

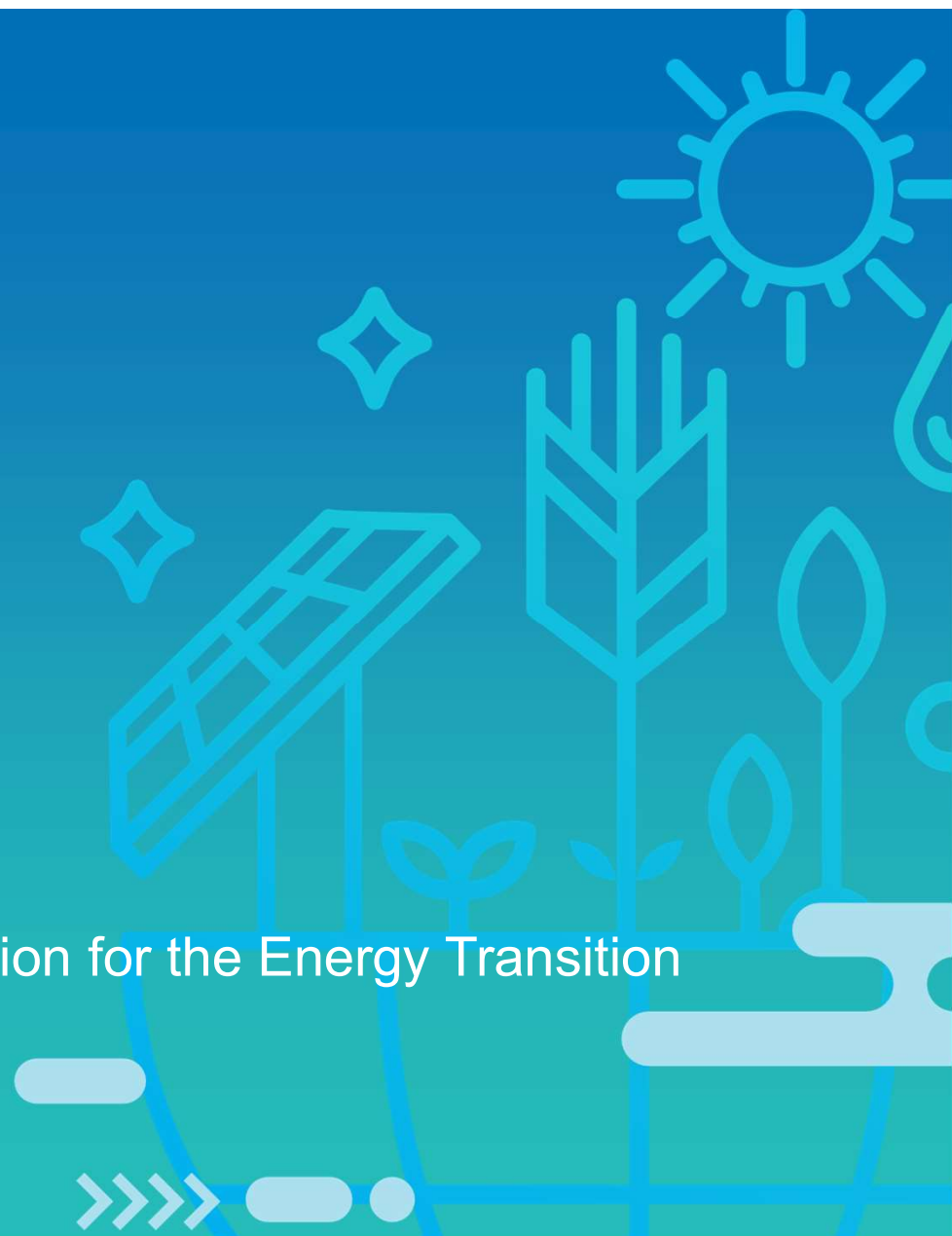


DLF ENERGY SUMMIT 2023

Deep Decarbonization

Grid eXchange Fabric - Digitalization Solution for the Energy Transition

Maarten Mulder and Robert Tusveld, Alliander
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Introduction

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Maarten Mulder – maarten.mulder@alliander.com
Product Owner IoT Field Device Platform at Alliander

Since 2005, I have been involved in the energy sector in various consultancy roles and management positions. Since 2020, I have been serving as the Product Owner for GXF and AWS IoT.



