



AI: Tomorrow's Manufacturing, TODAY! Better Efficiency, Better Costs, Better Planet

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Overview

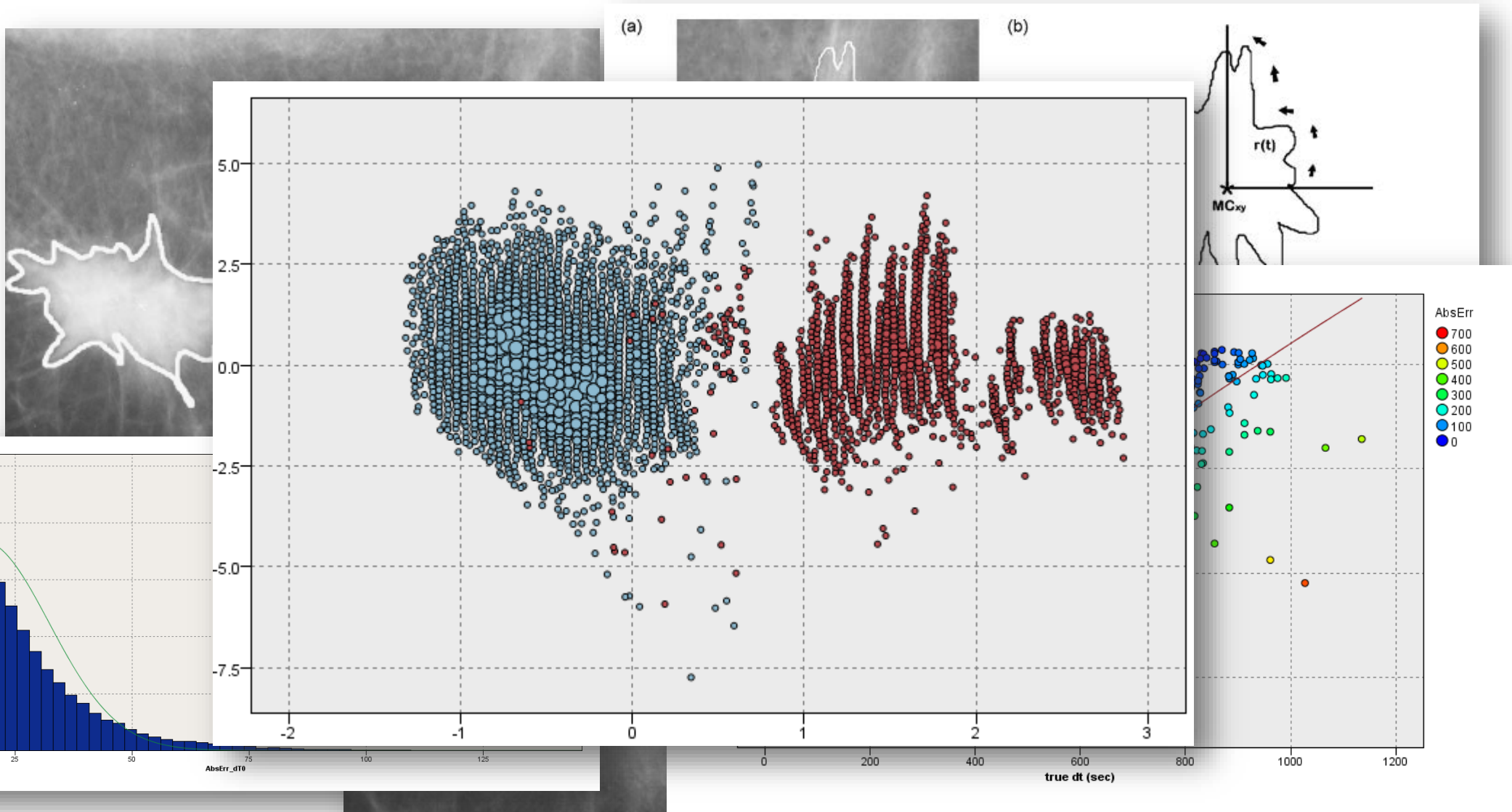
- Hype & Real status of AI/ML today
- Real AI/ML paradigms
 - Trustier, More efficient, Safer
- Conclusions

The hype of AI/ML today...

