

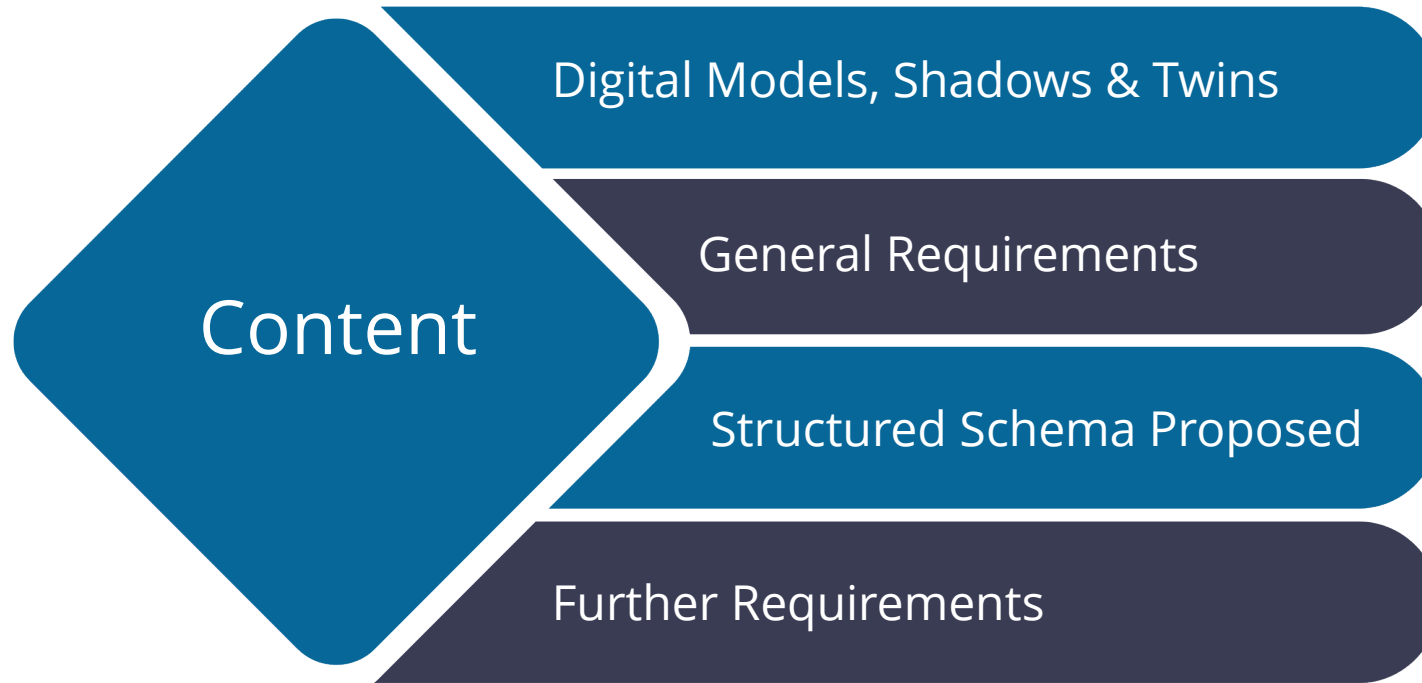
Implementation of a Scientific Metrological cloud kernel as a byproduct of the digital twins