Robert Tusveld – robert.tusveld@alliander.com
Solution architect at Alliander

I have more than 25 years of experience in software development and architecture, especially in complex technical environments. For the last 7 years I have been working at Alliander with focus on architecture in the energy sector.



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Company introduction
GXF history
Use-cases
Architecture
Next steps
Roadmap
Questions



Alliander a network company

2021 in figures

2021 in figures

Number of customer connections

5.8 million

5.8 million in 2020



Lost Time Injury Frequency (LTIF)

2.6

1.8 in 2020



Number of employees

5,991 FTEs

5,881 FTEs in 2020



Electricity outage duration

20.9 minutes

23.2 minutes in 2020



Gas outage duration

44 seconds

83 seconds in 2020



Net CO₂ emissions

115 kilotons

176 kilotons in 2020¹



Net revenue

2.1 € billion

€2.0 billion in 2020



Investments in property, plant and equipment

1,014 € million

€890 million in 2020



Total assets

10.2 € billion

€9.4 billion in 2020



Profit

242 € million

€224 million in 2020



Our service area



Electricity grid length

93,000 km

92,000 km in 2020

Gas grid length

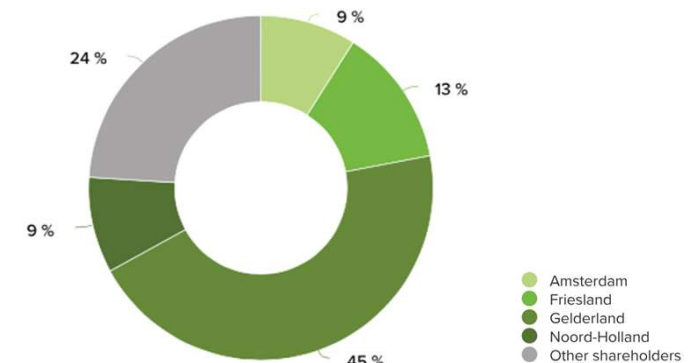
42,000 km

42,000 km in 2020

How we are organised



Our shareholders



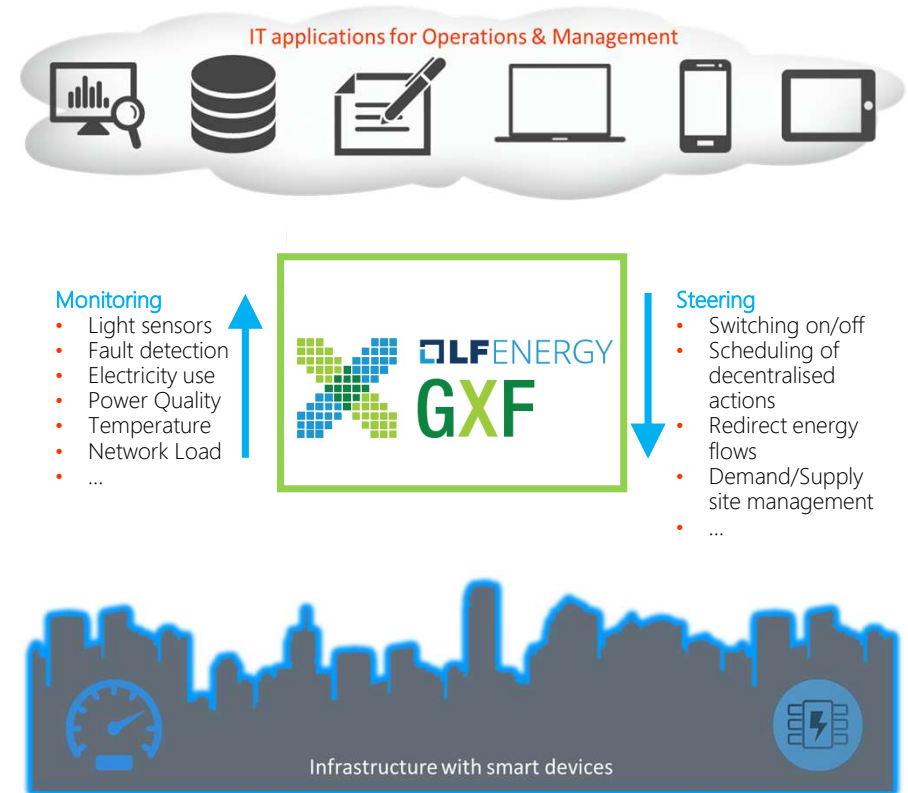
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Grid eXchange Fabric (GXF)

