally successful businesses which, in turn, will boost the competitiveness of the Finnish economy.

The Cloud Software Program facilitates collaborative research between several organizations that have mutual interests in the field of the cloud software and business. The Strategic Centre for Science, Technology and Innovation in the field of ICT (ICT SHOK) projects and programs are of varying sizes and occur both at the national and international level. ICT SHOK programs are different than typical ICT research ones in that they are industry led and have a strong focus on the business impact.

The use of collaborative, long-term traditional project planning in some research fields remains useful. However, in the field of ICT research, the traditional approach is a misnomer.

"There is nothing predictable about the rate of new innovations in the ICT sector except that the unexpected happens faster than we expect."

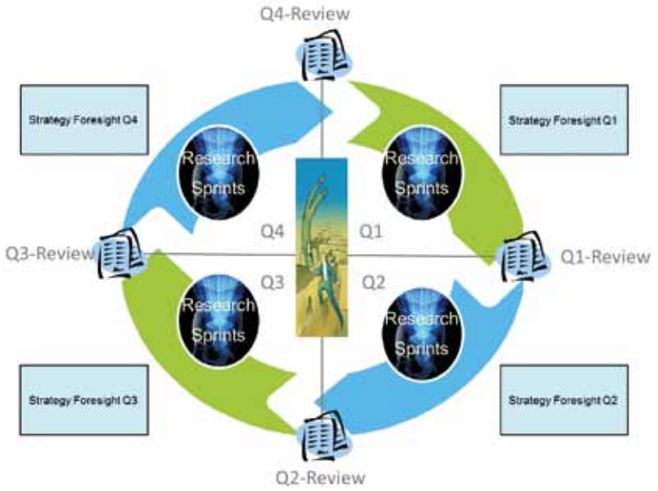
With multiple partner organisations and multiple cluster projects, effective planning for the Program is vital to its success. There are numerous planning strategies that have been embraced over the years. The Waterfall model was the most trusted approach to manage and minimize coding errors for the software development industry. However, in the last 10 years, researchers and experts began searching for other tools and methods that could replace the model and better respond to changing customer requirements.

This led to the beginning of the Agile period in software development which adopted a mantra that suggested facilitating change is more effective than attempting to prevent it. During the Program's planning, the same types of challenges that the Waterfall model followers faced were evident.

How do we recognize and benefit from the continual change in the ICT sector? The Program needed to set the vision, goals and key results for the four year program as well as plan the collaboration between a number of industrial and research organizations. However, it was felt that research could not be insulated from the ever-changing business environment, so an agile approach was adopted to the research program management. This approach was later called the Lean and Transparent Research Management Approach with a focus on the business and scientific benefits and an iterative sharing method for the results. The Program's activities and results are evaluated against what is happening around us and we make changes to the focus, research themes or structure as required. The two main components of this approach include continuous planning and the Sprint model.

The Program's continuous planning supports key goals through specific actions:

- Value - driven strategic planning improves the business impact of the program
- Business case planning maintains a consistent focus on business priorities and resource constraint assumptions
- Transparency and sharing of information ensures the visibility of the information and results
- Process discipline, results visibility and accountability enhances the Cloud Software Program's access to assets and collaboration

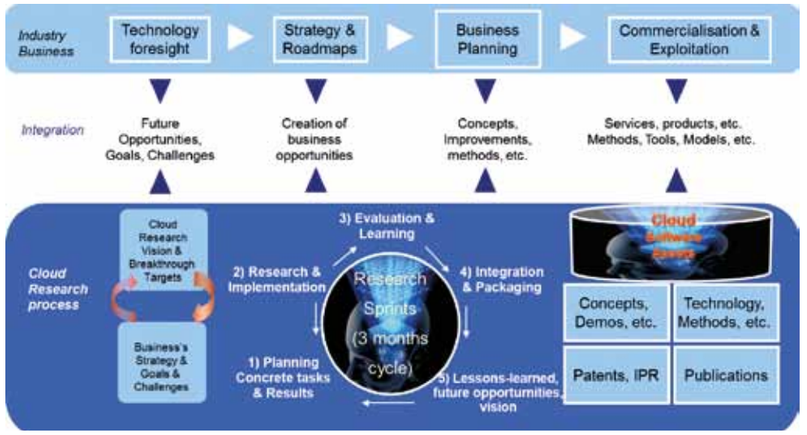


The Program's primary goal is to solve research challenges around cloud business cases as defined by the industrial organisations. The cases are strategically important research areas for the industrial organisation and the intended business impact is critical for its future success. The work effort on these cases is defined at the beginning of every three month time period, which is called the Sprint approach (Figure 2). At the beginning of the each quarter, the research team, comprising of members from 2 or more partner organisations, plans together a set of defined tasks and outcomes over the next three months. Work towards breakthrough targets is done in the two efforts: Business Cases (WP1) and Cloud Research and Consolidation work packages (WP2). The research is grouped into the following three clusters; Cloud Business Transformation, Operational Excellence and Open Cloud.

"We can't make systematic and reliable research within three months!" was the initial hesitation when the three month research Sprint approach was adopted. However, the Sprint approach facilitated the division of the work effort and results in the smaller, more manageable portions. But systematic and validated research methods could not be compromised.

The aim is to plan and execute only those actions that achieve positive results that are realistic to do within the sprint. The Program has defined business and scientific impact goals and measurements for each research cluster and their progress towards the defined goals are measured quarterly.

Outcomes of a sprint could include, for example, a design plan, methods description, a case study report, an analysis report, a journal article, a technical demonstration or a software module. These outcomes are cloud software assets which are stored in the Cloud Software Assets database - the main storage, access and sharing point for the Program's research assets.

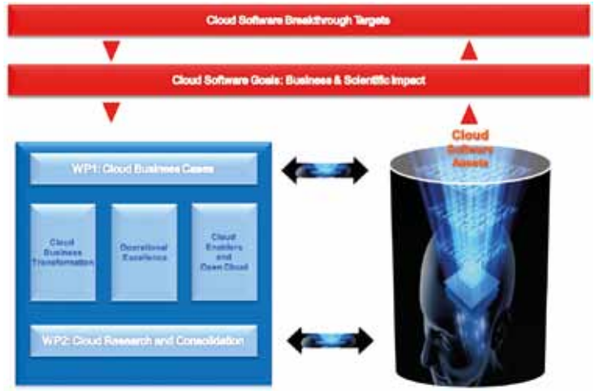


Cloud Software assets are classified as software offerings (patents, copyrights, IaaS/PaaS/SaaS, etc), Other Intellectual Property (product concepts, business models, new strategies, etc.), Internal Operational (new tools, processes, techniques, etc.) and External Relationship (business relationships, networks and ecosystems developed, etc.).

At the end of each research sprint, each team presents the highlights of their work in the Q-review meetings. The main motivation behind the Q-reviews is to ensure the required transparency to achieve the attainment of the greatest business impact. The value of the continuous planning process is most visible in the Program's Q-review meetings where key results are presented and demonstrated in the cloud bazaar. The Q-reviews consist of differently themed workshops, training and coaching events, presentation, strategy discussions, and planning sessions. The outcomes of the continuous planning process are updated to the Strategic Research Agenda (SRA), which serves as a roadmap for the research work.

The Program's efforts of continuous planning, the adoption of the agile and sprint approaches and a dedication to transparency are prerequisites for the journey that goes beyond:

- traditional research and development to seamless innovation from concept to customer
- well-structured long-term approach to robust innovation strategy
- cross-functional separate research teams to ecosystem-wide innovation networks



Tua Huomo

Program Coordinator
VTT

If you want to learn more about Lean and Transparent Research Management Approach, please contact Tua Huomo (Tua.Huomo@vtt.fi).

Software services from the cloud

The Finnish Cloud Software Program focuses on web software, creating superior user experience, and developing green software technology.

The software industry has changed its operating patterns everywhere in the world. Software and the accompanying services are downloaded from the Internet. The user does not necessarily know where the services reside. This means that they are in the “cloud“ but always available.

The term ”cloud” stands for a platform that provides all forms of information and communication technology (ICT) and computation equipment, even to the scale of large data centers. Using the cloud, ICT services can be outsourced over the web. The user does not need to worry about updating, maintenance, and security issues of servers or applications. Services offered through the cloud cover data storage, applications, and user support.

”This is a radical paradigm change, with the majority of services being transferred to the cloud. In the future, cloud technology will represent a major part of daily life. Active use of Internet applications will become common practice, for example, when consumers store, use, and distribute material they have created themselves. He leads the Cloud Software program funded by the Finnish Funding Agency for Technology and Innovation Tekes-,and ITC companies. The aim of the program is to develop the Finnish software industry’s capabilities to create new business based on the cloud platform. This means taking their services to the network for easy availability.

User experience is important

Järvinen explains that the transfer to cloud technology has been an easy step for F-Secure. Since 2001, the operating centers maintained around the world over the web prepared the foundation for real-time security web. Cloud technology-based security was taken into use in 2006, when F-Secure started to employ web-based vulnerability detection in its services relating to security against phishing. In 2008 the real-time security web was established.

”As cloud services become more common, users have more alternatives to choose from and changing from one service to another becomes easier. From the point of view of the service supplier, competition is getting tighter and users become more demanding, so the importance of a good and excellent user experience is increasing. The Cloud Software studies include research into what makes a product or service stand out and delight the user. Understanding the factors behind a superior user experience helps us to create products and services that are continuously more competitive”, Järvinen believes.

One important research theme in the program concentrates on user experiences. Human-centered software development has been a great challenge in ICT, since technology is advancing at an increasing speed, resulting in applications that are often too complex to use. Currently we are not concentrating on future applications; we try to find out what we can learn from the current applications used in daily work.

Another topical need is to create the principles for software development to help take into account the developments in web technologies. Cloud Software provides a possibility for us, because it contains the communication and data security between applications, and a possibility for further development of applications.

”In the software field, the most important factors affecting competition are operational efficiency, user experience, web-based software, open systems, data security, and sustainable development. The Cloud Software Program is concerned with all of these factors, because programs are increasingly being transferred to the web and becoming service products. The program aims to lead the way in the development of business models and software services relating to the cloud technology.

During the program a tool box will be designed for cloud computing application development, and the engineering principles will be laid down for open software development. One important target is mashups. They are web applications, in which data or functional properties are combined from several sources to create a new service.

The cloud is a major trend, and yet most companies are not prepared for the change”, says **Janne Järvinen**, Director at F-Secure.

Photo: Ari Turunen

"The coupling of embedded systems with cloud-based services is only a matter of time", says professor **Pekka Abrahamsson**.

"The real breakthroughs will occur when services involving broad interest in users are being developed"

Directly to leading-edge SW development

Cloud Software strives to be at the forefront of software development.

According to Pekka Abrahamsson, Professor of Computer Science for the University of Bolzano, Italy possesses a great deal of experience and skill in cloud technologies, open interfaces, and the utilization of agile methods in developing software services. "We have a good starting position. Now we should quickly combine our skills and meet the needs of the clients. By developing well-made cloud services based on customer needs we can establish a head start."

During the past 20 years software programs have become a success factor in the global competition between companies. Open interfaces, open source code, and communities producing them initiated the paradigm change in the field and have brought new possibilities for software development. "The next development step is to let users participate in the development of products and services. It is already an essential part of successful business today. Although several open code innovations have emerged from Finland, Finnish companies need to move faster to utilize the business potential that the social networks on the Internet provide."

Photo: Metso

With Metso's embedded system, both machine operators and maintenance specialists are involved in the problem recognition and solution process.

Photo: NSN

Elektrobit Connectivity Module

Elektrobit Touch VoIP

Abrahamsson thinks that openness in business and consequent transparency are essential factors. "Tailored, license-based software production and its role will be less important in the future. The answer will be provided by emerging companies specializing in lean-agile software services creating new dynamics, with the main emphasis on providing high-quality services and, perhaps, locality. It is clear already that the organizations utilizing information technology will have no business advantage through owning the software they use. Open software platforms will become more common in the future, and both cloud technologies and services will be important. "

Abrahamsson thinks that software development is also going through a period of change. "Fast and well-coordinated open source software development will play a key role. It is based on continuous collaboration between different communities. In this way good practices will be created for software development, taking into consideration customer needs and company goals." Abrahamsson is the academic coordinator for the Cloud Software Program. He emphasizes that the project involves trying out a new way of developing services. The starting point is not in technology but a comprehensive customer-based operational model that follows the principles of lean and agile software development. The results will be packaged into a model and will be published with guidebooks by 2013.

Finnish research into data security is internationally recognized. The two Cloud Software partners, CSC and F-Secure, have performed pioneering work on security issues. Funet CERT of CSC was the first Computer Emergency Response Team (CERT) in Finland, founded in 1995. The security services of F-Secure Oyj, founded in 1988, are used globally through more than 180 Internet service providers and mobile phone operators.

Photo: KONE

Kone Corporation has a global software center to develop embedded system software for lift applications.

The technical report on cloud computing technologies published

The technical report (D1.1.1) presents the main technologies currently used in cloud computing: what are the main commercial offerings and what are their programming models. Hardware virtualization technologies used in datacenters are discussed. There are three different service abstraction levels: infrastructure, platform and application. Also the main driver and adoption problems in cloud computing are discussed.

http://www.cloudsoftwareprogram.org/results

“In the future, cloud technology will represent a major part of daily life”

Embedded systems and green ICT connected to the cloud

Finnish software development has traditionally represented the global peak. Embedded systems, such as Kone Corporation’s elevator software or Metso Automation’s process industry applications, are good examples of this.

Elektrobit, one of the companies participating in the Cloud Software Program, develops stateof-the-art embedded technology solutions for the automobile industry and mobile systems.

Intelligence has been added to integrated systems by smart microprocessor technology. Various automation applications contain a great number of embedded systems. For example, current internal combustion engine control systems, microwave ovens, robot controllers, elevator control systems, mobile phones, and exchange units contain one or more integrated microprocessors. Future devices and domestic appliances will be complex embedded systems communicating with each other over the web.

”The coupling of embedded systems with cloud-based services is only a matter of time”, says Abrahamsson. He has a broad experience on collaboration with industrial companies, specifically on embedded systems. ”The mobile cloud is one of the hot topics in the field, but the real breakthroughs will occur when services involving broad interest in users are being developed.”

Environmental friendliness has also been important. Improved programs have helped to reduce energy consumption, optimize raw materials use, and offer new services in a sustainable manner.

A good example of this is the Sustainability Intelligence Service of Tieto Oyj; the software enables real-time monitoring of environmental and financial data at different phases of the production chain over the Internet. The data is efficiently maintained in data banks and it helps companies in their process planning in an environmentally friendly way. One of the research themes in the Cloud Software Program is sustainable development.

Finland has always had a strong foothold in producing low-energy solutions for the mobile phone industry. Finland can also offer a good environment for the realization of green information technology: cool climate, water resources, good educational level, safety, and inexpensive and green energy. The project involves investigation into how environmental friendliness can be improved with the help of software programs and algorithms.

Photo: Wärtsilä

As the world’s first manufacturer to use common rail electronic fuel injection on large, oil-fired diesel engines, Wärtsilä is one of the main innovators of embedded system development. Key to this innovation is Wärtsilä’s engine control software. The main engine of the world’s biggest cruising ship build by STX Finland: the Allures of the Seas.

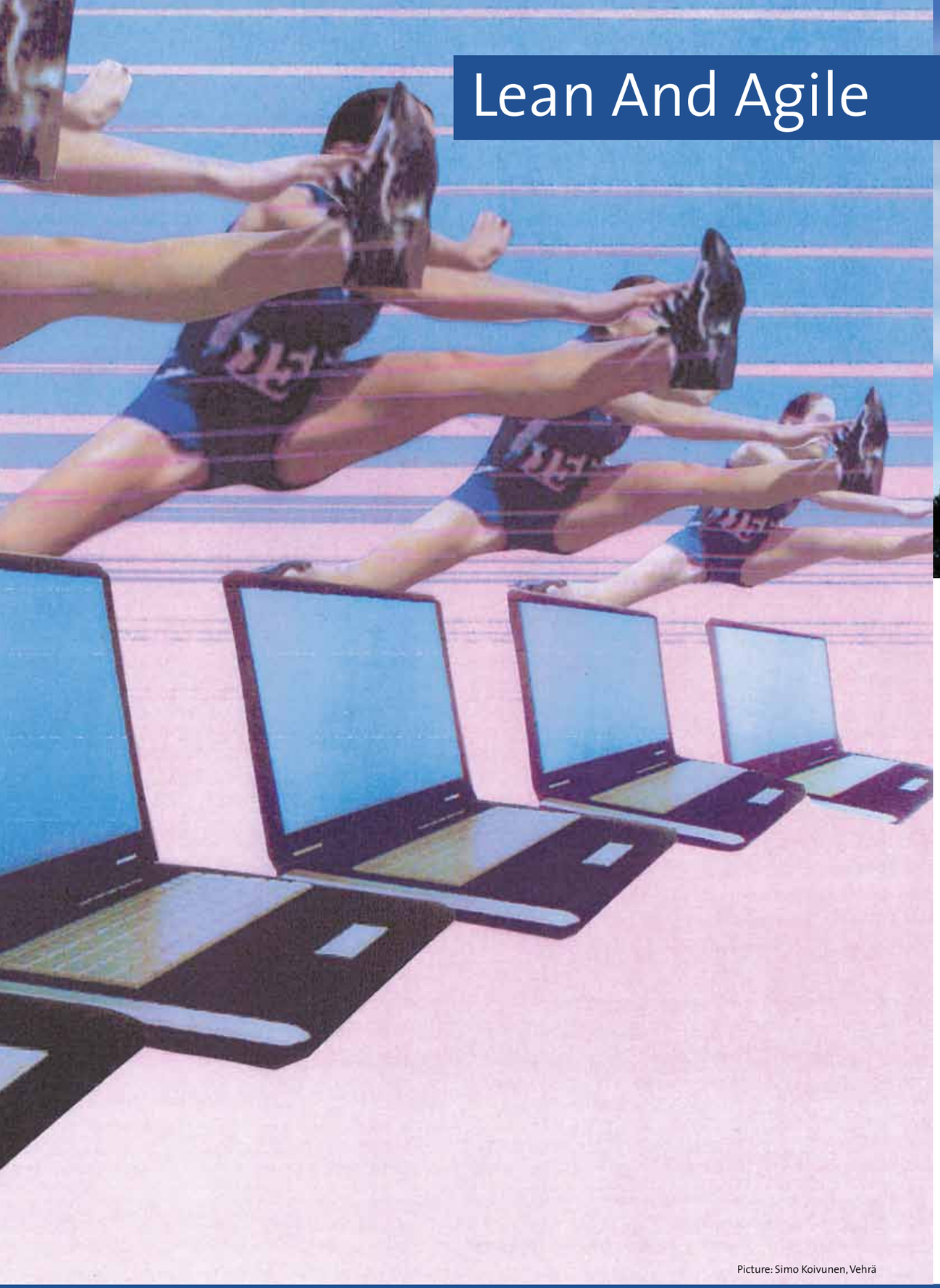
“Finland can also offer a good environment for the realization of green information technology: cool climate, water resources, good educational level, safety, and inexpensive and green energy.”

