DATATHINGS

SUCCESSFUL DEPLOYMENT OF ALVA AT CREOS LUXEMBOURG

The AI Twin of the Smart Electricity Grid

DataThings - Press conference – September 8th 2023

AGENDA

- DataThings & ALVA
  From research to product

- CREOS Luxembourg
  ALVA in operations

- M. Mario GROTZ
  Director General for Industry, Technology and Research
  On behalf of M. Franz FAYOT, Minister of the Economy

- M. Claude TURMES
  Minister for Energy

- Questions and Answers

ALVA

FROM RESEARCH TO PRODUCT

INCREASING TRENDS

Heat pumps

Photovoltaic panels

Electric vehicles

Digitalisation

Real-time monitoring

USD 14 trillion* needed for global electric grid investments

Power grid investments should grow with **USD 235 B** / yearly*
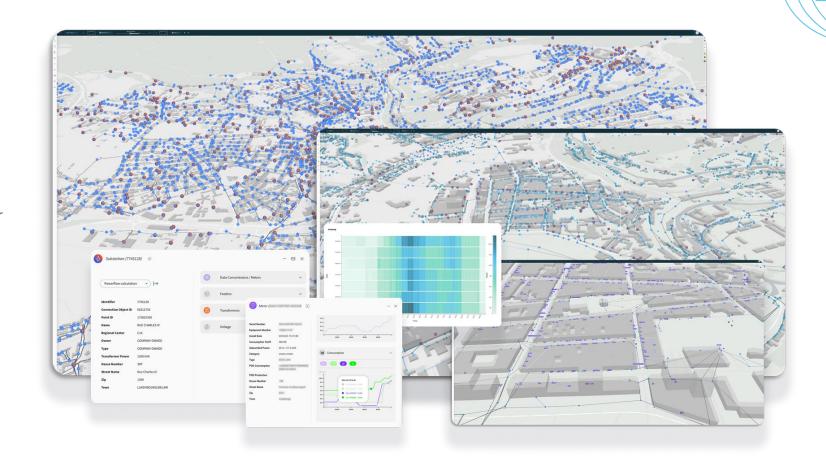
*Source: BloombergNEF

WHAT IS ALVA

Smart grid AI Twin

- Digital twin of the electricity network, fed in live with data from different systems, e.g.,
  - GIS, ERP, smart metering data, …

- AI models to forecast every single consumer and producer in the grid

- Advanced simulations (what-if)

ALVA IN NUMBERS

Speed and volume
DSOs will emerge as large-scale data organizations (big five)

350.000
Smart Meters deployed producing 4 types of data every 15 min

10.500
kilometres cables that are "power flowable" instantaneously

ALVA
Designed together with a Creos Luxembourg for DSOs worldwide
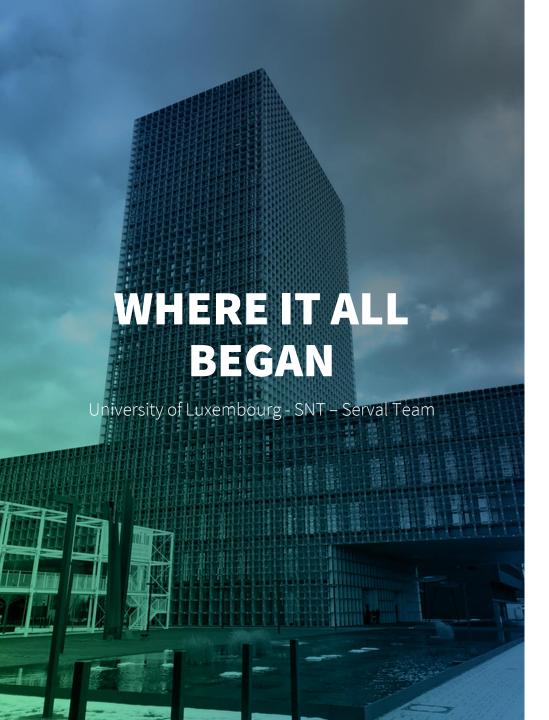
Deployed at Creos and nationwide in Luxemburg.

