Tapping Experiential Knowledge to Enhance Business Operations using Digital Twins

PERFORMATICA
STRATEGY : OPERATIONS : TECHNOLOGY : ALLIANCES

Nov 28th, 2023

10 AM CST (USA) / 930 PM IST (INDIA)

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

Energy | Manufacturing | Utilities

Consulting+ Technology solutions **team from Fortune 500 and Tier I IT/ITES Firms**

Members from consulting, technology and operations provide an **all-inclusive perspective at an engagement level**

Design thinking and Change Management at the core of any proposed solution

Leveraging **low-code/no-code platforms for MVPs** as part of our engagements
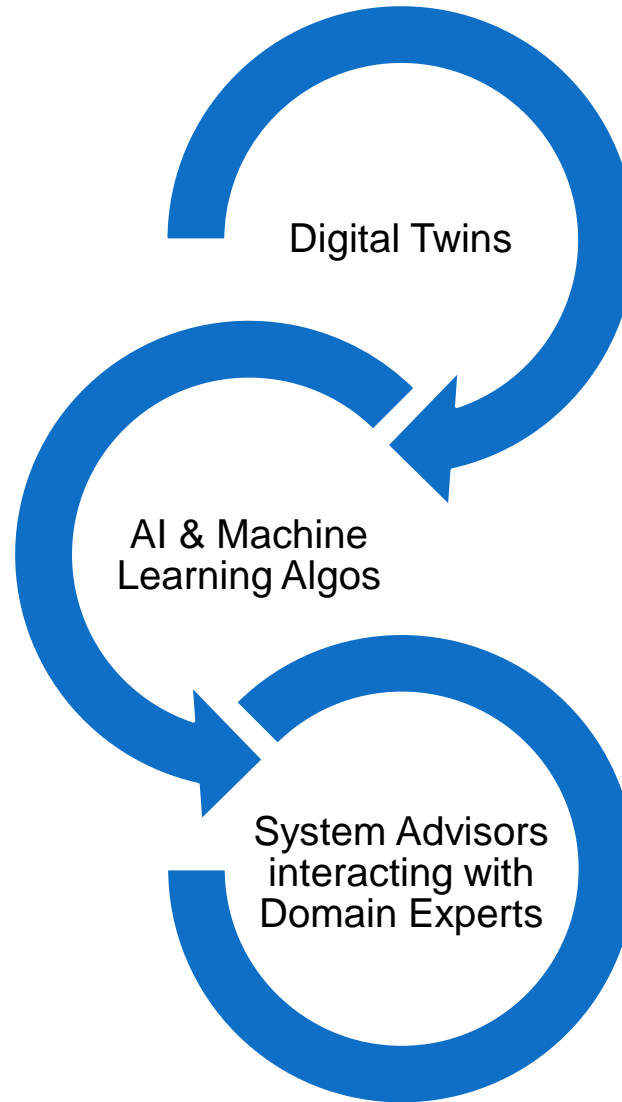
Enabling Digital Twins

DATA MANAGEMENT

Simulations/ Experiments

Rule Based Expert Systems

Real-Time Control Systems

Expert Chats/Documentation

Visual & Computer Image Files

Digital Twins

AI & Machine Learning Algos

System Advisors interacting with Domain Experts

SYSTEMS ENGINEERING

Engineering Design Codes - ET

Operations Data & Analytics - OT

Information Systems - IT

Enabling Digital Twins

Traditional Examples – Past

Three Mile Accident (Nuclear)
- Offline Analysis
- Operator Training Simulators
- Probabilistic Risk Analysis (PRA)

Airline Accident (Airlines)
- Pilot Training
- Equipment Failure RCA
- Man, Machine Interface (MMI) Development

