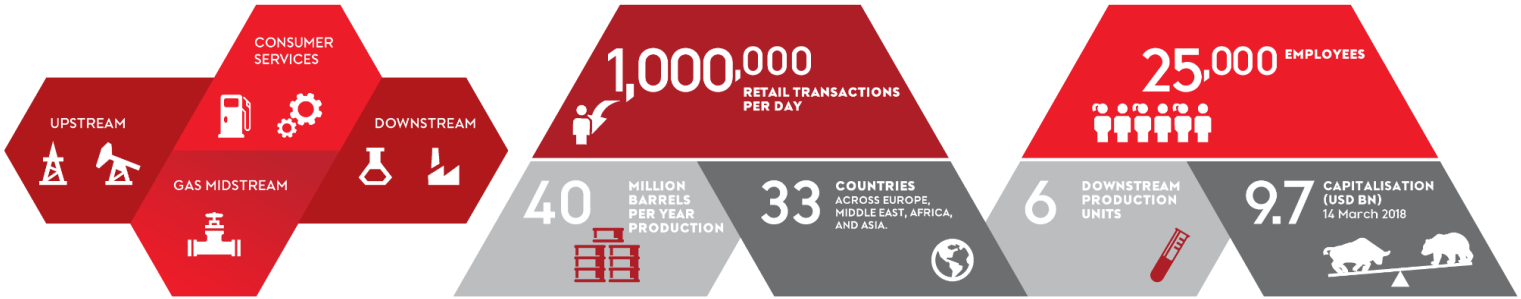
PI AF architecture as backbone of digital transformation & advanced analytics developments in MOL Downstream

Tibor Komróczki
Károly Ott

The MOL Group at a Glance

- MOL GROUP IS AN INTEGRATED, INTERNATIONAL OIL AND GAS COMPANY, HEADQUARTERED IN BUDAPEST, HUNGARY
- ACTIVE IN OVER 30 COUNTRIES
- INTERNATIONAL WORKFORCE OF OVER 25,000 PEOPLE
- TRACK RECORD OF MORE THAN 100 YEARS IN THE INDUSTRY
- 4 REFINERIES, 2 PETROCHEM PLANTS
- LOGISTICS INCLUDING 2,000 RETAIL STATIONS



MOL Process Information & Automation

- Closing the gap between process control and business
- Project and CR management
- Overall monitoring of refinery operation
- In-house developed PI solutions

- Team of 18 Process Information & Automation Engineers (APC/RTO/OTS & PI Systems)
- Report to Technology manager & group level
- IT in a supportive role…minimally involved – Operating Systems and SQL Servers

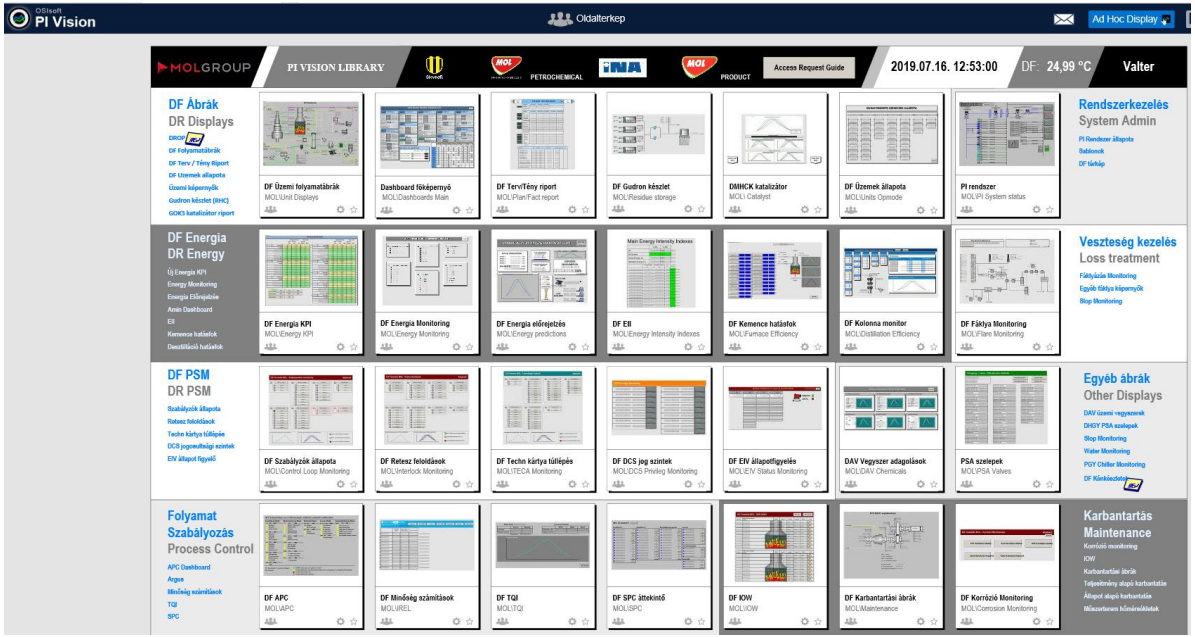
ADVANCED PROFITABILITY APPLICATIONS	REFINERY INFORMATION SYSTEMS	ADVANCED SAFETY & RELIABILITY APPLICATIONS
▪ ADVANCED PROCESS CONTROL ▪ INFERENTIAL MAINTENANCE ▪ KPI BREAKDOWN ▪ SOLOMON CALCULATION ▪ ENERGY MONITORING ▪ NAPHTHA POOL OPTIMIZATION	▪ NICE (NATURAL INFO CENTRE) ▪ PLANT INFORMATION (PI) ▪ SEMAFOR (KPI SYSTEM) ▪ SHAREPOINT DEVELOPMENTS ▪ SIGMAFINE (MATERIAL BALANCE) ▪ OPRALOG (E-LOGBOOK)	▪ ALARM MANAGEMENT ▪ INDUSTRIAL NETWORK ▪ HUMAN MACHINE INTERFACE ▪ OPERATOR TRAINING SIMULATOR ▪ CONTROL PERFORMANCE MONITOR

PI SYSTEM OVERVIEW

- 4 HA COLLECTIVES, ~400K TAGS
- USED BY MOL, MPC, LOGISTIC

- ELEMENTS:
  - 350 ELEMENT TEMPLATES
  - 23K ELEMENTS & GROWING (65X SCALE)

- EVENTS:
  - 6K NOTIFICATIONS
  - 10K EVENT FRAMES ANALYSES
  - 50K EVENT FRAMES (EXCEPTION BASED OPERATIONS)



INCREASING PROFICIENCY AND PRODUCTIVITY THROUGH DIGITALIZATION

COMPETENCY MANAGEMENT

INSTRUCTOR LED TRAINING

GAP ANALYSIS

COMPETENCY FRAMEWORK

EMBRACING DIGITALIZATION

WORKFORCE

TECHNICAL PERFORMANCE SUPPORT

LEARNING MANAGEMENT

REVIEW EVALUATION

INVEST IN HUMAN CAPITAL AND DEVELOPMENT THAT PROMOTE DIGITAL THINKING

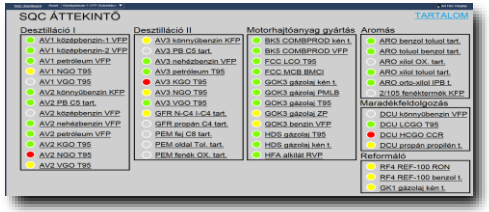
PI SYSTEM DEVELOPMENT & PI VISION DISPLAYS

PI SYSTEM

- ORION TO PI INTERFACE
- NICE TO PI INTERFACE
- NOTIFICATION WEBSERVICE UPGRADE

ADVANCED APPLICATIONS

- ADVANCED PROCESS CONTROL
- STATISTICAL QUALITY CONTROL
- TANK QUALITY INTEGRATOR

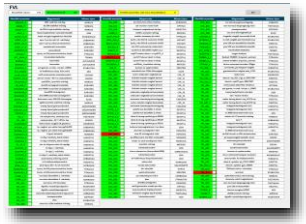


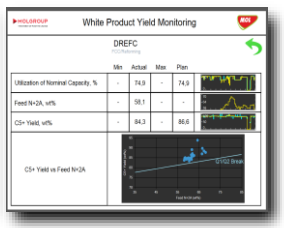
PROCESS SAFETY MANAGEMENT

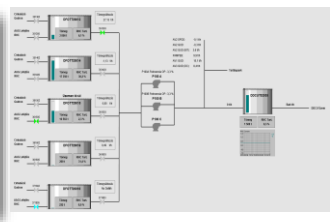
- 30 DAYS ILOCK MONITORING

PROCESS INFORMATION SYSTEMS

- UNIT BLOCK DASHBOARDS
- GROUP WHITE PRODUCT YIELD
- REFINERY N2 MONITOR
- PLAN FACT REPORT

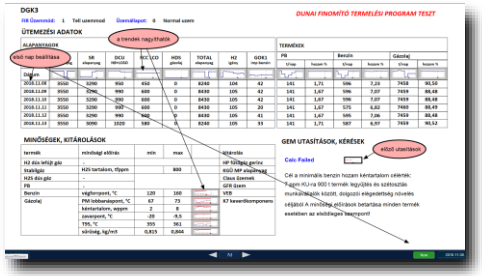


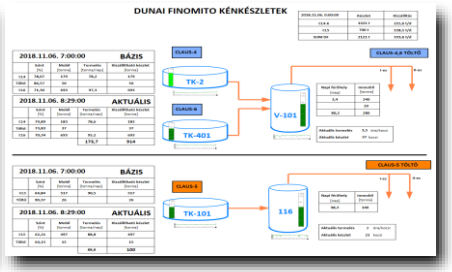




OTHER REFINERY SYSTEMS

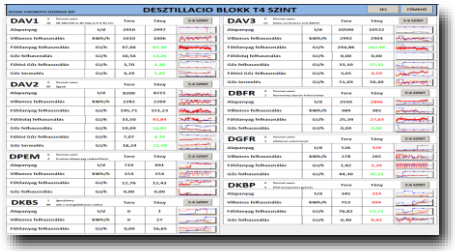
- LABOR EQUIPMENT AVAILABILITY
- ONLINE PRODUCTION PROGRAM
- SULFUR STOCK AND SHIPMENTS
- CATALYST REPORTS
- CHILLER MONITORING





