A Practical Approach

How NAS is doing Digitalization

Your mileage may (and probably should) vary

Start a Digitalization Team

Create a team of I4 practitioners

- They need I4 skills
    - Deep technical knowledge of process
        - For NAS, that meant Ops engineers, quality engineers, and maintenance engineers
    - Scripting or coding abilities in data access and general languages
        - SQL   - Python   - R   - C#
    - And a mix of:
        - Strong communication skills   - Project management skills
        - Open minded curiosity   - A continuous learning mindset
        - Strong teaching skills

Start a Digitalization Team

Your shiny new Digi Team's job

- Their responsibilities:
  - Somebody has to intentionally make I4 happen at your plant
    - The digi team doesn't have to be full-time I4 engineers unless you want them to succeed

  - They need to build things (that's why we call them engineers):
    - Data infrastructure   -   Data analysis tools
    - Bespoke projects   -   Training programs

  - They become I4 experts to assist in the continuing modernization of your factory
    - Digitalization is a new dimension of the manufacturing landscape that needs to be considered in the cost benefit analysis of every part of your company
      - Capex   -   Strategic planning   -   Continuous improvement
      - Hiring/retention   -   Maintenance   -   Quality
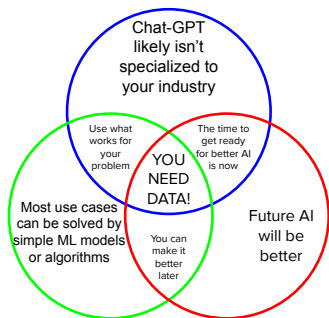
Beg/Borrow/Steal a Data Warehouse

The digitalized factory runs on data!

- You need a database ASAP
  - Good news: you probably already have one!
    (I'm not joking about commandeering an existing database - it's a massive boost if you can)
- You need tools to get new data into that database
  - Find every data silo you can connect it to the database
    - Process data should be collected (MES or ERP/job system hopefully has this)
    - Machine data should be collected (Historian systems are BUILT for this)
    - Process camera recordings, quality reports and product inspections, maintenance events or records, energy meters, spare parts and consumables inventory, etc.
- **Data is the new gold: even if you don't know what to do with it yet, start mining!**
  - **Hard drives are superior to time machines (since they actually exist and are relatively cheap)**

OBLIGATORY AI SLIDE

Chat-GPT likely isn't specialized to your industry

Use what works for your problem

The time to get ready for better AI is now

YOU NEED DATA!

Most use cases can be solved by simple ML models or algorithms

You can make it better later

Future AI will be better

- Large transformer models aren't trained on industry data...yet
- Most use cases will be solved by simple tools
- The tools will get better with time

...BUT none of it matters if you don't have data to run it on!

Build Out Data Tools

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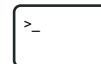
Learn a little devops and start building things

- Your digi team needs to learn how to do some data science
  - Controversial opinion: THIS SHOULD NOT BE DONE IN EXCEL!!! (but Excel is better than nothing)
  - Jupyter notebooks/R notebooks are a good platform for this
    - Update your notebooks with live data and you might accidentally make some dashboards. Deploy on containers for bonus points!
- Your digi team needs to build some data-based applications
  - Live algorithmic optimizers, basic ML models, or data collection apps are good place to start
  - Because anything worth doing more than once is worth automating!

Share the Digital Goodness

Your digitalization effort will fail if only your digi team does it!

- Small projects are your friend
    - Your Digi team will find some early projects to show what can be done
    - Later projects will be suggested by stakeholders once they see what tools are available
- Teach regular engineers as much SQL, DS scripting, and even machine learning concepts as they are willing to learn

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Q. How do you leverage a small team of highly skilled analytics engineers?
A. Augment them with an army of subject matter experts with at least basic data analytics skills.

SME's + Training × Advanced Tools = Doing more, better and faster

Cool AI Stuff

Time

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- Show and teach I4.0 tools to enough people and your company will start to think in digital terms, accelerating your digital transformation