Future

- **Tapping Retired Domain Expertise (at a global level)**

- **Combining Physics/Chemistry with Datasets**

- **Putting Machine Learning to use to capture possibilities**

Applications

- **Sustainability**

- **Energy Transition**

- **Remote Operations**

Sujatha Kumar
Panelist
Dsider, Inc. Founder & Chief Executive Officer

David Crawley
Panelist
Professor of Practice, Univ of Houston, Digital Media, Organizational Leadership and Supervision

Sabyasachee Panda
Panelist
CTO, Performatica and Co-Founder, Greenojo Consulting

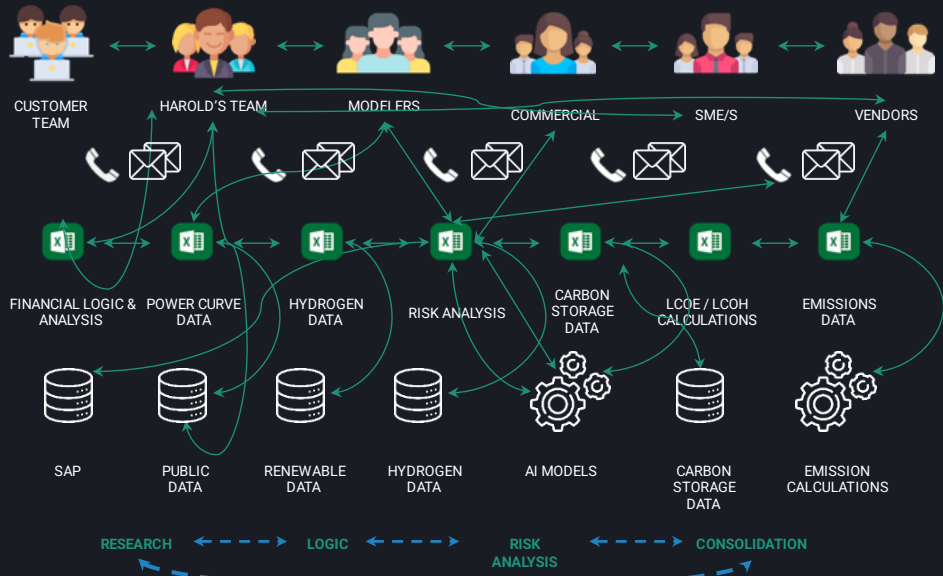**Murthy Divakaruni**
Panelist
Founder and CEO Performatica LLC

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

INDUSTRIAL COMPANIES STRUGGLE WITH DATA AND INSIGHTS TO ACHIEVE ENERGY TRANSITIONS

Enterprise NetZero Planning Solution, Delivers Analytics To Reduce Risks, Increase Decision Confidence, And Accelerate Energy Transition With Ease And Precision.

8

CURRENT PLANNING APPROACH IS COMPLEX AND INEFFICIENT

CUSTOMER TEAM · HAROLD'S TEAM · MODELERS · COMMERCIAL · SME/S · VENDORS

FINANCIAL LOGIC & ANALYSIS · POWER CURVE DATA · HYDROGEN DATA · RISK ANALYSIS · CARBON STORAGE DATA · LCOE / LCOH CALCULATIONS · EMISSIONS DATA

SAP · PUBLIC DATA · RENEWABLE DATA · HYDROGEN DATA · AI MODELS · CARBON STORAGE DATA · EMISSION CALCULATIONS

RESEARCH → LOGIC → RISK ANALYSIS → CONSOLIDATION

- Delayed planning timeline
- Compromised data integrity and ownership
- Sub-optimal collaboration
- Siloed Solution

DSIDER'S NET ZERO PLANNER REDUCES COMPLEXITY AND STREAMLINES PROCESSES

SaaS platform
- Integrates data, process, and analytics
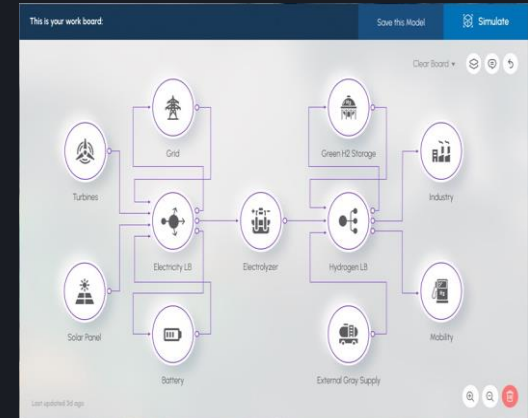- Creates single source of truth