- *“Deep learning is the train-n-play black box that can solve everything”*
- *“Enough GPU parallelization can overcome any algorithmic deficiencies”*
- *“Everything can run in the cloud, even real-time Big Data Analytics (DA)”*
- *“We don’t need DA experts with deep background, just good programmers”*
- (...)
 - Over-rated tools & “automatic” ML suites
 - Under-rated engineering required



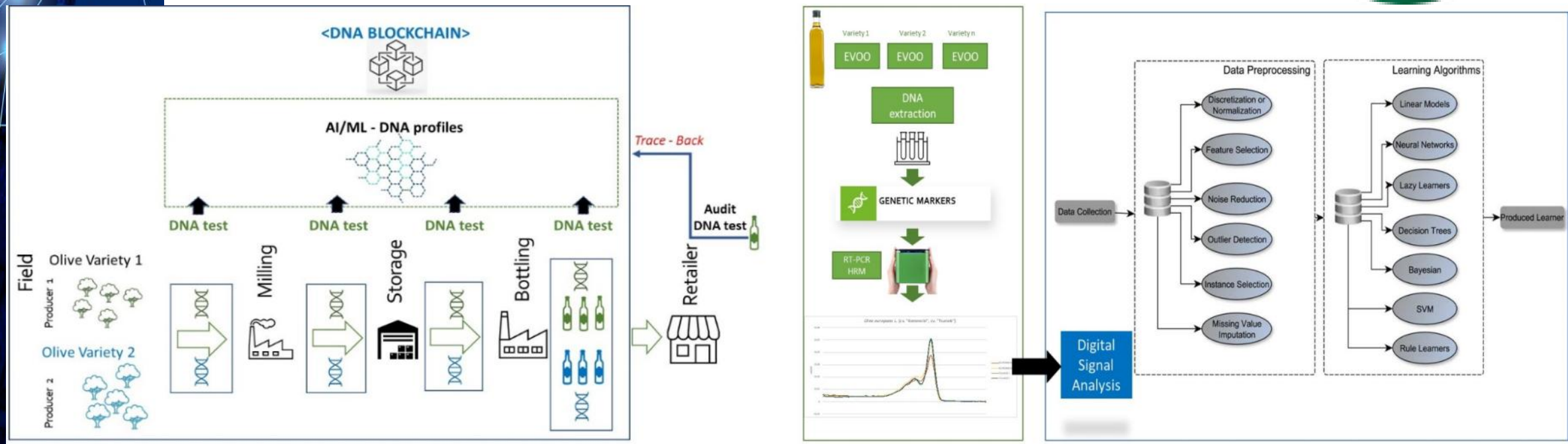
...and the real ML in practice



DNAblockchain

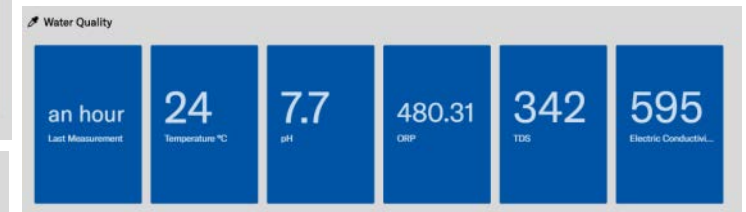
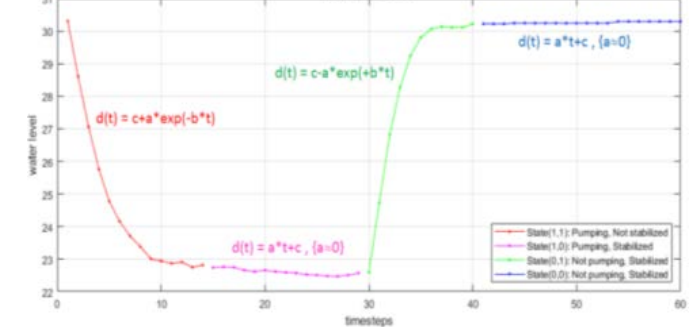
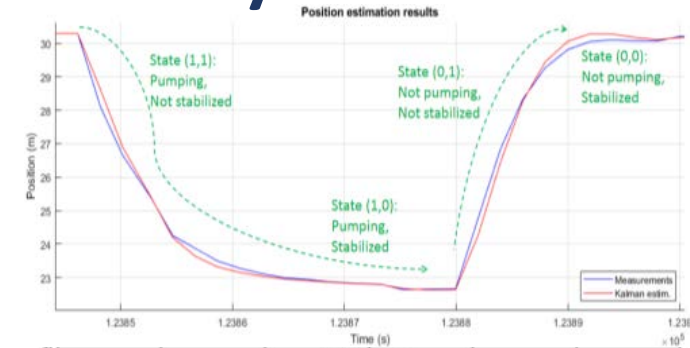
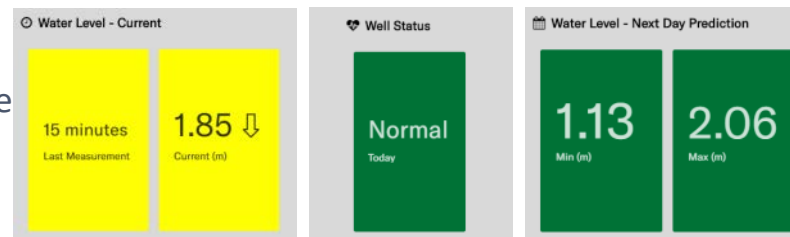
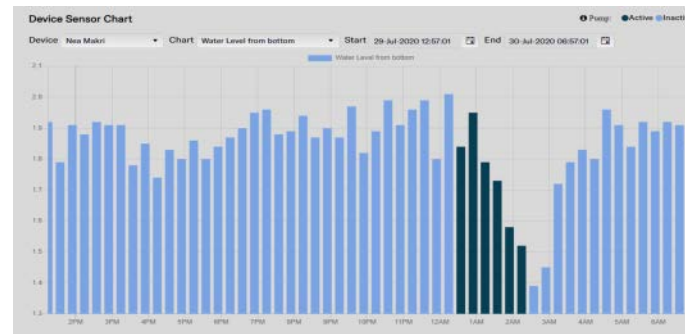
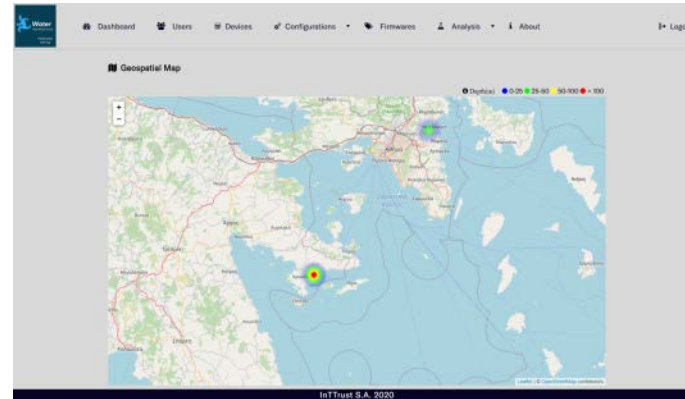
Protect EVOO label & prevent fraud

