**2020\_TR\_09\_title of report: Ethics Assessment of the Smart Dublin Programme**



**December 2019**

**Authors**

**Dr. Robert Bradshaw**

**Dr. Hadi Karimikia**

**** 

Table of Contents

[Executive Summary 2](#_Toc37382)

[Case Study Findings 5](#_Toc37383)

[Case Study No 1: Unheard Voices SBIR 5](#_Toc37384)

[Case Study No 2: 3D Docklands Planning Model 9](#_Toc37385)

[Case Study No 3: Flooding Sensor Project 11](#_Toc37386)

[Case Study No 4: Skytango Drone Project 14](#_Toc37387)

[Case Study No 5: EV Charging Project 17](#_Toc37388)

[Case Study No 6: Wi-Fi4EU 20](#_Toc37389)

[Case Study No 7: Bigbelly Bins 22](#_Toc37390)

[Case Study No 8: Dense Air 5G Network 25](#_Toc37391)

[Programme Level Findings and Recommendations 27](#_Toc37392)

[Citizen Engagement 27](#_Toc37393)

[GDPR Compliance 29](#_Toc37394)

[Skills Retention 30](#_Toc37395)

[Conclusion 31](#_Toc37396)

[Recommended Reading Resources 32](#_Toc37397)

[Appendices 33](#_Toc37398)

# Executive Summary

Smart technologies have been typically positioned by their advocates as inherently transformative and progressive, with the potential to create cities which are coherent, agile and responsive. In this positive framing, digital, networked systems (smart grids, sensor networks, transportation systems, mobile/locative media and so on) produce data which support the integration, management and control of urban infrastructure and services. Implicit in this framing is the assumption that technology operates in a largely benign way to promote efficiency productivity and improved forms of engagement and participation.

Increasingly however, this narrative is being challenged in much of the smart city literature which warns that the values shaping the design and management of infrastructure can operate in partisan ways to promote particular corporate and state interests i.e. entrepreneurial urbanism. As a consequence, the distribution of services can often have socio-economic and spatial biases leading to polarization and disadvantage. Researchers from the Programmable City project at Maynooth University, who focused their efforts on Dublin’s Smart city Programme, cite numerous instances where these issues were evident. Technologies such as shared transportation, traffic management systems, smart meters, and smart lighting, amongst others, were shown to conserve sectorial interests rather than prioritize social innovation. Even with projects designed to promote collaboration and devolved forms of decision making such as environmental monitoring, citizens were often little more than data producers with little agency to act upon this data subsequently. Again, this form of participation is instrumental rather than substantive.

In response to these criticisms and motivated by a desire to enhance the social value of its programme, Smart Dublin requested that an ethics assessment be conducted by Maynooth University to (a) understand the degree to which ethics is currently embedded within organisational thinking and practice and (b) identify strategies for developing improvements going forward.

The assessment was conducted through the latter part of 2019 and adopted a case study methodology. In conjunction with Smart Dublin, 8 projects were selected for evaluation.

These are detailed below in table 1.

### Table 1: Case Studies for Assessment

|  |  |  |  |
| --- | --- | --- | --- |
| Case Study #  | Case Study Title  | Lead Authority  | Interviews Conducted  |
| 1  | Unheard Voices  | Fingal  | 2 – internal & external  |
| 2  | 3D Docklands Model  | Smart Dublin  | 2 – internal & external  |
| 3  | Flooding Sensors  | DCC  | 2 – internal & external  |
| 4  | Skytango Drones  | Smart Docklands  | 2 – internal & external  |
| 5  | EV Charging  | 4 LAs  | 2 - internal  |
| 6  | WiFi4EU  | DCC  | 1 - internal  |
| 7  | Bigbelly Bins  | Smart Docklands  | 1 - internal  |
| 8  | 5G Network  | Smart Docklands  | 3 – 2 internal & 1 external  |

Due to issues with project availability, South Dublin and Dun Laoghaire-Rathdown county councils did not participate in the study.

Projects were assessed from a number of ethical perspectives including transparency and accountability, privacy and security, informed consent, social Inclusion, equality and fairness and value sensitive design. See appendix A for the full assessment protocol used. Where feasible, interviewees comprised representatives from both the city (internal) and from the relevant technology companies (external). This process was augmented by additional interviews with senior managers to ensure that the insights and recommendations developed through the process operated at both project and programme levels.

The report proceeds by presenting the findings from each of the case studies. Strengths and weaknesses are identified and recommendations are offered where appropriate. The findings are summarized in each instance using a SWOT analysis. The report then identifies more systemic vulnerabilities which should be addressed in order to develop ethics as a capability. In particular, and despite a strong ethos of social responsibility across individual projects and local authorities, the assessment has highlighted that citizen engagement remains relatively underdeveloped at a programme level. This is reflected in strategic planning, requirements gathering, project selection and the degree to which the programme is aligned with community needs. The report also identifies the need for greater coordination and process standardization in the area of data security and GDPR (General Data Protection Regulation) compliance. Despite Smart Dublin’s positive contribution to security leadership, the organisation is not a legal entity and so its participation in end-to-end compliance processes is not guaranteed. This exposes projects - and citizens - to avoidable risk. Finally, the report highlights the importance of staff retention. Most of the social enterprise identified in the programme is being championed by relatively new Smart Dublin employees with backgrounds in social innovation, community development or related areas. As such, they bring with them a level of awareness and expertise which has been historically lacking. Should these individuals be lost to the organisation then there is a significant risk that many of the citizen-centric initiatives currently underway may disappear. Recommendations to address this weakness, and the others noted, are offered in the report.