Collaboration
- Better collaboration reduces process timelines
- Advances execution of NetZero plans

Virtual SMEs
- Models embed expertise and create virtual SME Eliminates need to build huge departments to do these analysis
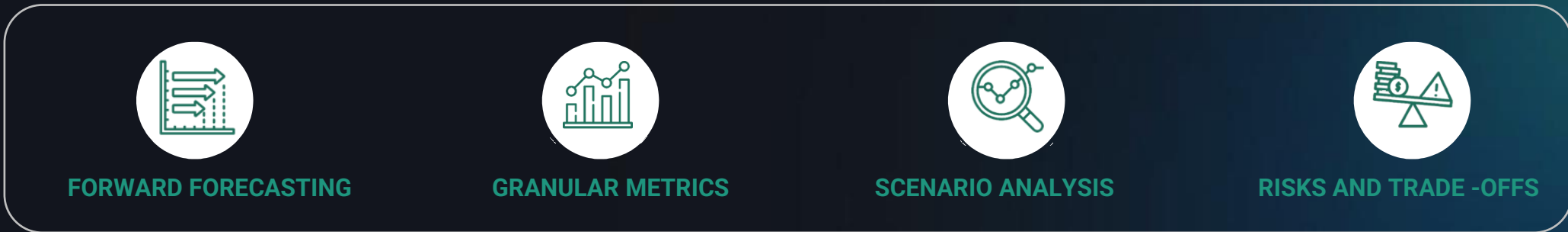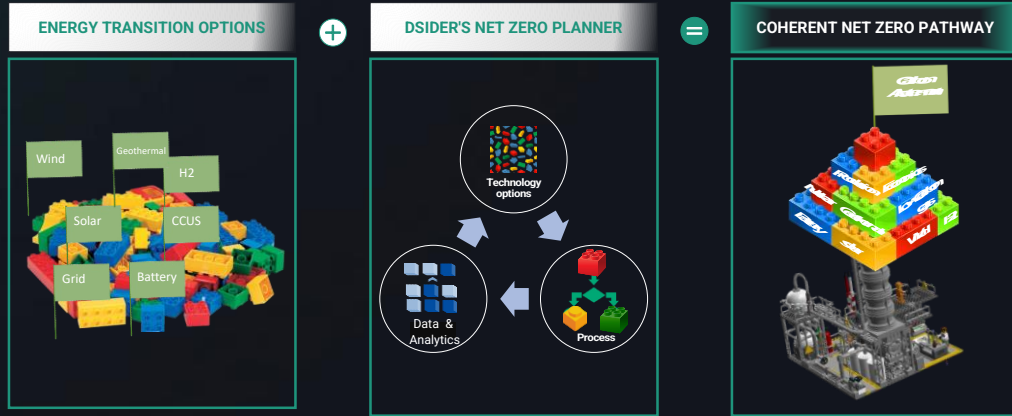

ANALYSIS IN HOURS VS MONTHS

DELIVERING SAVINGS OF $100M/YR

Dsider

9

OUR APPROACH ENABLES DIGITAL "LEGO" STYLE PLANNING

ENERGY TRANSITION OPTIONS + DSIDER'S NET ZERO PLANNER = COHERENT NET ZERO PATHWAY

SUSTAINABLE OPERATIONS

CAPITAL EFFICIENCY   RISK MITIGATION   EMISSION REDUCTION

ENTERPRISE NET ZERO PLANNING ACROSS THE LIFECYLE

FORWARD FORECASTING   GRANULAR METRICS   SCENARIO ANALYSIS   RISKS AND TRADE -OFFS

Dsider

A POWERFUL INTEGRATED PLANNING PLATFORM

OPTIMIZED PLAN

SIMULATED YIELD

- Energy Balance
- Material Balance
- Resource Efficiency

SIMULATED ECONOMICS

- NPV/IRR Metrics
- Cash Flow Projection
- Impact of Tax Credits and Subsidies

SIMULATED CARBON ABATEMENT

- Carbon Intensity of Energy
- Process and Component Carbon Intensity
- Aggregate Scope 3 Emissions