The Grid eXchange Fabric (GXF) is a communication platform that serves as a central hub for managing and controlling devices in public spaces, with use-cases in areas such as smart metering, distribution automation, and public lighting. GXF supports various communication protocols and acts as an intermediary layer between applications and hardware, providing scalability, high security, and no vendor lock-in.

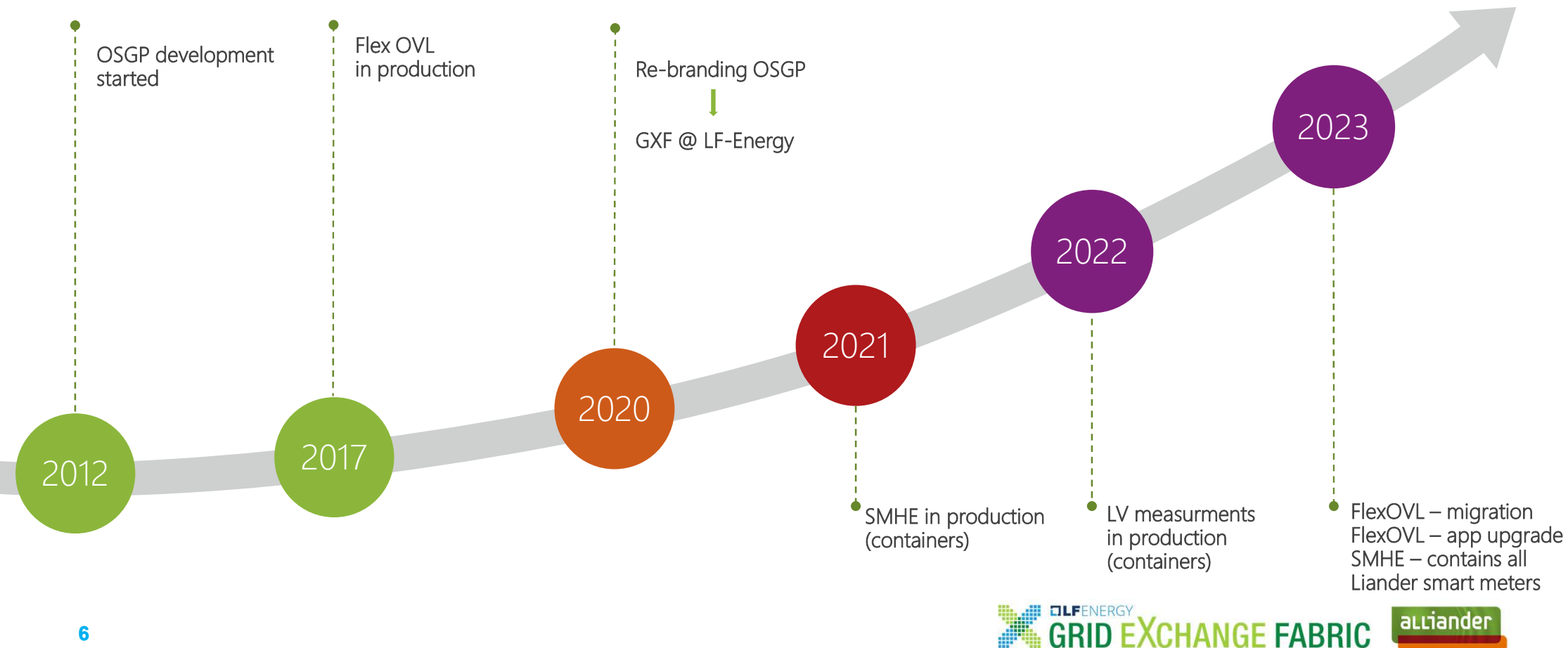
-  **Open** - no lock-in on a specific technology and/or supplier by using open protocol standards and open source technology
-  **Generic** - not limited to one use case, one value proposition or specific device(s)
-  **Independent** - stay in control of your roadmap and be flexible to future changes by building on an open platform ecosystem
-  **Scalable** – designed for high performance, dynamically scaling up and down with number of devices



