





SUMMARY

- 1. Big Data in a Petroleum Refinery
- 2. Treatment of Plant Data
- 3. Digital Twin of the Plant
- 4. SRU Prototype
- 5. Conclusions & Action Plan







BUSINESS STRUCTURE

We are an industrial Group able to manage end-to-end the value chain in all its phases, offering a range of services with a high degree of flexibility.



Hydrocarbon Processing

Renewable & Green

NextChem

New Business Model

Tecnimont

Neosia Renewables

Met Development

KT - Kinetics Technology

Stamicarbon

Met Gas Processing Technologies

TECHNOLOGICAL LEADERSHIP

PETROCHEMICALS

WELL ROOTED TECHNOLOGY **ORIENTATION: MARKET LEADER (#1)** FOR INSTALLED CAPACITY (last 10ys)

MARKET SHARE IN **POLYOLEFIN** PLANTS

50%

MARKET SHARE IN

LDPE **PLANTS**

Since 1970



MORE THAN

POLYETHYLENE AND POLYPROPYLENE **PLANTS** COMPLETED

FERTILIZERS

MARKET SHARE IN LICENSING UREA PLANTS TECHNOLOGY (#1 worldwide)*

MARKET SHARE IN LICENSING UREA **GRANULATION TECHNOLOGY** (#2 worldwide)*

Since 1924



AMMONIA AND **UREA PLANTS**

COMPLETED

OIL&GAS REFINING



WELL RECOGNIZED LEADERSHIP IN LICENSING HYDROGEN TECHNOLOGY AND IN

LICENSING SULPHUR RECOVERY AND TAIL GAS TREATMENT TECHNOLOGY



WORLD CLASS TRACK RECORD IN LARGE GAS TREATMENT PLANTS AND REFINERY PROCESS UNITS

Since 1971



MORE THAN

HYDROGEN AND SULPHUR RECOVERY **UNIT PROJECTS** COMPLETED

€50MLN INVESTED IN INNOVATION

INVESTED IN

R&D **PROJECTS** In Green Acceleration (last 5ys)