ADDRESS NET ZERO PRIORITIES WITH EASE AND PRECISION

Dsider

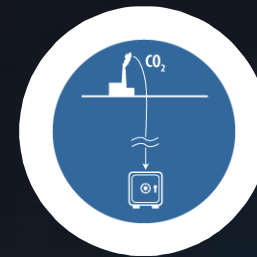# TO SOLVE A DIVERSE SET OF TRANSITION USE CASES

COMPUTATIONS OF EMISSION AND ABATEMENT ACROSS MULTIPLE ENERGY SOURCES

ENERGY YIELD AND COST COMPARISONS ACROSS MULTIPLE LOCATIONS

CROSS ASSET ANALYSIS FOR CLEAN BASE LOAD POWER

REDUCING NON-PRODUCTIVE TIME FOR LOW CARBON FOSSIL FUEL PRODUCTION

RELIABLE AND SUSTAINABLE SUPPLY OF GREEN HYDROGEN AND DERAVATIVES

INCREASING LEVEL OF COMPLEXITY

FORWARD FORECASTING

STANDARDIZED METRICS

SCENARIO ANALYSIS

RISKS AND TRADE-OFFS

Dsider

12

Sujatha Kumar
Panelist
Dsider, Inc. Founder & Chief Executive Officer

David Crawley
Panelist
Professor of Practice, Univ of Houston, Digital Media, Organizational Leadership and Supervision

Sabyasachee Panda
Panelist
CTO, Performatica and Co-Founder, Greenojo Consulting

Murthy Divakaruni
Panelist
Founder and CEO Performatica LLC

PERFORMATICA
STRATEGY · OPERATIONS · TECHNOLOGY · ALLIANCES

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

Creating Tomorrow by Building Today With Digital Twins

You can't dig a new hole by digging the same one deeper

Creating Tomorrow by Building Today With Digital Twins

Entering The Unknown and Everything Is Changing

- **The global digital twin market size was valued at around $8.6 billion**, and it is projected to grow up to US $137 billion by 2030.

- A.I. is now a downloadable consumer product and current to new generations and global to local organizations are taking note: new degrees are emerging

- Internet bandwidth speed and load has increased. *Last month China unveiled the 'world's fastest internet' network, claiming data transmission at 1.2 terabits per second*

- Digital Graphics and cloud-based virtual representations are able to mimic real world scenarios and physics in parallel with speed of reality

Creating Tomorrow by Building Today With Digital Twins

The Emerging Adventure: Bridging the gap between thinking and reality

- Organizations have proven to increase productivity at unparalleled speeds that have inspired new revenue streams, efficiencies, and innovations.

- Scenario Panning has become more acute and able to risk mitigate threats and prove-out opportunities relative to impact upon the organization.

- Along with new potential: new jobs and capabilities are emerging at unprecedented rates to integrate edge computing capabilities and enable real-time analytics that deliver better decision-making potential at the edge of networks.

- Increased rapid implementation of competitive edge tools and resources for reliable first mover advantages and response to the marketplace

Creating Tomorrow by Building Today With Digital Twins

The Emerging Challenges: The unknown

- Technology is emerging and will cause adjustments to enterprise siloes of legacy systems

- We don't know what problems the solutions will cause, what types of jobs will occur, how operations will accommodate a parallel workforce... or operational layers between digital and real.