Timeline

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Flexible public lighting

The FlexOVL service enables the following (main) functions for end users:

- Creating, modifying, and activating street lighting circuit diagrams in the switch devices online
- Ad hoc online switching of public lighting
- Switching public lighting according to the set schedules
- Generating a burn hours report from the platform
- Managing accounts.

Key figures:

- Legal duty commissioned by the government.
- For the entire network area of the network operator Alliander.
- 18.875 Switching devices (Elster/Kaifa) in 1/3 of the Netherlands



Low Voltage Measurements

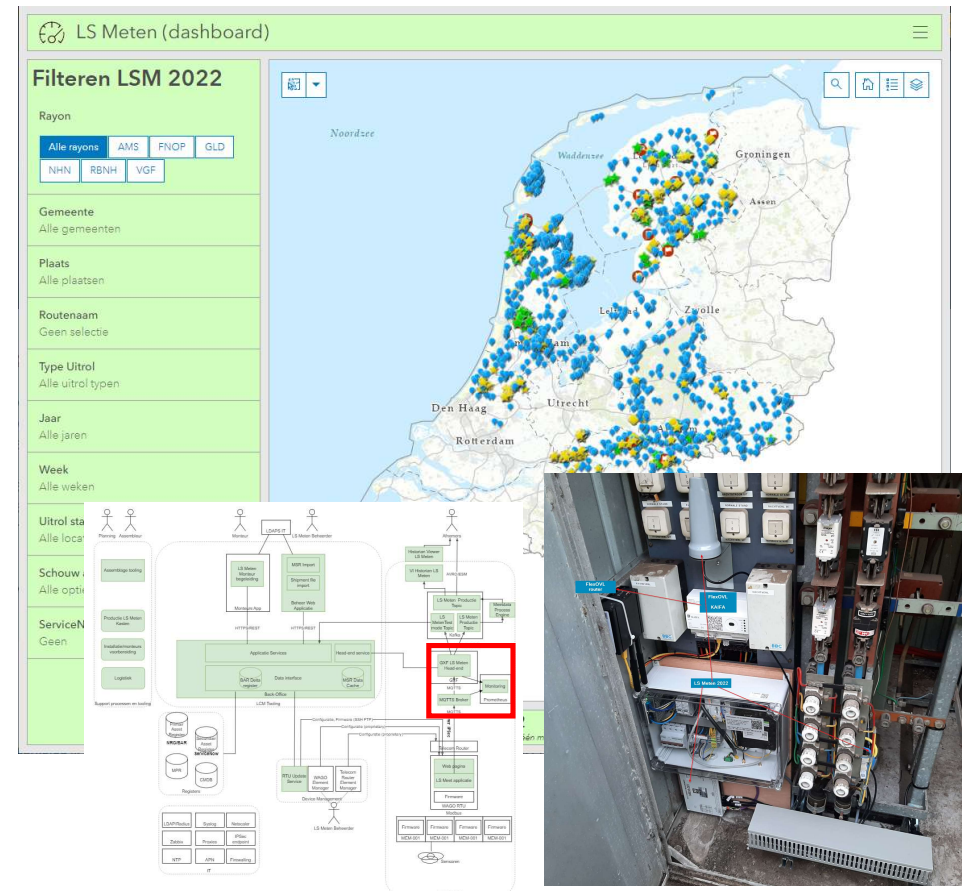
The measurement equipment measures the outgoing Low Voltage (LV) Fields and where possible, the transformer field. For this purpose, Rogowski coils are installed around the cables.

