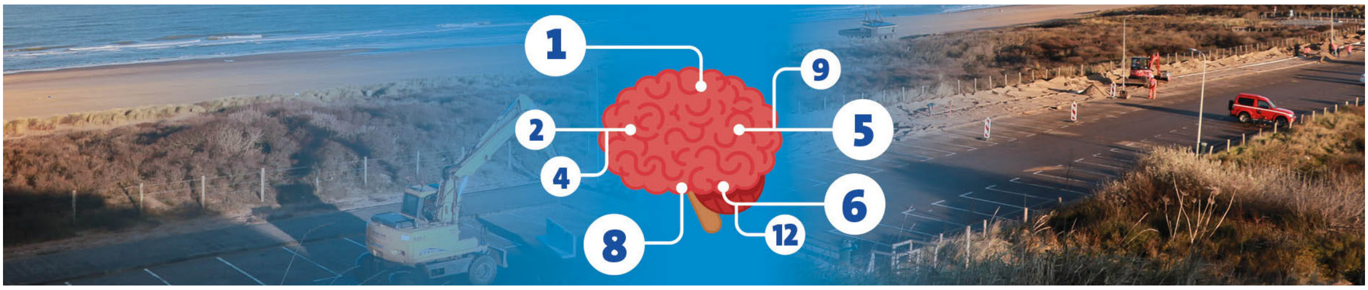


# Living Lab Scheveningen

## System Specification

LLS System Specification V05.docx
25-06-20
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V05 Draft

# Contents

# 1. Management summary

The Living Lab Scheveningen (LLS) System Specification describes the digital Smart City Infrastructure needed for Smart The Hague and, in particular, for the Living Lab Scheveningen. In line with its Smart City goal, the municipality of The Hague is looking to use technological innovations to address the societal issues that are now helping, and will continue to help, create an attractive environment for residents, companies and visitors to the city.
Adopting an architectural design approach, the LLS System Specification describes the digital Smart City Infrastructure (SCI) in relation to three selected areas: society; the economy; and the environment. The relationship with the surroundings and the applications make the link to Society. On top of this, the wishes of stakeholders and urban developments[1] have had a significant input in the architectural design. The SCI is a complex whole of users, applications, processes, software and hardware. To ensure that these elements are scalable and accessible in the design, a reference architecture was created. This layered model meets the Nederlandse Overheid Referentie Architectuur (NORA, Dutch Government Reference Architecture) criteria and is represented in Figure 1.1 below.

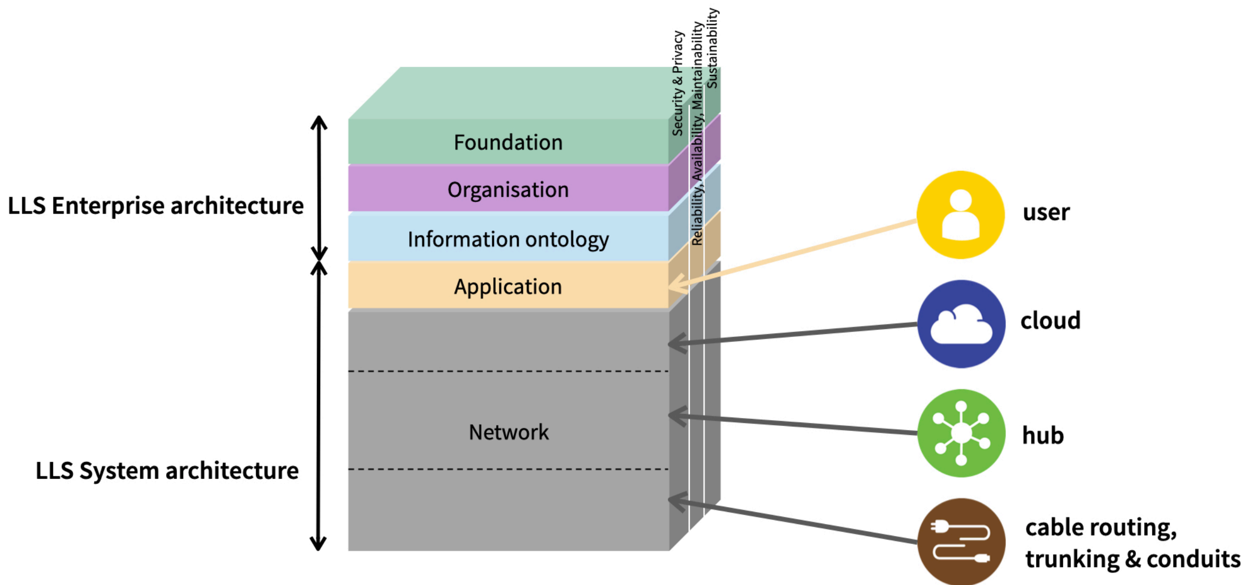


Figure 1.1: LLS reference architecture

The reference architecture consists of two parts:
1. The LLS Enterprise Architecture which gives guidance;
2. The LLS System Architecture which revolves around the physical systems for realisation and operation.

The layers in the LLS System Architecture are decoupled in such a way as to allow an open and scalable digital infrastructure to emerge. The layers contain the parts and elements of the SCI. At the heart of this model are the smart Hubs that can communicate with each other and communicate through the cloud. A second cross-section of the model forms the component system (privacy, security, availability …).

Component systems describe the traits of the layers that are mutually connected. All the layers, for example, contribute to the total availability of the system.
The reference architecture is described in a set of leading design rules and a set of concept selections. A 'concept selection' is a collective name for reflection, choices, options, scenarios and analyses that are taken to convert project goals into solutions.
System requirements are derived from customer requirements and concept selections, and are incorporated in a Specification. The Specification can be used either to check suppliers' solutions or as input for tender files.

1. See specification of customer requirements and area projections.

# 2. Introduction

The Living Lab Scheveningen (LLS) System Specification describes the digital Smart City Infrastructure requirements for Smart The Hague and, in particular, for the LLS. In forging the Smart City, the municipality of The Hague will use technological innovations to address societal issues that now, and in the future will, contribute to creating an attractive location for residents, companies and visitors to the city of The Hague. Smart The Hague is a comprehensive programme that incorporates the elements of Society, the Economy, the Environment, and Technology (see Figure 2.1 below) to turn The Hague into a smart city.

The LLS System Specification's primary focus may be on technology, but the focus is explicitly connected to the other three areas. The use cases make the link with Society. Other important inputs are the stakeholders' requirements and urban development. The Environment is also clearly seen in the use cases and is a precondition for the architectural system design. The System Specification itself is the input for the cost model.

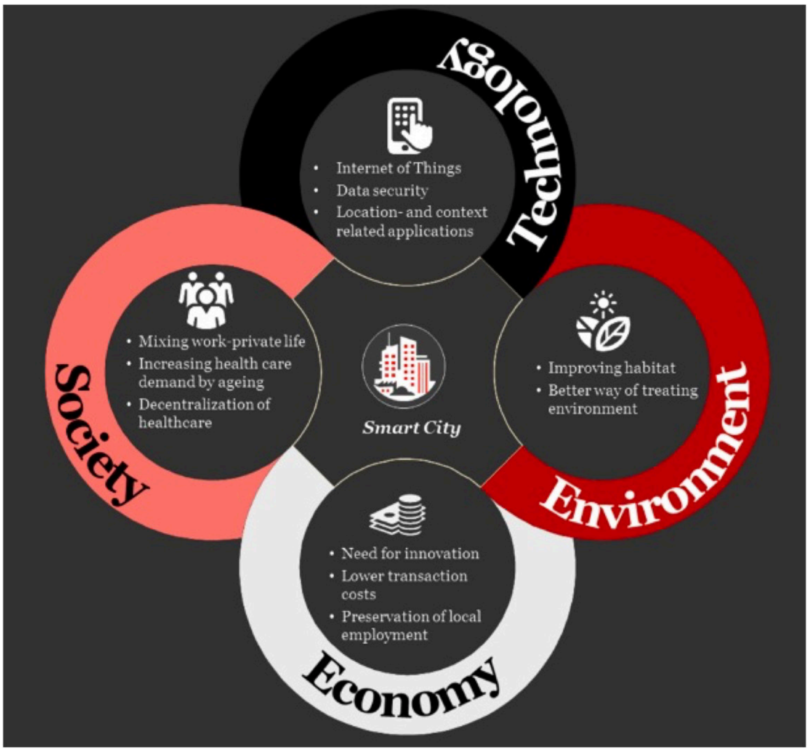


Figure 2.1. The overlapping elements of the Smart City.

The LLS System Specification includes a description of the Smart City Infrastructure (SCI), the underlying overlap of the system's elements and their relationship to the surroundings (chapter 2). The SCI is a complex whole of users, applications, processes, software and hardware. To make this whole scalable and accessible, a set of 'architecture' principles are important. These are described in chapter 3 and are the guiding principles for the design. This ultimately led to a number of considerations and concept selections (chapter 4).
The general and specific system requirements (Specification) are described in chapter 6 onwards. The structure of these requirements is explained in chapter 5.