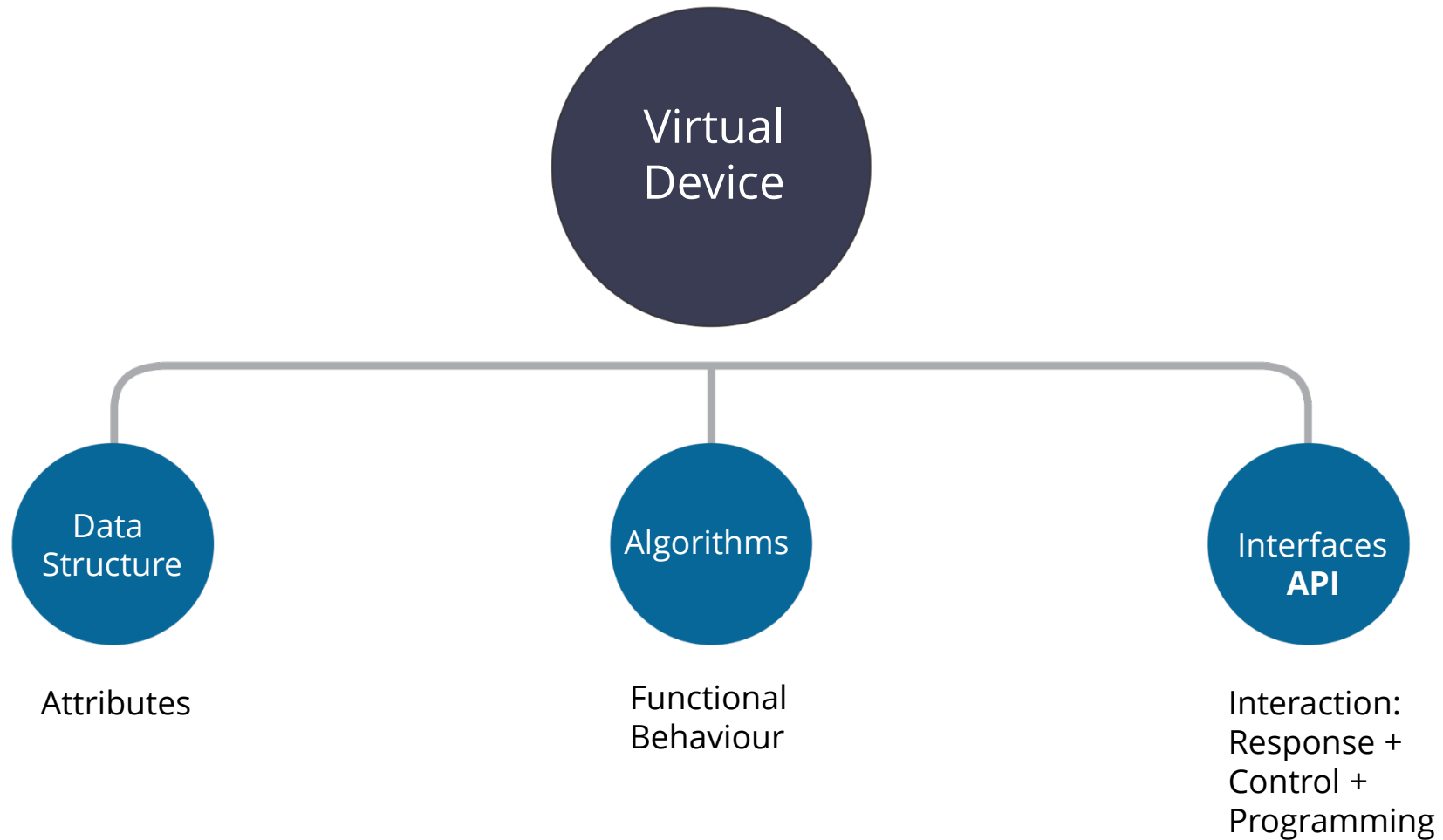
SE
SECRETARÍA DE
ECONOMÍA



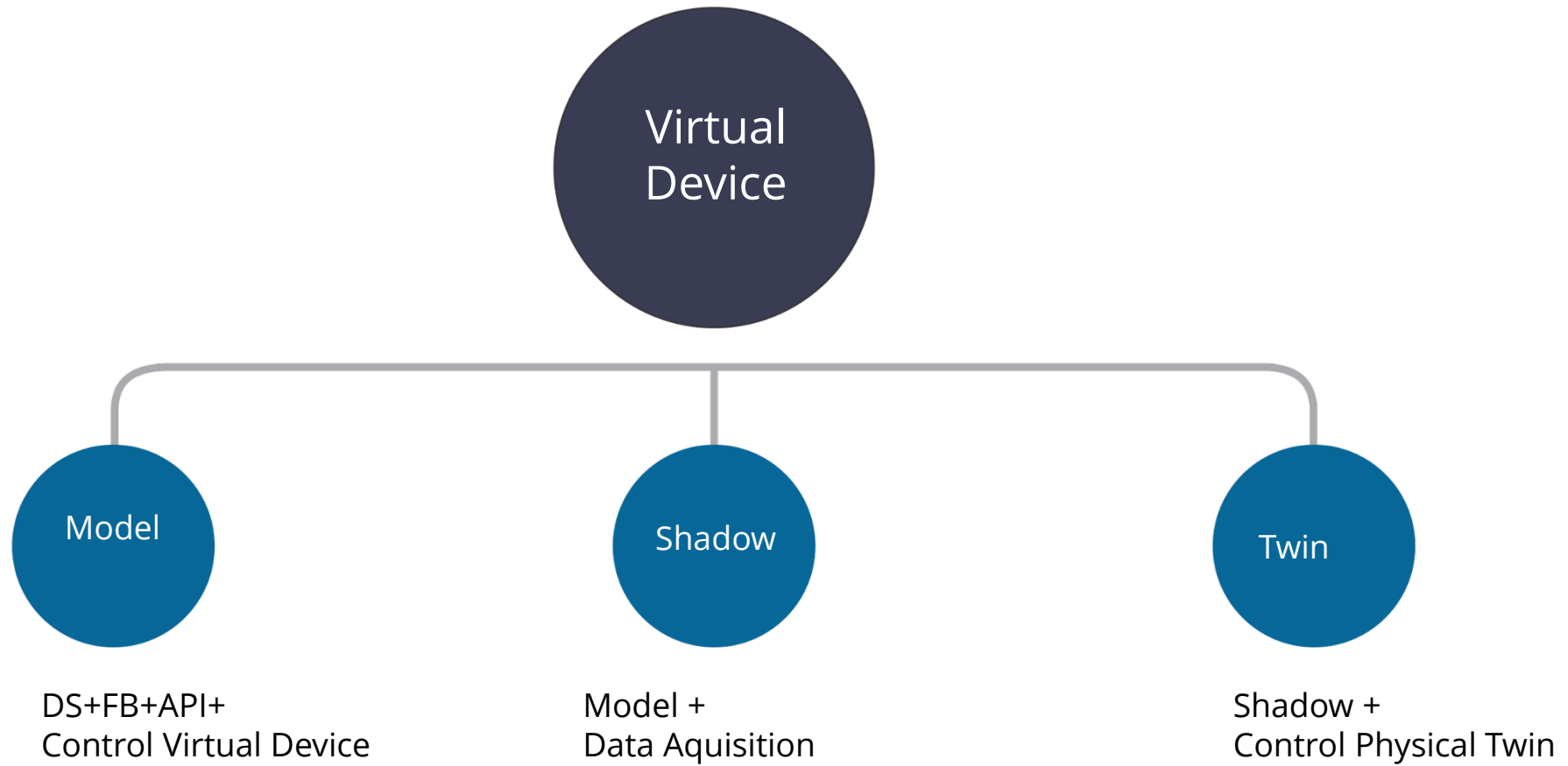
Hugo Gasca



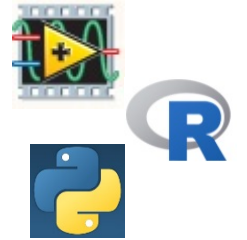
Components



Categories



Precedents (2016 ...)