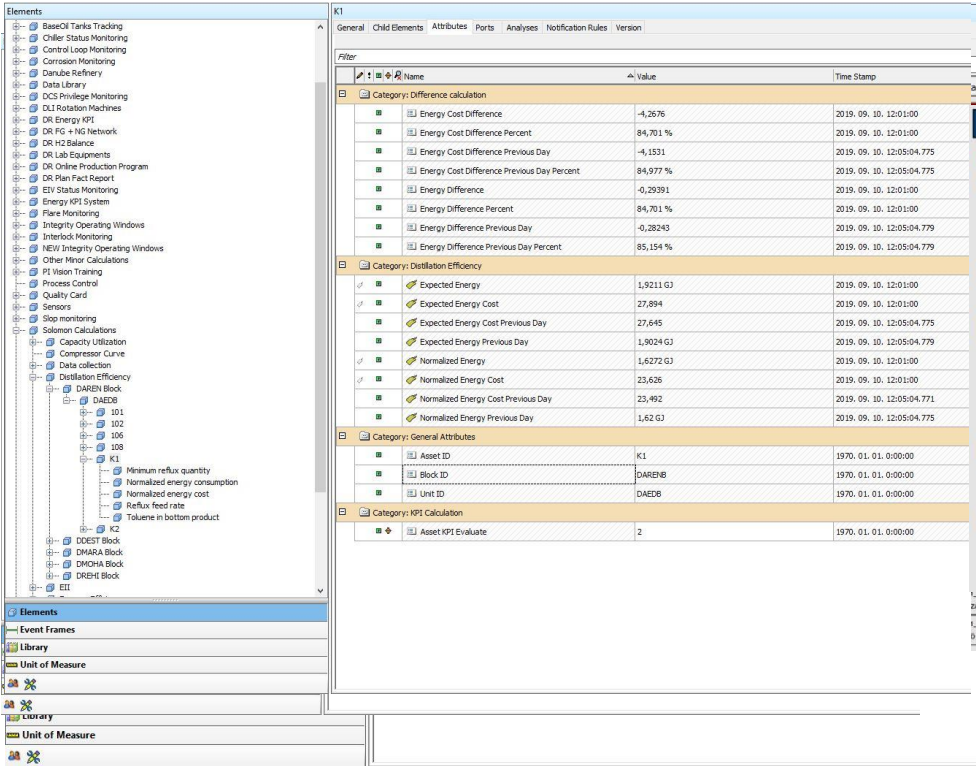
ENERGY MANAGEMENT

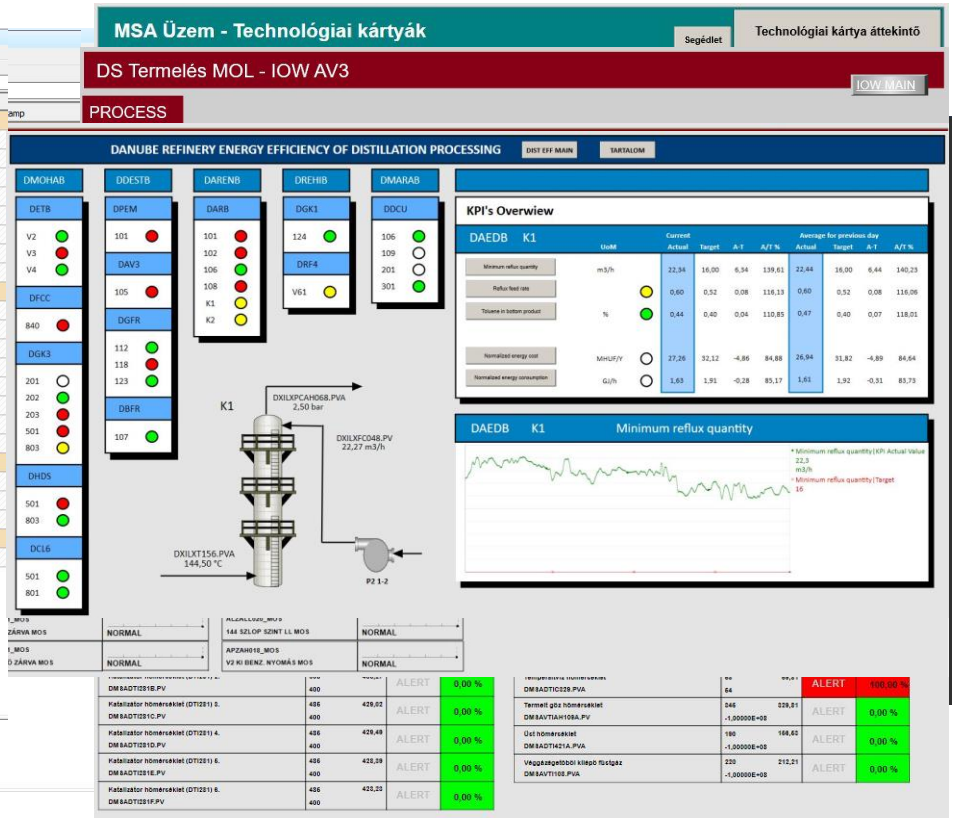
- ENERGY KPI SYSTEM
- ENERGY MONITORING SYSTEM
- EFFICIENCY MONITORING



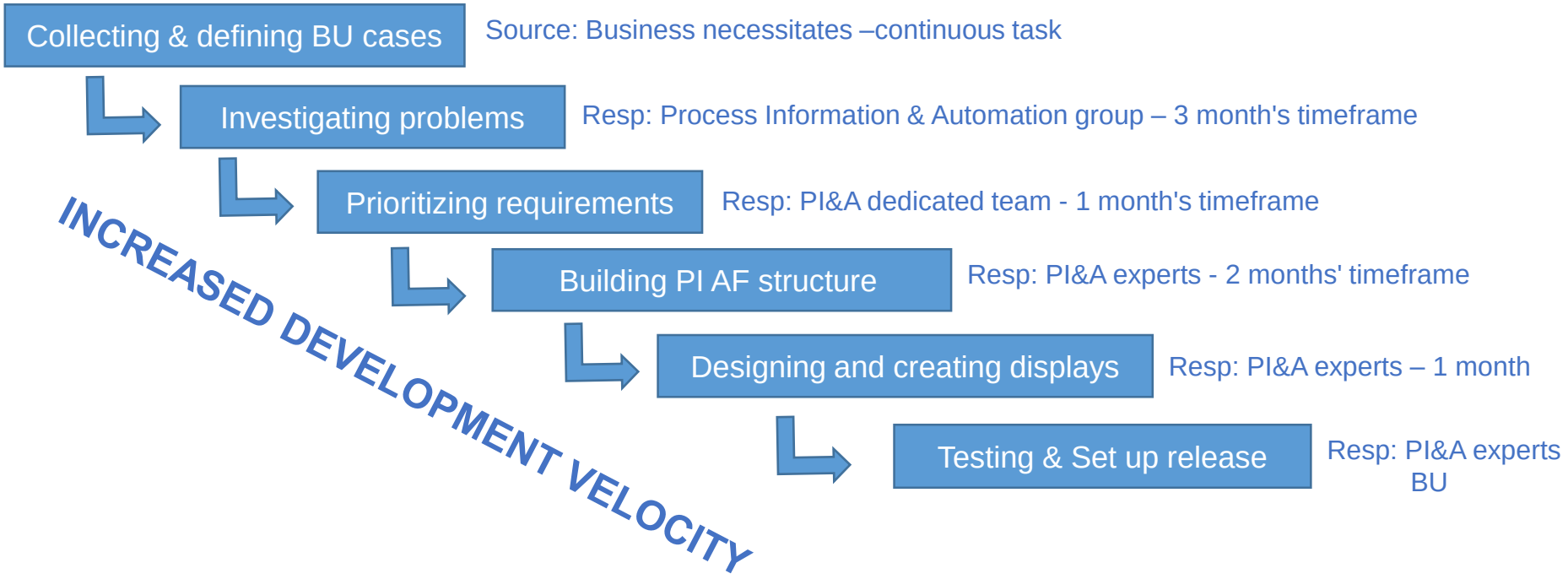
- PI Tag & AF structure establishment
- Bottom-up development
- Rapid roll out of solutions

EXAMPLES - [illegible]





PI AF & PI Vision development workflow



BUILDING PI AF SYSTEMS STEP 1

- DEFINING BUSINESS CASE → MONITORING OF FLARING ACTIVITIES:
- UNDERSTANDING PROBLEM → TOO MUCH FLARING ACTIVITY IN THE REFINERY
- DEFINING SCOPE → DETECT FLARING (AND SAFETY VALVE BLOW-DOWNS) IN THE REFINERY AND DOCUMENTING IT (IN E-LOGBOOK)
- WORKING OUT METHODOLOGY → VIA MEASUREMENT OF FLARE FLOWS (DIRECT) AND/OR VIA MEASUREMENT OF PRESSURES, TEMPERATURES, FLOWS, VALVE POSITIONS, ETC. (INDIRECT)

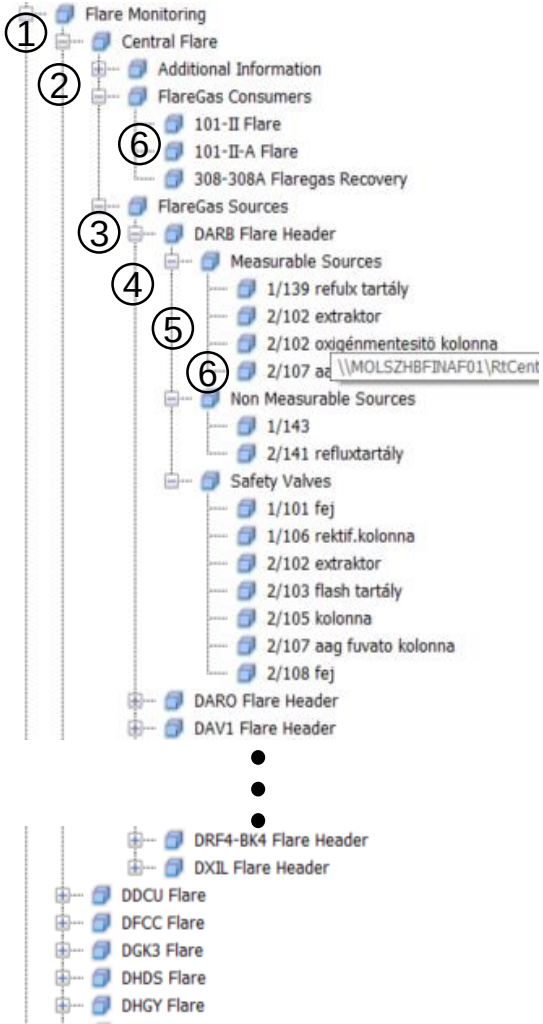
BUILDING PI AF SYSTEMS STEP 2

BUILDING UP AF STRUCTURE

- CREATING THE SKELETON
- FROM TOP TO BOTTOM

LAYERS:

1. SYSTEM
2. FLARES
3. CATEGORY (CONSUMER/SOURCE)
4. UNITS
5. CATEGORY (MEASURABLE OR NOT)
6. EQUIPMENT



BUILDING PI AF SYSTEMS
STEP 3

BUILDING IN FUNCTIONALITY

- CONFIGURING ATTRIBUTES, ANALYSES, NOTIFICATIONS, TABLES, ETC.
- FROM BOTTOM TO TOP (USUALLY)

Category: Auxiliary Attributes			
	ElementID	46affc53-e62c-11e5-8bc5-54ee754f2805	1970. 01. 01. 0:00:00
Category: Configuration Parameters			
	Flare Alerting Blocked	Nem	1970. 01. 01. 0:00:00
	Measurement	DAR1APV009.OP	1970. 01. 01. 0:00:00
Category: General Attributes			
	Equipment Name	1/105 oxigénmentesítö kolonna	1970. 01. 01. 0:00:00
	Flare Connection Position	fej	1970. 01. 01. 0:00:00
	Flare Header ID	DARB	1970. 01. 01. 0:00:00
	Flare Header Name	DARB fáklyagerinc	1970. 01. 01. 0:00:00
Category: Information			
	Blind	Nem	1970. 01. 01. 0:00:00
	Bypass Valve	Nincs	1970. 01. 01. 0:00:00
	Comment	-	1970. 01. 01. 0:00:00
Category: Limit			
	HI Limit	60	1970. 01. 01. 0:00:00
	LO Limit	-1000	1970. 01. 01. 0:00:00
Category: Process Data			
	Measured Value	48,848	2019. 09. 06. 13:51:09
Category: Results Final			
	Flare Source State	0	2019. 09. 06. 13:51:10
Category: Time Cumulated Data			
	Flaring Ratio	0	2019. 09. 06. 13:51:53.062

Name	Backfilling
FlareSource Event Generation (AbsType)	
Flaring State Calculation Measurable Flow	

Description:
Categories: FLAREGeneral:FLARESourceIndicator
Analysis Type: Expression Rollup Event Frame Generation

Add a new variable — Evaluate

Name	Expression	Output Attribute
flareStateLogic	IF TimeGE('Measured Value', '*-6m', '*', 'HI Limit') > 350 OR TimeLE('Measured Value', '*-6m', '*', 'LO Limit') > 350 THEN 1 ELSE 0	Map

```
IF TimeGE('Measured Value', '*-6m', '*', 'HI Limit') > 350 OR TimeLE('Measured Value', '*-6m', '*', 'LO Limit') > 350 THEN 1 ELSE 0
```