# Case Study Findings

## Case Study No 1: Unheard Voices SBIR

Unheard Voices is a Small Business Innovation Research (SBIR) Project being led by Fingal County Council and part funded by Enterprise Ireland. SBIRs constitute pre-commercial procurement and allow public bodies to stimulate innovation in the small business sector without violating formal procurement rules. SBIRs operate by addressing ‘challenges’ identified by local government that impact citizens. SBIRs share both the risks and benefits of innovation between contracting organisations and suppliers.

An SBIR Challenge is divided into two Phases:

* **Phase 1** – multiple companies undertake a technical feasibility study to understand the challenge and identify a potential solution to solve the problem.
* **Phase 2** – a smaller number of companies prototype a specific project, through extensive research & development.

The purpose of the Unheard Voices SBIR is to explore the potential of digital technologies in improving citizen engagement and enrolling local citizens and communities in the decision-making activities of local government. In particular, the project is concerned with identifying and engaging ‘the voices of those who had traditionally been silent’, encouraging the participation of these underrepresented groups and, in the process, addressing issues of inclusivity and inequality.

On completion of phase 1, ‘Smart Futures’, a French-based company with an expertise in collaborative technologies, was chosen to develop their proposed solution - a mobile application which uses collective and artificial intelligence to support meaningful dialogue between participating parties. Smart Future’s solution innovates primarily through a system of gamification and rewards which is designed to improve engagement. The solution is being trialed as a means of co-developing Tyrrelstown Park - a regional park being managed by Fingal County Council.

Significant Findings:

1. Smart Future’s platform was initially developed in conjunction with French municipal authorities in 16 cities, over a three year period. In this context, the application was used largely to report environment problems (i.e. potholes, missing manhole covers and so on). To meet the requirements of this project, however, the platform needed to be re-designed – a process which involved both community and local authority stakeholders. The solution was adapted in response to feedback from numerous workshops conducted with residents groups and social organisations. The user interface, for example, shifted from a text-based design to one more reliant on graphic or visual elements. This was to accommodate to the needs of a multi-ethic area with a relatively high non-English speaking population. In addition, and to enhance accessibility for those without a mobile phone, the service has been made available via a stationary tablet located in the foyer of Fingal’s HQ in Swords. The solution has also been informed by stakeholders from Fingal’s Planning, IT and Parks departments, who advised Smart Futures on a range of design issues, including data storage and transfer, security, reporting requirements and various aspects of GDPR compliance. This process also altered the specifications of the platform. As such, the degree to which the overall aims and values of the project (collaboration, representation and accessibility) - have been coded into the planning and design process is commendable.
2. While registering on the Smart Futures platform requires only that participants provide limited data - name and email address - the volunteering of additional information is encouraged through a process of gamification and rewards. This takes the form of offering citizens virtual coins which can then be exchanged locally with participating businesses for a variety of products or services (e.g. coffees, admission to local amenities and so on). This additional information includes age, nationality, location and socio-economic status (i.e. categories which are deemed necessary to understanding the reach and performance of the solution). Collecting this level of PII (Personally Identifying Information) through gamification may be problematic however, especially given that children as young as 13 years of age can register to participate in the trial. The collection of data from children without the prior consent of parents or guardians is not consistent with best practice as set out in article 8 of the GDPR, therefore incentivizing the volunteering of such data with a vulnerable group is questionable from an ethical perspective. Furthermore, at the time the assessment was conducted, a Data Protection Impact Assessment (DPIA) was still in the process of development and so the extent to which the solution was GDPR compliant was unclear.

As a way of mitigating these risks, Fingal County Council may wish to;

* + Raise the age of participation to 16 and/or remove the gamification component of the solution;
	+ Invite participants at the time of registration to provide additional information for the purposes of research;
	+ Complete all DPIA activities and ensure compliance with GDPR prior to the collection of any data.

1. As previously noted, SBIRs are a pre-procurement approach to fostering innovation and economic activity within the small business sector through test-bedding and experimentation. A condition of pre-procurement is that products or services developed through this process cannot be adopted by public bodies unless they also meet formal tendering and procurement requirements. The implications of this for Unheard Voices are that:

* + The project is essentially limited to a Proof of Concept (PoC);
	+ Participants in the trial may be framed as external sources of innovation for the development of a product/service which will be consumed elsewhere;
	+ Despite being well intentioned, the project may have a negative impact on trust and democratic participation in the longer term.

Fingal County Council may wish to mitigate these effects by:

* + Providing all participants at the time of registration with a project description which includes its scope, aims, objectives and limitations;
	+ Exploring the potential of other development strategies which prioritize benefit to the community rather than the solution developer.

### Table 2: SWOT Analysis of Unheard Voice Project

|  |  |
| --- | --- |
| **Strengths** * Values informing the project
* Collaborative ethos
* Participatory design
 | **Weaknesses** * Use of the SBIR model as a community building strategy
* Use of gamification to encourage the volunteering of PII
* Private company likely to be the primary beneficiary.

  |
| **Opportunities**  Explore development strategies which align more effectively with the long term interests of the community.  | **Threats** * Degree of PII being collected – in particular from children.
* Data being stored outside the EU
* DPIA not completed at the time of the assessment.
 |

## Case Study No 2: 3D Docklands Planning Model

This project, which sought to produce a detailed 3D model of the docklands area of Dublin, is a collaboration between DCC (Dublin City Council) and the computer aided drafting company, D3D. The intention of the project was to explore the potential of such a model in assisting planners and developers answer questions relating to structural and infrastructural issues. The Smart Docklands website for example notes that the model will:

“not only show what proposed construction projects will look like upon completion, but it will also allow all of those involved in the planning process to see the impact of buildings on the surrounding areas and the people living within them. Once fully developed, the model will also contain the functionality to provide information on underground infrastructure, real-time information on traffic flows, data on city water levels, and even the fill level of rubbish bins.”

