The Power of a Single Integrated Database

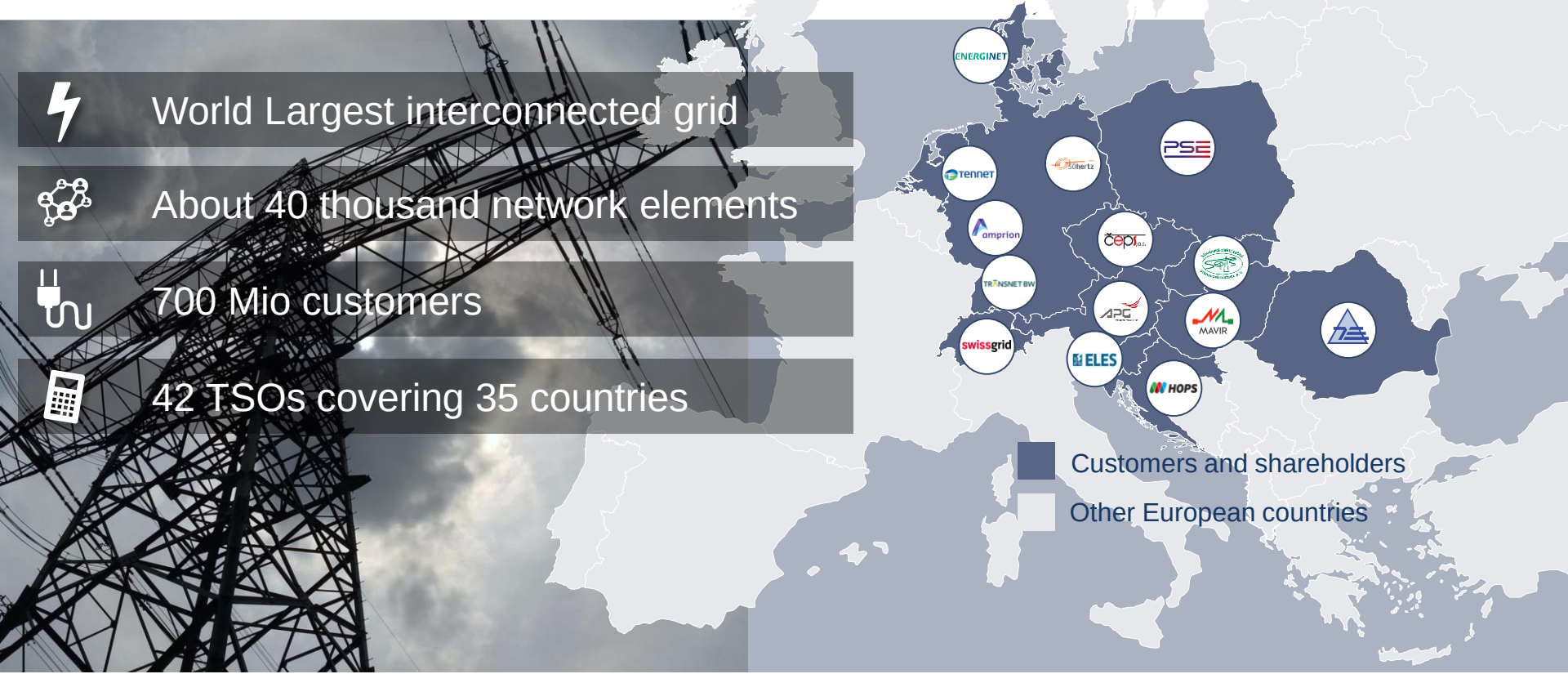
Gábor Bús

TSCNET Services

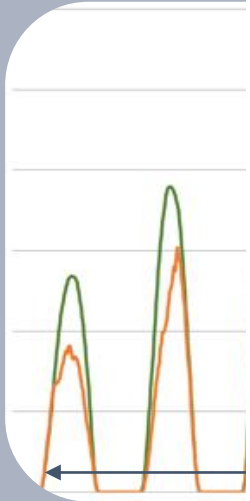
Connect. Create. Coordinate.