Photo: Nokia

Lean And Agile

Trust and openness guarantee good end products

Photo: Tekes, Helena Kalland



Picture: Simo Koivunen, Vehrä

In software design, it is essential to have an understanding of the factors hindering project progress. Trust between the production team and the customer can be improved through team work that aims at openness, transparency and interim results that are quick to attain. This leads to a can-do spirit and improved results.

The Cloud Software project is creating best practices for lean and agile software development.

“The building of project cooperation solely on agreement terms is the worst possible starting point.”

Lean and agile methods aim at eliminating unnecessary steps and establishing clear ownership of tasks. Both lean and agile methods consider face-to-face communications more important than the drafting of written documents. First and foremost, the methods allow the team itself to affect its work practices; the people and teams involved develop their operations within a certain framework and according to commonly agreed principles with the support of the organization’s management. Highquality product development is achieved through cooperation and constant interaction.

The proliferation and specialization of cloud services will increase connections between software suppliers and customers. This is referred to as the information technology ecosystem, in which intelligent applications operate together and complement each other in a way that is invisible to the user. The capacity for rapid and cost-efficient development is decisive from the point of view of service functionality and competitiveness. Lean and agile software development methods are one potential solution for this.

Finnish software development company Reaktor has years of experience in software development using these methods. Agile Coach **Panu Liira** is involved as a Reaktor expert in the Cloud Software Program aiming at combining lean and agile methods and cloud services.

“The entire way of doing things is iterative, involving learning and participation. Those performing the work get to plan it themselves. This allows the team to lead its own growth, which is conducive to committing them to common goals and working methods,” Liira explains.

“Operating practices can be adjusted to suit the situation, and any flashing red lights are quickly spotted.”

Liira is keen to be involved in developing expertize in coaching these methods, so that Finland can be forged into the best country in the world in exploiting them.

“Training is an efficient way of disseminating information, but actual learning and expertize are created and spread through work, as it is only by doing that you can apply knowledge to practice.”

Choosing his words succinctly, Panu Liira makes a clear point: everything is based on openness and trust, which give rise to creativity. Liira noticed very early in his career how agreements and clauses and the division of tasks on paper killed a fair share of joy and creativity.

Liira’s first employer, a software company in a promising growth phase, fell because of agreements with excessively strict terms: the agreements bound the company to something it could not deliver. The bitter experience set Liira off to reflect on how good software could be designed with solid cooperation. He began studying the history of software development. Liira analysed the types of software methods that had been formalized and what the relationship between the customer and supplier had been.

“When services are outsourced, the companies involved rarely realize the importance of establishing trust between them.

“Skilled employees are useless if they just sit in their own sandboxes. If the customer who owns the end result does not show an active interest and the team does not get feedback fast enough, the project will fail. Very few people pay attention to this.” says agile coach **Panu Liira**

Instead, there is an attempt to formalize the relationship in a lawful form defining its nature, content and operating practices. This eliminates flexibility and, if anything, serves to create conflicts between the parties, even when they have the same objectives. By making it impossible to change direction during the project, even where this is necessary, tightly defined agreements kill creativity. Few companies have the ability to start changing what has once been agreed,” Liira claims.

Liira became horrified of traditional efficiency thinking. “An excessively mechanistic approach kills creativity. We talk about innovation and creativity, but we don’t anticipate what it is that we should be innovating. If anything, this demonstrates a lack of confidence.”

Liira is critical of mechanical tendering processes, especially if the selection criterion is the cheapest price regardless.

The supplier’s ability to provide services and further development is typically weakest following an intensive round of tendering. Studies show that some employees in the sector can be as much as thirty times more efficient than others. Experience and competence are the only guarantees of high quality.”

In 2004 Liira found his place when he transferred to software house Reaktor.

“Reaktor was the first company in Finland to employ agile software development methods in their customer projects.”

Business Development Manager Arto Saari says that the relationship between the supplier and customer can be assessed as two dimensions: first as the degree of criticality of the assignment and second as the degree of trust between the parties.

“As a rule, the customer cannot give the supplier an assignment that exceeds the degree of trust between the two. The agreement terms are used to compensate for the lack of confidence in the supplier’s ability which often leads to a set-up that limits instead of secures the success of both parties, as general agreement models are based on sourcing of services and goods instead of cooperation.”

According to Saari problems with agreement models are especially encountered in projects in which the objective is to develop the customer’s business operations with the help of IT. The reason behind this is that such projects require continuous and open interaction between the parties.

“The building of project cooperation solely on agreement terms is the worst possible starting point, as it is generally the best way of ensuring that procurement practices will kill any interaction between the parties. When both parties focus on minimising their own risks, they both end up losing.”

Muda and kanban: a Japanese approach to lean thinking

Lean thinking is a management philosophy aiming at streamlined operations by minimising waste. In the Toyota Production System, waste is described using the Japanese term ‘muda’, which includes all unnecessary work, such as conveyance, inventory, motion, waiting, over-production, over-processing and deficient products.

One of the methods for eliminating unnecessary work is Kanban. Applications of Kanban in software development have included the use of a whiteboard illustrating the various phases of software development. The layout of the columns on the board is designed to limit the amount of incomplete work in each phase. Limitations prevent the build-up of incomplete work and allow the software to be completed at a steady pace – bit by bit, one feature at a time. Limitations also serve to develop the team’s ability to cooperate to overcome challenges, as work on new parts is not begun until all incomplete work has been completed together. Limiting the amount of work in progress at any given time also leads to faster and more frequent results and success. This generally translates directly into improved motivation for the teams using the method. According to Arto Saari the methods are being applied to several projects within the Cloud Software project. Their coordination is a prerequisite for success.

“Changing the approach to design, agility is in several respects similar to complexity management. The common objective of lean and agile approaches is shortening development and release cycles.” According to Saari the lean approach is particularly well-suited to the business models of cloud services. The change in the service interface forces organizations to re-examine the production and value delivery models.

“Examination across organizational boundaries will lead to an even greater overall understanding of the value chain and the service interface between the organizations.”

The way the Toyota Production System eliminates all unnecessary work has inspired software developers

Software suppler and customer working together

Panu Liira feels that the efficiency of software design depends on the structure of the organization and, particularly, its organizational culture. These decide the employees’ ability to learn and cooperate in reaching shared objectives. Efficient software development requires commitment by both customer and developer.

“Skilled employees are useless if they just sit in their own sandboxes. If the customer who owns the end result does not show an active interest and the team does not get feedback fast enough, the project will fail. Very few people pay attention to this.”

Liira says that the way in which organizations and people work together is decisive.

“The best projects I have been involved with have been projects in which you would not have been able to tell where anyone was working on the basis of the division of roles.”

Scrum: like playing rugby

One of the most popular agile methods is Scrum. ‘Scrum’ refers to the starting formation of a rugby team. Scrum is similar to a rugby match: the software development team quickly adapts to various situations and is constantly on the move, steering itself towards completion through phases determined by the team. The Scrum methodology aims at obtaining feedback as early as possible.

“This leads to confidence through actions. Scrum enables the production of something tangible much faster than with traditional methods.”

One of the team members is the Scrum Master, who does not have direct decisionmaking power over the team. Acting as a coach, the Scrum Master supports the team in using the method and in developing its own mode of operation. The objective is to make the team self-monitor compliance with the rules it has set up while also questioning and developing them. The Scrum Master also helps the team to identify and remove obstacles and external factors hindering the team’s work, but in the role of coach, not as project manager or team secretary.

“The problem in software development is expectation management: what can be realistically expected,” Panu Liira says. “Little by little the software becomes more and more complete during several implementation rounds, which are called sprints and which usually last between one and four weeks. Each sprint ends with a demonstration of the next software version, for example.”

Arto Saari points out that the basic idea of project work is often lost amid various opinions and views. In the end, it is all about the proper mix and application of predictability and the capability to change. However, Saari says that the question is not one of complete freedom of choice between these two, but that the applicability is determined by the project’s operating environment.

“In order to succeed, new and innovative development projects require an approach that accepts change, whereas complex but predictable delivery projects benefit from detailed task-level plans. Since the world is rarely this black-and-white, the best models are combinations: created as a result of long-term expertize and continuous imprroment, it’s a matching game of predictability and ablility to change in the right proportion and at the right levels.”

Ixonos is another company that has a long history of using agile methods in the software development of products ranging from mobile applications to enterprise backend systems. Ixonos Business Development Manager **Arto Saari** succeeds Panu Liira as the head of agile software development in the Cloud Software project.

Incompeleteness not a sin

An aspect of the Scrum philosophy is that you should only do what is absolutely necessary.Scrum aims at achieving product improvements with each sprint; complete features, forming part of a functional system, are created one by one.

“The ability to demonstrate part deliveries in an atmosphere of trust is extremely valuable, as it allows for immediate feedback to be received. It is of primary importance to get feedback on whether the feature in question is what was desired. If something is unclear, it needs to be cleared up immediately.”

The team creates its own understanding with the customer, which makes transparency paramount; everyone has an understanding of how tasks can be completed successfully.

The Scrum methodology involves certain ceremonies and rules. Actions and methods need to be thought of through principles: the way of working is owned by the people involved. Excessive formalization destroys this. This is why the team has a daily session for planning its work; outsiders are allowed to listen but not to comment. After successive iteration rounds the team showcases the results of its work, giving others the opportunity to comment. At the same time, the team and the customer define together what constitutes ‘complete’. The so-called “Definition of Done” is another aspect of the Scrum philosophy; since the people involved constantly work in close interaction, they know when the software is ready.

“When the users are constantly involved in determining the direction of development of an online application, the release cycle is considerably shorter than that of a physical product, for which a new version means an entirely new production series.
It is worth remembering, however, that releases can also take place on a smaller scale using prototypes, which also allows increased learning opportunities regarding products that are otherwise difficult to adapt,” Arto Saari points out.

Saari says that the lean approach has a great deal to offer in the development of mobile products in particular, a process in which consideration has to be given to hardware, platform and user services. In such cases optimisation is managed across development departments in a coordinated manner from the end-product perspective.

Methods for breakthroughs

Panu Liira is confident that lean and agile methods can lead to breakthroughs. The large companies in the Cloud Software consortium have begun adhering to these principles. For example, Ericsson Finland has set up twenty software development teams and completely reshaped its organization of the way of doing things and making software.

“Many organizations have tried agile methods and implemented them in product development. However, few organizations have introduced them as a comprehensive value chain, in which case the problem is often the lack of clear ownership.”

Liira says this is a problem facing large companies in particular. The excessive fragmentation of management leads to uncertainty over ownership of and responsibility for the service or product being developed.

“Large companies often divide responsibility into small segments which are not attributable to a single owner. Chopping up product development eliminates employees’ opportunities for influencing the product. This also means that no one owns the big picture and makes it difficult to put the pieces together. There is no passion; people get stuck in a rut and lose their sense of achievement in the absence of immediate feedback.”

This results in visibility over the product being lost. Clear responsibilities and the availability of immediate feedback contribute to a passionate approach.

“The idea is to instil confidence within the company: instead of micromanaging your subordinates, you trust them. In the lean philosophy the manager is a facilitator who encourages learning and independence.”

Arto Saari says that an organization is something like a football team. However, instead of playing as a single team, the different parts of an organization are playing their own game.

“It’s similar to defenders merely passing the ball to each other and always trying to shoot for goal from their own half. This is why lean thinking is a breath of common sense for operational development: it focuses on maximising value for all stakeholders and puts the entire organization to serve this single purpose. For many organizations this is a dramatic change, as they are not used to extensive, open and collaborative development efforts outside their own product or responnsibility area. Moreover, the customer is often fairly distant and poorly understood, which sounds almost absurd when you think that it is the customer that should form the basis for business. This is what makes lean an excellent approach for organizations looking to reshape their business operations.”

Saari says that lean thinking should not only be examined pragmatically, as models, “The real value is in its motivating and transforming force, which gives a muchneeded boost to the development of the organizational culture, an area that is often undervalued but easy to lose and difficult to establish. A culture cannot be imposed: it can only be created byt the organization itself. This is connected to the development of creative work management, an area which is still a fairly new concept for many organizations and managers.” tools and processes.

Ari Turunen

The Kanban production control system streamlines software production for the benefit of the customer.

First in the world, a research group of the University of Helsinki has produced scientific research results of the impact of the Kanban method on software production. The method has been studied at the Software Factory laboratory of the Department of Computer Science for a year. The Kanban method streamlines software production, which benefits the customer, but alone is not sufficient for comprehensive software project management. The study financed by the Tivit Cloud Software Finland research programme, carried out for instance at the Department of Computer Studies of the University of Helsinki, has already proved that Kanban helps reveal the non-value added work, such waiting and taking turns between tasks. It has also been shown that being a relatively free-form model, Kanban requires the persons in charge to be experienced enough to be able to tailor an optimal project. The source was published at the ICECCS ’11 conference (http://www.iceccs.org/2011/) in Las Vegas on 27-29 April 2011.

Ikonen, M., Pirinen, E., Fagerholm, F., Kettunen, P., and Abrahamsson, P. (2011). On the impact of Kanban on software project work: An empirical case study investigation. *Proceedings of the 16th International Conference on Engineering of Complex Computer Systems (ICECCS ‘11)*. IEEE.

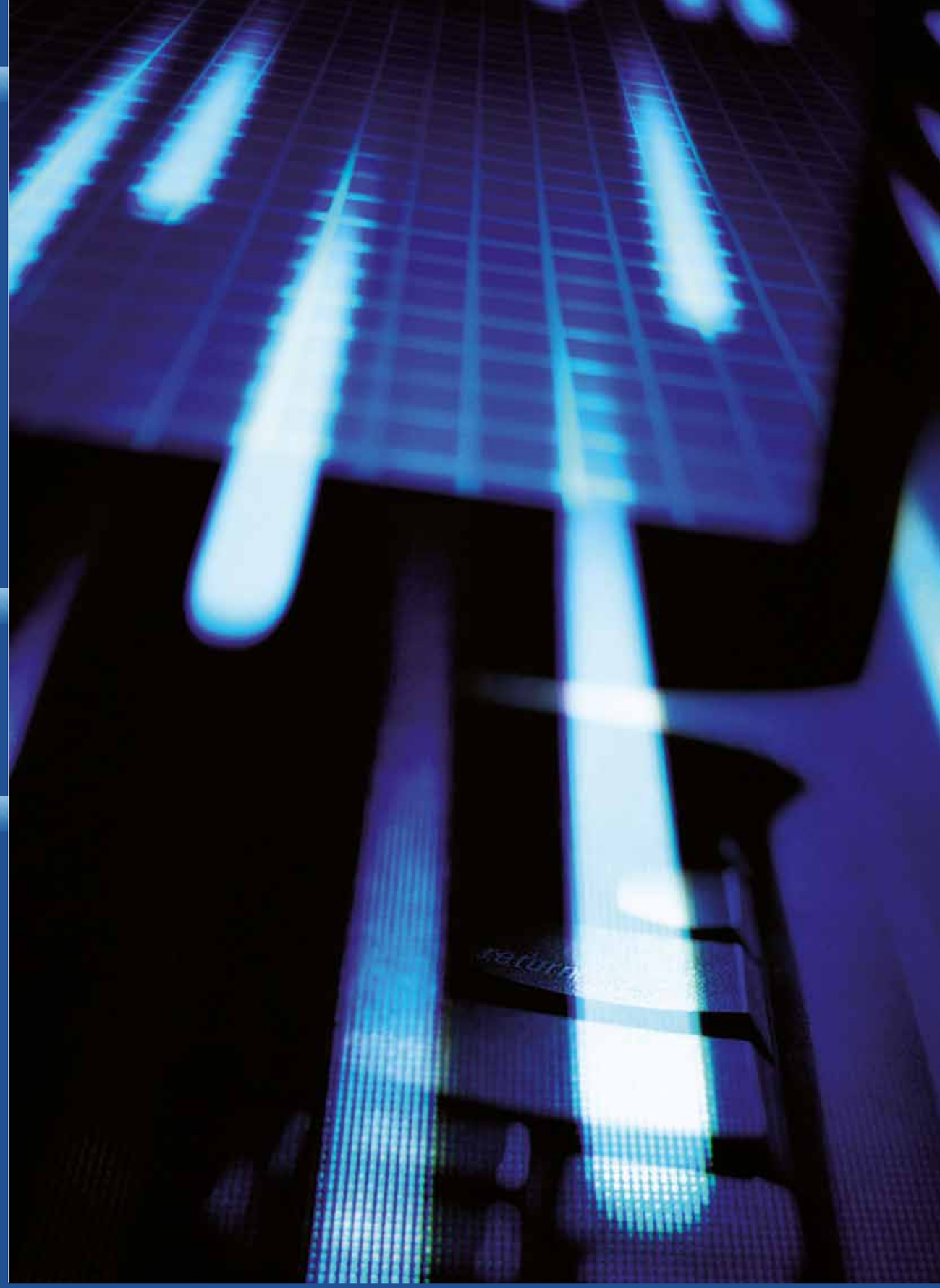
Lean software assessment model published

The report (D2.2.2 *Lean Software Enterprise Assessment Model*) summarizes the efforts, lessons learned and experiences collected on Lean Enterprise Software Assessment Model. The goal has been on studying and experimenting how to assess the implementation of agile/lean methods within a software organization, especially for those largest, to check the results, reduce uncertainty and guide the next steps of the adoption of these methods.