It has also been proposed that the solution will enhance the capacity of citizens to connect with the city and, as such, play a more active role in improving advocacy and collaborative decision making.

#### Significant Findings

1. In order to ensure a high degree of accessibility, the FBX files, which comprise the model, have been made available for download under a creative commons license at the Dublinked open data platform. This means that, while the underlying data cannot be commercialized, the development of applications or other monetizable products or services is permissible. Once downloaded, free utilities such as ‘Unreal Engine’ allow the model to be functional relatively quickly. In tandem with the release of this data, and in an effort to explore its potential value, the city conducted a 2 day geospatial hackathon, with participants invited to experiment with multiple sources of data taken from Dublinked. Participants were asked to address issues across a range of domains (e.g. construction and property tech, gaming, citizen engagement, transportation, the environment and others). A number of noteworthy ideas emerged from this process, such as using the data to assist emergency responders to locate essential services (water mains, gas pipes etc.), accurately modelling building energy usage, or assisting citizens visualize the impact of new developments in the city through augmented reality applications. At the time of the assessment DCC had not confirmed an intention to develop the model further, either as a planning tool or as a mechanism for enhancing citizen participation.
2. While the interviewees for the assessment confirmed that the project would collect no PII, there was a recognition that the model had the potential to create unwanted consequences for individuals and communities. Greater consideration of these issues during the planning phase of the project may have led to effective mitigation strategies. The following is a summary of the issues discussed.

* + The capacity of the model to be layered with additional data sets means that environmental black spots are more readily identifiable. These might include locations prone to flooding or areas which suffer disproportionately from various forms of pollution (e.g. air, water, noise and light). This could negatively impact property prices and/or the availability, or cost, of insurance premiums, creating additional hardship for vulnerable communities;
	+ The availably of detailed, high resolution images of individual properties carries additional risks to security and safety;
	+ In its current form, a relatively high degree of technical expertise is required to use the model. This may lead to the technology being adopted preferentially by institutions and businesses, with lay stakeholders marginalized. This limits the model’s capacity to support evidence based advocacy and social change.

#### **Table 3: SWOT Analysis of 3D Modelling Project**

|  |  |
| --- | --- |
| **Strengths** * Supports technical and business innovation.
* Collaborative project which leverages the expertise of private and public partnerships (Maynooth University provided consultancy to DCC throughout the procurement process).

  | **Weaknesses** * Model has the capacity to marginalize based on socioeconomic variables.
* Requires a level of expertise that may limit its use by lay stakeholders
* Adoption by DCC as a planning or engagement tool is uncertain
 |
| **Opportunities**  May be used a tool for social innovation if properly developed through meaningful engagement with community and residents groups  May be used to optimize the delivery of infrastructure and services if further developed by DCC as a planning tool.   | **Threats**  Potentially represents an additional risk to safety and security.   |

## Case Study No 3: Flooding Sensor Project

This pilot project is a collaboration between DCC, the Intel Corporation and Pervasive Nation (a component of the Connect research institute). The purpose of the project is to support technical innovation by testing the potential of a network of low cost, low powered rainfall and water level sensors to operate effectively on Pervasive Nation’s IoT

Testbed, using the LoRa flavoured LPWAN (low-power wide area network). The project was also intended to assess the solution as a viable alternative to DCC’s current, cell-based network and produce an affordable and scalable solution that delivered valuable data for those living in the city.

The project has developed over a number of phases. Phase one resulted in the placement of eight sensors at five different locations, while phase two involved deploying an additional sixteen sensors at a total of eight sites across the city. In early 2018 a further 10 river level (flooding) sensors were added.

#### Significant Findings

a) The LoRa network has evolved significantly over time and has involved a multitude of partners, technologies, and goals. While this process has been marked by a high degree of collaboration and co-operation, a consequence has been that the network’s current configuration is comprised of a diverse range of technologies operating at both the sensor and connectivity layers. Each of these in turn is owned by different independent partners who participate in the project on a purely voluntary basis. In addition, DCC has also confirmed that the project is limited to a feasibility study and, irrespective of project performance, it does not envision adopting the network in preference to its current solution. This has made project governance, long term planning and the delivery of broader social value challenging. A recent partnership with UCD’s Horizon 2020 ‘OPERANDUM’ research project, however, may represent an opportunity to appropriate the network for social rather than purely technical innovation. OPERANDUM seeks to use data being generated by the LoRa network to create tools and methods for the development of Nature Based Solutions (NBS) to hydro-meteorological risks. These solutions are inspired by nature and the project is funded to deploy a trial intervention intended to provide environmental, social and economic benefits to the chosen location. Solutions typically adopt the use of ‘green’ rather than hard infrastructure as a response to the threat of flooding e.g. using permeable soil or plant based alternatives to bricks or steel. In practice, this might involve replacing a concrete surface with a community garden, which, in addition to contributing to increased irrigation, provides citizens with an additional local amenity. The intervention will be co-designed with the community and local stakeholders will be invited to actively participate in the management of the amenity once deployed. While this collaboration with UCD is a positive development, the following issues should also be noted:

* Operandum is funded to deliver only a single intervention;
* Given the project’s pilot nature, there is little likelihood of medium to long term benefit;
* One might reasonably argue that these types of initiatives should be in receipt of stable, long term funding from statutory bodies and not be reliant on the availability of short-term research grants;
* While the project will not collect PII, the risks to communities are similar to those posed by the 3D modelling project. Identifying flooding black spots may result in property devaluation or in homeowners being unable to secure adequate home insurance. As a mitigation strategy, the project is currently developing data access policies which offer vulnerable group a degree of protection.