Weigh Mass
and
Block gauge

Shadow

Value and
Uncertainty

scalar 0D

Quantity Interpolation
Temporal Extrapolation

No
Yes

Digital
Thermometer

Shadow-Twin

scalara 0D

No
Yes

Analytical
Balance

Shadow-Twin

Continuos region 1D

Yes
Yes

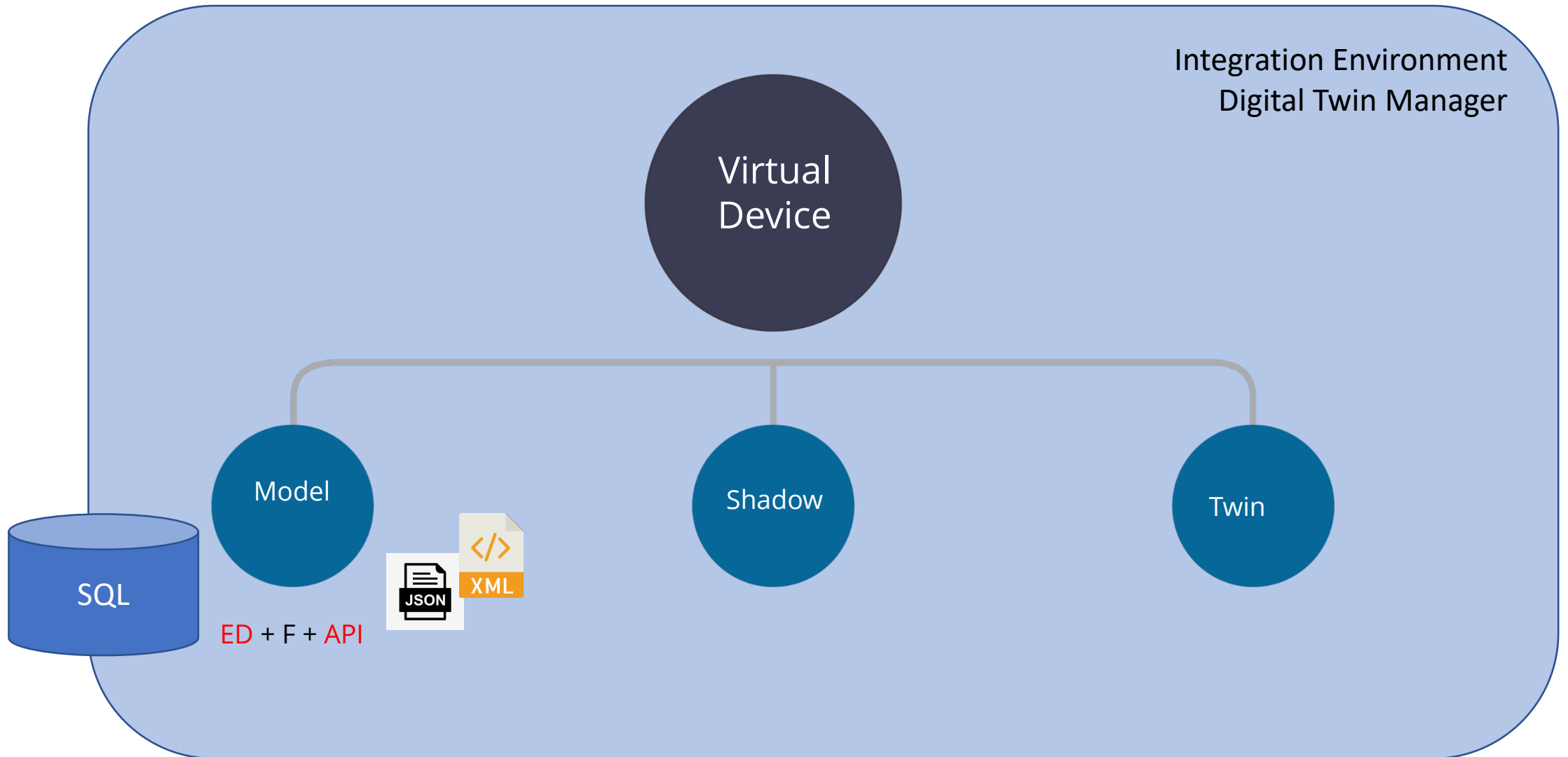
Microphone

Shadow-Twin