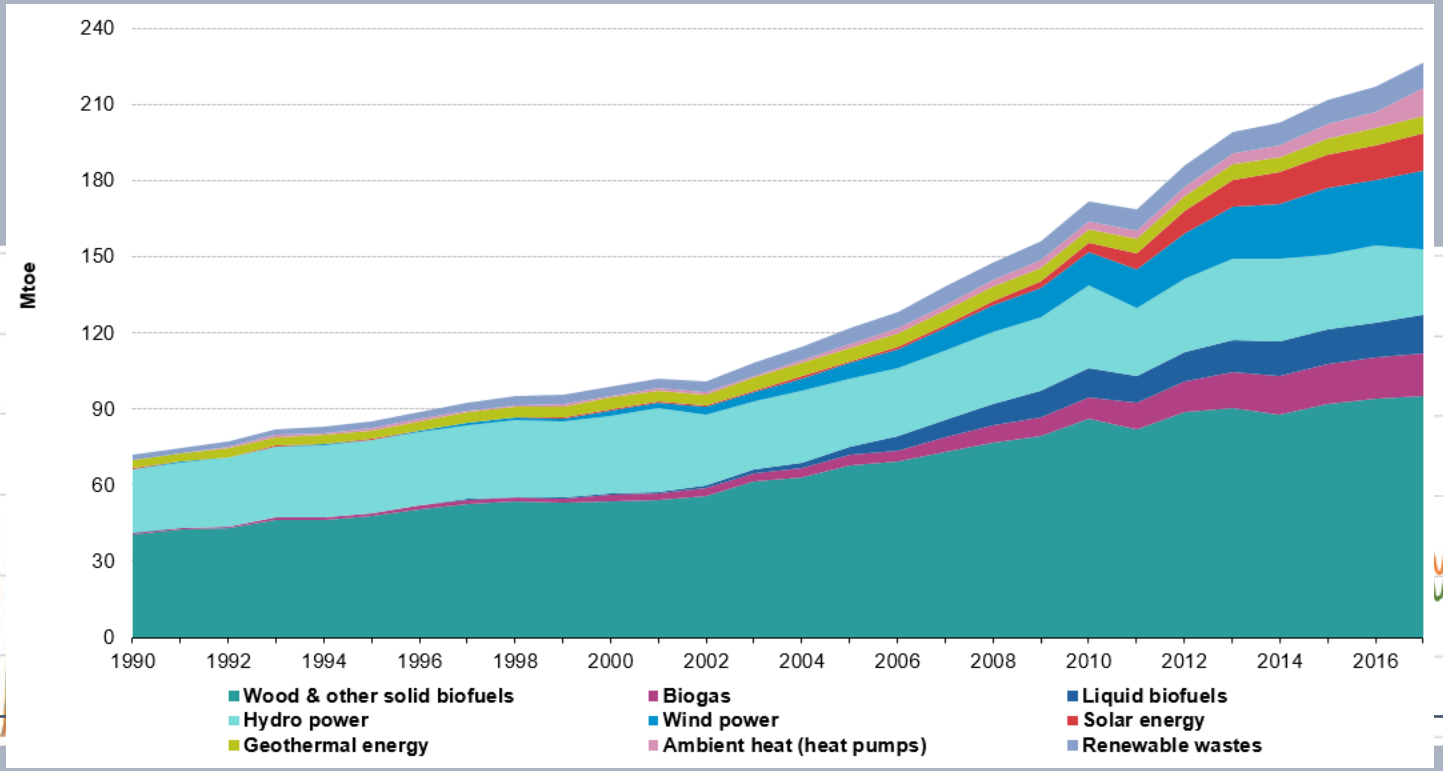
European Power Transmission System

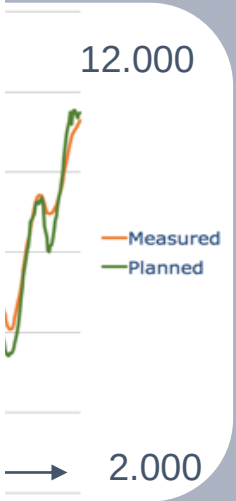
- World Largest interconnected grid
- About 40 thousand network elements
- 700 Mio customers
- 42 TSOs covering 35 countries



