FUTURE CITY • GLASGOW

INTELLIGENT STREET LIGHTING

END STAGE REPORT

Future City Glasgow

Intelligent Street Lighting Demonstrator

Build Phase

Published Date: July 2015

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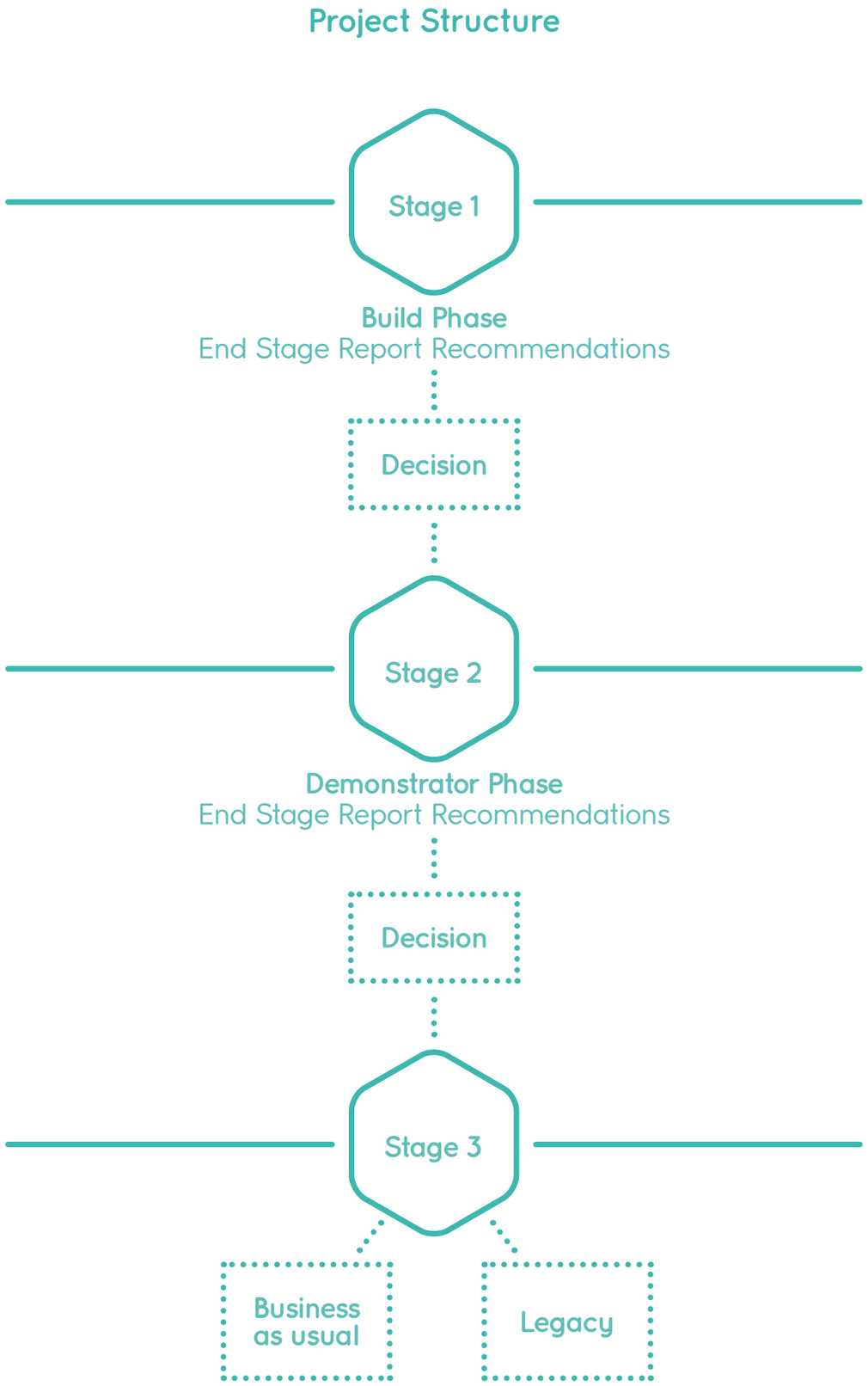
Introduction

This document provides an overview of the project reporting structure within the Future City Glasgow programme, summarising progress to date on the build phase of the Intelligent Street Lighting (ISL) project.

