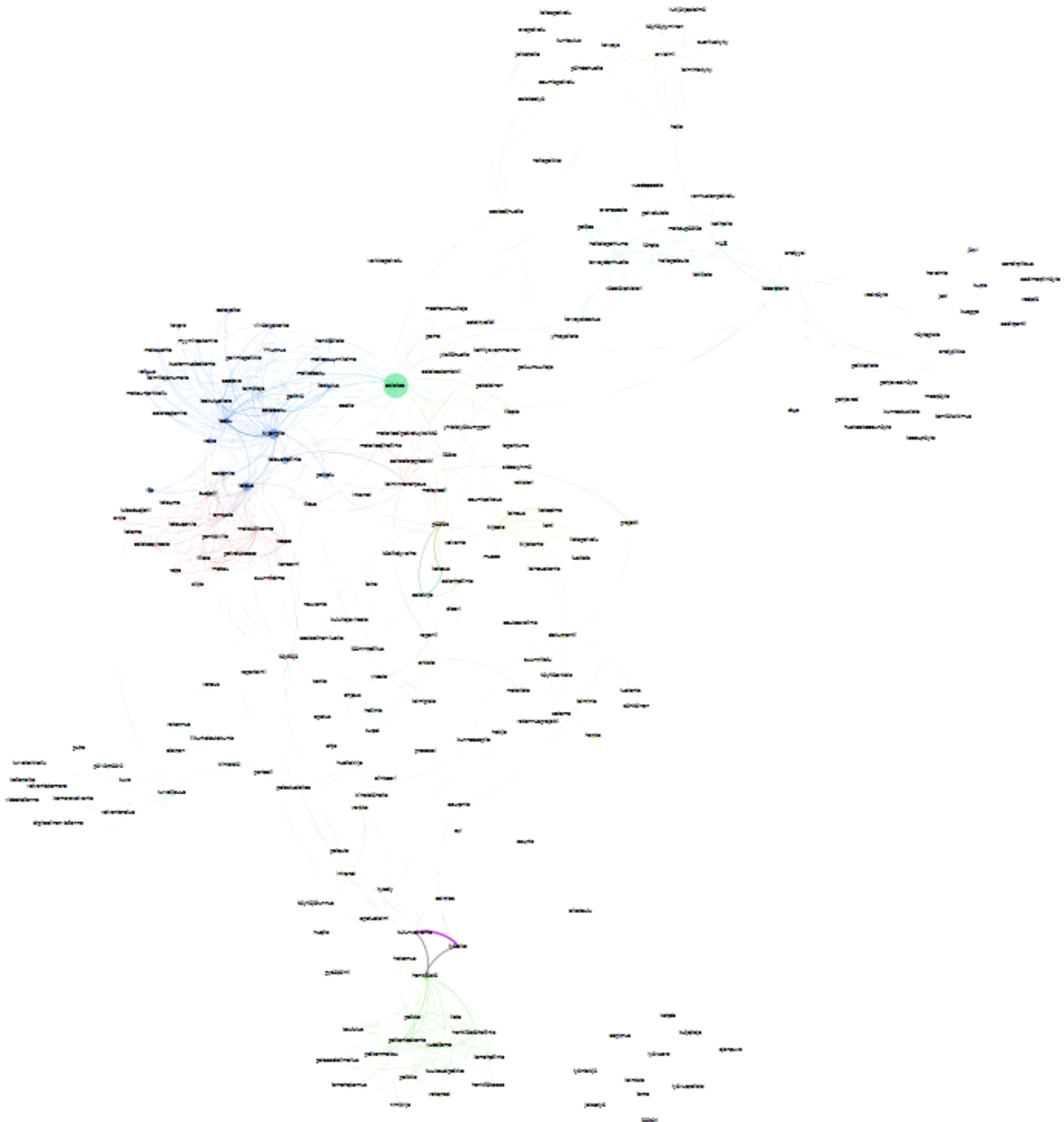


Information navigation in the city



Kim Viljanen
Antti Poikola
Pekka Koponen

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Fireball project

The study is part of the EU-funded Fireball project, in which cities and other organisations around Europe seek out their own and shared paths towards smarter operating practices.

Working group

Kim Viljanen is an expert in digital information management, with special expertise in the fields of the semantic web and linked open data, about which he has published dozens of scientific articles and is currently preparing his doctoral dissertation on the subject.

<http://digikim.iki.fi>

Antti Poikola specialises in the exploitation of social media, the development of collaborative solutions between citizens and public administration and the establishment of operating models based on openness. He is the chief contributor to the “Julkinen data - johdatus tietovarantojen avaamiseen” (“Public data – an introduction to opening information resources”) (Poikola et al., 2010) published by the Finnish Ministry of Transport and Communications.

<http://about.me/apoikola>

Pekka Koponen is a producer and designer of digital services, having extensive experience both from public and private sector. He works as Development Director for the Smart City project area at Forum Virium Helsinki. Projects have a strong emphasis on open data and interaction between city residents and city administration. In his present role he is facilitating co-operation of experts in different fields to build a better Helsinki, as is also the case with this study.

<http://www.forumvirium.fi/en/>

Interviews

In order to establish how Helsinki works, we interviewed employees in the public sector and other members of the urban community. We are indebted to our interviewees and other providers of comments.

Pekka Sauri, Deputy Mayor in charge of Public Works and Environmental Affairs, City of Helsinki

Markku Raitio, IT Director, City of Helsinki

Ari Andersin, Project Manager, Enterprise Architecture, City of Helsinki

Mirjam Heikkinen, Project Manager, Facility Register and Service Map, City of Helsinki

Matti Nikupeteri, Engineer, Building Regulation Department, Urban Landscape Unit, City of Helsinki

Otso Kivekäs, Member of the Public Works Committee, City of Helsinki

Jaakko Lehtonen, Dodo ry, for an eco-efficient city

Pirjo Tulikukka, Executive Director, Helsinki Neighbourhoods Association

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Table of contents

Foreword	1
1. Introduction	3
2. An open city with smart people	5
The dynamics of a 'smart city'	5
That's right. The people of Helsinki want to take part!.....	7
Open data in Helsinki	11
Conclusions.....	18
3. A complex giant	19
Finland's most complex organisation?	19
Data is the DNA of the city	21
Conclusions.....	26
4. The city of data	27
A single list of Helsinki's information systems.....	27
From a list to a map.....	29
Observations on the charting.....	33
Conclusions.....	35
5. Lessons learned.....	36
Literature	38

List of cases

Chapter 2

Case 1: World Design Capital: Helsinki 2012 - Open Helsinki	6
Case 2: Restaurant Day – The courage to act, a balance between creativity and reliability	8
Case 3: Tell-on-the-Map - enabling an open dialog between citizens and the city	10
Case 4: Helsinki Region Infoshare – the city’s internal open data consultant	13
Case 5: Apps4finland – Inspire and support the community of developers.....	15
Case 6: Interface for a roadmap for public transport	17

Chapter 3

Case 7: Plans on a map – Open processes, even if a little embarrassing	22
Case 8: Service map – information about municipal offices and services in the capital region	23
Case 9: Ahjo – the digitisation of decision-making processes	25

Foreword

Mayor Jussi Pajunen, City of Helsinki

The model of local democracy as we know it today is undergoing a fundamental transformation which will shake the foundations of our society. In a way, we are actually returning to the origins of the rule of the people; to the Greek and Roman city states, where informed members of the communities gathered to debate and decide on important matters.

For centuries we have distanced ourselves from this ideal. This development has, of course, occurred as a very natural consequence of the evolvement of the everyday lives and obligations of citizens. It would not be very practical to summon all the Helsinkians to the Senate Square to decide about the next year's budget.

Nevertheless, we now have the tools to do this virtually. In terms of city operations, the breakthrough of ICT has probably led to the greatest change in our way to work ever. However, until now ICT has been mostly perceived as a convenient tool just to carry out the duties as before. What I mean is that ICT has been glued on the existing structure, without reflecting on how it should be changed as a result of the new available technology. Only now are we entering a phase where computers and applications are really changing the ways we work. This is what I understand defines a Smart City – a whole new approach and level of ambition in combining information, communication and technology.

At present, we have an abundance of digital sources available just by a mouse-click, not to mention public libraries and other information services. Though, we still face several challenges in exploiting them in practice. For the average citizen, it requires great efforts to map out available sources and to learn how to access them – not to mention the challenge of processing and interpreting the information.

The norm of the Nordic society model has always been openness. Limitations on disclosure have been an exception and have required an explicit legal basis. Nonetheless, publicity of documents and accessibility to them are by no means congruent terms. Irrelevant of the principle of openness, special efforts have been required to attain official documents. Often this would involve a visit at the registrar's office of a specific department.

Herein lies the great revolution: information and technology in ICT have previously existed separately. Communication has mostly been one-way, going from the administration to the people.

Thanks to the new way of thinking, it will be possible to easily access virtually all data that may be disclosed as such in digital format. To illustrate my point, I will use the new information management system of Helsinki, Ahjo, as an example. All pending matters are registered and drafted in a citywide database. The different stages in the decision-making process add new information such as reports and statements from officials, departments and committees. Nearing the end of this cycle, there is an extensive amount of information concentrated in one digital system.

Now let us envisage that this information is made available to everyone through a web interface. In my visions all this information will be available to everyone, from the moment when the preparation process is launched within the city. Just imagine the vast opportunities for think tanks and residents' associations to present their own proposals regarding, for example, a new city planning project or the development of basic services in a certain district and make an important contribution to the official preparation procedure by providing an additional viewpoint. Participatory budgeting is another exciting possibility.

That being said, we are facing not only a groundbreaking paradigm shift in terms of openness, but regarding our entire democratic model and empowerment. It will shake the foundations of our present way of working and the way that we perceive local democracy today.

We have also received encouraging results from new informal forums where the scale of the operation is zoomed in from the local all the way to the district level. Representatives of residents associations, NGO's, civic activists and politicians come together in order to tackle problems that are common to a certain, limited part of the urban community.

An important question related to openness is the way information is made available. Vast databases are not easily interpreted. Special statistical understanding is required in order to make sense of the information. A great challenge is refining information into a more visual format.

Helsinki Region Infoshare is an exciting initiative that combines openness with visualization. Its main aim is to make regional information quickly and easily accessible to all. The data may be used by citizens, businesses, universities, academies, research facilities or municipal administration at no cost. The data published during the project is mainly statistical, giving a comprehensive and diverse outlook on different urban phenomena, such as living conditions, economics and well-being, employment and transport.

Behind the project is the vision that making public data readily available to all increases the residents' knowledge and insight into their region. This in turn improves the civic activity abilities of the public. Open access to information can also lead to new services and businesses in the area, and it may also advance research and development. The idea is also that the city can receive help from active citizens in interpreting the data and understanding the dynamics of the city. In the city strategy we have made a strong commitment to increase the citizen orientation in our welfare services.

In the core of this reasoning lies the vast scope of responsibilities of the Finnish cities, covering everything from basic health care and schools to street maintenance and city planning. This is based on our legislative framework. What is new is the emergence of a new approach and way of thinking regarding the duties of a municipality; that irrelevant of the responsible authority, everything that is in the interest of the residents is also a part of the extended duties of the city.

Helsinki aims to offer means and methods for ordinary citizens to participate in developing their living environment. Actions and plans do not always have to be huge and momentous. The most important thing is to involve people in the decision-making process that applies to their living area.

Publicly available and understandable information is a prerequisite for a functioning modern democracy. Access to relevant and future oriented information contributes to better decision making and better life in terms of liveable cities, competitiveness and sustainability. Our great challenge is to build mechanisms that now ensure the two-way communication between the citizens and the city and to find ways to support and encourage the civic activity envisaged.

Smart cities pave the way for new local democracy.

1. Introduction

The city, as we understand it, is a concentration of human activity in a physical location and in digital reality.

The physical concentration of habitation, services, business, culture and all kinds of human activities is helpful for the interaction between people. An ever-increasing amount of human activity related to the city is also occurring online, in digital reality. Internet and web add new dimensions to the city, create opportunities free of physical constraints, make borders more diffuse and make the city a part of the digital world. Distance becomes less significant, and people can interact with each other regardless of space and time.

To understand the city you visit, you may look at a map, read a history of the city, talk with local residents or have a coffee while you sit by a square and observe the hustle and bustle. Each of these ways of understanding a city offers its own perspective on it.

