Cognite

Modern APIs
for industry

Subsea Valley 2018-12-11
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CTO, Cognite

WHAT

"

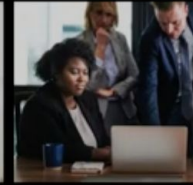**Cognite holds a complete digital representation of the industrial reality both immediate and past**

WHY

you name it.

A WORLD OF DATA SILOS

END USER

APPS

Dashboards & Reporting

Analytics, Optimization & Machine Learning

3D/AR/VR

DATA SOURCES
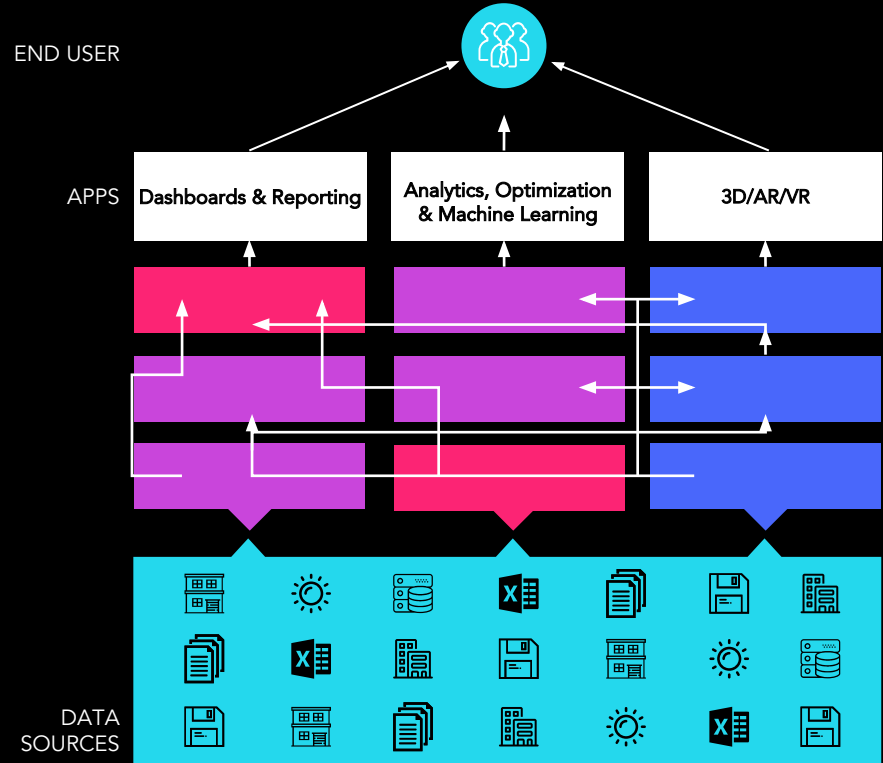
BREAK THE SILOS!

