Q-Interline

Industry 4.0 and the use of online NIR sensors

interline

Q-Interline at a glance

- Founded in 1996 by CTO Anders Larsen
- >20 years experience in the dairy industry
- Headquarter is based in Tølløse, Denmark
- Experience from > 500 installations

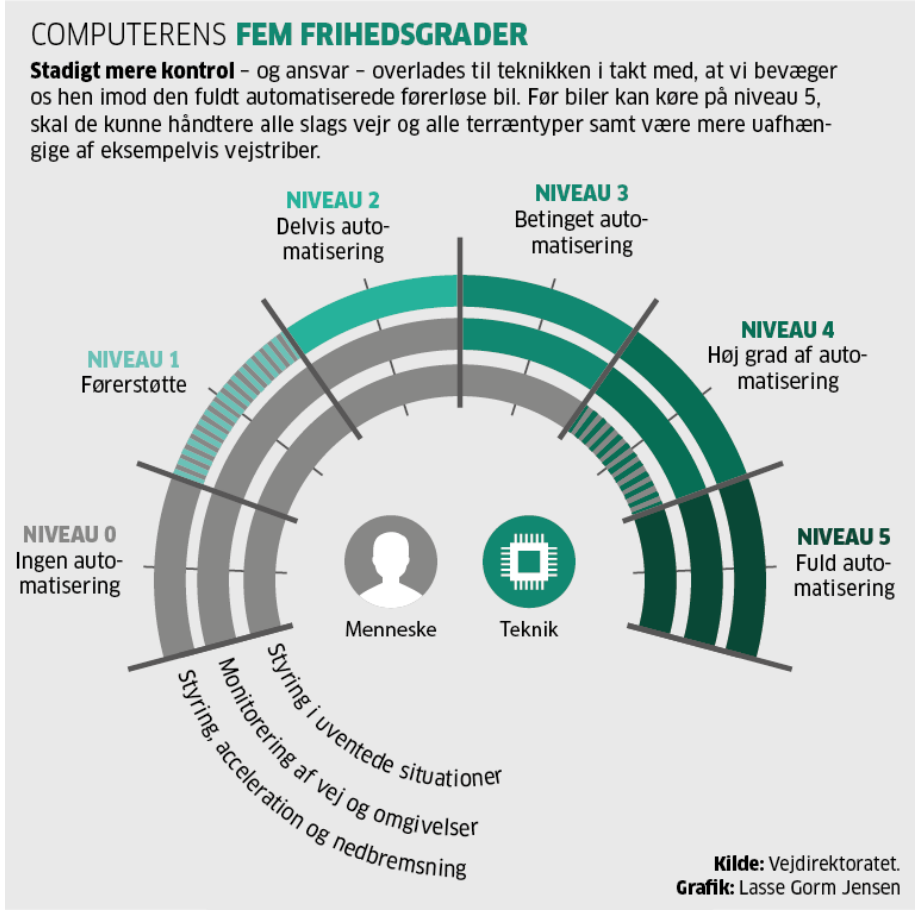
www.q-interline.com

Per Sand
BU Manager Nordic

What will be covered

- Our view of Industry 4.0
- New InSight Pro online FT-NIR
- Where are we and what is coming in the future