Digital data offer a new vantage point on the city as a whole. There is a wealth of data on cities: statistics, publications, simulation models, video recordings, images, maps, geographic information, 3D models. Data can be used to examine the past, visualise the present and anticipate the future. The municipal organisation itself also has vast amounts of data that tell what happens in the city in practice.

Ensuring cities' level of service provision and cultivating their vitality means that they have to be increasingly agile in meeting both anticipated and unforeseen challenges.

The concentration of people and functions also causes problems, such as traffic jams, expensive housing and crime. Many European cities also have to grapple with challenges such as aging populations and a scarcity of financial resources. Together with unforeseen future challenges, these require cities to renew themselves constantly and develop their expertise further. There is a worldwide demand for good solutions.

A *smart city* is one model of thinking for the development of a better city. In this model, the final aim is to improve the quality of municipal services through holistic development of the city. Holistic development concerns structures, processes, visionary leadership, definitions of policy, technology and municipal infrastructure (Nam & Pardo, 2011).

A smart city makes use of the entire human capital of the city community. The more people participate in solving the challenges related to the city, the more comprehensive the selection of ideas and smarter the solutions will become.

At its best, citizen participation produces a more functional city and a smarter administration. It increases both the trust between people and the social capital of the city community. When people are involved in planning, testing and realisation of shared services, they will view the services as their own.

A key factor in participation is a functional dialogue between the municipal organisation and the different actors in the city community. Participation of the city community requires a shared understanding of the city and shared knowledge base. To enable the city community to contribute fully to development of the city, the municipal organisation must make its information available to all.

The divide between municipal organisation and the city community is currently rather acute. Established ways of acting and administrative structures do not always support residents'

participation nor make it possible to take their ideas into account in the functioning of the municipality.

It is also a question of how the city is seen. Is the city a mere service organisation with clients, or is it primarily a community served by the service organisation but having people at its core? People have knowledge, skills and experience that can be used in developing services.

Digital data offer a new, uncharted perspective on Helsinki.

In this report we show what a 'smart city' means in Helsinki. Of the different parts of a smart city, we have emphasised resident participation in municipal development and the way the opened-up data accelerate development and facilitate information-based participation.

Information systems and the operations of a city are tightly integrated. Knowing what data and what information systems the city has would help understanding the city. Having clear picture of the city's information landscape is prerequisite for developing IT based smart solutions.

Until now, nobody has been completely familiar with all the data and information systems that the City of Helsinki has. Therefore as part of this report, we charted the information systems of the city and used the findings to create a visual map – *the Helsinki information system map* – which offers a new overview to the city. We believe that a similar charting and visualisation would also be of use to many other smart cities.

In addition, we present nine case studies of smartness in Helsinki. As the conclusion, we offer five lessons learned from Helsinki.

The report is based on interviews carried out in the municipal organisation and city community as well as a charting of the city's information system descriptions.

Welcome to a digital and participatory expedition into Helsinki!

2. An open city with smart people

“The concept of an Open Helsinki is literal: a city where information, ideas, thoughts and people can move freely without unnecessary, creativity-hampering obstacles.”

Jussi Pajunen, Mayor

The context of this report is a ‘smart city’, ‘smart citizens’ and open data. The following is a description of how Helsinki and this report approaches these themes.

The dynamics of a ‘smart city’

Helsinki views itself as a “smart city” where the “smartness” is first and foremost based on the smartness of the people of the urban community. With the help of the smart people participating in the developing of the city, smart services and operating practices can be created. Key enablers for participation are the openness, the transparency of activities, the distribution of information and the receptiveness of the municipal organisation. These ideas about how a city should be organized is also some of the major reasons why Helsinki was selected as the World Design Capital with the vision of “Open Helsinki - Embedding design in Life”.

Deputy mayor **Pekka Sauri** explains how Helsinki approaches ‘smartness’ as follows:

1) A smart city can combine service production and an innovative environment

The city is a service organisation, which produces dependable, predictable, reliable and efficient services. At the same time, the city should be an environment where creative activity and innovations are possible. The city should allow an adequate degree of freedom or directly encourage such innovation, combining it with risk-free service production. Reliability and security – creativity and risk-taking.

2) A smart city exploits available information

In its activities, the city should take into account all available information about the state of the world and mankind. All information is inevitably produced by people, that is to say, the urban community directly or others. Information may be objective or subjective. The planning of a service production system is based on objective information that is argued in the best possible way. In creating and supporting communities, there is often a need to take account of empirical information. Scientific information has merely gone through a more stringent process of argumentation than empirical information, which may be completely subjective.

3) A smart city means dialogue

The only information available for urban development is that produced by people directly involved in it or that which is produced when people talk about amongst themselves. Those ideas which do not directly relate to this field of communication are excluded.

Because a municipal organisation cannot own all the wisdom that exists in an urban community, dialogue is needed between the municipality and the urban community. In this dialogue, the community is given as much intellectual material as possible that the municipal organisation has at its disposal. At the same time, the city ensures that it can accept into its own activities those ideas

that have come from this extended field of communication. At its best, this dialogue forms a thread of positive learning.

If this field of communication across the urban community – or even global community – can be made available for the development of the city’s activities, then that is the optimal situation. There is nothing other than what people produce and discuss amongst themselves. The key question is how can this communication be organised.

4) A smart city is an urban community

If the city is interpreted merely as a service delivery organisation, then the organisation is in power and the role of its citizens is easily reduced to that of “complaining customer” and passive citizen. In that case, the organisation decides what the residents may do and what they may not. At the same time, the citizens outsource community spirit to the authorities.

Instead, if the city is perceived as a community consisting of communication and interaction between citizens in whose service the service organisation exists, the citizens’ degree of freedom increases and they are more open to experiment with new things, which in turn create innovations. This also benefits the service delivery organisation, which is then defined more by the ideas of the community – in interaction. In a smart city, the city’s service delivery organisation is at the service of the community.



Case 1: World Design Capital: Helsinki 2012 - Open Helsinki

The history of Finnish design is long and highly respected. It can justifiably be said that design is a key part of the Finnish way of life. We respect traditions and cherish the past, but for us design above all represents the future.

In 2012, Helsinki is the World Design Capital (WDC) together with Espoo, Vantaa, Kauniainen and Lahti. The theme of the WDC year is ‘Open Helsinki – Embedding Design in Life’. In an open city, people listen to the city and the city listens to the people. The theme “Open Helsinki” was selected to both represent current views in Finland on how to create a participatory, vibrant and evolving city, but also as an vision on what to improve even further.

The WDC year consists of many different kinds of public events both in Finland and abroad. The intention is not, however, to be a festival of fireworks lasting 365 days, but a project that considers the new role of sustainable design from a broader perspective, and one whose influence will extend far into the future. So what is essential is not what happens in autumn 2012, but what happens in spring 2021.

Perhaps more than anything, Helsinki as the WDC wants to stimulate discussion on how design can make life better, easier and more efficient. Answers to this question is searched through the various

programmes and projects of the year. Design exists for people.

World Design Capital status promotes and supports the cultural, social and economic exploitation of design. It is held every second year and the International Council of Societies of Industrial Design (Icsid) appoints the host city.

<http://wdchelsinki2012.fi>

That's right. The people of Helsinki want to take part!

The views of the city's administration presented above correspond to what has recently happened in Helsinki in practice. Citizens want to take practical action to develop this city and their own living environment. They find traditional methods of democracy less interesting.

The Finnish interest for elections and voting has been gradually declining over a long period. In the same way, interest in participating in traditional civic organisations, movements and parties has also declined. At the same time, it seems that there has been an increase in all kinds of activity in which people themselves can seize the opportunity to promote the general good or oppose things they see as wrong. Participation in social activity has not disappeared but is changing its form.

Citizens are developing new forms of participation and collaboration at a rapid pace. Examples include the *Kallio Movement* and *Restaurant Day*. The Kallio Movement was born to oppose the removal of the charitable Hursti bread queues from the Kallio district of Helsinki. Since then, this popular movement that sprung up in social media has organised block parties and other events.

Restaurant Day started as a rebellion against bureaucratic regulation and as an advocate for food culture. The movement started as a reaction to several reports in Helsinki of small kiosks and restaurants being fined or even closed down because of health and other regulations. The city's actions in these cases were generally considered excessive. City officials could also have banned Restaurant Day for reasons of the lack of food-related hygiene, distribution and other licences. The officials, however, decided not to interfere. This event is now seen as an excellent example of the flexible attitude of officials toward activity situated in the 'grey area' of acts and decrees, and as an example of something worthwhile that stimulates urban culture and the development of the policies and practices of the city. The Restaurant Day phenomenon has now spread from Helsinki to dozens of other cities around the world.



Pictured: Kääntöpöytä, one of the pop-up restaurants on Restaurant Day (source: [Maria Nordlund dodo.org](http://Maria.Nordlund.dodo.org) 2011)

Case 2: Restaurant Day

"The municipality should learn from Restaurant Day."

- Mayor Jussi Pajunen

Restaurant Day is a culinary carnival that takes place four times a year to promote food and urban culture. The purpose of the event, which originates from Helsinki, is to encourage people to set up their own restaurants for just one day. People can let their imaginations run wild! They can set up a café, restaurant, kiosk, street kitchen or other ingenious food establishment in their own home if they so choose. Other popular venues have been parks, offices, beaches and courtyards. There have also been a Bicycle Bar and Bread Car, which have brought delights to diners.

Official licences for the restaurants are not requested, and the authorities do not enforce them. The municipality has understood that it must stand aside when citizens occupy space in a completely new way and make Helsinki a nicer place to live and spend time.

On the first Restaurant Day on 21 May 2011, almost 40 pop-up restaurants sprang up in 13 different cities. On the next Restaurant Day in August 2011, about 200 restaurants opened their doors in 30 cities in four different countries. The figures for the last one held in February 2012 were more than 300 restaurants in 50 cities in 12 countries.

The key to Restaurant day is doing things together, enjoying it and having fun! At the same time, the Restaurant day has fostered discussion on how to improve regulation and city policies to enable a more vibrant city.

<http://www.restaurantday.org>

What these new forms of making a difference have in common is that people would rather do things for themselves than trust in the operations of large corporations, organisations or representative democracy. Civic activity is increasingly taking place in communities and networks without any formal organisation. Things get going quickly and may also fade or change into something else once the original aim has been achieved.

One key influential factor in this development is the internet which enables the provision of resources, mobilisation and organisation on a scale that was previously only possible through major organisations. Traditional organisations are also adopting the new approaches and taking advantage of the opportunities presented by the development of information and communication technology.

The new forms of civic activity affects also how people want to participate in the decision-making of their own city. Participation in democracy not only means voting in elections and commenting on the efficiency of public services. Democracy increasingly also means people being active themselves.

Active democracy means getting down to work, if necessary bypassing all the established structures when people feel that something needs to be changed. People now have the possibility to do this as they are better educated than ever before, they have more and more free time and the internet as an effective means of participation.

Participation in active democracy produces more direct results and not just demands for someone else to do something. It is no longer assumed that public authorities can solve all problems, as the potential of the public sector is limited. At the same time, top-down power is losing its significance as people are increasingly preferring to trust their peers. In addition, the activities of the people can lead to changes in the policies of the city - actions as a form of discussion in addition to the direct benefits of the actions.

Also the city can harness the eagerness of the citizens to participate by enabling an open dialog between the citizens and the city. One example of such activity in Helsinki is the Tell-on-the-Map service which has attracted thousands of people to comment on several development topics such as new tram line plans.

KERRO KARTALLA Kaupunkisuunnitteluvirasto **Munkkivuoren ratikka** Etusivu Kysely

Kommentit

Kohdassa 1 voit valita kommenttien aiheen.
Kohdassa 2 voit valita minkätyyppisiä kommentteja haet. Klikkaa lopuksi Näytä kommentit-painiketta

① **Valitse aihe**
Liikuminen Munkinseudulla

Reittivaihtoehdot

② **Valitse näytettävät kommentit**

- 50 viimeisintä kommenttia
- Kaikki
- Näytä kysymyksen mukaan

Valitse kysymys

Virkamiesten kommentit

Lisää hakuetoja

Case 3: Tell-on-the-Map - enabling an open dialog between citizens and the city

Tell-on-the-Map (Kerro kartalla) is a map-based commentary tool for citizens. It includes flexible and easy-to-use web tools which the civil servants and planners can use in designing and publishing many kinds of open questionnaires that combine maps, geographic information and discussion forums. The tool can be used in planning consultations, gathering local data from the area, local SWOT analyses, safety mapping and gathering ideas and suggestions. Alternative plans and drafts can be commented.

