

Importance and Challenges of Location Intelligence in Corona Pandemic

Tapio SILTALA, Finland

Background

The World Health Organisation (WHO) announced on 11th of March 2020 that COVID-19 can be characterized as a pandemic. During the following week Finland was stated to be in a state of emergency, lasting three months and resulting in massive migration to teleworking. The years 2020 and 2021 will be remembered especially on the worldwide corona pandemic which has had a huge impact on the way we think, our priorities, the way we work, the way we collaborate and much more. It has also raised the speed of digitalisation and importance of location intelligence a lot.

Remote work

Before the pandemic, during the last five years, in my personal work life I had made about half of my work as remote work. When the pandemic started and restrictions came in March 2020 me, like most of the other office workers in Finland, **moved to work almost fully by teleworking**. For me as an individual it wasn't a very big jump, but for many it really was giant change.

Many questions arose, like:

- How can we arrange a quiet working room from home?
- Is the quality of IT infra at home good enough?
- How can we manage security and privacy?
- Should we spend lots of time to learn many teleworking tools?
- How can we get IT support when needed?
- How can the collaboration with the colleagues and the customers be maintained?
- Can this affect on the feelings and motivation?
- Will our employer and supervisor trust on the employees?
- How can we manage the work and personal life together?

Aspects and effects on the work

In general there has been at least technical, personal, collaborative and social aspects. According to survey of Finnish Institute of Occupational Health (Työterveyslaitos) "How is Finland doing?" made in the spring 2020 (<https://www.ttl.fi/en/slight-increase-in-well-being-at-work-during-the-coronavirus-spring/>) the increased remote work actually resulted in short term **generally even slightly positively in well-being at work** during the first part of the

pandemic year in Finland. The core symptom of occupational burnout – exhaustion - was decreased and work engagement was increased. It is easy to understand that it also affected negatively to a part of the people, like reported increased feelings of boredom and job dissatisfaction without the full social support of colleagues.

The pandemic may have had the biggest effect **especially on the director's and manager's work life**. On top of the good old leadership and management requirements there has become new ones rapidly. It means they have had to find for example new ways to organise the work, information flow and communication. That survey also revealed a slight increase in occupational burnout just among the immediate supervisors and managers.

But there are still many fields where **remote work is not possible**, like in hospitals and different kinds of field work like surveying. In that research the employees who still worked only in close contact with other people **did not report significant changes in their well-being** at work **during the spring 2020**. However, these respondents also reported less exhaustion at work and an improved state of health, in short term.

The **support from colleagues and supervisors, as well open discussion** resulting new ideas to change the working practices, meaning improved collaborational work, seems to be one of the most important things behind this and is worth emphasising also in the future, also during better times.

So the effect in the **short term** seemed to be even mostly positive, but anyway we cannot afford to generalise too much the results of the surveys. Employees are different and we feel this our own ways. According to the follow-up surveys later on the trend had changed. According to another research of Tampere University in 2020 spring and follow-up the summer, the **positive results even improved slightly and negative results weakened**. In addition to the background factors, the maintenance or increase in the level of suction of work during the follow-up period was explained by the home's **functionality as a telework environment, the support provided by the community for telework, spontaneous work development and ability to belief and adapt**.

So it is important to have **support** in teleworking through effective telework management, promoting the home as functional place for teleworking and supporting the development of teleworking on the initiative of the employees.

More **longer term effects** has been released by a co-research of five finnish universities and Finnish Institute of Occupational Health. According to it the **work efficiency had even increased in teleworking due to fewer interruptions, lack of commuting to work and back, flexible planning of your own working time and peace of mind**. But after the initial

enthusiasm, the **disadvantages of telecommuting have begun to raise**. The employees seem to feel **more increased workload during** the coronavirus pandemic. According to the researchers, the biggest problem in teleworking is that it is **moving away from the community work**. Although videoconferencing also allows time for free-form exchanges, it is still organized and spontaneity is reduced.

I would say that **playful discussions, without no aims**, the skill the children use much more and adults do only a little, should be done more. Luckily many of us has e.g. successful virtual coffee breaks during the pandemic era. I believe that will keep our brains more active and also increase the possibility of problem solving which is very important in the working life.