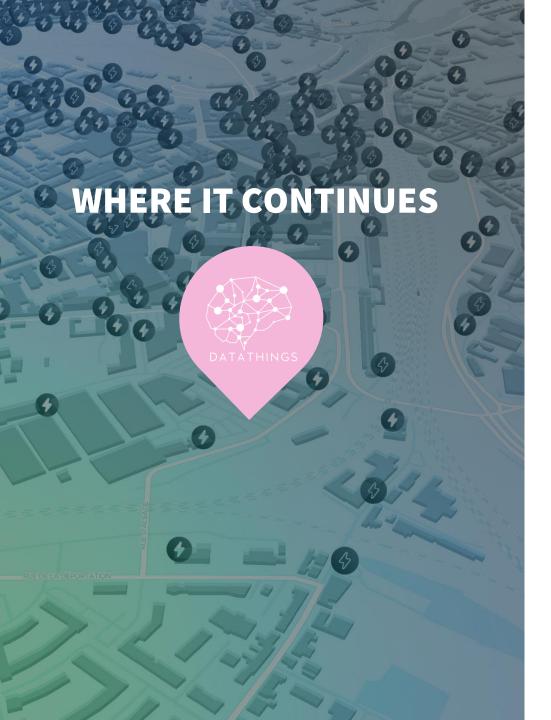### 150 B
metering values collected over the last 3 years.

< 4 min
all individual models are updated in less than 4 min - country-wide.

WHERE IT ALL BEGAN

University of Luxembourg - SNT – Serval Team

- Industries with big data analytics challenges

    - Need to analyze relational data evolving in time

- Prof. Le Traon & Prof. Klein constituted a team to address these challenges

- Founders worked in the same office for 5 years

- FNR Industrial Fellowship SNT – CREOS

- Researched a solution during 5 years in close industrial partnership

    - CREOS – Smart Grids

    - POST – Smart Homes

    - BGL – Transactions analysis

- FNR – Proof-of-Concept to evaluate market viability of spinning-off

- Creation of DataThings to transfer to industries a unique and generic data analytics and Machine Learning technology - GreyCat

WHERE IT CONTINUES

DATATHINGS

2017 - Founded

Spin-off of SnT (University of Luxembourg)

4 Co-founders **(PhDs), >70** scientific publications

GreyCat: proprietary, high performance AI platform

2 clients, 2 (early) **products**: ALVA & AiStudio

2020 – 1.3 Mio € Investment + YIE Support

Strategic Investors and Supporters:

PAUL WURTH SMS group   encevo   THE GOVERNMENT OF THE GRAND DUCHY OF LUXEMBOURG Ministry of the Economy