The user can put a comment on the map and also view what others have said as all comments and civil servants' answers can be read, searched and discussed further. The application produces categorized data that can be analyzed, refined and combined with other data in GIS programs and Excel. RSS feeds, Share options and REST API are also utilized. Open source software like Drupal, OpenLayers and GeoServer was used to realize the Tell-on-the-Map service.

The service has shown that people do participate when the participation is made easy and the topic interesting. The image above shows a screenshot of the survey, which collected people's comments about tram line extension in Munkkivuori district. In less than a month the survey amounted to nearly 4000 comments from 600 unique commentators. Based on the usage statistics, the web-based survey was particularly popular among working-age people.

Various surveys made with the Tell-on-the-Map have taught many lessons on how a web-based dialogue can be arranged. For instance the tram line survey's popularity was increased when the main newspaper Helsingin Sanomat wrote on the subject. Even more popular was a survey related to the winter maintenance of the streets, in three months it gathered close to 50 000 responses. This large amount of responses, however produced its own challenges. The department responsible for the street maintenance would have welcomed more comments about the quality of snow plowing on areas where it had been done. Now due to the snowy winter, the feedback was mainly on areas that have not been plowed. The lesson was that the surveys should be directed more accurately.

<http://kerrokartalla.hel.fi/>

New local democracy based on open dialogue

Citizens' active participation which is based on their own motivation is not representative in nature. People form groups around and act just for the causes that are interesting to them. When decision-making processes rely on civic participation attention must be paid to the issues of liability, of representation and equality.

In the current practice of representative democracy, politicians and parties are held accountable for the decisions and the civil servants for preparation and execution. How will the decision-making practice look like in the future? Decision-making system changes the state has paid attention to, inter alia, the data center of Helsinki researcher Pia Backlund, who wrote: "Local action today is characterized by the lack of clarity about what kind of internal logic of the operation of the planning and decision-making system is based on - and what kind it should lean on."

Digitization of the old is not enough - a smart city needs a new concept of local democracy, because the environment has fundamentally changed and the current political decision-making structure is from last or the previous century. The big change will not happen overnight, but it consists of a number of minor changes which are realized over time. Something that seems to be common for many recent examples of civic participation solutions, also those presented in this report, is that the dialogue between different actors becomes open.

For example, via above mentioned Tell-on-the-Map application citizens may comment on the urban development plans so that the comments are visible to all. The Service map application (see chapter 3.) in turn enable the people to give feedback to the various city services and agencies so that on the messages are visible to all other users of the Service Map. Also the open data portal Helsinki Region Infoshare (see the case later in this chapter) encourage people to open dialogue. It is possible to ask questions and leave comments related to published datasets either directly at the data catalogue service or the Facebook group of Helsinki Region Infoshare. Thanks to an open debate various shortcomings and errors of the published datasets have been quickly noticed and sometimes even corrected by the users of the service. In the old model of a closed dialogue, feedback and opinions were communicated mostly in one-to-one manner either by email or over phone. The wider community didn't know what the others had commented and couldn't participate the discussion with their own solutions.

Open data in Helsinki

"Information resources produced using public funding will be opened up for public and corporate access. The goal is to make digital data materials managed by the public sector available to citizens, companies, enterprises and organisations, authorities, and for research and education purposes in an easily reusable format via information networks."

Programme of Prime Minister Jyrki Katainen's Government. (2011)

The ever-strengthening movement of open data in Helsinki and around the world is tending towards a situation in which the public sector in particular but also companies and other organisations are openly offering data that they possess for the use of everyone. Open data is part of the "Open Helsinki" vision where information, ideas, thoughts and people can move freely without unnecessary, creativity-hampering obstacles. Open data is also considered to be of strategic importance for the City of Helsinki in the city's new information technology strategy (Information technology program of the City of Helsinki 2012–2014).

'Open data' means that the data is freely available without charge to all parties and to other web-based services, insofar as it is not confidential. The public content of information systems is

available in machine-readable format for the utilisation for example in internet services, mobile applications, information systems or various customer applications.

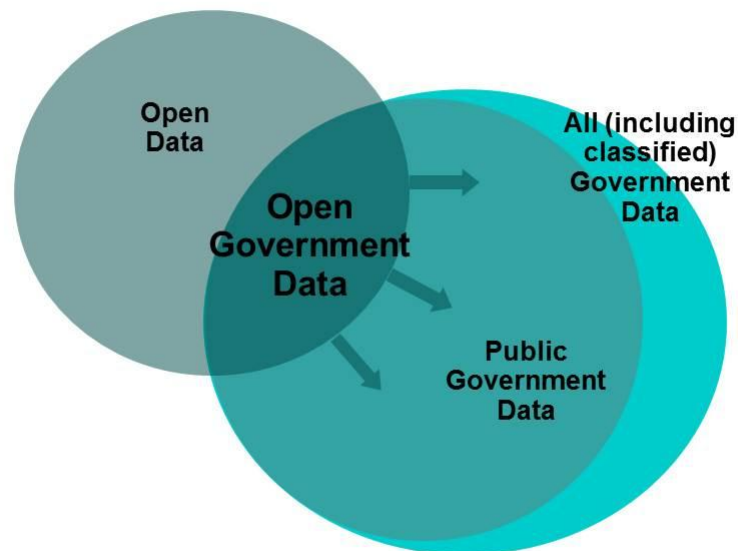


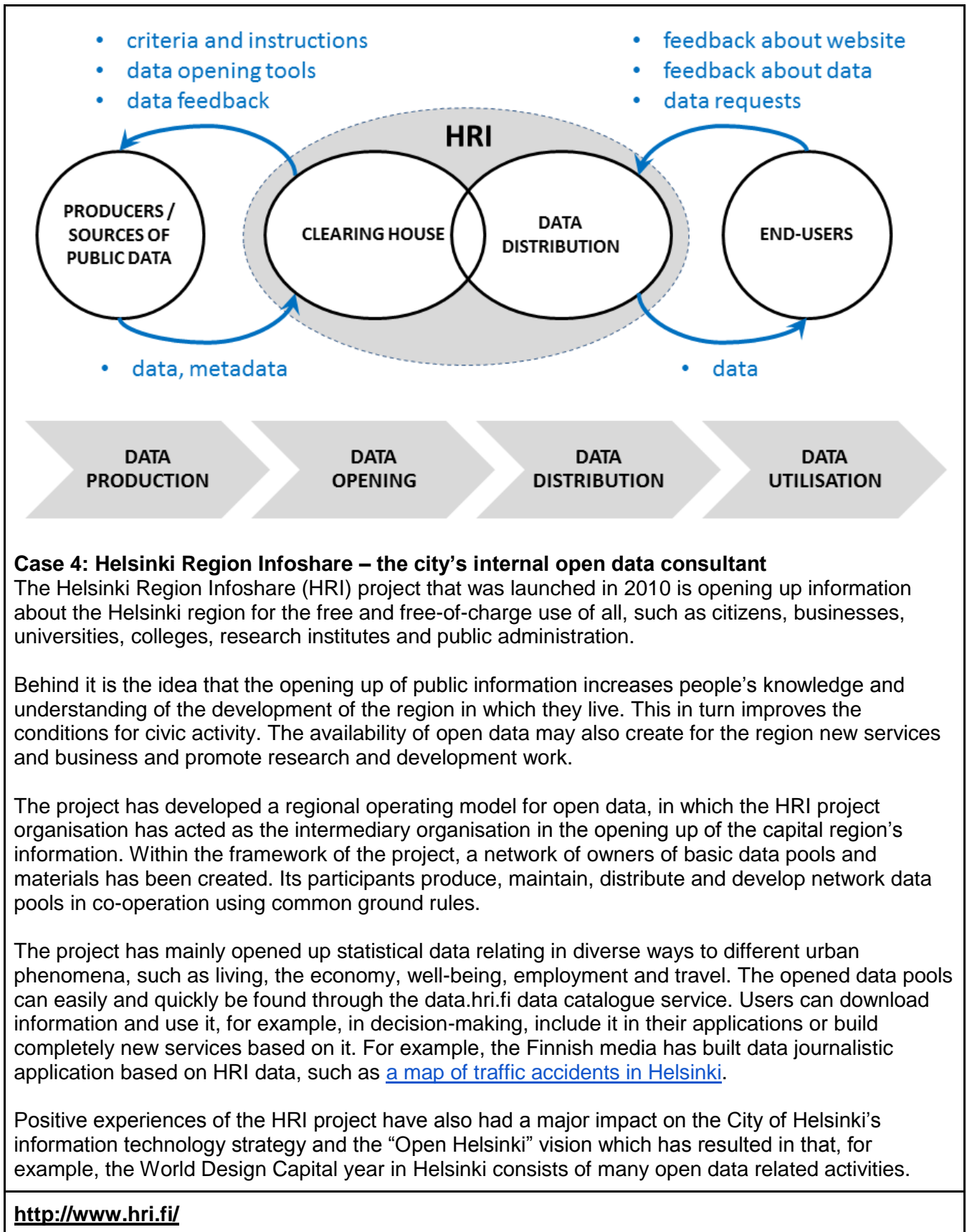
Image: Open government data is the part of public data sets that are openly accessible to anybody in machine readable form and free of charge. Part of the government data is confidential and can never be opened up, but there are many public data sets that are currently hard to access, but hopefully opened up in the future.

Through discussions, reports and projects, openness has rapidly become a key word in the vocabulary of administration. In discussions on openness, there is simultaneous talk about open licensing, technical interfaces, formats, metadata, the harmonisation of data, the transparency of administration, the opportunities for human participation, the principle of publication, reusability and machine-readability. It is not exceptional for different parties to mean different things.

The openness of data, and the right of access to it, should not be confused. ‘Open data’ means information which can be reused by anyone, without technical, legal or financial barriers. According to legislation, ‘public data’ on the other hand means information which is not subject to the laws of privacy protection – such as person registers – or cannot be interpreted as legally sensitive for other reasons, such as national security. Naturally, data that is not public cannot be open.

The technical ease of use of data does not automatically mean that it is open. Especially when talking about “open interfaces”, it is worth taking into account the fact that technically easily available data can be subject to conditions limiting its reuse or redistribution. Correspondingly, there may be cases where completely open data is not very easily usable, for example because of a difficult file format, difficulty in finding it or deficient documentation.

The Helsinki region has pioneered open data in Finland, for example through the Helsinki Region Infoshare (HRI) project and the excellent interface (API) work for Helsinki Region Transport. In both cases, it is a question of the City’s information being openly put at the disposal of all who are interested. The work is still ongoing and only a small proportion of all the City’s data has so far been opened, but through this work, experience has been gained and structures have been created concerning open data practices as described in the following cases and viewpoints.



Case 4: Helsinki Region Infoshare – the city’s internal open data consultant

The Helsinki Region Infoshare (HRI) project that was launched in 2010 is opening up information about the Helsinki region for the free and free-of-charge use of all, such as citizens, businesses, universities, colleges, research institutes and public administration.

Behind it is the idea that the opening up of public information increases people’s knowledge and understanding of the development of the region in which they live. This in turn improves the conditions for civic activity. The availability of open data may also create for the region new services and business and promote research and development work.

The project has developed a regional operating model for open data, in which the HRI project organisation has acted as the intermediary organisation in the opening up of the capital region’s information. Within the framework of the project, a network of owners of basic data pools and materials has been created. Its participants produce, maintain, distribute and develop network data pools in co-operation using common ground rules.

The project has mainly opened up statistical data relating in diverse ways to different urban phenomena, such as living, the economy, well-being, employment and travel. The opened data pools can easily and quickly be found through the data.hri.fi data catalogue service. Users can download information and use it, for example, in decision-making, include it in their applications or build completely new services based on it. For example, the Finnish media has built data journalistic application based on HRI data, such as [a map of traffic accidents in Helsinki](#).

Positive experiences of the HRI project have also had a major impact on the City of Helsinki’s information technology strategy and the “Open Helsinki” vision which has resulted in that, for example, the World Design Capital year in Helsinki consists of many open data related activities.