# 3. System description

## 3.1 Context diagram

The context diagram shows all the external systems (hard/soft) that are directly related to the LLS Smart City Infrastructure. For example, the sea and the beach affect the conditions (wind, salt, sand) in which the systems function. Underground cable routing, trunking and conduits partly determine the connections chosen and limit excavation work. These 'context specific issues' determine the external interfaces of the Smart City Infrastructure. Please note that the users and asset managers are part of the Smart City System as a whole and with the Smart City Infrastructure, form an external interface.

The Smart City Infrastructure consists of various component systems (e.g. power supply, fiber, lighting). Apart from that, the shared characteristics of these component systems are important. We distinguish the following main characteristics:

- Security & privacy
- Sustainability
- Availability and reliability
- Maintainability
- Safety

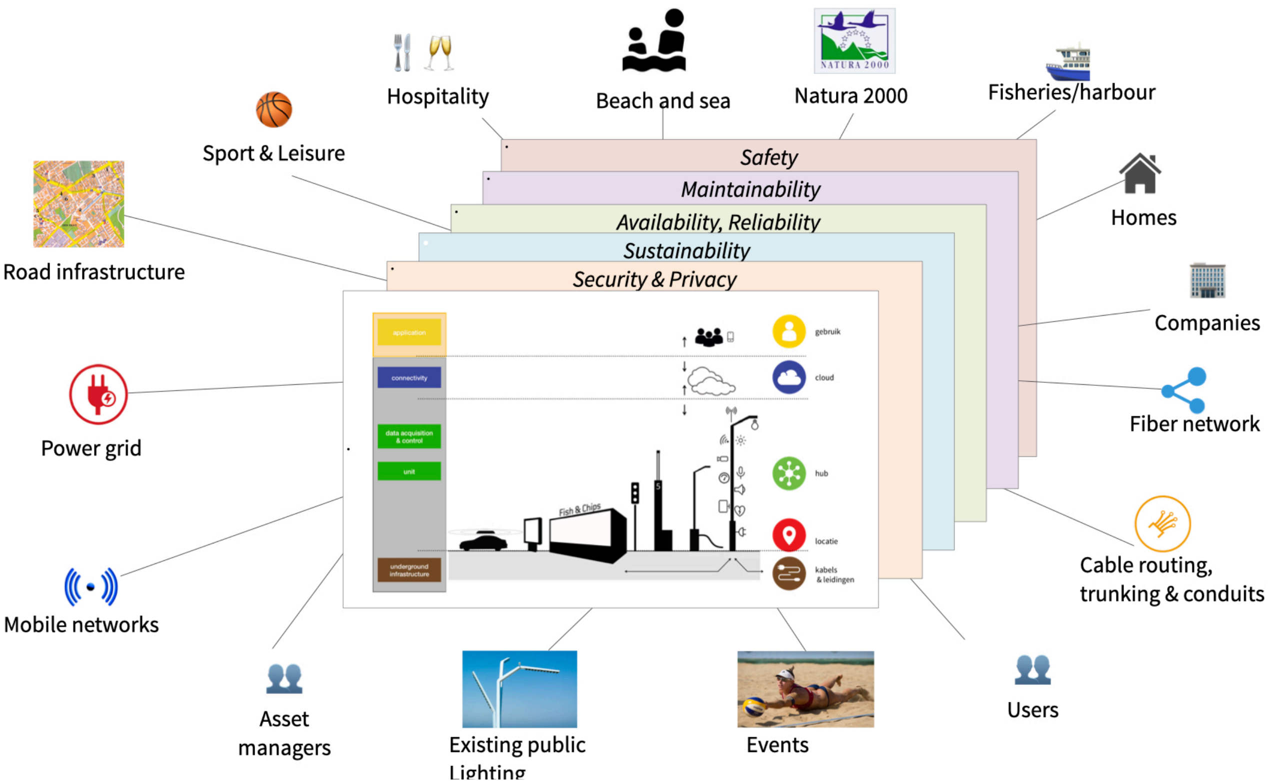


Figure 3.1: Context diagram of Smart City Infrastructure

# 3.2 Applications

The SCI is designed to meet as many needs and have as many uses as possible (also see DOC-00006, Background Living Lab Scheveningen 1.0). Figure 3.2 shows some of the potential application clusters.

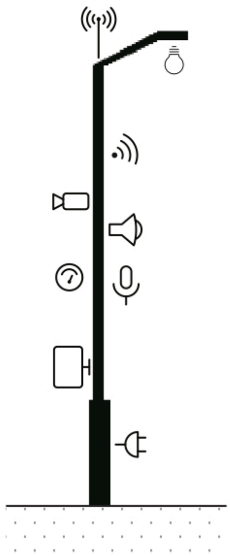


Figure 3.2: Schematic representation of the SCI clusters and their potential applications

The potential applications are turned into a long list of use cases. Use cases describe the actual scenario of the progress of an application and the interaction that occurs among the actors (users, equipment). A few promising use cases have been described in detail. See Annex IV for a list of the use cases.

# 3.3 Reference architecture

A reference architecture has been defined for the Smart City Infrastructure. A reference architecture is a description of the starting points and structure that describes the interaction of the different layers and parts of the Smart City Infrastructure. It contains a set of rules to keep the Smart City Infrastructure open and scalable. The SCI reference architecture is in line with the NORA (Dutch Government Reference Architecture model. See the figure below).

The NORA was created to give direction and be a guiding tool. It contains frameworks and current agreements for designing the Dutch Government's information system. Supplying utilities within the framework and agreements in the NORA, ensures that they will work well with other utilities and hence the best use can be made of existing solutions.

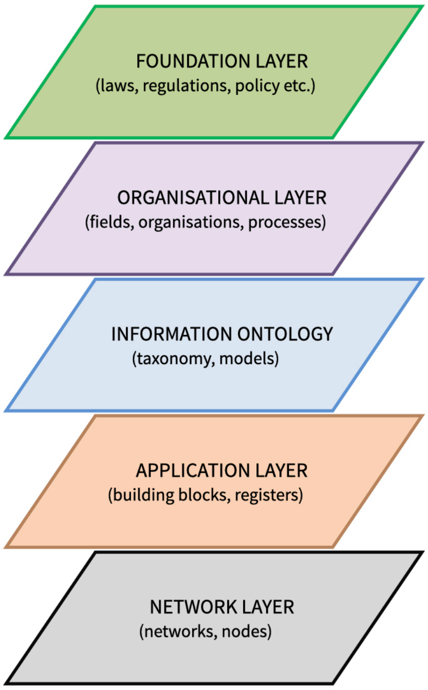


Figure 3.3: NORA

The NORA consists of five layers. The first three (principles, organisation, information) are mostly related to the starting points and the structure of the information (meta information). These layers are referred to as the Enterprise Architecture. The lower two levels contain the factual information and the shared channels for sharing information. These layers are referred to as the LLS System Architecture (see figure 3.4).

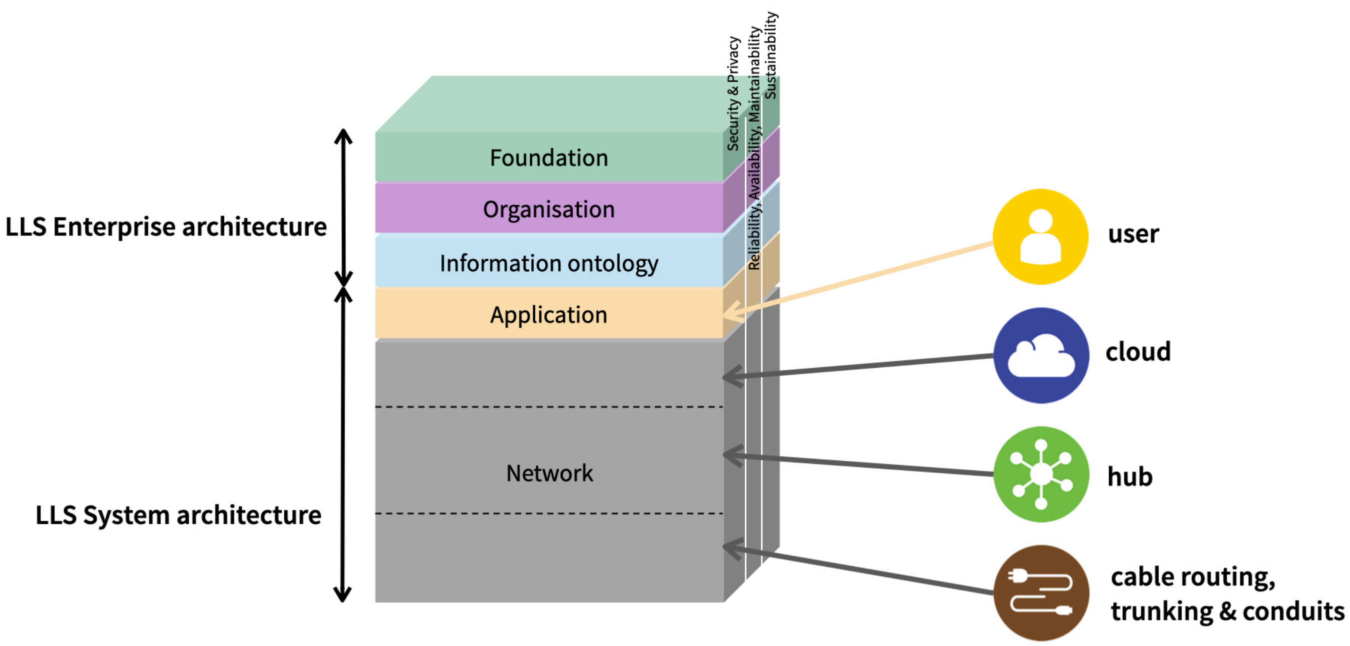


Figure 3.4: Interface between NORA and the LLS Reference Architecture

In turn, the LLS System Architecture is divided into four layers: application, cloud (connectivity), hub (smart carrier), and the underground cable routing, trunking and conduits.