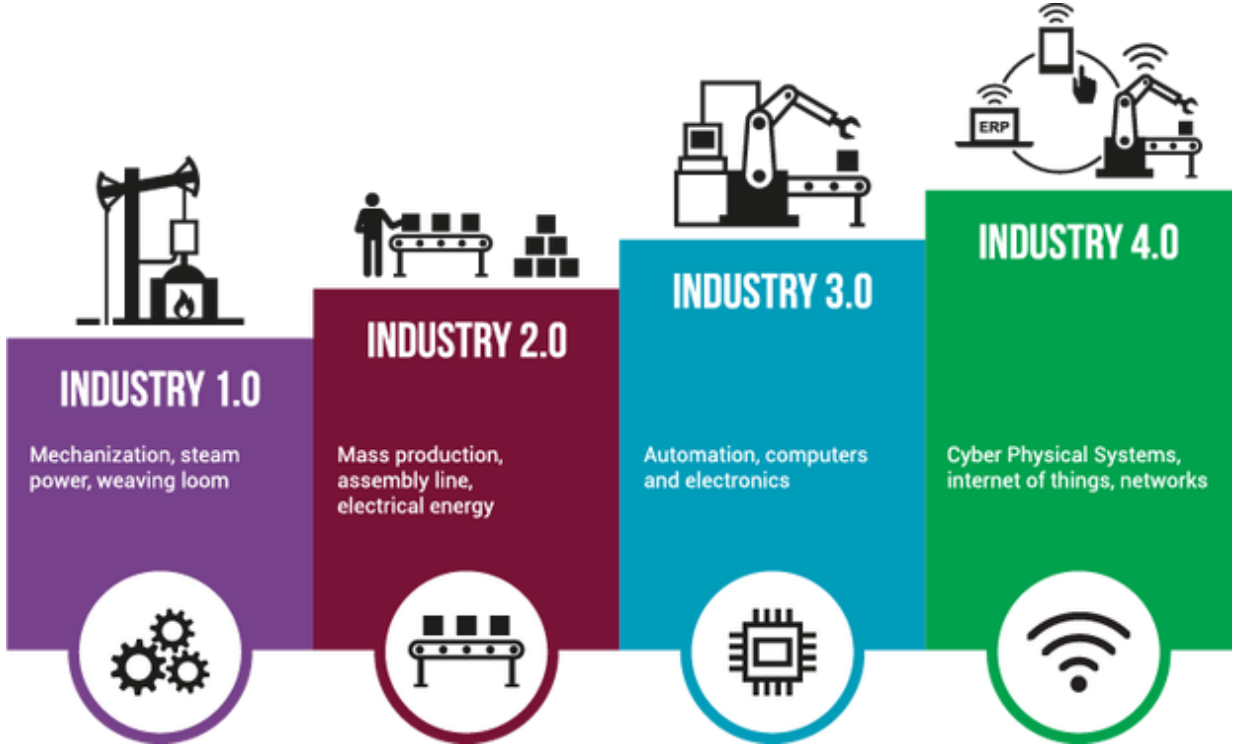
Think 20 years back



- Who would have ever thought a car could someday drive by itself?
- Visionary SAE engineers did!
- We have the visions to move NIR forward

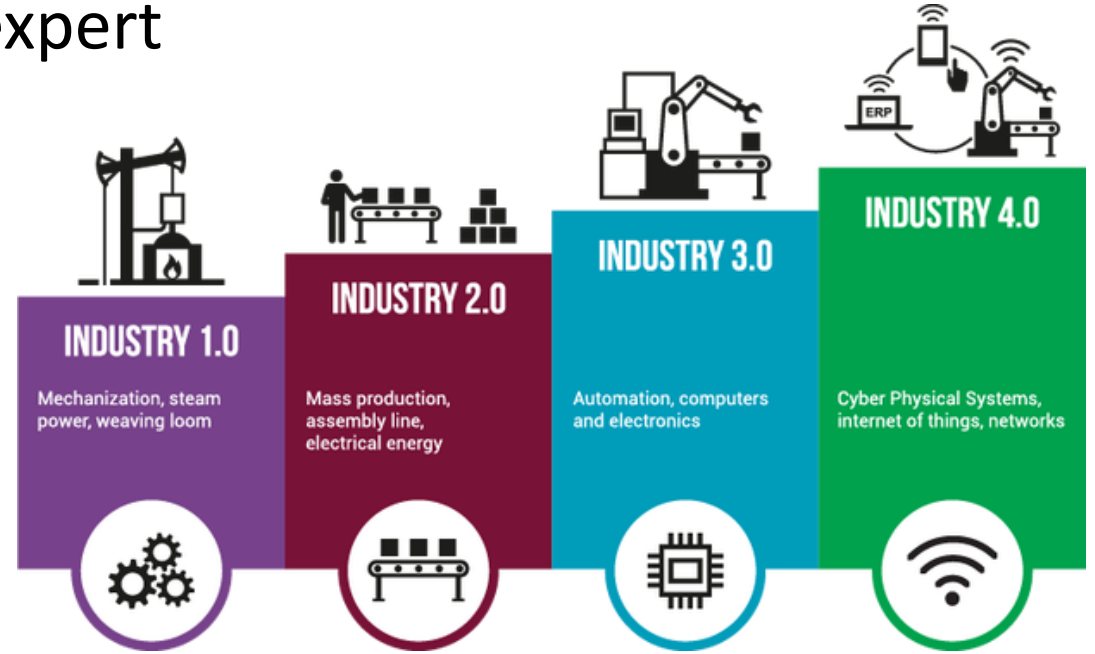
Were is the use of NIR presently?