DNAblockchain = DNA HR-PCR + Signal Analysis + DA/ML + Blockchain



Water Underground - functionality

- Map representation
- Dashboard - Metrics
 - Depth
 - Prediction
 - Trends
 - Statistics
 - Quality
- Time Analysis
 - Water height/level graph
 - Water quality graph (pH, TDS, ORP, EC, Temp)
- User roles
- Configuration
 - Application, System, Device
- Remote IoT Device Updates



pH : Alkalinity
ORP : Oxidation Reduction Potential (disinfection potential)

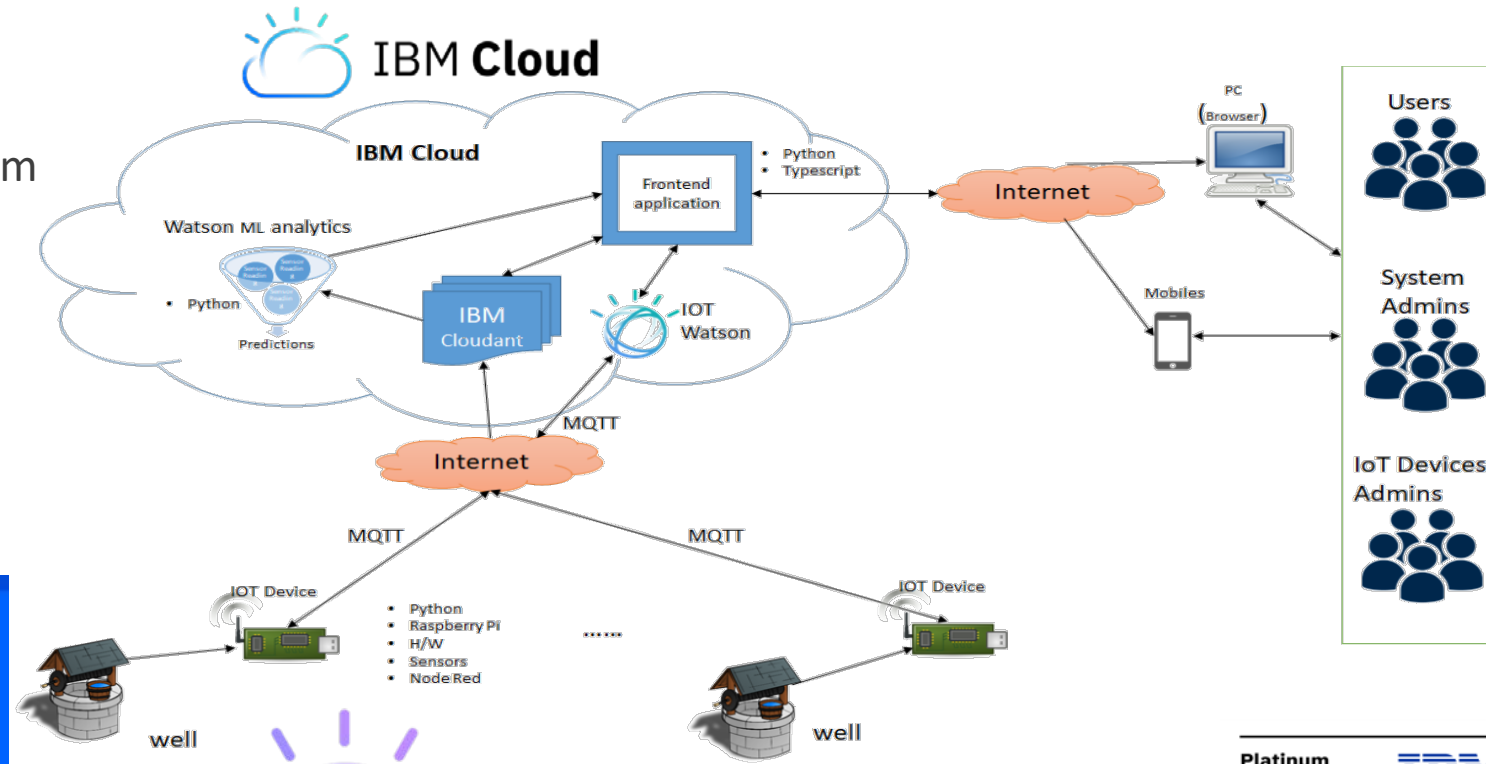
- **TDS** : Total Dissolved Solids
- **Electrical Conductivity** : Salinity