**The LLS System Architecture layers.**

**User:**
The user is an individual or organisation that uses the services of the Smart City System. They could be the residents of Scheveningen, an individual car driver looking for a parking place, the municipality of The Hague's Department of City Management that monitors Urban Lighting, or the police who are checking that safety is maintained during an event. Entities that offer the services through the Smart City System to third parties can be seen as users (e.g. the company that offers charging services). The users use different applications, compiled data and application platforms.

**Cloud:**
This layer is the connection between the information used locally and the applications of the users. This includes both accessing data and sending data to local component systems (Hubs and units).

**Hub:**
The Smart City Hub is at the heart of the SCI and takes different forms (light masts, kiosks, car scanners etc.). This layer is designed to standardise the data acquired from the physical units (cameras, sensors, light sources, small cells etc.) and make them available to the network (data acquisition & control).

**Cable routing, trunking and conduits:**
This layer includes the power supply from the OVL network and the connection to the public STEDIN power grid. The physical fiber network is also included in this layer.

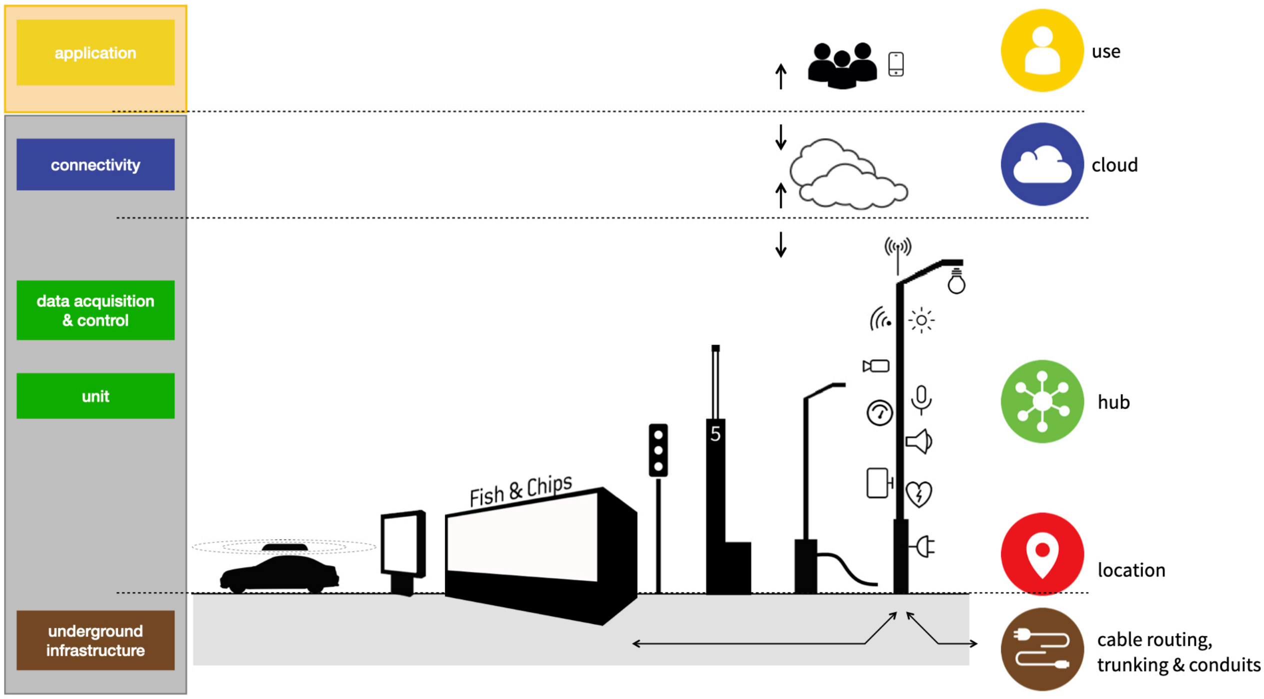


Figure 3.5: LLS System Architecture

# 3.4 Smart City Hub

As mentioned above, the Smart City Hub is the heart of the Smart City Infrastructure. The Smart City Hub consists of a support structure, one or more auxiliary units (cameras, lighting, sensors etc.), a connection to the network and a power supply at a static or mobile location.

The application areas give rise to applications that influence the critical system parameters for the SCI and the hub design. These applications and the critical system parameters are highlighted in the table below.

| Design parameters / Common usage | 24/7 | Power (A) | Voltage (V) | Capacity (Watt) | Network | Weight (kg) |
|---|---|---|---|---|---|---|
| Charge cars | x | 18-32 | 230 Vac 3f | 11-22 kW | Medium | |
| UL: Dynamic switching and dimming [1)] | x | 2 | 230 Vac 3f | 30W-300W | Low | |
| Digital displays, advertising & text messages | x | | 230 Vac | 300-700W/m2 | Medium | 50-80 |
| Small cells | x | | 48 Vdc/230Vac | 105-180W | High | 4,5 |
| Camera surveillance | x | | 21-30 Vac | 14-50W | High | 3 |

Table 3.1: Critical design parameters

The critical design parameters are based on the following applications.

- Capacity
- Connectivity (Network)
- Weight of the equipment

Looking at the critical system parameters, we can distinguish three basic building blocks for Smart City Hubs.

| Bouwsteen | Omschrijving |
|---|---|
| Lighting + | This is a smart light mast. It can switch lights on and off, dim them, is available 24/7 on the UL grid and is controlled in a LAN with light masts (limited connectivity) (power supply 24/7, 220Vac, 6A) |
| Fiber | This building block uses fiber to connect to the WAN (Internet). This building block could be part of various support structures and can thus be included in a switch box, for example (local power supply). |
| Capacity + | The capacity of this building block's power supply from the STEDIN grid (power supply 24/7, 220Vac, 18-32A) is large (for charging points). |

Table 3.2: Building blocks Smart City Hubs

The weight that a Smart City Hub can bear depends on the construction and design of the support structure. Weight is therefore a parameter that requires certain specifications for the support structure rather than for the building block. As an example, the K8 and K10 light masts are able to carry displays weighing 40 kg (1,200 x 1,250 cm).

A Smart City Hub can be built using one or more of the building blocks mentioned above. Not every building block needs to include lighting. A fiber building block can thus also be mounted on a UL box. On top of that, depending on the needs and the business case, additional accessories (auxiliary equipment (AUX)) can be added. In principle, the AUX remains the property of the investor. We recognise the following AUX.

| | |
|---|---|
| Camera | Charging infrastructure |
| Display | Sensor<br>General measuring; humidity; air quality |
| Fiber to the 'X' | Telecom (Small Cell) |
| Loudspeaker | Light source |
| Microphone | AED |

Table 3.3: Auxiliary Equipment

The Smart City Hub will thus be a modular design that can be tailored to the actual usage.

# 3.5 Cloud

A group of Smart City Hubs can communicate with each other through the Local Area Network (LAN), is connected through the Wide Area Network (WAN, fiber) to an area Point of Presence (PoP), the entry point to the world wide web (Cloud).
This creates a network of intelligent units that can communicate among themselves and use all kinds of cloud services (see Figure 3.5 below).