European Power Transmission System







The main 5 Services

Outage Planning

- More time horizons

3 Applications

Adequacy Assessment

- 1 Time horizon

1 Application

Coordinated Capacity Calculation

- More time horizons

2 Applications

Common grid Merging

- More time horizons

2 Applications

Coordinated Security Assessment

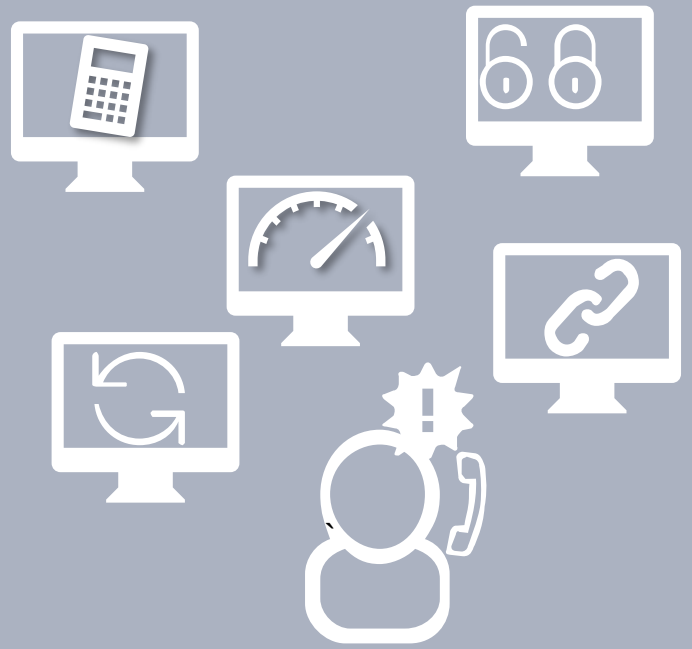
- More time horizons

2 Applications

24/7 shift operation

Challenge #1: Integrate Source Systems

- Diverging tools and environments
- Uncomfortable access of tools via VPN
- Dynamic IDs of network elements
- Overlapping processes during the shifts
- Enormous amount of data to process



Solution #1

- Pinpoint the what and where needs attention
- Integration of relevant data to PI
- Standardise network element IDs
- Implement intuitive PI Vision Dashboards

Solution #1

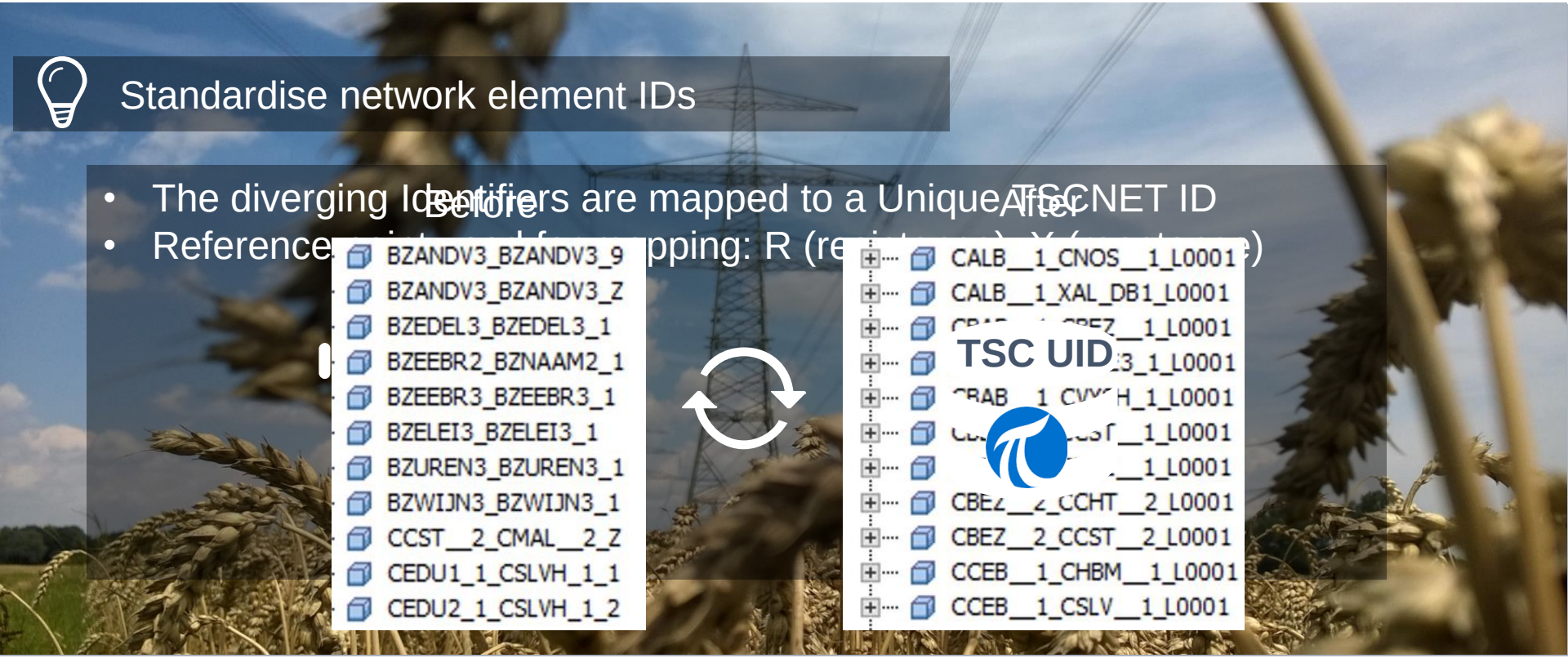
- Pinpoint the what and where needs attention
- Integration of relevant data to PI

