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Using Gaming Technology to Improve Industrial Digital Twins

Thursday, 21st July 2022 | Technical Topic Webinar

Presented by Mr. Greg Sevel, Product Manager at Sentient Computing

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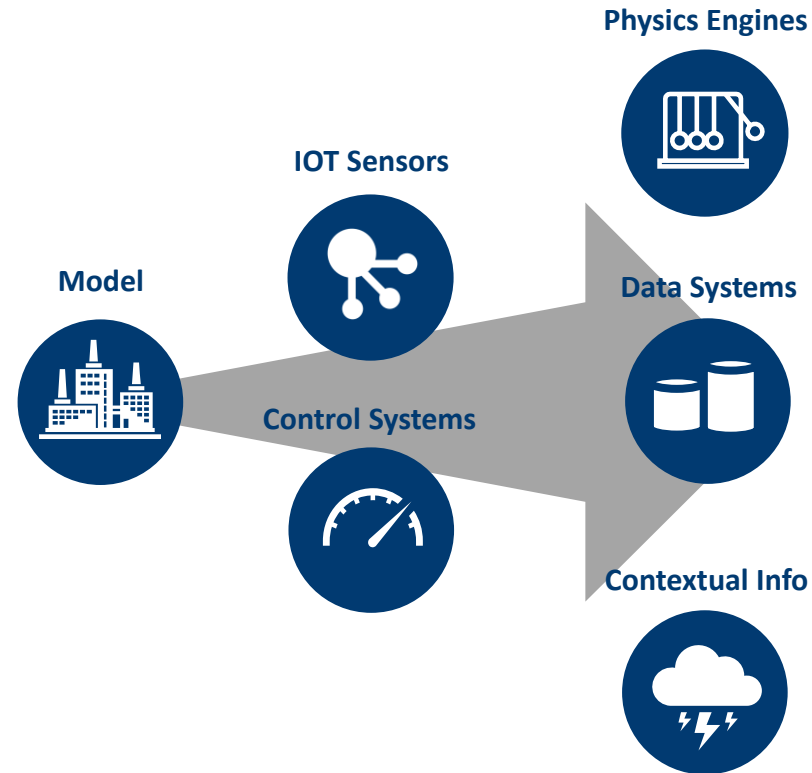
Agenda

1	Welcome and Introduction
2	Defining Digital Twins
3	Use Cases
4	Applying Game Technology
5	Case Study
6	Conclusion and Q&A

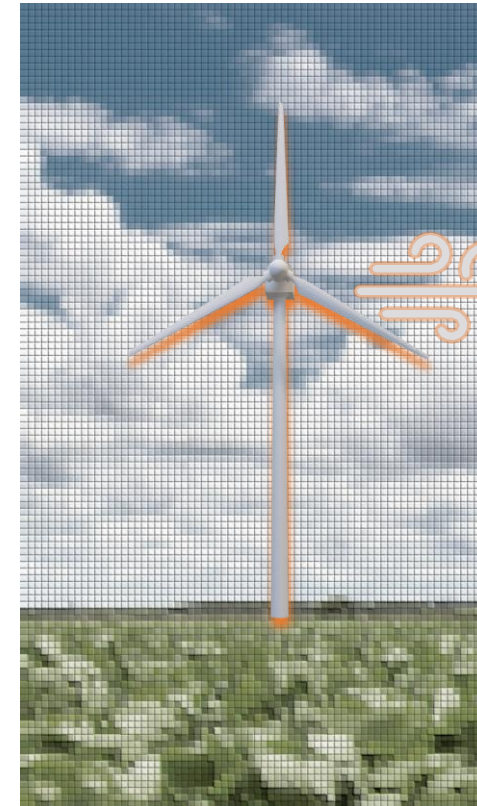


Defining Digital Twins – Basics

Real Thing



Virtual Replica



Parameter	Value	Units
rate	17.9	rpm
temp	32.1	degC
volt_out	34.5	kV
curr_out	93.7	A
power_out	3231	kW
efficiency	73	%
energy_out	11.63	GWh