Report on best practices for cloud computing published

This report presents best practices for cloud computing. It introduces the main technologies currently used in cloud computing. It then discusses the main commercial offerings and their programming models. The hardware virtualization technologies used in datacenters are discussed, and three different service abstraction levels: infrastructure, platform and applications. Also the main drivers and adoption problems in cloud computing are covered. The report contains sections on scalable cloud technologies, cloud from the application programmers view, security and privacy in the cloud, as well as the use of clouds for machine learning and data mining. A major part of the contents are case studies performed in the Cloud Software project as well as the best practices learned from the case studies.

Best practices for cloud computing (deliverable 1.1.2)



Cloud technology reshapes earnings principles in the ICT field

The term cloud technology has been widely heard for the past few years already. The possibilities offered by cloud are shaking the cornerstones of business operations in the ICT field.

Photo: Tekes, Laura Rannikko

Although many things have changed, the challenges for businesses offering cloud technology are the same as they have been for programming companies in the past. The greatest challenges for cloud services are related to scale, marketing and financing. The most significant factors causing uncertainty for customers are related to data security and operational reliability.

Cloud technology brings with it significant changes in the programming business. Business activities are being reshaped into horizontal layers as maintenance of user interfaces, programme applications and servers are distributed among different parties. Some companies are offering server space or infrastructure, while others are offering applications.

For the user of the service - an individual consumer or a company purchasing the service - cloud technology is visible in practice as faster or entirely new services, where data can be accessed from various sources faster than before. Functions are sped up because the capacity within the cloud always provides the necessary performance capability.

Cloud technology offers many new possibilities for service providers, as well. Business operations which previously required large initial investments and ownership of programmes and servers now have a greater degree of freedom because programme applications and server infrastructure can be procured for each specific situation, not scaled for the largest possible capacity that might be needed.

Professor **Pasi Tyrväinen** from the University of Jyväskylä, who is taking part in Tivit's Cloud Software Program, has analysed business models and earning principles for cloud services. "The change is going to be very significant," he says. "In the next few years the top priority for programming companies will shift even more toward offering services," Tyrväinen says.

The change may provide significant competitive advantages particularly for small, start-up programming companies making use of cloud technology. However, in order to realise these advantages it is important for a company planning to use cloud technology to establish its own earning principle within the changing structure of the field, and to successfully achieve it.

Success requires an ability to efficiently make use of economies of scale. Massive virtual server centres can provide service to many customers simultaneously, and offer server capacity flexibly according the customer's needs (PaaS, the Platform-as-a-Service model, in which the development environment for programmes is used as a service over the Internet). Companies offering infrastructure as a service (IaaS, the Infrastructure-as-a-Service model) also try to drive down their unit costs by accruing a large number of customers, and in doing so achieve a favourable profit margin per customer.

Photo: NSN

In Finland, market demand is rarely sufficient for making such large investments.

It is no surprise, then, that the driving force in the progress of cloud technology in the Finnish market is based on the SaaS (Software-as-a-Service) model, which offers programme applications as a service, with both businesses and consumers as customers.

The earnings principle of the SaaS model also presents challenges, for example that customer interest in the application often depends on the number of users. In order to make the application appealing, the service provider must develop a large enough number of users. This holds true particularly for applications offered to consumers. A large number of users also allows the efficient and economical sale of applications to consumers on the Internet. On the business side, where decisions are more difficult and involve a company's strategically important business activities, trade is based on personalised sales work, making it a significant cost for a company.

Photo: Nokia

"The change may provide significant competitive advantages particularly for small, start-up programming companies making use of cloud technology."

Risks of cloud technology depend on customers and providers

By implementing cloud technology, a customer gains a more commanding position in business operations. Among the largest risks for service providers are longer timeframes to achieve a return on investment, slower realisation of cash flow and new freedom for consumers. At least in theory, customers have more freedom to change vendors when purchasing both programme services and server space. Of course, the cost of making changes and the interruption of functionality create a significant cost for the customer. For companies offering cloud service, greater dependence on other service providers or vendors is a new operational risk.

An essential question for businesses is how to keep customers happy with the new business model. Tyrväinen's answer is to provide the best service possible. "By best service I mean not only technical functionality and response time, but also reacting to customers' needs and providing sufficiently frequent upgrades.

It is positive if, as a result of a new business model, programming companies learn to take into account the customer's viewpoint at the very beginning of their business activities," he says.

Success factors for cloud technology analysed

According to Professor Tyrväinen's analysis, the most common recipe for success in cloud technology is gaining a large market share and a large number of customers in a short period of time.

"Because income from cloud business activities is relatively small and income flow is distributed over a long period of time, even in the case of a large customer achieving economies of scale is a question of survival," says Tyrväinen.

The Finnish market is known to be limited, and is often too small to make starting a cloud business sensible. A limitation for Finnish companies is making the leap to international markets, which in turn requires outside financing. Whether it is a question of using cloud technology or a more traditional business model based on license operations, the problems confronting Finnish businesses seem to be the same.

According to Tyrväinen there are other ways to succeed, as well. A business can succeed in conquering a profitable sector by employing a business ecosystem. As an example, Tyrväinen cites Sympa Oy, a provider of personnel management information systems and expert support services for them, which has made a breakthrough in a narrow segment at very little cost and has succeeded in growing its marketing by using well chosen partners. Tyrvänen noted that the network is also trusted by another successful company, the data security firm F-Secure, which has entrusted its distribution network to its operating partners.

Despite the substantial risks, Professor Tyrväinen believes that in addition to cloud applications, Finland's possibilities include offering customers cooled server room resources which make use of the cold climate, or a combination of open source code and cloud technology.

"The use of open source code is well suited to offering cost-effective cloud services to a large customer base. Where use of the Internet as a distribution channel decreases distribution costs, the use of open source code decreases development costs for programmes that implement services. The majority of programmes used by large cloud service platforms (Amazon EC2, Google, etc.) run on open source code platforms," Tyrväinen explains.

Kirsi Gimishanov

Professor **Pasi Tyrväinen** of the **University of Jyväskylä** has studied the business models of Finnish companies that use cloud technology and performed an extensive analysis. **Aalto University**, **VTT** and, on the business side according to Tyrväinen are: **Ixonos**, **Gearsift Group** and **Elektrobit** have taken part in the research.

Earmarks of cloud business activities: Distinguishing characteristics of cloud technology are services that are used through a browser and are flexibly and quickly scalable according to a customer's needs. Resources are used effectively, and servers are often virtual and distributed among a number of supported customers.

Another characteristic is that the need for service can be measured and validated after the fact, and billing is based only on actual needs. In turn, recognising actual needs allows more precise targeting of costs.

Photo: Ari Turunen

The customer's user experience decides

The user experience produced by the product or service is not irrelevant for its success. We are slowly becoming aware of the significance of the user experience in Finnish product and service design, when the user friendly products beat its competitors with their wow-experiences. The willingness to investment into developing the user experience is still remarkably low.

When asked about the specifications of the user experience from **Sari Vilminko** who is the User Experience expert at Digia, she starts out with saying what it is not.

"User experience is not the pretty icons made for the application after when the technical structure is completed. The user experience is a comprehensive approach method which follows through the whole design process from the business idea and earning logic to marketing and introducing supplementary services", says Vilminko.

"The task of the user experience experts is to open the customer's eyes to noticing the user experience. It is a very business critical matter and not some cute addition", she continues.

Vilminko functions as a team leader in a team where is addition to the research institutes (VTT, University of Helsinki, Tampere University of Technology), include also several industry companies. The goal is to develop the user experience in the lean philosophy spirit towards efficiently detailed and streamlines processes and measuring research and development of the user experience. And all this by keeping the opportunities of the cloud technology in mind.

"A good customer experience includes an effortless use of the application and a feeling that you can concentrate on the problems of the matter which does not need any technical details."

A good user interface does not load the user's time and stress with that the logic of the application is different from the logic of the user. Everyone has experiences from a bad user interface, but a good design usually works when nobody notices it.

Also more self evident matters belong to a good user interface, like the safety of the product or service, reliability and individual features. Sari Vilminko emphasizes that we are in the very beginning of understanding the user experience. The extent of the research target has taken its form. According to her, the most interesting is what we still don't know. As an example she takes the hard to research experience factor, the so called wow-concept. Wow is a positive and surprising reaction which is caused by the user by using a certain application. The only way to clarify the experience composition is by trial and error.

Also the user experience is going to the cloud

The Cloud Software concentrates as by its name into the cloud technology from different angles. How does the cloud technology affect the user's user experience of the cloud application? Often the use of the cloud technology is not visible to the user, nor is the user interested in the technology behind the application as long as the application works flawlessly.

"The cloud technology might make new ways to do things possible", says Vilminko.

"The purpose of the partners involved in the program is to innovate and research the connection between the cloud technology and the user experience. The cloud technology itself is nothing new, but it can bring along several new ways to research user experience", she continues.

As an example of the challenges of the cloud she mentions the typical platform independent cloud technology. A well designed application should produce a good user experience regardless of the technical used for the application.

The interest scale of the involved partners range from social media applications to data security. For example the point of view for Tieto is sustainable development, for Sonera it is media and social media, and for Digia it is experiment and community. At the moment a test is started in the project where the good user experience of data security applications is researched and pondered how the uncertainty caused by the data security notification can be reduced.

"The data security notification is usually an alarm which does not tell the user what should be done next. The user will have an unpleasant experience about if the user acted correctly or did the user create damage to the organization's network", says Vilminko.

Sari Vilminko, project Manager at Digia is responsible of the company view in user experience research.

The user interface as the trainer

Vilminko also talks about the good interaction as a part of good user experience. Is a good interface such that it is sparring the user to optimize the user's way to use the application? Especially in the public sector it is possible to still bump into hard customized systems, which operational principle is hard to clarify even with reading hundred page manuals. In these cases the employees own logic and resources will not help, but the correct operational method has to simply be committed to memory. Naturally the costs for commissioning and training are astronomical and time is wasted daily to use the hard system.

"It is easy to calculate how much the daily additional 10 minutes means as wasted working time every year. The hard systems affect also the employees' motivation", says Vilminko.

"Luckily this incorrect customizing is going away. At the same time as the application suppliers invest in cloud technology, it is natural to invest in the user experience. On the other hand, nowadays the customers demand functional and flexible applications. And when it has been researched that putting effort in the user interface design will decrease significantly the need for user support, there should be sufficient basis for the investments", she continues.

Vilminko considers paper manuals quite old and believes that the application evolution is going more towards flexible applications which guide the user. With the help of the cloud technology, we can offer for example for the same application user different additional parts from the same program. Some part which is used for example only by a few from the company does no need to be available for everyone. Similarly a hesitant user can get guidance with additional help parts if so desired.

To research a good user experience is a good example of how the competitors get exponential benefit from cooperation. Especially when every company has its own special interest, the same matters will inevitably be viewed from different points. Vilminko says that she considers that the most important feature of the Cloud Software is the possibility to combine the research forces. According to her, to work together is in any case a must for the long-term survival of the Finnish ICT companies and the Cloud Software type programs which makes it possible to work together safely and naturally, are very important trial laboratories for the whole industry.

Kirsi Gimishanov

Digia is the largest ICT house in Finland which is working in the User Experience field and employs over 80 professionals. Digia is leading the Tivit's Cloud Software project which researches user experience together with several others (Exfo Nethawk, TeliaSonera, Tieto, Digia, Elektrobit, F-Secure, Ixonos and Nokia) ICT industry companies with different weighted participation.

One of the common goals of the Cloud Software is to develop a streamline user experience which is according to the lean philosophy, research the measurement of the user experience and to produce new innovations to the cloud technology where also the user experience is acknowledged.

The UX-team of the Cloud Software will in the future share their know-how at the review events of the program. A UX-clinic will be arranged at the events, where the professionals will solve user experience related problems.

Initial user experience models in Finnish Cloud Software Program

The report introduces the following building blocks for measuring and modeling user experience

There is a growing trend amongst companies who turn to the concept of user experience to enhance their competitiveness. This is because user experience, as a differentiation strategy, provides an opportunity to add value to customers. However the decision to establish user experience business activities within a company or outsource those also means investments and is a strategic decision company management needs to make.

User experience has proofed its value as a horizontal branch of business that can be applied throughout the whole development process. Concept and user interface creation with rich interaction flows such as experiential, interactive demos, visual design or visual facelifts, user studies in different contexts with different methods are used daily to create value for products and services. As the demand and interest to invest on user experience expertise grows among different industries questions how to measure it.

As a multidisciplinary field of business and research user experience can be modeled and measured from different perspectives. The Cloud Software Program deliverable introduces the following building blocks for measuring and modeling user experience: psychological attributes, user performance attributes, business impact of user Experience and value perspective to experience business.

Timo Jokela, Virpi Roto (University of Helsinki), Andrey Sirotkin (VTT), Kaisa Väänänen-Vainio-Mattila (Tampere University of Technology), Päivi Romppanen (Tieto), Sari Vilminko (Digia): Initial UX Models and Measures (Deliverable 3.3.1):

http://www.cloudsoftwareprogram.org/results/i/27390/1569/d3-3-1-initial-ux-models-and-measures

To develop user experience is an art of seduction

To change over to Cloud services is almost invisible to the regular software or web service end user, as it should be. For the normal user in Internet banking, social media applications and various web services which make everyday tasks easier (for example web stores and web customer service); it is most likely irrelevant on which platform the service run on, as long as it works.

The regular user's cloud service hides a lot of user experience pondering and development work. The cloud services might make the random user's life significantly easier. But in some cases, the transfer to cloud service will bring completely new challenges for developing the user experience. The goal in the Cloud Software Finland is to improve significantly the competitiveness of the Finnish software intensive industry companies in the international markets. The strategic focus areas of the program are the Finnish main factors of the software industry's competitiveness: effectiveness of the operative functions, good user experience of the services, to offer the software as a service on the web, data security and sustainable development. The program combines competitiveness factors together and produces new business models and ways that make software development based on flexible principles possible.

The program features several different research and development projects where a lot of effort has been put into the user experience.

A good user experience helps and seduces

To ensure a good user experience for services in the cloud service will at some parts require a lot more problem solving then others. Part of the problem areas come directly from the user's technological uncertainty feelings. These kinds of issues are for example data security related privacy and reliable service availability through the web connection. These parts are on the other hand challenges in the user experience due to the technology, like service functionality on terminal equipment. Additionally a well designed service will recognize cultural and user group specific important matters. When developing the user experience, the focus area is always at the end user's experience, which is divided into two areas: practical benefit, or the usefulness, reliability and usability, with emotional aspect, or the experience the service brings as its desirability and enjoyableness.

The general design principles of a good user experience are simple, although to bring them to use might be difficult. These principles are according to **Sari Vilminko**, project manager at Digia, among other things, to acknowledge the complete life cycle of the service and leaving own information control completely to the user.

Challenges to a good user experience bring the fact that the experience depends always on the user, user situation and the used service. The goal with the user experience is to map out the most general user groups and user situations of certain type of services and to make "sufficiently comprehensive" assumptions which define how the service can meet these needs. There are many moving parts and the user group categorizing are therefore always inevitably general.

"The user experience is an important part of the comprehensive experience of the service, which is best noticeable when the service does not work. "

The comprehensive experience is one of the important competitive factors, which easily decides the success or failure of a technically well made service. The extremely good and rich in experience user experience can be called the wow-experience. Explaining the popularity of certain services has been done by studying the wow-experiences.

Also the images are significant

Professor **Kaisa Väänänen-Vainio-Mattila** from Tampere University of Technology shares the challenges of the user experience with the Cloud Software Program under different themes, with which the user experience problems are easier to approach.

One of these themes is very general and common for several services; the user's worry about the fact if the stored information and material really safe, i.e. can the user control by himself/herself the user rights of his/her data and is the data security of the service sufficient in reality and on the imaginational level.