- Define the use cases
- Carefully asses the necessary data points (e.g. versions)
- 33 UFL interfaces
- 700k tags

Solution #1

Standardise network element IDs

- The diverging Identifiers are mapped to a Unique TSCNET ID
- Reference maintained for mapping: R (re[illegible]) Y ([illegible])

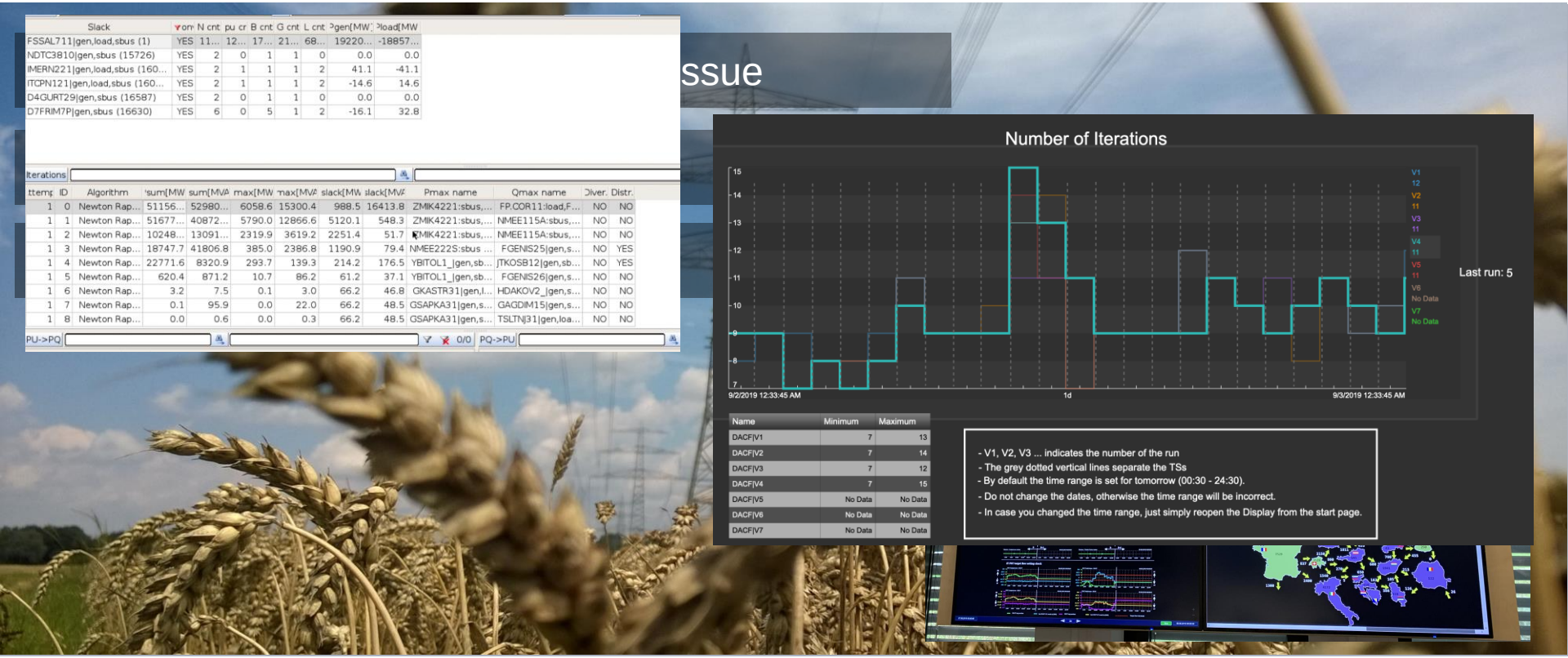