- Training, trusting proven providers, and prudent rollouts are critical to success

- The industry workforce is unprepared and lack the skills to adjust and capitalize:
  - 28% to 36% gap of innovation skills in the global workforce: Critical Thinking, Lateral Thinking, Systems Thinking, Logic Modeling, and Communications/Leadership. Meanwhile, 28% of the workforce will retire in the next 5 years.

Creating Tomorrow by Building Today With Digital Twins

The Emerging Approach: Be Prudent and Learn

- Don't boil the ocean

- New academics, certifications, and simulation training are being created from digital to skills of innovation

- Digital Twinning technology providers must be trusted partners… not venders.
    - *There are emerging providers with experience that have proven to be trusted and skilled*

- Educate your organization and monitor evolution with a sense of expectation and engagement. If you're going to not adopt, don't be left too far behind. Draft behind leaders (or competition) and learn.

The world has changed. You're either going to be part of it… or subject to it.

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

The 6 main Digital Twin applications

1 System prediction

2 System simulation

3 Asset interoperability

4 Maintenance
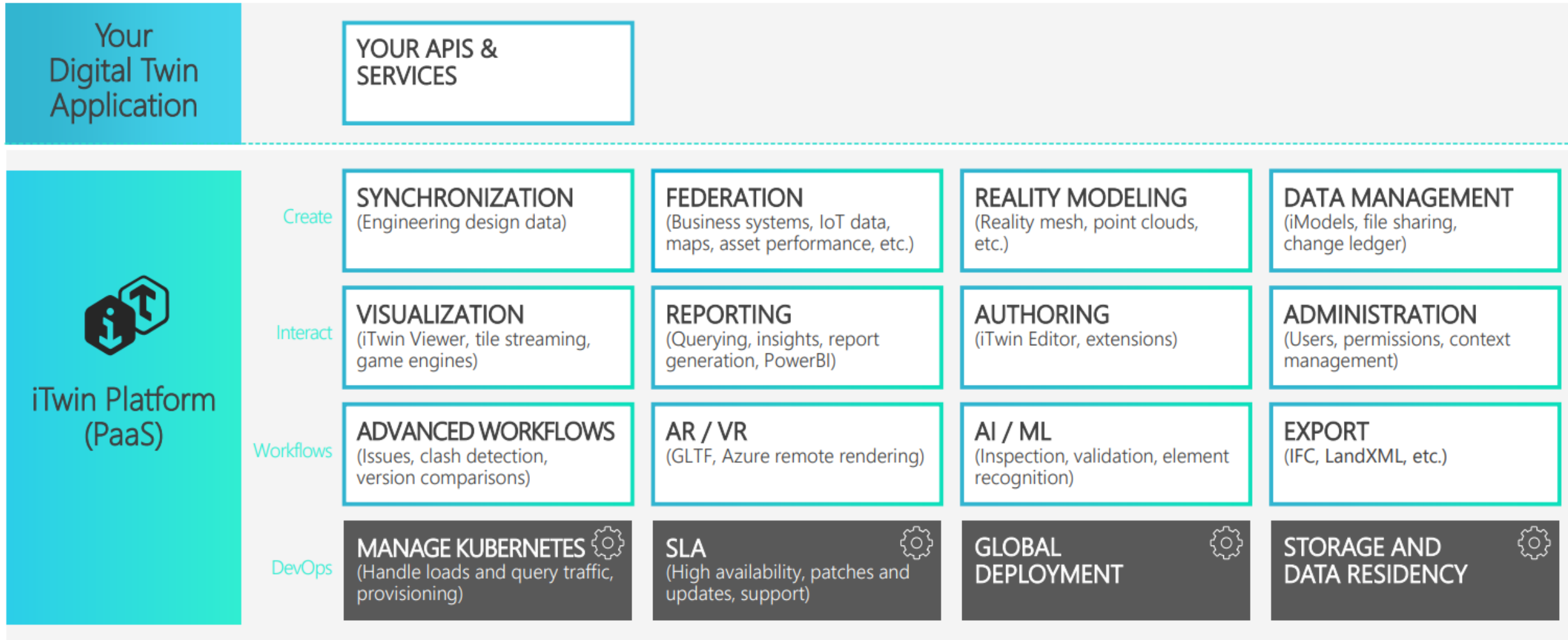
5 System visualization

6 Product simulation
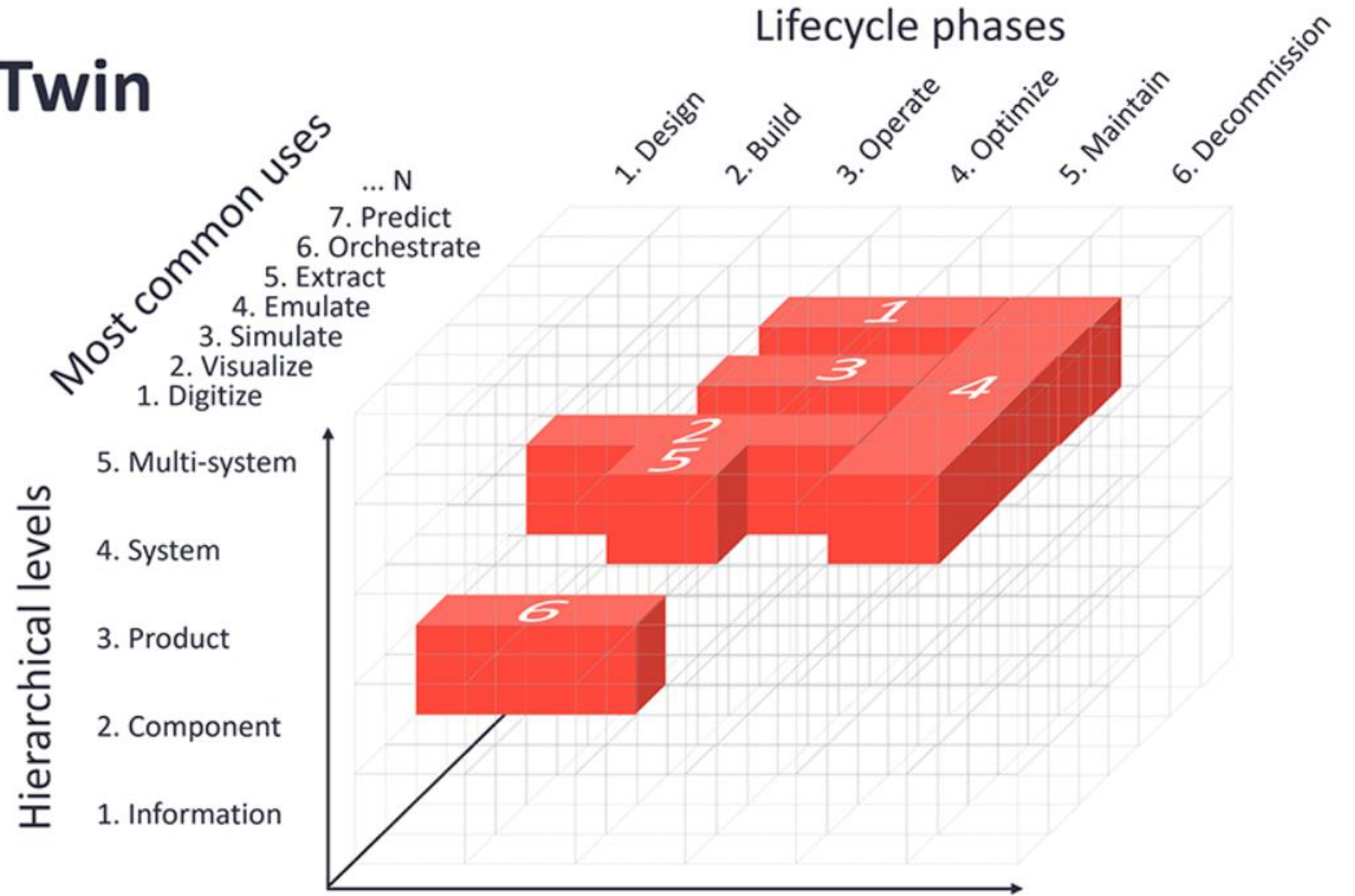
Reference – IoT Analytics Research 2023

Scalable, Modularized & Aligned to DT Consortium Model

Implementation	Integration	Insights		Inclusion

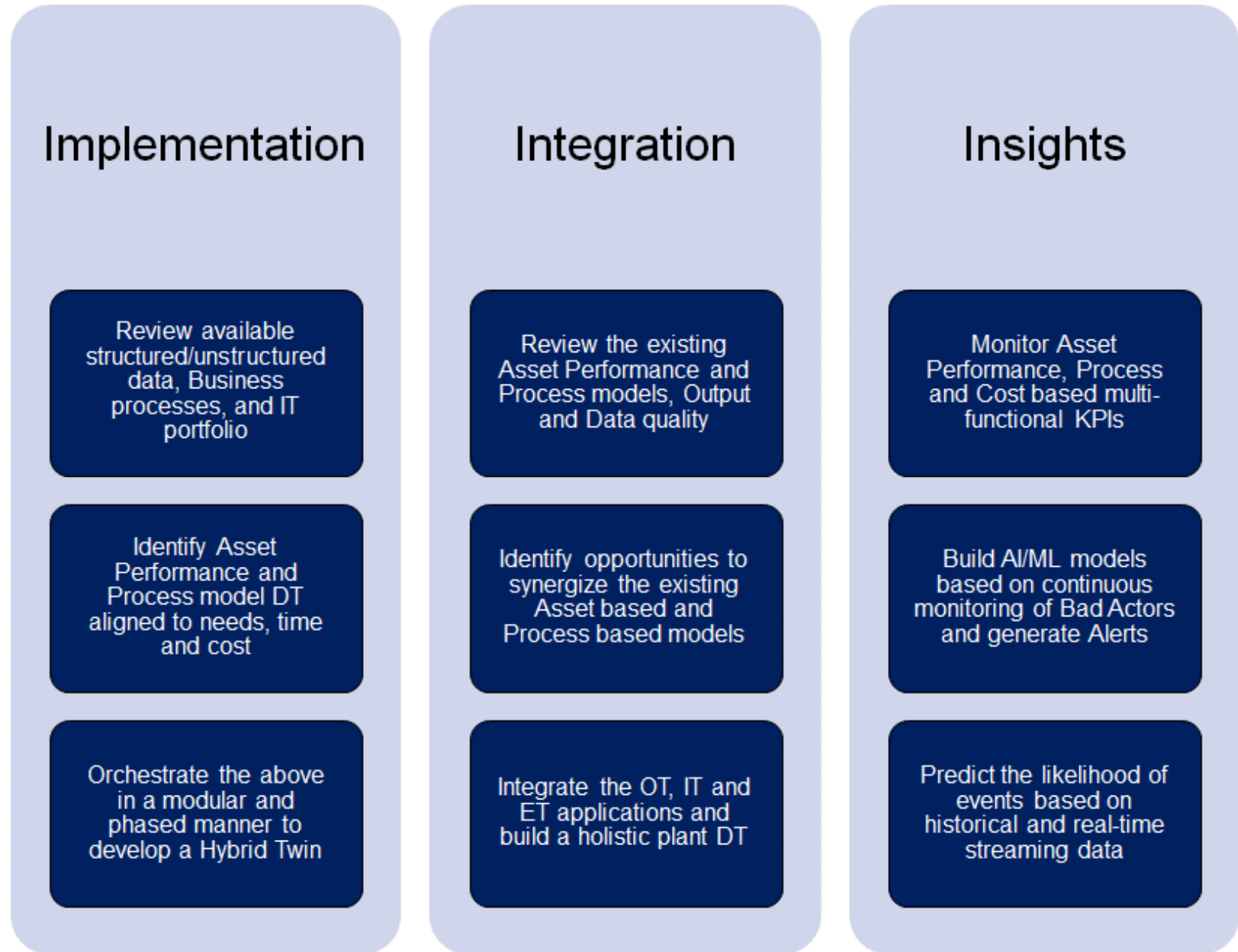| A. Data Services	B. Integration	C. User Experience	D. Intelligence	E. Trust	F. Management
1 Acquisition	1 Enterprise Systems	1 Basic Visualization	1 Command and Control	1 Security	1 Device Management
2 Streaming	2 Engineering Systems	2 Advanced Visualization	2 Orchestration	2 Privacy	2 System Monitoring
3 Transformation	3 OT/IoT Systems	3 Realtime Monitoring	3 Alerts and Notifications	3 Safety	3 Event Logging
4 Contextualization	4 DT	4 ER Visualization	4 Reporting	4 Reliability	4 Data Governance
5 Batch Processing	5 Collaboration Platform	5 Dash Boards	5 Data Analysis and Analytics	5 Resilience	
6 RT Processing	6 APIs	6 Continuous Intelligence	6 Prediction	6 Data Encryption	
7 Data Publication		7 Business Intelligence	7 Machine Learning	7 Device Security	
8 Data Aggregation		8 BPM and Workflow	8 AI		
9 Data Generation		9 3D Rendering	9 Simulation		
10 Manage Ontology		10 Augmented Reality	10 Business Rules		
11 DT Model Repository		11 Virtual Reality	11 Edge AI and Intelligence		
12 DT Instance Repository		12 Gaming Engine Visualization	12 Federated Learning		
13 Temporal Data storage		13 Gamification	13 Mathematical Analysis		
14 Data Archival			14 Prescriptive Recommendations		
15 Simulation Model Store			15 Distributed Ledger		
16 AI Model Store			16 Composition		