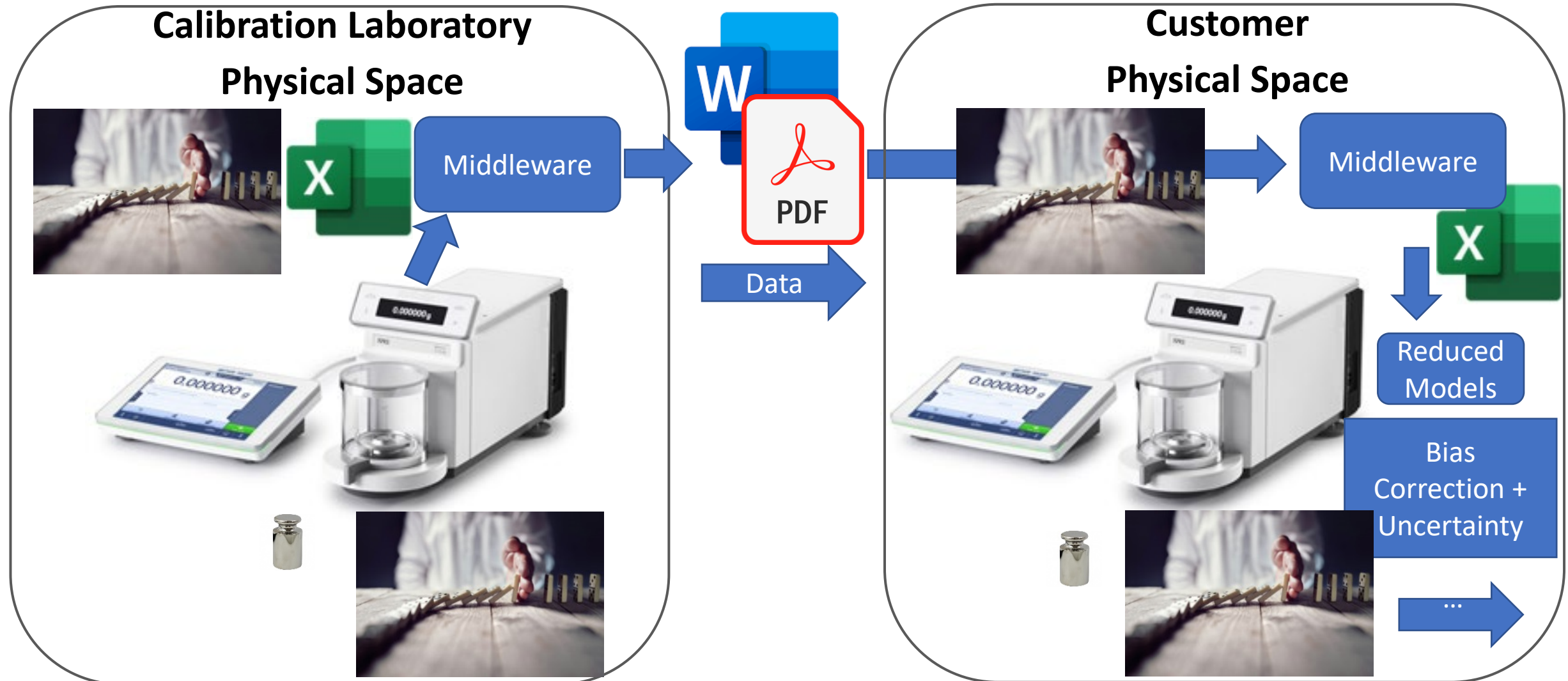
Continuos region 2D

Yes
Yes

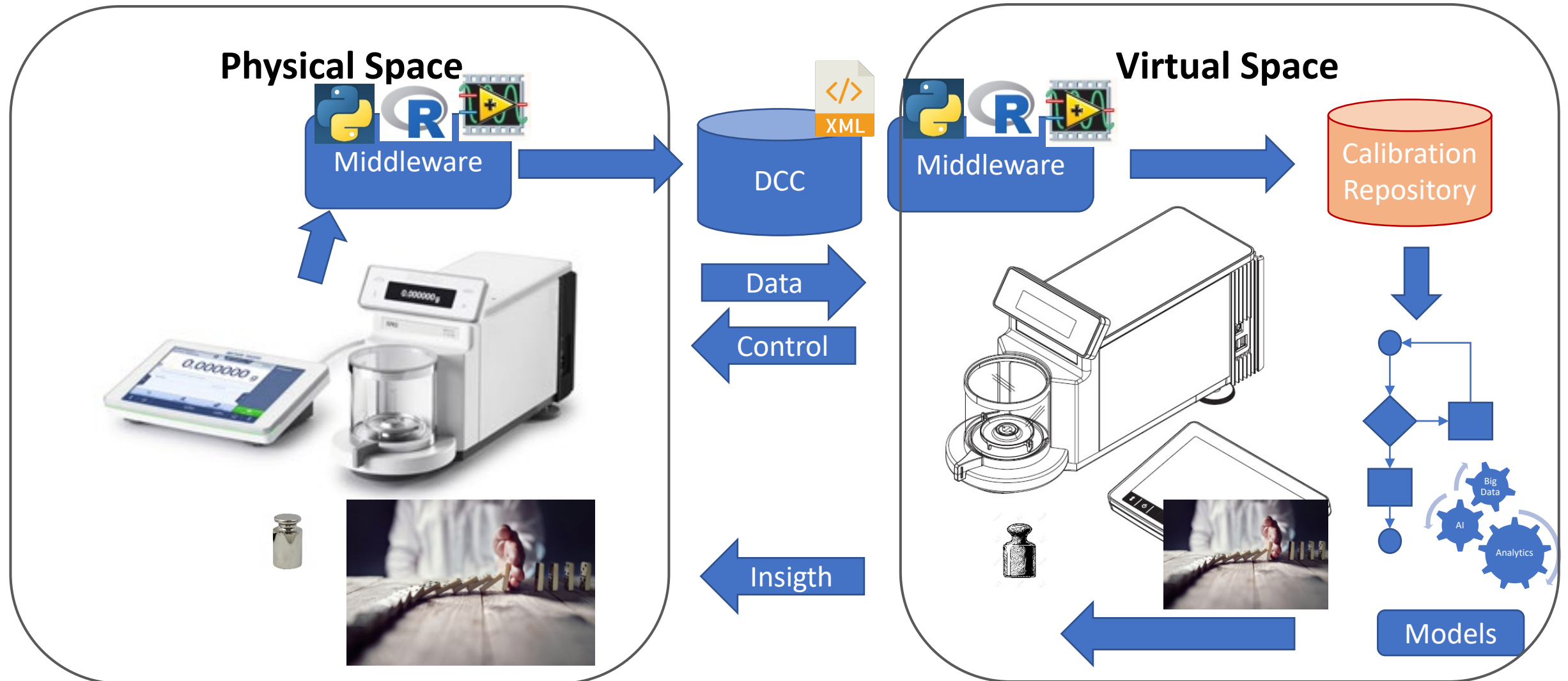
Need for reusability



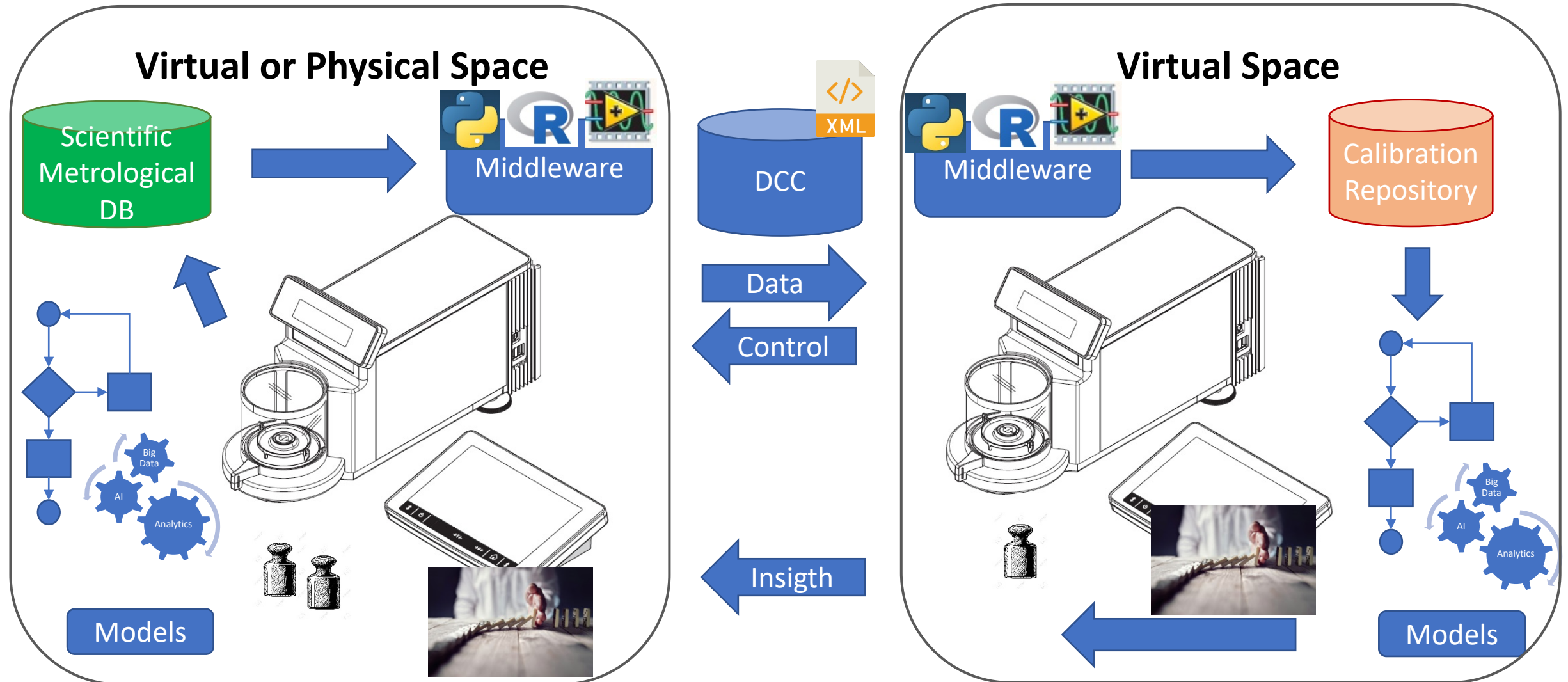
Example – Micro Balance



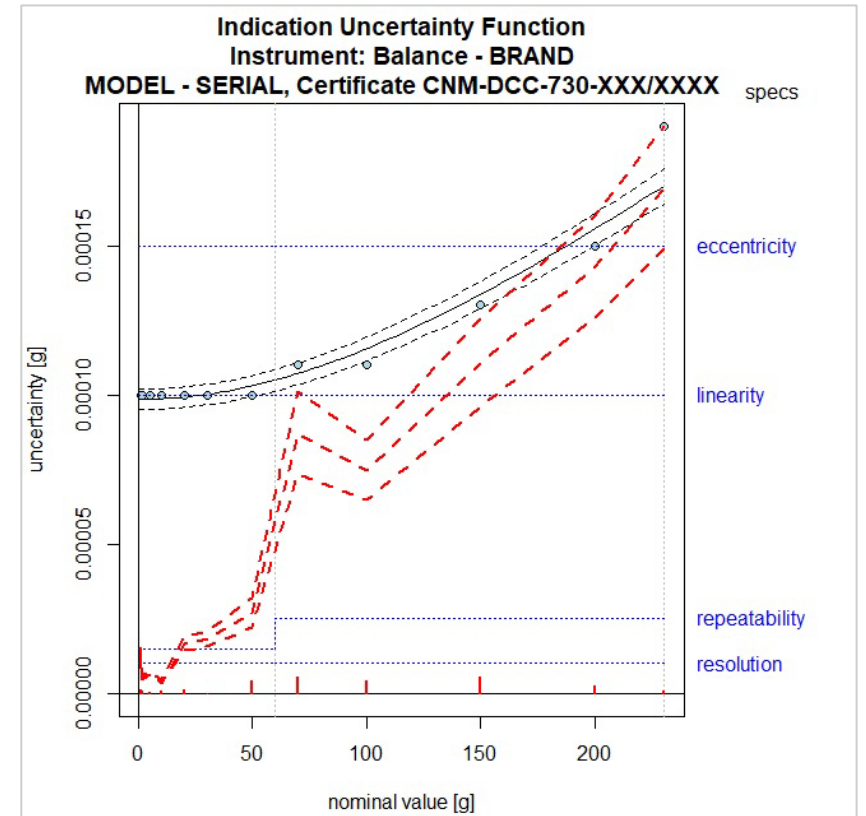
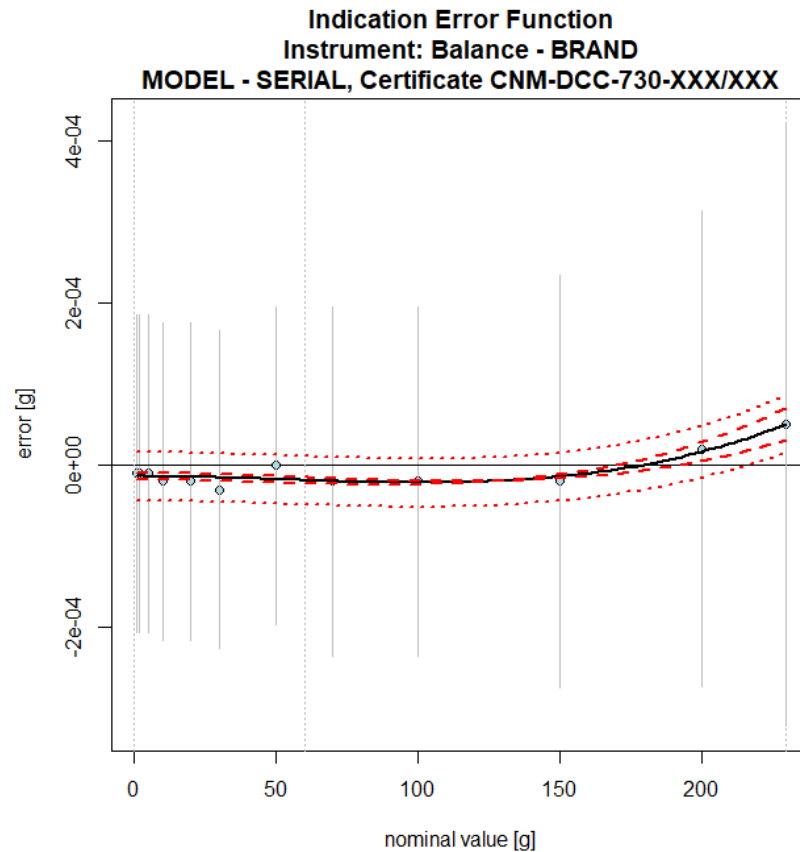
Example – Micro Balance