MANUAL

Defining Digital Twins – Uses / Value



Search & Find



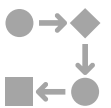
Remote Work



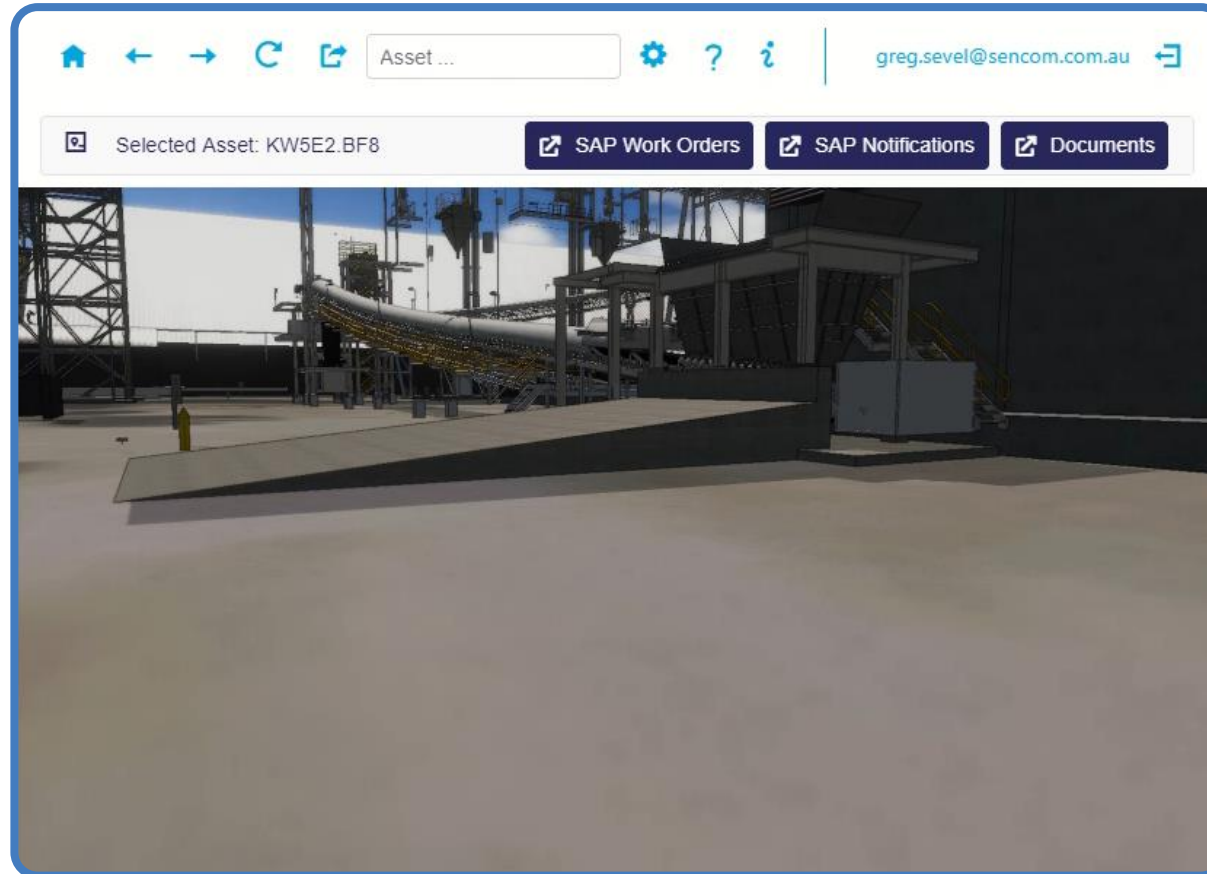
Real-Time Monitoring



Improved Human System Interaction



Workflow Optimisation



Business/Process Optimisation



Automation



Predictive Maintenance



Operational Training

Defining Digital Twins – Uses / Value



Search &
Find



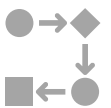
Remote
Work



Real-Time
Monitoring



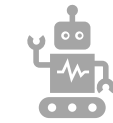
Improved Human
System Interaction



Workflow
Optimisation



Business/Process
Optimisation



Automation



Predictive
Maintenance



Operational
Training

Defining Digital Twins – Uses / Value



Search &
Find



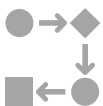
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Real-Time
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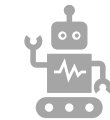
Improved Human
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Automation





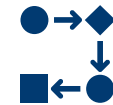







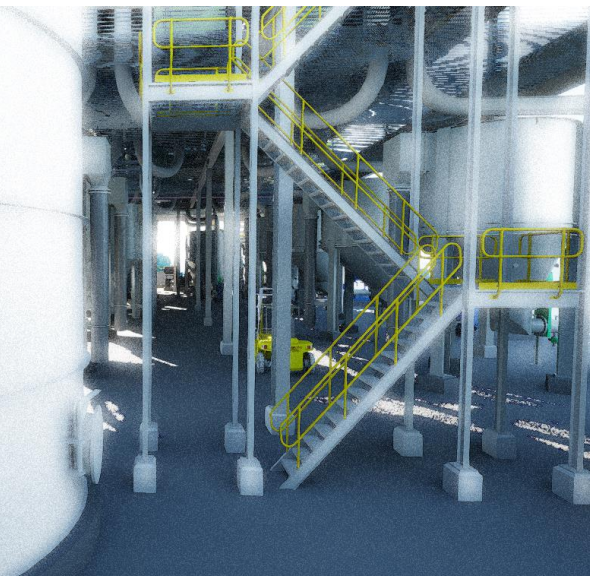



Predictive
Maintenance







Operational
Training

Defining Digital Twins – Uses / Value

-  Search & Find
-  Remote Work
-  Real-Time Monitoring
-  Improved Human System Interaction
-  Workflow Optimisation

 Health Monitoring	 Document System	 ERP System	 Permit to Work
 SCADA Apps			 Maintenance Apps
 Trend Apps			 Notification System

-  Business/Process Optimisation
-  Automation
-  Predictive Maintenance
-  Operational Training

Defining Digital Twins – Uses / Value



Search &
Find



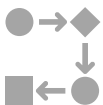
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Improved Human
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Defining Digital Twins – Uses / Value



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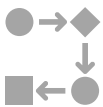
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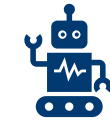
Improved Human
System Interaction



Workflow
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Business/Process
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Predictive
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Defining Digital Twins – Uses / Value



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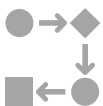
Remote Work