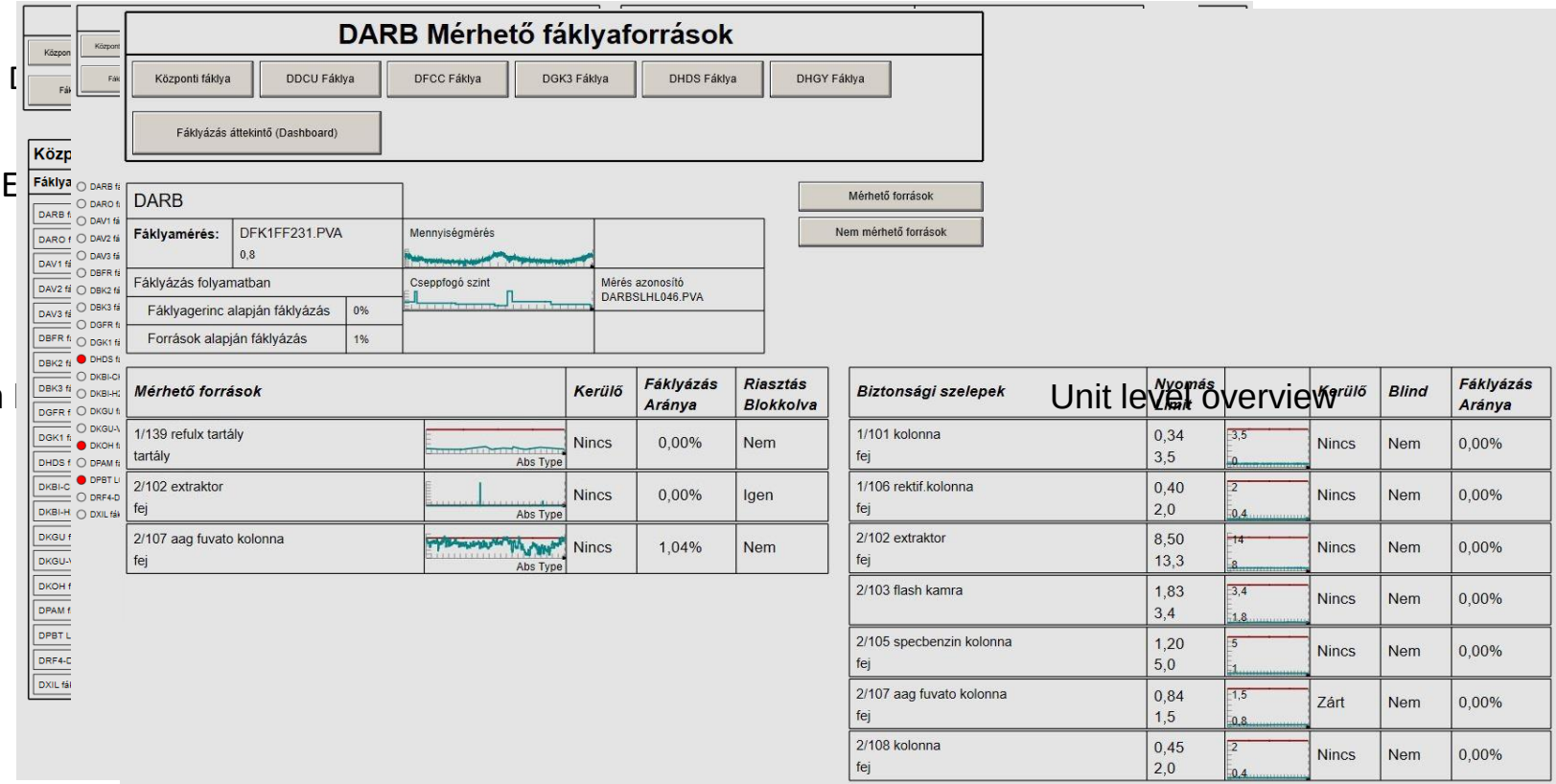
FlareStateResult	IF 'Flare Alerting Blocked' = "Igen" THEN 0 ELSE flareStateLogic	Flare Source State

BUILDING PI AF SYSTEMS STEP 4

CREATING [

- OVERVIE

System



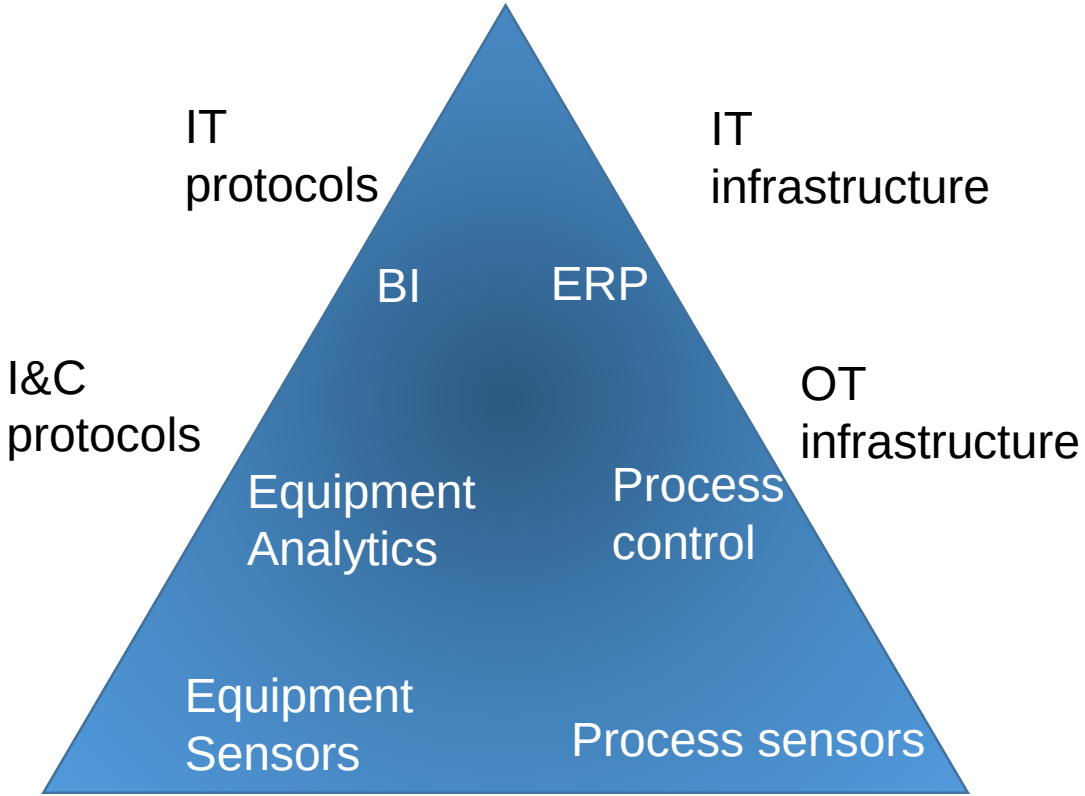
Unit level overview

RATIONALIZATION OF ANALYTICS TECHNIQUES

BUSINESS OPERATIONS	TRANSFORMATION	PRODUCTIVITY IMPROVEMENTS
• Ubiquitous data streams	• Rich digital representation of processes	• Maximized asset utilization
• Advanced analytics techniques	• Identification of new system integration & development opportunities	• Minimized unit shut-down times
• Establishment of a digital connection between refinery operation & IoT devices	• Commissioning good practices	• Driving direct energy efficiency
• Collaborating & leveraging refinery knowledge		• Reach mechanical integrity in every level
		• Smooth operation

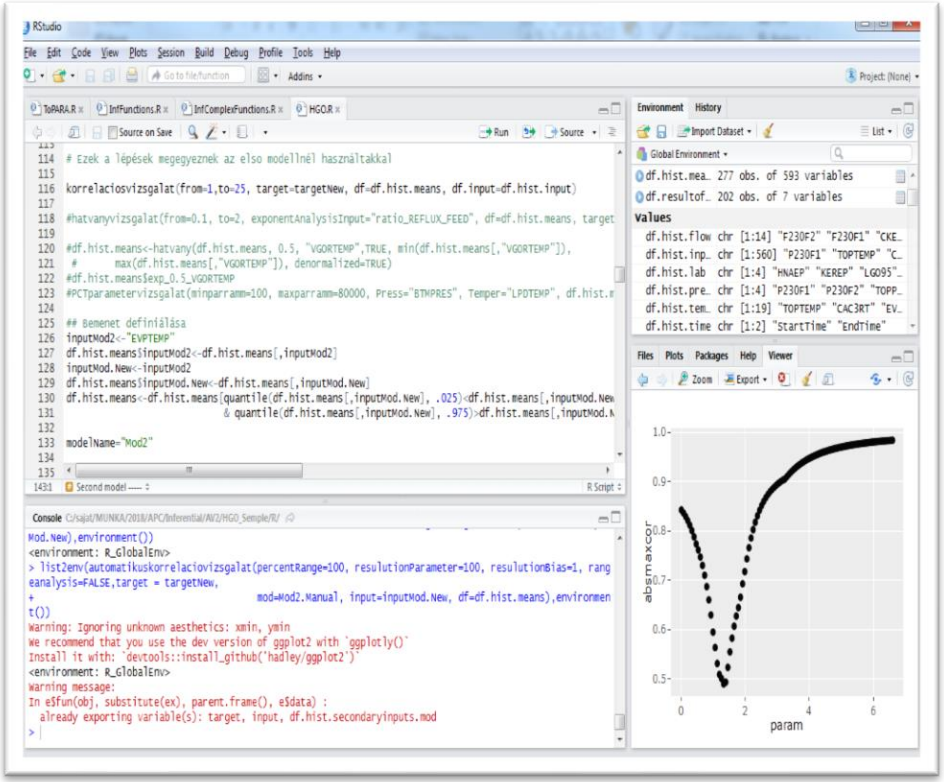
IT / OT CONVERGENCE

- ESTABLISHING ELABORATED PRODUCTION SCHEDULE
- OPTIMIZING OPERATION PROCESSES VIA SUPERVISOR AND AUTOMATIC CONTROL SYSTEMS
- INCREASING THE MECHANICAL AVAILABILITY



THE IMPORTANCE OF HAVING AN OT DATA INFRASTRUCTURE

- RAPID DEVELOPMENT AND SCALABILITY OF APPLICATIONS
- REINFORCE THE USE OF DATA AND ANALYTICS BASED DECISION MAKING
- SUPPORT CULTURAL CHANGE AND NORMALIZATION
- LEVERAGE ADVANCED TECHNOLOGIES INCLUDING ADVANCED ANALYTICS AND IOT TO ACCELERATE BUSINESS VALUE
- ENABLE SUSTAINABLE BUSINESS VALUE



ADVANCED ANALYTICS & IOT

- UTILIZE OPERATIONAL DATA TO DRIVE PROACTIVE E&P DECISION-MAKING THAT WILL REDUCE COST AND IMPROVE RECOVERY RATE.
- INJECT CONFIDENCE IN YOUR DECISION-MAKING BY CAPITALIZING ON DATA SCIENCE TO STATISTICALLY PREDICT PRODUCTIVITY IN A QUICK AND COST-EFFICIENT MANNER.
- INCREASE PRODUCTIVITY AND EFFICIENCY ACROSS ALL MAJOR BUSINESS UNITS THROUGH THE BEST PRACTICES FOR DATA HARMONIZATION.
- DEEPER UNDERSTANDING OF TECHNOLOGICAL PROCESSES -ALTERNATIVE CRUDE OIL USAGE AS FEED

Strategic Machine Learning/Big Data/Advanced Analytics Enabled by the OT Infrastructure

Tactical Machine Learning/Big Data/Advanced Analytics Enabled by the OT Infrastructure

Real-time Analytics – In the OT Infrastructure

Human Analytics Enabled *and* in the OT Infrastructure

“OPERATIONAL DATA HUB” TYPICAL APPLICATIONS

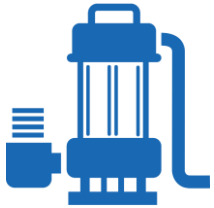
KPI monitoring

- White product yield
- Energy consumption
- APC utilization

Asset monitoring

+notification

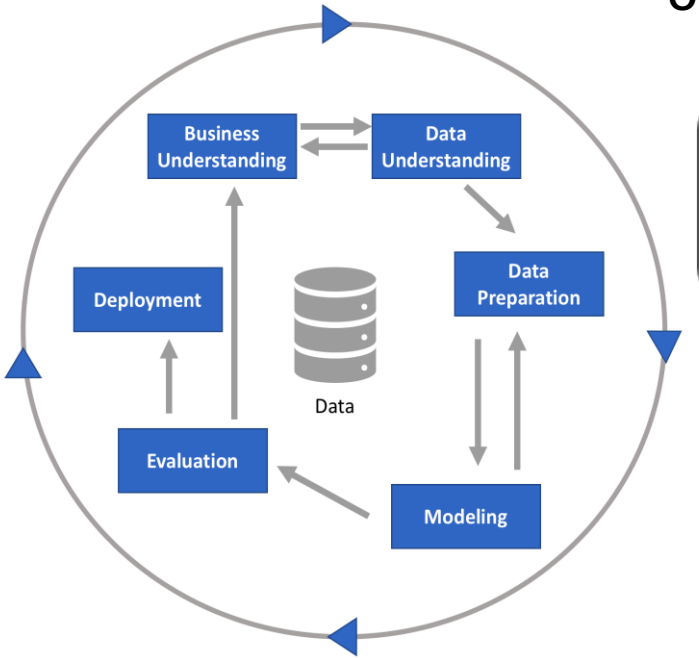
- Operation envelope
- IOW monitoring
- HTHA monitoring
- Analyzer validation
- SAP PM integration for CBM
- Flare monitoring
- Environmental reporting
- Control loop mode monitoring
- Failsafe mode monitoring
- Natural gas consumption forecasting (Predictive analytics)