<http://www.hri.fi/>

Ad hoc idea incubators analyse and utilise city data

In order to encourage the urban community to take advantage of open data and in order to generate ideas to develop the city, the City of Helsinki has actively encouraged and supported developers of computer and mobile software to create new applications for the city's open data. In recent years, application competitions run by organisations such as Apps4Finland and Helsinki Region Transport (HRT) have been held, as a result of which hundreds of open data applications have been created. At the same time, knowledge about the potential of open data has spread and several new companies have been established by the teams that participated in the competitions.

“In my opinion, the creation of services without the City being involved in all of them is a terrifically smart idea, for which people active in the urban community across organisational boundaries deserve thanks,” says City of Helsinki IT director **Markku Raitio**. This means that the municipality does not need to stretch its own resources into fields where other parties in the urban community can provide some city-related service better.

Applications developed by the community can also be decisive in the small 'niche' requirements of citizens, when municipal resources are insufficient or when it makes no sense to use them for that purpose. “The city should be more reminiscent of the development of the Linux system than that of the mainframe system,” explains **Petri Aukia**, managing director of the software company Codento. Typical of the thinking behind the open source code Linux is the fact that someone somewhere in the world will have developed an application for even the most 'niche' of needs. Or if that is not the case, you can do it yourself if you have the programming ability.

From an open data point of view, the people of Helsinki constitute an exceptional community in Finland. Due to being the capital city, lots of public workers and many state administration officials and decision-makers live in Helsinki. Helsinki has the most people employed in analysis and decision-making, and it has exceptional expertise in public administration. Helsinki has the best Finnish skills in open data analysis and the greatest number of available thinkers.

The Long Tail phenomenon is perhaps applicable to the use of open data. Whenever an issue is considered, no matter how obscure, it is probable that somewhere in the world – or even in the city – there is someone else who is interested in that very question. If a city publishes information and even a few people in the city grasp the issue, they form a kind of ad hoc idea incubator, the results of which can prove highly valuable and beneficial from the city's perspective. This can result in making better decisions in the city or for example as mobile applications that help the citizens in their daily life.



Case 5: The Apps4Finland competition

“We need open data, so that people can participate and public administration can better meet the needs of people’s everyday lives.”

- Paavo Arhinmäki, Minister of Culture and Sports, at the Apps4Finland Gala on 22 November 2011

The third Apps4Finland competition was held in 2011. It inspired a record number of people to think about and develop new ways to utilise the open data pools of public administration. The competition attracted 140 entries and the quality was very high. The entries dealt with transport in the city and countryside. The visualisations concerning society and politics illustrated information in an easily understandable form, increasing social transparency. Prizes totalling €21,000 were awarded. There were four categories: Idea, Application, Visualisation and Data. There were also special prizes.

The winner of the Application category was ParkkiNappi by Neligrate Oy. Using this application, you can pay for parking your car without coins and automatic ticket machines with a very simple mobile phone application. It makes travelling in the city easier and speeds things up for drivers. The Visualisation category was won by Lauri Vanhala’s Helsinki Public Transport Visualized video (pictured). In an impressive way, it shows how public transport in the capital region springs to life every morning. This beautiful work uses different data sources in a varied way. It is a fine illustration of how you do not necessarily have to use your own car to travel in the capital region, with such a highly comprehensive the public transport network.

<http://www.apps4finland.fi>

Open data business opportunities in Helsinki

The promotion of business is the second major objective in open data. It creates exceptional opportunities for success in technological industries, says Petri Aukia. “There are very few technical means for Helsinki to help companies in Helsinki or in its surrounding area to achieve a competitive edge globally. The intention is to make open data inevitable, coming to all municipalities through electronic means at some stage. In order to get those cities and municipalities with open data to

open it smartly and in good time, local industries are being established with access to better data resources than competitors from cities that are many years behind.”

All in all, public administration represents about one quarter of the Finnish IT industry. That means that whilst making the systems for about five million Finnish people, it has been possible to employ one quarter of the Finnish IT sector. Petri Aukia envisions that if, as we get accustomed to the openness of public administration in Finland, we are able to open up data more quickly than elsewhere, then the target market would be the whole of the western world in which about one billion people live; a market 200 times larger than that of Finland.

In Aukia’s opinion, we are looking at a Nokia-scale opportunity – but only if Finland acts with sufficient speed so that everywhere else in the world comes to buy Finnish open data expertise and systems. “Our advantage is that we are comparatively incorrupt and we have an officialdom that takes quite a positive attitude towards transparency. To get this going in a commercial way is an opportunity that only comes along once. If the opportunity isn’t seized, it will be missed,” predicts Aukia.

For the media, open data enables new kinds of article types based on data, as well as data journalism where, by combining and visualising data, new types of data-based journalism can be created. The end result may be, for example, web applications or different kinds of visualisations in newspapers. **Teppo Moisio** of the Helsingin Sanomat says that in the newspaper on which he works, they have already been doing basic data journalism for a long time based on the support of Statistics Finland where, on request, the media can get answers to its questions. In these cases, however, journalists themselves have got to – or had to – work with raw data. “We are of course not necessarily as good at doing research reports as the people at Statistics Finland or other municipal researchers. But it would seem that, through open data, the city can get more people – free researchers – to chew over its data.”

The publication of open data also produces news, as journalists notice new data and begin to consider what could be done with it. “Ideas don’t usually come from nothing. They have some trigger,” says Moisio.

In open data, Petri Aukia also sees employment opportunities. For example, expertise in the programming of information systems for mobile phone networks is also a useful skill in the processing of large volumes of open data and in its related programming. In each case, the problems are mathematical, the only difference being whether the programme is performed within the mobile phone network or with a computer that processes open data.

Application Programming Interfaces are the ‘spirit of the game’ in the future

The future large-scale support of open data is one reason why the City of Helsinki has a strong interest in getting interfaces to cover all future information systems and making data move between systems more flexibly than at present. The use of interfaces does not indicate which part of the data is public and which part for internal use only, but by using interfaces is data easily available outside the system if desired.

One important reason to seek interfaces is the desire to avoid being locked to the original system supplier. Through interfaces, additional features can be ordered from other suppliers, because the core of the system – its data – is available through the interfaces. Without interfaces, there is often a situation where only the original system supplier can make changes. “In the field of suppliers, we

must say frankly that the public sector in Finland requires such things. If in future you want to operate in this market, then this is the 'spirit of the game'," says Markku Raitio.

The requirement for interfaces is a change in the rules which can significantly alter the business models of system suppliers. The supplier of a flexible solution will in future consent to competing on an equal basis with other suppliers in terms of changes and maintenance. But this may also increase the price of the original system. "It is quite clearly evident that if, in competition, we only stress price and in particular the price of acquisition, it is virtually sure that we will get a system that is not open, has insufficient interfaces, and will not operate flexibly without the supplier sending a large bill each and every time," says **Ari Andersin**, who is in charge of overall IT architecture for the City of Helsinki.

"In public administration, it is regrettably typical that efforts are made to divide up a major investment so that the first stage does not seem expensive, but the following stages might be," says Petri Aukia. "It could prove cheaper to take a loan from the bank and put out to tender both the maintenance and development stage." At the same time, it will become clearer what the costs of the systems are over their entire life cycle.

"I believe that as a result of the activation of the field, these operative system suppliers will also take full advantage of the opening of these interfaces themselves," says Markku Raitio.

Case 6: Open data interface for public transport journey planner

Helsinki Region Transport (HRT) offers the developers open data through their own interfaces. This data is offered from many sources: routings for public transport, cycling and walking, route and bus stop timetables, traffic disruptions and even the real-time positioning of some vehicles. The opening of interfaces to public use is a natural part of the service development map. At first, there was a need to transfer data between the company's own services built at different times and by different suppliers. Gradually, the interfaces have been opened and also developed for open use.

HRT develops and maintains a well-known, efficient Journey Planner service, by which passengers can find the fastest route to their destination. By also opening up the high-quality data of this service to other developers, HRT did not need to be responsible for investments in countless constantly changing mobile device environments in addition to the web service. The interface has been very popular and is now being used by about 200 developers, which are developing user interface versions of the Journey Planner for many different mobile devices and purposes. Citizens get better services, developers more income and HRT more satisfied customers.

HRT's interfaces are also used in many services which are not centred on public transport, but which are complemented by the information in the Journey Planner. These include mobile applications guiding people to events or other services, which can at the same time offer a smarter route to the destination. The second example is real estate services, which can visualise, on a map, daily journey times depending on the location of a dwelling or place of work.

<http://developer.reittiopas.fi>

Conclusions

1. Helsinki's concept is that the smartness of the smart city lies in its people. The city develops in dialogue between the urban community and municipal organisation.
2. The city should share all its public data with the community, so that dialogue spawns new ideas. One part of this activity is open data.
3. Helsinki has successfully experimented with open data – so far hundreds of applications utilising the data have been created. Furthermore, the City of Helsinki has developed procedures for publishing open data.
4. Open interfaces are an important step in the development of the City's systems. They help bring about interoperability, reduce commitments for system suppliers and will in future enable open data at the level of all systems.

3. A complex giant

“Probably at the moment nobody in the City of Helsinki actually has an overall picture of the organisation’s information systems.”

Ari Andersin, Project Manager, Enterprise Architecture, the City of Helsinki

Open data in Helsinki can be considered as a next step of the centuries long traditions of transparency and access to information in the Nordic countries. The Swedish-Finnish Freedom of the Press Act, which came into force in 1766, was the world’s first piece of legislation on the freedom of knowledge. Since then, the social norm in the Nordic countries has been the right of access to information. Keeping information secret is an exception, which requires legal justification.

The right of access to documents and their availability are not, however, the same thing. Despite the principles of openness, obtaining official documents has required a considerable degree of effort, such as a visit to the archives of certain authorities and knowledge about what is available and in which archive. In addition, for example in Helsinki, based on our interviews, the city does not even itself know what all information it has about itself. Therefore, there is also not a single citizen who could know what information he or she could request from the city. Clarifying the issue of what information and digital data the city has about itself is considerably hampered by the fact that Helsinki’s municipal organisation is very extensive and complex. Few if any fully understand how it works.

Finland’s most complex organisation?

The Helsinki region is home to about 1.3 million people and hosts 738,100 jobs. The actual city of Helsinki has 588,549 residents (2011). The City of Helsinki is Finland’s largest employer and one of Finland’s largest and most complex organisations. It employs about 39,000 people. It has 29 departments and six public service corporations. It also owns 112 limited companies and 12 foundations, which employ a total of about 4,400 people.

The work of Helsinki’s municipal organisation is very extensive. For example, it takes care of education, health, social services, public transport, libraries and cultural services, energy maintenance, water, the street networks and countless other things. It is not surprising that based on interviews we conducted, nobody feels that they understand exactly how the City of Helsinki functions.