####  **Table 4: SWOT Analysis of Flooding Sensor Project**

|  |  |
| --- | --- |
| **Strengths** * Supports technical and business innovation.
* Collaborative project which leverages the expertise of private, public and academic partners
* No PII being collected
 | **Weaknesses** * LoRa network not stable due to nature of project
* Limited social value – DCC reliant on OPERANDUM to deliver community benefit
 |
|  Data access policies being designed to limit negative impact on vulnerable groups.   | * No possibility of adoption by DCC as an alternative to current network
* Ad-hoc governance due to heterogeneous assemblage of partners
* Integrating multiple information streams from different sensor types is challenging – a solution currently in the progress of development
* Benefit accruing primarily to private actors

  |
| **Opportunities** * May be used to mitigate flooding risks in the longer term if properly developed.
* Data may be used by communities to support evidence based advocacy.

  | **Threats**  Data may impact on vulnerable groups  |

## Case Study No 4: Skytango Drone Project

The Skytango Drone project represents a collaboration between Smart Docklands and the drone service marketplace operator, Skytango. While DCC does not have jurisdiction over air space, drone pilots must nevertheless secure the appropriate permits from DCC in order to launch or land UMAs (unmanned aircraft) on public property. On receipt of permit applications, DCC are faced with the time consuming and complex task of updating a wide variety of stakeholders of the ‘intention to launch’ which includes emergencies services, civil defence, An Gardaí Siochana, the OPW (Office of Public Works), business owners and so on. This pilot project is an attempt to understand how this process might be streamlined using Skytango’s management platform, and, more generally, how data and other outputs from the trial might improve DCC’s management of public spaces in light of increased drone usage.

For the duration of the trial, 10 to 15 drone pilots will use the Skytango management platform for all of their operational activities within the city. The company’s website proposes that the project will offer the following:

* Streamlined hazard assessment generation process and conversion into a permit application to DCC via email;
* The ability for a pilot to review assessments on-site and respond to city compliance requests within Skytango’s mobile app;
* Real-time notification of launch to interested stakeholders (via the App);
* DCC’s permits office can review pilot checklists, notes and hazard assessments through their portal and begin to better understand the complexity and challenges of drone operations. This in turn, may assist the city in planning for the future.

#### Significant Findings

1. To support the project, a multi-stakeholder steering group was created at the outset to identify key challenges and generate public confidence in the industry by encouraging compliance with best practice. These representatives included drone training schools, construction companies (which increasingly use drone technology), civil defence, the media, Smart Docklands, DCC and various drone service providers. To-date, however, no community groups or political representatives have been included in this process and so Skytango’s management platform, and associated permit application processes, are being developed in the absence of public participation. Furthermore, the group does not include representatives from the Irish Aviation Authority (IAA) or the Dublin Airport Authority (DAA). These bodies have responsibility for the regulation of drone activity in the air and, therefore, would be required in order to develop an integrated, permit application solution. Without the involvement of the appropriate statutory bodies, and given that the project is limited to a feasibility study, it is unlikely that this platform will be adopted by the city as part of any compliance process in the future. This being the case, the value proposition for communities and citizens in Dublin seems quite limited. A more productive approach for the city may be to engage with Maynooth University’s U-Flyte research project. It is funded by Science Foundation Ireland (SFI) and is currently working with state, commercial and community partners to develop the industry in ways that respond to both legal and ethical imperatives. As such, it may represent a more sustainable way for DCC to meet its objectives and develop an understanding of its role in the drone landscape as part of a scalable, integrated solution.
2. At the time of the assessment no consideration had been given to the nature of the data that might be collected as part of the research. Drones can be enabled with a variety of imaging technologies which have the capacity to identify people, behaviour, body characteristics, locations, and events, etc. Even when this information is collected inadvertently, it may still have legal and ethical implications which need to be considered at the outset. DCC’s DPIA has been limited to a consideration of the checklist data required by their permitting process. As such, the city has not taken a proactive role in identifying and mitigating the broader risks the project might pose to privacy, security and safety. The failure to carry out due diligence in this instance may be seen as inconsistent with the DCC’s stated desire of encouraging best practice.

#### **Figure 5: SWOT Analysis of Skytango Drone Project**

|  |  |
| --- | --- |
| **Strengths** * Assisting the city understand the drone eco-system
* Helps in building a co-operative network of stakeholders
 | **Weaknesses** * Not being developed for long term adoption by the city
* No engagement with citizens or political representatives
 |
|  May help socialize best practice within the industry   | * No participation with relevant regulatory bodies
* Benefit likely to accrue largely to

Skytango  |
| **Opportunities** * Has the potential to be a useful compliance tool if developed properly
* Collaboration with more established projects of a similar nature may offer greater longer term benefits

  | **Threats**  Limited DPIA conducted and no mitigation strategies in place at the time of the assessment for dealing with potentially sensitive data.     |

## Case Study No 5: EV Charging Project

This project is intended to facilitate Dublin’s four local authorities explore the challenges and opportunities associated with the provision of electric vehicle (EV) charging infrastructure. It is the intention of the local authorities to implement a network of charging stations in residential areas which compliments services currently being supplied by the ESB (Electricity Supply Board) and by private operators. The ESB is operating a chain of ‘fast charging’ stations located primarily on the country’s motorway routes while private operators such as ‘Easy Go’ have targeted business locations such as supermarket and hotel chains. The local authorities feel that a value proposition may exist in entering the residential market and, with this in mind, are preparing a feasibility study which will involve deploying charging points at 67 locations distributed across the city. Smart Dublin is currently assembling a broad spectrum of subject matter experts to provide the project with technical, commercial and legal guidance.