Equipment / Asset models

- Pump efficiency
- Exchanger Fouling
- PSA valve monitoring
- DCU feed composition calculation

ANALYSIS PROCESS – A PARTNERSHIP BETWEEN OT AND IT



Our Team

Domain knowledge
- *Correlations*
- *Preconceptions*
- *Data scoping*

Operations — PI&A

Operations User

Operations Side Data Analyst

ENTERPRISE ANALYTICS & DATA INNOVATION

Data Scientist

Data Engineer

MOL IS

Operator

Operational & Data, PI System Understanding

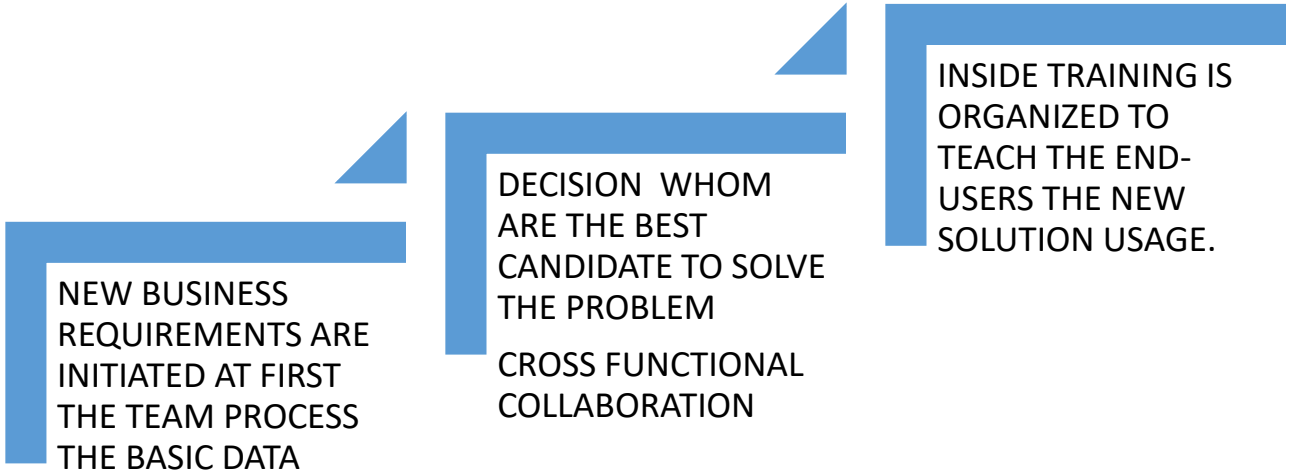
Explore & Analyze & Build → Deploy → Operate

Cloudera Enterprise Data Hub

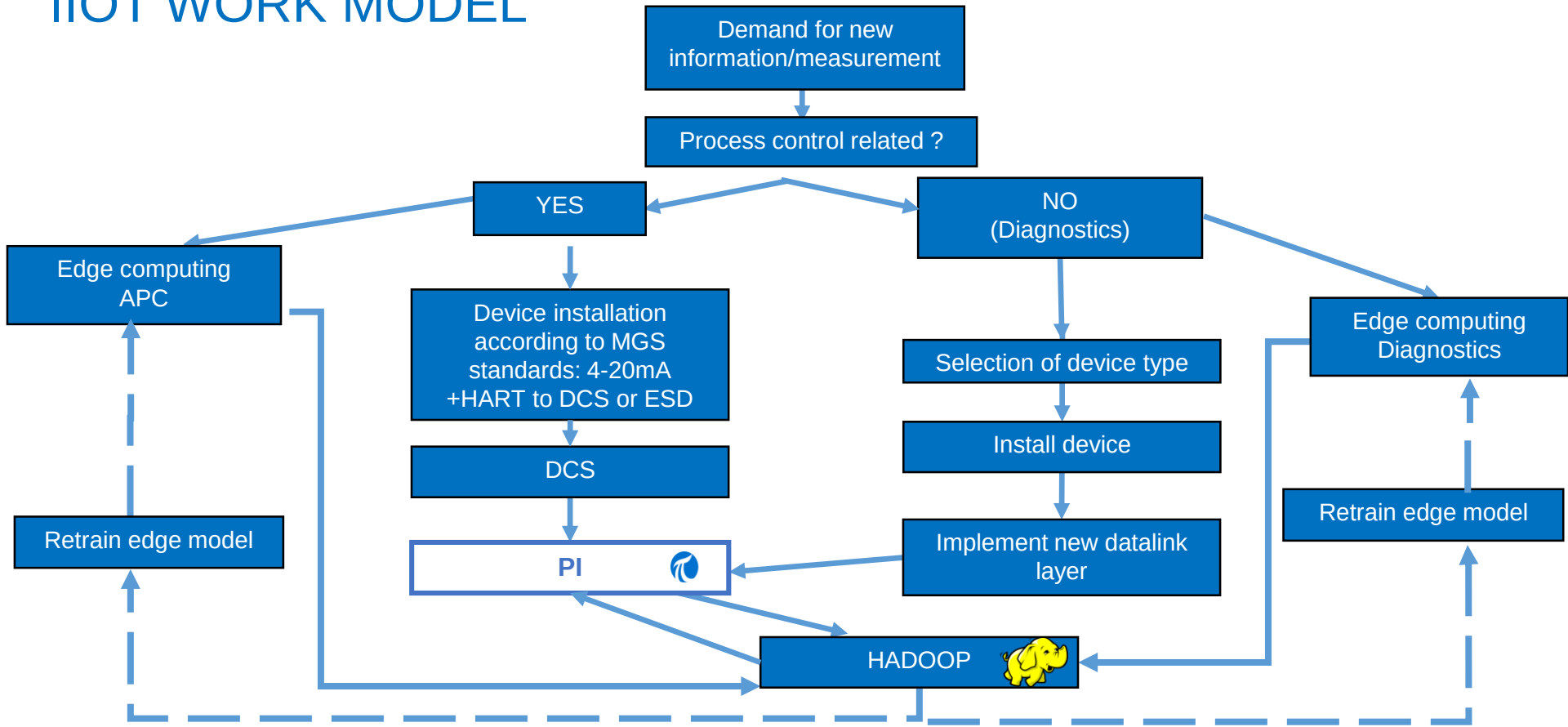
Expected **Defined Business** Case Delivery Time <3 months

DIGITAL TRANSFORMATION APPROACH

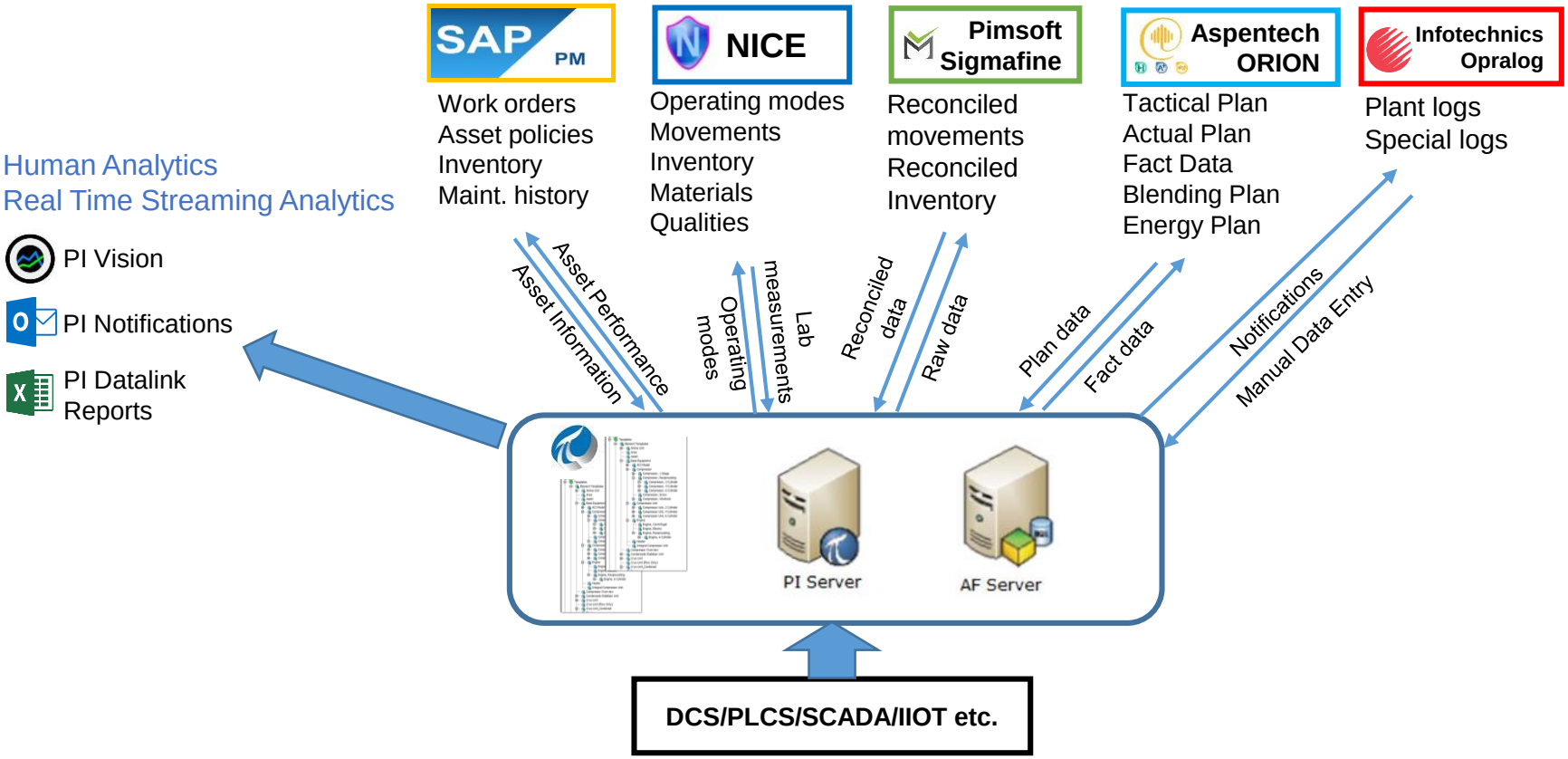
- PARTICIPATION IN OFFICIAL OSISOFT TRAINING TO LEARN THE BASIC TECHNIQUES OF THE PI CLIENT APPLICATION'S USAGE.
- SHARE MATERIALS WITH THE REFINERY WORKERS AS A SIMPLIFIED PI TRAINING SESSION
- DEVELOPMENT TEAMS ARE DIVIDED TO GROUPS BASED ON INFORMATION TECHNOLOGY INTEREST AND STRENGTH



IIOT WORK MODEL



TYPICAL SITE “OPERATIONAL DATA HUB”



NEW ADVANCED BI IMPLEMETATION PROGRAM IN MOL REFINING

Architecture Stream

Design, procure and implement on-premise data storage system.