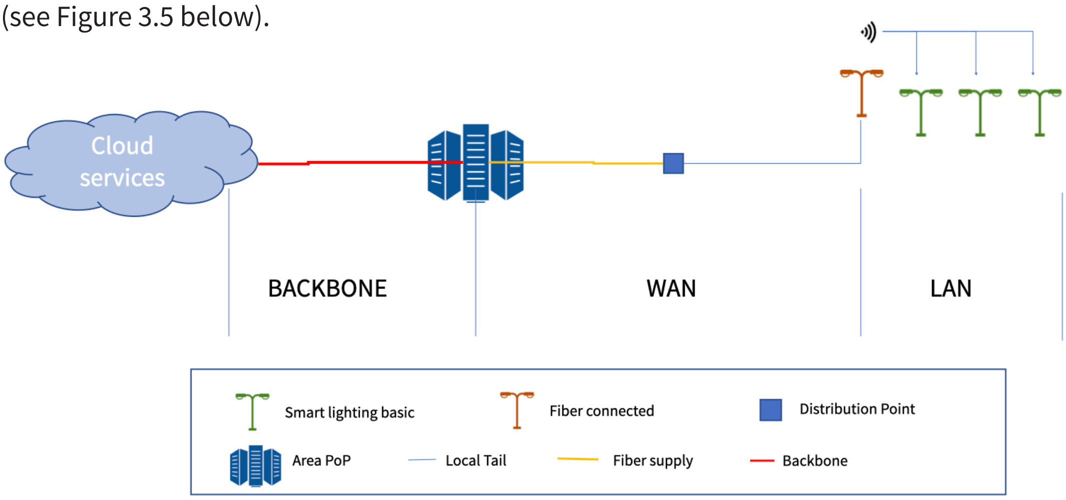


Figure 3.5: Cloud LLS

# 4. Reference Architecture LLS

A scalable, open and safe Smart City Infrastructure starts with adopting a consistent set of starting points: the architecture rules. This will help avoid spaghetti and we can embed the right standards from the start.

The term ‘open’ is open to interpretation and different perspectives. An ‘open source’ system is a system to which different developers can add source codes. The source code is available to everyone. This does not mean, however, that the system is interoperable. An open source system does not guarantee that its various component systems work together well or work with the external world.

Under ‘open’, we also understand that this helps avoid ‘vendor lock-in’. Choosing just one supplier’s system does not prevent modifying or expanding the system. To avoid differences in interpretation, we uphold the criteria below (in order of priority) for an open scalable SCI.

1. **Security:** the SCI is protected from access by unauthorised entities and complies with the privacy legislation.
2. **Scalable:** the SCI is easy to expand. The efforts needed to expand the infrastructure are in proportion to the scope of the expansion.
3. **Interoperable:** the various parts of the SCI can work together on the basis of explicit interface specifications and the chosen standards.
4. **Supplier independent:** SCI component systems can be replaced with component systems of other suppliers with little effort.

Further, the reference architecture has been translated into a set of concept selections in which the linkages and choices regarding the component systems are made visible.

## 4.1 Architecture rules

To develop an open and scalable SCI, we comply with a few architecture rules. These are the rules that are adhered to when designing the systems, the data, procedures and applications. The architecture rules are partly based on the Gaudi framework[2] and IEC-62890, IEC-62264 and IEC-61512.

### 4.1.1 Minimal links - maximum cohesion

The functions that interact intensively with each other are incorporated in the same component system. The functions that do not interact much are divided among different component systems. This is to further the efficacy of a system. It means that component systems need minimal interaction with other component systems to work. The interaction between the component systems are standardised wherever possible. Digital connections between the component systems or between objects with component systems will be made backward compatible (to support older versions). This will make them adjustable and manageable.

By decoupling the systems, they can be changed independently of each other and defects will not be passed on to other component systems. Changes of configuration data must be changed independently of each other in component systems and it must be possible to add objects. This principle is also known as the modular structure principle.

2 Gaudi Framework; G. Muller – Buskerud University/ TNO-Embedded Systems Innovation

### 4.1.2 Abstract data types

Data are independent of the internal technical operation of a component system. Should a component system by supplier X be replaced by a component system by supplier Y with the same functionality, the content and cohesion of the data are protected.

### 4.1.3 Minimum coupling layers/control levels

The system architecture is divided into several layers. These layers work independently of each other and are only coupled through standardised data and protocols. This promotes the interchangeability of reusability of the component systems.

### 4.1.4 Principle of nationwide scalability

The Smart City concept is a nationwide concept. The roles/functions that people use to operate, manage and use the system work in a modular fashion across the country. Different modules can be used for each region or city. The national and international standardisation of the Smart City is still under development. In anticipation of the formal approval of these standards, as much use possible is made of these standards (in particular IEC, NEN and BSI).

### 4.1.5 The new can be integrated into the existing

Projects always add something new to something that already exists. This is the reason that the architecture, specification and design explicitly look at migrating and integrating the new in the brownfield.

### 4.1.6 Limited impact of specials

Standard objects and systems deployed nationally will not be adapted (polluted) for specials. Specials are objects that are found in just a few places and require special treatment. The existing UL infrastructure contains specials and hence requires customisation. Wherever possible, specials will be avoided or removed. Greater priority will be put on reusability. Where specials are unavoidable, their impact on the Smart City System will be limited to the localised situation where they are deployed.

### 4.1.7 Lean en Mean systems

Redundant functions pollute the system and make it unnecessarily complex. In principle, any redundancy will be avoided and objects will not have any unnecessary functions. The objects in the Smart City system architecture will meet the needs of the Smart City concept's goal in a 'lean and mean' fashion. To a certain degree, this principle contradicts the idea of offering as many applications possible. It forces thinking about the utility and need of functionality.

### 4.1.8 Privacy & security

Those who generate these data are and will remain, analogous to the principle of emails, the owner of the data. Privacy cannot be added afterwards, but must be incorporated from the start in all the layers of the Smart City Infrastructure if the SCI is to meet the Personal Data Protection Act.

### 4.1.9 Availability and maintainability

Maintenance of a component may not cause the outage of other components. The failure of one component may not cause the failure of the whole system. For example, the Urban Lighting must work if the charging function for cars has a defect, and vice versa.

### 4.1.10 Shareable and Calculable

The layout of the infrastructure and building blocks' is generic. That of the SCI and the design of the building blocks must make charging according to usage transparent. The charging system should preferably be dynamic and automated. The infrastructure and building blocks are designed for shared use by various buyers. To this end, they are interoperable and use open standards.

### 4.1.11 Accessibility

Access is only granted to authorised individuals who have digital identities recognised in centrally authorised identity management systems. Controlled access to the services is location and device independent.

## 4.2 Concept selection

A 'concept selection' is a collective name for the considerations, choices, options, scenarios and analyses involved in turning project goals into solutions. The figure below shows how the reference architecture has been amplified into components and concept selections, indicated with this icon: 8

Concept selections include at least:

- an inventory of the options and/or scenarios;
- a weighing up of the project objectives. The same criteria are used for the evaluation framework as those for the use cases. Where possible, the considerations are quantified;
- a risk assessment of the options/scenarios;
- a reference to the underpinning documents and research.

The concept selections are described in separate documents. Table 4.1 below is an overview of the concept selections.

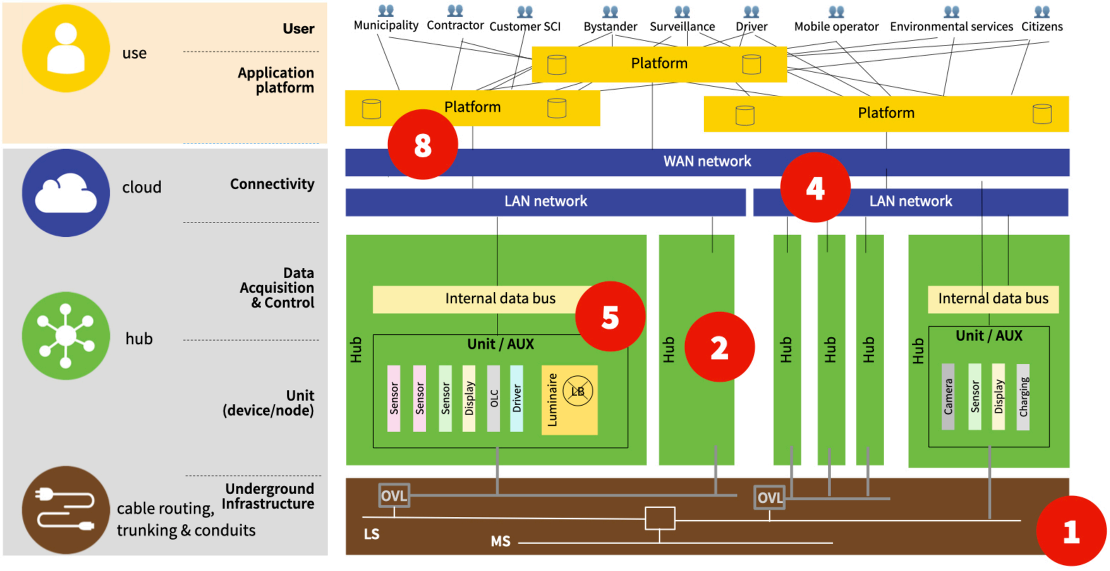


Figure 4.1: System architecture and components

| ID | Title |
|---|---|
| **OB-00001** | **Power supply concept**<br><br>• What type of charging uses must be included in the power supply and the hub in terms of capacity and space? For example, should there be charging functions for cars, bicycles, mobility scooters and public sockets?<br>• The municipality's UL grid has limited capacity. This means that many applications need a different power supply grid (LS-net/Stedin). How do we handle this?<br>• Is it possible to return energy to the grid should wind/solar energy be used in the future?<br>• How future-proof is the concept in terms of the potential future of direct current?<br>• Where will the 'Smart' component (for example measuring usage) be positioned in the sub-distribution board box, the mast etc.?<br>• Working with micro-grids and the energy transition. |
| **OB-00002** | **Smart City Hub**<br><br>• What Plug & Play concept do we want to adopt?<br>• Can modules be connected (this may lead to more cameras, for example)?<br>• How can an integrated system be brought about (choosing among many suppliers)?<br>• Who are the sensor owners?<br>• What is the relationship between position, space and weight?<br>• At what levels are the Sensor Hotels placed (low, middle, high)?<br>• Is the architecture based on integrated design or linkable modules?<br>• What are the consequences on maintainability?<br>• What is the impact of design (standardisation)?<br>• Where should sensors be placed (in the support structure, the fixtures etc.)?<br>• What is the level: specified functionality versus prescribed design? |