Benefits of this include:

- Better ability to safely integrate customers into our network
- Better ability to control and influence currents when necessary
- Detection of energy fraud

Key figures:

- Demonstrating congestion
- Ultimately for the entire network area of the network operator Alliander
- 2,355 measurement devices in 2023
- Alliander Semantic Model (CIM)



Smart Metering

The smart meter head-end enables Liander for reading out at scale:

- Daily/Interval/Monthly Electricity and Gas values
- Outage read outs and Outage Alarms
- Power Quality readouts: Sag/Swell, Voltage, Current, Power.
- Firmware updates, key changes
- Config changes
- Secure way by HSM
- Do we scale – yes!

Key figures:

- 3.4 Million meters are installed in the headend – March 2023
- 5 Million + read outs a day
- CDMA, LTE-M and GPRS compatible



Value chain architecture

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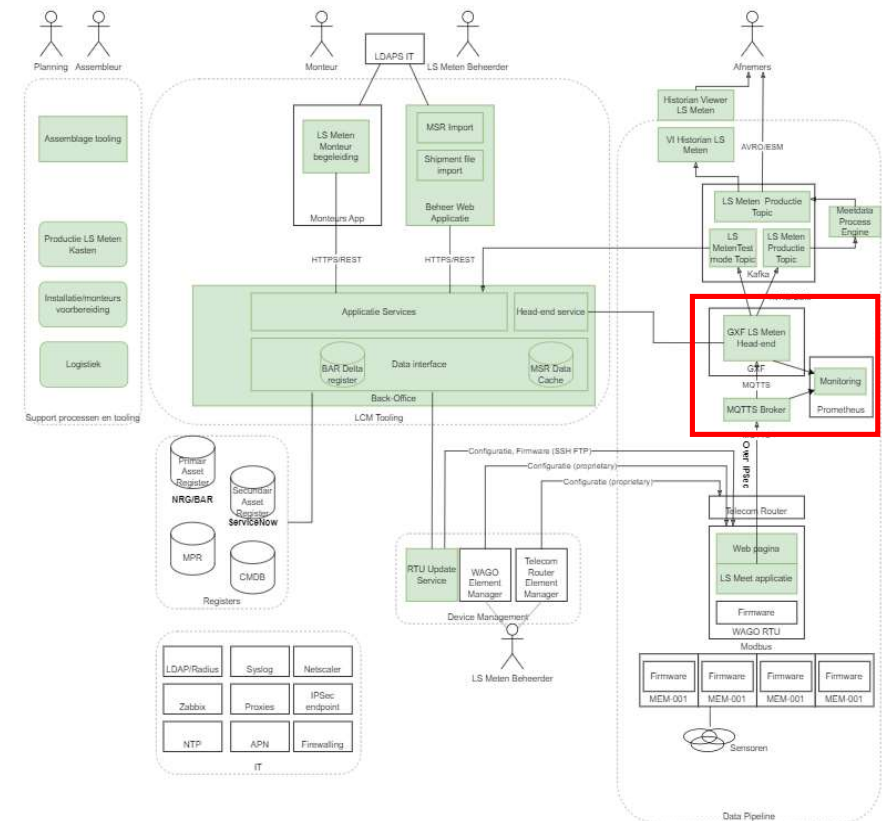
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What is GXF:

- GXF is the central communication platform to communicate with devices in the field
- GXF is there to manage, monitor, control and get information from/to devices in the field
- GXF is a life-cycle management middleware for the devices it manages (configuration, firmware, device management)
- GXF is extensible, flexible and multi-domain

What isn't GXF:

- GXF isn't a complete value chain solution, but an important link in the solution
- GXF isn't an end-user application, but ...
- GXF isn't hardware, but ...
- GXF isn't communication technology like LTE, NB-IoT, etc., but uses existing communication channels within your organization
- GXF isn't a monitoring tool, but ...



