



Burgemeester van
Groningen

Groningen, February 3th; 2015

Subject: IBM Smarter Cities Challenge Groningen

To whom it may concern,

This letter is to confirm my commitment and my authorization to our City's submission to the IBM Smarter Cities Challenge program.

Our Groningen submission is about developing an improved management regarding risk, incidents and disasters and their consequences. In Groningen city and surrounding area we are in need of such improved capacities in the light of the increasing earthquakes, which are caused by the exploitation of our natural gas resources the last couple of years. These small, but very frequent quakes, have caused wide-spread damage to buildings including our homes, hospitals, schools, the two universities, and also they have increased the stress on the dikes protecting our land from the sea. Of course we are currently looking at the cause of the earthquakes and for new and innovative ways of dealing with the damages and the need of reinforcing many buildings. But moreover– for me as mayor something which touches me most – the earthquakes have caused fear and uncertainty amongst people and a big loss of trust in authorities that govern the exploitation of our gas-reserves. Something which is a real challenge to cope with.

Although there is a lot of data and information on the causes and the consequences of the earthquakes, this data is widespread and disorganised. In many respects it requires a new approach, maybe a Big Data approach. And we, the city of Groningen, lack knowledge to implement these new techniques and solutions on how to create and improve our incident and risk management system.

We think we are in need of advice on how to acquire and organize information that will help us with open communication and the formulation of effective measures and policies, with a more effective response in case of incidents and disasters. This could also close the information-gap between the gas-industry and the mining authorities on one side, and the local community on the other side, thus creating a level playing-field for negotiations and a base for restoring citizens' trust.

I pledge personal commitment to this bid, as I am responsible for disaster-management in the bigger area surrounding the city of Groningen. If our proposal is selected and an IBM team is sent to our City, my office will ensure that all necessary resources and support are provided to ensure the process will be a success.

Yours sincerely,

5.1.2e

Peter den Oudsten

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Onderwerp : Letter of support smarter cities challenge Groningen

To whom it may concern,

With this letter we want to express our support for the application of the city of Groningen for the IBM city challenge.

As the city has described the earthquakes are a pressing subject and have massive impact on the region and the people living in it. The current situation brings major social and economical challenges for the city, the region and the country as a whole. Safety of the people is essential and trust has to be rebuilt.

We are of the opinion that a good, accurate and usable information system would support us while handling that challenge. It would help stakeholders to substantiate decisions and react accurately when problems occur.

We emphasise that our organisation fully seconds this initiative. We are convinced that this initiative will support the process of addressing the challenges at hand and we will take great interest in the results of the initiative.

This decision is taken on behalf of the Provincial Executive Board by the member of the Provincial Executive Board who has this subject in portfolio.

Yours sincerely,

Provincial Executive Board:

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, kings commissioner.

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, secretary.

GEDEPUTEERDE STATEN

Attachment 1. The Groningen Challenge: Risk and Incident Management

Proposed Topic

1A. What challenge facing the city or region do you propose addressing with a Smarter Cities Challenge grant? Please provide a brief summary of the context surrounding the proposed topic area, including past efforts and current initiatives.

If desired, include links to relevant articles, papers or blogs covering the topic to provide our review team with additional background material.

Groningen is suffering from recurring and increasingly strong earthquakes caused by gas mining from the gas field below the region. These earthquakes form a risk to the population, damage building in a wide region, and result in economic decline. Moreover people feel left out of critical information resulting in uncertainty and lack of trust.

To alleviate the above, Groningen requires improved incident & risk management capabilities for risk analysis & mitigation, early warning & response and improved open communication. Inexperience, socio-politics complexity and organizational culture have prevented the city from developing these capabilities so far. Winning the Smarter City Challenge would concretize the required capacities and provide a roadmap for their implementation. As incident & risk management is important for the city and region, funds might be available for a sound plan and roadmap implementation.

Groningen is built on top of the 10th largest gas field in the world. Gas has been extracted from the field for the last 60 years, boosting the economy of the Netherlands and Europe. Only recently the side effects are felt in the occurrence of earthquakes, which increase nowadays both in number and intensity. Over 1,000 earthquakes have been registered the past few years, the strongest so far denoted 3.6 on the Richter scale but forecasts show that quakes of scale 5 could soon be reached. The Groningen earthquakes are man-induced and originate from only 3 km deep. The existing knowledge on 'classical' earthquakes can hardly be applied. The Richter scale for instance is inadequate as a tool to predict and measure damage caused by the earthquakes.

The gas field is managed by the Nederlandse Aardolie Maatschappij (NAM), a subsidiary of Shell and ExxonMobil. A draft report of the National Security Council released only January this year (ii) revealed that until 2013, the NAM never recognized possible safety risks, earthquakes were only seen as a damage risk that could be reimbursed.