#### Significant Findings

Given that the project is still at the initiation phase, Maynooth’s role was largely advisory. The project was assessed from a number of ethical perspectives and direction was offered where appropriate. The following is a summary of the issues discussed.

1. As with the drone project, no community or political stakeholders have, as yet, been invited to participate in the planning and development of the solution. Unlike the drone project, however, it is likely that the technology produced in this instance will be implemented by the city as a service offering. As such, there is an additional onus of responsibility to give communities a meaningful opportunity to raise value concerns and participate in design activities. Enrolling the Public Participation Networks (PPNs) may be a useful way of initiating this process. In the absence of adequate participation, and given the inevitable pressure for the trial to achieve positive results, the distribution of infrastructure may become biased by the perceived link between electric-vehicles and middle class consumption.
2. The project may also represent an opportune time for the city to experiment with use of digital channels as a way of augmenting traditional modes of engagement such as workshops, town hall meetings, newsletters, etc. Social media, for instance, has the capacity to support open and interactive communication while GIS and other geospatial tools could be used by city planners as a means of bringing proposals to the public and, in the process, stimulating debate and feedback.
3. An important consideration for the project will be the choice of business models used to generate revenue and the impact these may have on pricing and service availability. It was suggested by interviewees, for example, that free-to-use charging points may be provided adjacent to shopping areas in an effort to stimulate retail activity. This would effectively implement a form of social sorting and lead to differential levels of access to the service. The project is also currently exploring the possibility of implementing variable or personalized pricing. In addition to price discrimination, this would significantly increase the collection of PII and expose service users to additional privacy and security risks.
4. For the purpose of comparison, the project is considering trialing different technical solutions across the four local authorities. Smart Dublin should work with the local authorities to ensure that, on completion of the study, a single architecture is adopted across all jurisdictions to ensure standardization, predictability and ease of use.
5. Given that the majority of charging points will be located on-street, utilizing the city’s network of public lampposts, the project should ensure that the appropriate assessments are conducted in order to understand and minimize the risk posed to both human and environmental health.

####  **Table 6: SWOT Analysis of EV Charging Project**

|  |  |
| --- | --- |
| **Strengths** * Makes an important contribution to environmental sustainability
* Supports Department of Transport policy initiatives regarding hybrid vehicles

  | **Weaknesses**  No public or political representation at the time of the assessment   |
| **Opportunities** * The potential to play a role in more systemic behavioural change
* May act as a catalyst for future collaborations between the four local authorities
* Represents a useful opportunity for DCC to utilize the PPN and other social-civic networks.
 | **Threats** * Pricing models may lead to differential access, price discrimination and the collection of

PII * Will need to work with the ESB to ensure a viable solution can be delivered via the public lamppost network.
 |
|  |    | Developing consensus around a standardized solution which incorporates the principles of universal design may be challenging.  |

## Case Study No 6: Wi-Fi4EU

WiFi4EU is an initiative of the European Union which promotes free access to Wi-Fi connectivity for citizens in public spaces such as parks, squares, public buildings, libraries, health centres, museums and community and Council facilities The initiative provides municipalities with the opportunity to apply for ‘vouchers’ to the value EUR 15, 000 which are then used to install equipment in locations within the municipality that are not already equipped with free Wi-Fi hotspots. In 2018, DCC was awarded four vouchers (EUR 60,000) which has been matched by the Department of Rural and Community Development, leaving a capital budget of EUR 120, 000. It is the council’s intention to roll out the network of hotspots away from the city centre which it feels is adequately served at present by private operators and business interests. As with the previous project, Wi-Fi4EU is still in the earliest stage of development and Smart Dublin is currently conducting a public consultation process to identify where this infrastructure might be usefully located. Once this phase has been completed, DCC will be inviting funding applications from interested parties within these areas.

#### Significant Findings

1. A notable feature of this initiative is the extent to which DCC’s engagement team and social inclusion unit have socialized the project. ‘Citizen Space’, a consultation platform for democratic participation, is being used in conjunction with Twitter, Facebook and Instagram to stimulate interest and dialogue, while project information packs are also being disseminated through libraries, community centres, sports facilities and so on.

The engagement lead for DCC is also planning face-to-face consultations with political representatives, residents associations and community groups. Equity is also embedded in the criteria to be used in assessing funding applications. In addition to connectivity black-spots, priority will be given to:

* + Areas of significant socio-economic disadvantage;
	+ Applications linked to educational environments – schools, community centres, libraries, etc.;
	+ Areas with a particularly young population.

Should it be necessary, DCC will also endeavor to extend the broadband network to provide connectivity for successful applications. As such, the project is incorporating a strong ethos of collaborative decision-making and shared governance.

1. The process of procuring a solution will require diligence on the part of DCC to ensure the technology meets best practice security and privacy standards. While the service is not expected to collect PII, public Wi-Fi can still pose significant risks to users through poor encryption, MAC address collection, ‘eaves dropping’, malicious hotspots, malware distribution, and so on. As a way of mitigating these risks DCC may consider including its IT department and/or the services of external technical expertise in the evaluation process. A robust DPIA should complement this process to identify any possible risks the technology may pose to data protection.

