
INGSA CASE STUDIES

INNOVANDIA:

Smart city networks and AI for solving societal problems

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Background and context

Innovandia is a small developed country with an ethnically diverse population of 8.5 million. It has a democratically elected single-chamber parliamentary government, which is currently a coalition between two centrist parties: the Futures Party (FP) whose constituency is mostly the younger voting population with a focus on sustainability and a high tech future, and the Prudential Party (PP) which is positioned to the right and seen as a business friendly neoliberal party.

Innovandia has a stable economy traditionally based on a mix of exports of high-quality primary products (from agriculture, horticulture, fisheries/aquaculture) and tourism, more recently augmented by a range of emerging high-tech industries. It has invested heavily in AI-related research in its universities and in providing subsidies to hi-tech industrial parks as part of the government's future-focused agenda, which has attracted several major multinational digital companies. It has also benefitted from increasing global connectivity that has spurred the trend towards a high-tech, knowledge-based digital economy. The citizenry has rapidly adopted digital habits including a high use of social media and online shopping.

Innovandia projects the image of being a good global citizen, promoting a sustainability agenda. The country has had a high profile as a socially liberal country, and has received a large number of refugees from dysfunctional countries in the neighbouring region, where there is considerable ethnic and religious violence. Further, the government has had an active immigration policy, believing that immigration fuels economic growth. Simultaneously it seeks to attract foreign direct investment and multinational companies by promoting itself as a magnet country for talent in the high tech industries.

The vast majority of Innovandia's population now lives in and around its urban centres. The Minister of Science and Innovation (from the Futures Party), with support from the PM's policy advisor on innovation, has pushed for 'smart city' solutions to accurately gather, analyse and act on information about urban systems to improve resource allocation, manage waste, reduce traffic congestion, and provide better and cheaper utility services. Their coalition partner (PP), while initially sceptical of the cost-benefit had agreed seeing the potential to also use surveillance systems to reduce crime and enhance public safety. In turn, as the party having control of the finance ministry, they had argued that the use of 'big data' analytics and the application of algorithmically-informed decision-making promises increased fairness and efficiency in the delivery of essential government services such as social welfare and mental health services.

The Minister of Police, also from the PP, had returned from a meeting of OECD police and justice ministers and reported on the success of predictive policing in major urban centres in several countries. The Commissioner of Police supported this view strongly although a respected Professor of Criminology at one of the universities had argued that the evidence for the success of predictive policing was very weak.

Artificial intelligence (AI) is already being used by several banks including a government owned bank to determine loans, by the immigration agency in determining visas, to assist judges in sentencing, and big data is being suggested as a way to identify at risk children early in life for targeted welfare intervention.

While AI holds significant promise, there are also significant challenges in the rapid push to integrate these systems into high stakes domains. The central government has identified 'big data' as both a strategic priority and an area of ethical and legal concern. In response to growing public concerns both domestically and as a result of well publicised international issues involving social media companies, it has recently established a Digital Governance and Ethics Advisory Board (DGEAP) that reports to the Minister of Science and Innovation (from the FP) and Minister of Justice (from the PP). That Board wants the government to be more proactive in regulating digital innovation, but the Cabinet worries that regulation beyond current privacy and libel laws (which have not been tested in relationship to digital information in court) might stifle the very innovation agenda that brought both parties to power.

But privacy advocates raise concerns about the quality of the privacy regulations and the protection of private data. They also argue the need to ensure that the government's use of AI doesn't create unintended discriminatory consequences. They cite North American evidence to suggest such biases are inevitable.

The issue

Innovandia's biggest city, Esterbridge, is both the financial centre and the centre of innovation. The largest science innovation park, housing numerous start-ups and several multinational companies, is based there around a National AI Research Institute. This innovation dynamic has spurred a lucrative market for technology and telecommunications companies (both local and multinationals) for developing digital and networked solutions, and with this, a growing ability to capture, aggregate and process an ever-greater volume and variety of data. In addition, the proliferation of personal devices capable of collecting and transmitting information to the internet and to databases has linked most Innovandians to the growing 'Internet of Things (IoT)' – a massive web of people, data, things and processes interconnected via a dynamic, global digital infrastructure.