Besides earthquakes, gas extraction is estimated to result in subsidence between 30 and 40 cm in the coming decades. Rather unfortunate for a region that is already below sea level (iii). Under an unfortunate combination of an earthquake, significant rainfall and high water the situation at the dikes which protect the region from rivers and the sea might become critical. A report from Deltares, an international institute regarding Delta Protection, estimated that up to 105 km of dikes is at risk (iv). In a worst-case scenario parts of the region could be flooded.

Even a resolute action like stopping gas extraction completely seems too little, too late. Even if it stops today, earthquakes would continue for at least half a century (i). Furthermore,

from a national financial perspective stopping completely is next to impossible. There is a growing support to slow down the pace of extraction (also from Shell), but now there is debate needed about the potential effects on the occurrence and strength of the earthquakes.

The effects of ever increasing earthquakes on the city and region are enormous. Literately feeling the ground shake beneath your feet several times a week has detrimental impact on inhabitants' social well-being. Furthermore, reactions to earthquakes are mostly post-hoc: an earthquake is registered and afterwards some action might be undertaken. Also economically Groningen suffers: who wants to live or work in an Earthquake Zone?

Moreover, a mayor impact of the earthquakes is a deeply felt distrust in the authorities. The inhabitants feel that they have been misconceived, and that their observations and worries have not been taken serious. Early concerns have been dismissed, damage has been downplayed, and procedures for reimbursement have been unclear. People feel left out of critical information and feel having lost control over their own lives, their possibilities of the future and the stability of their homes.

General info: <http://www.bbc.com/news/world-europe-22542982> and <http://www.ukrant.nl/english/10-questions-about-groningen-earthquakes.html>

References (only in dutch):

- (i) TNO, 2014 [Research report about maximum strength of earthquakes], <http://www.rijksoverheid.nl/onderwerpen/aardbevingen-in-groningen/documenten-en-publicaties/rapporten/2014/01/17/onderzoek-maximale-sterkte-van-aardbevingen.html>
- (ii) NOS, 2015, [Safety citizens ignored at gas extraction], available at <http://nos.nl/artikel/2012483-veiligheid-genegeerd-bij-gaswinning.html>
- (iii) NAM, consulted at January 28, 2015, [Subsidence due to gas extraction], available at <http://www.namplatform.nl/gaswinning/bodemdaling-door-gaswinning.html>
- (iv) Deltares, January 2014, [Effects earthquakes on critical infrastructure Groningen], available at <http://www.rijksoverheid.nl/onderwerpen/aardbevingen-in-groningen/documenten-en-publicaties/rapporten/2014/01/17/deltaers-effecten-van-aardbevingen-op-kritische-infrastructuur.html>

1B. Which key stakeholders are invested in the proposed topic area, both inside and outside of government? Please describe their current roles and involvement in the topic area.

Stakeholders are:

- Citizens: all citizens and inhabitants of the city, and the region, adding up to around 480,000 people. The citizens are organized in several actiongroups, most dominantly the Groninger Bodem Beweging (Groningen Earth Movement).
- Regional governments: the Municipality of Groningen, the municipalities of surrounding villages and the Province of Groningen. Given the impact of this topic, Local and Regional governments are cooperating together for the good of people.
- National Government and (Semi)-governmental bodies: the Netherlands National Ministry of Economic Affairs, the National Security Council, the State Supervision of

Mines (SodM) and TNO (Netherlands Public Applied Sciences Organization), The KNMI (Royal Netherlands Meteorological and Geophysical Institute.)

- Companies: Nederlandse Aardolie Maatschappij (NAM), a subsidiary of Shell and ExxonMobil. Several datacollecting SME's, Centrum voor Veilig Wonen (Center for Safe Living, a consortium responsible for repairmen of damaged buildings) and Arcadis (engineering company, responsible for damage assessment and strategic advisor to the NAM).
- Academia: University of Groningen and Hanze University of Applied Sciences. Together, they are developing a knowledge center for the earthquakes.
- Medical: Groningen University Medical Center, which is responsible for disaster medical services, suffers damage itself and its function can be impacted by damage to key infrastructure
- Economic: The Economic Board Groningen: a board to manage the nearly €100 million designated to "compensate" the economic consequences of the earthquakes. A significant part of this money is not yet allocated.

C. Which senior staff member would serve as the project's sponsor, and potentially lead the implementation of recommendations?