Building Custom Digital Twin Solutions for Enterprises

Reference – Bentley Systems

- Hybrid Digital Twin (HDTs) Services, Solutions & Applications

Implementation

Review available structured/unstructured data, Business processes, and IT portfolio

Identify Asset Performance and Process model DT aligned to needs, time and cost

Orchestrate the above in a modular and phased manner to develop a Hybrid Twin

Integration

Review the existing Asset Performance and Process models, Output and Data quality

Identify opportunities to synergize the existing Asset based and Process based models

Integrate the OT, IT and ET applications and build a holistic plant DT

Insights

Monitor Asset Performance, Process and Cost based multi-functional KPIs

Build AI/ML models based on continuous monitoring of Bad Actors and generate Alerts

Predict the likelihood of events based on historical and real-time streaming data

23

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

Tapping Experiential Knowledge to Enhance Business Operations using Digital Twins

- Panel Discussion

Section	Topic	Speaker/s
Introduction	On Performatica	Murthy Divakaruni
Industry Insights	Transformation of Business Operations using Industrial AI and Digital Twins	Sujatha Kumar
Trends	Industrial Metaverse – "Digital Twinning"	David Crawley
Applications	Application of Digital Twins in Energy Industry	Sabyasachee Panda
Panel Discussion (Moderator)	Discussion and Q&As	Richa Saxena & All Panelists
Key Takeaways	Summarize and Next Webinar	Murthy Divakaruni

Performatica Support in Enterprise Adoption of Digital Twins

Generate the Platform Strategy with Product Roadmap & Milestones

Design Platform CoE & Run the Operations/PMO Office

Manage & Monitor Technology Licenses and the Cloud Partners

Develop & Monetize from the Alliance/Partner Ecosystem

Thank You

Performatica LLC
marketing@performatica.net

https://performatica.net/

PERFORMATICA
STRATEGY · OPERATIONS · TECHNOLOGY · ALLIANCES