2023 - Today

20 highly technical staff members, 8 nationalities

6 clients, **>10** ML projects delivered

3 products: **ALVA**, GreyCat, AiStudio

2024 - Onwards

Scale up

ALVA

NEXT STEPS

ALVA
NEXT STEPS

Making the solution HPC-ready

- Explore how MeluXina can empower Alva and allow addressing bigger deployments

Adaptation to other distribution networks

- Water, Gas,
- Transportation
- Logistics

International development

- Partnership with Iskraemeco

iskraemeco
BY ELSEWEDY ELECTRIC

- Smart energy and water solution provider

- Global company with local expertise

- We are embracing diversity and grow culture of inclusivity
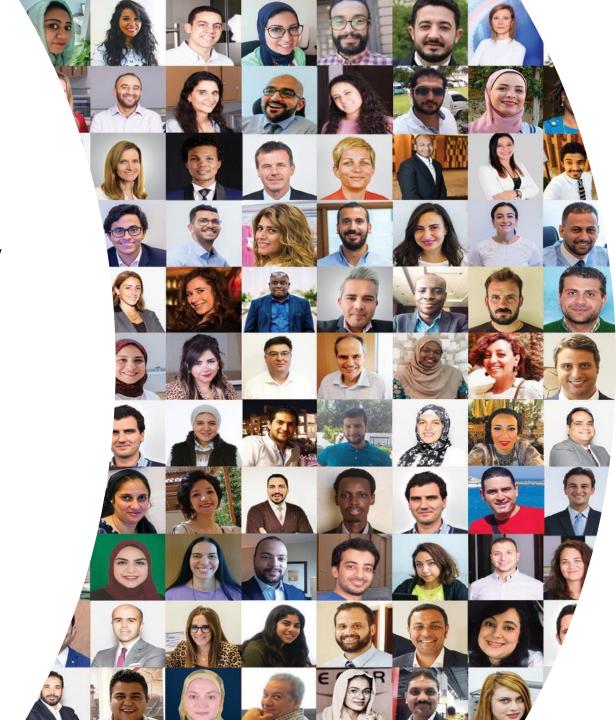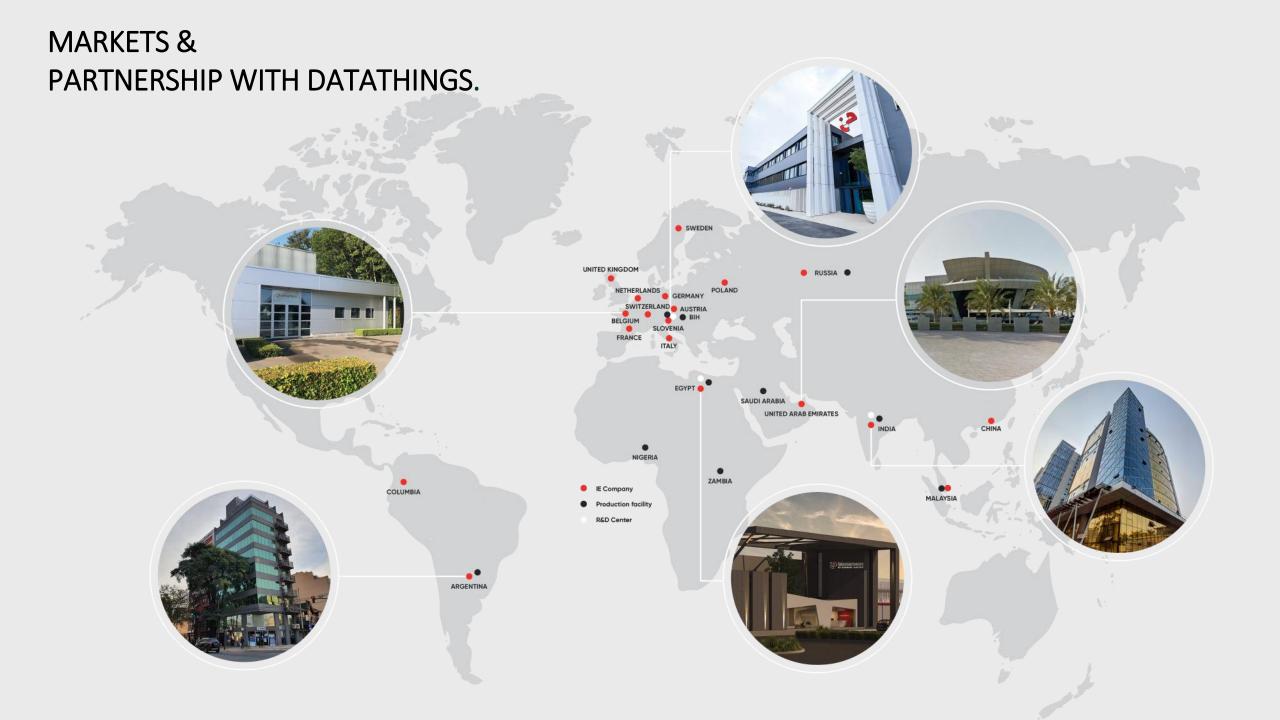
> 80 countries
global presence

1500+
employees worldwide

100.000 m² Production facilities
3 Technology Design Centres

> 200 MIO EUR
revenue in 2022

MARKETS &
PARTNERSHIP WITH DATATHINGS.

SWEDEN

RUSSIA

UNITED KINGDOM

NETHERLANDS
GERMANY
POLAND
SWITZERLAND
AUSTRIA
BELGIUM
BIH
SLOVENIA
FRANCE
ITALY

EGYPT

SAUDI ARABIA
UNITED ARAB EMIRATES
INDIA
CHINA

NIGERIA

ZAMBIA

● IE Company
● Production facility
○ R&D Center

COLUMBIA

MALAYSIA

ARGENTINA

ALVA

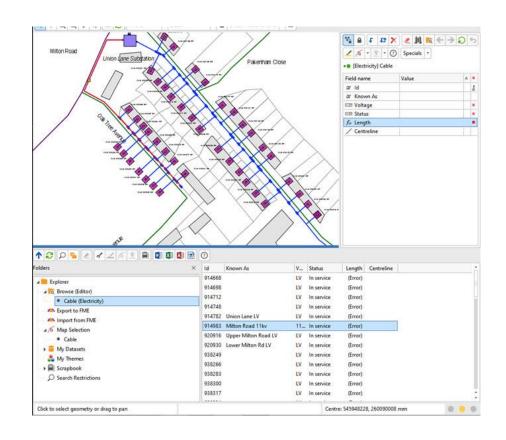## IN OPERATIONS

creos

Alva – Press Release
08.09.2023

Alva – Press Release

Historical management of an electricity grid

- Main concern of the electricity grid operators was to transport the energy to the customer and to avoid repetitive reinforcements of the grid

- Grid dimensioning was based on:
  - synthetic load profiles obtained from a yearly consumption value
  - a few really read load profiles
  - worst case simulation cases (only production and no consumption,…)