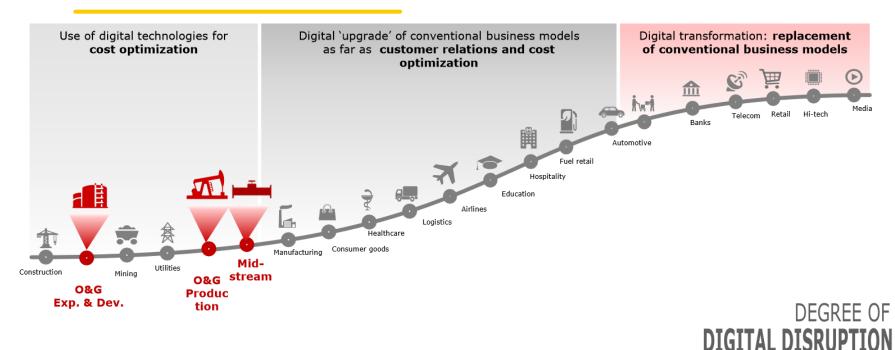


~1,300 **Cumulated Patents**

Strong commitment to technology development



DIGITAL TRANSFORMATION IN INDUSTRIAL SECTOR



DEGREE OF DIGITAL DISRUPTION

TRANSFORMATION

Operations & costs impacted by Hybrid digital-physical digital disruptions

Hybrid digital-physical customer experience

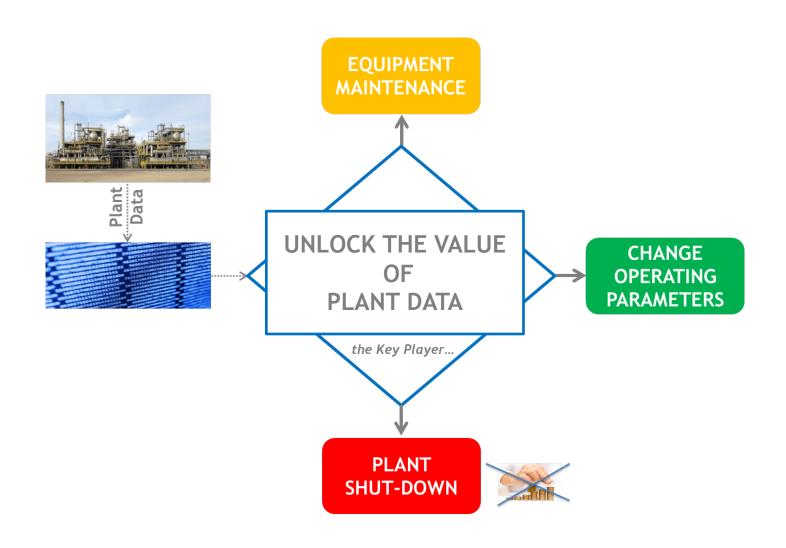
New competitors or Total digital substitution risk for traditional players

In this era of low oil & gas commodity prices, improvements to process and technology efficiencies begin to emerge as a critical success factor Aging assets across application areas that were economically viable when oil prices were high, are now too inefficient to compete in a low-commodity-price economy



THE IMPORTANCE OF PLANT DATA IN A PETROLEUM REFINERY

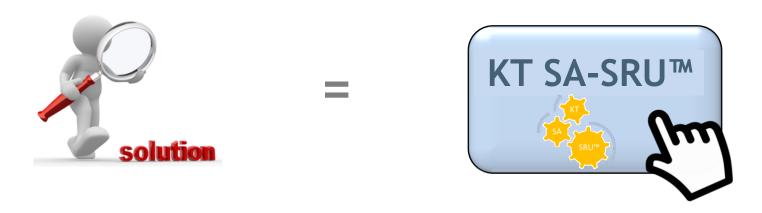
Plant Data are utilised by Operator to take a decision in all operating scenarios:





KT Digital Platform

NEW SMART "APP" for the Management of Plant Data

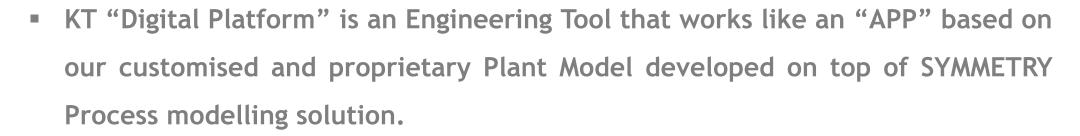


KT "APP" is capable to support 24h/day Operator in achievement of Plant Operation Excellence and Full Plant Profitability

KEY WORDS:

Plant Model, Data Validation, Data Reconciliation, Reliable Data, Monitoring Plant Performances, Plant Optimization, Maintenance, Safety, Training

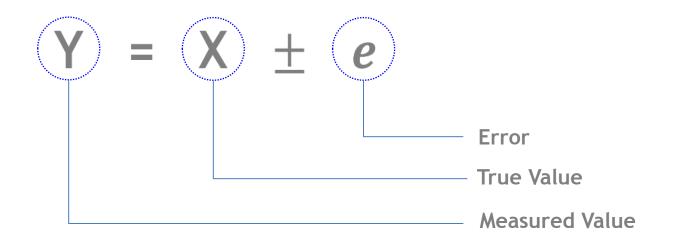
KT "DIGITAL PLATFORM"