- We are taking advantage of tools of Industry 3.0
- Can we reach Industry 4.0?



Online NIR for Industry 4.0

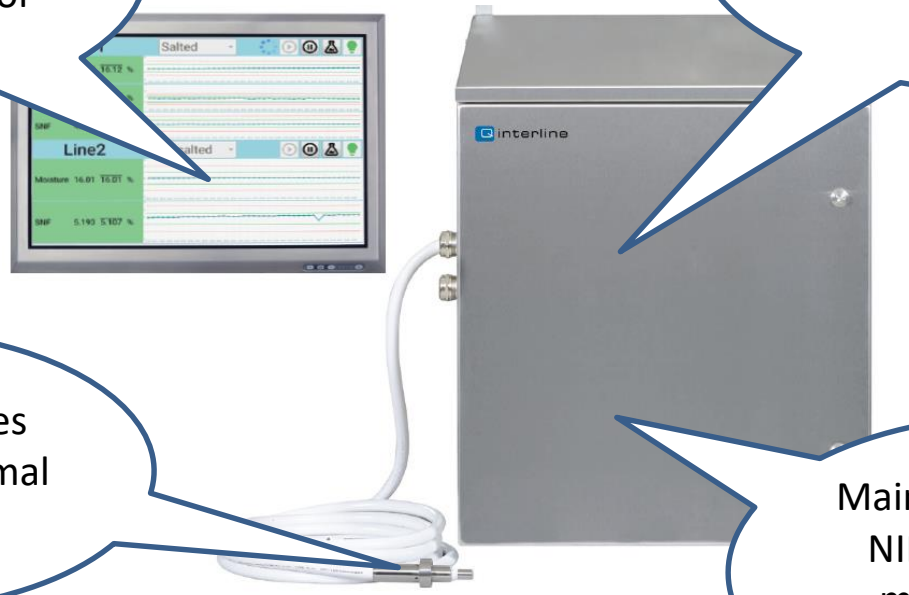
- There is much more value to be obtained
- Harvest the value by doing things right
- You don’t need to be a spectroscopic expert



InSight Pro Online NIR

High performing IT linked to advanced instrument control and PCS

Instrument under controlled conditions for unattended operation



Optimized probes and cells for optimal performance

Maintenance free FT-NIR platform with modern long life components

InSight Pro

- Hardware is ready for the challenges of Industry 4.0
- Focus must be on
  - Customer and organisation
  - Software, cloud and artificial intelligence
  - BIG DATA

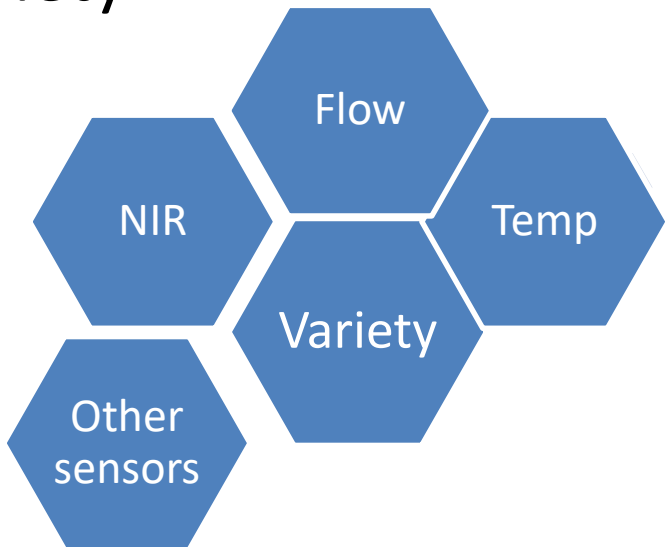
~~4V model~~

5V model

Variety – Data from different sources

- InSight Pro is a source of data
  - Provides physical and chemical snap-shots
- Does not offer sufficient variety

