



HAL
open science

Expert and Machine Digital Twins for Nuclear Systems Analysis

Corentin Ascone, Frédéric Vanderhaegen, Benjamin Verhaeghe

► **To cite this version:**

Corentin Ascone, Frédéric Vanderhaegen, Benjamin Verhaeghe. Expert and Machine Digital Twins for Nuclear Systems Analysis. Mardi des Chercheurs 2024, Mar 2024, Mons, Belgium. , 2024. hal-04542473

HAL Id: hal-04542473

<https://uphf.hal.science/hal-04542473v1>

Submitted on 18 Apr 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License

Expert and Machine Digital Twins for Nuclear Systems Analysis

Corentin ASCONE^{1,2}, Frédéric VANDERHAEGEN¹, Benjamin VERHAEGHE²

¹ Université Polytechnique Hauts-de-France, LAMIH - UMR CNRS 8201, Le Mont Houy, 59300 Valenciennes, FRANCE.

² Framatome, Installed Base of Jeumont (IBJ), 59460 Jeumont, FRANCE.

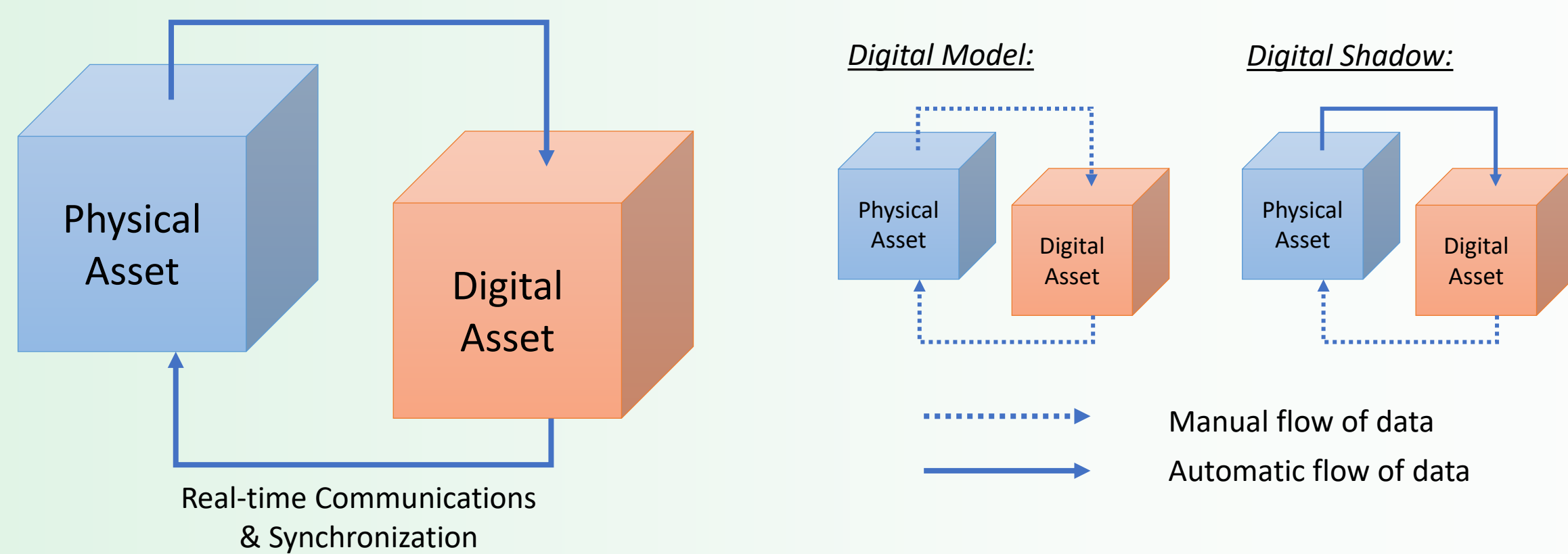


LinkedIn

What is a Digital Twin?