Technogy: Cloudera Enterprise Data Hub (Hadoop technology)

Early 2018

Primary system integration and data ingestion setup:

- ***Sensor Data***
- ***Laboratory Measurements***
- ***Operating modes***
- ***Reconciled Data***
- ***Plan Data***
- ***Smart Data***

2018

Deployed all scheduled jobs to production, handover for operation team

Early 2019

Integration of Opralog and NICE systems to

- ***Movements***
- ***Inventory***
- ***Materials***
- ***Daily Unit Logs***
- ***Dispatcher Log***
- ***Special Entries***

Analytics Stream

Development and deployment of an energy nomination support application

2018

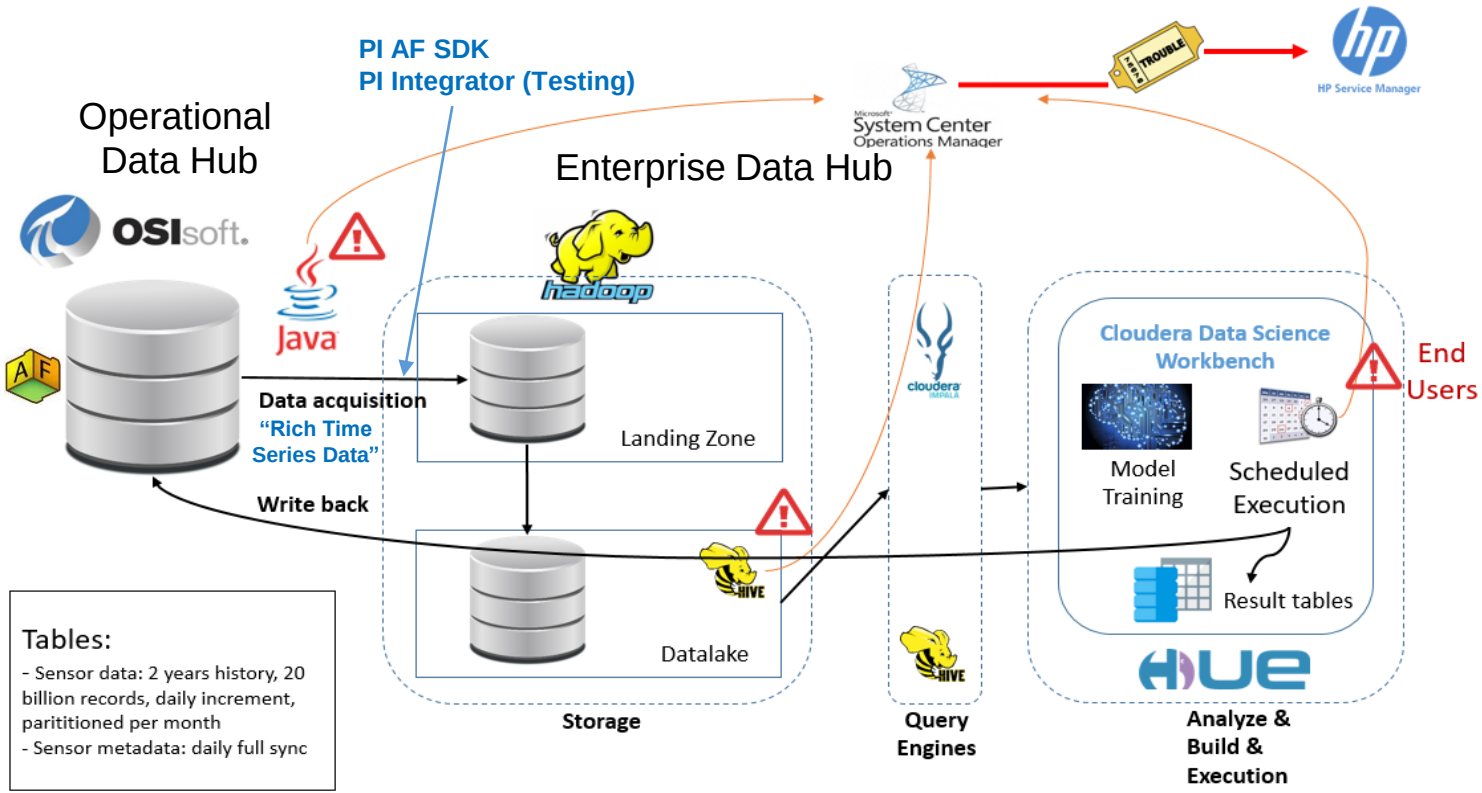
New Analysis Cases (Ongoing)

2019

Design and implement production management related reports, dashboards

2020

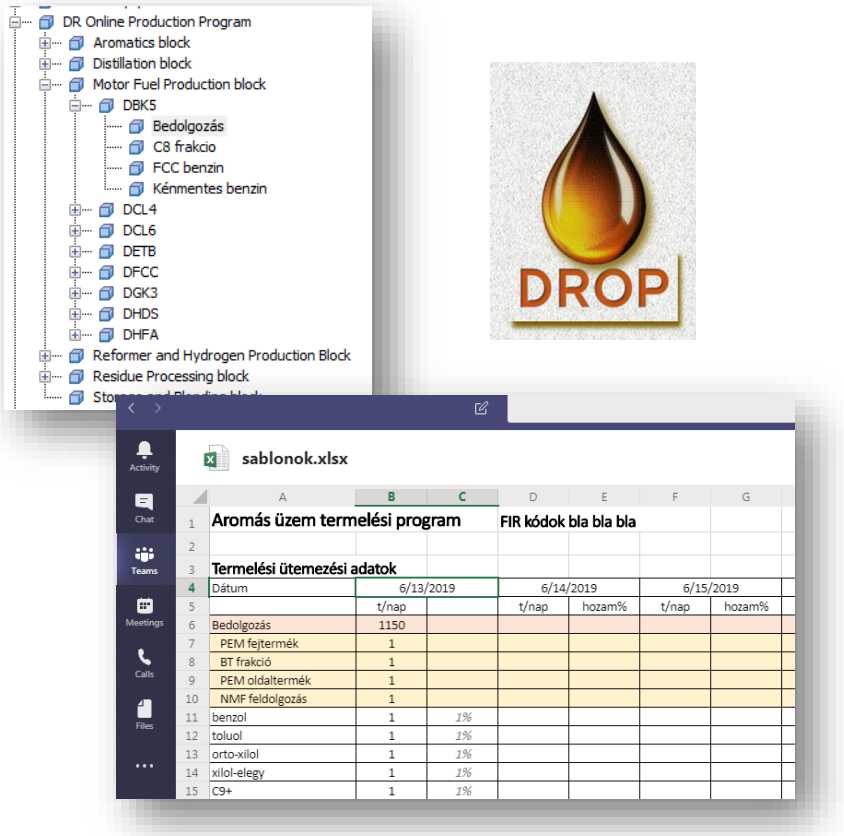
INTRODUCING THE ‘ENTERPRISE DATA HUB’



Features

- Daily upload
- Streaming
- Model Building
- Model Execution
- Supervised by IT
- PI&A enabled

DROP - DANUBE REFINERY ONLINE PROGRAM



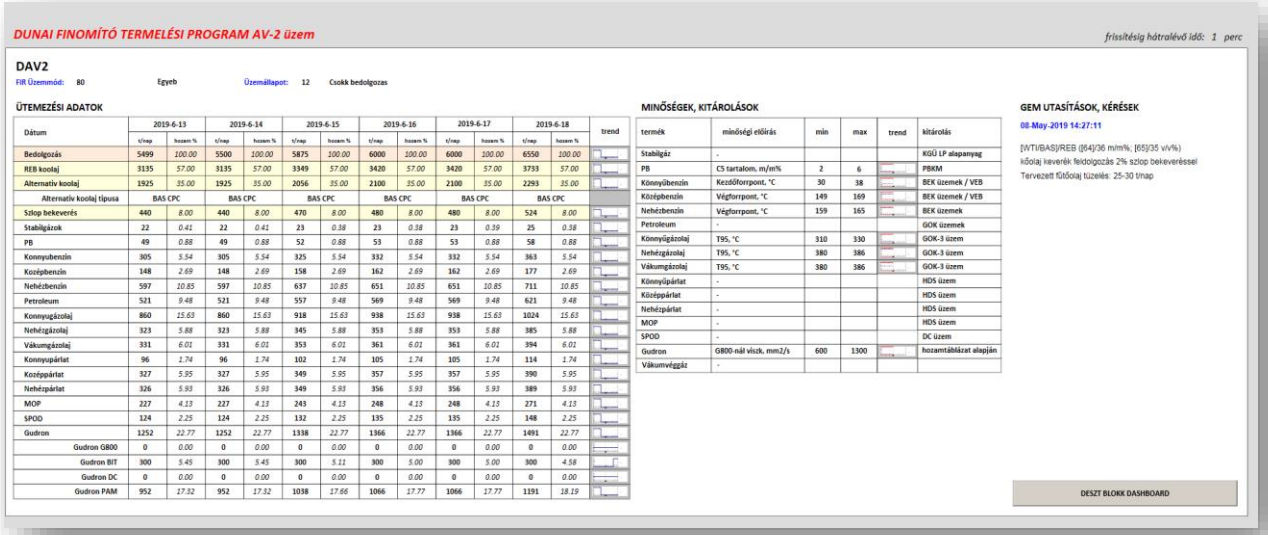
SYSTEM IS PROVIDING THE LATEST PLANNING DATA (THROUGHPUTS, YIELDS, QUALITY REQUIREMENTS) FROM PLANT-FLOOR LEVEL (OPERATORS, SHIFT LEADERS) TO OPERATIONAL MANAGEMENT LEVEL TO FACILITATE TRACKING OPERATIONAL DIRECTIVES CHANGES IN REAL-TIME.

PI SYSTEM COLLECTS THE PLANNING DATA FROM ORION DATABASE, THE OPERATIVE EEM DIRECTIONS FROM OPRALOG AND QUALITY REQUIREMENTS FROM QUALITY MANAGEMENT SYSTEM

DROP / PI AF DISPLAY

DISPLAYS ARE CREATED BY A STANDARD TEMPLATE VISUALIZING THE FOLLOWING INFORMATION: SCHEDULING DATA (VOLUMES AND YIELDS)

- FEEDS AND PRODUCTS FOR THE NEXT 5 DAYS
- OPERATIONAL MODES, UNIT STATES
- QUALITY REQUIREMENTS
- ACTUAL EEM DIRECTIONS



DUNAI FINOMÍTÓ TERMELÉSI PROGRAM AV-2 üzem

frissítésig hátralévő idő: 1 perc

DAV2

FIR Üzemmód: 80 Egyeb Üzemállapot: 12 Csökk bedolgozas

ÜTEMEZÉSI ADATOK

Dátum	2019-6-13		2019-6-14		2019-6-15		2019-6-16		2019-6-17		2019-6-18		trend
	t/nap	hozam %	t/nap	hozam %	t/nap	hozam %	t/nap	hozam %	t/nap	hozam %	t/nap	hozam %	
Bedolgozás	5499	100.00	5500	100.00	5875	100.00	6000	100.00	6000	100.00	6550	100.00	
REB koolaj	3135	57.00	3135	57.00	3349	57.00	3420	57.00	3420	57.00	3733	57.00	
Alternatív koolaj	1925	35.00	1925	35.00	2056	35.00	2100	35.00	2100	35.00	2293	35.00	
Alternatív koolaj típusa	BAS CPC		BAS CPC		BAS CPC		BAS CPC		BAS CPC		BAS CPC		
Szlop bekeverés	440	8.00	440	8.00	470	8.00	480	8.00	480	8.00	524	8.00	
Stabilgázok	22	0.41	22	0.41	23	0.38	23	0.38	23	0.39	25	0.38	
PB	49	0.88	49	0.88	52	0.88	53	0.88	53	0.88	58	0.88	
Könnyubenzin	305	5.54	305	5.54	325	5.54	332	5.54	332	5.54	363	5.54	
Középbenzin	148	2.69	148	2.69	158	2.69	162	2.69	162	2.69	177	2.69	
Nehézbenzin	597	10.85	597	10.85	637	10.85	651	10.85	651	10.85	711	10.85	
Petroleum	521	9.48	521	9.48	557	9.48	569	9.48	569	9.48	621	9.48	
Konnyugázolaj	860	15.63	860	15.63	918	15.63	938	15.63	938	15.63	1024	15.63	
Nehézgázolaj	323	5.88	323	5.88	345	5.88	353	5.88	353	5.88	385	5.88	
Vákumgázolaj	331	6.01	331	6.01	353	6.01	361	6.01	361	6.01	394	6.01	
Konnyupárlat	96	1.74	96	1.74	102	1.74	105	1.74	105	1.74	114	1.74	
Középpárlat	327	5.95	327	5.95	349	5.95	357	5.95	357	5.95	390	5.95	
Nehézpárlat	326	5.93	326	5.93	349	5.93	356	5.93	356	5.93	389	5.93	
MOP	227	4.13	227	4.13	243	4.13	248	4.13	248	4.13	271	4.13	
SPOD	124	2.25	124	2.25	132	2.25	135	2.25	135	2.25	148	2.25	
Gudron	1252	22.77	1252	22.77	1338	22.77	1366	22.77	1366	22.77	1491	22.77	
Gudron G800	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	
Gudron BIT	300	5.45	300	5.45	300	5.11	300	5.00	300	5.00	300	4.58	
Gudron DC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	
Gudron PAM	952	17.32	952	17.32	1038	17.66	1066	17.77	1066	17.77	1191	18.19	