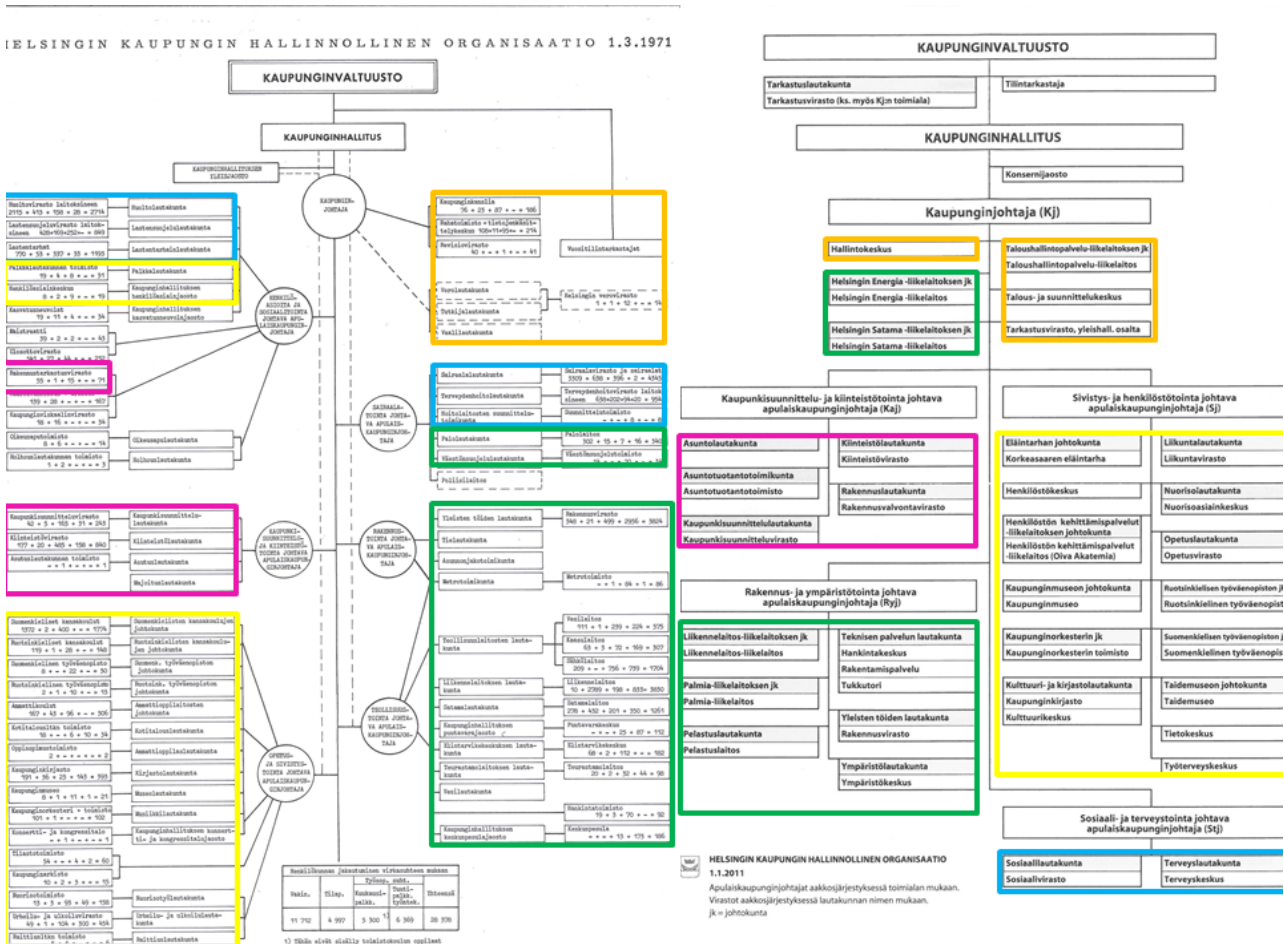
Just one individual issue, perhaps sorting out with the authorities a wrongly-placed pile of snow, can require communication with many different departments, each of which is partially responsible for the matter in question. You need to know about legislation, contracts and other things if you want to be able to know who handles what. “All sectors seem constantly to be overlapping and adjacent to each other. They are crying out for more co-operation” says **Pirjo Tulikukka**, the executive director of the Helsinki Neighbourhoods Association.

In the global context, Finland’s system of administration is very local government-centred. In many other countries, for example, health care is the responsibility of the national, regional, state or provincial government. In Finland, the large majority of the responsibility for the provision of public services rests with local government. The municipal organisation might be complex and sometimes

not fit for purpose, but each department and unit is responsible for the provision of some service, which justifies its very existence.

The operations of the City are not a permanent construction; the organisation is constantly developing in different spheres. Correspondingly, as the City's departments, offices, companies and other parties constantly develop their own activities, situations regularly crop up where functions overlap. In such cases, it is necessary to clarify job descriptions. The City is more reminiscent of a living organism than a static diagram.

The diagram below is a comparison between the 1970s organisation and the present one. Many functions have changed places, units have merged and new ones have been created.



The municipal organisation of Helsinki 1971 (left) and 2011 (right).

A fundamentally simpler or more easily understandable organisational structure is difficult to develop, as many services must, however, be produced by somebody in some organisation. Above all, the modification of structures is no guarantee of better service provision. "What is essential is how this looks to the people of the city. How they find things, whom they should contact if they want to know or ask something. The organisations in themselves are not the problem, because people don't need to know about these organisations," says Deputy Mayor Pekka Sauri.

The City's structures and organisations are also enablers. They must be flexible enough to allow and give space for free innovation. When new ideas are then created, the best of them should be adopted by the City as normal practice. An example of this is the Restaurant Day phenomenon described earlier.

A more everyday example of the flexibility of the City's officials is the way in which planning permission applications are dealt with. "Particularly in large projects, we endeavour to ensure that the matter is dealt with unofficially before it becomes an official application, so that everything can be looked at the preliminary stage and guided in the right direction from a planning perspective," says **Matti Nikupeteri** of the Building Regulation Department of the City of Helsinki. "We rarely make negative decisions. If a negative decision is to be made, it is usually agreed with the applicant."

Data is the DNA of the city

The operations of the City entail a great deal of data. Some of the services provided by the City are such that the less residents know about the details, the more content they are. For example, running water requires complex systems to ensure that it is available to all at the correct pressure, it is potable, the correct temperature and flows without interruption. As far as the average resident is concerned, the less you have to think about the whole water system, the better. Usually if drinking water is in the news, it is not very positive.

In other cases, however, citizens may want more detailed information about what the city is doing. For example, these days users of public transport feel it is useful to know perhaps where each bus and tram is situated at a certain time or by how much a train is delayed. Through such information, users of public transport can, for example, save time and optimise their journeys. It is also fun to follow the amount of space on public transport. The border between information and entertainment is becoming blurred – the city is turning into a game.

Sometimes applications can also control the city. The City of Helsinki is putting positioning transmitters on its snow ploughs, which enable people to follow the movements of the ploughs on a map. By clicking on the map, you can also report problems with snow. Your own notification will then appear on the map and, by following the map you can see when a snow plough will arrive at the problem location. "There is clear interest in this and people like things of this kind. It has elements of a game about it," says Pekka Sauri.

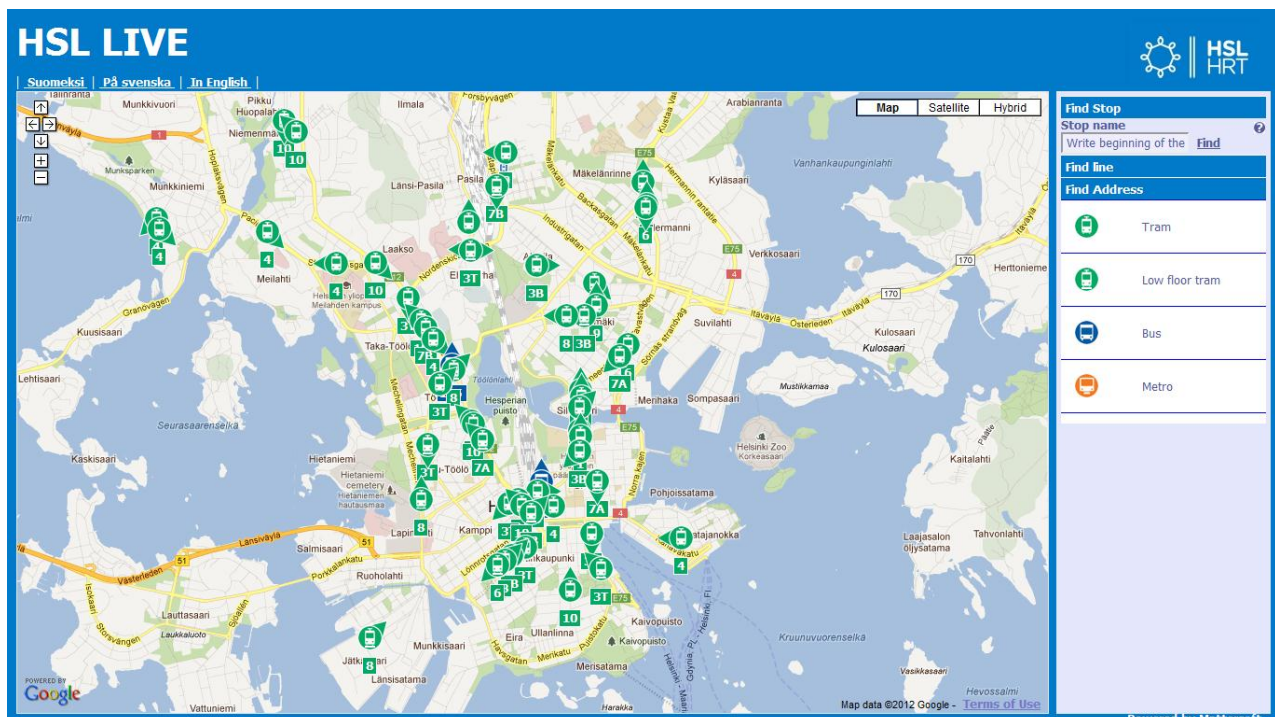


Image: The position of Helsinki trams on Friday 23 March 2012 at 12.35 pm.

The City's processes and decision-making entail a great deal of data. Without data, the City could not operate in an organised fashion. For example, the control of a power station requires information about present and predicted energy needs and the production capacity of other power stations. The City's strategic decisions concerning city planning, for example, require statistics and other relevant facts. The results of voting are recorded in the decisions of the City Council.

Through the Plans on a map (Suunnitelmat kartalla) service, citizens and others who are interested can follow what projects are going on in the city and where, illustrated on a map.

Nordenskiöldinkadun ja Mechelininkadun pyörätiet
liikennesuunnitelma, Kslk 2010-0390

Nordenskiöldinkadulle ja Mechelininkadulle on tehty pyörätiesuunnitelma Urheilukadun ja Hietaniemenkadun välille. Nordenskiöldinkadulla, Mannerheimintieltä Nordenskiöldinaukiolle, pysäköintipaikkojen vasemmalla puolella Mechelininkadulla pyöräilijät ajavat pyöräkaistoilla ja yksisuuntaisilla pyöräteilla.

Hankkeesta vastaa:
DI Niko Palo, puhelin 310 37220
DI Mika Kaalikoski, puhelin 310 37433

Suunnitelman käsittelyvaihe:

Valmistelu	Hyväksyminen	Toteutus
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Suunnitelman toteutuksesta vastaa rakennusvirasto [Asiakaspalvelu](#)

» Tietoa kartasta | Palautte

Each location on the map refers current or planned project in the city. When a specific location is highlighted, detailed information about the project is shown on the left.

Case 7: Plans on a map

“The reason I like this service is because it shows how the process actually works. And yes, it is a bit clumsy, bureaucratic and crazy, but that’s how it works.”

Otso Kivekäs, Member of the Public Works Committee

In the Plans on a map (Suunnitelmat kartalla) service provided by the Helsinki City Planning Department, you can read about the planning situation for City planning, partial disposition plans and traffic plans. The service also provides project planning material. When planning for a project begins, the service gives a short explanation of what the whole thing is about and shows the affected area on a map. Then, as the project progresses, the service publishes documents and other material generated during the process. Citizens have the opportunity to comment on the projects, both online and at specially organised residents' evenings. It also gives the contact information for the person responsible for each project. Benefits of the service include the fact that although the progress of projects is often complex and bureaucratic, the City openly reveals how the process works, so people interested in each project can genuinely participate in discussion on the project and influence the actions of the City.