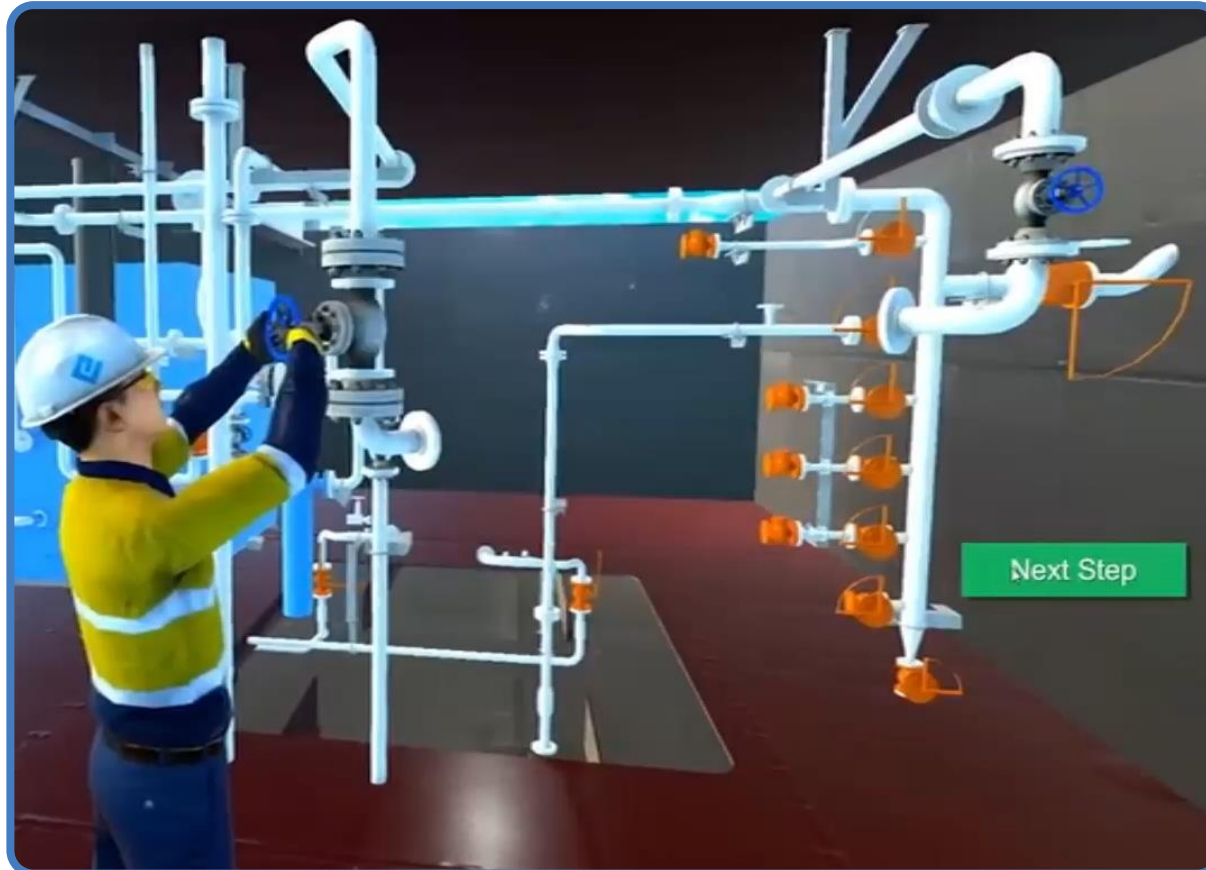
Real-Time Monitoring



Improved Human System Interaction



Workflow Optimisation



Business/Process Optimisation



Automation