Water Underground – IoT & Architecture

Incorporate:

- Smart sensors – IoT – Edge computing
- Back-end processing, ML/analytics, short/long-term predictions
- Aquifers' modeling
- Cloud computing
- Front-end application, User Interface

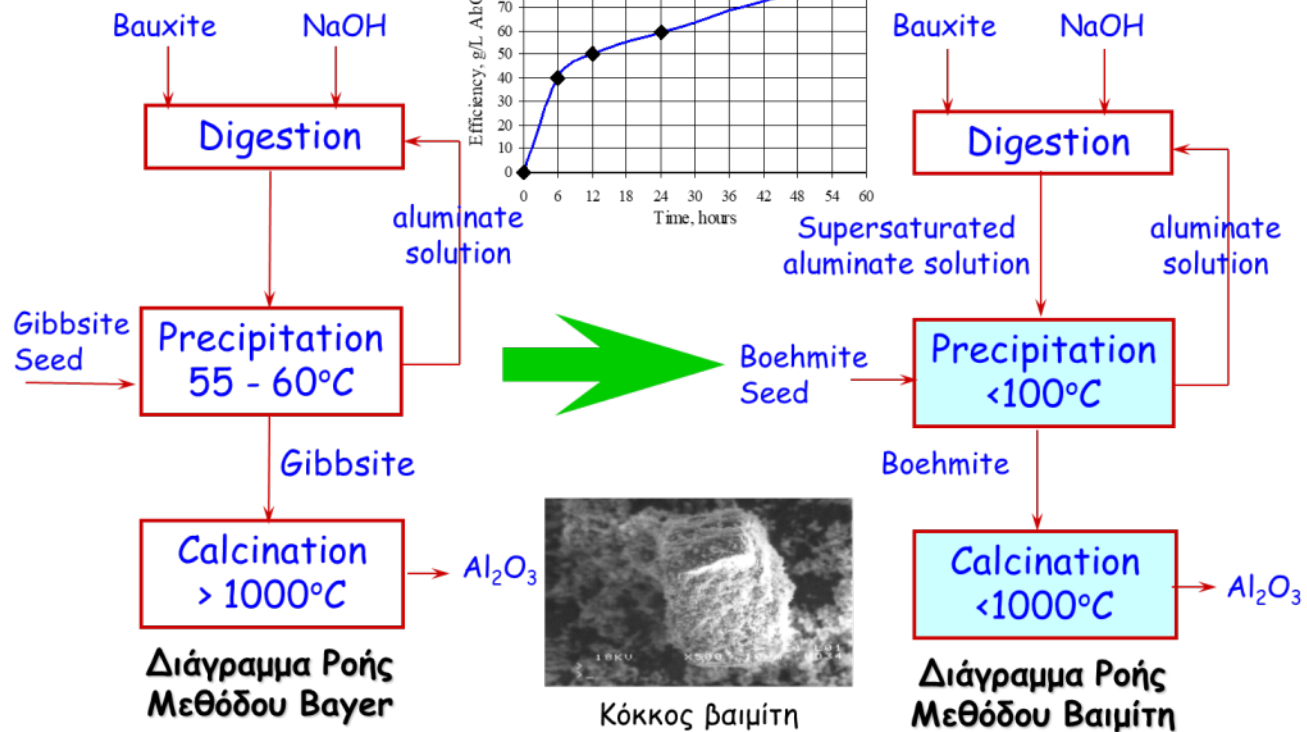
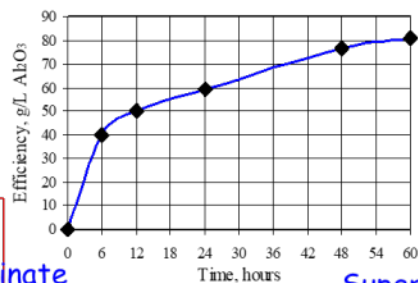
Interconnected IoT devices for real-time monitoring of the underground waters' level and quality.