| | |
|---|---|
| **OB-00003** | **Decoupling design and functions of support structure**<br>(included in OB-00002 Smart City Hub concept selection) |
| **OB-00004** | **Connectiviteit**<br><br>• What will be the network concept, network architecture (topology/blueprint)?<br>• Where do we position Connectivity in the layer model?<br>• Do we fit an IOT gateway for all applications or are there exceptions (police, charging etc.), in part depending on the Data concept (OB-00008)?<br>• How do we distinguish the layers of the network, OSI model, Managed Services; what role does the municipality play?<br>• #/distance branching fiber<br>• What is the bandwidth of the network?<br>• Do we use LANs/low power WANs for the joint coupling of masts?<br>• To what extent is public WiFi desirable? To what degree is free spectrum needed to allow other functions (e.g. phone, GPS, parking)?<br>• What does Points of Presence fiber look like? |
| **OB-00005** | **Lightubg Control**<br>Operating and controlling the lighting is dependent on the other functions of the Hub. Should we use smart fixtures or switches through existing power boxes? What protocol do we use for telemanagement (ALIS, OSGP, Talq etc.)? |
| **OB-00006** | **Extendibility of the Brownfield**<br>• Is there an option to build/expand existing support structures (masts, MUPIs, kiosks etc.) and with what functionality? What are the numbers/specifications?<br>• What do we do with the existing masts? |
| **OB-00007** | **Renewable energy**<br>• To what extent can wind and solar energy play a role (scale)?<br>• Coherence of the energy transition<br>• Micro grids and settlement, blockchains<br>• Returning energy to the grid |
| **OB-00008** | **Data concept**<br>• Who owns the data?<br>• How can/may data be distributed?<br>• How do you safeguard privacy and security?<br>• Are separate networks desirable?<br>• To what extent is a shared open platform desirable?<br>• How do we collect and enrich data? Is this desirable?<br>• What data is supplied in the handover to the asset manager + data during phase III? |
| **OB-00009** | **Demarcation, Asset Management & Maintenance**<br>• What is the Governance model for phases II and III?<br>• How is the ownership/property arranged?<br>• What is the allocation of Asset Management and Maintenance?<br>• Are there multi maintenance entities for each object? |
| **OB-00010** | **Sensor Hotel**<br>(included in concept selection OB-00002 Smart City Hub) |

| | |
|---|---|
| **OB-00011** | **Configuration (included as sub-documents according to zone in OB-00012)**<br>• What lighting conversion/new build applies to each zone?<br>• What is the configuration of the building blocks and auxiliary equipment?<br>• How do the pipes run (electricity, fiber)?<br>• Are there other Smart City Hubs than light masts (MUPIs, UL boxes, kiosks etc.)?<br>• How does it fit into the surroundings and what is the lighting plan?<br>• Joint usage of existing objects/support structures (aesthetic outdoor space)? |
| **OB-00012** | **Pre-prepared construction (combined with OB-00011)**<br>• What specifications can we give to parallel projects to be well prepared for the building of the Smart City Hub (jacket pipes, protocols etc.)?<br>• Being well prepared prior to building allows the phasing of LLS and projects in the area to be coordinated. |

Table 4.1: Concept selections

# 4.3 Research agenda

In addition to the concept selections mentioned above, there is also a research agenda of subjects that need to be further explored in relation to this R&D project.

| |
|---|
| **Configuration Management**<br>The Smart City Infrastructure consists of several objects, software, maintenance regulations, master data etc. The objects will also be subject to changes (new operating firmware for the lighting, updating of sensors, new protocols etc.).<br><br>An important element in good configuration management is the unique and reliable identification of objects. This is currently done in different ways, often manually. The preference is for objects that identify themselves (auto install). What are the technical options and what costs/savings do they bring?<br><br>How do we manage information profiles for the asset management and maintenance? What meta data in terms of the 'As Built' do we want to manage (information layer)? |
| **ALiS commando set**<br>The proposal is to standardise the ALIS command set. The set of commands is not yet complete and needs to be further developed. The conditions, preconditions and financing can be deployed across the country to further expand the ALIS command set and guarantee reliability. ALIS is the standard for the asset management platform. The communication between the asset management platform and the OLC, however, is not yet standardised. Ideally, this communication could also be standardised through the segment controller so as to protect the decoupleability of the system layers. However, there are various proprietary solutions in this area on the market that are not yet interchangeable.<br><br>*New developments are showing that ALIS is not a future-proof protocol for the sets of commands. The understanding at present is to have applications mutually communicate through Application Programme Interfaces (APIs). The supplier will be asked to develop an API (obligatory) for the intended application and to guarantee the interchangeability of data.* |

**Integrated maintenance and asset management tasks**
The Smart City Infrastructure requires an increasing multidisciplinary approach. This also applies to the maintenance and asset management aspects. Civil, environmental management, mechanical engineering, electronics and telecom need to be more and more integrated to avoid miscommunication, long repair times and low availability. This calls for a search for the best input from the maintenance and asset management organisations. The idea is to adopt an A team approach to look into this issue. This will secure the availability in the short term, even if not in the most efficient way. From here, work can be carried out into optimising the set-up. The premature restrictions on procedures, scripts and SLAs will lead to rigidity.

**Use of direct current**
The current power supply concept is based on alternating current. Direct current has many more advantages for moving towards the future: less energy loss, safer and greater capacity. However, conversion is a major nationwide issue. The proposal is to work with Stedin, knowledge institutions and the market to assess various scenarios and phasing in to see what is desirable.

**Research into examples of practice for police cameras**
It appears that the design of the Smart City Infrastructure would benefit from examples of good implementation and practice. This would help the configuration of the building blocks in the various zones get the options and specifications right.
This also applies to the level of application. Without application, there is little point to a functioning SCI. The proposal is to use a concrete application (e.g. security monitoring and surveillance) to assess the implications of an application. Some of the questions that will be examined include the following.

- What is the status of the money flows?
- How do you project precise locations of cameras, for example?
- Who owns the equipment?
- How do we safeguard the security and privacy of information?
- What data are public, private and confidential?

**Fewer objects in public space**
The municipality of The Hague intends to reduce the number of objects in public space. To this end, they are looking into instruments such as policy frameworks, permits, and the price mechanism of ‘locked-in rent’. Combining the usage of objects could also be cost saving. One example is a parking meter combined with a smart light mast that has parking utilities.

**Data as a service**
The initial concept of the Smart City Infrastructure and the business case was based on renting positioning (physical space, power supply, connectivity). Data as a service is increasingly being seen as an enabler to make the SCI cost-effective. The following issues will be examined.

- What is the earnings model?
- How do you avoid a conflict of interest, that is, a monopoly on positioning?
- How do you price savings?
- Who owns the data?
- Where does the line between public and private data lie?
- What are the advantages/disadvantages of open data?

| |
|---|
| **Implementation privacy legislation**<br>In line with European legislation, the new privacy legislation came into force in May 2018. How does it affect the implementation of the Smart City System?<br>• New/modified privacy framework of the municipality of The Hague.<br>• Organisational embedding (authorisation, procedures etc.).<br>• Audit system/data architecture<br>• Technological compatibility with the new legislation. |
| **Measuring energy consumption**<br>The power supply concept for the Smart City System supports several types of usage (lighting, charging, sensors, small cells etc.). This means that there is a need to assign energy consumption and to differentiate between public and private use. There are different ways to do this, each with its own advantages and disadvantages.<br>• Placing usage meters.<br>• Assigning on the basis of calculated used capacity.<br>The proposal is to run a pilot to test both methods (dual blind) concurrently. It will allow both the calculation of consumption while monitoring the actual consumption using a power analyser in 1 or 2 UL boxes. This 'calculated capacity usage' approach is impacted by dynamic circumstances and administrative prerequisites. |
| **Data Model Taxonomy**<br>The taxonomy (arranging and defining terms) of the Data Model to be used for the Smart City System is still under development. The taxonomy is needed to allow the applications to communicate with each other. If we say 'dimming of the Urban Lighting' and one application thinks about reducing the lumen while another thinks of reducing the current/voltage, the applications do not understand each other. The proposal is to address the taxonomy in a domain managed approach. Another aspect is to do this within national and international standardisation and research without having to wait for complete conformity. |
| **Connectivity Faget cabinet**<br>Smart City Hubs should be unlocked easily on the cloud. An investigation is looking into a communication module that can be placed in a standard Faget cabinet. |

Table 4.2: Research agenda

# 5. Explanation and Specification type

In accordance with the methodology of Systems Engineering, the Specifications are derived from concept selections and are coupled to the objects (components). The hierarchy of the Specifications are thus determined by the hierarchy of the objects.