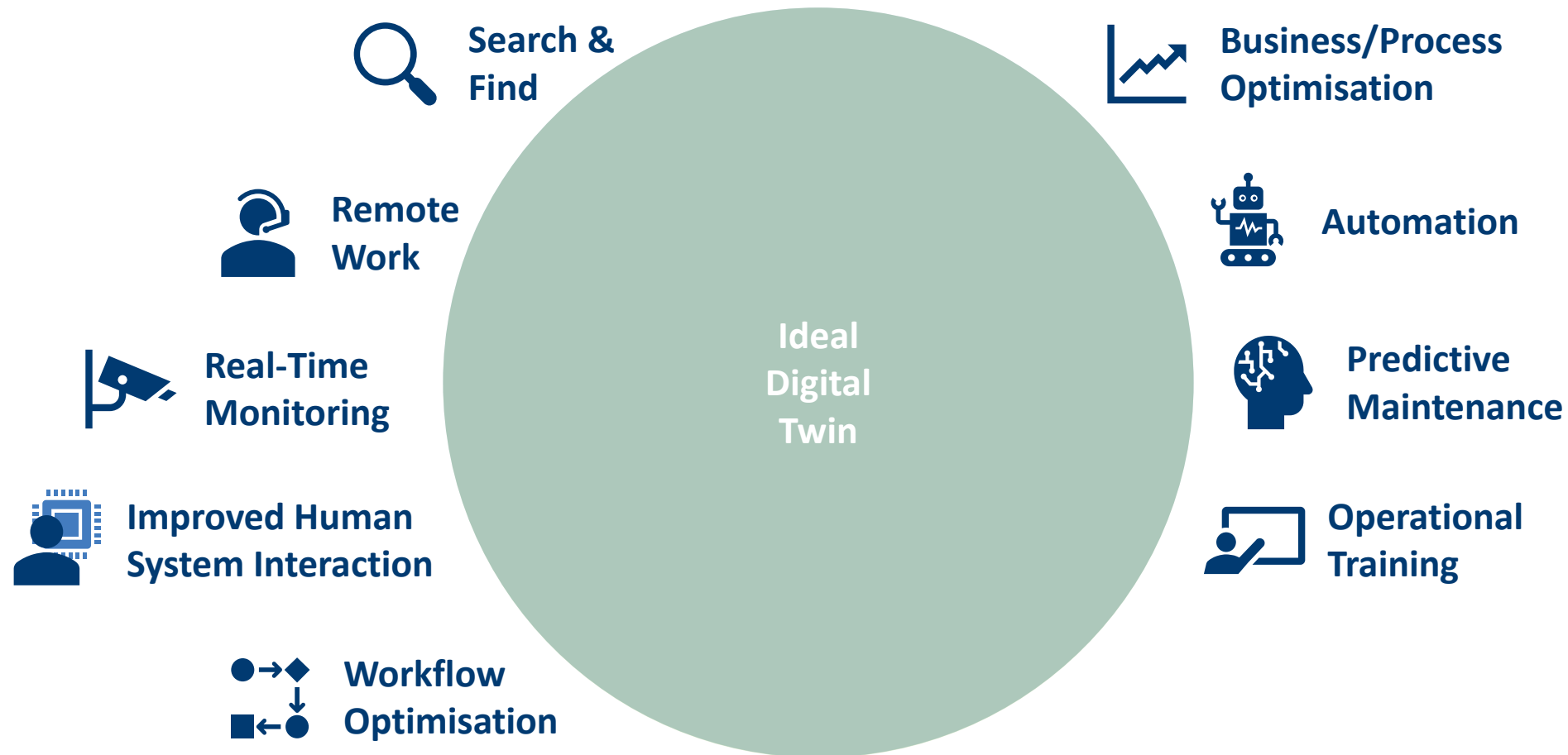


Predictive Maintenance



Operational Training

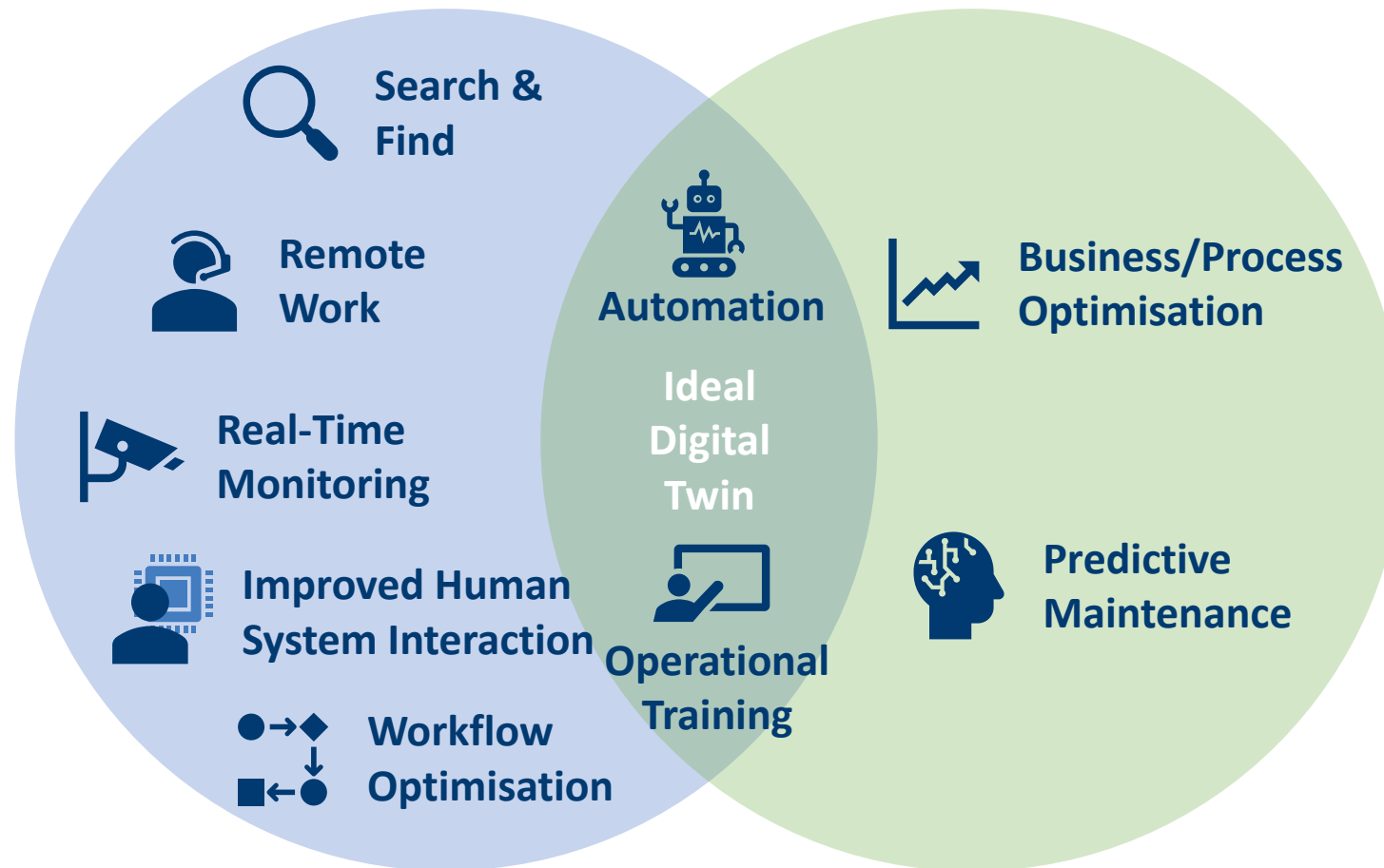
Defining Digital Twins – Types



Defining Digital Twins – Types

