Smart Monitoring for a Smart City. Environmental Monitoring using IoT and Blockchain: Key Solutions for Efficient Work Execution and Improved Environmental Communication

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AGENDA

✓Smart monitoring for a Smart City

✓Which data

✓How to acquire data (hardware/software issues)

✓Data flows

✓Which communication for smart monitoring

Smart monitoring for a Smart City

Urban Development

Construction activities and large quantity of excavated soil

Dust emissions and AQ monitoring
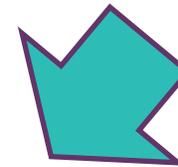
Digitalisation

Lower cost of sensing technologies

Ever-improving connectivity / big data management

Smart Monitoring through Citizens

Involving the Local Community in real-time monitoring of Atmospheric Particulate Matter

Smart Monitoring for a Smart City

- How can multi annual construction activities in a wide urban area earn the trust of neighbors even during their execution?

- How can the Proponent improve its environmental communication to the Stakeholders during the development of a key initiative submitted to an EIA procedure ?

- How can digitalization improve environmental monitoring leading to wider and deeper knowledge about the effectiveness of the technical solutions adopted?

Involving and leading the community to monitor environmental data through personal smart technologies

Smart Monitoring for a Smart City

- The Project Owner provides interested citizens with low-cost sensors for PM2.5/PM10 monitoring

- Integrating data from PM monitoring stations approved by competent Authorities with data provided by nearby citizens

- Involving residents and having their homes (windows, terraces, gardens) installed with sensors for a pervasive air quality monitoring, thus providing in real time visibility over the effectiveness of the technical solutions adopted during construction activities

- Connecting citizens to the Project through a dedicated app giving them information about air quality trends in the nearby area

- Increase the reputation of the Proponent and of his Project

- Giving the possibility to Citizens to be rewarded for publishing their AQ data as per Market/Institutions request

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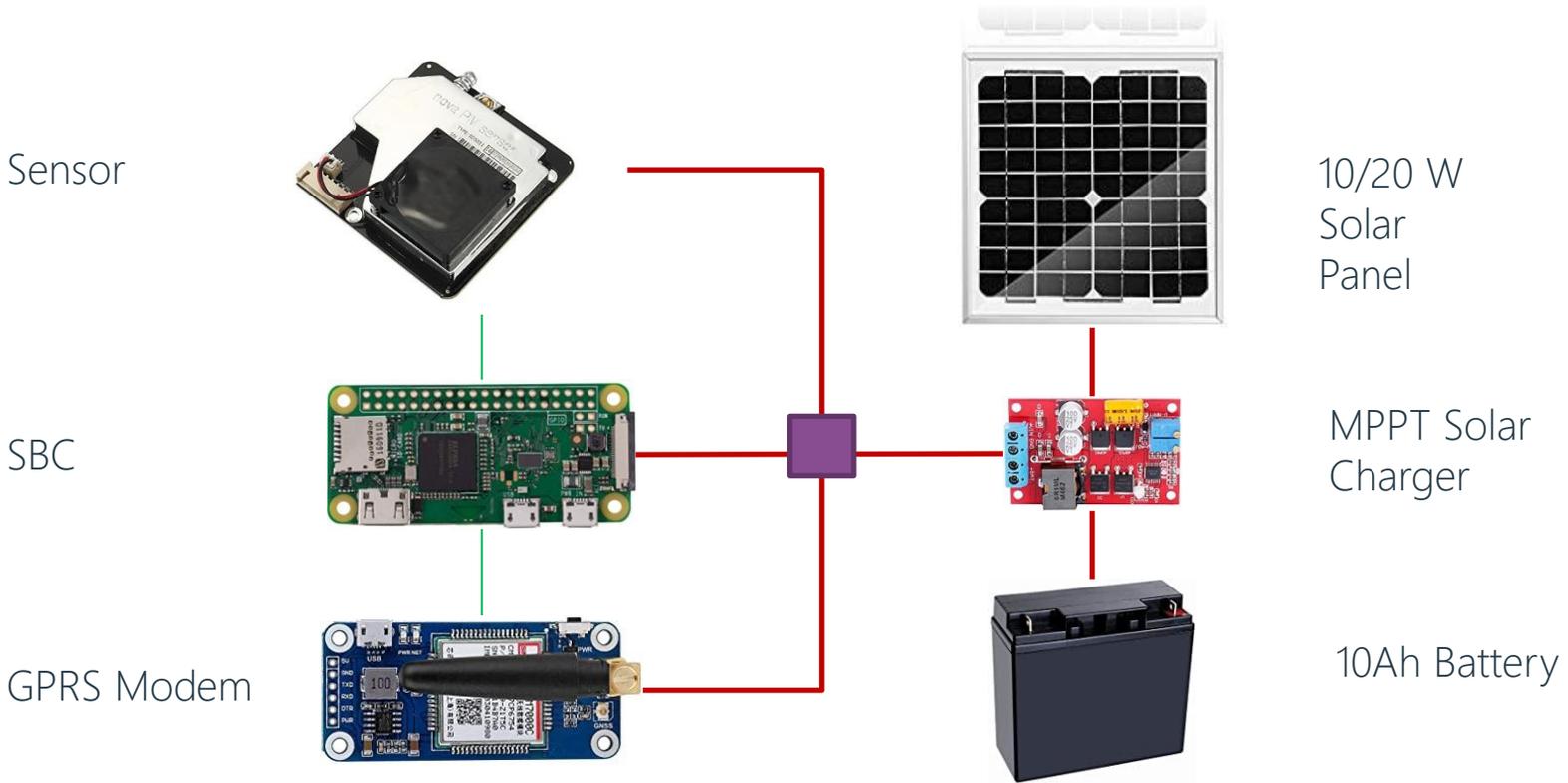
Which data