An open, uniform way to access <u>all</u> industrial data

Applications

Data layer

Standard access regardless of assets

HORIZONTAL DATA PLATFORM

Data sources
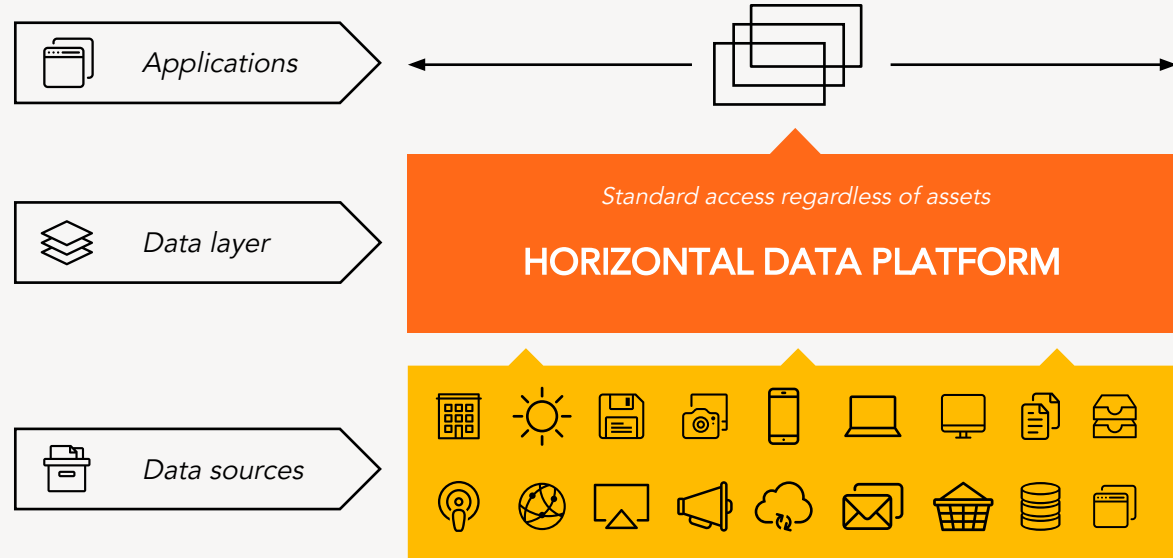
CONTEXTUALIZE!

3D Digital Twin – from
equipment to entire asset

Physical Process
Digital Twin

Other context:
weather, satellite
images, maps++

Maintenance logs,
ERP data

3D models

P&IDs

Equipment
hierarchy

Sensor
metadata
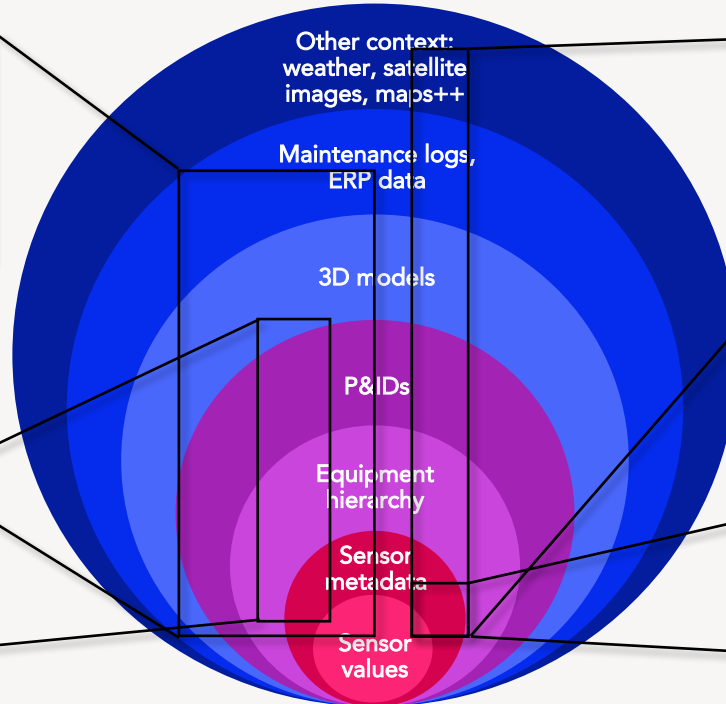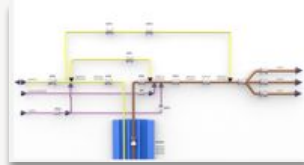
Sensor
values

Predictive models

Real time replica of
sensor values

MACHINE LEARNING MODELS
SOPHISTICATION

BE OPEN!