Workflow Focus

Simulation Focus

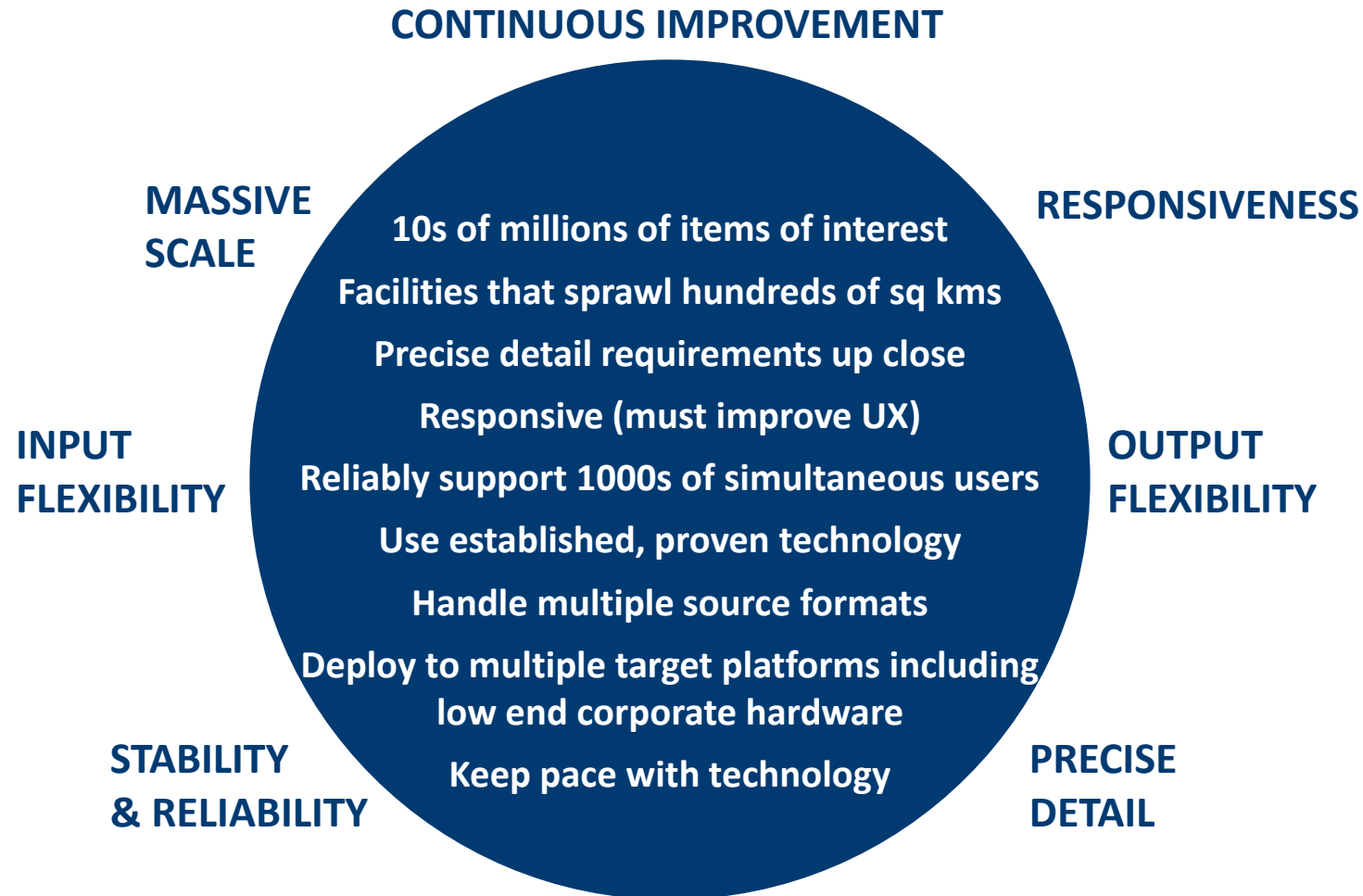


Other Common Terms

- Operations Digital Twin*
- Design Twin*
- Asset Twins*
- System Twins*
- Process Twins*