- PM 2,5 and PM 10 to be registered by personal Smart Monitoring kit with a capture high frequency
- Sensors to be preliminarily validated through the monitoring data provided by official air monitoring stations
- Sensors to be made available by the Proponent to the interested citizens
- Sensors' location should be representative of all the residential areas nearby
- Smart Monitoring kits will be delivered fully configured and ready to be installed.
- Smart monitoring will provide key flags about PM presence, indicating air quality trends during the construction activities execution

How to acquire data: Smart Monitoring Kit for Citizens

Sensor

SBC

GPRS Modem

10/20 W
Solar
Panel

MPPT Solar
Charger

10Ah Battery

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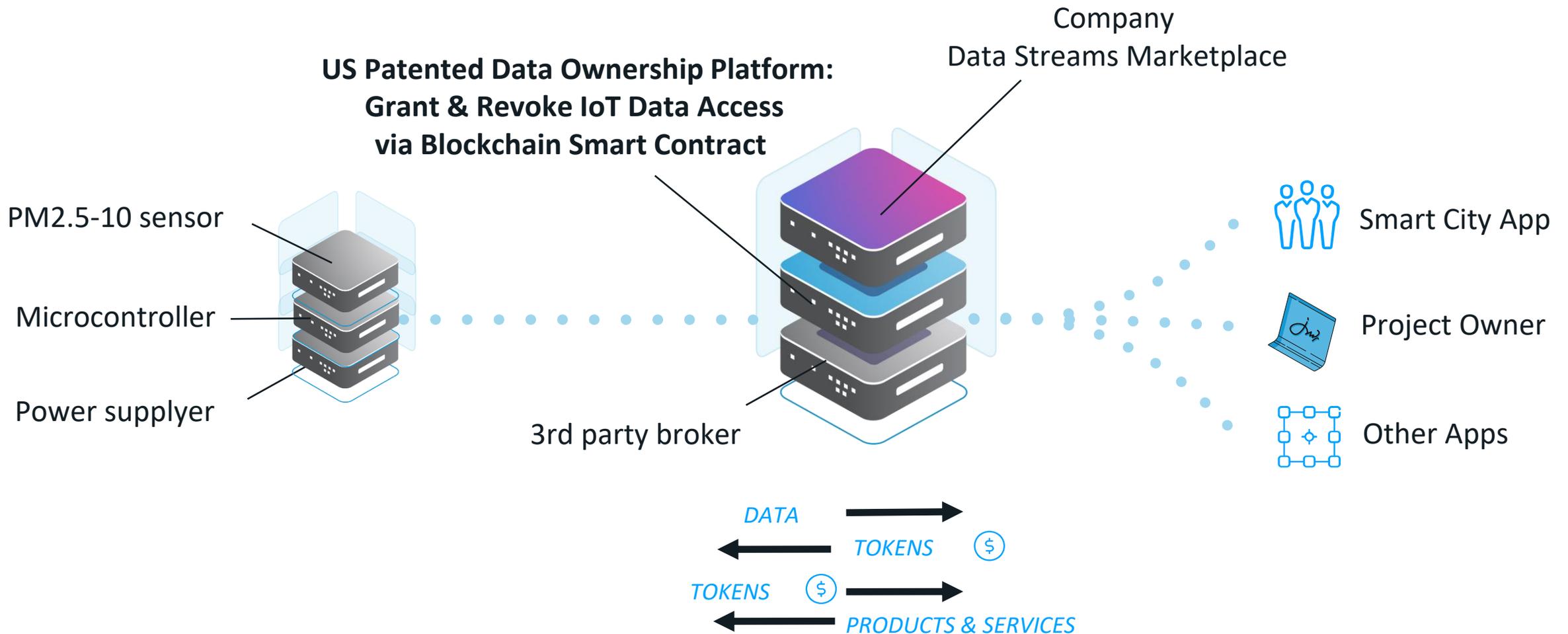
How to acquire data: Hardware/Software issues