Example – Micro Balance

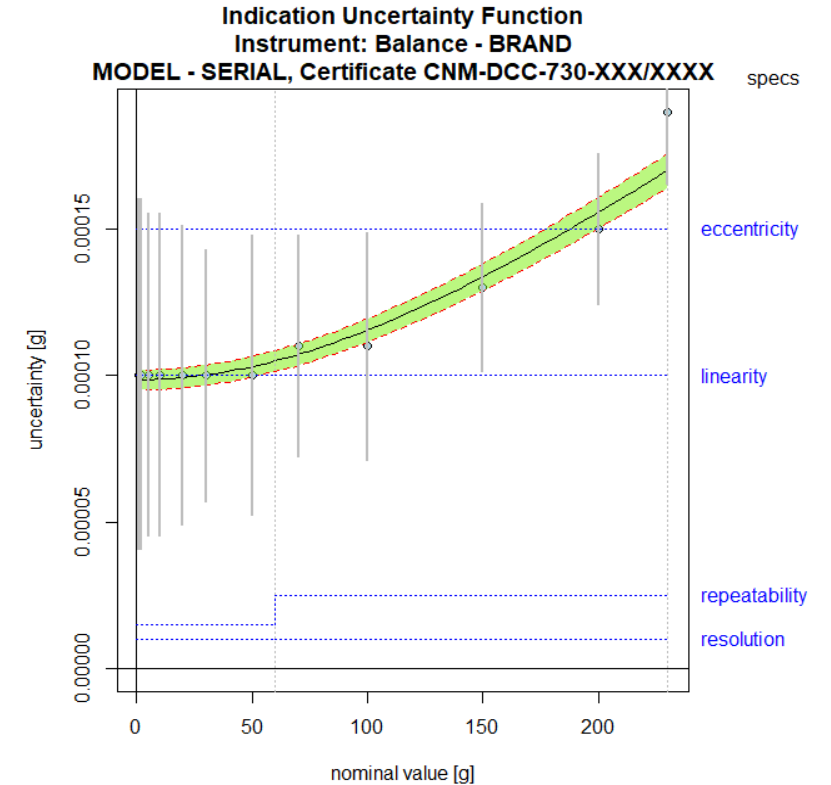
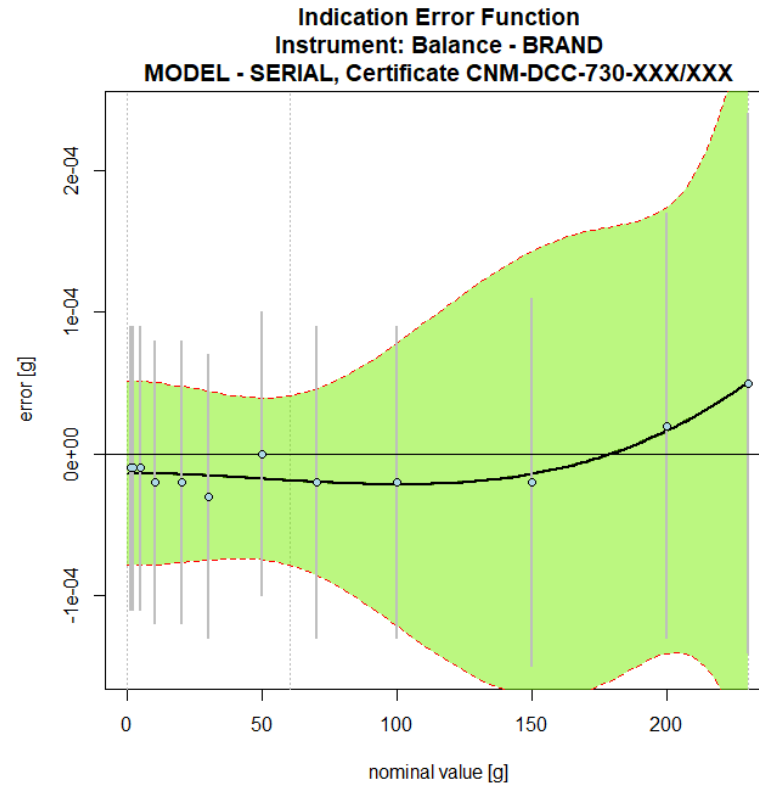