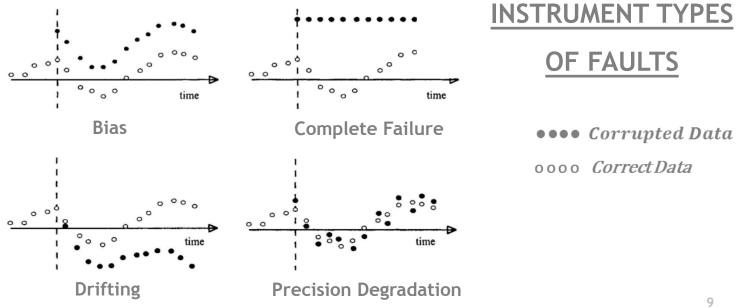


- What you can do with our App:
 - Model the real behaviour of the Process Unit
 - Perform Data Classification, Validation and Reconciliation of Plant Data through mathematical algorithms, returning reliable consolidated results
 - Analyse the results of a change of one or more operating parameters
 "off-line" for and easy and smoother Plant Optimization

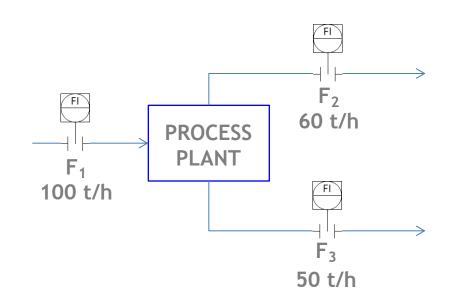
Our way to "bring our expertise closer to operation"

MEASURED PLANT DATA





THE PROBLEM OF TREATMENT OF NOT RELIABLE PLANT DATA...



In a "Real Plant":

$$F_1 - F_2 - F_3 \neq 0$$

because INSTRUMENT ERROR

How to solve the problem?

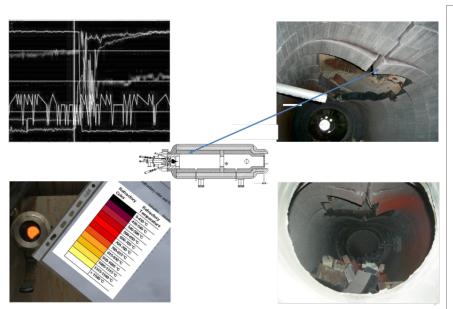
It is necessary to "refine" the Plant Data utilizing a mathematical technique:

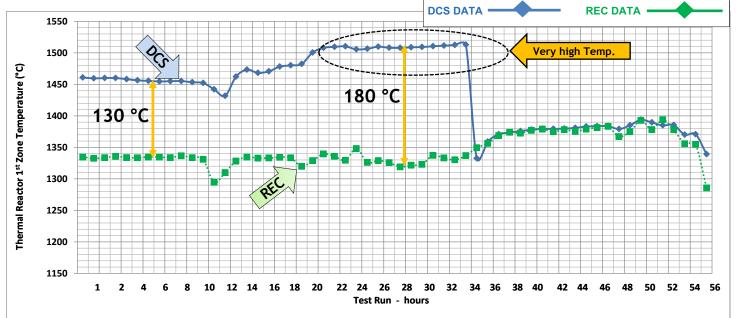
$\Phi_{\text{MIN}} = (F_1 - X_1)^2 + (F_2 - X_2)^2 + (F_3 - X_3)^2$		X ₁		
	t/h	103.33	46.67	56.66

This technique is called DATA RECONCILIATION "PLANT DATA REFINING" → RELIABLE DATA

THE IMPORTANCE OF RELIABLE DATA - CASE STUDY

When the Flame Temperature in Thermal Reactor is too high...







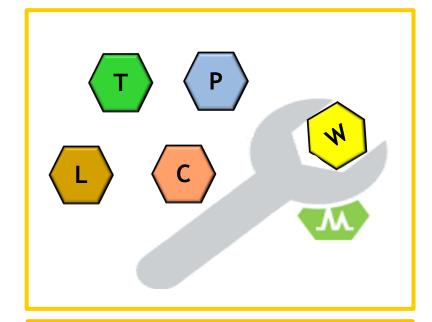


Our proprietary Data Processing Technique can be utilised by industry to reduce and/or completely eliminate the effects of Random Errors

KT DIGITAL TWIN - DATA RECONCILIATION

Three ingredients are required:

- ☐ Measurements Data (DCS DATA)
- ☐ Plant Model (Rigorous PROCESS SIMULATOR SYMMETRY)
- lacktriangle Mathematic Optimizer (Solver for $\Phi_{ ext{MIN}}$)

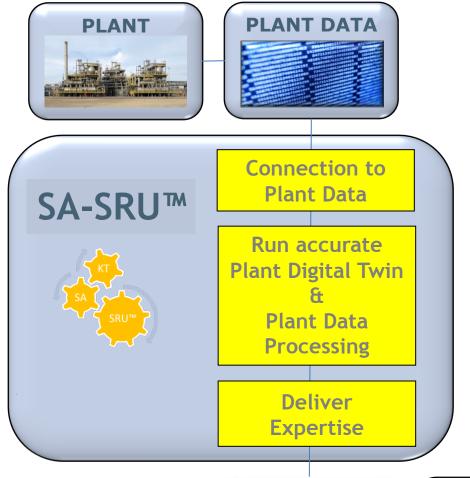


DATA Reconciliation is the adjustment of DCS Data...



Plant Model has to "mirror" the behaviour of Real Plant...

ARCHITECHTURE OF THE "APP"



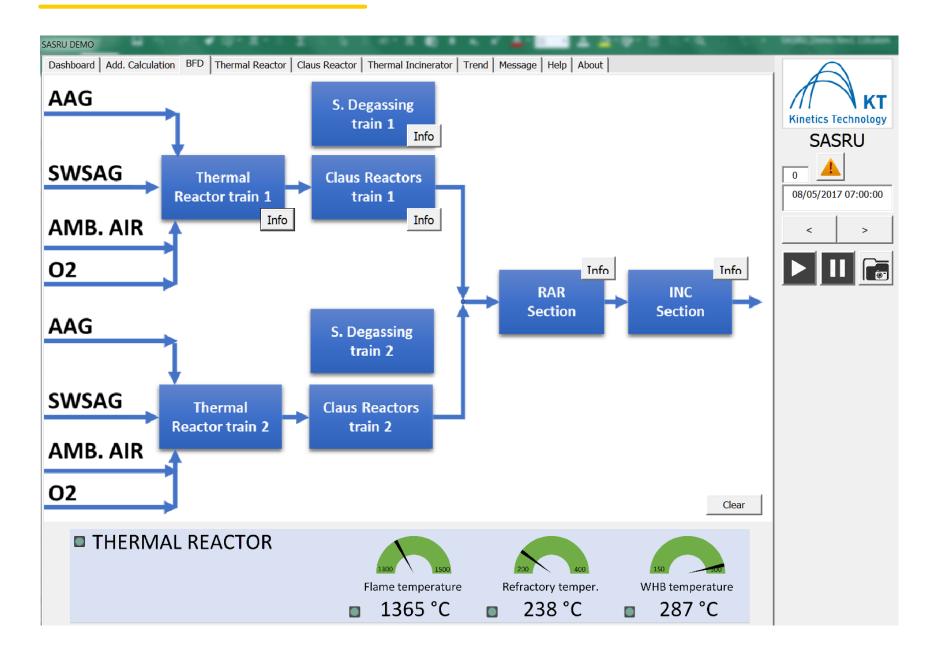
SA-SRU™

Efficient use of ALL Plant Data to support Operator in achieving Operation Excellence and Full Plant Profitability