However, the growing population, housing shortages, relative ghetto-isation of some ethnicities and migrant groups within the city, pressures on natural resources, pollution, and claims of rising rates of violence and crime have led to a rise in populism at both ends of the political spectrum and within one faction of the Democratic party. The palpable shift in the political dynamic is increasingly commented on by political commentators. A rising projection of a dystopian future is appearing in the political and media discourse, which is being exploited by the leader of the major opposition party.

Health and social services, school services, and infrastructure, including roads and public transport are also under pressure in Esterbridge. One multinational digital company, having initially announced it would have a major research centre in the city, its first in the region, has now decided to not do so but rather base itself in a neighbouring country. The company spokesperson stated that changing circumstances in Esterbridge make it no longer as appealing for attracting and retaining high quality staff, but the decision was likely prompted by the murder of two of the staff from their small commercial office in Esterbridge – a husband and wife team – in a highly publicized metamphetamine-fueled home invasion.

Some commentators, including some very distinguished academics, are claiming that drug use and associated crime are largely arising from parts of society which have little hope, being stuck in the cycle of transgenerational disadvantage. Populist politicians are however claiming that it is the refugees and recent migrants that are responsible and want the government to greatly reduce immigration and the refugee quota. The media debates, as well as the intense coverage of disturbing cases such as the mentioned home invasion, seem to have influenced public perception of crime: while the crime rate has

actually been steadily falling, surveys show that 75% of the population believe the crime rate is rising rapidly. A major property developer has fueled matters further by announcing the development of a gated community with 24 hour security to appeal to the upper end of the market. The societal discourse is becoming more polarised and the political dynamic increasingly appears to reflect that.

Approaching the crime problem

Esterbridge has been investing in a strong digital infrastructure with extensive traffic and environmental sensors. According to the mayor's public statements, street crime in the downtown has reduced thanks to a number of digital cameras that have been installed in the downtown by the City Council. The city has paid for many of these to be now linked into the central police station.

City officials rely upon data analytics to support a number of initiatives, including traffic, environmental and utilities management. More recently big-data software companies have sold software and AI services to the Esterbridge Metropolitan Police Department (EMPD) that apply computer algorithms to predict where crime is likely to occur, based on property data, social media, historical crime statistics, and other data on the local community and its residents and visitors. This has been used to plan where the police force should be deployed: so called predictive policing – an approach that has been contested as to its effectiveness overseas.

Recently, under public pressure, the city issued a request for bids for an integrated video management solution that would allow the city police to better monitor a number of suburban localities identified as being at highest risk for crime. Cyclops Inc., a domestic company, 75% owned by the large multi-national Advanced Informatics Technology (AIT), won the bid and began replacing traditional passive CCTV surveillance cameras in suburban shopping centres and neighbouring streets with intelligent video sensors to alert suspicious activity to the monitoring agency (mainly the police). The contract allowed for the potential to introduce facial recognition software into the sensor system, but city councillors have not agreed to fund that update as yet (though the vote margin was narrow). But the system continues to evolve, with novel uses for the video camera feeds added in by multiple departments including parks, transportation, emergency management, and public facilities. The data provided by the cameras is now linked to automobile number plate recognition technology, developed for use on the toll roads.

In response to the home invasion murders, a well established lobby group (Reduce Crime and Protect Survivors ; ReCaPS) has demanded further expansion of the crime-prevention initiatives. They have developed neighbourhood watch groups and have demanded access to the CCTV feeds. They have also raised money to sponsor a Private Security Camera Incentive (PSCI) programme, which encourages residents, businesses and social organizations to install security camera systems on their property and register them with the police.

Capitalising on this potential opportunity to enter a new market aimed at private homeowners, Cyclops developed a video-enabled door buzzer with connected security camera, which sends an alert to a smartphone when someone is at the door, and saves video footage online. This allows the homeowner to monitor deliveries, record theft of packages, and identify suspicious persons on their property. Cyclops can at least in theory link the data to its other real-time crime monitoring systems already installed throughout the city.