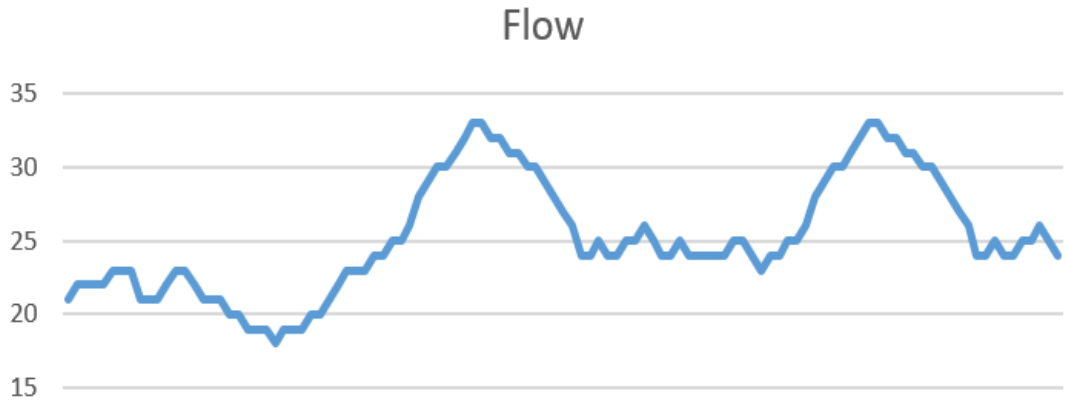
Combine with other sources of data
to obtain sufficient Variety



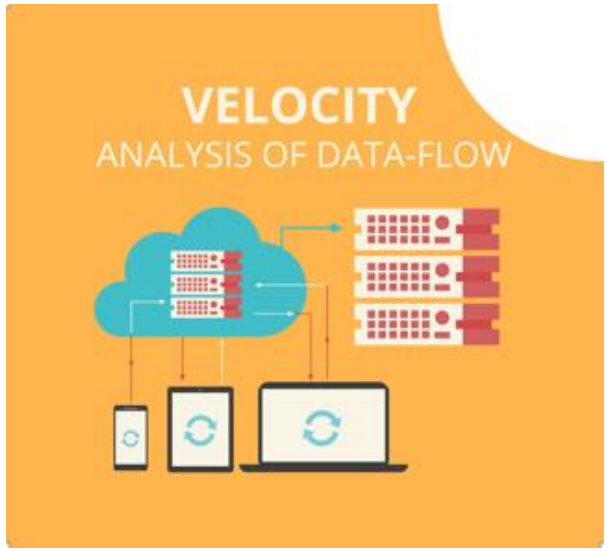
Why is variety important – an example

- Time frame: One hour
- NIR measurement every 30 seconds = 120 measurement/hour
- Flow varies as shown below:

Data must be statistically sound without Incorrect weighing error (IWE)

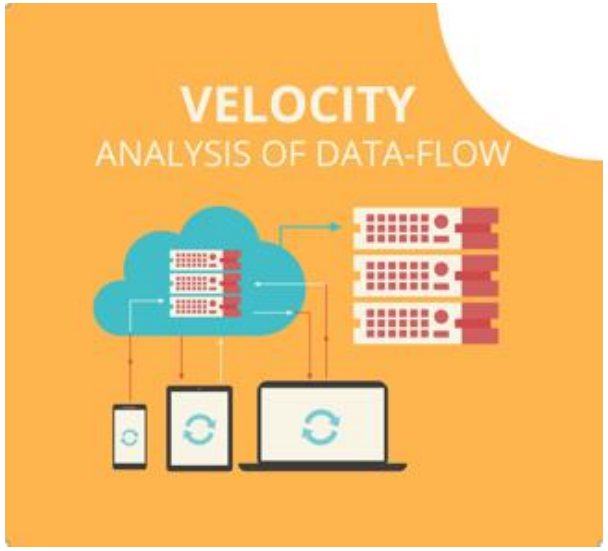


Velocity – speed of data



- Processed data from InSight Pro every 10-30 seconds
- Data is treated instantly
- Results presented as trend lines