MINŐSÉGEK, KITÁROLÁSOK

termék	minőségi előírás	min	max	trend	kitárolás
Stabilgáz	-				KGÜ LP alapanyag
PB	C5 tartalom, m/m%	2	6		PBKM
Könnyűbenzin	Kezdőforrpont, °C	30	38		BEK üzemek / VEB
Középbenzin	Végforrpont, °C	149	169		BEK üzemek / VEB
Nehézbenzin	Végforrpont, °C	159	165		BEK üzemek
Petroleum	-				GOK üzemek
Könnyűgázolaj	T95, °C	310	330		GOK-3 üzem
Nehézgázolaj	T95, °C	380	386		GOK-3 üzem
Vákumgázolaj	T95, °C	380	386		GOK-3 üzem
Könnyűpárlat	-				HDS üzem
Középpárlat	-				HDS üzem
Nehézpárlat	-				HDS üzem
MOP	-				HDS üzem
SPOD	-				DC üzem
Gudron	G800-nál viszk. mm2/s	600	1300		hozamtáblázat alapján
Vákumvéggáz	-				

GEM UTASÍTÁSOK, KÉRÉSEK

08-May-2019 14:27:11

[WTI/BAS]/REB ([64]/36 m/m%; [65]/35 v/v%)
kőolaj keverék feldolgozás 2% szlop bekeveréssel
Tervezett fűtőolaj tüzelés: 25-30 t/nap

DESZT BLOKK DASHBOARD

IT INNOVATION – IT & BU COOPERATION TO PROCESS OPERATIONAL DATA

- PROJECTS

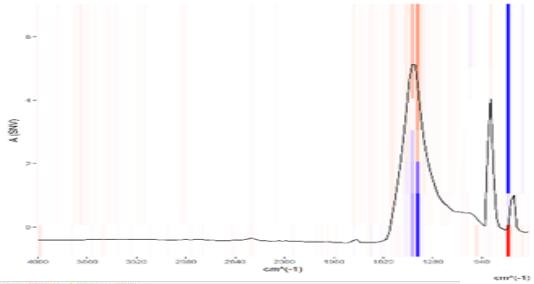
- CHANGE REQUESTS

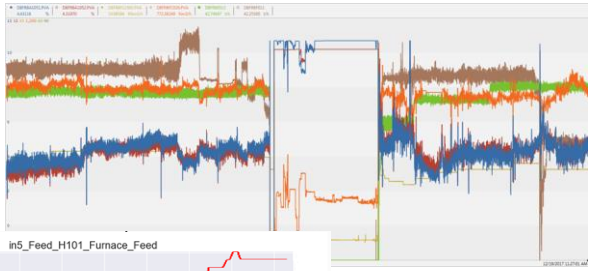
- PROOF OF CONCEPTS > INNOVATION

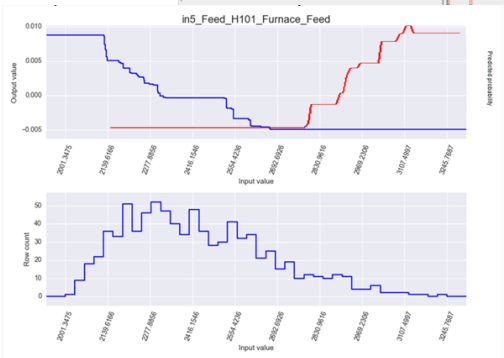
- PART OF MOL GROUP IT CTO TEAM
- PROOF OF CONCEPTS
- 1-3 MONTHS RUN (+ PREPARATION)
- TESTING IDEAS, INTRODUCING TECHNOLOGIES AND SOLUTIONS – **BASED ON PI DATA**
- PROJECT GENERATION
- MARKETING (PRESENTATIONS, GROUP PORTAL, YAMMER, LINKEDIN)

INNOVATION TOPICS

- 2017-2018: BIG DATA AND MACHINE LEARNING, IOT/IIOT, CHATBOT
  - REFINERY PRODUCTION PLANNING AND OPTIMISATION
  - ADVANCED DOCUMENT MANAGEMENT
  - UPSTREAM SPECTRA ANALYSES AND ROCK TYPING
  - COKE YIELD AND STEAM ERUPTION ANALYSES
  - BUTADIENE ANOMALY DETECTION
  - RETAIL AND HELPDESK CHATBOT
  - …
- 2019: AUGMENTED AND VIRTUAL REALITY, BLOCKCHAIN
  - HIDDEN WORKS VISUALISATION
  - MOL CAMPUS VISUALISATION
  - POLYOL PLANT VISUALISATION
  - RETAIL SHOP VISUALISATION
  - …

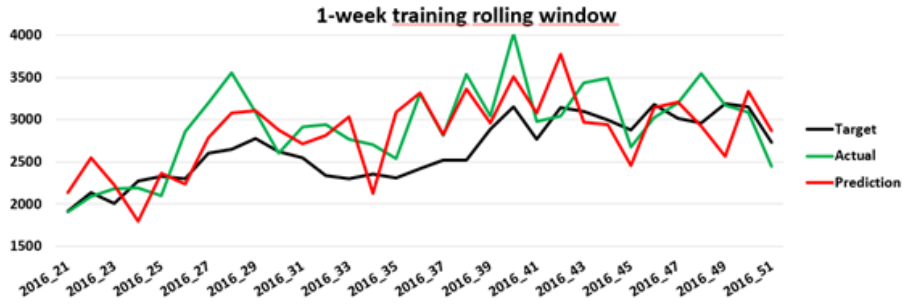


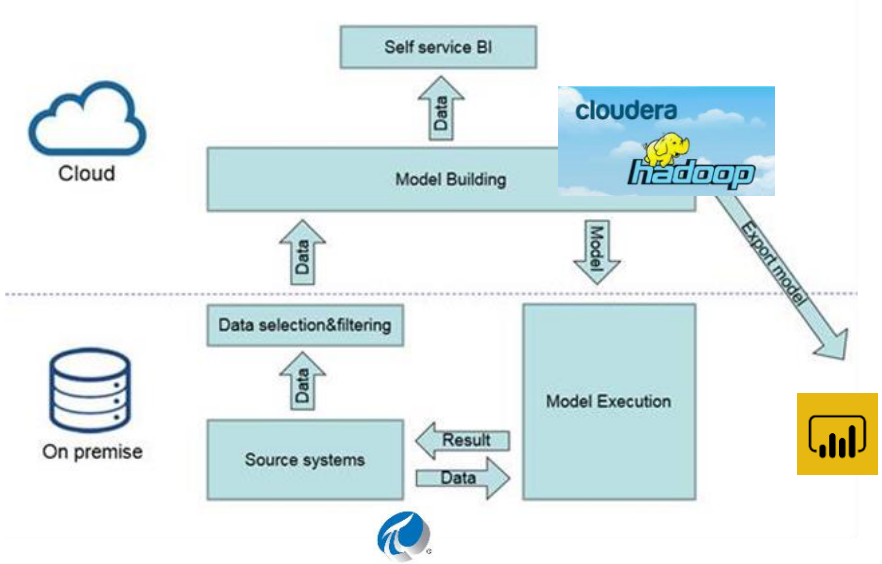




FOLLOW-UPS

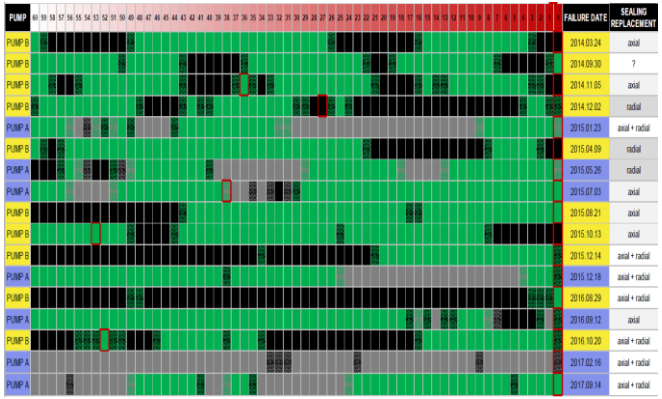
- PROJECTS
  - SALES DEMAND PREDICTION
  - DANUBE REFINERY ADVANCED ANALYTICS
  - …
- STRATEGY
  - PI SYSTEM AS DATA SOURCE OPTION
  - CLOUDERA HADOOP – BIG DATA PLATFORM
  - CLOUDERA DATA SCIENCE WORKBENCH – MACHINE LEARNING PLATFORM
  - MICROSOFT POWER BI – VISUALISATION PLATFORM
  - CHATBOT – NEW COMMUNICATION CHANNEL
  - …