Cyclops has heavily marketed their smart door buzzer devices to both the public and the police as a means to increase public safety and reduce crime, and their device carries an endorsement from PSCI. But the evidence on which their claims are based is purely anecdotal. Nonetheless, insurance companies have

offered rebates to homeowners to install the buzzers, and ReCaPS has provided them for free to a selection of residents in high-crime areas in the hope of catching offenders and essentially providing 'herd immunity' to burglaries and other crimes in those neighbourhoods. The local police chief and mayor attended the ceremony in which the first free device was installed.

Cyclops also has market dominance on police body cameras and their parent company has a number of data management contracts with the Government including maintaining the immigration and customs databases. Their cloud-management data storage service (provided for a monthly fee) ensures long-term contracts with EMPD.

AIT and Cyclops have patents between them for potential uses of their smart cameras that would be enabled with facial recognition technology, a development allowed for in their police contract. The additional feature would allow comparisons of facial images to a 'database of suspicious persons'.

The Cyclops CEO, in a well-broadcast interview on a programme on new technologies, has discussed the potential value to the homeowner of technology recognising someone 'suspicious' on the homeowner's doorstep; it could alert the homeowners, and would also retrieve additional information about the person from the database, which would be accessible by police. Homeowners would have the ability to add visitors to an 'authorised list' if they are known to them.

One of AIT's major developments has been in advanced facial identification technology. It claims to have over 500 million faces in their database which has been extracted from Facebook and other sources. In some countries it has contracts with their immigration and police agencies to have access to their databases. They have not yet formally approached the government of Innovandia but they have engaged a former Minister of Police as their Innovandia advisor.

Neighbourhood crime prevention groups are already using mobile phones for monitoring and communicating about suspicious activities. The potential to link to AITs facial recognition technology through private door buzzer cameras would allow more detailed information about suspicious people to be shared amongst the community watch groups.

A national weekly magazine has published an 'expose' of AIT claiming that they are seeking ways around Innovandia's privacy policies. In the same issue, a retired high court justice wrote an essay arguing that new technologies are undermining basic privacies and could lead to undermining fo the justice system. This debate has now entered the political arena with editorials in different newspapers taking different views. ReCaPS have started a major publicity campaign to support more use of facial recognition software, while civil liberties groups are taking a different view, citing a distinguished academic who claims the facial recognition software is not very accurate in particular when recognising/distinguishing people from ethnic minorities. Both police and criminal justice in Innovandia have a history of biased treatment of some minorities and given the publicity around several recent cases in America of fatal misidentification of black men based on 'automated suspicion' algorithms, there is a growing chorus of dissent against the use of such technology by police.

The Crime Research Unit and the AI Research Institute are two components of the University of Esterbridge: they have just received a major research grant for US\$25 million from offshore to use the growing data on crime in Esterbridge to explore the social precedents of crime. Their grant application indicated that the use of large data bases linking educational, health, welfare and justice data around identified individuals would be the basis of their research. While their application did not mention facial

recognition, they are excited and have indicated to the Minister of Justice and Minister of Science and Innovation that the use of AI facial recognition would lead to major breakthroughs with global implications, and would have many spinoffs.

Meanwhile, it has come to the attention of privacy advocacy groups that the umbrella company of Breakwell Insurance – the largest insurance company promoting the use of the smart door buzzer devices – is also a shareholder in AIT. The question of whether these three companies are sharing data has been raised by an investigative reporter. The companies fiercely deny this.

Public oversight and regulations (including Innovandia's Privacy Act) have not kept up with the rapid evolution and uses of these technologies. Both local and central government of Innovandia are now faced with the challenge of deciding how and when such surveillance data can be used – an issue significantly complicated by the fact that the technology for gathering it is proprietary, and the data itself is also in the hands of private enterprise. The major opposition party (People First Party PFP) is seeing an opportunity and is demanding action to limit the technology. ReCAPs not surprisingly has taken the view that the technology must be introduced. Rival petitions to parliament are being circulated. Technology companies are beginning to wonder if they are welcome.

The Prime Minister feels the debate is getting out of hand. There are multiple issues and as a starting point she needs to have an urgent report and she asks the relevant minister to set up an ad hoc committee to look at the issue.