Solution #1

Imple

- An
- No
- 8 F

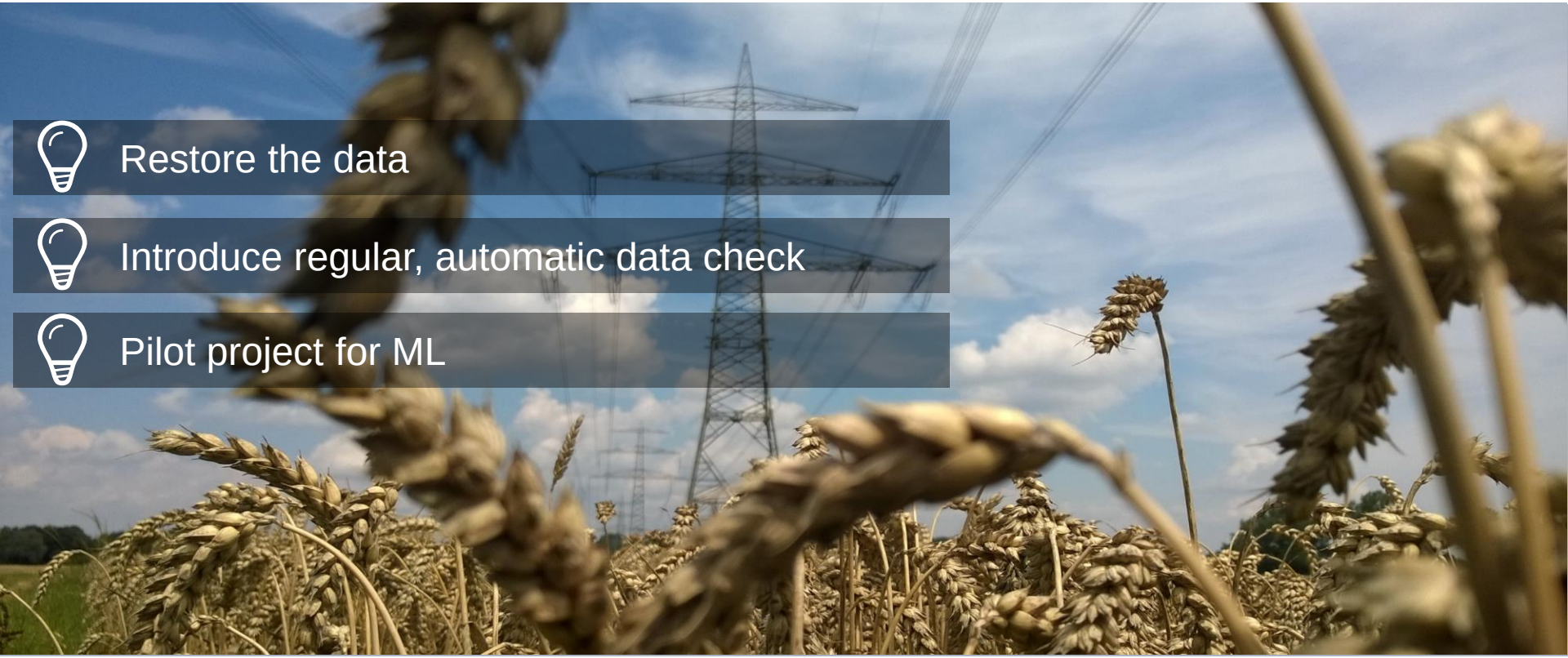
Benefits #1



Challenge #2: ML with clean data

- Explore Machine Learning potentials
- Maintain clean & complete data source

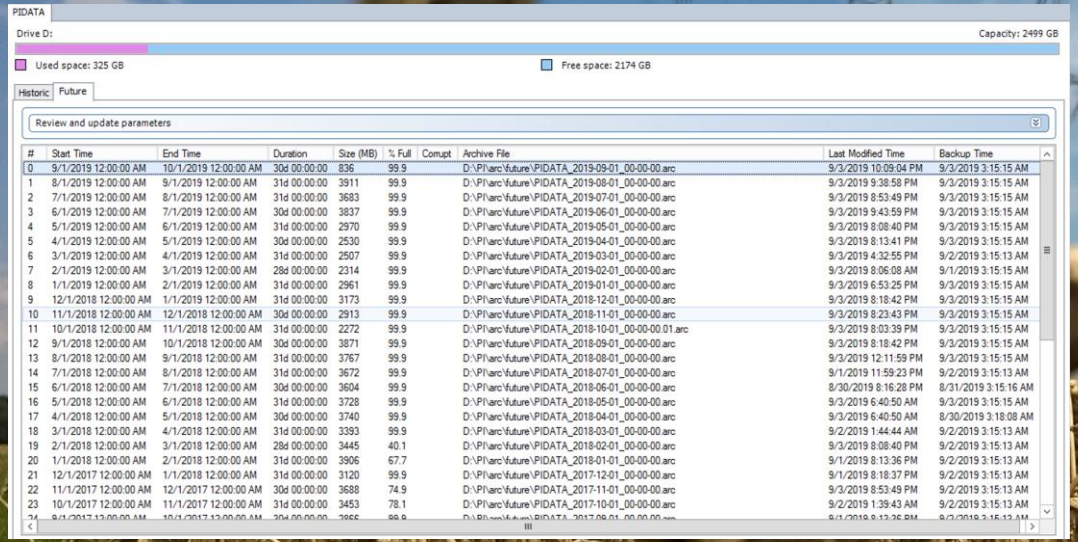
Solution #2



- Restore the data
- Introduce regular, automatic data check
- Pilot project for ML