## 5.1 Specification type

The Specifications are divided among the following Specification types.

**Functional Specifications**
Functional Specifications set specifications on the function, in other words, the performance that the system, sub-system or object is expected to fulfil.

**Aspect Specifications**
Aspect Specifications set specifications on the particular features of the system or object that are not a direct function of the relevant system, sub-system or object. For example, specifications related to the security or durability of the system.

**Design Prerequisites**
Design Prerequisites are limitations to the design that emerge from the standards, guidelines, guiding principles and other documents, or from existing design preferences. A Design Prerequisite in a standard or regulation is not a clear-cut or specific Specification, but needs to be interpreted to become project specific. The Design Prerequisites are imposed on the System through the Specifications. The Specifications set preconditions on the content and further details of the design.

**Interface Specifications**
Specifications that ensure that the system can be connected to objects, sub-systems or systems, or their parts, are called Interface Specifications. These Specifications contribute to the objects in the scope of this Agreement. The interfaces must be done in such a way as to ensure that the activities of third parties are not disrupted and the objects connect to the external objects (context objects).

The Specifications are arranged in different types. This puts the Specifications into context for the convenience of the reader.

## 5.2 Specification Display

The template for one Specification is shown in Table 5.1. This is the relevant table when referring to a Specification. The whole table is the Specification and includes the Specification title, verification and validation method, information etc.

| | | |
|---|---|---|
| E-XXXXX | Specification title<br>SYS-YYYY | |
| Specification text | | |
| Summary | | |
| Information | | |
| V&V Method | Criterion/information | Phase |
| Binding document | DOC-ZZZZZ  Title | |

Table 5.1: Specification template

**Specification ID (E-XXXXX)**
Specifications have unique and non chronological numbering.

**Specification title**
A short description of the Specification with key words, often coupled to the related function or its objective. Incudes the system or component subject to the Specification (SYS-YYYY).

**Summary/Information**
Enumeration and explanation are part of the requirement. The contractor should understand the context of the requirement and should demonstrate full compliance with the requirement.

**V&V**
A Verification and Validation method is given for a number of Specifications.

**Binding documents**
Some of the Specifications refer to binding documents and drawings.

# Annex I. Abbreviations & terminology

| Term | Abbreviation | Explanation |
|---|---|---|
| Automated External Defibrillator | AED | |
| ALIS | ALIS | ASTRIN Lighting Interoperability Standard |
| Algemene Maatregel van Bestuur | AMVB | |
| Application Programming Interface | API | |
| Auxiliary Equipment | AUX | |
| Citizen Alert Real Time | BART! | |
| Customer | | The paying buyer/renter of a lock. |
| Customer Premises Equipment | CPE | Connection of a component to the WAN fiber network via an internet connection. |
| Digital Addressing Lighting Interface | DALI | This is an international standard (IEC-62380) that ensures that the operating of lighting, including, dimmable lighting, of different manufacturers is interchangeable. |
| Demarcation Connection Point | DCP | Connection point for the power supply, data, fiber. In its physical form it comprises: Faget cabinet, meter box, POP. It is often the demarcation point for the connection of various suppliers. |
| Dutch Government Reference Architecture | DGRA | Dutch Government Reference Architecture |
| De Kust Gezond | DKG | De Kust Gezond (the healthy coast) is the programme to improve the quality of the outdoor space in Scheveningen. |
| A type of hardened drop fiber cable | DLX | |
| Electrical Ballast | EB | The driver that operates the lamp. |
| Enhanced Performance Fiber Unit | EPFU | The EPFU fiber cable is a very thing fiber cable specially designed for blown fiber applications. |
| Fiber Termination Unit | FTU | The FTU is the connection point for the fiber network on the Hub. |
| Generic Closure Organiser | GCO | The GCO is a fiber distribution point where the fiber is split and can be disassembled. |
| Governance Model | GM | This Model describes how Eneco and the municipality demonstrate that they are meeting or will meet all the conditions laid out in the Agreement (including the Annexes). It also describes how the municipality will oversee Eneco's performance and how it will check and/or accept these. |
| Glasvezel | GV | Fiber |
| High Density Polyethylene | HDPE | |
| The Hague Security Delta | HSD | |

| | | |
|---|---|---|
| International Mobile Equipment Identity | IMEI | This is a unique number for mobile telephones. |
| Integrated multifunctional Humble Lamppost | ImHLa | |
| Internet of Things | IoT | |
| Local Area Network | LAN | |
| Location Based Services | LBS | |
| Living Lab Scheveningen | LLS | The research environment in Scheveningen where Phase III's research activities will be carried out. |
| Local Loop Unbundling | LLU | |
| Long Range | LoRa | The LoRa technology can exchange small amounts of information between objects and systems at an ultra low energy consumption. |
| Loose Tube Mini Cable | LTMC | |
| Main junction box | MJB | (HAK Hoofd AansluitKast) |
| Media Access Control address | MAC address | The Media Access Control address is the unique identification of a device assigned in a network. |
| Multiple Input Multiple Output | MIMO | MIMO is a method to provide a different signal to multiple mobile users from one sending point (multiple bundles). |
| Mobilier urbain pour l'information | MUPI | A MUPI is an advertising column that is lit from the inside so that it is visible 24 hours a day. The advertisement is usually 1,185 mm by 1,750 mm and can be fitted either one-sided or double-sided. |
| Non-Governmental Organisation | NGO | Non-Governmental Organisation |
| Dutch Government Reference Architecture | NORA | |
| Nationale Wetenschapsagenda | NWA | National Science Agenda |
| Outdoor Lamp Controller | OLC | The OLC controls the desired level of light of a lamp and turns the Electrical Ballast (EB) on and off. It also fulfils various analysis functions in the system and, through the segment controller, is the link to the LAN. |
| Contractor | ON | Opdrachtnemer |
| Onderzoek op Routes door Consortia | ORC | |
| Open Smart Grid Platform | OSGP | Infrastructure for smart grid applications towards a future proof modern smart grid. |
| Open Systems Interconnection | OSI | |
| Sub-distribution board | OVK | |
| Personal Data Protection Act | PDPA | The PDPA came into force on 25 May 2018. |

| | | |
|---|---|---|
| Power over Ethernet | PoE | Power over Ethernet is a technology that supplies power and data through a standard twisted-pair cable in an ether network. |
| Point of Presence | PoP | |
| Public Space Advisory Committee | PSAC | Building Inspectorate, municipality of The Hague |
| Public Space Manual | PSM | |
| Specification | PvE | Programma van Eisen |
| Slot | | A space rented to Customers where they can fit a Unit. |
| Smart City System | | The entire Smart City Infrastructure and Smart City Services established as part of the Project. |
| Public power socket | SAP | Stroom Aansluitpunt |
| Smart City Hub | SCH | Individual objects such as masts that house or will house parts of the Smart City Infrastructure such as urban lighting, connection points, sensors etc. |
| Smart City Infrastructure | SCI | The infrastructure comprising the Smart City Hubs and the Smart City Hubs network. It includes the software used for operation, management and security. |
| Standard configuration-property types | SCPT | Network variable use in protocol definitions |
| Smart City Services | SCS | Public and/or private services (applications) that are delivered to third parties and/or the municipality using the Smart City Infrastructure. |
| Service-Level Agreement | SLA | A commitment between a service provider and a client. |
| Standard Network-variable types | SNVT | Network variable use in protocol definitions |
| Traffic Control System | TCS | |
| Unit | | The hardware/firmware owned by a Customer that uses a Slot in the Smart City Hub. They comprise the following Units:<br>• Active Unit: such as Small cell, WiFi access point, Camera, advertising panel<br>• Passive Unit: such as Sensors |
| Urban Lighting | UL | |
| Underground Residual Waste Container | URWC | |
| Change Request | VTW | Voorstel to Wijziging |
| Law and regulations | W&R | Wet & Regelgeving |
| Wide Area Network | WAN | |

Table generated by Living Lab Scheveningen Relatics database.