The recommendations contained within this document will provide the basis for formal approval of the Intelligent Street Lighting project proceeding to stage 2 demonstration phase.



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Overview of Stage 1: Build Phase

A safer, cheaper and more efficient lighting network for Glasgow. Street lighting can become part of the wider network of intelligent assets collecting data and improving diagnostic capabilities.

2.1 Objectives

The objectives of the Intelligent Street Lighting project are to:-

- Improve lighting quality in the city – the ability to optimise street lighting according to ambient lighting, and the use of intelligent lighting to expand lighting to areas of the city that are not currently lit to encourage more Active Travel.
- Improve public safety in the city – the ability to adjust lighting in response to pre-defined events such as public safety incidents.
- Improve efficiency of lighting maintenance – the use of alerts from lighting equipment to improve the efficiency and effectiveness of lighting maintenance resources.
- Improve energy efficiency - the use of energy-efficient lighting to reduce costs and carbon emissions and to leverage this through variable lighting to deliver further energy reductions.
- Improve data collection – the ability to gather data about the city (e.g. footfall, noise and air quality) and to integrate this data within a wider systemic city model.

2.2 Scope

The primary purpose of the project is to develop a "Smart Lighting Network" and demonstrate the benefits. The build phase included:

- Initial research investigating what technological innovations are available and comparison of systems used in other 'SmartCities' around the world.
- Development of a bespoke 'open standards' Intelligent Lighting Network for Glasgow.
- Identification of suitable test bed sites to enable evaluation of different aspects of the Intelligent Lighting solution.
- Exploring the possibility of "retro fitting" an Intelligent Lighting System into an existing Lighting Network as one of the potential routes to wider roll out.
- Collaborative working with the City Data team to ensure bilateral integration of data to the City Data Hub allowing the network to inform and be informed by Big Data.
- Develop a Central Maintenance System that is vendor agnostic (not tied to the products of a specific manufacturer).

2.3 Resource

Project Manager	1 FTE
Technical Lead	1 FTE
Design Lead	1 FTE
Design Architect	1 FTE

2.4 Deliverables

The Intelligent Street Lighting project has achieved the following deliverables:

- Secured delivery and installation of three dynamic and sustainable street lighting installations (City Centre, Clyde Walkway & Merchant City).
- Successful installation and integration of an 'open standard' lighting central maintenance system (CMS). Employing an internal system that communicates with the Glasgow Operations Centre, supporting installation of sensors on the street lighting network to collect and deliver information to the City Data Hub.
- Production of network lighting data, visible in both a raw format, in the data observatory, and in a pre-scripted format, on the City dashboard.
- Developed a CMS that can send real time fault alerts for predictive maintenance.

2.5 Constraints

Design
The Scottish Government mandates that Government IT has to be open to people and organisations that use the services. Government bodies therefore must comply with Open Standards for software interoperability, data and document formats in Government IT specifications.

As such, the Intelligent Street Lighting CMS, had to comply with open standards. This meant that the available systems on the market were not suitable and a "Glasgow Solution" had to be found which, in turn, restricted the systems available to use.

Site
As two of the three project sites were situated in the city centre, work was constrained by the need to minimise disruption. This introduced delays in deployment.

Unplanned changes
In order to produce an end-to-end solution the project included "Design and Build". Due to unforeseen design changes, procurement of supplies was disrupted resulting in delays in completing the installation. i.e cable requirements, size of sensors.

Time
The project had to comply with council tender guidelines for procuring a supplier. The tight timelines of the project restricted the number of proposals submitted.

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Current Position

"A substantial energy saving and carbon emission reduction opportunity.