Solution #2

Restore the data


PIDATA

Drive D: Capacity: 2499 GB

Used space: 325 GB Free space: 2174 GB

Historic Future

Review and update parameters

#	Start Time	End Time	Duration	Size (MB)	% Full	Corrupt	Archive File	Last Modified Time	Backup Time
0	9/1/2019 12:00:00 AM	10/1/2019 12:00:00 AM	30d 00:00:00	836	99.9		D:\PI\arc\future\PIDATA_2019-09-01_00-00-00.arc	9/3/2019 10:09:04 PM	9/3/2019 3:15:15 AM
1	8/1/2019 12:00:00 AM	9/1/2019 12:00:00 AM	31d 00:00:00	3911	99.9		D:\PI\arc\future\PIDATA_2019-08-01_00-00-00.arc	9/3/2019 9:38:58 PM	9/3/2019 3:15:15 AM
2	7/1/2019 12:00:00 AM	8/1/2019 12:00:00 AM	31d 00:00:00	3683	99.9		D:\PI\arc\future\PIDATA_2019-07-01_00-00-00.arc	9/3/2019 8:53:49 PM	9/3/2019 3:15:15 AM
3	6/1/2019 12:00:00 AM	7/1/2019 12:00:00 AM	30d 00:00:00	3837	99.9		D:\PI\arc\future\PIDATA_2019-06-01_00-00-00.arc	9/3/2019 9:43:59 PM	9/3/2019 3:15:15 AM
4	5/1/2019 12:00:00 AM	6/1/2019 12:00:00 AM	31d 00:00:00	2970	99.9		D:\PI\arc\future\PIDATA_2019-05-01_00-00-00.arc	9/3/2019 8:08:40 PM	9/3/2019 3:15:15 AM
5	4/1/2019 12:00:00 AM	5/1/2019 12:00:00 AM	30d 00:00:00	2530	99.9		D:\PI\arc\future\PIDATA_2019-04-01_00-00-00.arc	9/3/2019 8:13:41 PM	9/3/2019 3:15:15 AM
6	3/1/2019 12:00:00 AM	4/1/2019 12:00:00 AM	31d 00:00:00	2507	99.9		D:\PI\arc\future\PIDATA_2019-03-01_00-00-00.arc	9/3/2019 4:32:55 PM	9/2/2019 3:15:13 AM