<http://ptp.hel.fi/hanke/>

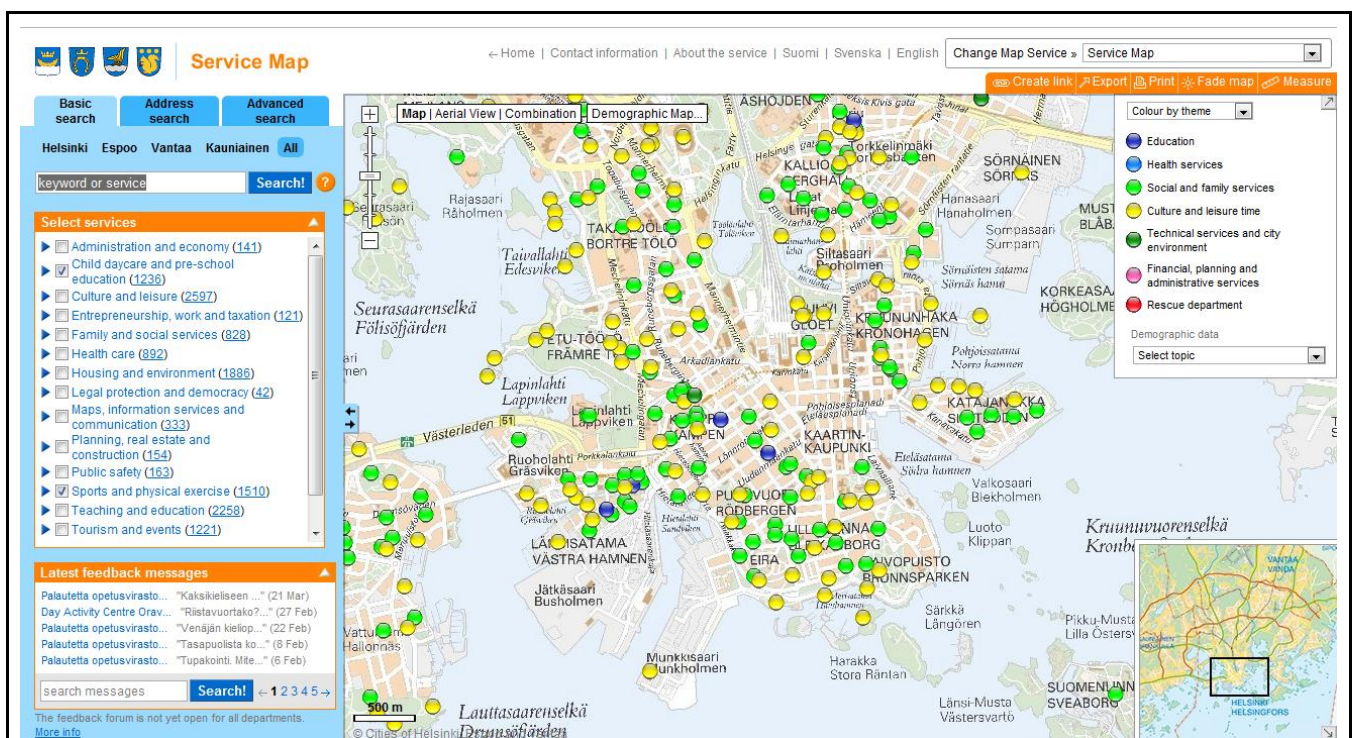
A significant proportion of the information concerning the city is in digital format in the City's different information systems, but some of it is also in other formats such as paper and archived microfilm.

So-called tacit knowledge, in the possession of people themselves is one of the key forms of knowledge within the municipal organisation. An important topical challenge is ensuring the knowhow of retiring city employees is transferred to the next working generation.

When talking about the digital information of the public administration, the well-known basic registers usually come to mind, such as the population register, the property register and perhaps also statistical data and weather information. Maps and geo information are quite well-known and some people also mention varieties of traffic information. Data related to cities particularly includes information on living, public transport, safety, social affairs and health and other services. This list can be lengthened and made more specific, but understanding the overall picture is nonetheless difficult.

It must also be remembered that information on public administration is only a small part of all the information concerning an individual city. For example, companies and individual cities have much digital information which in one way or another concerns the city, such as tourists' holiday snaps of the city or information from local taxi companies about where you can go by cab.

A city's information systems strongly reflect how its service production is organised. "These days, a information system and the operations of its organisation are completely integrated. All the development projects of the organisation are also information system development projects, and all successful system projects are at the same time operating method projects," says IT specialist **Otso Kivekäs**, who is both a member of the Public Works Committee of the City of Helsinki and an active cyclist.



Case 8: Service map

The service map is an open information channel about municipal offices and services in the capital region. It provides contact information about each office as well as its website, topical issues, nearest bus stops, transport connections and accessibility. In Helsinki, the map can also be used to check different kinds of population information (age, language, average size of dwellings) or browse feedback given to offices, events or tourism sights. Through the map it is possible to give feedback

and to enter into open discussion directly with the people in charge of offices and services.

Once the basic service was set up in Helsinki, an almost infinite number of possibilities to improve it became evident. Developers almost instantly received feedback, asking why Helsinki was producing a map service from which data could not be exported to Google Maps and combined with other data. For that reason, the City quickly published a Google-compatible KML interface and then thought 'great, that's settled.' But no. Next, people asked why the service map included only Helsinki services. Did they think that, in the capital region, only Helsinki data was sufficient?

It was decided to make a general service map for the whole capital region. The classification and harmonisation of an enormous volume of data had already been done in Helsinki and now a great deal of extra work had to be done. The developers of the service thought about such things as how to define the right service words and how to make searches user-friendly so that the data could be presented in an understandable way. The organisational jargon used by officials was not necessarily comprehensible to ordinary citizens.

Public administration is not always very nimble at reaching the pinnacle of development, and so it is also important to be involved in topical discussions about opening interfaces and data, and in implementing concrete solutions. The aim is for the reliable and up-to-date information produced by public administration to be in as accessible a form as possible, and for us to be aware of all the freely available applications that are being produced for its utilisation.

<http://www.hel.fi/palvelukartta>

By checking information systems and the digital data they contain as a whole, it can be seen in a new light how the municipal organisation and the city as a whole function on a practical level. For an organisation, data is a kind of DNA, which reveals what is happening in the city. Digital data offers a new kind of overall image of how a city functions.

We believe that at the level of this digital information, cities are more reminiscent of each other than at first glance or for example when comparing the organisational structure of cities as, although there are differences between cities and countries in relation to who delivers municipal services – the municipal organisation or some other body – the needs of citizens are, however, quite the same everywhere. Everyone needs health care, education, water, electricity, heating, the opportunity to move from one place to another, etc. Because of this, organisations responsible for municipal services – be they the city's internal bodies or other actors – record in their information systems largely similar data, which is comparable. We believe that digital information offers a very interesting way to view the city as whole. Such an overall digital picture would also be valuable for the city itself.

A glance at a city's digital information as a whole might give municipal experts the same kind of overall picture as maybe a comparison between geographical maps, from which a traffic expert can see at a glance the characteristics of certain cities. For example, Helsinki lies on a peninsula, Barcelona between the sea and the mountains and Berlin and Vienna are circular cities.

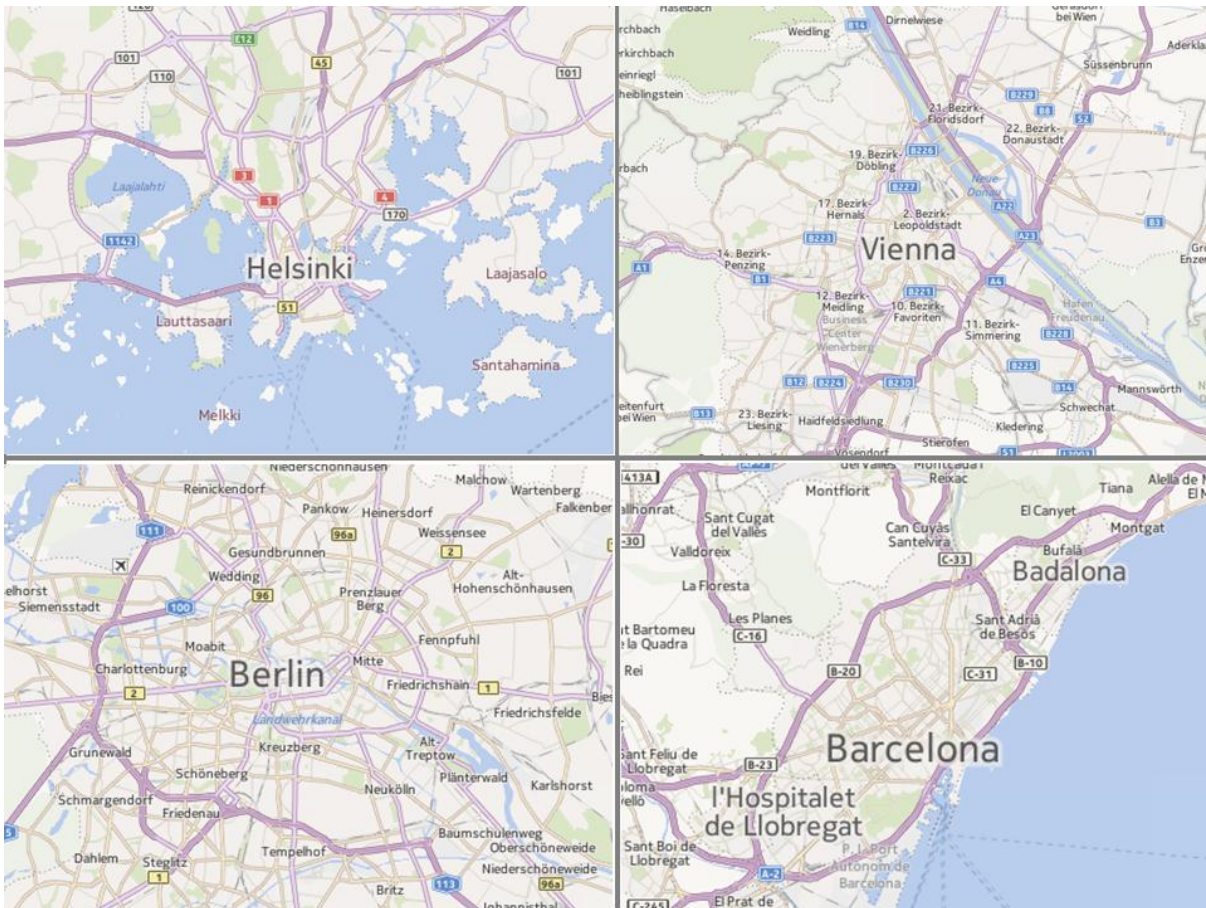


Image: The geographical map is a classic way of forming an overall image of a city.

Case 9: Ahjo: the digitisation of decision-making processes

"Sure, every day people curse this system... there are still things to improve, but nevertheless it is a big thing that we have moved to a paperless decision-making process."

- Deputy Mayor Pekka Sauri

In 2011, the City of Helsinki introduced a new case management system, Ahjo, which changed how decisions and documents are processed and made meetings procedures fully electronic. In connection with this process of digitisation, processes also changed, the functions of 35 administrative bodies were merged and, thanks to Ahjo, time, trouble and paper were saved in administration. Previously, registry offices managing documents needed a staff of 80, but now they can get by on a quarter of that. The City Board and Council alone had annually consumed 11 million sheets of paper, so the reduction in paper consumption is also bringing savings of hundreds of thousands of euros.

Ahjo users include not only 600 elected officials but also about 5,000 other municipal office holders and other employees such as draftsmen, presenters, keepers of minutes and information officers. Meetings of the Council, City Board, committees and management boards are held electronically in the Ahjo system.

The investment of money and working hours into this reform is a significant ecological act, but in future it will also open up completely new opportunities for more and more citizens to participate in the preparation of matters to be raised and in the decision-making process. Once information is in electronic form, the next logical step is to open up to a suitable extent the data contained in the system for the use of anyone. Electronic documents contain metadata, by which documents related to the processing of each case can easily be found, and they can be linked both to each other and to other data concerning the case in hand, such as statistics or background financial information.

It is not worthwhile for the City itself to develop all applications supporting decision-making and communications, as the opening of data and interfaces also enables the input of other parties. Preliminary work to open Ahjo has begun in co-operation with the developers.

[Ahjo brings paperless decision-making to Helsinki](#) (Story from the service provider Tieto)

At present nobody knows exactly all the digital information that the City of Helsinki has. Even the City itself does not have complete overview on all the information systems it has in its dozens of different departments and public service corporations. It has been estimated that altogether there are about a thousand information systems.

The decentralized operating model of the city means that not even the IT Division has access to all the data. "People often imagine that the boss of IT has access to all data, but that's not the case," says Markku Raitio. But the situation is now gradually changing. The aim is for the examination of municipal operations through a digital database to enable the transcending of traditional 'silo boundaries' within the organisation, thereby bringing added value to the internal functions of organisations.

Helsinki is thought to be one of the top cities for IT exploitation in such spheres as electronic business and web services. In spite of this, there is no overarching picture of the City's information systems. We have also asked other cities about their situation, and the end-result is always the same: nobody has a comprehensive overall picture of the data and information systems of their city. Even in the catalogues of open data that have proliferated in different cities in recent times, such as the Helsinki region's Infoshare *data.hri.fi* and the City of London's *London Datastore*, there has been no joy for people trying to piece together an overall picture, because they only list material that is already open, and do not tell what data is not available. There is therefore reason to assume that, in addition to Helsinki, other cities are also unclear about all the information that they actually have.

Conclusions

1. Digital information offers a new perspective for understanding municipal operations. It helps in the understanding of complex organisations, such as the City of Helsinki.
2. Nobody knows all the data that the City of Helsinki has, so there is not a single citizen who can know what data he or she could request from the city.
3. If it were possible to establish what data the City of Helsinki actually has, we could also get a better overall picture of how the organisation of the City of Helsinki functions.
4. Other cities in the world are probably also unclear about what data they actually possess.