####  **Table 7: SWOT Analysis of Wi-Fi4EU Project**

|  |  |
| --- | --- |
| **Strengths** * Explicitly intended to address social disadvantage
* Collaborative in nature with the public part of the decision making process
* No PII to be collected
 | **Weaknesses**  Relatively small capital budget limits the scope of the service.   |
| **Opportunities** * Linked to educational initiatives and a reduction of the digital divide
* Improves citizen access to online government services.
 | **Threats** * Robust project management required to avoid sub-optimal solution
* May be vulnerable to privacy and security issues without the participation of the appropriate technical resources.

  |

## Case Study No 7: Bigbelly Bins

This project is a two year feasibility study being undertaken by Smart Docklands in order to explore the potential of Bigbelly smart bins delivering service and environmental benefits for the city and the project was designed to investigate the following three categories:

**Service optimization:** To what extent can a smart bin solution drive efficiencies in the management of waste collection? The local authority anticipates that the technology could reduce the total number of bins by up to 20 per cent.

**Developing an advertising-based revenue stream:** Can a revenue-share business model be developed to finance or part-finance the solution? In particular, can the bins be used as advertising street furniture to offset the cost of the technology?

**Smart City functionality:** What might the value be of fitting the bins with additional connectivity (Wi-Fi hotspots or 5G cells for example) and aligning the network with the broader smart docklands project i.e. incorporating the bins as part of the developing IoT ecosystem? Also, with the appropriate technical upgrades, could smart bins be used to support the following?

* Tourism Information / Wayfinding, with solutions linked to Bluetooth beacons for example;
* Footfall counting and measuring of flows of people across the district;
* Measuring the advertising revenue potential of the bins (linking footfall analytics to the amount of potential advertising income).

The project launched in January 2019 and is scheduled to run until the end 2020. There are currently 110 Bigbelly bins distributed throughout the docklands areas.

#### Significant Findings

a) The primary ethical issue identified with this project relates to the footfall counting and people tracking activities noted above. It was proposed that these activities would be supported through the collection of mobile phone MAC addresses and, in the early phase of the project, DCC were actively engaging with the market to procure the sensing technologies needed to provide this additional functionality. However, MAC addresses, when used in conjunction with other data sets, have the potential to uniquely identify individuals and so their collection is problematic from a GDPR perspective. Article 6 (1) of the regulation outlines the following circumstances under which the collection of PII is permissible:

1. The person concerned consents to the processing for specific purposes.
2. The processing is necessary for the performance of a contract with the data subject.
3. The processing is necessary for the fulfilment of a legal obligation incumbent on the Controller.
4. The processing is necessary to protect the vital interests of the data subject in lifethreatening situations.
5. The processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority.
6. The processing is necessary for the legitimate interest of the organisation or of the third party to whom the data are disclosed.

Conditions 2 – 6 do not apply in this context and so the prior consent of data subjects would be required. The regulation also stipulates that such consent would only be valid if subjects gave it freely, without ambiguity and on the basis of specific information being provided. As most of the subjects would be random (pedestrians or shoppers etc.), meaningful consent would be extremely difficult, if not impossible, to secure. Once Smart Docklands became aware of these issues through consultations with Maynooth University, Castlebridge (GDPR compliance consultants) and others, the decision was taken to suspend all activities associated with category 3. The project is now primarily concerned with service efficiencies and revenue generation.

####  **Table 1: SWOT Analysis of Bigbelly Bins**

|  |  |
| --- | --- |
| **Strengths** * A willingness to respond positively to the ethical and legal implications of people tracking.
* Positive contribution to environmental sustainability through reduction of carbon footprint.
* Service efficiency improvements reduces costs of waste collection for the city.

  | **Weaknesses**  Process innovation and change management will be required to ensure adoption into business-asusual occurs seamlessly. At the time of the assessment, the longer term consequences of the technology for operations and workforce organisation had not yet been considered.   |
| **Opportunities**  Using the infrastructure to host Wi-Fi hotspots and/or 5G cells may be a useful and cost-effective use of the technology.  | **Threats** * A resumption of people tracking activities by DCC may lead to reputational damage and/or legal action.
* Failure to develop broader internal support may jeopardize the project.

  |

## Case Study No 8: Dense Air 5G Network

This project is a collaboration of DCC, the 5G service provider Dense Air and the Connect research centre at Trinity College. The project is designed to trial Dense Air’s neutral-host, small-cell 5G network in the docklands area of Dublin. As mobile data consumption increases, Mobile Network Operators (MNOs) are faced with the prospect of increasing the densification of their infrastructure in preparation for the transition to 5G standards. A neutral-host approach, which operates by providing multiple operators with 5G connectivity via a network of small cells, reduces the need for this densification and creates considerable cost savings for the industry in the process. Furthermore, the EU has mandated that local authorities must now provide telecommunications companies with fair and equitable access to city assets for the purpose of hosting 5G hardware. Given this obligation, the neutral-host model may prove far less impactful on city infrastructure. A single neutral-host cell on a public lamppost, for example, would make a cluster of cells from a variety of other service providers unnecessary. In addition to the environmental and aesthetic benefits, this would also require the city to negotiate and manage significantly fewer Service Levels Agreements (SLAs). The purpose of the trial then is (a), to understand the viability of the neutral-host model and (b), to explore the technical, operational, legal and regulatory issues for DCC in becoming a stakeholder in the telecommunications landscape.