Anyway, at least the firms seem to adapt pretty well to teleworking, partly because of the fact that many firms had already done some teleworking before the pandemic.

Location Intelligence and digitalisation

The pandemic has changed the **importance of location intelligence** enormously. For sure, earlier geospatial data and tools had already been more and more important for example in the background of many business decisions. But the pandemic changed all this permanently and **location intelligence revealed its power** and it has proved to be not only important, but **even crucial** in the unstable and uncertain world.

One example: because the street foot stores and restaurants had to adapt rapidly in the new situation where the customer flows changed, many of them had to find **new ways of making sales and other operations** safely. For example Starbucks responded to COVID-19 by expanding delivery options across its locations. They recognized that store closures would lead to a tremendous surge in demand for delivery and pickup orders. They **analysed which customers in which geographies prefer delivery and pickup options**. Then Starbucks was able to **react quickly** on this information and strategically reposition several stores to focus on pick-up, drive-thru, and curbside delivery.

Actually many of us have made our first meal or food delivery purchases ever in lockdown. Some companies used available digital information about their **customers behaviours** like visiting times, possible partnering enterprises nearby and delivery companies which could deliver the product to the door of the end customers. Especially the **rapid development in food and meal delivery platforms and services** connecting restaurants or grocery stores with customers and couriers has been a big leap in utilisation of digitalisation. For example Amazon Food, DoorDash, Uber Eats, Grubhub and Postmates in US; Delivery Hero, Just Eat, Takeaway.com, Uber Eats and Deliveroo in Europe and Ele.me and Meituan Waimai in China.

Of course Zomato in many countries as well. In addition, many regional companies are rapidly challenging this competition, for example Wolt and Glovo. All of those have reacted rapidly to the changes around, and the companies who adapt their services and/or volumes will be the winners. The bigger those businesses are, the more location intelligence they need and the more value they can add.

Also a new terms like “**cloud kitchens**” or “virtual restaurants” have become to the market. Those are commercial facilities purpose-built to produce food specifically for deliveries. Cloud kitchens are centralized licensed commercial food production facilities under one roof, where the restaurants rent space to prepare delivery-optimized menu items. They are planned to **geographically locate** in out-of-town efficient and low cost industrial complexes, but not too far, and they may also offer driver parking, driver waiting areas and check-in stations for seamless driver pick-up. All that is designed to get food out of the door and into the customer’s as rapidly as possible and being effective at the same time.

All the delivery companies **high quality location information and for example asset and route optimisation are critical** to work efficiently. Actually there is strong international and regional food delivery competition going on and those who use **location information, efficient data flows, location analytics and easy to use applications** have absolutely better chances to win. Location intelligence is essential in integrating data sets coming from many data flows and its special power is in the human understandable visualisations, location analytics and turning information to knowledge and actions.

Location information is used more in many levels: locally, regionally, nationally and internationally.

During the pandemic huge amounts of office spaces have had very low usage at local level. Teleworking and workflows in office work have developed a lot, so there will be a permanent change to reduce office spaces, which will also reduce the enterprises costs. New office space planning can be made by using **indoor mapping and positioning technologies**, which will improve for example space and energy usage, impacting at the same time on the carbon footprint of the companies.

Already in early 2020 some countries used surveillance data, including location data, to **trace and warn** anyone who might have come into contact with the virus. The best known example is from **South Korea where mass surveillance** was taken in use. They could trace where the citizens had visited and how they have travelled across a transport network. As well phone location logs have been used and got from the mobile operators giving rough data of which people were located at the same cell area. They also captured extensive network of surveillance cameras to track citizens who had been infected but also to trace the movements

of the positive tested people so the people who may have been in close contact with those could be alerted. All this kind of information has been collected in their national database and used to e.g. alert citizens. So their solution was a pervasive contact tracing. It proved effective in flattening the curve of the country's first wave without the need to close private businesses. But in the longer term the public fatigue seems to have reduced those benefits anyway.

People in South Korea had been already used to have this kind of surveillances, because during MERS outbreak in 2015 there was enacted a law which allows the authorities to collect personal information very widely and the citizens mostly understand the benefits for the society. But in the long term it's absolutely not the question only on technology or privacy, it is also the question of continuously motivating citizens and informing on the impacts.