Mr. Peter Teesink, CEO, City of Groningen

D. Which areas are connected to the proposed topic?

- Public safety: the earthquakes impact physical and psychological safety of the people, as well as trust in authorities and civil society.
- Economic Development: the earthquakes damage current buildings and infrastructure as well as trust in the future. Furthermore, they decrease investments in the region significantly. This results in economic decline.
- Water, Energy & Environment: earthquakes can be extra dangerous as they lower the region. Under unfortunately combinations of earthquakes, rain and high water levels the dikes protecting the region will break and the region will be flooded.
- Transportation: earthquakes cause damage to infrastructure which can be repaired only post-hoc.
- Health & social services as well as transportation: damaged infrastructure might diminish the effectiveness of physical and psychological health services. If the dikes break and the region is flooded, existing medical services – if not flooded themselves – will be unable to deal with the scope of the problem.
- Other: earthquakes require incident & risk management capabilities, which might be built on open and transparent information systems, data analytics and risk management

E. What systemic factors prevent the city and community from addressing this issue without a Smarter Cities Challenge grant (for example: insufficient budget, organizational culture, regulation, legislation, etc.)?

Several systematic factors slow down the development of Incident and Risk Management capabilities:

Inexperience:

As Groningen is a traditional safe and incident-free region, Incident and Risk Management is a relatively new challenge for all stakeholders including the city and the regional authorities. Winning the Smarter Cities Challenge Grant will bring in IBM's global expertise and as such will help the city and region in the right directions and fasten up the process of developing these capacities.

Information-gap:

Some of the critical information is being held confident for public by both the NAM and the KNMI. Other information, like the extent of damage to buildings, is not centrally monitored. Information in social media is still not adequately structured, monitored and processed.

Technical and scientific complexity:

There are several high-level ideas to address the earthquake issue, see also "Anticipated Outcomes". However the city and region lack the expertise and the knowledge on how to combine different data and analysis methods, and how to manage these data.

Socio- political complexity:

The Earthquakes have a big impact on inhabitants' lives but the financial benefits from the gas represent 5% to 10% of the total income of the National Government of the Netherlands. Especially in the current economically difficult times a cut in income cannot be missed easily. The Groningen earthquake-problems are hot in both regional and national politics, but the political and often emotional discussion is mostly about whether to stop or slow down gas mining or not and how much. In the meanwhile the earth in Groningen won't stop shaking for the coming decades, so the discussion on how to deal with them and the consequences is currently still in development.

Organizational culture:

If Groningen wins the Smarter Cities Challenge Grant, the awarded period of consulting as well as the report will help enormously to fasten the cooperation process with all involved parties to develop Incident and Risk Management capabilities.

Anticipated Outcomes**A. What would be successful short and long-term outcomes of a Smarter Cities Challenge engagement for the city?**

On the short term a successful Smarter City Challenge would provide (i) recommendations on how to organise and develop Incident and Risk Management capabilities as well as (ii) ideas on how to implement these recommendations in a project for all stakeholders.

On the longer term a successful Smarter City Challenge will provide the city and region with Incident, Risk & Disaster Management capabilities and as such take up its public responsibilities better and more visible.

Such Incident, Risk & Disaster Management capabilities would include:

- Risk analysis and mitigation: possible instruments to do impact analysis, evaluate what-if scenarios, use big data analytics to improve modelling and forecasting, easy adding new data sources.

- Early warning and response: possible instruments for some form of real-time monitoring, situational awareness and dashboard functions for city and regional authorities. As well as applications for inhabitants to get open and transparent access to information concerning them, and even adding information themselves, making it into an interactive system.
- Open communication: (i) information instruments including semi-open access data ("check-yourself" for citizens), (ii) applications connected to (i) which make the data easily accessible and possibly allows citizens to help in adding information;(iii) social instruments to understand and respond to earthquake related sentiments.

On the long run, the above will result in:

- Increased safety for the citizens due to better understanding risks and quick and effective responses in case a risky situation occurs
- Restored trust in national government and in the gas industry, by closing the information-gap for both citizens and regional government, thus creating a level playing field for the region to negotiate with national government and the gas-industry
- Restored trust in the city and regional authorities and as such alleviate the economic decline due to uneasiness about the earthquakes
- Making Groningen a showcase for Smart Incident, Risk & Disaster Management. This might help and inspire other cities with similar problems, for example tsunamis, large forest fires or floods, to deal with these problems in a more effective way, especially with regards to inhabitants' concerns and open communication.

Anticipated Outcomes

B. After the engagement, what specific actions would be taken to implement recommendations? What efforts would be taken to share best practices with other cities and regions?

The recommendations will be used to help enhance and speed up the cooperation between the stakeholders, and to start up a project to realizing them. Funds for realizing the recommendations might be provided by the Economic Board of Groningen, which controls a special "Earthquake compensation fund".