#### Significant Findings

1. Due to the diverse nature of the public assets being utilized (public buildings, street lighting, traffic signals and so on) hosting the 5G infrastructure will require historically siloed departments within DCC to work together in co-operative ways. Similar relationships will need to be developed with external stakeholders such as the ESB who retain ownership of much of the lighting network and who also have the responsibility for meeting 5G’s energy consumption requirements. As such, protocols relating to billing, access to assets, and the management of Service Level Agreements, warranties and insurance etc. will need to be developed and agreed upon. While these issues may be complex and time consuming, the process of working through them may produce more agile and effective forms of governance.
2. The participation of DCC as equipment hosts may offer the city the opportunity to develop significant revenue through leasing agreements with service providers. Smart Docklands reports that it will advocate that any such revenue be re-invested to provide high speed connectivity to communications black spots. US cities such as San Jose, Long Beach and Los Angeles have taken this approach i.e. they have guaranteed a portion of their 5G revenue for outreach programmes. If possible, Smart Docklands is also committed to leveraging its position to ensure an equitable distribution of 5G cells as the project develops and scales across the city.
3. From a heath perspective, the network under trial is not using millimeter wave technology i.e. the part of the electromagnetic spectrum which has historically been the most controversial. Instead, Dense Air’s cells operate at 3.5 GHz which is situated at the lower end of the spectrum and comparable to Wi-Fi. This does not necessarily mean that the technology is without risk to human health and DCC should continue to collaborate with Comreg, the EPA and industry experts to ensure the project meets best practice standards from a health and safety perspective.
4. The project is not collecting personal data. The network is currently limited to carrying test traffic only and is being used exclusively by Dense Air’s staff. However, should this change, then a robust DPIA would be required.

#### **Table 8: SWOT Analysis of Dense Air Project**

|  |  |
| --- | --- |
| **Strengths** * Proactive governance on the part of DCC to improve its ability to participate in the 5G ecosystem
* May represent a useful solution for DCC’s own IoT network.

  | **Weaknesses**  A lack of co-operation amongst stakeholders is causing significant delays. It has taken 18 months to deploy the trial’s 20 cells.   |
| **Opportunities** * May produce more performant and responsive urban governance.
* Revenue from the implementation of 5G may be used to address digital divide – will require the support of the national government.
* DCC may be able to shape the distribution and density of cells.

  | **Threats** * The health implications of small cell technology are unclear.
* The longer term implications of increased speed, connectivity and data generation have yet to be considered.
* An unwillingness by the MNOs to engage with the neutral-host model would lead to multiple proprietary networks and major disruption to public infrastructure.

  |

# Programme Level Findings and Recommendations

## Citizen Engagement

While citizen engagement remains somewhat ad-hoc when viewed from a programme perspective, there is evidence of more coordinated and embedded approaches to participation within individual local authorities. Fingal, for example, has shown a strong ethos of collaborative planning. This is evident in their choice of SBIRs (the Unheard Voices project is an example) and in their recently developed digital strategy which has been informed primarily by community workshops conducted in cooperation with Smart Dublin. The result of the latter has been a set of policy initiatives which closely aligns both internal transformation and external project delivery with local needs. To ensure transparency and accountability, Fingal will support this with an ongoing dialogue so that citizens can receive feedback, express value concerns and influence decision making. With the appropriate resources, the other local authorities and Smart Docklands should be able to use similar methodologies to develop their respective digital strategies and programmes. Stakeholders within Dun Laoghaire-Rathdown and DCC have already expressed interest in initiating this process with Smart Dublin so an awareness of the importance of participation, and its relationship with broader ethical principles (equality, inclusion, access, value sensitive design, etc.) does exist across the programme. The following recommendations are intended to capitalize on this and produce more accountable and responsive governance.

* Delivery of effective engagement should be prioritized at all organisational levels i.e. strategic, tactical and operational. For example, engagement, and ethics more generally, should be articulated in corporate level planning but also embedded in project and programme reviews, procurement processes, participatory budgeting and so on ;
* To avoid it becoming a purely rhetorical exercise, engagement should be properly resourced i.e. with time, money, staff, training, etc.;
* All projects across the programme should be selected to meet specific social needs and be linked to requirements gathering conducted with communities i.e. programme development should embody the concept of technological sovereignty;
* Staff should be supported to experiment with various methodologies in order to develop democracy toolkits that are appropriate to a variety of contexts and circumstances;
* Smart Dublin should be leveraged to coordinate the implementation of new practices and processes across the programme and effect systemic change;
* Greater use of Public Participation Networks may lead to more effective collaboration with communities. Smart Dublin notes that they have been largely underused since their introduction in 2014.

## GDPR Compliance

Though the responsibility for GDPR compliance rests with the law departments of the relevant local authorities, Smart Dublin staff typically conduct the initial review of projects, identify those with potential data privacy related issues and then collaborate with local authority staff and other stakeholders to design and implement assessment protocols. Smart Dublin staff have noted, however, that they do not necessarily retain visibility of the compliance process after these tasks have completed. For example, they may not know the identity of the acting local authority Data Protection Officer (the person responsible for process sign-off) or if a project requires reassessment due to changes in technical specifications. This absence of clarity compromises Smart Dublin’s capacity to provide effective support and may expose projects to unnecessary additional risk.

Furthermore, given the innovative and complex nature of many of the technologies being trialed through the programme, understanding the threats posed to security and privacy on a project by project basis can be challenging. While Smart Dublin staff have developed considerable experience and expertise in the area of security leadership since the introduction of DPIAs in early 2019, the pace of technical change means that, on occasion, additional resources may be necessary.

With these issues in mind, the following are recommended:

* Create process standardization across the four local authorities or make existing processes more transparent and accessible;
* Formalize Smart Dublin’s role as active participants through all phases of the compliance process;
* Provide additional training and capacity building for Smart Dublin staff;
* A systematic and rigorous audit of companies to ensure compliance with agreements. Current resources does not support either due diligence prior to project initiation or spot checks during the project lifecycle;
* Ensure Smart Dublin has access to the services of external GDPR consultants as required. Access is currently available but on an ad-hoc basis.
* Incorporate internal IT resources as part of the evaluation process for all projects.