4. The city of data

“Visualising data improves the understanding and utilisation possibilities of the data. Visualisation also creates the possibility of viewing the raw data from different perspectives - potentially combining different sources and viewpoints. The results can be used for improving both decision making and for creating new service innovations. The value of information is created by using it.”

Markku Raitio, IT Director, City of Helsinki

One of the authors of this report, Antti Poikola, lectured in the autumn of 2011 at a data journalism course on the use of public data for journalistic purposes. The course required a comprehensive overview of the information resources possessed by the City. The City’s web site listed the information systems of the various municipal agencies, and also included the system descriptions required by law, but the information was not up to date. To receive the most up-to-date information on the systems, Poikola made a freedom of information request at the municipal Registrar’s Office.

The information request and the need for an overall view of Helsinki’s information resources attracted interest from the City’s IT management department, which was working on the same questions. The charting of information systems that originated in the data journalism course was taken forward. The results are included in this report. The following describes how the charting of Helsinki’s information systems was carried out using this public information. What was the picture of the city’s information systems that emerged?

A single list of Helsinki’s information systems

With the help of the Registrar’s Office, we received lists of information systems from nearly all municipal agencies and public utilities. On the part of information systems, the view is relatively comprehensive. But in addition, many pieces of municipal information are found in isolated documents outside the systems. No information system description has been made for these documents, and for this reason they are not covered by the charting. Examples of excluded information are various statistics and background materials for reports that are saved in a format such as Excel.

The number of information systems varied widely from agency to agency. On average, the agencies had approximately 18 catalogued information systems. A few had only one system catalogued. The Port of Helsinki had the largest number of systems (54). To form an overview, the information in the various documents was compiled into one overall list. After faulty entries and duplicates were removed, it included a total of 595 information systems.

Many of the systems are connected to the running of the municipal administration. These systems are typical of all agencies: for instance, the systems related to staff, access control, monitoring of working time, travel management and financial administration. On the other hand, the systems related to production of services are often agency-specific. Among the more specialised systems are the control of traffic lights, the database on financial assistance for building of lifts and the registry of trees planted in the city streets. The following table includes more examples of information systems and their contents that do not come to mind very easily.

Agency	Name of system	Intended use	Information content
Administration Centre	Medals of the President of the Republic	Applying for the decorations issued by the President of the Republic	Information on the decorations applied for and issued by the President of the Republic to city staff and elected officials
Port of Helsinki	Vessel diary	Reporting of traffic by vessels	Information on vessels leaving and arriving at the Port of Helsinki
Helsinki City Library	Sanojen aika	Searchable database of writers	Presentations of writers
City Museum	MediaKsi	Management system for the City Museum's collections and content information	Information on cataloguing and acquisition of the museum's collections
Helsinki Philharmonic Orchestra	Opas	Tool for preparing sheet music and planning programmes	Information on composers, compositions and line-ups for sheet music; information on concerts; work list
City Planning Department	Traffic light control systems	Direction of traffic	Use of traffic lights
City Planning Department	Production of plans	City plans and traffic plans	Plans
City Planning Department	Planning and calculation of traffic network	Planning of traffic network	Traffic volumes
Real Estate Department/ Housing Division	Database on financial assistance for the installation of lifts	Database software used to compile statistics on municipal 10% lift assistance granted by the City of Helsinki	Information on the recipients of assistance and their agents; amounts of assistance granted; expenditures
Youth Department	Hobby search	Facilitation of hobbies for youth	Information on hobbies, hobby arrangers, facilities; information on youth found in personal registry descriptions
Education Department	Camera surveillance system	Camera surveillance	The system records images of people moving in the cameras' area of operation. Dates and times are also recorded. Speech is not recorded.
Rescue Department	Merlot Medi Web Reporting	Reporting of paramedics' tasks	Information on clients and measures taken during paramedics' emergency calls
Rescue Department	Facta registry of municipalities – Primas	Information on population; information on property registration	Information on population, building permits, planning and properties
Public Works Surveillance Department	Facta registry of municipalities – Facta building surveillance	Granting of building permits, surveillance during building work, continuous surveillance, etc.	Building and building permits; information on surveillance during building work and continuous surveillance
Public Works Surveillance Department	Comet parking fee system	Loading of money into parking fee meters	?

Table: Examples of the systems found by charting information systems.

Keywords as the basis of an overview

The general features, informational content and purpose of the information systems were described with free-form keywords, such as *economy*, *billing* and *purchase bill*. Proper names, names of agencies and words referring to geographic areas were avoided to make the keywords as comparable as possible with other cities. *Housing*, *traffic*, *health*, *education*, *administration* and many other similar concepts describe cities around the world, although organisations and areas of responsibility may vary.

Currently, the keywords may still include words that are synonymous with each other. Some of the words introduced through manual keywording are not very descriptive (e.g. *information*, *subject*). There are over 800 keywords, of which more than half occur only once. The list of keywords is too long to be useful. The table below gives key information on the material.

The agencies and public utilities covered by the charting	33	There are 35 agencies in all. The information on Helsingin Energia and the Wholesale Food Market is missing.
Number of information systems in the overall list	595	In the original lists of information systems, the number of systems was slightly higher. When the lists were harmonised, clearly superfluous entries (e.g. e-mail clients) were removed. Also removed were duplicates, i.e. systems used by more than one agency and entered in the lists of the different agencies.
Average number of systems per agency	18.3	The Port of Helsinki had the most systems (54 in all). A few agencies only had one catalogued system.
The number of keywords used in description	845	Most keywords (570) were used only once. The material included a total of 1,684 keywords. The most common keywords and their frequency are shown in the next table.
Average number of keywords per system	2	The number of keywords varied from 0 to 7. There were 18 systems without any keywords.

Table: Statistical data on the City's information systems.

The most common keywords were *client*, *staff*, *library*, *working time* and *access control*. Other common keywords were related to areas such as financial administration, properties and document management. The list of the most common keywords is not very surprising. On the evidence of its information systems, the municipal organisation would appear to concentrate on clients and staff.

The following table compares the information systems' most common keywords with the keywords of the Helsinki open data catalogue (HRI). It would be useful to make the lists of keywords uniform in the future. This would enable linking of open information content and information systems.

Overall catalogue of information systems 595 information systems keyworded with 845 keywords, used for a total of 1,684 times	Helsinki Region Infoshare data catalogue 869 information systems keyworded with 669 keywords, used for a total of 5,531 times
client (40)	helsinki (295)
staff (31)	vantaa (250)
library (25)	age (203)
working time (22)	population (171)
access control (20)	gender (143)

Table: On the left, the most common keywords in the charting discussed here. On the right, the most common keywords of the Helsinki Region Infoshare data catalogue.

From a list to a map

A list of information systems is interesting, but it is not yet in an easily understandable format. It is hard to see how systems are connected to each other, or to get an overview of everything that belongs to the digital field formed by the City's information systems. We decided to experiment with visualising the information systems into an image. The *Helsinki information system map* was born.

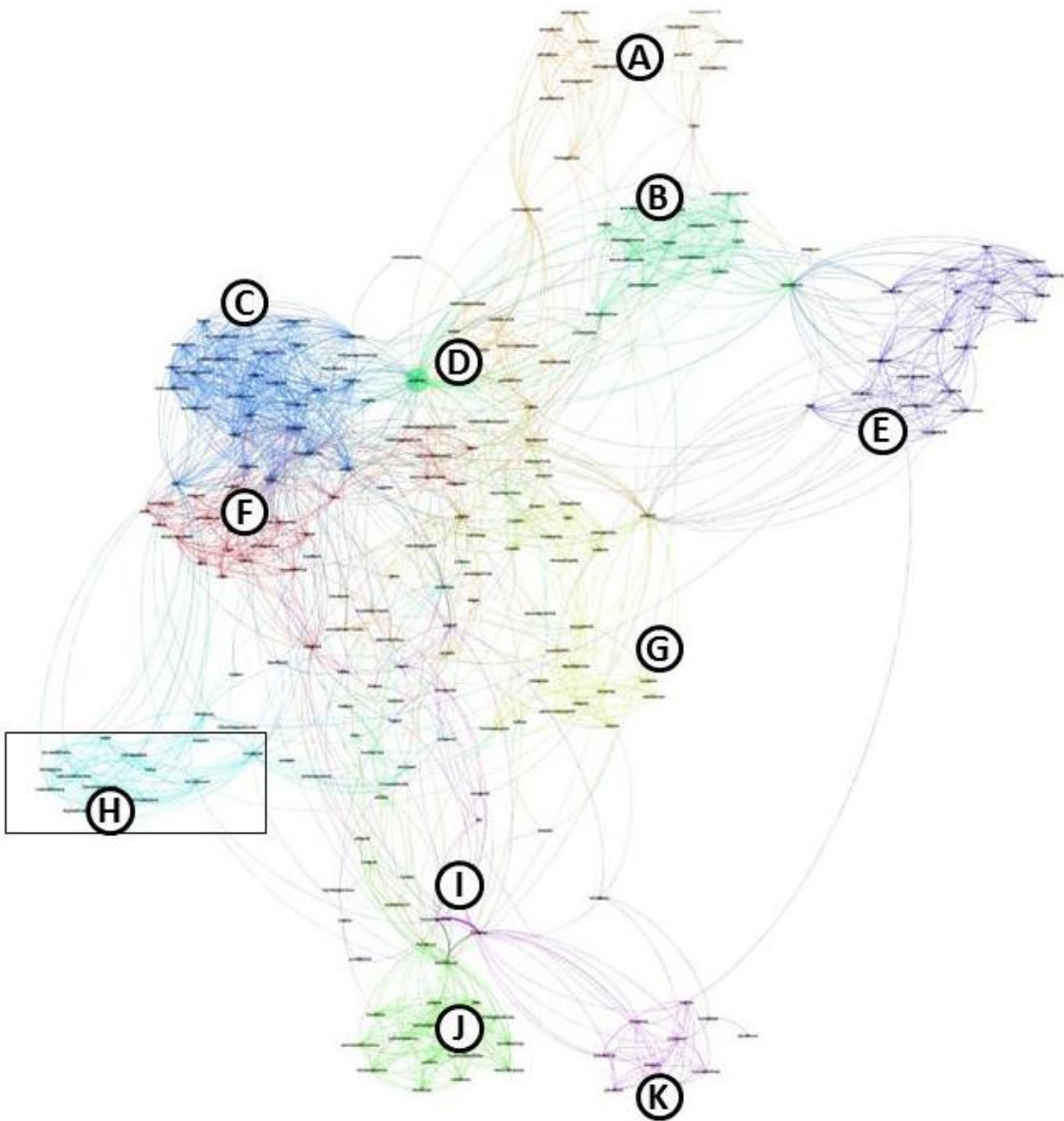


Image: A map formed out of the keywords describing the information systems of the City of Helsinki. The key groups of keywords have been marked on the map. A – Social services, B – Health, C – Economic administration/billing, D – Clients, E – Environment, F – Economic administration/accounting, G – Other, H – Surveillance and security, I – Access control, J – Staff/wages, K – Staff/working time.

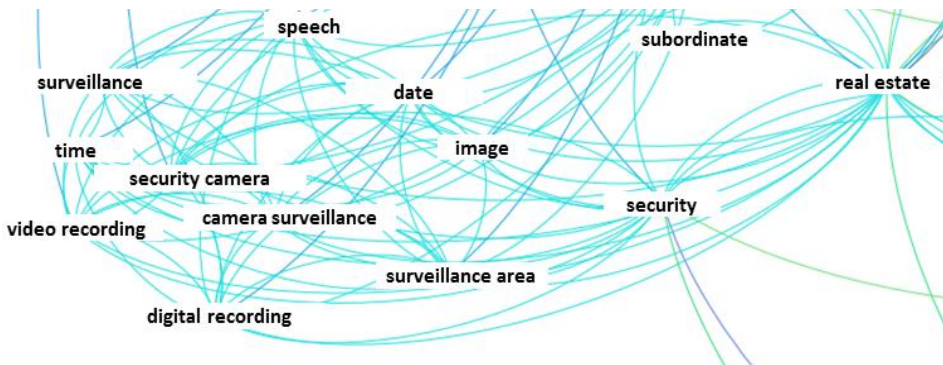


Image: Enlargement of “Surveillance and security” (group H above).