The expected uptake of the capabilities to be developed (risk analysis & mitigation, early warning & response and open communication, see earlier in this document) is expected to be very high, as the population recognizes this as a key priority, and local SME's are keen to incorporate these capabilities to on implementing these data into services for citizens and the regional government. Also our local IBM Service Centre Groningen might be able to take part in this implementation.

Note that as IBM has a Service Center in Groningen and has connections with several projects related to the University of Groningen (for example project DOME, the ASTRON & IBM Center for Exascale technology), many stakeholders know IBM as respected partner in innovation. Consequently, recommendations from an IBM Smarter City Challenge Team will be receive the highest attention at key stakeholders and will be taken very seriously.

Groningen has two renowned universities and a quarter of the population consists of students. As such Groningen uses the title "City of Talent" and developing into a smart city is at the strategic core of the innovation agenda. When Groningen has smart Incident & Risk Management Capabilities the city and region will happily inform if not broadcast this to the rest of the world, as it reinforces the agenda of the city: being known as a smart City of Talent.

In other words: IBM might want to use the best practices for Incident & Risk Management Capabilities developed during the Smarter City Challenge Groningen as a show case. Groningen is more than interested in being that showcase.

Capacity for Driving Change

A. Please describe the city's accomplishments in encouraging innovation and driving change, that demonstrate the city's and city leader's capacity for acting on recommendations delivered by an SCC grant.

The city of Groningen counting 200.000 inhabitants, is the largest city and the economic capital of the northern Netherlands. The city sits at the core of the Functional Urban Area of 480.000 inhabitants, underlining the central function of Groningen (source: OECD). With over half of the population being under 35, the inhabitants are on average younger than anywhere in the country. Groningen is home to two universities and the second largest University Medical Centre in the Netherlands. It is home to 60.000 university students, of which some 6000 are from abroad. The Groningen workforce is on average the highest educated in our country.

The city's economy thrives on the service-industry, with a focus on healthy ageing, energy and creative industries as innovation drivers. The way Groningen tries to speed up innovations in these focus fields is through a 'smart city' approach. City users and inhabitants are central in this approach. We want our citizens to control and develop their own living environment and invite them to innovate together in partnerships. We use results from our universities, entrepreneurs and citizens and combine these with ICT technologies in order to make life better and to be able to take control of our own health and energy systems. Consequently, the city is used to drive change, particularly in cooperation with citizens, business and knowledge institutions

With this approach we have attracted international attention. In March 2014 the city of Groningen became the runner up for Europe's Innovation Capital competition, the iCapital award. Running together with Barcelona and Grenoble the city was acknowledged for its outstanding innovation climate.

Specifically regarding to earthquakes and the required Incident and Risk Management capabilities: the societal needs are very high, the political willingness to cooperate is evident, on both local, regional and national. Also visibility and impact will be high, and local leaders are making this societal challenge to a top priority.

Data

A. What role can open data and citizen engagement play in addressing the proposed topic area?

Incident and Risk Management capabilities like risk analysis & mitigation, early warning & response and open communication are based on data, preferably and mostly open data.

To put it even stronger, we consider Open Data and citizen engagement to be at the heart of this project. Assuring equal access to information, together with the civic engagement that is already in place, will leverage the stakeholders' and inhabitants' feeling of self-control, restore trust in authorities and will help to look for a general accepted way to determine the details of Incident and Disaster Management in the future.

A lot of data is available (see next question), but is scattered over sources. As such although it is available it is currently not very usable by non-specialist citizens. An important step still to make towards full citizen engagement is designing some way of making the data not only available but also easily usable by citizens.

B. What data relevant to the topic area would be available to a Smarter Cities Challenge team for analysis? What data relevant to the topic area is not available?

- Risk assessment data are mostly available for larger infrastructure, mostly open, and partly available for private housing.
- Geological data are partly available, mostly classified as business sensitive.
- Historical data on geological events are partly available
- Data on building plans are available; data on state of buildings are available; data on state of damage repairs are unknown.
- Data on extent of damage already caused are available, but partly classified as business sensitive. Could be crowd sourced.
- Data and overview of critical infrastructure and risks are mostly available and open.
- Social media in case of event, incident or disaster are of course open, but have been limited monitored and analysed.
- Fine gridded data on the impact of quakes are partly available, analysis is lacking, and real-time data is not fine-gridded. A typical gasquake has a very shallow epicentre, and local soil conditions will influence the energy-uptake of buildings.
- Data on location and readiness of disaster relieve resources are available, structured and accessible.
- Extensive research reports regarding earthquakes models and resulting estimates for earthquake frequency, intensity, possible damage, and so on, are available.
- Data regarding some elements of economic impact on the region is available
- Data regarding the financial importance of gas sales for the National Government as well as international contractual obligations regarding these sales are available
- Data on location and readiness of disaster relieve resources are available, structured and accessible.