3.1 Benefits achieved to date

The build phase of the project has provided an opportunity to create a scalable smart lighting network specific to the needs of Glasgow. The focus of the project was not only on the infrastructure to create the lighting network but harnessing the benefits of the infrastructure.

Street Lights have a constant mains supply which opened up the opportunities available to the infrastructure. In order to exploit the benefits, a number of sensors were attached to the lighting networks including air pollution, footfall and noise sensors. The sensors provide an additional source of data to help understand the city and inform investment decisions.

The LED light engine does not only provide a focused light but feeds into a more controllable, efficient lighting system. The CMS provides the opportunity to centrally control the lighting system and achieve additional energy savings. There is an approximate lighting saving of 60% on the sodium lamps.

3.2 Residual benefits expected

Early indicators in build phase have shown a substantial energy saving and carbon emission reduction opportunity. The Demonstrator phase will be used to help measure and validate the additional reductions in costs and carbon that would be realisable through a further widespread roll out of an Intelligent Lighting Network. This will enable the generation of a business case, expanding the concept across the city, and demonstrating the value to other municipalities.

In addition to the energy savings, the self-diagnostic, auto-notifying capability of intelligent lighting delivers maintenance savings. Maintenance can be proactive reducing outage times and allowing the system to order required parts therefore securing lower costs. Pre visit remote diagnostics enable single visit fixes reducing multiple attendances. Self-diagnostics also enable accurate lamp lifetime calculation facilitating controlled budgeting based on a planned cycle of lamp replacements.

In the city centre locations, the Demonstrator will provide evidence on the ability to manually or automatically manage crowds or deter anti-social behaviour through changed lighting levels in response to local events.

The lighting infrastructure has a constant mains supply and could host more sensors or have further uses. The demonstration phase will provide the opportunity for further investigation into exploiting the infrastructure which could include the provision of publicly available WiFi for citizens and businesses, improving digital connectivity.

The Clyde walkway location provides a test bed for the assessment of the impact on perceptions of public safety by walkers and cyclists and the contributory benefits to active travel that such lighting networks can deliver.

3.3 Issues

Environment
Existing road and street conditions, including broken and incomplete ducting caused delays in deployment. In some case alternative approaches and methods were required.

Engagement and planning
A fragmented supplier partnership (Street Lighting/Communications) resulted in communication and programming problems. These were compounded with challenges around stakeholder engagement and by the fact that the initial programme planning and milestones were based on conventional street lighting installations and did not reflect the test bed nature of this project.

3.4 Lessons Learned

There were a number of lessons learned from the Intelligent Street Lighting project as follows:

- Full and extensive surveys of areas considered for ISL deployment are a sensible investment of time and resources.
- Recognising that procurement timelines can be longer than projected and extending response times during the procurement process.
- Early and continual stakeholder and partner engagement is critical. Communications / meetings should involve all partners supplying the ISL solution to ensure delays are kept to a minimum and issues are flagged early. There needs to be recognition that for new and innovative ICT solutions, existing models of programme planning and milestones lack the required agility and responsiveness.

4/
Recommendations

"Evaluate and quantify the benefits relating to energy efficiency, public safety and data collection so that they can be incorporated within a business case

Recommendations

The Demonstrator phase will be used to help evaluate and quantify the benefits relating to energy efficiency, public safety and data collection so that they can be incorporated within a business case. This will assess the benefits of sustaining the solution moving forward, expanding the concept across the city, and demonstrating the value to other municipalities.

In particular, the Demonstrator phase has a specific workstream that is investigating:-

Legacy
The development of a business case for sustaining and expanding the Demonstrators across the city to maximise the legacy benefits for Glasgow, and the investigation of innovative new business models.

Innovation
The opportunity for further innovation building upon the Demonstrators developed during the Intelligent Street Lighting project.

Internationalisation
Identifying opportunities to take the learning from Glasgow to help other cities around the world embrace the Future Cities market, and (where applicable) provide new opportunities for UK business.

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