Such Korean methods are not acceptable in western countries like Finland, because of the **privacy regulations**. In EU the **tracing and warning apps** were developed and are used on voluntary basis and are based on **bluetooth proximity technology**, respecting the users privacy and do not enable the tracking of people's locations. All the personal data has to be highly protected. This service works according to **national decentralised system** where the calculations happen locally and works in combination with EU's **gateway** enabling the apps to be used also across the borders.

But, like in South Korean example, even if the increased amount of their COVID infections later on, possibly due to their decisions to ease restrictions in the autumn and their early success, was not only because of the utilising location information, but also by aggressive testing, isolations, restrictions and widespread mask-wearing, we can see that **location intelligence can be technologically highly used in acute crises** by integrating the existing technologies and data flows from several systems. But we also have to take care of **people's privacy** and we have learned in Europe that decentralised data collecting method can work efficiently across the borders when the regulations are similar and clear.

It has been a pleasure to also notice in Finland that part of the biggest cities has taken in use their **location platform's wide capabilities**, connected to the cities other processes, giving location intelligence to have a role as communication channel. One example is the city of Vantaa which offers locally lots of location infection and vaccination information on the web : https://www.vantaa.fi/terveys-ja_sosiaalipalvelut/paivystys/koronavirus/vantaan_koronavirustilanne . As well Finnish Institute of Occupational Health has started to provide realised vaccination situation map on municipality level: https://www.thl.fi/episeuranta/rokotukset/koronarokotusten_edistyminen.html. Still I see that

there would much more to improve, especially in communicating by using map visualisations and using location analytics, in all the levels.

Testing, experiencing and assessing COVID-19 data in a proof-of-concept

In the spring 2020 we made **COVID-19 data researches** and map works with open COVID-19 and other statistical data sets, map visualisations and location analytics both locally in Finland and world wide on both country and state level.

Johns Hopkins University collects worldwide data on COVID-19 from many sources and nowadays offer the data freely available through a GitHub repository. They also released the first public map at the end of January. As well **WHO** and for example in **Finland Finnish Institute of Occupational Health** released more detailed map in Finland in the spring 2020. They all use the same platform and tools in the backend.

I wanted to challenge the first maps and include something even more useful, having the purpose to help people to **know and understand the pandemic situation better**. I wanted to retrieve the original data from Johns Hopkins university site and include globally on country or state level information from many sources into one database. After Finnish Institute of Occupational Health had released national publicly available data in Finland I wanted to go even deeper, to municipality level when Finnish Institute of Occupational Health released it publicly available data.

I will share my experiences what I noticed when rapidly establishing a **corona situation map** without coding. As well I will show a short demo during this FIG presentation later on. I used CARTO's location platform in the cloud, so it was rapidly deployable in use. Every morning I downloaded the daily COVID-19 content from Johns Hopkins site directly as csv file and copied it into Excel database. It was easy, but a little bit time consuming part. There become also international and local APIs available later on, which would have allowed to make the process more automatical, but my project was like a proof-of-concept. I also had a chance to make my own quality checks and corrections if needed.

The meaning of data quality and availability

I observed practically **how important the data quality really is** and how important it is to make **data quality checks** and even better to have them **included already on the background processes** and on the field. As well **metadata** would have helped many times a lot. Sometimes the daily quantitative results were for example zero or even negative, meaning that there were data from several days combined to one day or sometimes unknown but remarkable variation. It seems still be the situation also now. Like in all location intelligence use cases and digitalisation **the quality of content is crucial element**.

It is not the question only of **data** and its great **visualisation**. It would be the best to find **phenomena and correlations**, and all the best would be if we could notice **insights and reasons behind the phenomena**. In my proof-of-concept, in addition to COVID-19 data, I collected the **other latest data sets** from Wikipedia about the **number of inhabitants** of all the countries and US and Australian states, the **square area** of those to be able to calculate the COVID-19 infections per population and square km². I had an idea to make the map visually more pleasing, so I started to collect **flags** of all the countries from worldometers.info. A few flags missed, so I collected them e.g. from other sites. That was one time job, but actually an interesting phase.

