Progress beyond

Industrial Vision of a Process Engineer in a Digital Plant

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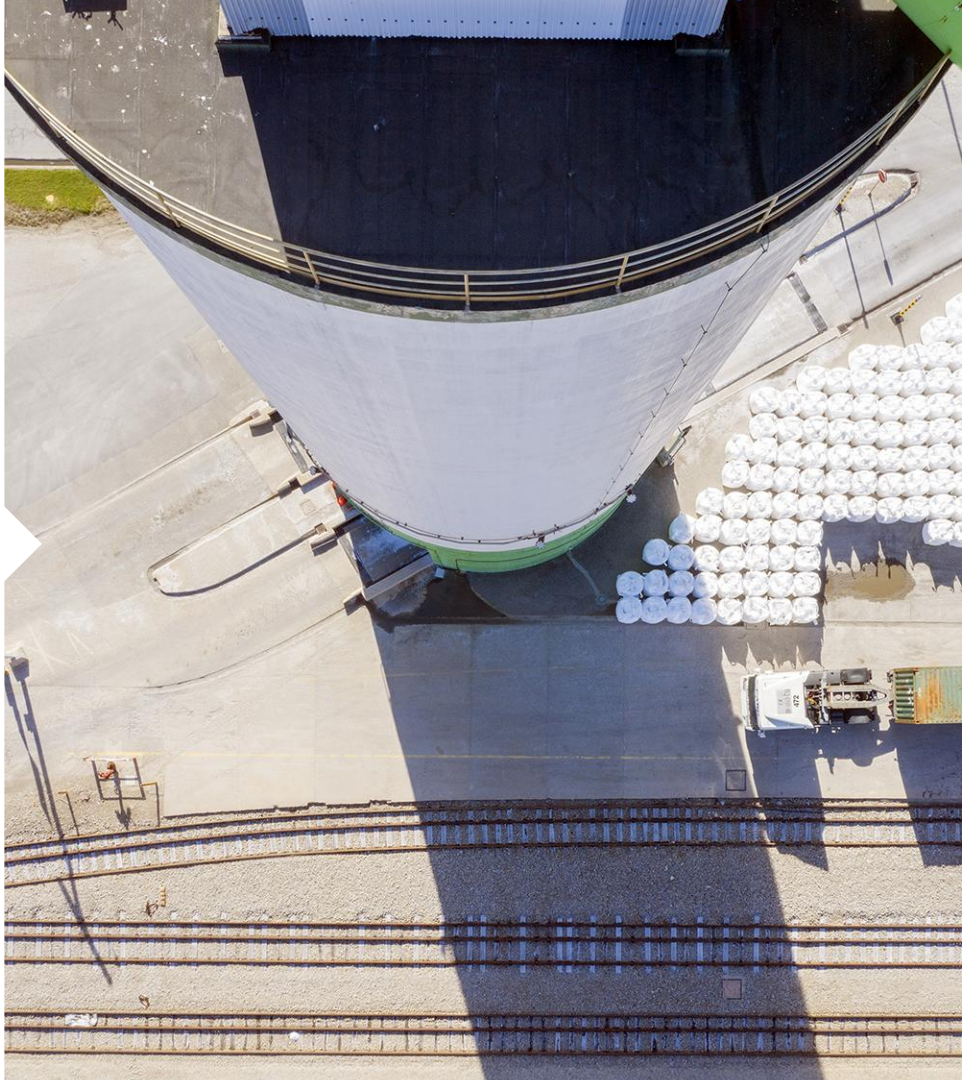


Our Vision of the Plant of the Future

- Agile and flexible in the face of an ever changing customer market
- Modular, standardized, scalable, repeatable, relocatable
- Secure in its access to infrastructure and data
- Simple, transparent and open for learning
- Customer oriented, pro-actively connected to customer needs and creating value with innovative products and services
- Sustainable, ensuring employee health and safety, with zero environmental impact
- 100% under control: Predictive, predictable and reliable

Digital transformation is business driven and geared towards multi-dimensional impact

Asset owners / Business

Asset performance through 'Data Analytics'
Enhance process performance

Asset-network value maximization
Increase profitability by applying dynamic optimization algorithms