GXF Architecture

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Multi-purpose and extendable

Multi secure

- Security measures throughout the architecture – Zero trust

Multi flexible and extendable

- Applications can be added
- Domains can be added (Public Lighting, Smart Metering, Distribution Automation)
- Protocol can be added (IEC61850, OSLP, DLMS/COSEM, IEC60870-5-104, MQTT)
- Communication channels can be added (CDMA, 4G, LTE-M, NB-IOT, LoRaWAN)

Multi-protocol

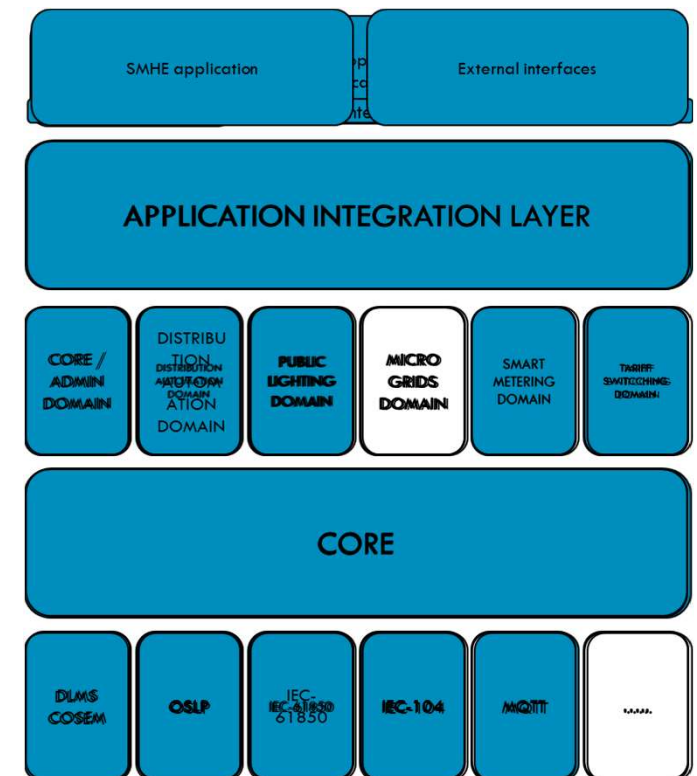
- Protocols are configured per device

Multi-tenant

- Multi owner solution
- Authorization based
- Authentication based

Multi-solution

- Combine several solutions on one instance or separate solutions per instance



Future Use-Cases

Battery Powered Gateway

Using gateway devices can lead to increased standardization of digital chains, making it easier to expand digitization and improving overall management.

Gateway device battery powered

- KB - Cathodic Protection
- KOD - Cable Oil Pressure
- SVK - Fault Detector

MSR Gateway

Gate way device connection to multiple devices

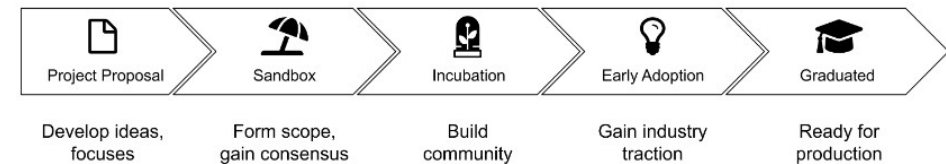
- Public lighting
- LV measurements
- Power quality measurements
- Temperature measurements
- Door sensors



Community development

Within LF Energy

- Early adoption stage → upgrade to graduated stage
- CII Best practices batch → upgrade to Silver badge
- Collaboration with other parties within and outside LFE