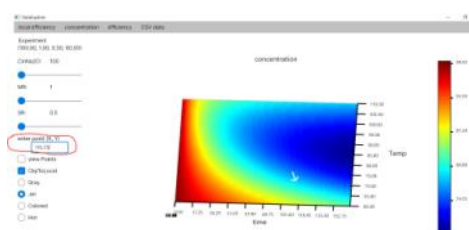
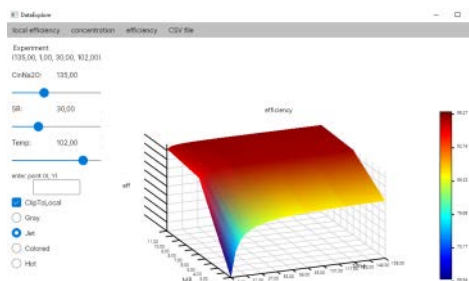
Boehmite Alumina Precipitation

Boehmite precipitation = Energy consumption optimization of Bayer Process

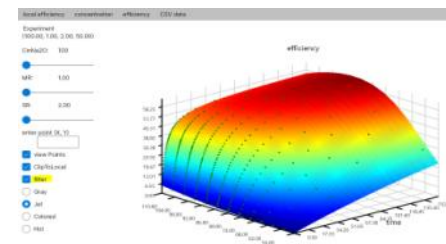


Analytic Digital Twin

$$\frac{dC_{pr}}{dt} = 2.29 \times 10^{13} (C_{Na_2O})^{-1.8} \times (SR)^{0.54} e^{-\frac{10,750}{T}} (C - C_e^{app})^2$$



ML Digital Twin



Advantages

- Analytical model not required (e.g., complex/unknown processes)
- Relies only on observed data
- Fast and responsive (analytical model often time consuming)
- Low resources' consumption
- Graceful to errors/deviations from abstract/ideal processes

Result: **Energy consumption reduction by 1.8 GJ/ton Al₂O₃** – ML process optimization simulation

About InTTrust S.A.

Some of InTTrust's customers

- Founded in 2006
- Certified and Highly Qualified Engineers
- Active research and experience in the field of AI/ML
- Awarded International Expertise
- Innovation, in cooperation with the Customer
- Presence in North America (Canada)



Patents, Awards & certifications



100+ Engineers



300+ Certifications

Gold
Microsoft Partner





Metallurgy4

- **Metallurgy4** is aiming at the development of customized products and services to the Mining and Metallurgy Sector (as well as other sectors, e.g. cement, wood etc.) across the globe, in the field of Industry 4.0
- It combines the expertise of a **multidisciplinary team**, covering deeply all aspects of **Minerals** and **Metals Value Chain** (e.g. Mining, Mineral Processing, and Metallurgical Processes) and Information Technologies
- It analyzes existing production *activities, processes* and *value chains*
- It applies all modern tools of **AI**: Machine Learning, Predictive Analytics, Process Automation, Natural Language Processing, Data Mining, Image & Signal Analysis and Classification, Recommendation systems, etc.
- It identifies hot spots and **PIP's** (Probable Improvement Points) at a daily or strategic time horizon
- It installs AI environment, offering absolute **control** of the manufacturing facilities and their **performance**

Conclusions

- AI/ML is real and is here – it cannot do everything we can imagine, but it is a strong tool & we must use it today, as our competitors do
- AI/ML real apps need more than programmers & tools: Data Scientists & Skilled domain experts
- Each case has to be examined separately – there is no one-size-fits-all solution
- Find a trusted, knowledgeable partner to focus on your specific needs



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Thank you for your attention