Stationary condition + Data Analytics



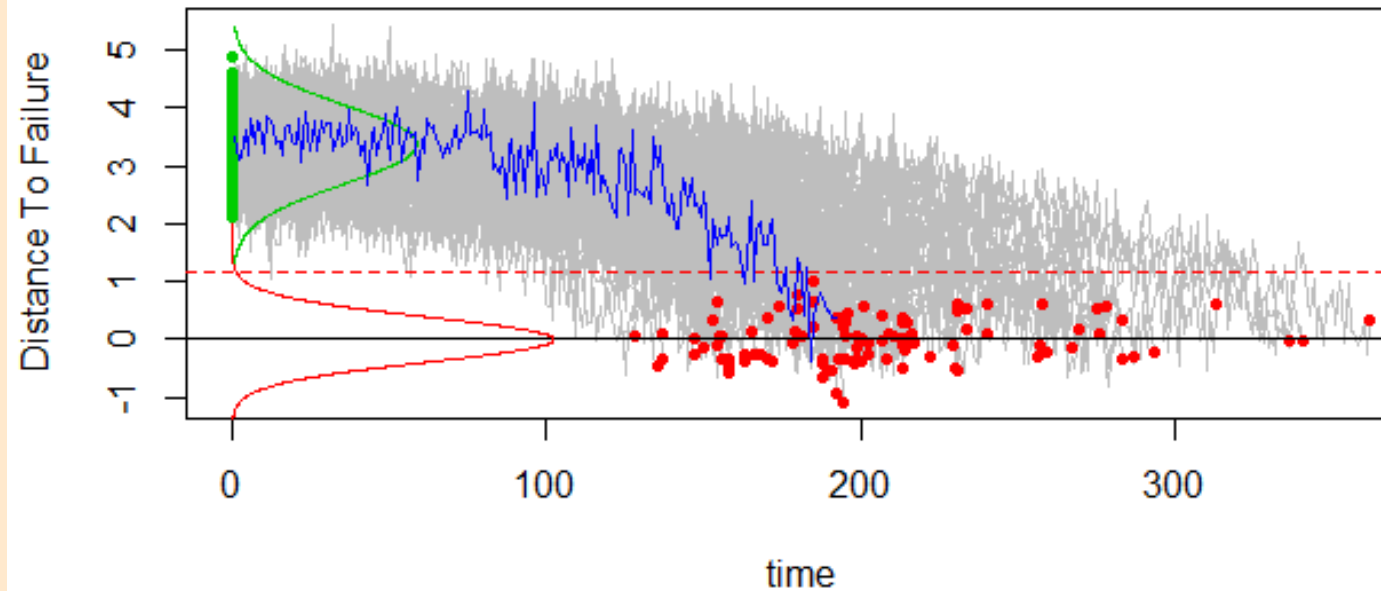
- Modelling (ignoring uncertainty):
 - Curve fitting, uncertainty propagation, classical data analysis, time series

Stationary condition + Data Analytics



- Modelling (including uncertainty):
 - Curve fitting, uncertainty propagation, classical data analysis, time series

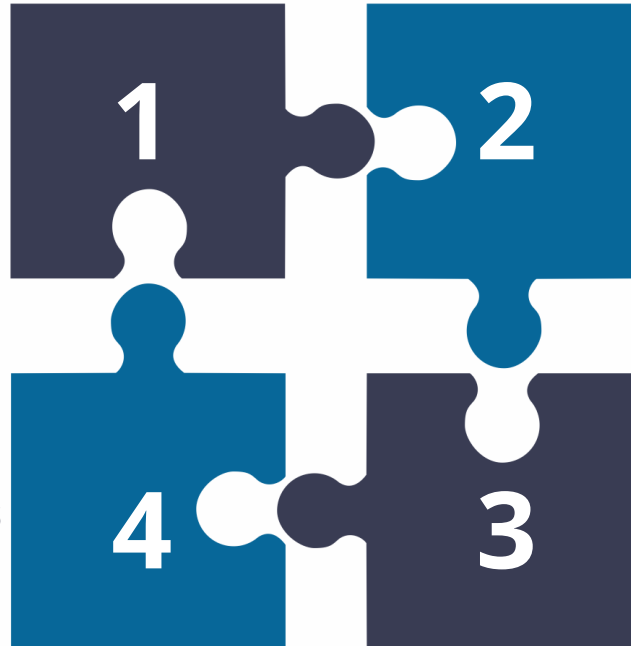
Predictive Analytics



- Taking advantage of historic & fleet data:
 - Prognostics, Predictive Maintenance, Big Data, Complexity Reduction, Artificial Intelligence, Simulation, Fleet Learning