The committee consists of:

1. The Chief Science Advisor (chair) – PM's knowledge broker on science and technology issues to inform policy
2. The Privacy Commissioner – tasked with protecting the privacy of Innovandia's citizens
3. The head of Innovandia's Innovation Agency – a government agency tasked with promoting development of private sector innovation
4. The Justice Sector Science Advisor – knowledge broker for science issues impacting police, customs, and justice
5. The government Chief Information Officer – responsible for the government's data management
6. The spokesperson for the Organisation of Innovandia's Mayors – representing local government issues
7. Innovandia's Human Rights Commissioner – promotes and protects human rights according to the Human Rights Act
8. The PM's policy advisor on Equity and Ethnic affairs – advises on cultural sensitivity issues, diversity, etc
9. The President of the National academy of Arts and Sciences – representing academia in humanities and sciences
10. The President of the Institute of Engineers

Exercise

You are appointed as a member of the panel to discuss these issues and synthesise multi-stakeholder views and evidence for the Prime Minister

***Not for distribution

Wider lessons and insights

The problem here is not the willful misuse of AI. It's that AI and related technologies are being used without processes or standards to ensure safety or fairness, or without a deeper consideration of their complex social interactions.

Issues include:

- lack of regulatory oversight,
- lack of agreed principles for data use/sharing
- a constantly-changing technical landscape which significantly influences the evidence basis and can change ethical, social and legal aspects of the public-facing debate.

Discussion points:

- **Issue framing** by different groups (including govt): How might this influence policy development?
- **Who owns the data?** Policing, surveillance, crowd control, emergency response are traditionally part of state functions. Citizens might expect sensitive data to be held by the state. But local governments depend on public-private partnerships to develop the analytics necessary for "smart" urban systems, meaning much of the data is held by private companies
- **Transparency vs company IP:** An important issue is lack of transparency of the proprietary algorithms and technologies. Black-box operating systems mean the city/agency loses control of critical information and data – the corporation controlling the data and analytics becomes the 'command centre'. This might lock agencies into proprietary systems
- **Trusting machine learning over professional judgment.** *In 2009, for instance, San Francisco police handcuffed a woman and held her at gunpoint after a license-plate reader misidentified her car.* – Officers trusted the machine over their own observations that the model and colour of the car were wrong. This relates to fundamental issues of police discretion and accountability when utilising technologies for "automated suspicion" [{Joh, 2016 #760}](#) –
- **Responsible innovation?** --relevant for engineers: do they need to just think 'what's possible' but also 'what kind of societal and environmental impact might my work have'
- **Should we address the issue of 'disruption'** – is disruption a good thing?

QUESTIONS / EXERCISE

1. Can you identify technical questions that can be answered in a relatively straightforward manner (assuming the appropriate expertise is available) – even where there is likely to be disagreement on whether (or how) the government should act on that advice? (i.e. the technical question is uncontroversial, but the social/political question is very controversial)
2. Present the most relevant issues from the perspective of
 - A Cyclops engineer /spokesperson for industry
 - The Crime Research Unit and the AI research centre

- The Esterbridge Metropolitan Police
- Reduce Crime and Protect Survivors (ReCaPS) victim support lobby group
- Innovandia central government
- Esterbridge city council
- A group representing minority residents of a high-risk neighbourhood of Esterbridge

In addressing the issues, consider both friendly audiences and those likely to oppose, even when you seek to influence policy in a particular direction

Can your argument be supported by technical analysis and evidence? What further information might you need? Have other groups developed similar positions, and if so, on what basis?

What might need to be explained to policymakers (and other audiences) on how these powerful tools can be used in such a way as to ensure maximum benefit while minimizing risks?



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INGSA provides a forum for policy makers, practitioners, academics, and academics to share experience, build capacity and develop theoretical and practical approaches to the use of scientific evidence in informing policy at all levels of government.

INGSA's primary focus is on the place of science in public policy formation, rather than advice on the structure and governance of public science and innovation systems. It operates through:

- Exchanging lessons, evidence and new concepts through conferences, workshops and a website;
- Collaborating with other organisations where there are common or overlapping interests;
- Assisting the development of advisory systems through capacity-building workshops;
- Producing articles and discussion papers based on comparative research into the science and art of scientific advice.

Anyone with an interest in sharing professional experience, building capacity and developing theoretical and practical approaches to government science advice is welcome to join INGSA.

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