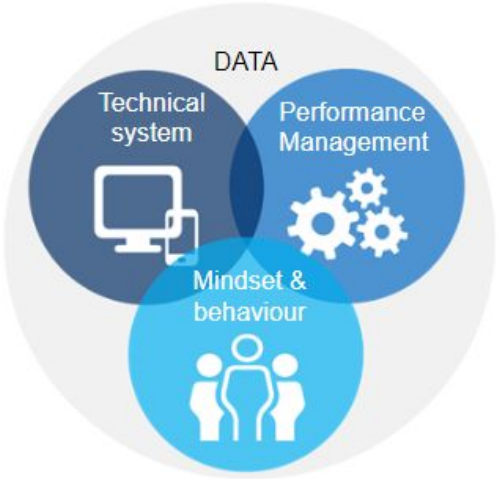
Data-enabled asset reliability
Leverage equipment data analytics to optimize maintenance

Digital workforce
Implement human – machine interface technology to streamline key processes

Robotics & Cobotics
Optimize plant fixed costs through robotization of key processes

- Safety
- Working conditions
- REBITDA
- Quality
- OTIF
- Cash

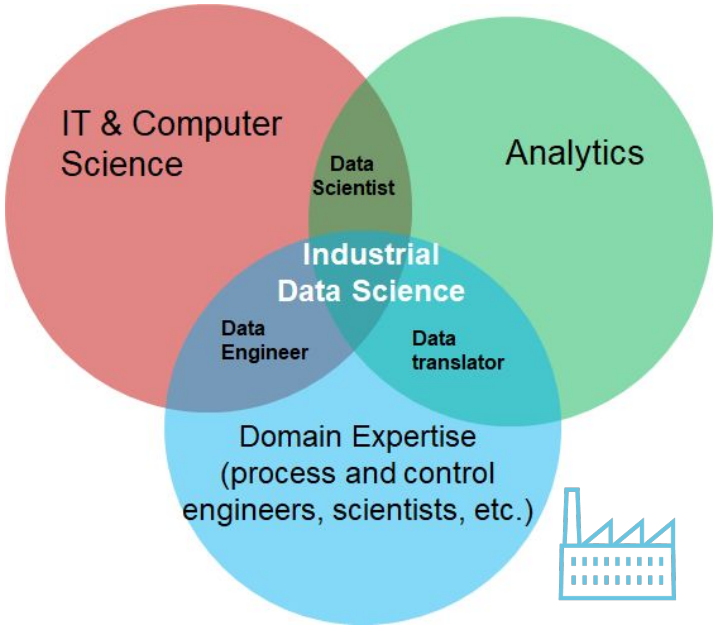
The 3 axes of the Plant Digital Transformation

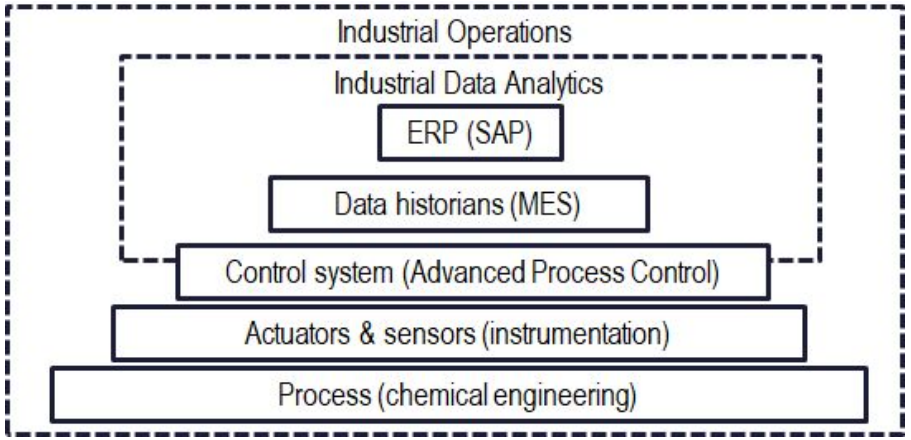


Developing the Transformation program means:

- Enhancing **site and network infrastructures and OT/IT tools** such as AA, APC, Integrated Planning, etc
- Strengthen and speed-up **Performance Management**
- **Transform Mindset and Behaviors** of all employees in the unit/site
- Develop and leverage **new technical capabilities**
  (Data Scientist, Data Translator, Data steward, Transformation Mgr,..)