Requirements

**FAIR principles
BIPM+CIPM**



**General & Specific Standards
Product Specifications
Production Standards
ISO & OTHERS**

**Digital SI + DCC
EURAMET + EMPIR
+ SMARTCOM**

**VIM* + GUM
BIPM**

*** partially covered**



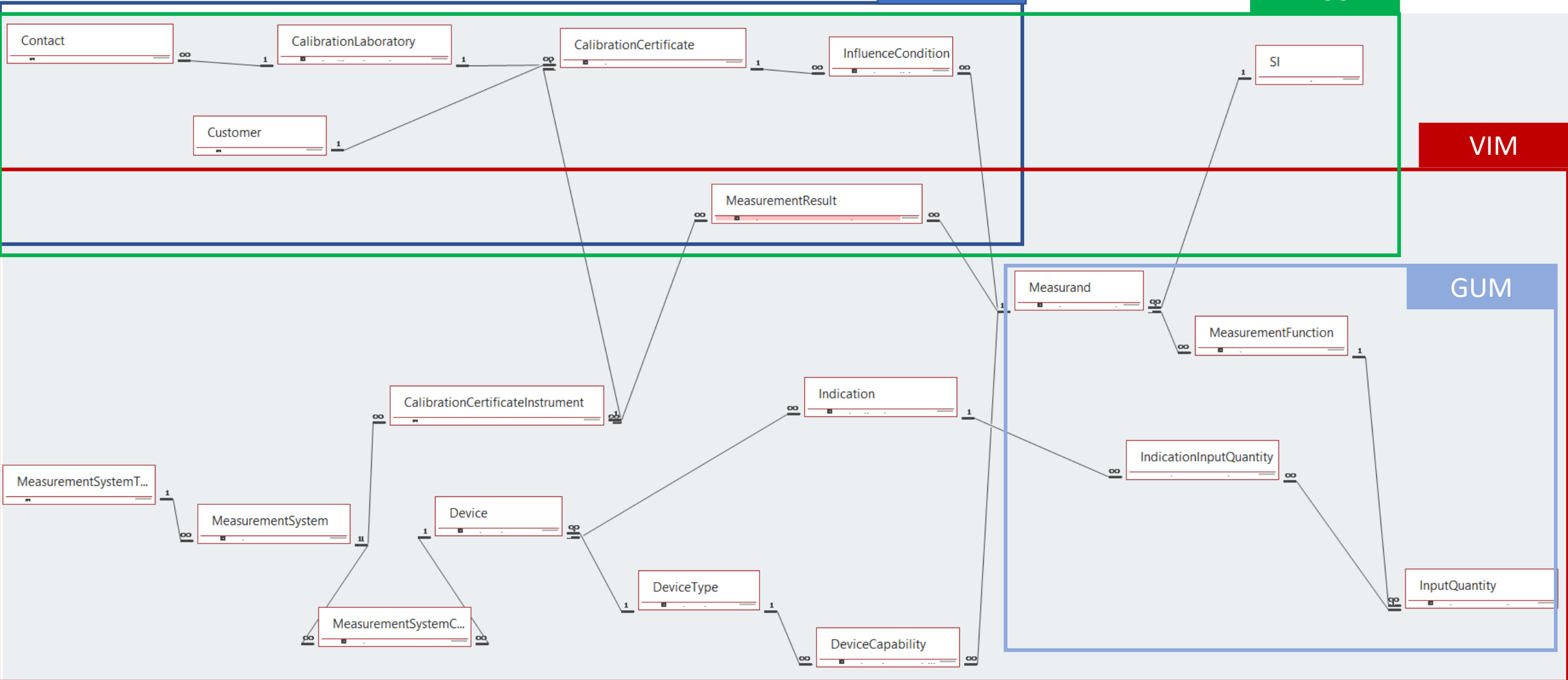
ScMDB Kernel - version 1.4

ISO 17025

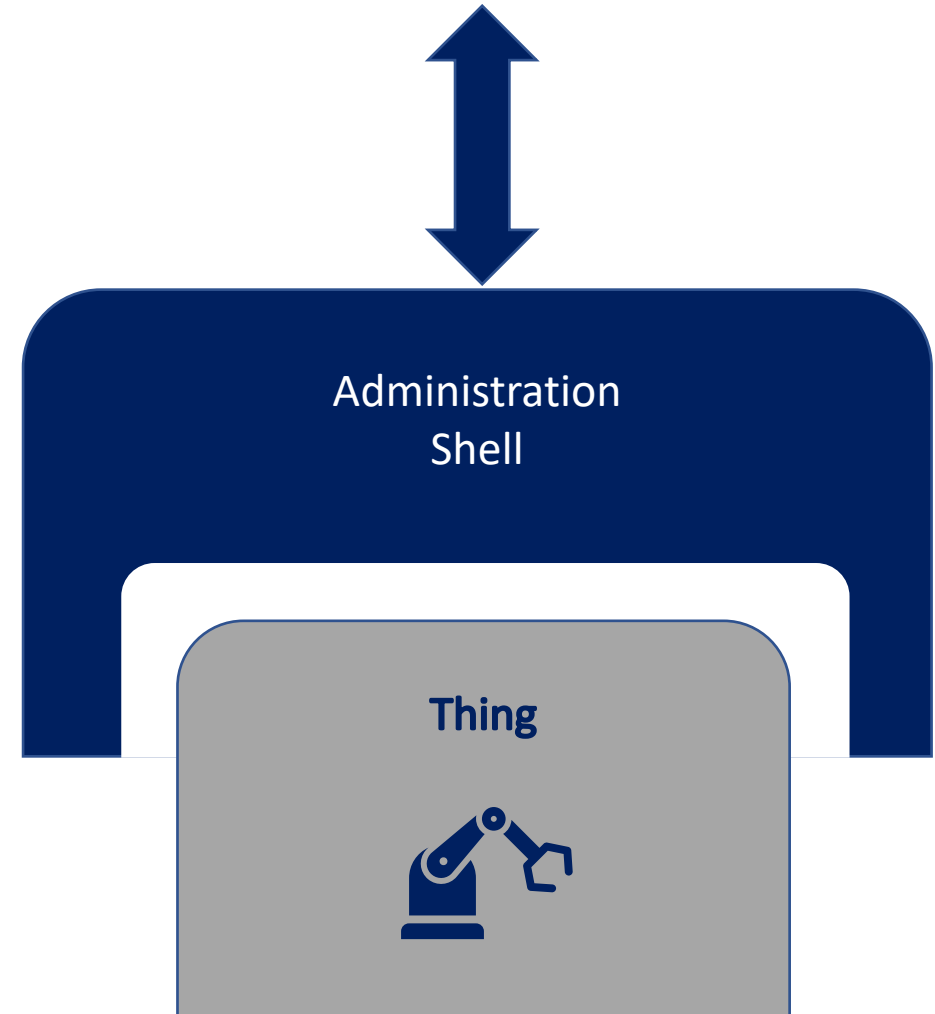
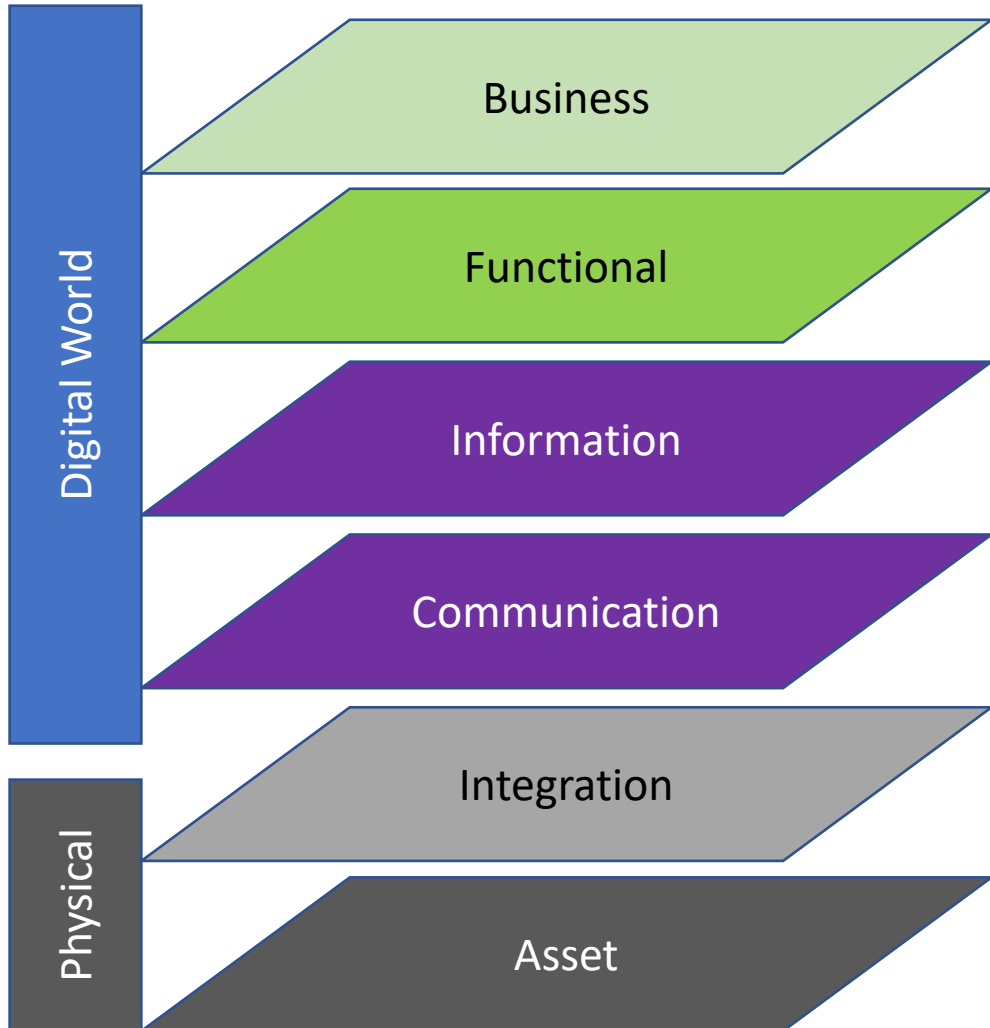
DCC