## Skills Retention

Much of the social innovation noted across the programme has resulted from the vocational efforts of a small number of core staff operating in, or in collaboration with, Smart Dublin. For the most part, this innovation is developmental and tentative in nature and has yet to be embedded in business-as-usual. An ethics assessment protocol, for example, has been recently developed by Smart Dublin’s regional coordinator and is currently being used on a trial basis to evaluate new projects from a range of perspectives including governance, social inclusion, universal design and so on. This initiative, and the others noted, position Smart Dublin as an incubator of new ideas, values and practices with the potential to positively change the culture of urban governance. Realizing this potential, however, is likely to be a complex and long term process as new ways of operating are iteratively developed and refined. However, many of the staff with responsibility for these initiatives are retained on short-term (2 year) contracts. This puts these initiatives at risk and jeopardizes Smart Dublin’s capacity to act as an agent of sustainable transformation. In order to address this, the following should be considered:

* Giving the organisation a legal or statutory status would formalize its role and allow it secure sufficient investment from central government to offer its staff, and the programmes they manage, greater stability;
* In the event that this is not feasible, work with the current the funders to provide Smart Dublin with financial security in the medium to longer term.

### Table 10: SWOT Analysis of Smart Dublin Programme

|  |  |
| --- | --- |
| **Strengths** * Staff with a commitment to relationship building and social enterprise
* Strong ethos of Data ethics and GDPR compliance
* Numerous citizen-centric initiatives currently underway.

   | **Weaknesses** * Uncoordinated and underdeveloped citizen engagement practices across the programme is delivering differential outcomes for citizens.
* Smart Dublin is not a legal entity and does not have executive decision making rights.
* Smart Dublin is isolated from the technical activity occurring outside the programme.

  |
| **Opportunities** * Smart Dublin, if properly supported, can facilitate the alignment of ethical practices across the programme.
* Important lessons around planning and participation can be learned from Fingal. DCC has also been creative in its use of engagement methodologies.

  | **Threats** * A lack of compliance process standardization across the 4 local authorities exposes projects to additional risk.
* Short term employment contracts increases the likelihood of disruption to organisational transformation.

  |

# Conclusion

This assessment was undertaken to determine the degree to which ethical thinking and practice are embedded within Smart Dublin. The findings are broadly positively. Recent appointments to the organisation have shifted the culture from compliance and risk aversion to one more concerned with justice, equity and the public good and a number promising initiatives are underway. However, with limited resources, the task of effecting substantive change across four administratively (and culturally) distinct local authorities is extremely challenging. Leadership will be required to prioritize ethics and ensure that the bottom-up advocacy being shown by Smart Dublin is met with the appropriate resources supports. In the absence of this, any change is likely to be partial, ad-hoc and short lived.

# Recommended Reading Resources

Cardullo, P, Kitchin, P. (2017). Being a ‘citizen’ in the smart city: Up and down the scaffold of smart citizen participation. Programmable City Working Paper 30

Coletta, C, Heaphy, L, Kitchin, R (2017). From accidental to articulated smart city: The creation and work of ‘Smart Dublin’. Programmable City Working Paper 28

Kitchin, R (2016). The Promise and Peril of Smart Cities. https://www.scl.org/articles/3385the-promise-and-perils-of-smart-cities -

Wright, D (2011) [A framework for the ethical impact assessment of information technology.](https://philpapers.org/go.pl?id=WRIAFF&proxyId=&u=http%3A%2F%2Fdx.doi.org%2F10.1007%2Fs10676-010-9242-6) https://philpapers.org/rec/WRIAFF

# Appendices

**Ethics Assessment Principles and Associated Questions**

**1. Context:**

* Can you tell me about the project?
* How was it initiated?
* What problem is it seeking to address and how does the project aim to achieve this?
* What is the relationship between you and the state agency involved? i.e. Public Private Partnership, private, Service Level Agreement, etc.

### 2. Planning and Design - Engagement

* Did you engage in a process of user requirements?
* If so, can you elaborate on the process?
* Who was included in the user group – does it include a representative sample of the communities that will use the solution?

### 3. Value Sensitive Design

* What values informed the design process?
* In what way does the design promote these values?

**4. Governance - Accountability and Transparency:**

* Does the project have a governance structure and if so, what is it?
* How many and what kinds of opportunities do stakeholders and citizens have to bring up value concerns?

### 5. Accessibility and Social Inclusion

* Did you conduct an assessment as to whether the project would impact on the inclusion or exclusion of any groups? (digital, economic or social inequalities) If so, can you describe the process? If not, why?

* 1. **Nonmaleficence (Avoidance of harm):**
* Did you assess the project from the perspective of physical or psychological harm?
* If yes can you describe the process?
* Was the project subjected to an environmental impact assessment?
* If yes, can you elaborate? If no, can you explain why?

* 1. **Discrimination and Social Sorting:**
* Does the project or service use profiling technologies?
* If yes, what profiling is done and has the impact of such profiling been assessed?
* Does the technology nudge behavioral change? (Does this accord with user requirements?)
* If yes, what are the associated penalties or rewards?

* 1. **Privacy and Data Protection:**
* Did you consider privacy and data protection issues in the development of this project?
* If so, in what ways and how have you implemented them?
* Will personal data be collected? If so, will it be with the knowledge and consent of the data subject?
* Who owns any data collected?
* Has the project been assessed from the perspective of GDPR? Is it compliant?

* 1. **Sustainability:**
* What are your plans to make the project economically or socially sustainable?