Digital Twin Rendering Requirements

Workflow Focus

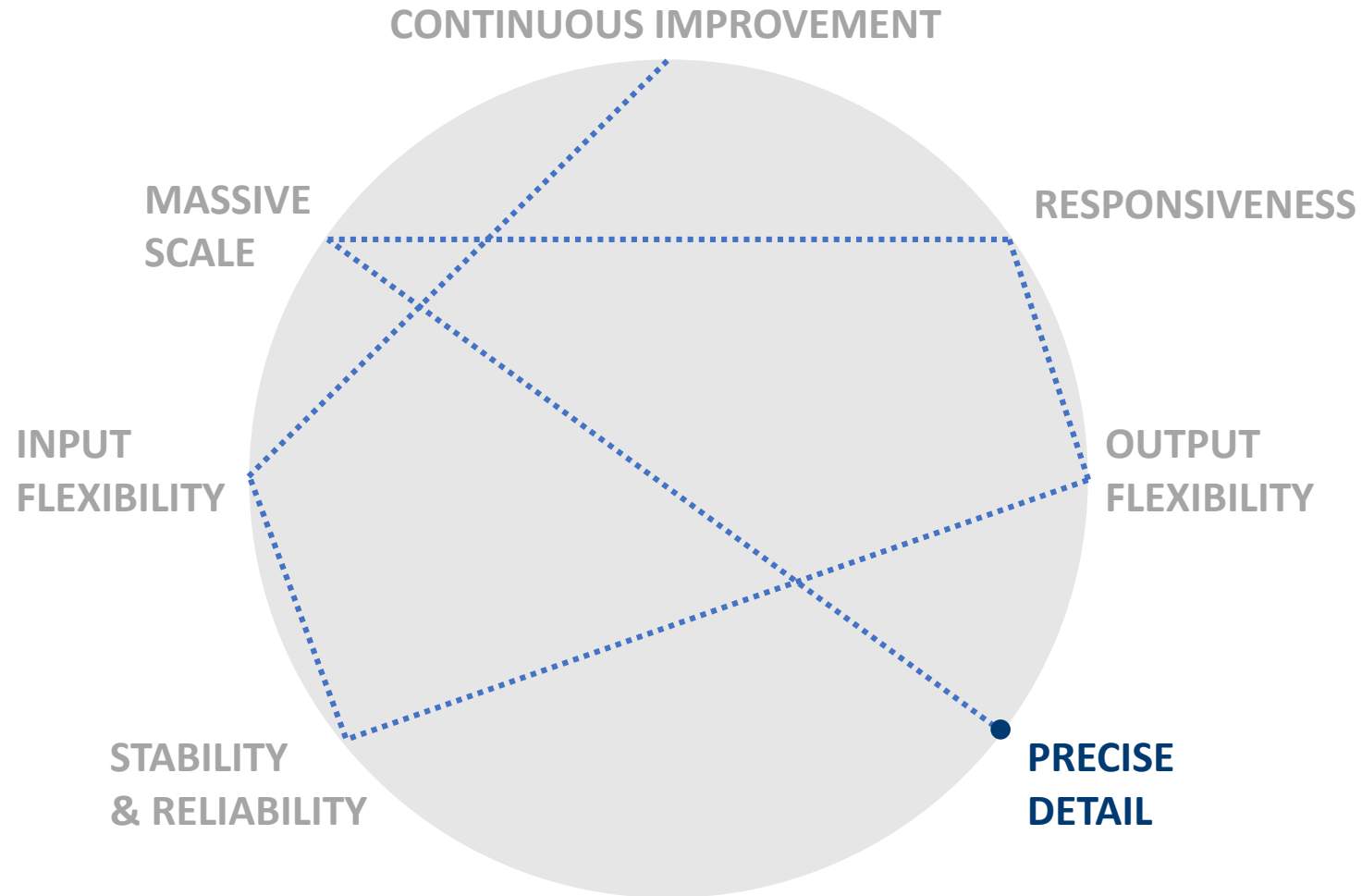


Digital Twin Rendering Requirements

Workflow Focus

Legend

- Great
- OK
- Hmm
- Disaster



A Game Technology Approach

Scale & Detail

- Content Streaming
- Level-of-Detail

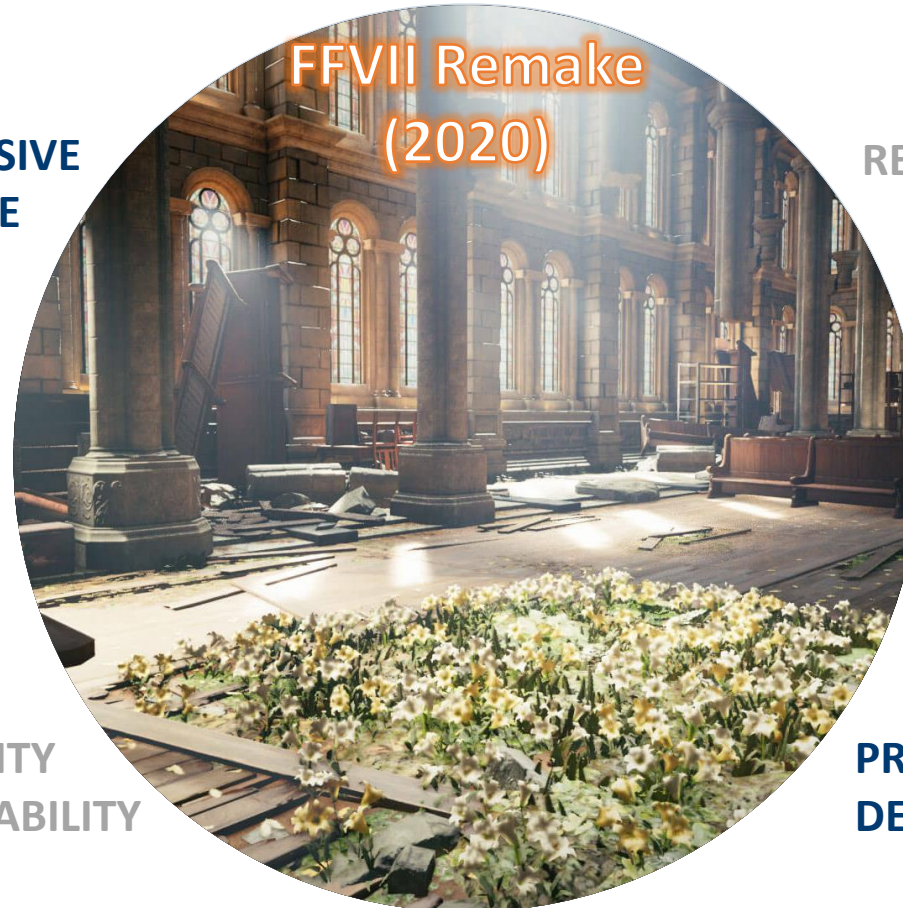
<https://www.gdcvault.com/play/1014627/Classic-Game-Postmortem>