7	2/1/2019 12:00:00 AM	3/1/2019 12:00:00 AM	28d 00:00:00	2314	99.9		D:\PI\arc\future\PIDATA_2019-02-01_00-00-00.arc	9/3/2019 8:06:08 AM	9/1/2019 3:15:15 AM
8	1/1/2019 12:00:00 AM	2/1/2019 12:00:00 AM	31d 00:00:00	2961	99.9		D:\PI\arc\future\PIDATA_2019-01-01_00-00-00.arc	9/3/2019 6:53:25 PM	9/3/2019 3:15:15 AM
9	12/1/2018 12:00:00 AM	1/1/2019 12:00:00 AM	31d 00:00:00	3173	99.9		D:\PI\arc\future\PIDATA_2018-12-01_00-00-00.arc	9/3/2019 8:18:42 PM	9/3/2019 3:15:15 AM
10	11/1/2018 12:00:00 AM	12/1/2018 12:00:00 AM	30d 00:00:00	2913	99.9		D:\PI\arc\future\PIDATA_2018-11-01_00-00-00.arc	9/3/2019 8:23:43 PM	9/3/2019 3:15:15 AM
11	10/1/2018 12:00:00 AM	11/1/2018 12:00:00 AM	31d 00:00:00	2272	99.9		D:\PI\arc\future\PIDATA_2018-10-01_00-00-00.01.arc	9/3/2019 8:03:39 PM	9/3/2019 3:15:15 AM
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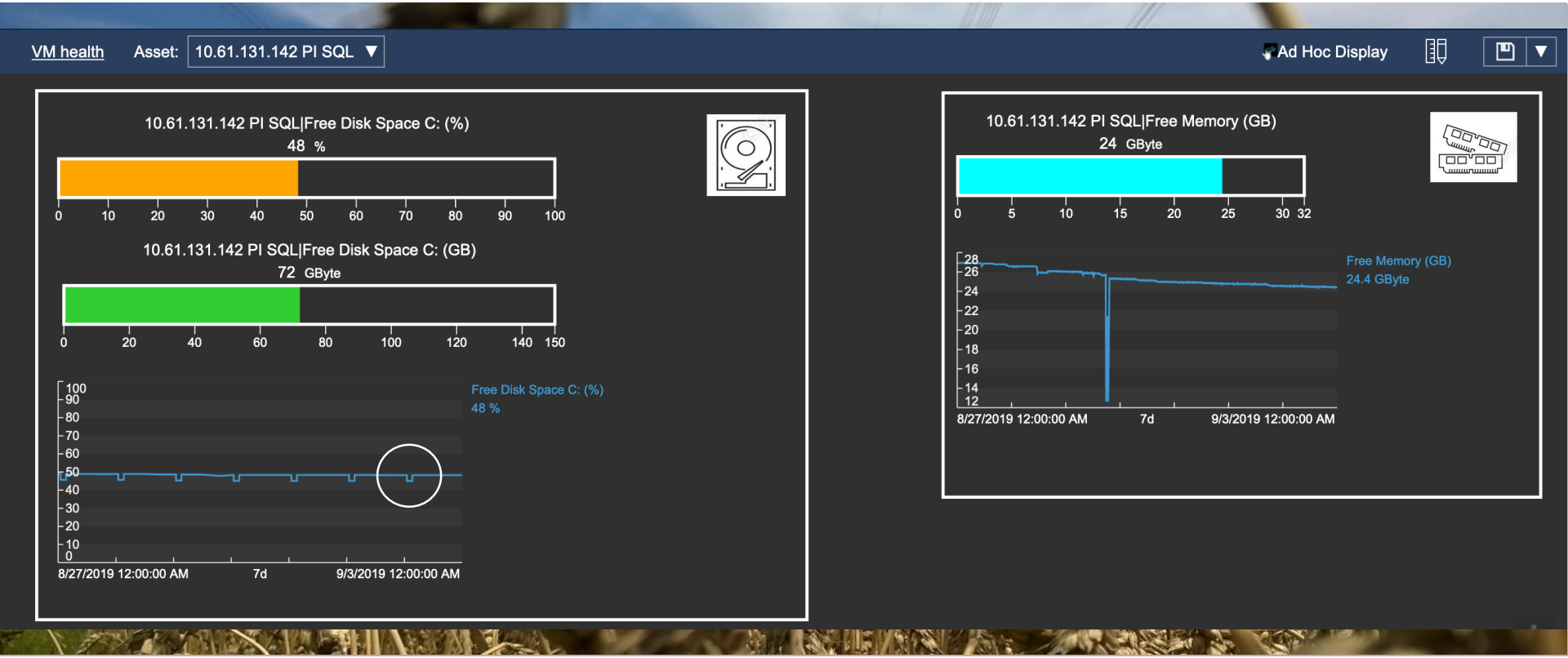
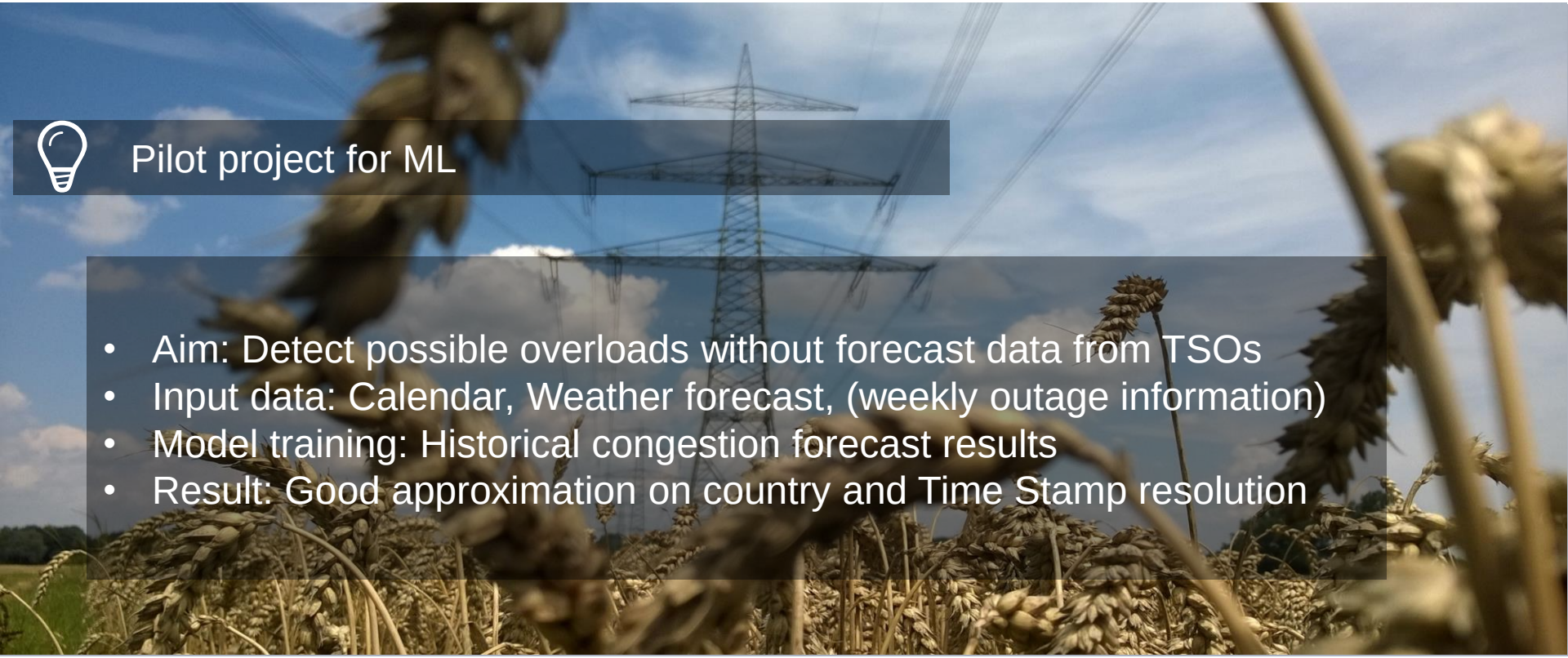
22	11/1/2017 12:00:00 AM	12/1/2017 12:00:00 AM	30d 00:00:00	3688	74.9		D:\PI\arc\future\PIDATA_2017-11-01_00-00-00.arc	9/3/2019 8:53:49 PM	9/2/2019 3:15:13 AM
23	10/1/2017 12:00:00 AM	11/1/2017 12:00:00 AM	31d 00:00:00	3453	78.1		D:\PI\arc\future\PIDATA_2017-10-01_00-00-00.arc	9/2/2019 1:39:43 AM	9/2/2019 3:15:13 AM

Solution #2



Solution #2



Pilot project for ML

- Aim: Detect possible overloads without forecast data from TSOs
- Input data: Calendar, Weather forecast, (weekly outage information)
- Model training: Historical congestion forecast results
- Result: Good approximation on country and Time Stamp resolution

Benefits #2

- Lessons learned: clean data is 80% of ML or data analyses
- It is proved that ML can be potentially used for enhanced services

Single Integrated Database

TSCNET Services
Connect. Create. Coordinate.

CHALLENGES

- Diverging source systems and IDs
- Too much data for human processing
- Historize and save data in a secure manner
- Potential in ML?

SOLUTION

- Integrated source system to a single database based on pre-defined use cases
- Run automatic analyses
- Inform operational staff via visualization and notification
- Maintain database health

BENEFITS

- Less time and effort in analyses and reporting
- Higher level of database maintenance
- Proven ML concept for future services

Thank you for your attention

- Gabor Bus
- Lead Data Visualization and Analyses
- TSCNET Services GmbH
- g.bus@tscnet.eu

Questions?

Please wait for the **microphone**

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