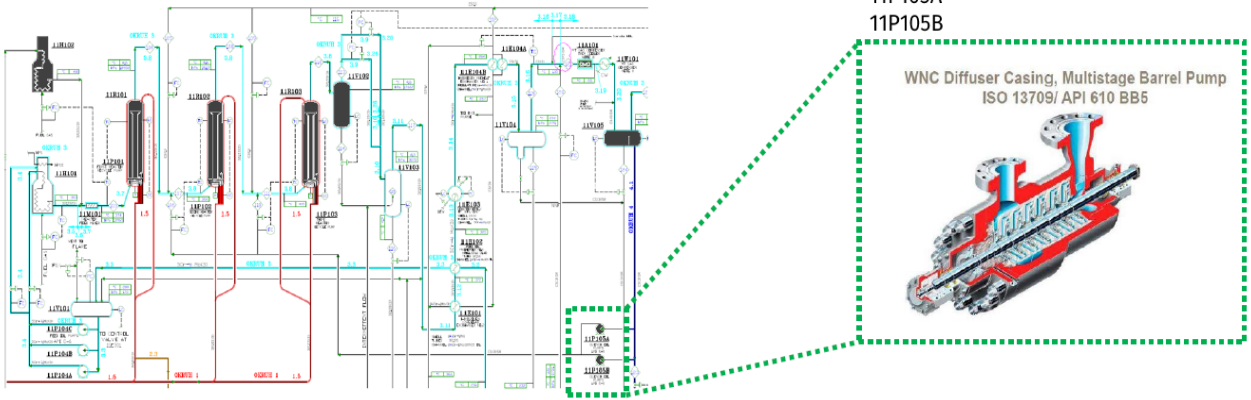


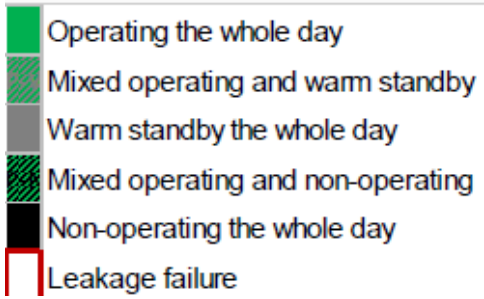


SLOVNAFT PUMP FAILURE POC

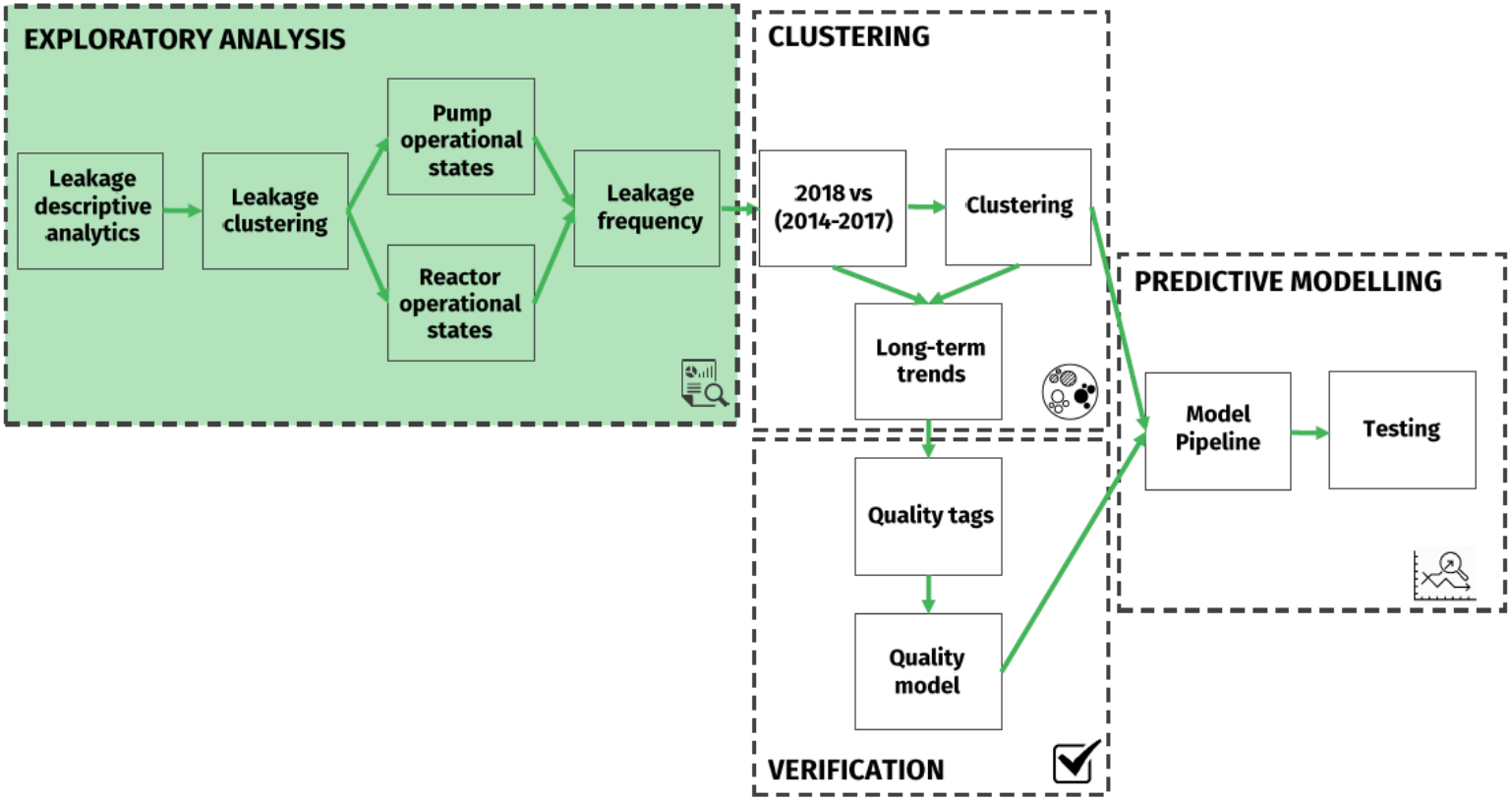
- POC'S SCOPE:
  - 2 COOLING OIL PUMPS
  - LEAKAGES ON THE SEALINGS MORE FREQUENTLY THAN EXPECTED
  - ONE PUMP MUST WORK, OTHERWISE SYSTEM SHUTDOWN
  - ROOT CAUSES ANALYSIS AND PREDICTION NEEDED



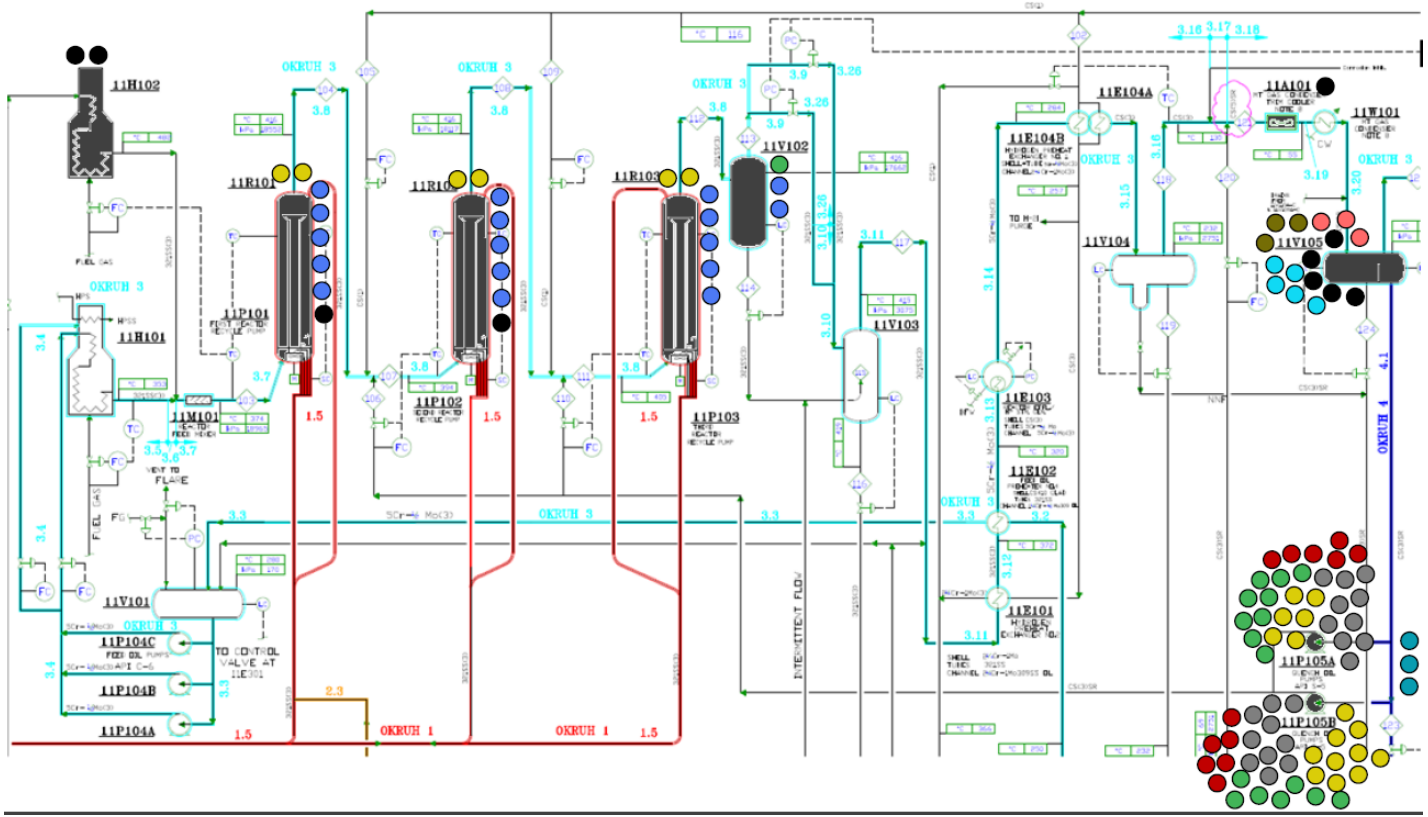




ANALYSIS APPROACH

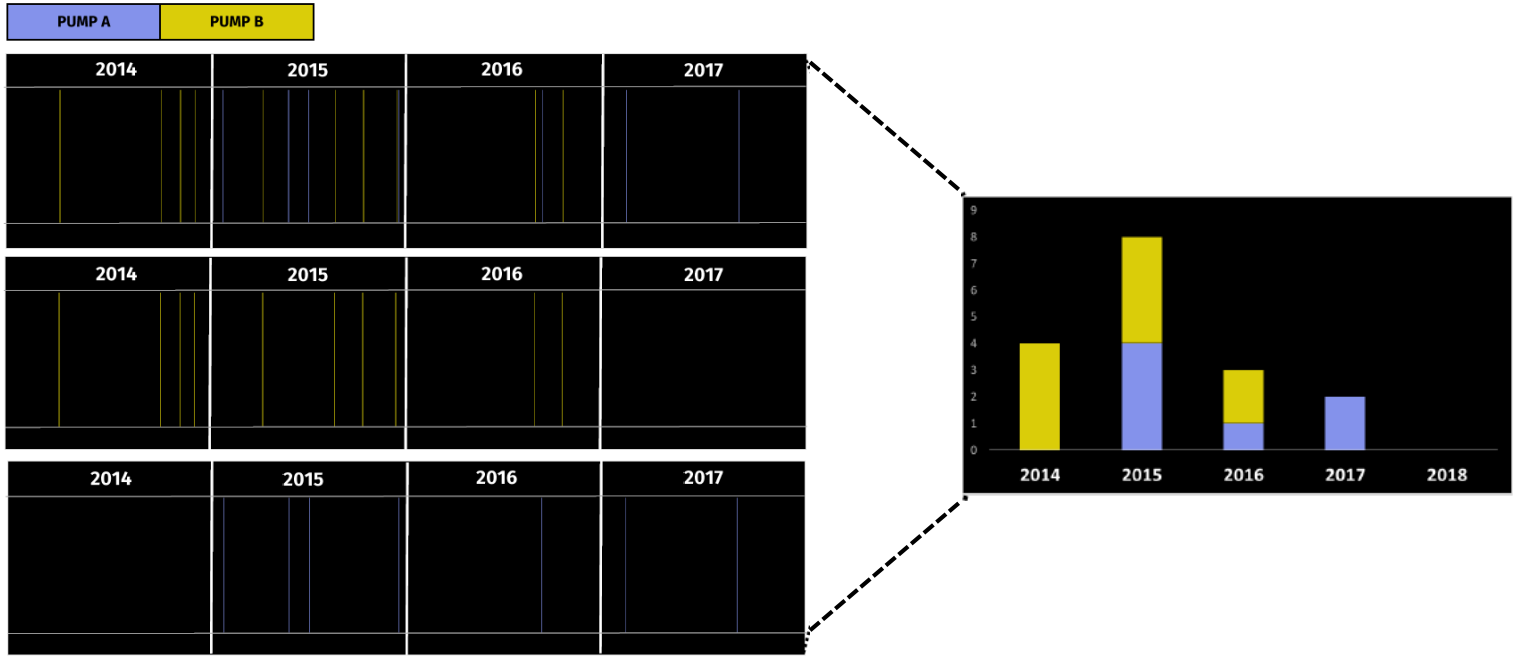


SYSTEM DIAGRAM



- Temperature
- Vibration
- Densitometer
- Operation
- Seal
- Interface
- Quench oil
- Vapors
- Suction
- Other