New roles are needed - Process engineers are key actors





Collaboration in multidisciplinary teams is key!

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Advances and opportunities in machine learning for process data analytics

S. Joe Qin[a,b,*], Leo H. Chiang[c] [2019]

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Qin (2014), Reis et al. (2016), Chiang et al. (2017), and Venkatasubramanian (2019) provided comprehensive reviews of process data analytics and discussed a wide range of technical challenges. These articles reflected on a critique that spurious patterns and correlations outnumber genuine discoveries especially when process data analytics is applied to chemical engineering problems without context and domain knowledge.

needed to integrate data analytics tools with fundamental knowledge to create a robust and scalable solution for industrial processes. To drive innovation in process industries, a company must invest to create a critical mass of chemical engineers with technical skills in statistics, mathematics, modeling, optimization, process control, visualization, simulation, and programming. This group of

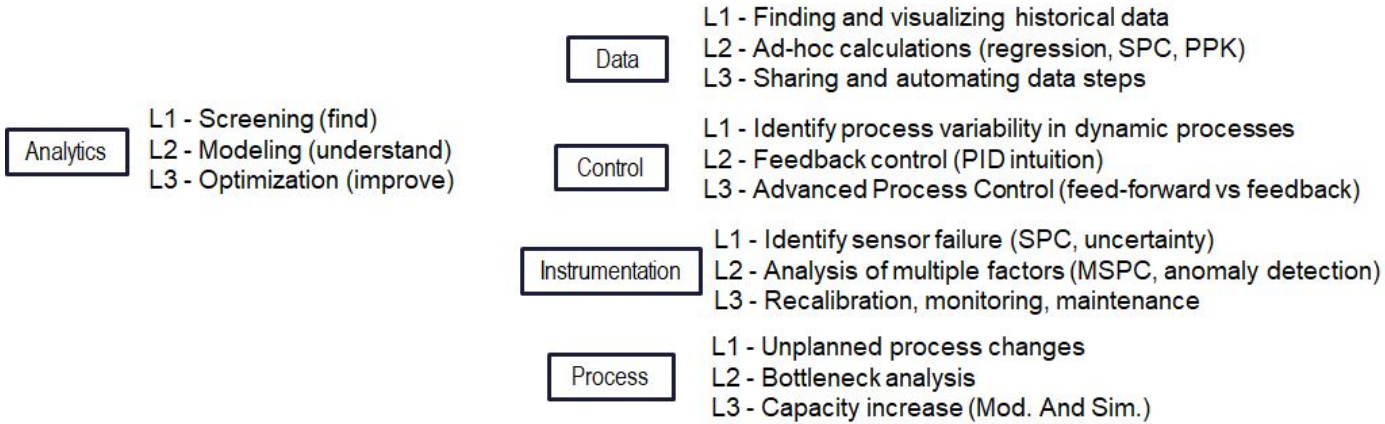
it is much easier to train chemical engineers on data analytics topics rather than to train data scientists on chemical engineering topics. As process industries employ a large number of chemical engineers, this community of practice is a fertile hunting ground to send motivated chemical engineers to pursue an advanced degree in data analytics and related disciplines.

The "digital" process engineer

1- Asking experts of each discipline two *simple* questions

- Short list of the most common problems during diagnostics
- Software or procedures (ex checklist) to identify these common problems

2- Classification



3- Build the training catalog with those 3 levels (awareness + problem based learning)

4- Build cursus (webinars, training on the job) adapted to individual background + coaching

Conclusions

- Chemical Engineering MUST be teached at “University”
- Problem based learning is encouraged
- Collaboration in multidisciplinary teams is key
  - Minimum understanding of other disciplines (process control, …)
  - soft skills / transferable skills
- Continuous improvement Mindset
- Digital = Data
  - Minimum level is to be able to detect anomalies (screening) thanks to process data analytics and to be able to interact with Data scientist and Data Steward
  - Options for more advanced trainings should exist (modeling and optimization)
  - Hands-on training followed by Coaching

Thank you for your attention.

Any question ?

SOLVAY

Progress beyond

Together we can create
a sustainable and shared future.