# Annex II. References

| ID | Number | Title | Date | Document type |
|---|---|---|---|---|
| DOC-00001 | 160518b | Onderzoek en ontwikkeling SCI Den Haag; Opdrachtomschrijving (Research and development SCI The Hague. Order description.) | | Agreement |
| DOC-00002 | 160518a | Samenwerkingsovereenkomst ter zake Onderzoek en ontwikkeling Smart City Infrastructuur Den Haag (Collaboration agreement regarding Research and Development of the Smart City Infrastructure, The Hague) | 2017-08-17 | Agreement |
| DOC-00003 | 15369-1-RA-001 | Bestemmingsplan Scheveningen Haven; onderzoek naar het windklimaat op loop- en verblijfsniveau en nautische effecten. (Zoning plan Scheveningen Harbour; research into the wind climate at walking and ground level, and its nautical effects) | 2013-05-13 | Report |
| DOC-00004 | NL.IMRO.0518.BP0253D | Bestemmingsplan Scheveningen Haven (Zoning plan Scheveningen Harbour) | | Standard, directive |
| DOC-00005 | RIS268741 | Handboek Openbare Ruimte (Public Space Manual) | 2013-12-03 | Standard, directive |
| DOC-00006 | | Achtergrond Living Lab Scheveningen (Background Living Lab Scheveningen) | 2017-08-22 | Report |
| DOC-00007 | | Adviesrapport Smart Data City ‘Humble Lamppost' (Advisory report Smart Data City ‘Humble Lamppost’) | 2015-06-02 | Report |
| DOC-00008 | | NL Smart City Strategie 1 (NL Smart City Strategy 1) | | Report |
| DOC-00009 | PAS 182:2014 | Smart city concept model – Guide to establishing a model for data interoperability | 2014-10-01 | Standard, directive |
| DOC-00011 | | DALI Protocol IEC-62386 | | Standard, directive |
| DOC-00012 | | SCI Assessment rapportage (SCI Assessment report) | | Report |
| DOC-00013 | DIN SPEC 91347 | Integrated multi-functional Humble Lamppost (imHLa) | 2017-03-01 | Standard, directive |
| DOC-00014 | 95/46/EG | Richtlijn betreffende de bescherming van natuurlijke personen in verband met de verwerking van persoonsgegevens en betreffende het vrije verkeer van die gegevens (Directive to protect natural persons in relation to processing of personal data and the free sharing of that data) | 1995-10-24 | Standard, directive |
| DOC-00015 | | Analyse Gebiedsomgeving (Areal analysis) | | Report |

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|---|---|---|---|---|
| DOC-00017 | | ALiS Server Specifications | 2016-10-19 | Standard, directive |
| DOC-00017 | | ALiS Server Specifications | 2016-10-19 | Standard, directive |
| DOC-00018 | | SNVT Masterlist | 2014-11-01 | |
| DOC-00019 | | SCPT Master list | 2014-11-01 | |
| DOC-00020 | | Algemene Specificaties voor een geïntegreerde netaansluiting in een AC laadstation (General Specifications for an Integrated Network Connection in AC charging stations) | 2017-01-01 | |
| DOC-00021 | | HOR Deel 3; Technische Eisen voor de Inrichting van de Openbare Ruimte (PSM Part 3: Technical Specification for Designing the Public Space) | 2013-12-08 | Standard, directive |
| DOC-00022 | | Programma van Eisen Laadinfrastructuur (Specification Charging Infrastructure) | 2017-09-27 | Specifications |
| DOC-00023 | | Projectering Z01 Zwarte Pad (Configuration Z01 Zwarte Pad) | | Drawing |
| DOC-00024 | | Projectering Z02 DKG Noordboulevard en tramlus Noord (Configuration Z02 DKG Noordboulevard and North turning loop) | | Drawing |
| DOC-00025 | | PvE laadinfrastructuur Den Haag (The Hague PvE charging infrastructure) | 2017-09-27 | |
| DOC-00026 | N2K 097-1 | Ontwerp Beheerplan Natura 2000 Meijendel Berkheid (Design Natura 2000 Management Plan for Meijendel Berkheid) | 2016-02-05 | |
| DOC-00027 | N2K 097-2 | Meijendel Berkheide kaart (Map Meijendel Berkheid) | | |
| DOC-00028 | | Zhaga connector specificatie (Book 18) | 2018-07-01 | |
| DOC-00029 | | LLS Integraal Systeem Ontwerp (LLS Architectural System Design) | | |
| DOC-00030 | RIS298658-A | Richtlijn Licht op Natuur (Light on Nature Directive) | 2017-11-16 | Standard, directive |
| DOC-00031 | RIS298658 | Visie op licht (Vision of light) | 2018-02-28 | Standard, directive |
| DOC-00032 | | VTW 5 WD Mantelbuizen (VTW 5 WD Pipe Sleeves) | 2019-06-11 | |
| DOC-00033 | OB-00005 | Aansturing verlichting (Lighting control) | | Design note |
| DOC-00034 | OB-00009 | Demarcaties Beheer en Onderhoud (Demarcation Asset Management and Maintenance) | | Design note |
| DOC-00035 | OB-00011 | Projectering (Configuration) | | Design note |
| DOC-00036 | OB-00008 | Datamodel (Data model) | | Design note |

| | | | | |
|---|---|---|---|---|
| DOC-00037 | OB-00006 | Uitbreidbaarheid brownfield (Expandability brownfield) | | Design note |
| DOC-00038 | OB-00001 | Voedingsconcept (Power supply concept) | | Design note |
| DOC-00039 | RIS290042 | Boekje De Kust Gezond (The Healthy Coast booklet) | | Report |
| DOC-00040 | RIS283897 | Smart City Den Haag Roadmap 2014 (Smart City The Hague Roadmap 2014) | | Report |
| DOC-00041 | OB-0004 | Connectiviteit (Connectivity) | | Design note |
| DOC-00042 | RIS303907 | Vervolg Living Lab Scheveningen (Continuation Living Lab Scheveningen) | 2019-11-12 | Memo |
| DOC-00043 | RIS303907_A | Evaluatie voorbereiding Living Lab Scheveningen en vervolg (Evaluation preparation Living Lab Scheveningen and continuation) | 2019-10-22 | Report |
| DOC-00044 | | Aanleginstructie glasvezelkabel (Installation instructions fiber cabling) | 2019-12-09 | Standard, directive |
| DOC-00045 | 191415-OT-01-A | Boring Willemsparkbrug (Drilling Willemspark bridge) | | |
| DOC-00046 | | Projectering Middenboulevard (Z04) - Functionaliteit (Configuration Middenboulevard (Z04) – Functionality) | | Drawing |
| DOC-00047 | | Projectering Middenboulevard (Z04) - Techniek (Projectering Middenboulevard (Z04) – Engineering) | 2019-12-17 | Drawing |
| DOC-00048 | | GV BuisAanleg instructie (Fiber Pipe Installation instruction) | 2019-12-17 | Standard, directive |
| DOC-00049 | | DLX hardened drop glasvezel (DLX hardened drop fiber) | | |
| DOC-00050 | | UC0033 Challenge Zwerfaval (UC0033 Litter Challenge) | 2019-09-24 | |
| DOC-00051 | | UC0004 dynamische verlichting (UC0004 dynamic lighting) | | |
| DOC-00052 | | UC0037 Challenge canvas uitwerking - geluid meten (UC0037 Detailing challenge canvas – measuring noise levels) | | |
| DOC-00053 | | support-letter NWA ORC bioclock | 2020-01-13 | |
| DOC-00054 | | PVE voor het uitvoeren van civiel technische werken | | Specifications |
| DOC-00055 | | Challenge canvas template | 2019-09-13 | Template |
| DOC-00056 | | Use Case template | 2019-09-13 | Template |
| DOC-00057 | | Bijlage 2: PVE Programma van eisen Openbare Verlichting Gem Den Haag (Program of requirements for Public Lighting Mun. The Hague) | | Customer requirement specifications |

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|---|---|---|---|---|
| DOC-00058 | | Elektrotechnisch Veiligheids-Handboek Den Haag, deel 1 | | Standard, directive |
| DOC-00059 | | Elektrotechnisch Veiligheids-Handboek Den Haag, deel 2 | | Standard, directive |
| DOC-00060 | | Elektrotechnisch Veiligheids-Handboek Den Haag, deel 3 | | Standard, directive |
| DOC-00061 | | diia-specification dali part351 luminaire mounted control devices | | Standard, directive |
| DOC-00062 | | diia-specification dali part 253 diagnostics maintenance | | Standard, directive |
| DOC-00063 | | diia-specification dali part 252 energy reporting | | Standard, directive |
| DOC-00064 | | diia-specfication dala pert 251; memory bank1 extension | | Standard, directive |
| DOC-00065 | | diia-specification dali part 250; integrated bus power supply | | Standard, directive |
| DOC-00066 | | diia-specification dali part150; aux power supply | | Standard, directive |
| DOC-00067 | RIS265101 | Meerjaren onderhoudsopgave OVL 2014-20123 | 2013-09-01 | |
| DOC-00068 | BSD2019.39 | Samenwerkingsovereenkomst Fiber to the Home | 2019-02-22 | Agreement |
| DOC-00069 | BSD2019.182 | Intentieovereenkomst 5G-projecten met T-mobile | 2019-09-18 | Agreement |
| DOC-00070 | | PvA UC template | | Template |
| DOC-00071 | 19-0619 IBD | Invulformat Rijksmodel DPIA | | Template |
| DOC-00072 | | Modelovereenkomst slimme stad | 2019-12-05 | Template |
| DOC-00073 | | Format brief samenwerking GDH en project xxx | | Template |
| DOC-00074 | | Samenwerking interne opdracht format | | Template |
| DOC-00075 | | Concept bestuurlijke afspraken DH-ZH smart city infrastructuur | | Agreement |