For the user, the stored personal data is a factor that both makes things easier, but is also a potential threat. The previously given default information makes the service more practical by making it possible to use existing profiles and to customize the service just right for yourself, but on the other hand, creates uncertainty if the user does not exactly know what information of the user the service will store. A successful data security is naturally a basic prerequisite, but Väänänen–Vainio-Mattila emphasizes that it is important for the service developer to understand that also the conception is significant.

"The unfounded fear of the user does not decrease their importance. Therefore it is important to communicate the safety of the service to the user. Also the way in which the matter is communicated is very essential. Cryptic automated notifications will not make the conception better of a well managed data security."

A trustworthy conception can be created with the user interface by offering clearly stated and easily found, what information the service will store from the user and who has access to the information. The safety conception can also be strengthened by different service announcements: for example when storing information, the security feeling could be strengthened by announcing "your information has been stored and you can adjust the user rights and visibility of the material".

The services are ever more networked and it is more common that for example logging in to several services is done by one username/password combination or the username/password combination of another service. The bilateral networking of services brings naturally more headaches for the cloud service user experience and data security developer. For the service provider, developing the user experience is a balancing act between practicality and the legislation. The developer has to know the legislation well, and understand for example what tools can legally be used to identify the person, and what not.

Key user experience related to six cloud services

User experience (UX) is an important design target and success measure for new services, especially when the users have plenty of choice within the quickly expanding service offering.

From the user's point of view, the cloud concept may facilitate better user experience but the concept may also raise new challenges.

UX targets for the cloud are still undefined in research. In the research article, key user experience issues related to cloud services in six design and evaluation cases will be identified. These are Open Telco, Cloud of Things, Social TV, Mobile Web Browsing, Photo Sharing through a Cloud Service, Class –Platform Service Access. Based on the findings, research questions for initial research agenda on UX in the cloud are proposed.

Kaisa Väänänen-Vainio-Mattila (Tampere University of Technology), **Eija Kaasinen** (VTT Technical Research Centre of Finland), **Virpi Roto** (University of Helsinki): **User Experience in Cloud: Towards a Research Agenda**

http://www.cloudsoftwareprogram.org/results/thesis-and-articles/i/27487/1570/article-user-experience-in-the-cloud-towards-a-research-agenda

Photo: Ari Turunen

The aim is to integrate the user experience methods tightly in the cloud computing and lean/agile sowtware development. Professor **Kaisa Väänänen-Vainio-Mattila** leads the academic user experience research in Cloud Software.

Cultural difference and sociality

Also different terminal devices that can access the service, will create additional challenges for optimizing the user experience. Typical terminal devices are a PC and different mobile terminals. The advantage with cloud services that they are up-to-date independently on the devices, because the data is always retrieved from the cloud, not the device. Technically a cloud service running with a browser would at first seem to be a more reasonable solution then an application created for every device, but Sari Vilminko advices to broaden the perspective to a global users. The world has still many users who are just now getting into browser based services and whose devices might be of the "first generation". The difficulties with global services are the cultural differences, says Vilminko. A simple example is related to the used colours in the service; for example the definition of a pleasant colour world differs significantly between Asia and Europe.

Along with cultural differences, there are also generational differences. For example Vilminko mentions communities which will divide the net natives, who have grown along with the web with the ones who have learned at a later age to use the web, closer to the middle age, into different groups. For "net natives" socializing on the web is more natural then for late bloomers. The late bloomer will easily get an overdose if the social interaction and needs a break, where the net native will become stressed without the social interaction. This is also a great challenge for the service developer: to see the fine line to what context social interaction fits. Just to make sharing possible will not make the service addicting, also the usefulness aspect is necessary. Of course there has been evolution in the web services using social interaction at the national level. People and organizations learn by trying, what works on the web and what is suitable.

For many service developers, the fact seems to remain unfinished of how the use of the service is terminated. Is the user wishes to leave the service, he/she should be easily able to remove all his/hers information from the service. A way from a good user experience is to make the service so desirable that terminating the service is not an option.

"Very few services will make random "break" possible: a flexible temporary termination and later a flexible service continuance", Vilminko says.

To notice the user experience through the complete life cycle will ensure a better user experience at every part.

"The better a succeeded and memorable user experience is ensured, the more Finnish software products and service will be able to respond to international competitions", summarizes Vilminko.

Kirsi Gimishanov

“The Open Cloud Stack work will produce at best a model, which is so far lacking in the software industry, to share information even among competitors”

Photo: Ari Turunen

Open Cloud Stack

Cookbook for cloud services developed by Tivit’s Cloud Software Finland Program

Photo: Ari Turunen

The aim is to create a live manual that will contain the most completely productised technologies as possible, i.e. advance as well as guaranteed tried and tested templates, says professor **Tommi Mikkonen**.

The enormous cost savings and the wide range of opportunities of cloud services attract. Cloud services are a great way to test ideas quickly and cheaply in the right market, especially for new software companies, as the starting threshold has lowered dramatically in terms of rental capacity. Whereas you needed 100,000 euros to start a business five years ago, today you can get started with just 10,000 euros.

Professor of software engineering at Tampere University of Technology **Tommi Mikkonen** takes a calm view on the current hype surrounding cloud technology. He sees the hype around cloud as part of the wave where, firstly, people wanted to diverge from the big mainframe computers toward the individual computer, and now back again to the central mainframe model. This time round, the appeal of the central mainframe, however, increases the existence of a global channel – the Internet. It enables the same level of service to all end-users, irrespective of location. And in turn, the new business models mean that the very idea of owning a mainframe seems silly.

Be aware of a fashion craze

Cloud technology would still benefit from being refined, according to Mikkonen. When it comes to more recently productised technology, it makes sense to bring the companies’ more critical functions to the cloud.

“It is a bit like a fashion craze, or mass hysteria, in which big groups of companies might get involved without much preparation or without identifying the risks,” says Mikkonen. “It’s not very wise. With an unfinished technology, the result will inevitably be bad,” he adds.

Mikkonen knows what he is talking about because he is involved in productisation at Cloud Software– as the head of the program’s technology section. The technology team’s task is to commercialise cloud services for different applications, different platforms and a variety of hypotheses. This has given birth to the manual, or the cookbook as the project likes to call it, which acts as a location landmark that analyzes where things are going in terms of cloud technology. Its aim is also to ensure that no double work is done, i.e. investing effort in things that have already been done.

“I find it a big problem that technical programmers only have time to properly familiarise themselves with a couple of technologies at most. And among the software technologies, on the other hand, there is always one dominant technology that then guides familiarisation. This has not happened in cloud services yet,” says Mikkonen.

The key idea in the cloud services cookbook will be technology independence. The point is not to know how an application or service has been made, but to first and foremost examine it through service interfaces. The cookbook is primarily aimed at application developers, but corporate IT departments will also benefit from it.

The common good as a goal

Coordinator and head of Ixonos **Jari Kekkonen** sees a great deal of sharing in productisation work for the greater good of the Finnish software industry.

“In the Finnish software industry there are many small companies that aim for the global market. Our idea whilst creating the cookbook, or the Open Cloud Stack, was to together with research institutes and companies give birth to a common technical overall solution package that will benefit different players in the software industry. Our goal is for the common good, that is,” says Kekkonen.

The project players’ input vary depending on expertise and interests. The project consists of teams whose roles it is to drive things forward in various areas. Ixonos’s own interest, according to Kekkonen, is in the two ways of doing business research: Ixonos wants to be involved in developing a SaaS type business, especially for the local government sector, and also in building a platform for web applications and clever product development.

Cooks wanted

The Open Cloud Stack work will produce at best a model, which is so far lacking in the software industry, to share information even among competitors, maybe even an entire collaboration ecosystem. The currently ongoing work has yet no commercial purpose, but the project partners consider the discovery of such possible. Everything depends on how good the end result of the work is.

“The ideal would be if the partners decide to create a business based on the productised cookbook – even a separate company that would continue the development work,” Mikkonen visualises. “It would also be easier to find global partners for such a company,” he says.

The Open Cloud Stack

A Tivit’s Cloud Software Finland program productised package based on open-source productised cloud service components, upon which companies participating in the program can safely build their own business.

Tommi Mikkonen is responsible for the entire technology section, while Inoxos’s Jari Kekkonen manages the subsequent steps. Companies (F-Secure, Nokia and Tieto) as well as research institutes participate in the project. The companies’ area of responsibility is the construction of the best possible program, whereas the research institutes aid in test integration. The first installation is planned for the end of 2011.

Kirsi Gimishanov

Photo: F-Secure

The future of the ICT-industry in Finland is in data security

As the cloud services become general, it has completely changed the require-ments for data security. The cloud services grow the common interfaces be-tween the software and services and blur the picture of the complete service complex. In the cloud world, it is impossible to secure information with stand alone band aid solutions. As the ICT solutions change to a service purchased off the web, the data security also changes to a total service which covers the lifetime of the software environment.

Ari Pietikäinen from Ericsson has been involved in thinking about the devel-opment of the data security requirements on a national level. The report Finland leading the way in Data Security from the work group was published in the publishing series of the Ministry of Transportation and Communications in 2010, and the matter has not become obsolete in one year. The report gives proposals for actions to preserve and develop Finnish data security. According to the report, it is foremost important to establish a top know how unit for data security, the Finnish experts to attend international standardization meetings, and general national data security training, and to improve the cooperation be-tween companies, research institutes and public organizations. Of course to be able to implement the recommendations, government funding is required, but also a more detailed plan regarding realization.

Pietikäinen is also very much involved in data security because of his work. His opinion is that the data security point of view comes to most application devel-opment trends afterwards. Cloud computing and trends it makes possible – saving data reserves, storing and processing in the cloud – offer a more flexi-ble services for the users, but at the same time many new interfaces and po-tential vulnerabilities.

Is the key to success in developing the cooperation?

Finland has gained an excellent reputation in data security know-how, and Pietikäinen wished for public funding to maintain the reputation. According to him, to develop the data security solutions is one of the most important possibilities for the Finnish IT-export.

“The know-how of the Finnish experts is very technically oriented, and our strengths are in technical securing and testing”, Pietikäinen says.

“We have excellent know-how in the data security of web protocols and in defending from viruses and malwares. All this information is scattered around in companies, research institutes and public organizations”, he continues.

When significant attacks are aimed on data reserves, the lines are together fast, but Pitkänen would like a more deep and preventive approach to the cooperation.

The problem is typical also in other top IT-countries, but it is essential how vigorously the cooperation is to be improved. For example Pietikäinen mentions North-America and India, where the cooperation of different players has been realized and significant effort has been put into.

“The benefits of cooperation should be utilized also in Finland. A lost reputation is much more expensive to start-up again than to maintain”, he says.

The cooperation openness of the companies is easily limited by business related trade secret information. Pitkänen also wishes for more mutual cooperation forums like the CERT-community. As a good program feature he sees the tight cooperation of the research institutions. The research institutions have resources and they are able to put effort into developing the calculations and mathematics, as long as the company partners in the project guarantee that the final result surely corresponds with the market demands.

Surely there is development to be done in the Finnish data security know-how. The development areas are according to Pitkänen in the operative side of data security. One of the development proposals according to the report is the general data security training of the citizens or – increase the awareness. In the end, the data security is depending on the user.

Photo: F-Secure

Photo: Ari Turunen

“The theme for year 2011 was to search for a data security solution that will apply the flexible methods.” says professor **Juha Röning**

The value of a lost reputation and occurred damage is very hard to estimate, and usually there are no precedent cases. It is hard to apply investment calculation or insurance math to data security investments. There has been several examples of serious data reserve leaks and misuse. According to Pietikäinen, what all these have in common is that their effect to business during only one day is significantly higher then what the money required to develop data security would have been. When the probability that a major risk would actualize is small, it seems that risk is rather tolerated than covered.

Flexibility in Data Security

The leading know-how in data security R&D can be found at the University of Oulu. Professor **Juha Röning** from the computer science department says that according to the focus areas of the Cloud Software Finland – software, in developing data security - the aim is in life cycle thinking and adapting to flexible development demands. In practice this means that data security is continuously a part of the software development’s different phases, all the way from requirement specifications to developing spin-off products.

Professor Röning also wonders the detachment of the data security in software development

“For some reason, there has been reluctantly towards paying for data security. It can be seen where the data security has for long been as a separate attached part to the complete package”, says Juha Röning.

“Our starting point is although to integrate data security to be a part of the complete package”, he continues.

The theme for year 2011 was to search for a data security solution that will apply the flexible methods. The flexibility is along with data security, one of the Cloud Software’s focus areas. Development work done by using the flexible principles advances in short sprints. The long test time required by data security is sometimes hard to fit in the sprint work pace. To solve this problem in Röning’s group, the tool Radamsa has been developed to test the web browser in a flexible work environment.

Radamsa is almost an automated browser test tool: it enables fast, cost effective and most important high amount of testing. At the same time, Radamsa is one tool that enables data security to integrate as a part of the software development and flexible principles. With the help of Radamsa, the testing can be automated and simplified, and reduce simple errors. In the next development phase, the aim is to research how errors are made and how they can be eliminated before they are made.

Kirsi Gimishanov

The reliability of cloud is fine-tuned with automatic testing

Radamsa, developed by the University of Oulu, is an efficient automated toolbox for data security specialists. Hundreds of millions of people are already using services which utilise cloud technology over the Internet without realising it. With cloud technology, the number of interfaces and therefore risk factors increases, which also poses a major challenge for the data security of the future. Radamsa, developed by the University of Oulu, is an efficient automated toolbox for data security specialists.

The data security and reliability of cloud technology are the biggest concern of companies considering the use of cloud technology. Insecurity is understandable when even the more critical operations use the cost effective cloud computing. **Pekka Pietikäinen** from the University of Oulu data security development team trusts in the future in any case.

“Cloud technology is an important element for companies when they want to do big things cost effectively, and its data security issues can be solved,” says Pietikäinen. “As with any new technology, the companies adopting cloud must assess carefully their risk-taking ability and the benefits that cloud can produce.

Agile data security for the entire life span

The agile principle methods cause problems in the testing phases of software development, which usually are time consuming. When work is done in short sprints, it is essential that testing is also adapted to the fast working pace. Radamsa offers help for the testing of data security development work. It can be used to test the ability of the program to run and tolerate hostile input.

Pekka Pietikäinen explains that the key concept is being systematic. Data security is examined throughout the life span of software development, so that it is already included in the requirement specification stage. A process has been created for each phase of the life span, where all issues specified in advance are examined systematically.

“Data security must not be some kind of an afterthought. Instead, it must be taken considered throughout the life span of software development.” “Every time a string of code is completed, it will be tested with the automatic testing system,” Pietikänen describes the progress.

The operating principle of the testing system is to take specimens of all possible data which is input for the software to be tested, like a browser or a cloud service, and create test cases of them. Partners of the project have already used Radamsa in their own testing. There will certainly be commercial potential for Radamsa.

Radamsa is a fully automated testing tool of data security, which deduces structures and creates test cases. It combines the best features of the previously developed automated data security testing tools. Corporate partners of the project have included Ericsson, Nokia, F-Secure, Google, Mozilla Foundation and WebKit.org. Radamsa is based on open source code.

https://www.ee.oulu.fi/research/ouspg/Radamsa

Cloud news

Cloud Software Finland is developing a data security manual for cloud technology

Cloud services enable new modes of operation and major cost savings for businesses. Recent problems with data security have shown that hacking and sabotage also causes problems for the data security of cloud technology. A Finnish research project focusing on cloud services will provide help to the situation.

Companies find cloud technology a very tempting new way to operate, even if it isn't quite as new a technology as the recent hype has led us to believe. Transferring computing elsewhere is not a new concept, but the limitations in band width have previously restricted the use of cloud computing. Now band widths are sufficient, and the opportunities for cloud services are therefore better. Customers are most concerned about data security and reliability, however. The Focus Area Director, **Janne Järvinen** from F-Secure, emphasises that the recent news reporting about cloud data security problems is in part a consequence of new developments, such as cloud technology problems, simply gaining more attention. The basic principles of data security will not change with cloud technology; instead, the ongoing race to keep ahead of the hackers will continue.

"Cloud services will introduce more interfaces, while more flexibility is called for. This is a complex problem area, and therefore the data security of cloud still requires a lot of development. Companies which transfer their operations into the cloud must now be particularly vigilant and analyse the risks and benefits carefully," explains Järvinen.

Open interfaces cannot be avoided

The practical data security work at Cloud Software is led by **Juha Röning**, Professor at the University of Oulu. He explains that within the programme, a manual will be created, which should help companies better understand what needs to be taken into consideration when using cloud technology, and how to proceed in practice. The manual will contain a lot more than just technical details: it will for instance explain how to steer role-setting inside a company, and who should be aware of data security issues. The data security work led by Röning is advancing in short sprints, in accordance with the principles of agile software development. The work also addresses how within a short space of time, a volume of testing is undertaken quickly and cost effectively: for the browser, a tool set already exists for this.

Röning continues to talks confidently about the. "Since the beginning of the 21st century until today, a lot has happened in system development," he notes. "Ten years ago, people put a lot of faith in embedded systems. Today, there are no embedded systems, for which open interfaces couldn't be found elsewhere. Let's think about an average car: it has an on-board computer which continuously communicates with external systems. Its systems have diversified and become more complex, and communicate continuously with other systems. This is also the future of corporate data communication systems. That is why data security must be built continuously throughout the development and life cycle of the software.