Velocity



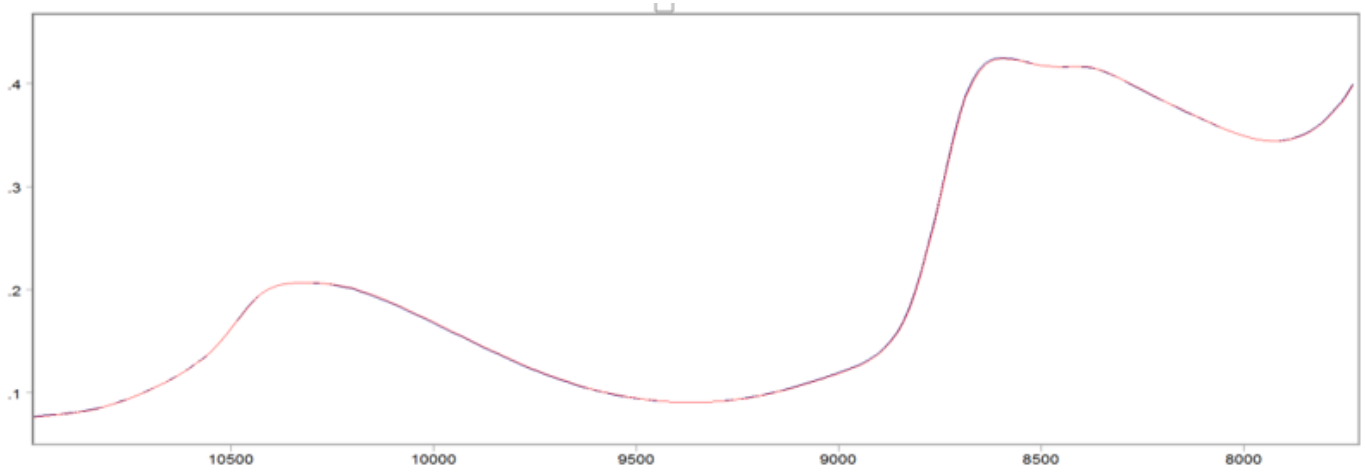
Sampling speed is defined by what you want to detect

"According to the **Nyquist Theorem**, the **sampling** rate must be at least twice the highest variation we wish to detect"