Smart Monitoring Kit Selection process

- Sensors Analysis & Evaluation

    - Accuracy, Range and Resolution of the mass concentration:
    - Minimum sampling interval
    - Operating temperature range
    - Sensor size
    - Lifetime

- Electrical Specifications

    - Interface with a microcontroller
    - Supply Voltage requirement
    - Supply Average Current requirement

- Operation and Communication through the Interface (communication stacks)

- Project Architecture

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How to acquire data: Project architecture

PM2.5-10 sensor

Microcontroller

Power supplyer

US Patented Data Ownership Platform: Grant & Revoke IoT Data Access via Blockchain Smart Contract

3rd party broker

Company Data Streams Marketplace

Smart City App

Project Owner

Other Apps

DATA →
← TOKENS $
TOKENS $ →
← PRODUCTS & SERVICES

Data Flow

A smart city needs a smart community of **citizens**, the most pervasive and necessary medium during the execution of a Key Urban Planning initiative.

Engaging citizens in the digitalisation of the urban environment by:

- Ensuring them visibility over **data streams** generated by their particulate matter sensors and over **aggregated data** provided by the Project Owner and other involved City's stakeholders' applications with reference to Air Quality

- Giving them the possibility to share their data in a controlled and GDPR compliant manner with interested Third Companies/ Institution and get rewarded for sharing it

Data Flow

How it works:

- Residents having their homes installed with sensors are both Data Producers and Data Users

- Sensors will send data streams to a Data Broker in the Cloud as Data Exchange Hub managed by the Project Owner

- Data Broker will have different subscriber applications:

  - Project Owner receives in real time data that will be used in decision making process during Construction phase minimising environmental impacts on the nearby citizens

  - Data Users (Residents) can access the platform (through an app) to check real-time monitoring activities and get involved during construction

  - Other Data Users rewarding Data Producers can access directly to the AQ data as per their needs/applications

- Each Citizen with a home-based environmental sensor will use Smart Contracts in the blockchain to grant and revoke data access to Selected Data Users

A presentation by Wood and Ecosteer

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Which communication for smart monitoring

- **Involvement:** Stakeholders, citizens, Third Companies/Institutions

- **Narration:** Building strong content and multichannel   communication

- **Reputation:** Traditional media and event participation

Communication goals

Which communication for smart monitoring

- **Direct contacts** with Local associations already active in the area

- **Social network campaign** including citizens involvement with strong content construction

- **Traditional local media**: radio - neighborhood newspapers - local newspaper backs

Multichannel campaign to achieve communication goals

Let's continue the conversation!

Post questions and comments via chat in the IAIA21 platform.

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