Two reports on cloud business

Cloud Software Program has published two reports on Cloud Business models. The first (First taste of cloud software business) is a report on definition of cloud software business, on transition from software project business and license business, and on value propositions and risks of cloud software business. The second (Intermediate report on industry-specific cases) is an intermediate report on industry-specific cases of value chains in cloud software business, their composition and description how value is generated for the customers and providers.

A book on Agile Product and Portfolio Management

The book Towards Agile Product and Portfolio Management by Aalto University's Software Process Research Group (SPRG) provides guidelines for linking long-term product and business planning, portfolio management and agile software development. The guidelines are a synthesis of latest practitioner and research literature as well as decade of collaboration with Top Finnish Software Companies.

Demo to test combined voice and geospatial data location services for Internet applications

The School of Science at Aalto University has been conducting research on combining teleoperators' voice and geospatial data location services for Internet-based applications.

Teleoperators' open interfaces (Open Telco) present new and interesting application possibilities. To develop the technology, demo versions are being studied as part of a Department of Computer Science and Engineering course focusing on mobile programming and cloud software.

A growing number of applications provide the opportunity to use geospatial data services. A corresponding service is becoming globally available in Facebook. "A demo version of Geo Broker worked to define how the end user can determine to whom and when the user's locational data is visible on the web or operator services," says **Yrjö Raivio**, a doctoral student at the Department of Computer Science and Engineering.

"In the demo project we tested restricting the data by making the location visible, for example, during working hours but not during free time. We also tested defining the locational data based on the location itself and the Internet application. This would allow the user to limit the locational information disclosed to his/her position within the workplace surroundings, for example, and allow, say, Facebook as the locator but no other web-based applications," adds Raivio.

How to combine voice calls and Internet services?

"A demo called Ringle studied combining Internet-based services and voice services. As the voice service we used teleoperator's voice service, while the Internet service was Doodle, which is the currently available web-based open access calendar service," says Raivio. In the demo test phase, the voice service called the employee's mobile phone, explained the alternatives for a meeting, and asked the user to choose the time that best suited him/her.

"Combining voice phone calls with an Internet service was studied at the concept level. Operators receive most of their earnings from voice calls, so making voice directing automatic and providing access to Internet-based services may bring new and interesting application possibilities," Raivio explains.

Teleoperator's software tested on cloud platforms

The HLR Cloud demo investigated how teleoperator services work on cloud platforms. "Our research focused on the mobile network's most critical software element, namely the Home Location Register (HLR) database. The application was run on the Amazon Elastic Cloud Compute (EC2) cloud platform and changes in delays and performance of the HLR were followed. According to the results the current cloud platforms are able to meet the performance requirements set by telecom networks," says Raivio.

Demo testing on SMS and multimedia services combined to Internet applications

The School of Science at Aalto University has been conducting research on combining teleoperators' short message services (SMS) and multimedia messaging services to Internet-based applications. Open telecom interfaces for operators (Open Telco) are generating new and interesting application possibilities.

Ordering tickets through Facebook using a mobile phone

Facebook users are creating numerous events on the Facebook-Event website. However, the website is not an e-shop for buying tickets; the purchase has to be made separately using ticket selling websites.

"In cooperation with Event Experience we developed a demo version, through which tickets can be ordered through Facebook," says **Yrjö Raivio**, who is preparing his doctoral thesis at the Department of Computer Science and Engineering. The user can access the Order page by participating in the event and this is done by pressing the "Attend" button. The orderer enters his/her phone number into the appropriate field and presses the "Buy" button. This causes a matrix code (Upcode) to be sent to his/her mobile phone as a multimedia message (MMS) and the code serves as a ticket to the event. In the future the demo project will investigate how a ticket can be charged directly in conjunction with the phone invoice."

Car pools formed with text messages

There are several actively working car pool websites in Finland. Those who look for drivers and passengers willing to use a car pool have to browse for announcements.

"We implemented the same idea for the mobile phone. The name of the service is Kassi Mobile Rideshare and it automatically links a suitable ride provider and a person needing a ride. The match is informed to the ridesharers with a text message," says Raivio.

The service works through the Kassi network service, which is a second-hand shop for buying, selling and exchanging articles for students at Otaniemi campus. In the future the demo project will investigate how riders could pay their share of the fuel costs through their mobile phone account. Founding a company for the purpose of developing the Kassi web service is under way.

Arvue: Web-based user interface designer

Vaadin Ltd, Åbo Akademi and Tampere University of Technology have developed a service which is used in a web-browser to create visually attractive web applications and user interfaces. The service is called Arvue and it allows anyone to easily create applications that can be presented to a large, world-wide audience.

"Usability is one of the most important aspects of user interfaces, and we believe it's much easier to achieve good usability when designing visually", says **Marc Englund**, Senior Vaadin Expert from Oy Vaadin Ltd.

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Based on this idea, Oy Vaadin Ltd, Åbo Akademi and Tampere University of Technology have developed an early prototype of an Integrated Development Environment called Arvue, which is a browser-based environment for developing and deploying Rich Internet Applications (RIAs). The service can be used in any modern web-browser to create visually attractive user interfaces and applications, which can be presented to a large, world-wide audience. Arvue is used for designing small "stand alone" programs or programs that are embedded to other Web sites. Examples of these are different kind of calculators or forms that can be easily built. User interfaces can be visually designed by placing components and connecting functionality to them in a source code editor. Visual designing is made by using the Visual Editor, which is a program that Oy Vaadin Ltd has developed.

"The Visual Editor is improving constantly. Now for instance sports configurable snapping (snap to grid and components), nested visually edited layouts and basic add-on support generally look and work much better", Englund says.

"Also source code editing is supported and a source code editor with highlighting and code completion is progressing according to plans. On the service side, we have already an initial working publishing mechanism (compile, deploy to OSGi container) and a data binding component in the works. Research regarding load-balancing, provisioning and application level isolation in the Java Virtual Machine is ongoing", Englund adds.

The user interface designer can be used by anyone who is interested of creating web applications. Other users getting advantage of the service are Java developers or people with little experience in software development or programming. The service bases on the Vaadin Framework, which is a Java framework for building modern web applications. Also Arvue itself is a Vaadin application. According to Englund, a possibility to take the project "offcloud" allowing user to continue developing with regular tools and choosing own deployment environment will be provided in the future. For the time being, the plan is also to make everything free and open source including the applications made with the service.

Englund envisions that program contains business opportunities for future. "One example would be to charge depending whether a developer wants to keep an application private or closed-source."

Into viral community software development

Vaadin Ltd.'s Managing Director, **Joonas Lehtinen** has a vision of how software development can become easier and accelerate to the extent that it will progress exponentially. Vaadin intends to achieve this with its visually tempting, simple software development tool based on open source code, working on a cloud platform. Basing both the development work and the server space on a cloud, software development costs can be pushed down dramatically.

"Our goal was to take a longer leap in technology and bring the principles of communal working into application development," explains Lehtinen. "Cloud technology matches the needs of application development perfectly and lowers the threshold to start, when it is no longer necessary to install the development tools into one's own computer. We also wanted to benefit from our active user community and offer them something quite new. The support of the user community combined with the cloud technology makes the possibilities limitless. Winning ideas can be created with a small budget, when the development work can head to a completely different direction from the original along the way," he adds.

Web 2.0 created contents, Web 3.0 creates applications

Communality in a user community means that you don't always have to start from scratch. According to Lehtinen, viral progress can for instance mean that some grass-root level actor builds a simple solution for him/herself. The application can then be taken into use somewhere else. In the best case scenario, the published application will start to live its own life with the help of the Arvue tool, as new ideas to develop the already existing application to better fit someone else's needs pop up in the user community.

The use of Arvue is so easy that even someone with modest software developer skills can create simple applications with little effort. This lowers the barriers between different areas of sciences and is sure to promote the spreading of new ideas and ways of thinking also for software development. One of the significant benefits of community software development is that the user community is also able to use and combine fresh research results faster. Coming up with something new and surprising is more likely in community application development.

Both integrated application development (IDE) and server space are virtualised. Use of cloud technology makes it possible to always have just the optimal amount of resources in use for application development. When necessary, additional resources can be taken into use flexibly, and any unused capacity will not put an unnecessary stress on the server.

http://dev.vaadin.com/wiki/Arvue

Three articles on Kanban software development projects

The articles are focused on the exploring the sources of waste, on leadership, and on the impact of Kanban project work. The article *Exploring the Sources of Waste in Kanban Software Development* Projects takes a new angle and explores waste in the Kanban-driven software development project context. A preliminary research model is presented for helping the consequent replication of the study. The results from the empirical analysis suggest Kanban can be an effective method in visualizing and organizing the current work, but does not prevent waste from creeping in, although the overall project outcome may be successful.

The results from the empirical analysis (*Leadership in Kanban Software Development Projects: A Quasi-controlled Experiment*) show that waste is present in each project but the amount and significance of waste can be reduced with the right leadership even in self-organized teams of Kanban projects.

The aim of this study (*On the Impact of Kanban on Software Project Work: An Empirical Case Study Investigation*) is to improve the understanding on how Kanban impacts on software project work. For the purpose of the study, a framework is developed and empirically investigated in an experimental software R&D setting called Software Factory in a single case setting. The impact of Kanban is evaluated from nine theoretically derived perspectives. The qualitative findings indicate considerable positive support for the application of Kanban in the case setting. This bears direct managerial implications, which are addressed. The key implications of the findings suggest that Kanban and its inherent simplicity increase project visibility and thereby improve the ability to steer the project better.

The New Experience for Business: Why User Experience IS the Differentiation Strategy

The commoditization of products and services has forced organizations to look new ways of product differentiation. The new VTT Research Summary concentrates on differentiation strategy and user experience. Cloud is a major global trend propelling the information and communications industry today, resulting in improvements in technological and business environments. Customers are actively looking to access Cloud services and businesses are interested in the opportunities associated with the Cloud. The production of amazing experiences has become an imperative for business success. Creating and delivering experience offerings require advanced understanding of individual customer behaviour as well as general patterns of preference. Cloud technology makes such comprehension possible.

There are two fundamentals to acknowledge with respect to the experience market. First, an experience product or service is a distinct offering. A company cannot move to a user experience market by re-labelling its current products and services. Second, the transition to the experience business demands a new organizational model based on different capabilities than those of a service, usability or software development provider. The primary goal of the transformation is the development of capabilities and processes that would enable a company to compete at a new level

The commoditization of products and services has forced organizations to look for new ways of product differentiation. Software companies often turn to the concept of user experience to enhance their competitiveness. However communicating the new added benefits of user experience services to customers is a challenge that may impede corporate strategy. If an experience offering is not distinguished from aesthetics, elegance and usability design then the customers will not perceive the added value and will likely not pay for it.

Even a successful software enterprise needs to build a new set of capabilities to transition into the user experience market. The organizational knowledge of a software integrator or usability designer is useful but not sufficient in the new business arena of experience.

The new web store utilizes the developed know-how from the Cloud Software project

Software Company Reaktor has developed in cooperation with Elisa a web store aimed towards companies. Reaktor and Elisa received an honourable mention for the web store in the Grand One digimedia competition. As a result of the development work, a fast, straightforward service was created, where the users can complete their shopping, identification, shopping cart changes and other events, in the order that they want. Equipment and services can be easily ordered from the web store which ranges from computers to payment terminals and various communication services at any time of the day.

The delivery process of the web store is completely automated. Therefore the service is very fast and the customer will often receive the product already the next day. The web store attracted from the start new customers who Elisa had not reached before. The sales targets were reached in half a year.

http://oma.elisa.fi/yrityksille/verkkokauppa/#!/etusivu

Ericsson Research & Development Center Finland adopted lean and agile organization model

Lean and agile methods aim at eliminating unnecessary steps and establishing clear ownership of tasks. The Cloud Software Program is creating best practices for lean and agile software development. The large companies in the Cloud Software consortium have begun adhering to these principles. For example, Ericsson R & D Center Finland has set up twenty software development teams and completely reshaped its organization of the way of doing things and making software.

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In 2008, Mobile Media Gateway organization in Ericsson R&D Center Finland started adopting Lean and Agile in software development. The first concrete step was taken in autumn 2009. One of the most popular agile methods is Scrum. The company started with one isolated cross-functional team performing as pure Scrum as possible. In 2010, Ericsson extended the change to involve the whole Mobile Media Gateway organization. It was early realized that this is a profound transformation of the way of working, the organization, the physical seating arrangements, the culture and the competence profile. A multi-year journey towards the next level of continuous improvement has just started and a major change in the mindset has already happened.

"We have understood that we need rather "to act our way to a new way of thinking, than to think our way to a new way of acting". We need to learn off from the past were we thought we could plan and predict everything in detail. We are learning to take one step at a time, stop worrying and live with the uncertainties", says **Kirsi Mikkonen**, Development Program Manager at Ericsson.

The development of Ericsson Mobile Media Gateway (M-MGw) is located in two countries. The product is mature and about ten years old. RoseRT/RSA-RTE, C++ and Java as programming languages are utilized in complex development environment.

Article on mobile cloud computing

Cloud computing is emerging in several ICT areas, including the mobile services industry. This development is known as mobile cloud computing (MCC).

MCC may save mobile energy consumption and be utilized to overcome the fragmentation challenges of application developers, who must take into account various mobile operating systems. The research article introduces a novel mobile-device-independent development approach. Mobile applications will be placed into a cloud and will utilize open application programming interfaces from the telecom infrastructure. This approach, called Open Telco, enables application deployment that is fully based on cloud-computing principles. In this study, we present a business model analysis of an application case called Event Experience, using the Service, Technology, Organization, and Finance (STOF) framework.

Innovation in mobile clouds: analysis of Open Telco Application (Antero Juntunen, Vesa Suikkola, Yrjö Raivio, and Sakari Luukkainen, Aalto University)

Article on Open Telco

The research article utilizes internet case studies in order to find out the best mobile broker business models.

The term Open Telco refers to a new phenomenon where telecommunication operators provide open APIs (application programming interfaces) for 3rd party developers and content providers. Multi-operator support requires cross network service providers (CNSPs) or network brokers between operators and developers. In the mobile domain brokers have already stepped into the SMS and data roaming businesses, but API brokering is still an emerging phenomenon. Business models based on mobile brokering are also in an early phase. On the other hand, internet API management providers have been offering services to various API publishers for a long time. The research article utilizes internet case studies in order to find out the best mobile broker business models.

Towards Open Telco – Business Models of API Management Providers (Yrjö Raivio, Sakari Luukkainen, and Saku Seppälä, Aalto University)

Master's thesis on agile software development methods

The study assessed agility and usage of agile software development methods of software development teams. The results of the study may be used to improve the internal practices in the company. Various teams in two units of the company were assessed in the Veli-Matti Puurunen's thesis (*Assessing Agility of the Software Development Teams, University of Oulu*). All the teams are relatively new with agile software development. Each team has used Scrum for less than year. There are three issues in the research problem: what kinds of methods are there that have been used for assessing the agility of software development teams, how agile are the assessed teams and what improvement actions could be taken to improve the agility?

The teams were assessed using a combination of structured and open interviewing techniques. The results of both interviews support and supplement each other. The research revealed that the organizations had adopted Scrum and some other agile best practices rather well.

Ixonos Business Solutions is first to provide cloud-based e-government services to the municipal sector

Ixonos has developed the City Online solution, an e-government platform for municipalities, and now provides it as a cloud-based service under the SaaS (software as a service) delivery model. Ixonos, which has made a long-term commitment to promote the e-services of local governments, is the first provider to offer cloud-based municipal services for residents.

The City Online cloud services conform to a predefined and reliably tested e-service model. The development work has made use of the results of the municipal customer service project and of *Towards partnership - services without boundaries for families with children* - project. The cloud-based e-government services meet the requirements. "This means that the municipalities that deploy the service platform can rely on the interoperability between the platform and present and future services" , explains **Teppo Kuisma**, head of Ixonos' Business Solutions unit. Ixonos also intends to take to the cloud all future solutions that Ixonos will develop in targeted projects for the municipal sector.

Photo: Ari Turunen

The City Online cloud services offer a new way of developing, providing and sourcing municipal e-government services. The SaaS model allows municipalities to deploy City Online e-services in a rapid, standardised and cost-efficient manner while cutting down on project investments, licence and application procurement and employee workload. "Municipalities benefit from a fully-fledged platform that is continuously being developed further and is managed, in accordance with the service agreement, by a reliable domestic provider" , Mr Kuisma remarks.

With versatile municipal services available on the Web, inhabitants can conduct their business with the municipality more freely. They can acquaint themselves with the municipality's services, and they can file secure on-line applications such as to enrol children for school and for after-school activities. Cases are handled in accordance with a unifying and expedited procedure that saves time for users and officials alike.

Today's teenagers can become part of their idols' lives using a mobile application

Flowd.com is a free, location-based web delivery service for iPhone and Android phones which makes the relationship between artists and fans more personal.

Flowd, an entertainment application which uses cloud technology and positioning, is a social networking application focused specifically on music fans. Flowd brings together artists and fans and gives artists a new marketing and relationship-building method as well as access to the newest social media mobile marketing tools, while at the same time giving its users a way to communicate with their idols. Users of the service are teens to young adults.

The basic idea of the service is to help fans follow their favourite artists' news, performance schedules and even where the artist is located. Flowd's objective is also to provide one-stop access to other social networking media. If the peak of enthusiasm for idolizing artists has already passed, users may still be interested in sharing their own sites, keeping up with friends or maybe recommending good parties or services.