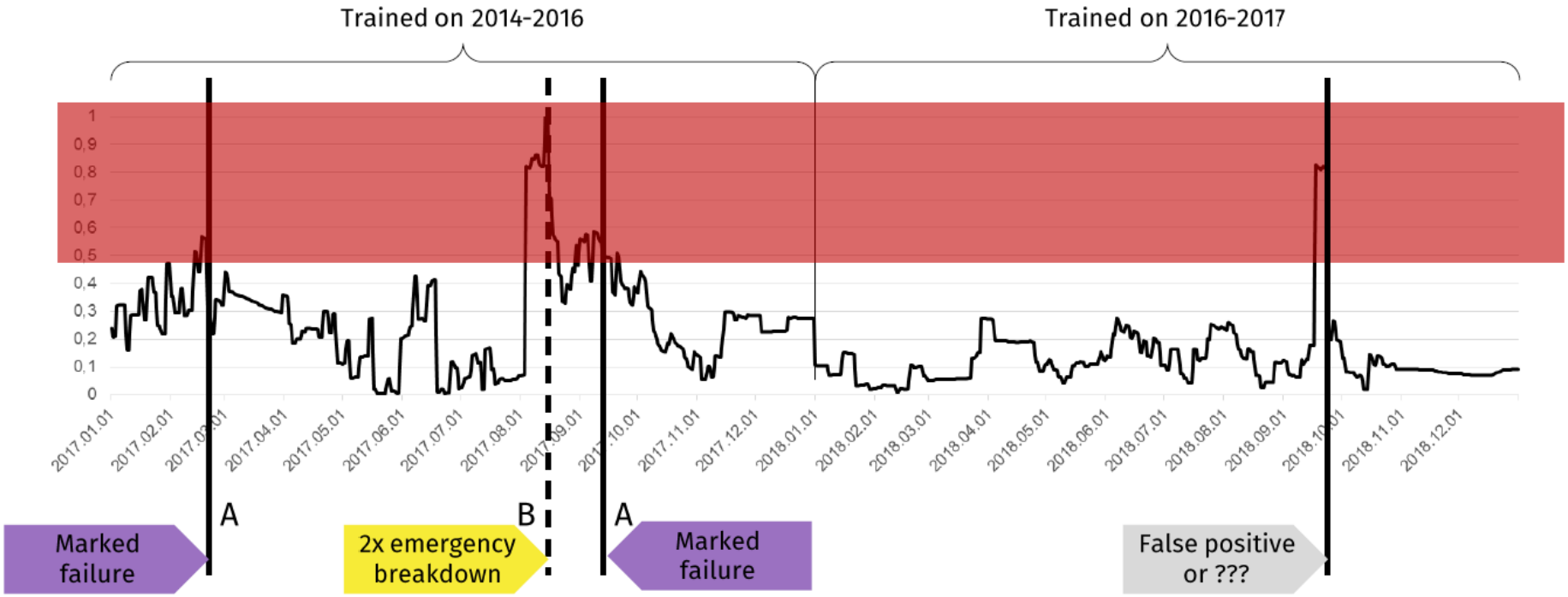
LEAKAGE FREQUENCY



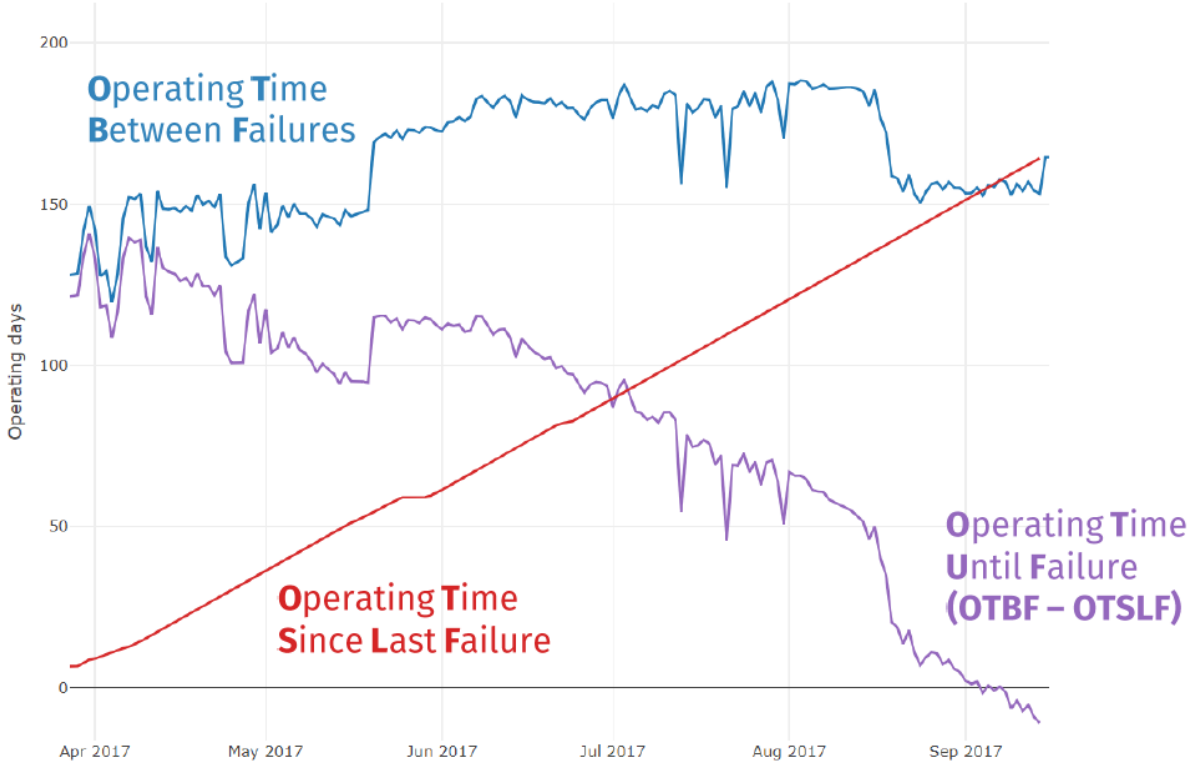
LONG-TERM TRENDS – CLUSTERS OF DAYS

PERIOD	2014.sep-2016.feb	2016.apr-2017.mar	2017.mar-2018.oct
NR OF DAYS	475	318	509
NR OF LEAKAGE FAILURES	13	4	1
RATIO OF LEAKAGE FAILURES	2,7%	1,3%	0,2%

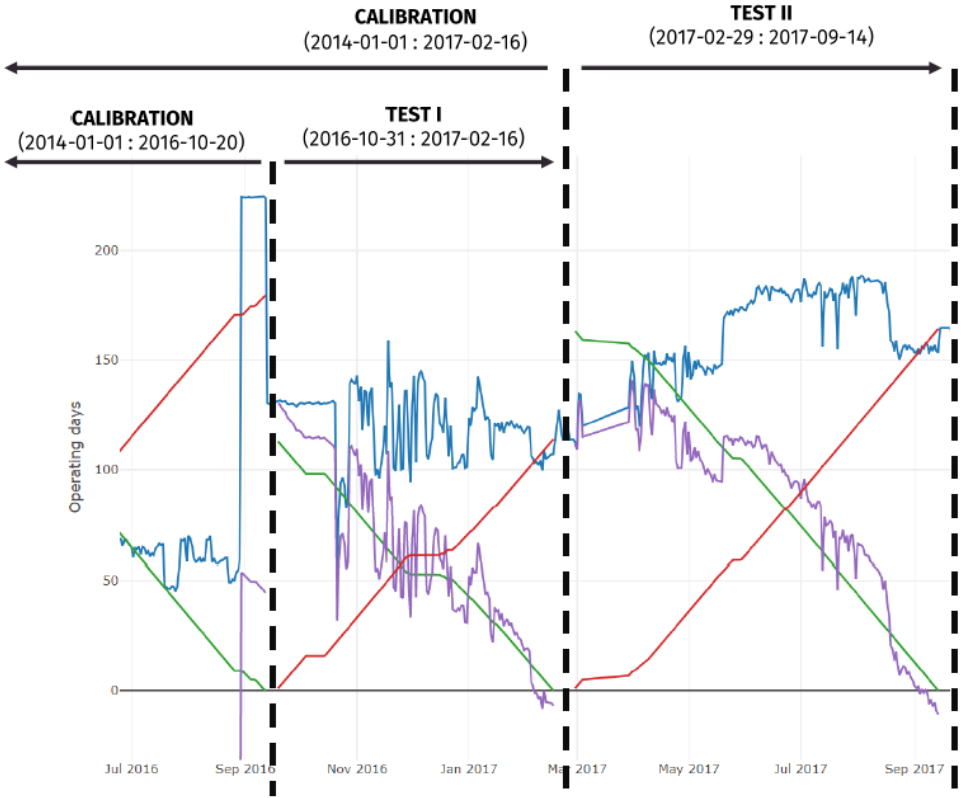
MODEL TRAINING



PREDICTION METRICS

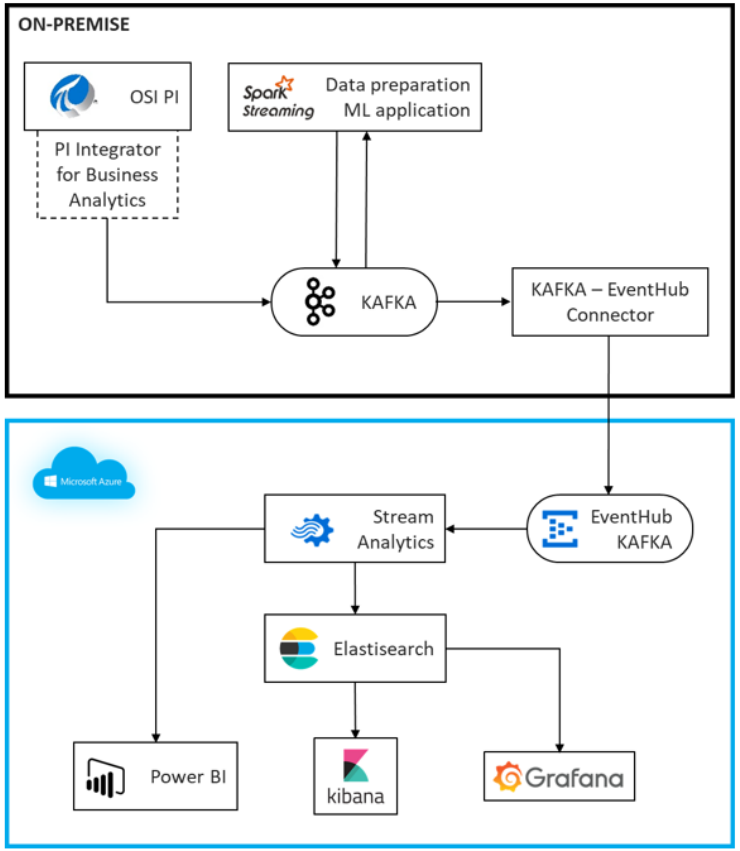


PREDICTIONS



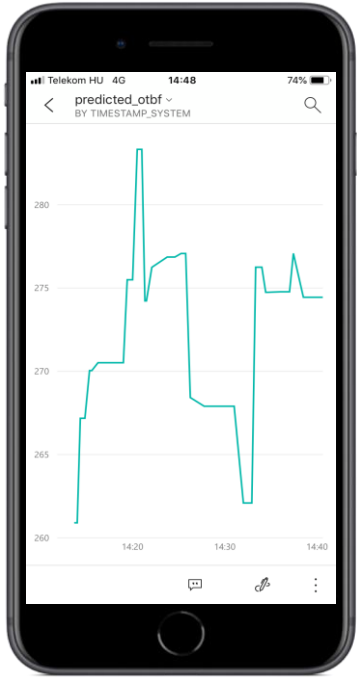
	TEST I	TEST II	Overall 2017
Accuracy	0.94	0.97	0.96
F1	0.80	0.88	0.84
Precision	1.00	0.78	0.85
Recall	0.67	1.00	0.83
Specificity	1.00	0.96	0.98

STREAMING SOLUTIONS AND VISUALIZATION



OSIsoft PI Advanced Integrator connected PI to Kafka and Hadoop

COMPARISON OF INTEGRATION TOOLS



VISUALISATION IN SMART PHONE

FEATURE	CUSTOM-MADE INTEGRATOR	PI INTEGRATOR
DEVELOPMENT/SETUP TIME	10+ days	1 day
LOAD FREQUENCY	Daily	Minutely
COMPLEXITY	Predefined tags	Selected tags
PRICE	$	$$$

”For testing purpose and short-term solutions custom-made integrator can be enough.

For long-term solution PI Integrator is suggested.”

CHALLENGES

- Volatile Business Environment
- New business request - > waiting quick fix
- Competition situation about digitalization world-wide and region
- Difficulty of cleansing business data to Advanced analytics engineer

SOLUTION

- **Rapid application development with PI AF** - > Quick solution for business pain points
- **Collecting smart data** (cleansing) in PI AF -> Easy handover and collaboration between Business Analyst and subject matter expert
- Innovative thinking - **Quick proof of concepts**

BENEFITS

- Effective **solution covers all business area and processes**
- **Optimize yields, energy, asset health**
- **Mitigate risk** in processes
- Valuable **digital transformation**

The goal is to turn data into information, and information into insight.

Carly Fiorina

Presenters

Tibor Komróczki

- Process Information and Automation Leader
- MOL Plc
- tkomroczki@mol.hu

Károly Ott

- Innovation Manager
- Mol Group
- kott@mol.hu

Questions?

Please wait for the **microphone**

State your **name & company**

Please remember to…

Complete Survey!

Navigate to this session in mobile agenda for survey