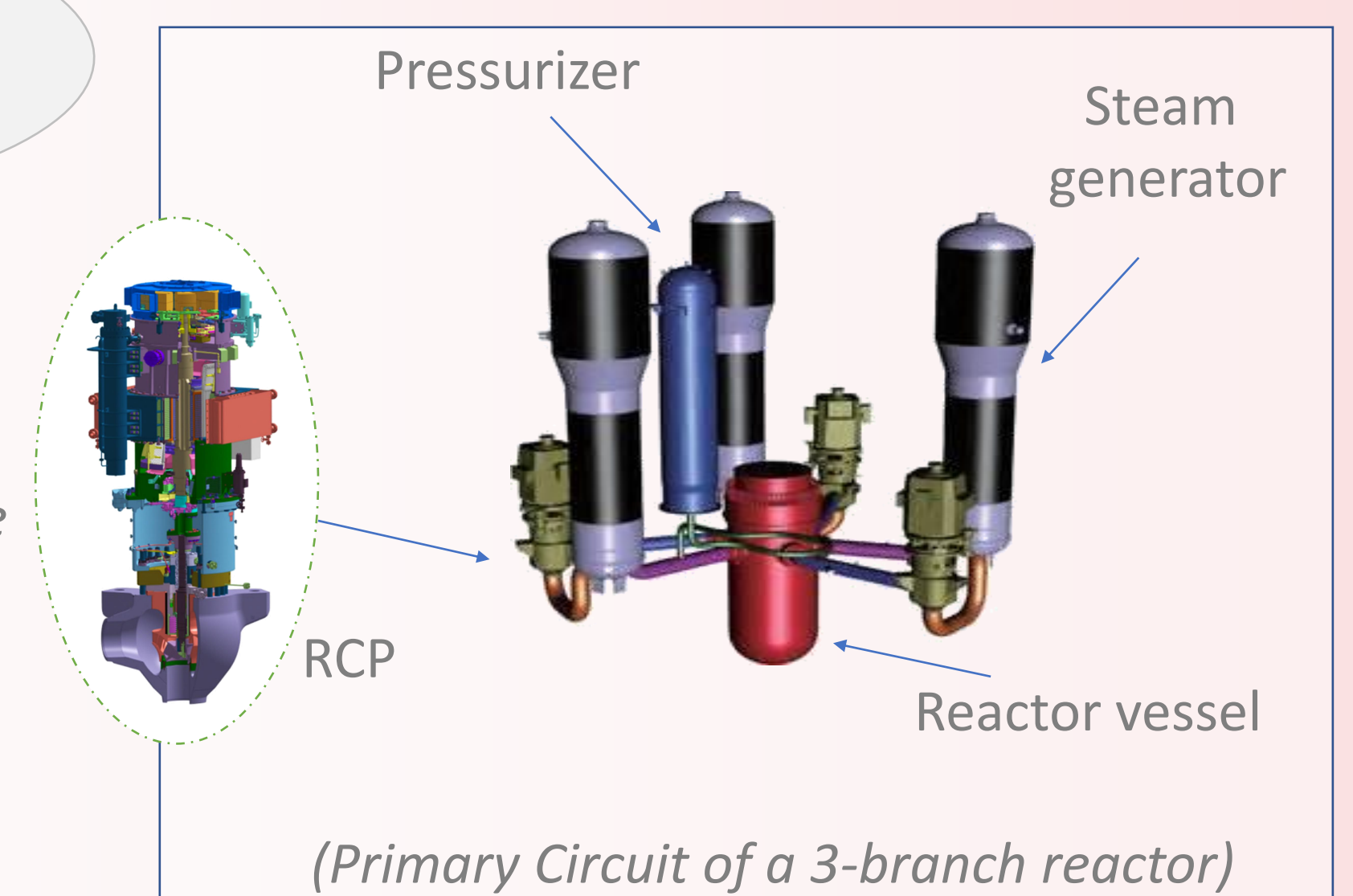
"A Digital Twin is a virtual representation of an object or system that [...] is updated from real-time data and uses simulation, machine learning and reasoning to help decision-making." source: IBM

Digital Twin:



What is a RCP?

RCP is a rotary machine which circulates the reactor coolant at high temperature and pressure in a PWR nuclear power plant.



Which challenges to face?

- Build efficient AI models (RNN, ES, XAI)
- Make accept the collaboration Expert/AI
- Keep Experts competent through use and time
- Support RCP systems from 40 to 60 years minimum

EXPERIA is an application designed to assist experts in their activities of diagnosis and pronosis of Reactor Coolant Pumps. EXPERIA host Automation, Digital Twins solutions and AI models to perform efficient assistance and results.