Volume – Lots of data generated

Data ~ 10 KB/measurement → One spectra/30 seconds

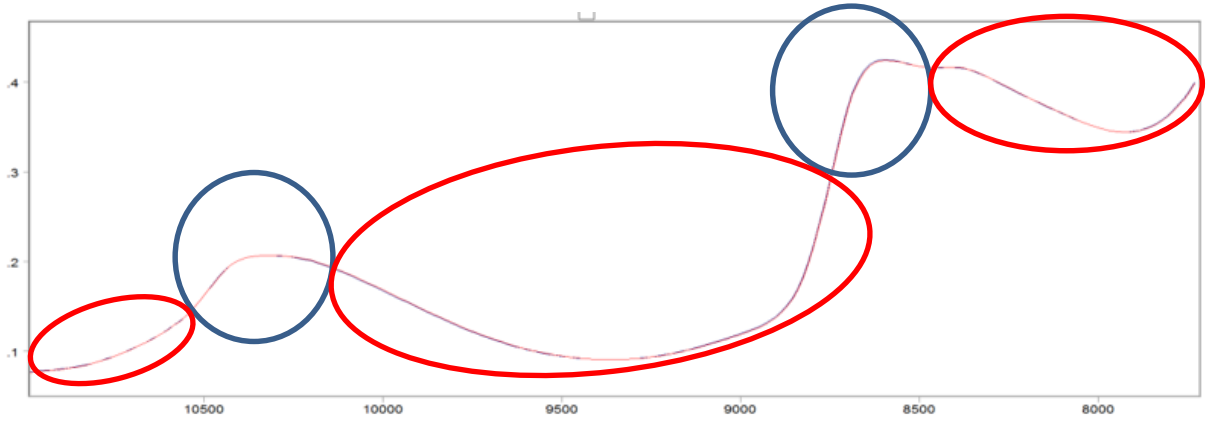
29 MB/day ~ 11 GB/year



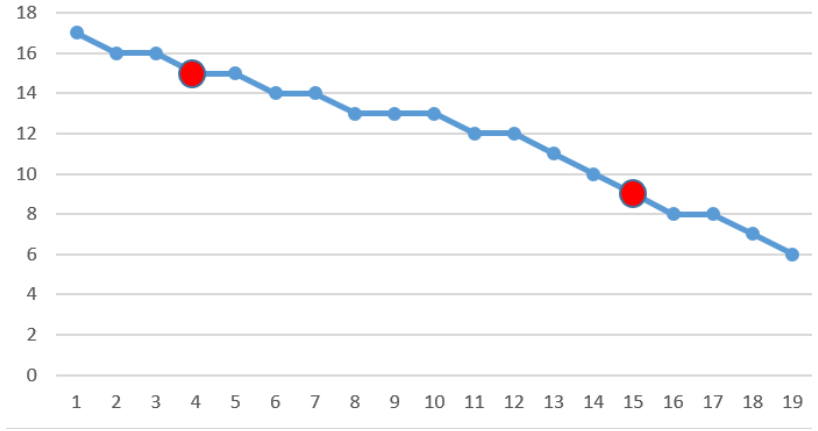
With two measurement points – 22 GB/year

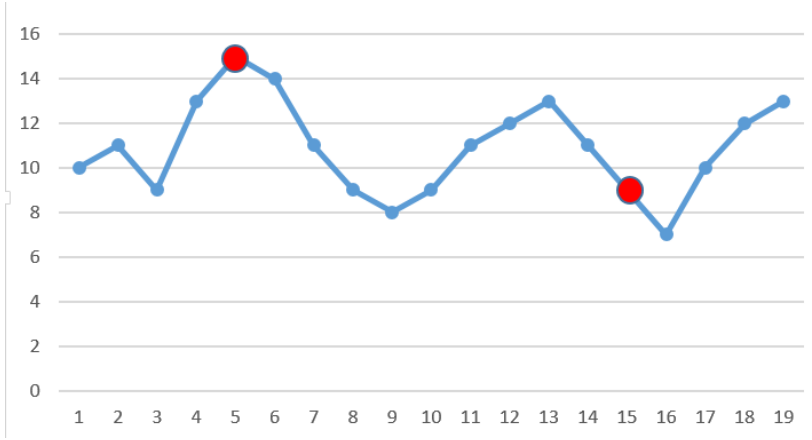
Volume – Traditional use of data

- Selected peaks are used
- Provides information about %X, %Y and %Z
- What about the rest?