A number of big stars, including **Armin van Buuren**, can already be found on the service. Flowd offers an excellent, low budget marketing channel for new artists just breaking into the market. Artists log on to the service just as fans do, but through artist registration. Through their profiles artists can offer exclusive material to their fans, for example pieces that have not yet been released or discounts on music purchases.

Flowd's technology relies on positioning and cloud technology. The project and product development phase was ongoing throughout 2010 and led to Android, iPhone and Nokia versions now available on the Internet. Using Flowd, a site is created in a desired location where users can post information and share it with friends. Artists can create sites, forward information about them and send messages to fans, and fans can comment on them.

www.flowd.com

Research article on the design of a database adapter for the Google Datastore and the Vaadin Rich Internet Application Framework

In their article **Johann Selänniem**i and **Ivan Porres** (Åbo Akademi) present the design of a database adapter for the Google Datastore and the Vaadin Rich Internet Application Framework. The adapter allows us to develop Vaadin applications that can use different database systems and can be deployed in a private infrastructure as well as in the Google App Engine platform. The adapter uses a two-level cache schema to improve performance and reduce operation costs. Experimental results show that the use of the adapter does not hinder the ability of the Google App Engine platform to scale web applications on-demand to high loads.

Johann Selänniemi and Ivan Porres (Åbo Akademi): The design of a database adapter for the Google Datastore and the Vaadin Rich Internet Application Framework

Article on automatic performance and scalability testing of Rich Internet Applications in the Cloud

The emergence of asynchronous techniques for building interactive web applications has led to the development of Rich Internet Applications (RIAs). RIAs offer greatly enhanced usability and the ability to deliver rich dynamic content. However, due to the widespread use of RIAs, there is a need to develop and test highly scalable RIAs. Furthermore, cloud computing introduces new opportunities for ensuring and extending the performance and scalability of RIAs. This has necessitated the need to devise effective ways for doing automatic performance and scalability testing of RIAs.

In their research article, **Niclas Snelmann**, **Adnan Ashraf**, and **Ivan Porres** describe different problems and challenges in automatic performance and scalability testing of RIAs. They then propose the ASTORIA framework as a novel solution to the identified problems and challenges.

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Cloud news

The effectiveness of our proposed approach is demonstrated by building a working prototype for ASTORIA and by using it for conducting experiments.

Niclas Snellmann (Åbo Akademi), Adnan Ashraf (Turku Center for Computational Science), Ivan Porres (Åbo Akademi): Towards automatic performance and scalability testing of Rich Internet Applications in the Cloud.

In the future a community will be able to regulate its own community services

Helsinki Institute of Information Technology (HIIT) researchers solve the data monopoly problem when developing a data warehouse quite by chance. We have them to thank for the fact that in the future, we will be able to have community services, the conditions of which a single actor cannot unilaterally influence.

OpenLookup is a storage space meant for short-term storage, developed by **Ken Rimey** at HIIT. OpenLookup makes it possible for clouds administered by different actors to communicate with each other. Research related to OpenLookup continues in the Cloud Software Finland program, in the research group of Professor **Sasu Tarkoma**. Specialised in the online use of the system, researcher **Toni Ruottu** will develop the system further and assesses its applicability for supporting cloud services. The principles of the system are similar to those of a peer network. The files stored in the service are shared with other members of the network, but a user of OpenLookup can him/herself define who he/she is in contact with. The principles of OpenLookup also include independent administration, which guarantees that none of the network administrators gets to be in a monopoly position, for example, deciding alone whether the network is closed down or not.

OpenLookup serves only as temporary storage, and it is therefore essential to ensure that any data to be disposed has been appropriately saved elsewhere. The recipient can only retrieve the data within a certain time period. It is also characteristic of OpenLookup that the sender and recipient of the data do not have to be present at the time the data is sent, but the sender can drop the data in OpenLookup and the recipient can retrieve it within a week, after which time the date gets destroyed. The storage warehouse also has commercial possibilities. Intranet service providers could make OpenLookup available for businesses to use, because it enables affordable application development when resources are scarce. Researchers, on the other hand, would like to see the storage space as a service available to the public online. A public service would enable data to be obtained on what the storage server is used for, and this in turn would help the planning of communications between clouds.

OpenLookup was developed to replace OpenDHT which used to serve as a corresponding storage space, and which several of the HIIT projects were built on. When the maintenance of OpenDHT was terminated, the projects were left on empty.

There was indeed a need for storage space that wouldn't be dependent on any administrator, and the existence of which could thus be secured into the future.

OpenLookup is a cloud technology utilising data storage space meant for short-term storage, designed by the HIIT researcher group. It enables the communication of the users – businesses or applications. Cloud technology is used in such a way that users located in clouds administered by different actors can also share information with each other.

The service is federated. This means that the continuity and administrative independence of the service is secured in the event that one user decides to leave the network, which would not affect the operation of OpenLookup.

Ixonos launched Ixonos Elastic Cloud, the first Red Hat certified cloud in the Nordics

Ixonos launched an open and secure enterprise cloud solution for R&D and e-services and becomes the first Red Hat Certified Cloud Provider in the Nordic countries. "Through our Certified Cloud Provider Program, we confirm that vendors offer a trusted destination to use Red Hat technologies in public clouds and that the clouds meet rigorous testing and certification requirements to ensure a safe and consistent environment for enterprise cloud deployments", says **Magnus Svensson**, Nordic Regional Manager at Red Hat, Inc.

For customers planning and developing new services for global or domestic markets with tight time-to-market demands, Ixonos Elastic Cloud offers an endlessly scalable R&D platform based physically in Finland. The cloud is delivered according to the Platform as a Service (PaaS) model and it serves specifically well those enterprise system and R&D customers already running their applications on JBoss Application Server and in Red Hat Linux environments. Ixonos' cloud offers a consistent environment for seamless migration from on-premise data centres to the cloud as well as for adding new cloud services to a company's existing operations. The PaaS environment is ready to deploy applications with global level coverage and will soon be enriched with payment and authentication solutions.

"Not only is the cloud's payment method flexible, as customers only pay for the services they use - the other notable benefits of employing a fully developed platform from the cloud are the quality guarantee and the speed: you get a certified, integrated and fully supported framework for running and developing your business, and it is instantly ready to be deployed", explains **Teppo Kuisma**, head of Ixonos Business Solutions.

"Ixonos Elastic Cloud is already used to provide next generation public services to municipalities in Finland with Ixonos City Online Ixonos already designs and implements numerous agile R&D software services for innovative SaaS (Software as a Service) providers in Finland", says **Jari Kekkonen**, Director, Products and Services, at Ixonos Business Solutions.

"Ixonos is an active member of the Cloud Software Program, a Tivit-led research program where corporate participants from the Finnish software industry collaborate in building new cloud business models, lean software enterprise models and open cloud software infrastructure. As the program has been running for 18 months now, it is fascinating to see that in Finland, we are in the forefront of making cloud business real. Ixonos again shows an example by building a cloud foundation for many new opportunities" , says Director **Janne Järvinen** from F-Secure, the leader of the Tivit Cloud Software Program.

Article on integrating secure development lifecycle to an ongoing software project

It is better to adapt the secure development lifecycle for Agile incrementally starting from one-time-practises and thread modelling. In his article **Markku Korkeala** explores two ways to integrate Microsoft Secure Development Lifecycle (SDL) for Agile practises to an ongoing software development project.

Photo: F-Secure

Agile software development processes have gained acceptance in the software industry to develop software. Security can be seen as a direct customer need and so agile software development methods should include security aspects in their development process. Microsoft's SDL for Agile is one method to combine agile process with security.

Korkeala presents two ways of integrating the SDL for Agile in a real world case. One way is to adapt the changes to the development process in one big chunk and the other way is to adapt the changes step-by-step. He also looks at benefits and downsides of only partly adapting the SDL for Agile. According to Korkeala it is better to adapt the SDL for Agile incrementally starting from one-time-practises and thread modelling.

Korkeala provides a prioritized list of the order in which to adapt the SDL for Agile practises as well as point out some of the useful tools to be used with SDL for Agile which Microsoft has developed.

Markku Korkeala (Tampere University of Technology): *Integrating SDL for Agile in an ongoing Software Development Project*

University of Oulu in 'lean' development cooperation with MIT

University of Oulu's Department of Computer Science has developed a tool that can effectively assess the success of adopting a new, enhanced and agile way of working within organisations. Very few such 'lean' transformation-related assessment methods have been carried out. But now, the team at University of Oulu gets to cooperate among others with MIT. The assessment tool by the Department of Computer Science at University of Oulu is one of a kind. It is a survey tool developed to assess a company's success of the 'lean' transformation process. The first version of the survey is based on industry literature, but the tool will be developed as work progresses. The survey is meant for efficient and rapid data collection, and therefore only a small number of individuals (10-15 people) take part. The survey is complemented with in-depth interviews that enable more redefined answers. The survey tool has been used by the likes of Nokia, as well as simulation platform developer Exfo Nethawk. In the latter company, 'lean' transformation success has already been assessed on two occasions.

"Of course every company has their own individual development targets but, so far, based on the surveys we have carried out for six different companies, we have found the three most common pain points of learning the 'lean' process. It is about big things: an agile and 'lean' philosophy, and adoption of new working practices, requires some getting used to. The biggest challenge is changing the culture of the organisation, which does not happen instantly," says Project Manager **Pasi Kuvaja**.

"The survey tool we have developed is especially important for the industry as a tool to validate the rationality of investments," says Kuvaja. "In large production processes it is quite impossible to focus on heavy research practices," he adds.

The surveys are always carefully tailored to the company; to fit the company's objectives, methods, and their own terminology. According to Kuvaja, the biggest part of the job is done in terms of terminology. For every company, the terminology has to be reviewed at each survey round and checked many times over. This ensures that the respondents completely understand the questions as intended. Replying should also be quick. The aim of the tool is for the survey last no longer than 15 minutes. This way, the replies of even the busiest of people are documented. Simultaneously, the aim is to eliminate everything unnecessary from the survey, i.e. information that can be obtained elsewhere. Thanks to careful preparation, the survey respondent percentage is extremely high.

University of Oulu is part of the Cloud Software Finland program in developing a tool to analyse a company's success of the transformation process based on the 'lean' philosophy. 'Lean thinking' refers to the Japanese car manufacturer Toyota's management philosophy, with the help of which more efficient business processes are sought, along with improved customer satisfaction and quality, as well as reduction in operating costs and shortening of production lead times.

Cloud news

The consumer is wowed

Personalise, predict and note the usage. Constantly surprise and combine creatively. With these means, the 21st century consumer is hooked on products and services that benefit from cloud technology. In consumer studies people talk about the 'wow experience', indicating the end-user's exceeding expectations of a product or service to a surprising and extremely positive experience. A Finnish research team, conducting new and innovative research in the field of consumer experience, will be presenting their findings at an industry conference in Milan today.

"Distinguishing the products and the services from each other is proving increasingly difficult in today's market. A good consumer experience, usefulness and ease of use is not enough anymore, but a successful product should also be visually appealing, inspiring, adventurous and even offer a gaming experience," says Professor **Kaisa Väänänen-Vainio-Mattila** from Tampere University of Technology. "Studying the 'wow experience' is interesting to companies also because it can make the end-user commit firmly to a certain product," she adds.

Väänänen-Vainio-Mattila is heading the part of the research project for which one goal is to identify new possibilities of creating 'wow experiences' for products and services benefiting from cloud technology. The project is part of Tivit's four-year Cloud Software Finland venture.

Photo: Tekes, Pasi Hytti

'Wow' surprises and captivates

The study subject, the 'wow experience', is very multi-faceted and it also has several definitions. Väänänen-Vainio-Mattila clarifies the concept by summarising a few. "The 'wow experience' refers to an surprising and special, albeit always positive experience. An emotional experience can arise from a high degree of personalisation, for example, or an effortless and intuitive sense of excellence. It can be compared to the 'flow experience' where everything seems to just flow on its own. 'Wow' as an emotional experience can be associated with successful products or services." Though, experiences based on the element of surprise always fade with time and use.

The challenge is to produce experiences that would succeed in captivating the end-user over and over. Cloud technology can be used to provide consumers with new and easily updated service features with which an element of surprise and exceeding of expectations is possible. Wow can be a competitive factor in the growing service markets.

Based on the project's initial findings, Väänänen-Vainio-Mattila summarises the instructions for developers of cloud services in a few simple design guidelines. She advises to predict the needs of the end-users even before the users themselves can identify these. The 'wow experience' often arises from realising that things work together in an unexpected way. The dynamic properties of the cloud services and the ability to quickly utilise and combine information from different data storage devices create the potential for a positive surprise.

However, the usage and situation determine the degree of the experience, and the nature of the 'wow' changes from one area of application to another. For example, the 'wow' elements of the services offered by the data security and the electronic communication fields are very different. While a high degree of automation serves communication services and contact management, data security users simply want reliable and complete data security. Cloud technology is characterised by the fact that the end-user can take advantage of the service anywhere and with any device. Therefore, device independence has to be taken into account in the design and planning stages.

The results of the 'wow' research will be published at the Milan DPPI 11 - Designing Pleasurable Products and Interfaces Conference. Conference website: www.dppi11.polimi.it

Paper on Security Activities in Agile Software Development published

Ville Ylimannela's paper discusses security in agile software development. The framework used is Scrum. The goal is to map important control points in Scrum and decide what security activities should be performed in the control points. The security activities chosen were: security templates, threat assessment, feature flagging and residual risk approval. The criteria used to judge the activities were: documentation, customer interaction, speed of execution, simplicity and security. Control points in which the security activities were applied to were: the product owner, sprint planning and sprint review.

Ville Ylimannela: *Security Activities in Scrum Control Points*, Tampere University of technology, 2011

Cloud and open interfaces create new business ecosystem

Operators are busier than ever trying to find new ways of creating useful and entertaining mobile services for the end-user. To do so, it is natural to take advantage of cloud technology and to develop open interfaces.

The operators' systems contain information that is useful to third parties, such as companies doing application development. So far, data mobility has been a problem due to the lack of widely accepted interface standards, as interface specifications vary from operator to operator. From an application developer's point of view, the ideal solution would be to find a common way to open interfaces, between national operators as well as international.

TeliaSonera is conducting a project, within Tivit's Cloud Software Finland program, with the aim to produce new opportunities to develop information-combining internet and mobile applications in the way of mashing-up different services. By developing open interfaces the aim is also to create a common interface ecosystem for application developers in Finland.

Gain more by combining

According to TeliaSonera's **Mika Raitola**, who also works on the project, end-users want more than just data and a telephone device. In addition to a good consumer experience, various features such as those based on location information are of interest.

"An operator needs ideas from developer companies to produce these services. For example, a couple of years ago we held an open international competition for application developers. The winning application was one that sends out reminders for a specific calendar meeting and looks for the best public transport links in relation to your location and destination. When you have a meeting, the service will alert you before you need to leave," Raitola recalls. "The benefits of open interfaces are the same for operators and third parties. TeliaSonera is a company operating in global markets and it can therefore provide the right applications with excellent possibilities for commercialisation," he adds.

TeliaSonera's aim in using APIs is associated with three sub-areas: regeneration of the traditional content business; development of applications aimed at businesses, and utilisation of developer companies' creativity. According to Raitola, the latter two, in particular, carry huge potential for commercialisation.

"As operators enable safe application of the necessary data, there is a tremendous opportunity for small companies to develop new business activities," he says.

Software-as-a-Service under the spotlight in the Finnish Software Industry Survey

The SIRT research team at University of Jyväskylä participated this year's Software Industry Survey. Their focus was on SaaS firms, whose business model and performance were examined.

The SIRT research team at University of Jyväskylä participated this year's Software Industry Survey. Their focus was on SaaS firms, whose business model and performance were examined.

The research team considers scalability of the whole business model as critical factor for SaaS success.

The chapter on Software-as-a-Service in the Software Industry Survey report introduces the characteristics of SaaS firms and their business model. Out of the 480 survey respondents, roughly 12% had high SaaS characteristics. These include both pure SaaS firms, focusing solely in producing and delivering SaaS, and other software firms with only part of their revenue from SaaS offering. The survey results indicate that SaaS firms are smaller, spend more on R&D, invest more in growth and are currently less profitable than other software firms. SaaS firms also deploy distinctive business model: They sell less expensive automated services to high number of smaller customers. This requires scalability in how the offering is produced and in how the sales operations are organized. Despite the high requirements for business model, SaaS is seen as good opportunity for Finnish software firms: SaaS can to be more easily deployed in foreign markets and SaaS offering attracts new underserved customer segments among SMEs.

Software Industry Survey Report and SaaS chapter (on pages 56-66) is accessible at http://softwareindustrysurvey.org/ReportFinland2011.pdf

Developing Cloud Business Models: A Case Study on Cloud Gaming

Cloud computing lets small firms compete in markets traditionally dominated by multinational corporations. Over a 10-year period, one such firm developed a successful cloud gaming business model.

Ever since the software industry diverged from the computer manufac¬turing industry, software firms' busi¬ness models have been in flux. Over the last decade, the primary software industry has tended to be seen as a combination of a US$200-billion soft¬ware product industry with products comprising either enterprise solutions or packaged mass-market software and a $500-billion professional-services industry producing bespoke software systems matching exact cus¬tomer needs. In contrast, the vertical software industries' role has been dif¬ficult to grasp, existing between the pri¬mary software industry and industries purchasing specialized software sys¬tems for their core businesses. In the arcticle the focus is on the evolution of a small software firm's product and busi¬ness model, from an Software as a Service (SaaS) toward a Platform as a Service (PaaS) strategy. In particular, this case study considers how, over time, this firm developed a successful cloud busi-ness model to compete in computer gaming.