Applications	Predictive Maintenance / Production Optimization / Remote monitoring / Simulations and visualization / Alliance Partners	
Data layer	Standard access regardless of assets — **HORIZONTAL DATA PLATFORM**	
Data sources		

Partner logos: BAKER HUGHES a GE company, GE, FRAMO an Alfa Laval brand, SOLUTION SEEKER, KARSTEN MOHOLT, ARUNDO, AkerSolutions, Honeywell, VISAVI TECHNOLOGY, SINTEF, SIEMENS, inprocess

Example use cases

Predictive maintenance

- In-house, partner or OEM need access to relevant time series for one or more pieces of equipment
- Depends on P&IDs to find relevant tags, then historians for actual TS data
- May need data about downtime and maintenance from work orders and failure notifications

Production optimization

- Example: Solution Seeker to optimize well velocity/erosion trade off
- In general using correlations between objective function and inputs to system or simulator technology
- Depends on process topology (P&IDs), asset engineering data (such as PDMS 3D model), historical well production rates and historical input time series like choke/valve positions

Digital field worker

- Access to all relevant data for field workers through portable device
- Depends on asset engineering data, documents (PDFs), 3D model, work orders, failure notifications, time series
- Applications will want to trigger events in ERP systems like SAP (approve work order etc.)

LEVEL OF MATURITY OF DATA PLATFORMS

| Data lake (Dropbox in the cloud)	Contextualized data lake	API on top	API used @scale	Master data platform
Extractors, integrations, scalable file storage	Relationships, data typing, inferred and explicit connections	Clever indexing, security, search, scalability	Ease of use, documentation, tutorials, self-serve, SDKs, integrations with common tools	Trust, lineage, versioning, subscription to push updates

Speed vs standardization

The web is not an ISO standard
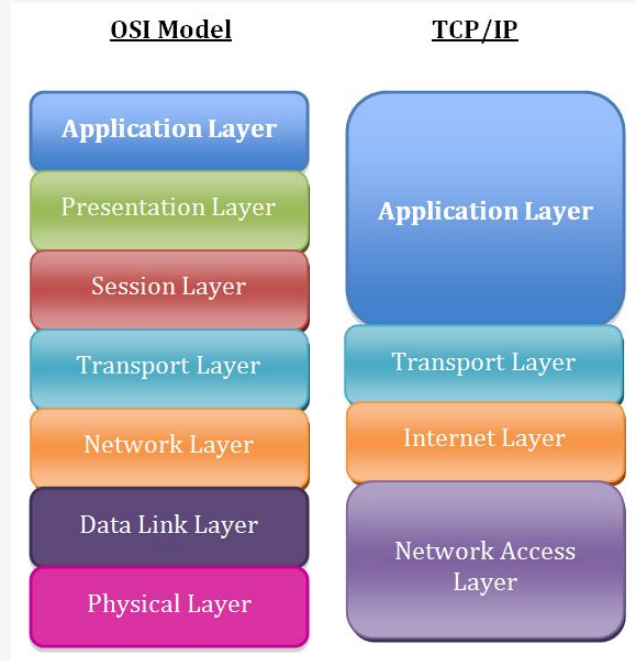
Why internet standards aren't really standards

"The Internet, a loosely-organized international collaboration of autonomous, interconnected networks, supports communication through voluntary adherence to open protocols and procedures defined by Internet Standards. From its inception, the Internet has been, and is expected to remain, an evolving system whose participants regularly factor new requirements and technology into its design and implementation." - IETF

Today, most standards start out as implementations that evolve until they have adoption and momentum. The company/companies that "win" and become de facto standards often then turn them into more "proper" standards with governance.

Versioning: move forward without breakages

Goal is to continue to innovate while existing integrations and applications keep working.

Why URLs look like this: https://api.cognitedata.com/api/0.5/timeseries

Add new versions while old ones keep running. Then deprecate old ones in a reasonable amount of time (12 months?)

Golden data sharing principles

- All data sharing will happen through API portal

- All derived output from data shall be stored and made available in API portal

- All data needs to be searchable

- All data is open (internally) by default, unless proven to be confidential or restricted due to legal, market sensitive, or personal information

- All data is available in a standardized, well documented and versioned API

- All APIs have the same authorization and access control and only allows encrypted connections

- All suppliers need to provide their documentation in a machine readable format, ingested into API portal

- No underlying technology will be exposed through the APIs, to ensure continuous optimization

- All data extraction happens real time or regularly - no one off data dumps

Convergence instead of standardization