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# Annex III. System Breakdown Structure

- SYS-0020 - Environment (context)
  - SYS-0021 - Existing fiber network
  - SYS-0052 - Existing UL network
  - SYS-0051 - Stedin network
  - SYS-0057 - WAN Backbone
- SYS-0024 – Project areas
  - SYS-0025 - Z01 Zwarte Pad
  - SYS-0027 - Z02 The Healthy Coast Noordboulevard and tram turning loop (North)
  - SYS-0032 - Z03 The Healthy Coast Zwolsestraat and Van Alkemadelaan
  - SYS-0033 - Z04 The Healthy Coast Middenboulevard, Vitalizee, Kurhaus Hotel
  - SYS-0034 - Z05 Renbaankwartier
  - SYS-0035 - Z06 Scheveningen Dorp, Keizerstraat and Scheveningseweg
  - SYS-0036 - Z07 Northern Harbour Entrance Boulevard Beach City
  - SYS-0026 - Z08 Northern Harbour Entrance Visafslag
  - SYS-0037 - Z09 Peninsula
  - SYS-0038 - Z10 Morales Boulevard
  - SYS-0063 - Z11 Tram route line 1
  - SYS-0065 - Z12 Willemsparkbrug bridge
- SYS-0001 - Smart City Infrastructure
  - SYS-0005 – Application platform
    - SYS-0062 - Lighting asset management and operation
  - SYS-0006 – Network connectivity
    - SYS-0029 - LAN
    - SYS-0028 - WAN
      - SYS-0049 - Area PoP
      - SYS-0050 - Fiber distribution point
      - SYS-0053 – Fiber cabling
        - SYS-0064 - Fiber drop
        - SYS-0008 –Fiber power supply
        - SYS-0048 - Local Tail
  - SYS-0007 - Power
    - SYS-0067 - Compact station
    - SYS-0015 – UL network
  - SYS-0002 - Smart City Hub
    - SYS-0039 - Connection - network
      - SYS-0010 - Customer Premises Equipment
      - SYS-0045 - Fiber Termination Unit
        - SYS-0066 - Strandbox
      - SYS-0054 - Gateway – segment controller
    - SYS-0009 - Connection – power supply
      - SYS-0055 - Metering
      - SYS-0046 - Main junction box (MJB)
      - SYS-0058 – Internal Power Supply
        - SYS-0060 - PoE power supply
        - SYS-0059 – USB power supply
        - SYS-0061 - Light source power supply
      - SYS-0056 –Automatic switch

- SYS-0047 - Auxiliary equipment
    - SYS-0041 - Camera
    - SYS-0042 - Display
    - SYS-0011 – Emergency button
    - SYS-0013 - Charging unit
    - SYS-0012 - Sensor hotel
    - SYS-0014 - Small cell
    - SYS-0068 - Power connection point
- SYS-0003 – Support structure
- SYS-0018 – Lighting
    - SYS-0022 - Driver
    - SYS-0004 – Light source
    - SYS-0023 - Outdoor Light Control (OLC)

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# Annex IV. Use Cases

UC-0001 | Asset Management & Maintenance
- C-0016 | B&O Public Space
- UC-0017 | B&O Urban Lighting
- UC-0135 | Urban Operator
  - UC-0119 | B&O Smart City Infrastructure
  - UC-0015 | B&O Smart City Services
  - UC-0136 | UO Odyssey

UC-0004 | Facilitate Lighting (dynamic)
- UC-0112 | Seasonal Lighting Connection
- UC-0021 | Decorative Lighting
- UC-0031 | Ambiance
- UC-0075 | Social Safety
- UC-0040 | Bat-friendly Lighting

UC-0002 | Facilitate Connectivity
- UC-0018 | Fiber to Beach Bars
- UC-0019 | Public WiFi
- UC-0125 | Small Cells
  - UC-0020 | 3G/4G
  - UC-0091 | 5G
  - UC-0090 | Antenna Sharing

UC-0003 | Facilitate Energy
- UC-0128 | Power to Beach Bars
- UC-0109 | Local batterij
- UC-0102 | Charging for Electric Cars
- UC-0092 | Charging for Electric Bicycles
- UC-0022 | Power in the Public Space (SAP)

UC-0006 | Crowd Management
- UC-0104 | Transmitting Audio
- UC-0070 | Managing Visitor Flows
- UC-0023 | Crowd Management Boulevard
- UC-0073 | Crowd Management Events
- UC-0074 | Crowd Management Entertainment

UC-0140 | Ethics and Awareness
UC-0129 | Data awareness in public space

UC-0014 | Incident Management
- UC-0105 | AED
- UC-0051 | Recognising Incidents
- UC-0052 | Emergency Button
- UC-0053 | Push Messages

UC-0084 | Information & Advertising
- UC-0117 | Personalising Advertising
- UC-0099 | Dissemination Areal Information
- UC-0100 | Counting Passers-by ad Group Profiling
- UC-0101 | Advertising for Concession Holders
- UC-0087 | Advertising for Local Entrepreneurs

UC-0005 | Nature, Health & Environment
- UC-0032 | Processing street waste
  - UC-0033 | Processing Litter
    - UC-0130 | Beach Bot
  - UC-0036 | Detection Dumping next to Underground Rubbish Containers
  - UC-0034 | Detection Dog Faeces

UC-0038 | Biodiversity
- UC-0039 | Seagull Deterrents
- UC-0126 | Nature Censuses
- UC-0121 | Animal Nests

UC-0044 | Local Weather Forecast
UC-0079 | Measure CO2
UC-0080 | Measure Particulates
UC-0037 | Measure Noise
- UC-0134 | Experience Noise Pollution

UC-0115 | Measure Event Noise Levels
UC-0035 | Measure Shipping Noise
UC-0078 | Measure Shipping Lights
UC-0048 | Measure Light Pollution
UC-0043 | Measure Air Quality
UC-0041 | Measure Flooding
UC-0122 | Measure Temperature
UC-0042 | Measure Water Quality
UC-0103 | Reduce Particulate Matter

UC-0007 | Parking
- UC-0061 | Automatic Payment
- UC-0064 | Enforcement Parking
- UC-0063 | Monitor Individual Parking Place Occupance
- UC-0062 | Monitor Parking Pressure
- UC-0065 | Monitor Bicycle Parking
- UC-0066 | Reserve Parking Place
- UC-0120 | Rent Parking Place

UC-0083 | Pleasant Living Environment
- UC-0095 | Neighbourhood Watch
- UC-0108 | On Demand Rubbish Disposal
- UC-0111 | Discouraging Loitering Youth
- UC-0094 | Housing Inspectorate

UC-0081 | Smart Sports
- UC-0086 | Individual Time Registration
- UC-0116 | Instruction for Gym Equipment
- UC-0107 | Monitoring Vital Signs
- UC-0114 | Lighting on Request
- UC-0030 | Route Display
- UC-0106 | Running with Your Shadow
- UC-0085 | Access Outside Opening Hours

UC-0082 | Smart Shopping
- UC-0089 | Profiling Visitors
- UC-0113 | Counting and Determining The Direction Of Pedestrians
- UC-0088 | Extending Duration of Parking According to Consumption

UC-0009 | Surveillance, Control & Security
- UC-0131 | Control and Security 2.0
- UC-0012 | Surveillance Shops
  - UC-0054 | Shop Theft
- UC-0137 | Bollard Surveillance
- UC-0139 | Street Watch Team
  - UC-0024| Amber Alert
  - UC-0133 | B.A.R.T.
- UC-0013 | Safety in the Harbour
  - UC-0045 | Detection Docking by Recreational Sailors
  - UC-0046 | Detection Ships' Movements
  - UC-0049 | Detection Disturbance
  - UC-0050 | Detection People
  - UC-0110 | Detection Sleeping Persons in Car
  - UC-0047 | Identification Ships
  - UC-0124 | Entry Control
- UC-0010 | Safety on the Beach
  - UC-0132 | Occupance Lifeguards 2.0
  - UC-0057 | Identification Boulevard Visitors
  - UC-0098 | Safety Information
  - UC-0056 | Counting Number of Beachgoers
  - UC-0097 | Monitoring Beachgoers in the Water
  - UC-0060 | Monitoring Water Sports
  - UC-0096 | Monitoring from the Air
  - UC-0138 | Searching for Lost Children using Drones
  - UC-0059 | Lost Children Found

- UC-0008 | Traffic Management
    - UC-0072 | Controlling Car Traffic
        - UC-0025 | Routing Motorised Traffic
    - UC-0123 | Facilitating Self-driving Cars
    - UC-0071 | Enforcing Traffic Safety
    - UC-0068 | Enforcing Traffic
    - UC-0093 | Monitoring Traffic Intensity
    - UC-0069 | Public Transport
    - UC-0118 | Spreading Visitor Departure

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