Arto Ojala and Pasi Tyrväinen (University of Jyväskylä): Developing a Cloud Business Models: A Case Study on Cloud Gaming, IEEE Software/IEEE Computer Society, July/August 2011

Cloud news

Article on value networks in cloud computing published

The research article by **Arto Ojala** and **Pasi Tyrväinen** examines value networks in cloud computing. It considers how and why the network may change over time. In business networks, firms share common interests, which motivate them to develop relationships with each other for their mutual benefit. The benefits thus offered form value networks. In e-commerce businesses, where the product is intangible, and where knowledge is one of the main resources of the firms, the term "value network" is a useful alternative to the term "value chain" which is commonly used in industrial production. These value networks are dynamic: they may change when a firm deepen its existing relationships, establishes new ones, or ends problematic ones. This case study examines the value network of a cloud service provider.

Arto Ojala and Pasi Tyrväinen (University of Jyväskylä): *Value Networks in Cloud Computing*

Articles on an analytical cost model for hybrid cloud services published

Hybrid clouds, combining the in-house capacities with on-demand capacity of public clouds, achieve both the increased utilization rate of the in-house infrastructure and the limited use of more expensive public cloud, thereby lowering the total costs for the cloud user. In the research article, an analytical model of hybrid cloud costs is introduced, wherein the costs of computing and data communication are taken into account. Using this model, the cost efficient division of the computing capacity between the private and the public portion of a hybrid cloud can be identified. By analyzing the model, it is shown analytically that the greater the volume of data transferred to/from the public cloud, the greater portion of the capacity should be allocated to the private cloud.

Oleksiy Mazhelis and Pasi Tyrväinen (University of Jyväskylä): "*Role of Data Communications in Hybrid Cloud Costs*", in Biffl, S., Koivuluoma, M., Abrahamsson, P., and Oivo, M. (Eds.) Proc. of the 37th EUROMICRO Conference on Software Engineering and Advanced Applications (SEAA2011), IEEE Computer Society

Oleksiy Mazhelis and Pasi Tyrväinen (University of Jyväskylä): "*Economic Aspects of Hybrid Cloud Infrastructure: User Organization Perspective*", in Information Systems Frontiers, 2011, Springer OnlineFirst DOI: 10.1007/s10796-011-9326-9, published 13 September 2011.

The technical report and an article on mobile mashups published

Mashups, that combine data, code and other content from multiple sources, are a new breed of web applications that utilize the ubiquitous power of the web. The report and a research article describe a mobile multimedia mashup ecosystem and how integrating different media and content can provide a coherent and advantageous user experience.

Mashups are used in desktop computers but also on mobile clients where new challenges emerge. This technical report presents currently available techniques and methods used implementing mashups on mobile environment and discusses about how these applications could be implemented in the future. One viewpoint of this document is how mashups can be used to create superior user experiences.

First, a brief look is taken at general features of mobile environment, mobile multimedia, current mashup applications and general and legal issues related to mashups. Second, the requirements of mobile multimedia mashup ecosystem are discussed. Third, a list of fundamental technical problem areas of the ecosystem discussed.

Existing mashup examples and frameworks reveal the great potential of combining mobile multimedia and other content from the web. Many components needed to implement elegant and attractive mobile multimedia ecosystem have already been build. However, besides some individual advanced applications, mashups available today in general do not provide good enough quality and consistency for end-users. Usability of proposed solution discussed in this report should be further researched from this point of view.

Legal issues are an important topic where further work maybe by experts in this area is needed. Most mashups developed by individuals for non-commercial purposes do not have same restrictions as ones developed or supported by a commercial vendor. Because of different services may set arbitrary terms for those willing to access their data, difficulties may emerge. This is probably an area where new business models could be created.

Article on mobile multimedia mashup ecosystem was published in *Workshop on Advances in Mobile Networking - Towards a Next Generation Mobile* held in conjunction with IEEE ICC'2011 Kyoto, Japan.

Arto Salminen, Jarmo Kallio, Tommi Mikkonen (Tampere University of Technology): *Towards Mobile Mulimedia Mashup Ecosystem*

The product speaks to the buyer - literally

With the help of the virtual product description application developed by Tieto and VTT, product information may soon be available in an exciting three-dimensional and personalised way.

A familiar scene from a sci-fi film is when an android is able to recall and compile information on objects or people in its visual field. A similar experience might soon be offered in your normal supermarket.

With the help of the virtual product description application developed by Tieto and VTT, product information may soon be available in an exciting three-dimensional and personalised way.

Photo: Tekes, Niko Nurmi

With the application from VTT and Tieto you can look at the product without opening the packaging, by looking at it through the camera of a smartphone. In the shop, it can provide the buyer with useful extra details, as well as information to help decide on a purchase, and, once at home, with user instructions and tips.

"A purchase is more and more motivated by the level of experience and interactiveness," says VTT's **Timo Urhemaa**. "With an exciting 3D graphics-based application we strive to make product information more useful and easier to understand.

With the help of the application, the end-user can also create a personalised profile. The profile allows the consumer to give top ratings to certain product features, such as origins, etc.

"For example, it is natural to highlight the eco-friendly features of a product in the product description. If there are many similar products on the shop shelf, our service primarily suggests the products with the features specified by the consumer. 3D graphics and a more real-life feel offer the end-user a new kind of consumer experience," says Tieto's **Ville Puntanen**. "With the application you can compare the carbon footprints of different products, for instance. The application can also shorten the distance between the manufacturer and the consumer, offer information on the manufacturing process or on equivalent products by the same manufacturer," he adds.

There are high expectations on the application, which is the result of VTT's and Tieto's collaboration. The technology comes from VTT and Tieto's role has been conceptualisation and the development of the application's cloud service.

The user interface and user experience are results of the collaboration between VTT's and Tieto's experts. Tieto will also be responsible for the commercialisation of the idea. Tieto sees many opportunities for different customer groups. For advertising companies the product information system provides a new advertising and consumer engagement channel, for retail chains an easy and exciting shopping service, and for device manufacturers more versatile user instructions than printed manuals.

The product information system's technical background is in cloud technology. The system utilises location information and augmented reality technology, and obtains all product-related information from the cloud. This way the product information provided can vary depending on the location of the product or the consumer's personalised profile.

Pasi Välkkynen, Alain Boyer, Timo Urhemaa (VTT), Riku Nieminen (Tieto Finland Oy): *Mobile Augmented Reality for Retail Environments*

Tieto develops a mobile application to facilitate consumers' purchase decisions

Tieto has developed an application for smart phones that provides consumers with additional information to support their purchase decisions.

Tieto has developed an application for smart phones that provides consumers with additional information to support their purchase decisions. The Tieto Goods Spotter application gives consumers access to additional information provided by the manufacturer so they can better assess the suitability of an item for their own needs. The application also allows consumers to share their views on the product through social media channels.

According to a survey by VTT Technical Research Centre of Finland, nearly 70% of consumers carefully study product information. More than 60% of respondents would like to have more detailed product information in the purchase situation, and more than 75% would like better opportunities to compare the features and source materials of different products. According to the survey, access to information is crucial in allowing consumers to shop sustainably. The survey, conducted in September 2011, canvassed the opinions of approximately 1,000 Finnish and Swedish consumers.

"Consumers like to make environmentally friendly choices and buy locally and ethically manufactured products. However, more than 73% of respondents find it difficult to obtain sufficient information regarding the ethicality of products, and more than half would like to know about their ecological indicators.

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Cloud news

Consumers are also prepared to pay more for products which comply with sustainable development," says VTT's research coordinator **Tua Huomo**.

"New applications play an important role in promoting sustainable development. The Tieto Goods Spotter mobile application provides consumers and manufacturers with a unique communication and cooperation channel. The application pushes the boundaries of social media, mobile gaming and consumer feedback," says **Ville Puntanen**, program manager, Tieto.

Manufacturers can use the Tieto Goods Spotter to provide product information for mobile users through a support line, videos, images or text. The manufacturer can also create digital content from the real world for user review. Information can be provided for example on a product's place of manufacture, carbon footprint, usability and availability. Before purchasing a product, the consumer can view feedback provided by other consumers. The consumer can also participate in mobile games in social media and, for instance, compete for points awarded to those who volunteer opinions and product ratings.

New insights to interior design by using improved user experience

Finnish Vividworks achieves for global markets with a web tool and cloud technology aimed for interior design.

Interior design and food interests are booming and they have arrived to stay. This conclusion can be made by reviewing the amount of publications specialized in the area around the world. Frontrunners in this boom are the top names whose ideas are applied at homes in all western countries. Vividworks believes in the willingness to experiment and to bring your own creativity forward and they provide the tools to utilize the increased reality into furniture and interior designing.

VividPlatform™ helps to improve the sales process and remove manual bottlenecks by creating accurate sales lines and keeping all information updated. The sales process can be standardized and managed resulting in better sales volumes. Client

With Vividworks web tool, it is possible to design new interior solutions into a photograph or a floor plan. The tools are made with the "everyone can use" principle for the consumer and furniture sales personnel. The application areas are numerous: before moving into a new home, you can test for example how your living room suite would look like in the new home. Or by combining a photograph and furniture elements, it is possible to test how a new living room suite would look like in your own living room. Also the furniture sales person or manufacturer can utilize the Vividworks tools: sales persons can for example demonstrate different options on their tablet regarding the colour and shape of the living room suite to make the selection easier. The Vividworks application utilizes markers or the so called guiding device. A printer paper which is acting as the guiding device is placed in the room, which is to be interior designed and the room, is photographed. After this, it is easy to place virtual elements, for example different shape shelves or living room suites of different patterns into the photograph.

The advantage the Vividworks web tools are that they are always available due to their Internet based design, and no training is required for their use. The user interface is made so simple, that even an inexperienced designer can effortlessly use it. Extraordinary is also the effort put in visualization and the so called wow-experience.

"The wow-experience is usually created when the users of the tool realize that they can place reality into their own picture like interior elements and furniture", says **Miska Visuri**, Managing Director of Vividworks.

Visuri says that the Vividworks name comes from his own inspiration when he was playing with colourful play bricks together with his two year old daughter. The joy of experimenting and making play possible is also the aim for Vividworks.

"Everyone should be able to try playing with colourful bricks", says Miska Visuri.

Twonky Video clears the chaos in video services

Every user of online video services has come across the same problem: how to find quickly what one is looking for in the content chaos of the numerous different video services.

The number of online videos stored on the Internet has grown and continues to snowball. Videos are made for numerous purposes. They contain entertainment, advertising, tips and instructions, propaganda, presentations, speeches, and output containing image and sound. Making online videos is easy even for a layperson, and a moving image catches the attention of the viewer with easy-to-implement effects. For the recipient, the amount of content is not the issue, but how to find what one is looking for more easily.

Information overload can be eliminated with a mobile multimedia search service, Twonky Video by PacketVideo, which was developed in collaboration with the Tampere University of Technology. Twonky Video searches for online videos in several different video services, many times faster than a normal search engine, and combines the search results into one view. The efficiency of Twonky is accomplished by using cloud technology.

With Twonky Video, images can be transferred for instance onto a TV screen. Twonky Video also makes sharing videos in social media particularly effortless.

PacketVideo has high expectations for the Twonky Video mobile search service. The product is now available on the Android market, and later it will also be made available for other operating systems. The Twonky Video development is backed by a strong trust in the future of online video.

"I believe that due to its affordability and ease of use, online video will be a dominating media channel," explains **Jarno Kallio**, Senior Software Architect at PacketVideo. "The European markets are behind the USA in the development of online videos, but online video format is gradually becoming more common here as well," he continues.

Twonky Video uses cloud services and mash-up technology. By transferring the capacity-consuming mash-up technology into the cloud, it is possible to speed up the video search considerably.

The Twonky product family includes many multimedia applications which make use of cloud technology when searching and combining content simultaneously in different online services. The applications of the Twonky product family can be used in smart phones, tablets, and computers.

Founded in 1998, PacketVideo Inc. is a multinational software company specialised in mobile multimedia solutions. The headquarters of the company are located in San Diego, and it has product development and sales units in Europe and Asia. PacketVideo Finland Oy is a subsidiary of the company and is located in Tampere.

http://www.twonky.com/

Report on Cloud Software service business development methodology

The report focus on business potential evaluation and business model transformation

Cloud businesses represent a specific field within software business depicting new kinds of opportunities but also new kind of challenges for firms active or targeting at the Cloud business environment. Due to this, there is a need for new tools and approaches to be developed for the Cloud business context. From the Cloud service point of view, business potential evaluation consists of several consecutive steps starting from opportunity recognition/development and continuing with the evaluation of total and addressable market size.

Long term business potential of disruptive innovations stems from companies' ability to cope with imitation and utilize complementary assets. From the business model transformation point of view, the most interesting notions related to the characteristics of Cloud businesses is their relativism and ecosystem specificity – in the Cloud the boundaries of the firms have become unclear, fuzzy and constantly changing. In this kind of context the importance of approaches such as Business Potential Assessment, Scenario Planning, Customer Journey Mapping, Canvas & Four Actions Framework, Alternative Business Model Development and Evaluation, as well as Business Ecosystem Build-up is increasing.

The findings related to business potential evaluation indicate that within Cloud businesses product business potential does not equal with the service business potential as Cloud transformation requires willingness to cannibalize own product business. Also, the business potential depends on the ecosystem and its characteristics. Regarding Cloud offering, so far the needs identified among the customers are not the same thing as benefits offered to them as the customer journeys of the customers in the Cloud differ if compared to traditional packaged software products. Therefore, the value created by the Cloud companies does not equal with the value captured and synergy with ecosystem partners is required for providing successful Cloud services. Cloud businesses exist in ecosystems where value creation and capture go hand-in-hand. Similarly, value related competition and co-operation go hand-in-hand, too. Thus, success of each business model is determined within the ecosystem.

Deliverable 3.2.1: *Cloud Software Service Business Development Methodology*

Cloud news

Amazon award to Åbo Akademi University

Amazon has honored the Åbo Akademi University with a research grant for $15,000 USD in Amazon Web Services credit.

Amazon has honored the Åbo Akademi University with a research grant for $15,000 USD in Amazon Web Services credit.

With AWS in Education, educators, academic researchers, and students can apply to obtain free usage credits to tap into the on-demand infrastructure of the Amazon Web Services cloud to teach advanced courses, tackle research endeavors, and explore new projects – tasks that previously would have required expensive up-front and ongoing investments in infrastructure.

Åbo Akademi researchers will use this grant in the context of the Tivit Cloud Software Finland research program to carry out large experiments using the Amazon cloud infrastructure to study:

- Distribution of video transcoding tasks in the cloud
- Performance and scalability testing of cloud services
- Automated scaling and provisioning of cloud resources based on current end-user workload

FreeNEST project platform combines Cloud Services and Open Source

Cloud enables efficient software development and Open Source tools are cost-efficient. Established on the strengths of these two, the FreeNEST Portable Project Platform combines various tools on a customizable platform.

FreeNEST is a next generation open source solution. It integrates the tools needed and used for project management to one package distributed via cloud service. Previously integrated solutions have been those of the big commercial players. NEST aims to give the same functionality without complex features and heavy price tag. Due to virtualization and adaptability it can be combined from the specific tools needed.

“FreeNEST integrated a set of the best Web-based open source tools. The modular architecture enables the easy addition, change and removal of software components”, says concept lead architect **Marko Rintamäki** of Nestronite.

Partner of Nestronite is a software development consultancy Contribyte. “The benefits of cloud and open source solutions are well known. Combining the two will be very efficient for project management. Scalable platform allows it also to be used in large-scale projects”, Contribyte CEO **Lasse Mikkonen** says.

Article on energy consumption of data centers

The research article presents a system level controller making a cluster of low-power servers power proportional.

Energy consumption is a major issue in data centers operating 24 hours a day, 7 days a week. The power dissipated by a web cluster is not proportional to the numbers of incoming requests if only Dynamic Voltage and Frequency Scaling is used. This is because of the nonlinear power efficiency of dynamic voltage and frequency scaling, the large load fluctuation in web services and the typical central processor unit (CPU) utilization rates of a server.

Photo: CSC

This paper presents a system level controller making a cluster of low-power servers power proportional. The controller presented in the paper uses sleep states to switch on or off CPUs in order to continuously match the current workload with the system capacity. It uses methods from control theory to drive the CPUs from and into sleep states. The power proportional characteristics of the proposed energy manager is studied for different workload patterns. Results from system simulation show that power proportionality is obtainable but only with appropriate parameters set on the controller.

Moreover, with a cluster sized to handle the maximum request rate, our approach shows a 30 to 83\% reduction of the energy consumption compared to a cluster using only Dynamic Voltage Frequency Scaling as power management.

Simon Holmbacka, Sébastien Lafond Johan Lilius (Åbo Akademi University): *Power Proportional Characteristics of an Energy Manager for Web Clusters*. In Proceedings on Embedded Computer Systems: Architecture, Modeling and Simulation 2011, Jul 2011.

Lean Perspective on Distributed Software Development: Case Study in Waste Factors

Paula Mäenpää’s master thesis (University of Helsinki) examines in what extent a distributed software development can be lean.

According to lean philosophy, products should be produced at the right time efficiently, flexibly, and without non-value-adding activities i.e waste. The problem was approached through a case study of a distributed software development project - in particular by analysing what types of waste occurred in the project and whether the work flow was efficient.