VIM

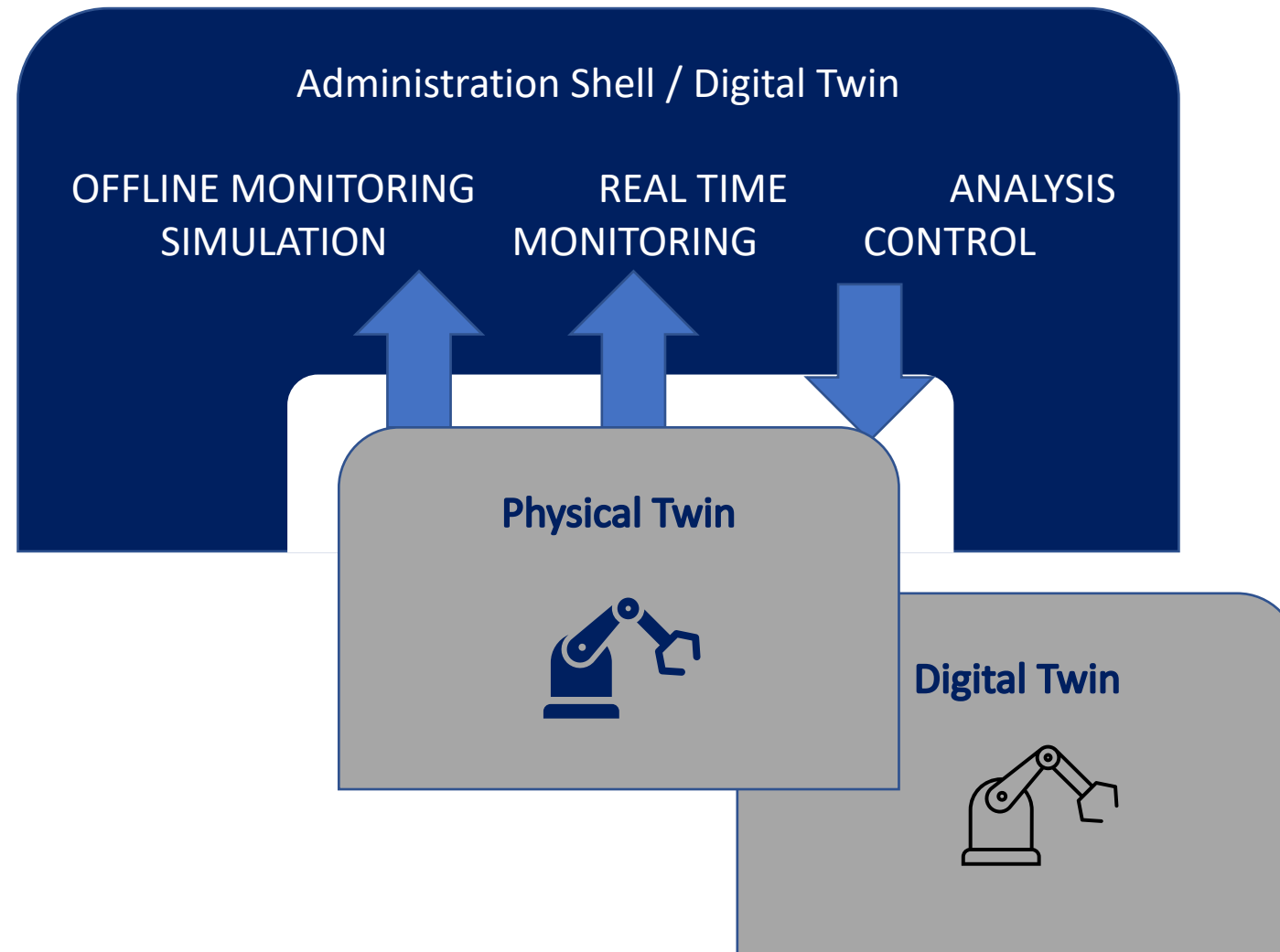
GUM



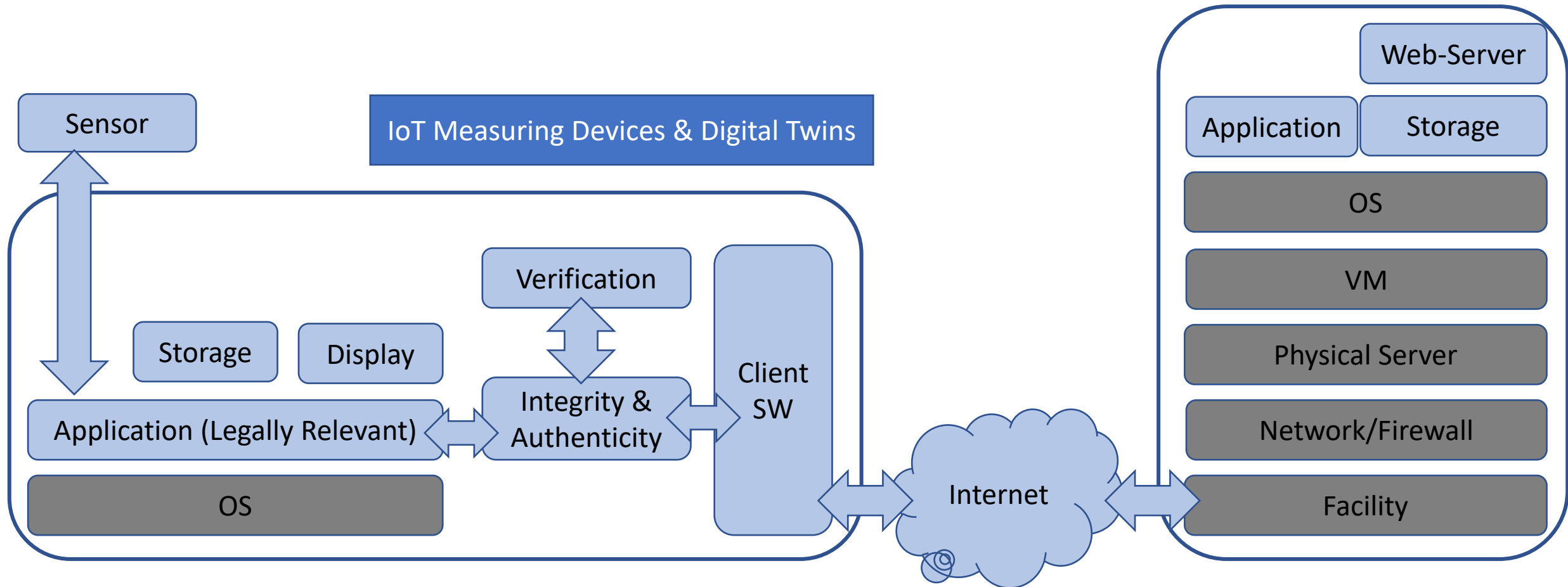
Reference Architecture Model Industrie 4.0 Axis-3 & Cyber-Physical Systems



Digital Twin as an Administration Shell and as a Physical Twin surrogate



SaaS & PaaS Architectures



Thank you!

Questions?

hgasca@cenam.mx