Volume – Much more data to use





We need more data to see the real picture

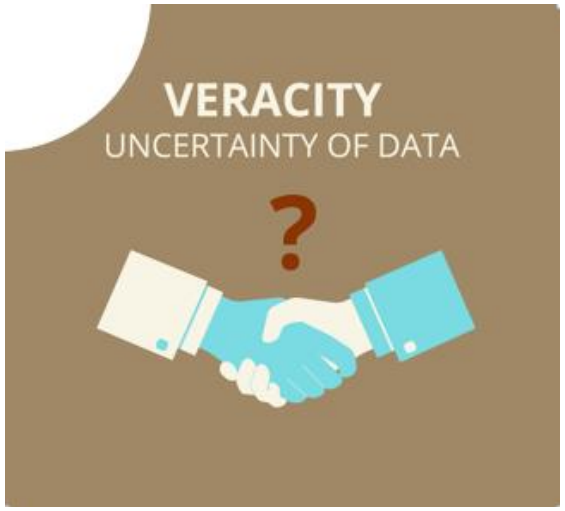
Veracity – Trustworthyness of data

The numbers looks strange

The analyzer must be wrong

Can I trust the data

Veracity – Trustworthyness of data



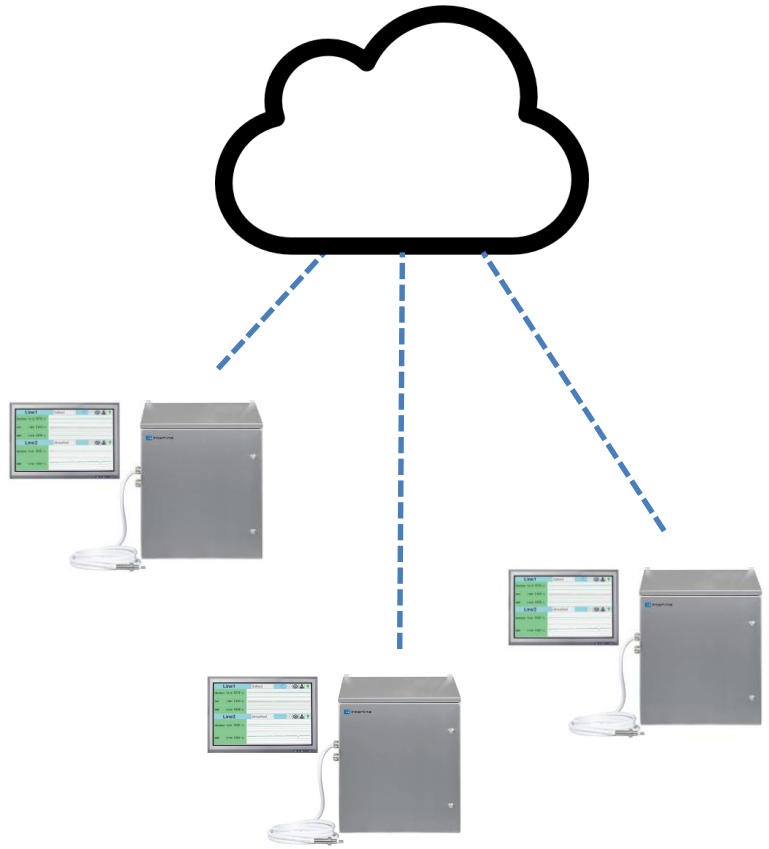
Make sure the quality of the data is constantly controlled

- Hardware
- Application
- Laboratory
- Agreement

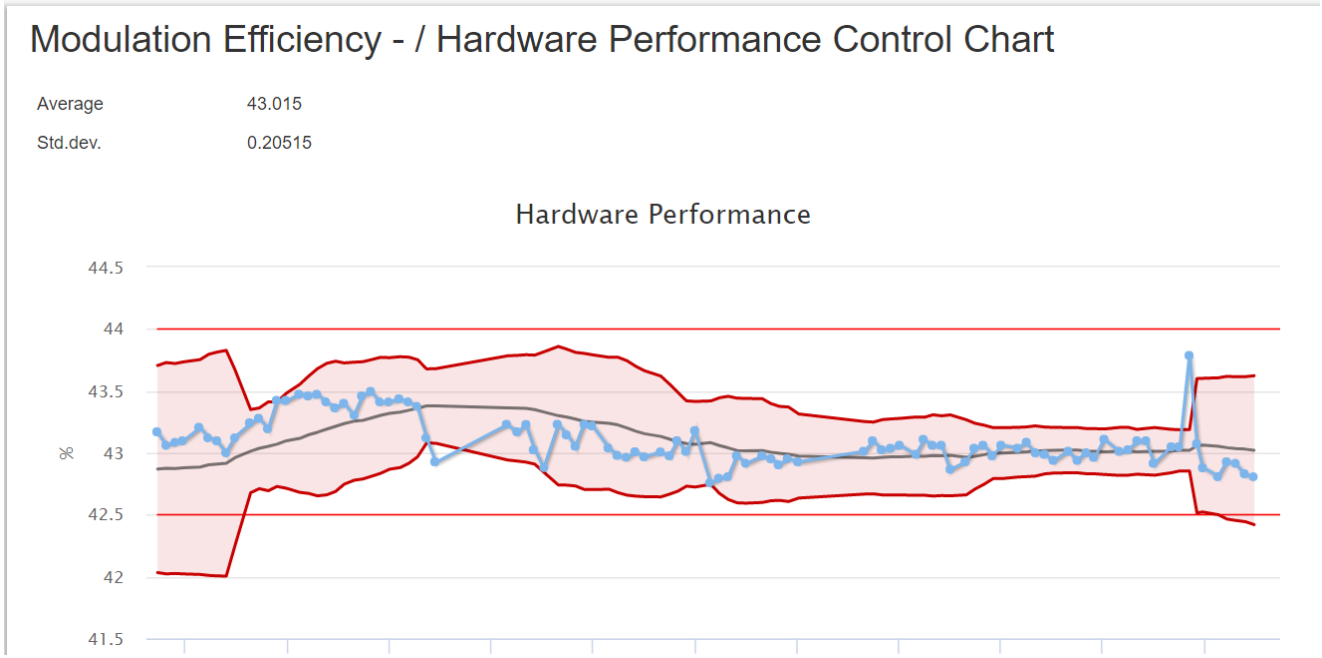
Get really busy!