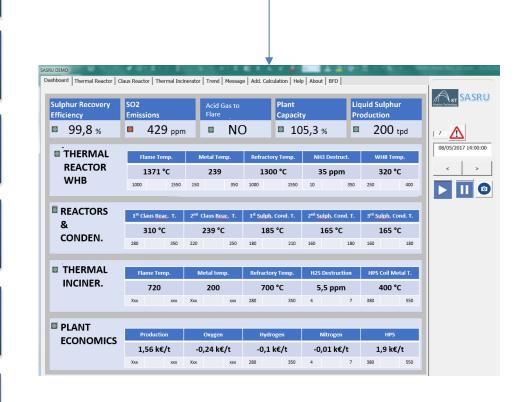
ADDITIONAL INFO

DCS GRAPHIC PAGES

TRENDS

MESSAGES

HELP





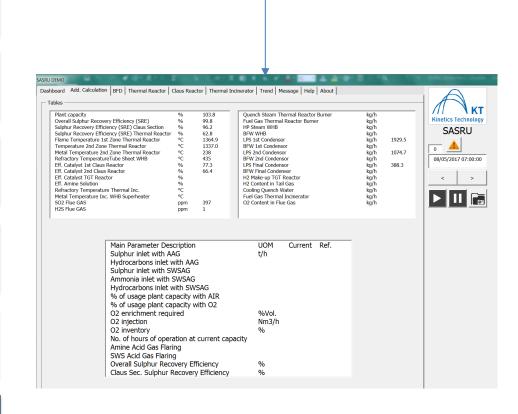
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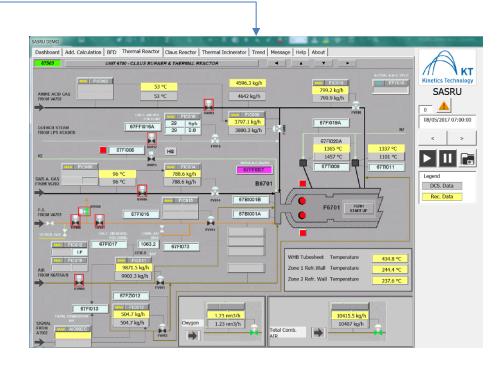
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DASHBOARDS

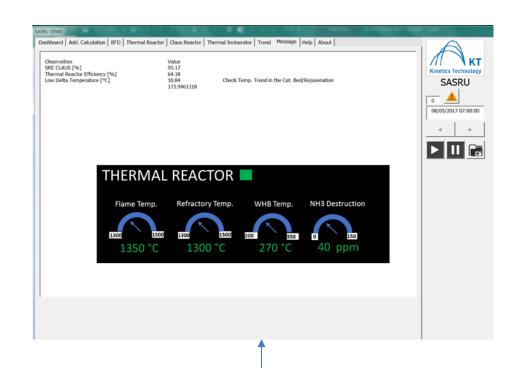
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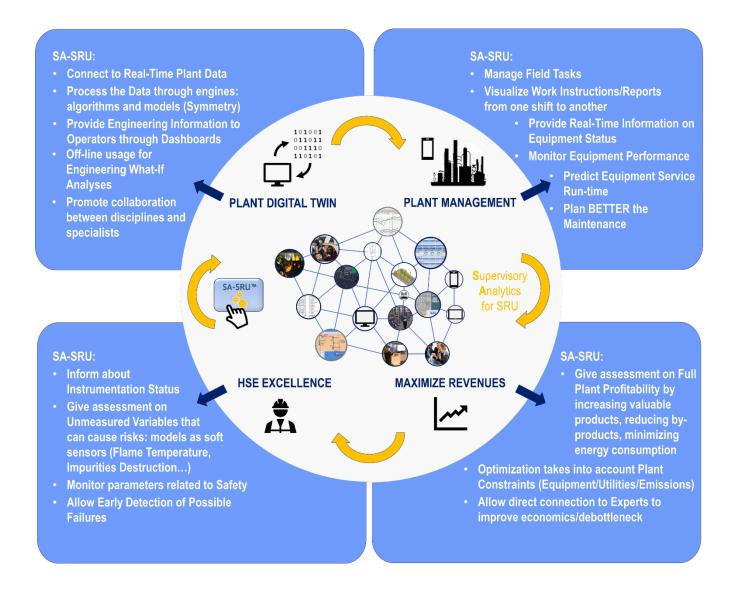
MESSAGES

HELP





CONNECT PEOPLE...







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