A map of the digital Helsinki

The accompanying image shows the map formed out of the lists of Helsinki's information systems. The visualisation helps one to see the areas in which the systems are grouped according to their content and purpose. On the map, the keywords used to describe the systems form clusters. These can easily be interpreted as larger functional wholes, such as "health" or "environment". The key functional wholes have been named in the overall picture. Underneath is an enlargement of the group of keywords related to surveillance and security.

Technically, the map is based on a network graph; the keywords describing the information systems are its nodes. Two keywords (nodes) have been linked with a curved line where an information system has been described with both words.

The following image shows an enlargement of the words "työaika" (working time), "henkilöstö" (staff) and "kulunvalvonta" (access control) occurring close to each other. Among other things, they connected to each other by the access control system named *Timecon*. Because the same keywords have also been used to describe other information systems, they are linked in the network graph to these systems, such as wage calculation, work shift and key management systems. In this way, the hundreds of keywords used to describe information systems are linked, placed on the map and grouped into thematic clusters.

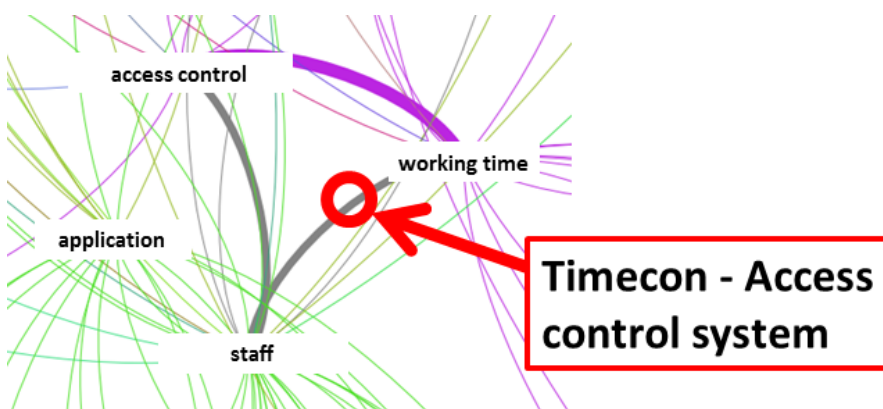


Image: Enlargement of "Access Control" (group I in the overview image)

To make the overview image clearer, keywords linked only weakly to the whole have been filtered out. Such keywords have been used to describe just one or two information systems. For instance, the program planning and sheet music design software used by the Helsinki Philharmonic has received keywords such as "nuotti" (sheet music), "sävellys" (composition) and "orkesteri" (orchestra), which do not occur in relation to any other information system. For this reason they are not shown on the map. After filtering, approximately one third of the keywords in the original material are shown.

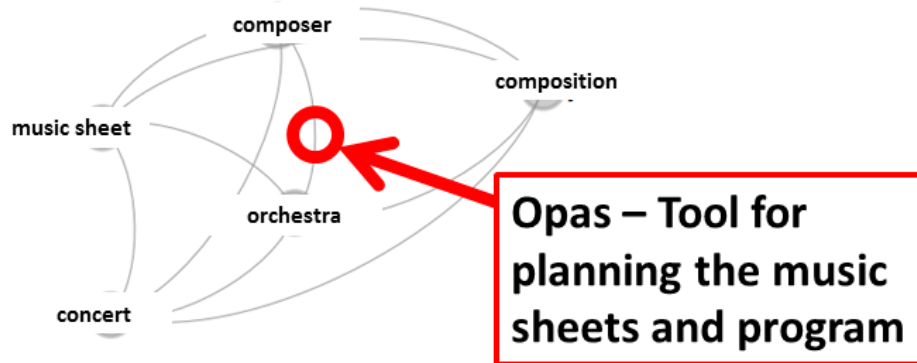


Image: An example of weakly linked keywords that are filtered out of the overview image for clarity. These keywords only describe one information system used by the Helsinki Philharmonic; they are not linked to the larger overall picture.

Possible uses for the information system map

The Helsinki information system map presented above is a first sketch of what a map of a city's virtual reality could be. In our view, even this sketch will begin to yield new information on a city's existing systems and the connections between them.

The map gives an overview of the City's information systems that transcends organisational borders. Currently, the financial administrators are familiar with financial software and the geographic information people with geographic information systems; but nobody knows the whole. The information system map could help the persons responsible for the systems of the various agencies to see them as parts of a larger whole. In developing the architecture of the information systems, the map can be compared to a city map used in city planning. It is a picture of the current state that makes it possible to plan the future.

In addition, the map would make it possible for both the city and the open-data community to find the as yet unopened public data possessed by the city and the people responsible for it. Perhaps the map will also become a treasure hunter's map from time to time; it can be used to find lost, forgotten or unknown information systems with valuable data in them.

Actors outside the municipal organisation would also need an overview. For instance, it would be useful for the open-data developer community to know and understand the systems behind the data. The information could be used in making new applications. Officials of other cities and researchers interested in urban development would perhaps want to compare cities digitally or create an overview of cities' digital similarities and differences.

Images could be generated to link municipal agencies to keywords or to systems. It would also be possible to create images on just one specific area, such as a map of the information systems related to ecology and the environment. One obvious use for information system maps is the visualisation of the systems of a country's entire public administration – or of the systems of any large company or organisation. It would also perhaps be interesting to compare these to cities' information system maps.

The visual information system map is first and foremost a tool for communication. Visualisation gives birth to discussions that are not possible by just looking at lists. The Helsinki information system map has received excited and immediate comments from the people to whom we have presented the intermediate stages in our work.

Observations on the charting

The large number of information systems

One obvious question is why the City of Helsinki has so many information systems. The large number of systems is partly caused by the way legislation and other rules prevent the use of, say, client information between different agencies, which can often be due to very reasonable privacy concerns.

Another reason is the uncontrolled way systems are sometimes acquired without regard for the whole. "We too have several systems around and installed in the computers that nobody actually ever uses," says Matti Nikupeteri.

Use of data reveals deficiencies in it

No material is complete or fully free of faults. This is the case especially when updating the material is liable to human error and when it is the task of many people. When materials are used, the errors are revealed. This is entirely a good thing.

In the original lists of information systems, the charting and visualisation revealed faults that made the analysis more difficult. However, whenever these faults come to light, it is possible to correct them systematically for the future.

The City's information system descriptions were partly incompatible or too brief. For instance, agencies had given notice of the same systems under slightly different names, even though the systems were not actually installed several times but were in shared use.

The lists of information systems also included rather general software, such as e-mail clients and sticker-printing software. The problem was that there was no definition of "information system" anywhere. We concentrated on the information systems that were potential sources of data.

At one phase it emerged that the City Registrar's Office did not know the numbering used uniquely identify agencies in certain lists of information systems. The numbering was finally discovered on the data catalogue of the Helsinki Region Infoshare as part of the opened economic data on the city. The city's organisational structure and the names of its various agencies (in Finnish and English) were not available in an unequivocal form, much less a machine-readable one. Information was scattered here and there, and the names were slightly different in each place.

A practical problem for the editing of the information system descriptions was the fact that the original documents were in Word or PDF format. They also had anomalies in presentation that made it more difficult to handle or combine data automatically.

In addition to the challenges mentioned above, it is possible that mistakes were made when editing the information system descriptions; for instance in assigning keywords or copying and pasting texts by hand.

There were mistakes and incidents on the way and the list of information systems may still contain errors but our general estimate is that the content of the final list or map is not made different in any essential way by any isolated mistakes that may remain.

Could the method be generalized?

In Finland, the law requires all public-sector organisations, such as municipalities and cities, to provide information comparable to the information the charting work was based on. It is thus possible to make a similar map of other municipalities and cities in Finland. It is especially useful for larger cities likely to have many information systems.

The law may not require municipalities and cities to provide similar information in other countries. However, at least some information on every city's information systems will probably exist for administrative purposes.

Editing the information system descriptions and the map requires some work by hand. It is likely that the information system descriptions contain errors, deficiencies and variation, just as in the case of Helsinki.

Directions for future development

The preliminary visualisation of the map was done using NodeXL and Gephi software intended for network analysis. The Google Refine tool was used to make the data uniform. With these tools, it is possible to search and delimit the data and visualise various subsets. Sadly these cannot be presented comprehensively in this report.

It would also be possible to realise the visualisation as an interactive web page generated directly from the up-to-date system database. Users would be able to carry out text searches and focus the map on even the smallest detail. The existing online map services like Google Maps, currently familiar to all, function as visual interfaces to the physical city. In the same way, the interactive information system map could function as a search interface for the city's digital information resources and systems.

Currently, any updating of the information concerning the system has not been organised to enable the maintenance of an up-to-date database. The information used for our charting work will also become out of date as agencies renew their systems.

The publication and updating of the lists of information systems should be made uniform. A first step would be to move from text documents to a compatible format, such as Excel spreadsheets. In the long term, our recommendation to the City would be to establish a separate database service for the presentation and administration of the lists of information systems.

If up-to-date descriptions were contained in a single database, classified and tagged in the way described above, the system could be used for automatic generation of the information system descriptions required by law. It could also generate the Helsinki information system map; an up-to-date visual depiction of all the city's information systems.

As an immediate step for future development of the Helsinki information system map presented here, a prototype is being produced for an online service that would keep the city's information system descriptions and the information map up to date. The prototype will also enable the map to be published as an interactive application for use by the City or anyone interested in the city itself.

Conclusions

1. Finnish law requires an information system description for all public-sector information systems.
2. By collecting these descriptions together, an overview was created of the information systems of the City of Helsinki.
3. The Helsinki information system map is a visual presentation of this information. The map is helpful in understanding and discussing the City's digital information resources.
4. It is also possible to draw up an information system map for other cities, both in Finland and elsewhere.

5. Lessons learned

As described previously, in Helsinki, a smart city is considered first and foremost to be based on the smartness of the people of the urban community. Enabling the participation of the people is the key for a city to evolve in to a smart city.

A smart city can be outlined as a city that 1) can combine service production and an innovative environment, 2) exploits all available information in its activities and decision making, 3) fosters a dialogue between the municipality and the urban community, and 4) where the city is not thought as a service organization with citizens as the customers but as an urban community where the citizens are the city.

In relation to this general vision on what a smart city is, and based on the examples and details presented in the previous chapters, we conclude with the following five lessons learned that can be recommended to other cities that are seeking paths to becoming 'smarter'.

1. Courage to act; balance of creativity and reliability

A good city has discovered the golden mean between reliability and creativity. Services function reliably and with sufficient quality, while the city structure gives room for creativity – a kind of anarchy within the system. Allowing creativity in this way helps give rise to the new ideas that develop the city into a smarter one.

Example: Allowing and encouraging the Restaurant Day.

2. Opening up information required internal expertise by the City

Together with the other cities in the region, the City of Helsinki established an internal project, Helsinki Region Infoshare (HRI), to realise and help with the opening-up of information. HRI seeks out information resources to be opened up, negotiates, provides training and creates networks between data producers and users. It also offers support services for data producers. In addition, HRI recognises agents of change within the municipal organisation and offers them support. As an internal function, there is a commitment to opening up information. Deep learning is generated through continuity. A process of change of this kind cannot be driven from the outside.

Example: Helsinki Region Infoshare (HRI)

3. Inspire and support the developer community

Open information is not enough by itself. Applications are also needed to make use of it. One way of encouraging the developer community to create new applications is to hold Apps -contests. Several competitions relating to open data in the Helsinki region have been arranged in recent years. For instance, opening up the city transport data has inspired many developers to create applications on top of the data – applications that would otherwise not have been created or which would have been beyond the City's resources. The first commercial applications have also been created on top of open data. This is one important yardstick and a goal for open data.

Example: The Apps4Finland competitions

4. Open processes even when they are a bit embarrassing

The City of Helsinki has a wide-ranging and complex organisation that is impossible to understand completely. Although the City does not always function optimally and there is considerable bureaucracy at times, it is open about the state of its processes. This gives people a chance to participate and affect the City's decision-making. Openness is one of the Nordic administrative traditions.

Example: Plans on the map.

5. Draw up an information system map for your city!

As a direct result of this report, we presented the *Helsinki information system map* as a promising example on how to create an overview of the City's information resources. This helps the city to understand how the city is organized and what data it possesses about itself which is the first step of utilizing the data more efficiently both inside the city organization and for example publishing it as open data. Experts in Helsinki and in other cities have considered the map to be very interesting.

Find out about the information systems in your city and draw up visualised general views to receive a new kind of overview of the city's activity. Compare the information maps with those of Helsinki and other cities!

Example: The Helsinki information system map

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