To establish this setup quite a big amount of **manual work** was required, but I was able to **keep all this in my own hands and make rapidly changes**. The daily updates were easier to make anyway. I published both international on country or state level and national map visualisations on municipality level. I will shortly **present those visualisations**.

Regarding **data APIs** I may have taken the modernised version of **OGC's Observations and measurements standard for JSON encoding** in use, but the final releases are scheduled for publishing by the end of 2021, so it was not available and supported. The Observations and measurements defines a conceptual model for describing observation events and their results as geospatial features. This specification uses an early draft proposal version of the ISO 19156 Edition 2 data model currently under preparation in the OGC O&M Standards Working Group. Our company Spatineo made its contributions for the Corona GIS Finland specialists group for helping the Finnish governmental organisations, communities and companies in mitigating the impact of the COVID-19 pandemia in 2020: CovidJSON, standards based GeoJSON data model for infection data <https://covidjson.org/> and <https://data.covidjson.org/>. It provides data model for two primary epidemic related use cases: Individual test cases and Regional infection statistics. **We encourage to use standards every time when it is possible and reasonable.**

National ways to collaborate in Finland

In Finland we have an advantage of being a forerunner in digitalisation, utilising location information and e.g. lots of open datasets has been released. We have been also used to use commercial datasets. As well our small size as a nation, but active and innovative communities also in spatial it gave us better chances to co-operate.

In Finland “Report on spatial data policy” was released in 2018. It is a national report on spatial data policy outlining the types of spatial data needed in society, how their production, management and distribution is developed, and how their use is promoted. The vision of the report is: Finland has the most innovative and secure spatial data ecosystem in the world. The aim of the report is to oblige all actors in the public sector to see to the interoperability of spatial data and access to it in a way that they can be used by the public authorities and companies as efficiently as possible. At the same time a high standard of information security and personal data protection must be ensured. **Finland has been lucky to have this kind of initiatives and co-operation before pandemic.**

Geoforum Finland, raised from the “Report on spatial data policy” in Finland, which is a network enabling the growing benefits of location intelligence in society and developing cooperation between the geospatial industry and organisations using spatial data, **setup a Corona GIS specialists group in the autumn 2020**, in which all the networked specialists released their willingness to solve location intelligence challenges without charging. The working model of Geoforum Finland is based on similar principles than in the other Nordics.

Finland is one of the leaders in digitalisation globally. **Many new datasets were taken in more active use** during the pandemic. One good example is when analysing the peoples movements, how much had it really changed because of the restrictions. Mobile operator Telia offered its **mobile customer’s anonymised and aggregated location data** (Crowd Insights) in Finland to be analysed the impact of corona virus to the movements. That is still used during the second wave of corona and actually it is the only reasonable way to utilise and use almost up-to-date content in this kind of use case. In the future, or already today, societies can benefit much more about available data sets and there’s no technical showstoppers, only the limitations in our heads how to rapidly find the best practices available.

Lessons learned

As mentioned above, we cannot too much emphasize the **data quality and working data flows**. Without **high quality data and the innovative professionals** used to utilise them and of course **spatial tools**, the decision makes can’t make their right decisions based on the facts. It is sure, that there will be acute crises also in the future, but can’t predict what they might be, but one thing is sure; we have to be prepared. It is not only the question of the technical preparedness, it is a much wider topic.

Without an idea on how geography matters, businesses, public operations and individual people will become embarrassed again when the next crisis hits, and the world can’t afford

that. Currently many of the individual organisations have stuck on their respondings with separated spatial strategies. The operations can't be on only the backs of the hardworking people who happens to be at work. The communities should give collaborational support to individual professionals and organisations, and actually we need a wider, even spatially enabled global crisis strategy. We can and we have to learn from the experiences on all levels of the processes. We also have to improve the data quality and data flows and continue the development of standard APIs. If businesses are unprepared, the consequences will be more challenging. We see that the best practices done, like nationally in Finland's case has been done when using data and APIs, should be developed more internationally and thus give the world better preparedness. More collaborative mindset gives us better chances to be successful not only in the crisis but also in the better and inspiring working life in the future.