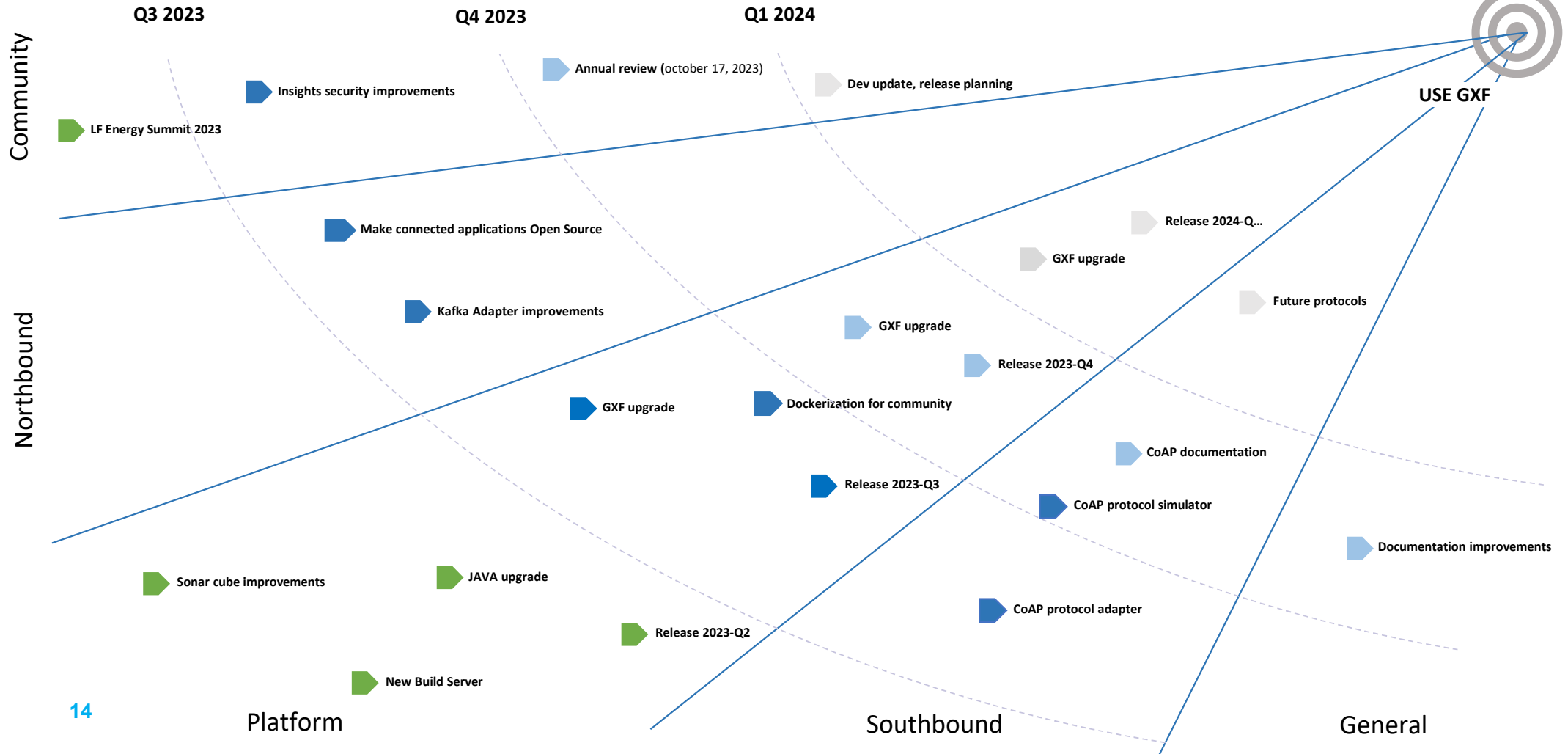
Community improvements

- Easier startup
- Containers
- Accessible
- Description of code/applied hardware
- Making applications open source
- Documentation
- Common Protocols
- GXF Upgrade



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Roadmap



More information - Questions



Visit our Github community @ [Github.com/OSGP](https://github.com/OSGP)



Read our documentation @ [Gitbook documentation](#)



Visit our website @ www.lfenergy.org/projects/gxf



Do you have questions @ gxf@lists.lfenergy.org