Veracity – Trustworthyness of data

- Use advanced instrument control
- AnalyticTrust - a cloud based QA solution



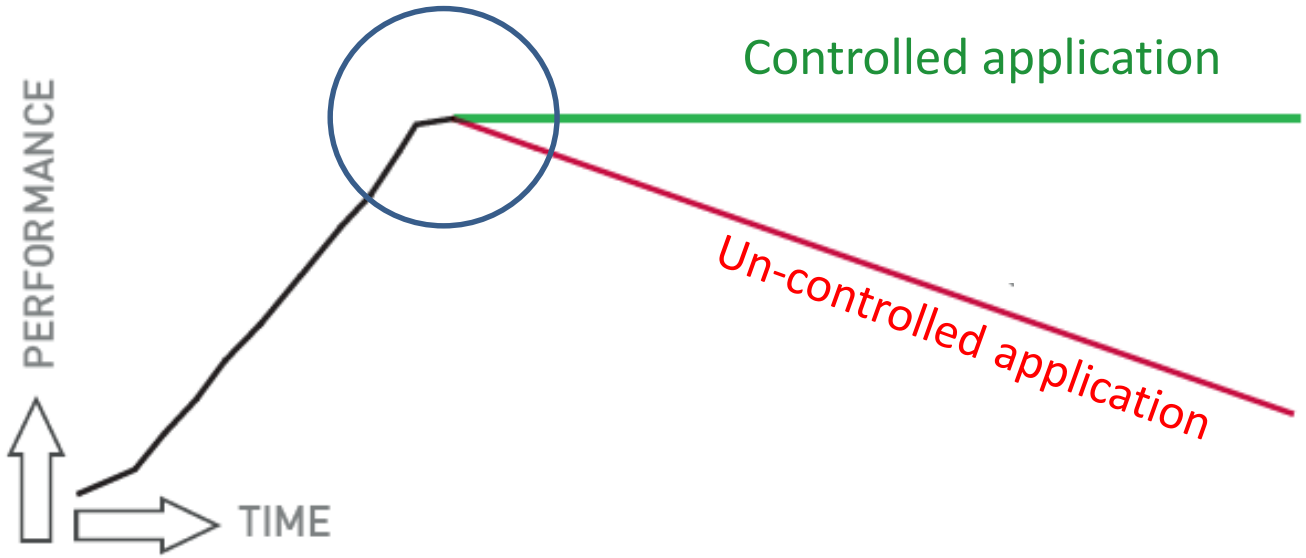
InSight Pro + AnalyticTrust



- Pro-active alarms
- Always trustworthy data
- Trends to be addressed before they become an issue

VERACITY

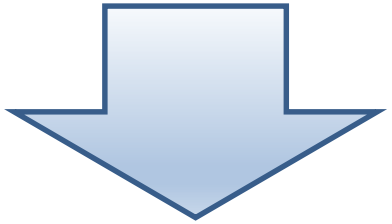
Veracity – Dont forget the organisation



- The organization is important
- Secure an efficient transfer to the organization

Looking X years into the future

- We have created a ”NIR SAE” model and we have reached level 1 and 2 for various functionality
- We have created very strong hardware which allows us the freedom to focus on the customer and software, cloud and artificial intelligence.



- We believe we can make the instruments autotune and act in a network with other artificial inteligent systems.

To summarize

InSight Pro can supply VOLUME of data, but not VARIETY. When combined with AnalyticTrust VERACITY and if all used in the right way VALUE

Thank you for your attention

Questions?