The data was collected by observing the students in the Software Factory course at work and interviewing them. The project was a success from both the customer’s and the student’s point of view: the product was completed on time and learning experience was positive to everyone. It is demonstrated that there occurred variety of different types of waste in the project. Some types of waste could have been prevented or eliminated. This is further demonstrated by a more detailed analysis of a specific set of problems observed in the project, namely collaboration problems, which relate closely to a waste called ineffective communication. This thesis also indicates that it would have been possible to optimize the work flow by following shared practises. Ineffective and insufficient communication leads to several types of waste, such as extra features, defects in the product under development and unnecessary waiting between different sites. Although all types of waste are important to identify and eliminate, it seems that ineffective communication is the reason behind most other types of waste commonly occurring in distributed projects.

Paula Mäenpää (University of Helsinki): *Lean Perspective on Distributed Software Development: Case Study in Waste Factors*

Dissertation on Lean Thinking in Software Development : Impacts of Kanban on Projects

The aim of Marko Ikonen’s (University of Helsinki) doctoral thesis is to improve the understanding of how Kanban impacts on software projects. The research is carried out in the area of Lean thinking, which contains a variety of concepts including Kanban.

The history of software development in a somewhat systematical way has been performed for half a century. Despite this time period, serious failures in software development projects still occur. The pertinent mission of software project management is to continuously achieve more and more successful projects. The application of agile software methods and more recently the integration of Lean practices contribute to this trend of continuous improvement in the software industry. One such area warranting proper empirical evidence is the operational efficiency of projects. In the field of software development, Kanban as a process management method has gained momentum recently, mostly due to its linkages to Lean thinking. However, only a few empirical studies investigate the impacts of Kanban on projects in that particular area.

This article-type thesis conducts a set of case studies expanded with the research strategy of quasi-controlled experiment. The data-gathering techniques of interviews, questionnaires, and different types of observations are used to study the case projects, and thereby to understand the impacts of Kanban on software development projects. The research papers of the thesis are refereed, international journal and conference publications.

The results highlight new findings regarding the application of Kanban in the software context. The key findings of the thesis suggest that Kanban is applicable to software development. Despite its several benefits reported in this thesis, the empirical evidence implies that Kanban is not all-encompassing but requires additional practices to keep development projects performing appropriately. Implications for research are given, as well. In addition to these findings, the thesis contributes in the area of plan-driven software development by suggesting implications both for research and practitioners.

As a conclusion, Kanban can benefit software development projects but additional practices would increase its potential for the projects.

COMMUNICATIONS OF CLOUD SOFTWARE

The Communications of the Cloud Software is a new journal by the Cloud Software Finland team. It is aiming at advancing and communicating the scientific and industrial advancement in cloud computing technology, methodologies for developing cloud services, and in business of cloud computing. Compared to traditional journals with exhausting review cycles, this journal facilitates disseminating your original contributions on the topic within days. And it empowers to discuss on the viewpoints, findings, best practices, details and opinions.

Communications of the Cloud Software is available at http://cloudsw.org

The on-line journal will be published quarterly by the Cloud Software Finland team and the University of Jyväskylä. It is an open access publication, enabling high impact among those interested in the developments of Cloud Computing.

For scholars, the Communication of the Cloud Software offers two types of publishing opportunities for research articles:

1. Discussion Papers; After passing the editor's access-review, the contribution is published as a discussion paper. This type of publication enables disseminating your novel ideas fast. Discussion papers will be commented publicly on this CCS website.

2. Peer-Reviewed Articles; Discussion papers shall be appointed referees, which provide insightful comments and critique about relevance and rigor of the article. The comments from the general public received through the website should also be considered. Once the improved paper is of expected quality, it will be published in the issue of CCS.

For industry experts and practitioners, CCS offers a medium to bring into spotlight your excellence for example in business performance, technological advancements, superior user experience, and use of agile methods.

Material published on the Cloud Software website http://www.cloudsoftwareprogram.org/results

Deliverables

D3.2.1: Cloud Software Service Business Development Methodology
D1.2.1: Technical Report: Multimedia mashups
D3.2.1.1: The Use and Impact of Cloud Services in Finnish Software Industry
D1.1.2: Best Practises for Cloud Computing
D2.3.2: Scaling Agile: Automatic Acceptance Testing of High Capacity Network Gateway
D2.3.2:Scaling Agile: Energy Project Story: From Waterfall to Distributed Agile
D2.3.2:Scaling Agile: Systematic Piloting of Agile Methods in Large
D3.3.1:Intial UX Models and Measures
D2.2.2:Lean Software Enterprise Assessment Model
D3.1.1: First Taste of Cloud Software Business
D3.2.1: Intermediate report on industry-specific cases (OpenTelco)
D1.1.1: Technical Report: Cloud Computing Technologies

Other reports

Lean Thinking Principles for cloud software development (Raija Kuusela, Tua Huomo, Mikko Korkala)
Towards Agile Product and Portfolio management (Jarmo Vähäniitty, Kristian Rautiainen, Ville Heikkilä, Kevin Vlandeeren)

Thesis

Subhamoy Ghosh (Aalto University): An Approach to seamlessy cloudify user-generated content from mobile devices

Terho Norja (Aalto University): Designing a Framework for Linking Company Goals with Daily Tasks in a Small Software Company

Jari Pääkkö (Aalto University): A Software Architecture for Supporting Self-healing Service Compositions

Olle Svanfeldt-Winter (Åbo Akademi): Energy efficiency of ARM architectures for cloud computing applications

Thomas Forss (Åbo Akademi University): Resurövervakning och resursbalansering i prestandatest för en testgenerator

Marko Seikola's master thesis (Aalto University) Scrum Product Backlog as a Tool for Steering the Product Development in a Large-Scale Organization

Joonas Salo (Tampere University of Technology): Designing a RESTful Grid Computing System

Joona Selin (University of Jyväskylä): Software-as-a-Service Marketing and Sales in a Business-to-Business market

Johann Selänniemi (Åbo Akademi University): An efficient NOSQL database adapter for a rich internet application framework

Antti Seppälä (Aalto University, F-Secure): Improving Software Quality with Continuous Integration

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Jens Smeds (Åbo Akademi University): on Evaluating Power Management Capabilities of Low-Power Cloud Platforms

Oskari Kettunen (Aalto University): Agile product development and strategic agility in technology firms

Jakub Järvenpää (Aalto University): Implementing a Software Application Based on a GUIDe Specification

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Henri Karhatsu (University of Helsinki): Building a Self-organizing Software Development Team: Multiple Case Study

Marko Seikola (Ericsson, Aalto University): The Scrum Product Backlog as a tool for steering the Product Development in a Large-Scale Organization

V. Palkosaari (University of Helsinki): Evaluation of Open Source Cloud Platforms

P. Mäenpää (University of Helsinki): Lean Perspective on Distributed Software Development: Case Study in Waste Factors (in Finnish)

T. Kairi (University of Helsinki): Coaching agile software development teams: A case study from mentoring viewpoint

M. Ikonen (University of Helsinki): Impacts of the Lean-based Kanban model on software development projects (PhD dissertation)

Material published on the Cloud Software website http://www.cloudsoftwareprogram.org/results

Articles published

Subhamoy Ghosh, Juha Savolainen, Mikko Raatikainen, and Tomi Männistö (School of Science, Aalto University, Espoo, Finland; Email: {subhamoy.ghosh, mikko.raatikainen, tomi.mannisto}@aalto.fi; Cloud Computing Systems, Nokia Research Centre, Tampere, Finland; Email: Juha.E.Savolainen@nokia.com): *Cloudifying User-Created Content for Existing Applications in Mobile Devices*, 2011 35th IEEE Annual Computer Software and Applications Conference

Antero Juntunen, Vesa Suikkola, Yrjo Raivio, Sakari Luukkainen (Department of Computer Science and Engineering, Aalto University School of Science, antero.juntunen@aalto.fi, vesa.suikkola@aalto.fi, yrjo.raivio@aalto.fi, sakari.luukkainen@aalto.fi): *Innovation in Mobile Clouds. Analysis of an Open Telco Application*

Pasi Välkkynen, Alain Boyer, Timo Urhemaa (VTT Technical Research Centre of Tampere, Finland {firstname.lastname}@vtt.fi), Riku Nieminen (Tieto Finland Oy / Decision Support Solutions P.O.Box 449, 33101 Tampere, Finlandriku.nieminen@tieto.com): *Mobile Augmented Reality for Retail Environments*

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Human-Centered Technology; kaisa.vaananen-vainio-mattila@tut.fi),
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Virpi Roto (University of Helsinki; virpi.roto@helsinki): User Experience in the Cloud: *Towards a Research Agenda. Proc. CHI'11 workshop on Designing Interaction for the Cloud*

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Johan Selänniemi, Ivan Porres (Department of Information Technologies, Abo Akademi University ; johan.selanniemi@abo.fi, ivan.porres@abo.fi): *An Efficient Google Datastore Adabter for Rich Internet Applications*

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Yrjo Raivio, Sakari Luukkainen, Saku Seppälä (Aalto University): *Towards Open Telco – Business Models of API Management Providers*

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ffirstname.lastnameg@cs.helsinki.fi): *Building Blocks for Self-Organizing Software Development Teams: A Framework Model and Empirical Pilot Study*

Marko Ikonen, Petri Kettunen, Nilay Oza, Pekka Abrahamsson {marko.ikonen|petri.kettunen|pekka.abrahamsson}@cs.helsinki.fi, Department of Computer Science, University of Helsinki), nilay.oza@vtt.fi (VTT Technical Research Centre of Finland): *Exploring the Sources ofWaste in Kanban Software Development Projects*

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S. Tarkoma, E. Lagerspetz (University of Helsinki): Arching Over the Mobile Chasm: *Platforms and Runtimes*. IEEE Computer 44(4): 22-28 (2011)

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CLOUD SOFTWARE FINLAND

Proudly part of the Finnish Cloud Software Program

Aalto University

Established in 2010, the Aalto University is a new university with centuries of experience. The Aalto University was created from the merger of three Finnish universities: The Helsinki School of Economics, Helsinki University of Technology and The University of Art and Design Helsinki. The Aalto University is strongly future-oriented while, at the same time, building on the combined 300-year-history of three highly regarded universities. Only the best students and researchers are admitted to study and conduct research at the Aalto University.

CSC – It Center For Science

CSC — IT Center for Science Ltd is administered by the Ministry of Education and Culture. CSC provides IT support and resources for academia, research institutes and companies.

Digia

Digia's driver is the desire to succeed. It offers its customers success, through inventive solutions that enhance operational efficiency, improve user experiences and increase sales. Digia helps its customers become forerunners. With almost 1,600 top experts, Digia enables its customers to benefit from changes in the market, making the future a mutual success.

EB

Elektrobit develops advanced technology and transforms it into enriching end user experiences. EB specializes in demanding embedded software and hardware solutions for the automotive industry and wireless technologies.

ECE

ECE Ltd is a technical leader in the field of cellular planning and optimisation. We provide services and software products along with global solutions.

EXFO NetHawk

EXFO NetHawk provides its customers with powerful, scalable and easy-to-use tools and applications for telecommunications network testing.

Ericsson

Ericsson is the world's leading provider of technology and services to telecom operators. Ericsson is the leader in 2G, 3G and 4G mobile technologies, and provides support for networks with over 2 billion subscribers and has the leading position in managed services. The company's portfolio comprises mobile and fixed network infrastructure, telecom services, software, broadband and multimedia solutions for operators, enterprises and the media industry.

F-Secure

F-Secure is the global leader in providing security as a service through operators. A proven partner for revenue generation with an expanding portfolio of value-added services.
While you concentrate on what is important to you, we make sure you are protected and safe online whether you are using a computer or a smartphone. We also backup and enable you to share your important files. Our services are available through over 200 operators around the world and trusted in millions of homes and businesses.

Gearshift Group

We are a management consulting and M&A advisory firm serving technology companies. We have unmatched experience and know-how from technology business and our partners have seen the ups and downs of the segment for over 20 years.

IPSS

Intelligent Precision Solutions and Services helps clients develop their business by utilizing customer data.

IPSS is a partner which compiles an efficient and productive customer work environment for its clients – complete with customer data, equipment, tools and operating models.

Ixonos

Ixonos creates wireless technologies, software and solutions for mobile devices and services.

JAMK University of Applied Sciences

JAMK is an attractive, internationally oriented higher education institution with a strong role among the developers of the Jyväskylä region and Central Finland. The number of students is 8,000. We offer first- and second-cycle degree education, open studies, continuing education, and vocational teacher education.

Nokia

Nokia is committed to connecting people to what matters to them by combining advanced mobile technology with personalized services. More than 1.3 billion people connect to one another with a Nokia, from our most affordable voice-optimized mobile phones to advanced Internet-connected smartphones sold in virtually every market in the world.

Nokia Siemens Networks

Nokia Siemens Networks is a leading global enabler of telecommunications services. With its focus on innovation and sustainability, the company provides a complete portfolio of mobile, fixed and converged network technology, as well as professional services including consultancy and systems integration, deployment, maintenance and managed services. It is one of the largest telecommunications hardware, software and professional services companies in the world.

Movial

Movial inspires rich, intuitive Internet experiences for companies embracing transformational technologies. Leveraging its deep expertise in Internet, Linux and mobile devices, Movial seamlessly enables its customers to deliver richer user experiences to millions of people on PCs, and on mobile devices.

PV

Founded in 1998, PacketVideo is the software pioneer powering the world's leading multimedia services on millions of home and mobile devices. PacketVideo is a subsidiary NTT DoCoMo.

Reaktor

Our goal at Reaktor is to help our clients run demanding software projects successfully.

We work closely with several major corporations and large public sector organizations, helping them to build better information systems. We believe in long-term partnerships, and we use our knowledge and expertise to deliver the ideal technology solution for each individual client and project. We earn our clients' trust by delivering successful projects and high quality software.

Proudly part of the Finnish Cloud Software Program

RM5 Software

RM5 Software is a software company specialising in Entitlement Management. Our entitlement management technology manages 175 000 user identities by 1800 administrators in 700 different organisations and powers 200 different web services – both in on-premises and on-demand environments.

Tampere University of Technology

Tampere University of Technology (TUT) conducts scientific research in technology and architecture and provides higher education within these fields. The University operates in close collaboration with business life and other facets of society and produces high-standard services within its range of tasks. TUT is Finland's most international university of technology in researcher and student exchange. Leading-edge fields of research at TUT are signal processing, nanophotonics and intelligent machines.

Techila

Techila develops and sells Middleware solutions to produce HPC from the cloud. Techila enables applications to harness and utilize the infinite capacity of the Cloud quickly and easily. Unlike any other HPC Middleware solutions, Techila can be integrated easily and used securely, without the complexity.

Techila's typical customers are large organizations doing business critical optimization, modeling, simulations or data-analysis, and who need faster access to results in their business critical computing.

Tekes

Tekes is the most important publicly funded expert organisation for financing research, development and innovation in Finland. We boost wide-ranging innovation activities in research communities, industry and service sectors.

TeliaSonera

TeliaSonera provides network access and telecommunication services that help people and companies communicate in an easy, efficient and environmentally friendly way.

Tieto

Tieto is the leading IT service company in Northern Europe providing IT and product engineering services. Our highly specialized IT solutions and services complemented by a strong technology platform create tangible business benefits for our local and global customers. As a trusted transformation partner, we are close to our customers and understand their unique needs. With about 18 000 experts, we aim to become a leading service integrator creating the best service experience in IT

Tivit

Tivit is committed to ensuring even more rapid development of Finnish ICT know-how. As with other Finnish Strategic Centres for Science, Technology and Innovation (SHOKs), Tivit seeks to implement innovation policy, combine and systematise research and at the same time ensure that the results flow on to be used in the business world more rapidly than has previously been possible.

University of Helsinki

University of Helsinki is one of the best multidisciplinary research universities in the world. The high-quality research carried out by the university creates new knowledge for educating diverse specialists in various fields, and for utilisation in social decision-making and the business sector.

University of Jyväskylä

Drawing on the rich experience of 75 years of educational heritage, while at the same time embracing rapid modernisation, the University of Jyväskylä continues to set its sights firmly and confidently on the future.

Our core fields in research and education are basic natural phenomena and the structure of matter; education, learning, and teaching in the future; languages, culture, and social change processes; physical activity and wellbeing; and human technology.

University of Oulu

The University of Oulu is an international research and innovation university engaged in multidisciplinary basic research and academic education. The University of Oulu is one of the largest universities in Finland with an exceptionally wide academic base. Internationally pioneering research is conducted as a collaboration of different disciplines.

Vaadin

Vaadin is a Java framework for building modern web applications that look great, perform well and make you and your users happy.

VividWorks

VividWorks Ltd. offers innovative user-friendly visual solutions to the global market. We provide tools which are instantly accessible, enabling visual customization of products as a part of the purchase experience.

Vincit

Vincit provides solutions for challenging software projects

VTT

VTT Technical Research Centre of Finland is the biggest multitechnological applied research organisation in Northern Europe. VTT provides high-end technology solutions and innovation services. From its wide knowledge base, VTT can combine different technologies, create new innovations and a substantial range of world class technologies and applied research services thus improving its clients' competitiveness and competence.

Åbo Akademi

Åbo Akademi University has an acknowledged position at the forefront of research in such areas as biosciences, computer science, democracy, human rights, material sciences, process chemistry and psychology.

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