- Maintenance activities were analyzed based on:
  - unidirectional energy flow (consumption)
  - experience of technicians

Alva – Press Release

Current evolution of the grid management

- How to manage the Energy Transition

- Thanks to the introduction of the smart metering obtain a better visibility about what happened in the grid

- Grid simulations can be based on real data which helps to identify hot spots and plan investments according to the real needs in the grid

- The whole electricity sector undergoes a digitalization and beside copper, data becomes more and more important

  ➢ Use artificial intelligence "AI" to manage the grid in a more efficient way
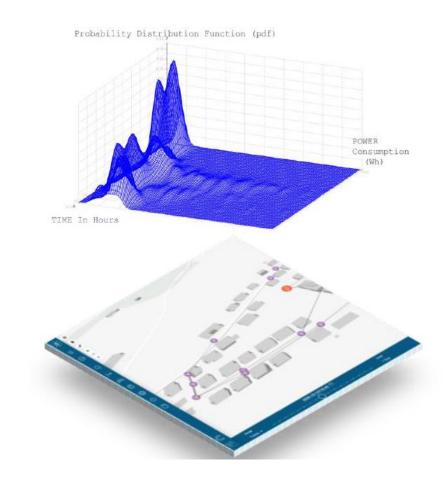
Alva – Press Release

Functionalities of ALVA

The digital twin that is built within ALVA helps Creos to improve its overall monitoring of the electricity grid:

- Assets are visualized on the map
- The related consumption and production values can be shown, analyzed and clustered via heat maps

The machine learning algorithms parse the billions of values contained in every input in a very performant way and generate predictions of the consumption and production values based on various inputs such as:

- Historical values
- Seasonal information
- Weather data
- Other data like prices on the spot market,…

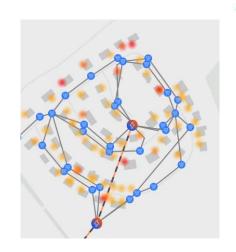# Alva – Press Release

Functionalities of ALVA

The integrated power flow engine allows Creos to run a nationwide power flow calculation
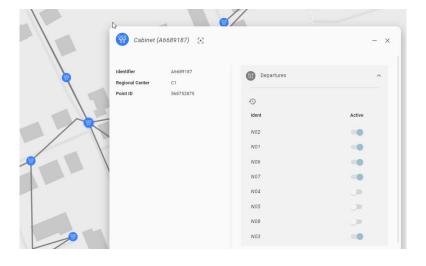
- to simulate the loading of all our cables and assets
- to identify the hotspots in our network which allows to specify better our investments for the future
- to use the grid in a more efficient way

The users have the possibility to simulate themselves a different grid topology (in case of a planned or unplanned maintenance):

- ALVA provides them an analysis of the technical feasibility of this network reconfiguration even for future points in time

To realize a digital twin, several data sources from different systems are combined and data quality issues are avoided.
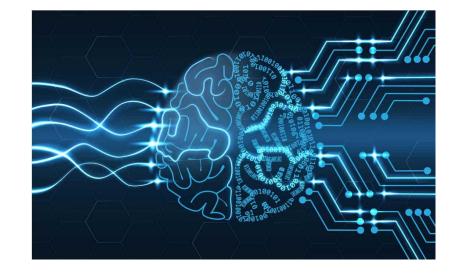
Alva – Press Release

Alva – Press Release

Future outlook for ALVA

The fact that the <u>loads and generations</u> on the electricity network will be <u>more variable</u> as consumptions (EV charging,…) and productions (PV, wind,…) are complex to predict is a real challenge for the grid operators:

- Analysis based on historical data might not be sufficient anymore
- Integration of real-time data will become a must
- Allowing the predictions to become more precise and the digital twin more accurate

A tool like Alva allows the grid operator <u>to simulate different actions</u> in the digital twin and to analyze their outcomes <u>prior of realizing</u> them in the real grid.

The next step in the digital evolution is to use the AI functionalities of Alva to <u>analyze</u> the situation and <u>suggest</u> the <u>best actions</u> to be taken.

M. Mario GROTZ

Director General for Industry, Technology and Research

On behalf of Minister Franz FAYOT,
Minister of the Economy

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

ALVA

: 22

M. Claude TURMES
Minister for Energy

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Énergie et de
l'Aménagement du territoire

QUESTIONS?

CONCLUSION

- Picture session with official delivery of Ava to Creos

- Press Kit available at
  https://datathings.com/alva/press.html

  - Press release text (LU, FR, EN, DE)
  - Illustrations
  - Video
  - Pictures (soon after the event)

THANK YOU
FOR YOUR ATTENTION

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