CONTINUOUS IMPROVEMENT

**MASSIVE
SCALE**

INPUT
FLEXIBILITY

STABILITY
& RELIABILITY

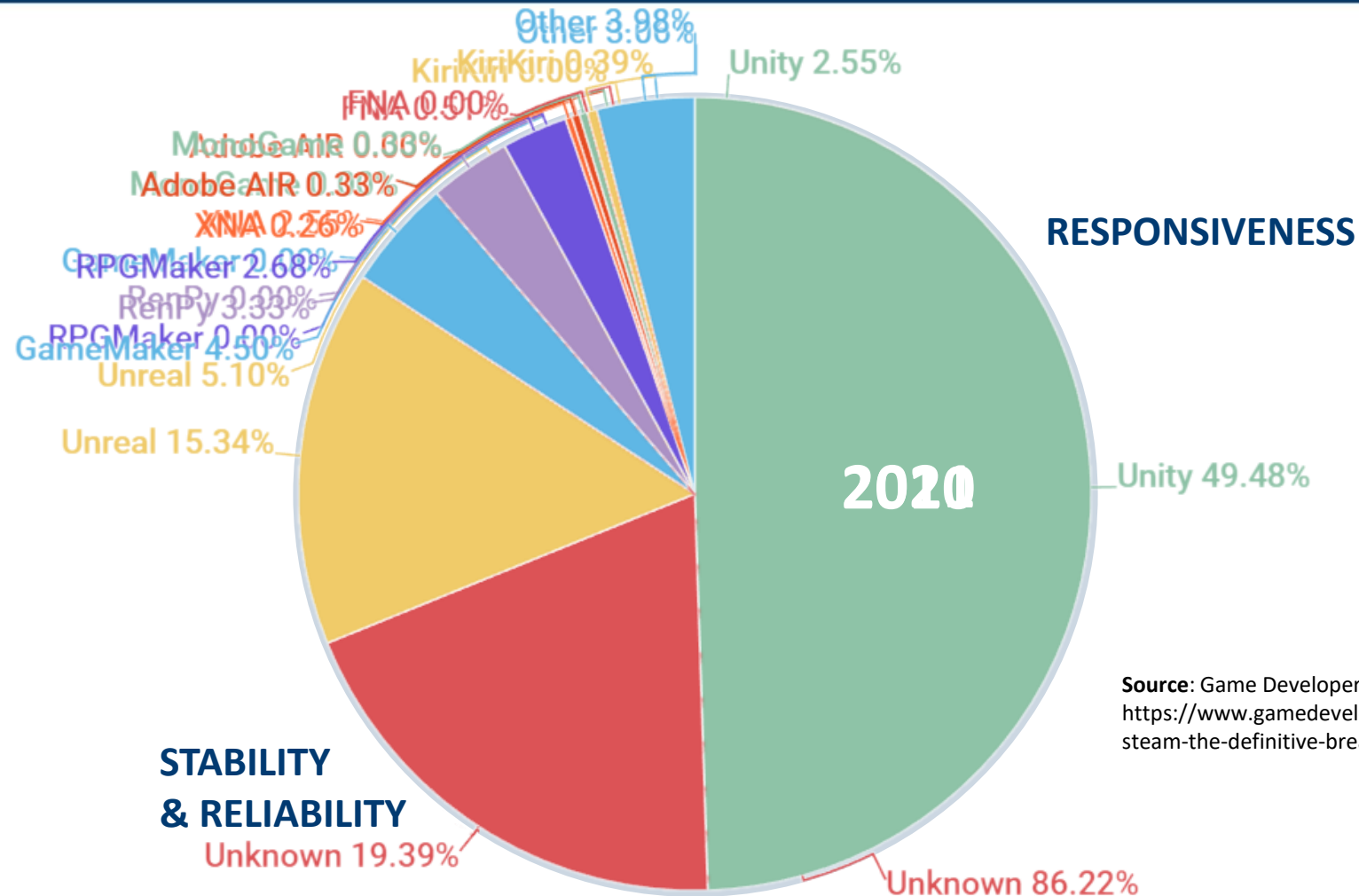


RESPONSIVENESS

OUTPUT
FLEXIBILITY

**PRECISE
DETAIL**

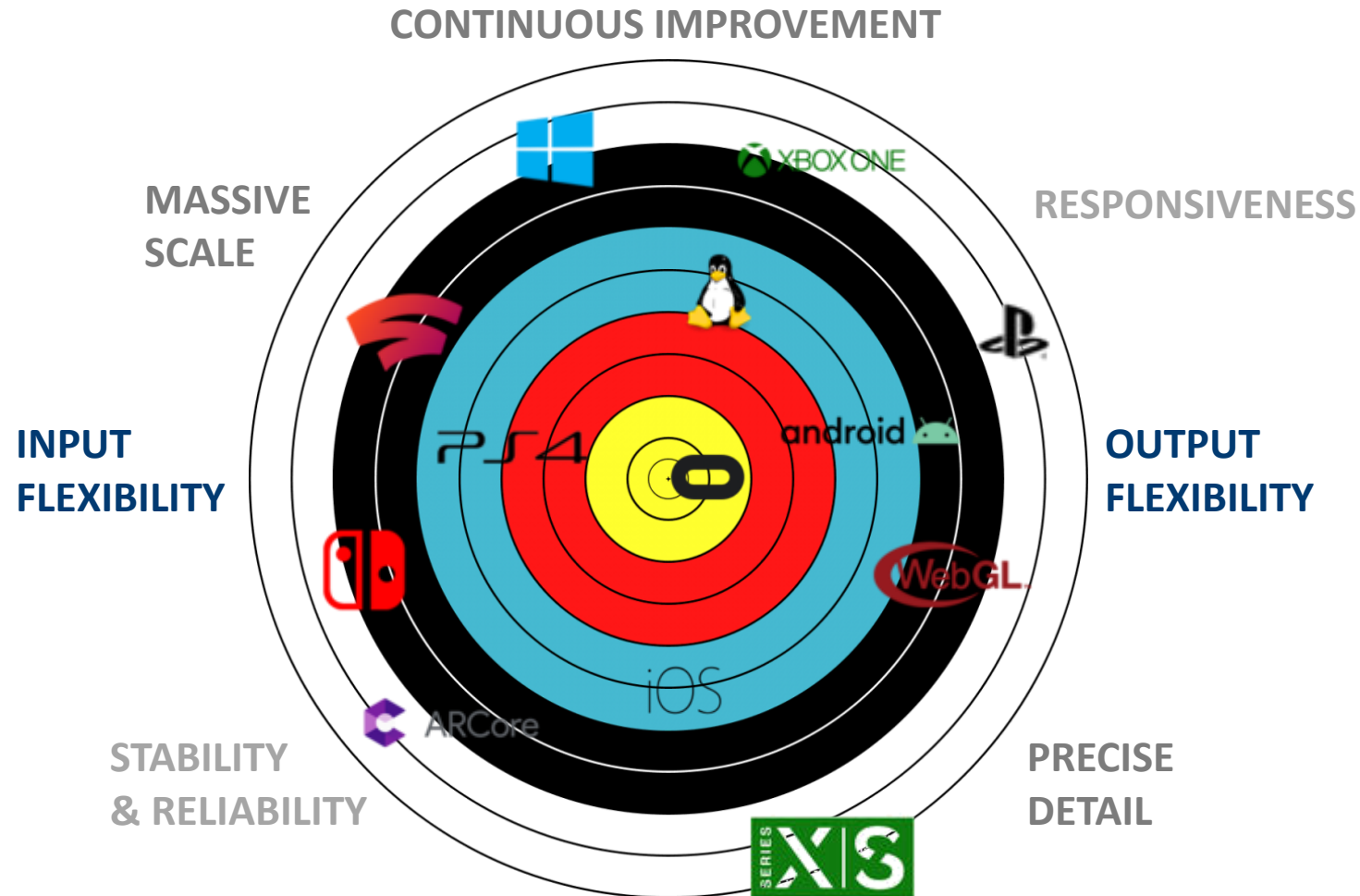
A Game Technology Approach



Stability:
Unity Engine
Responsiveness:
Netcode
GPU Streaming

Source: Game Developer (Lars Doucet, Anthony Pecorella)
<https://www.gamedeveloper.com/business/game-engines-on-steam-the-definitive-breakdown>

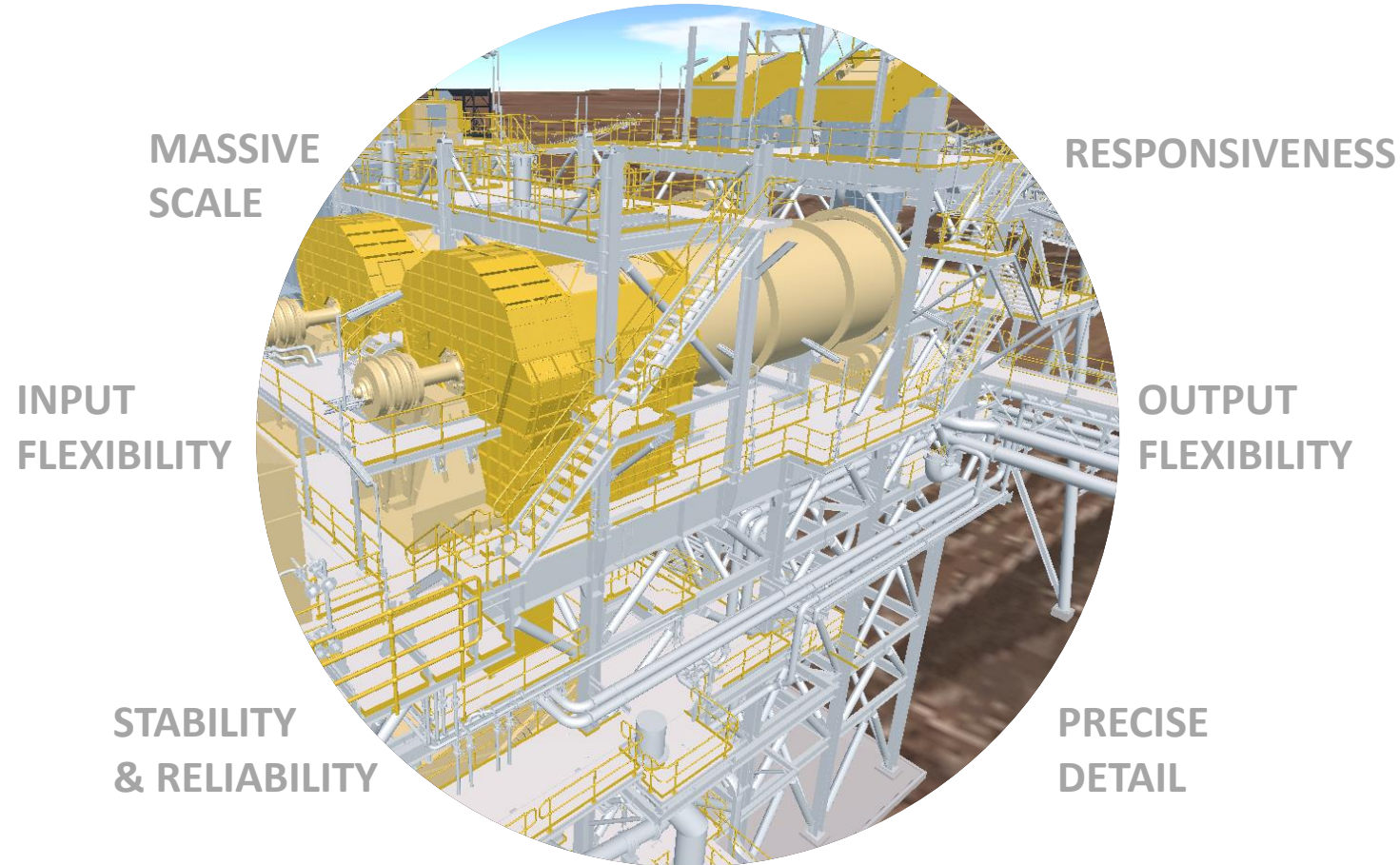
A Game Technology Approach



Sources & Targets:
Cross-Platform
Deployment

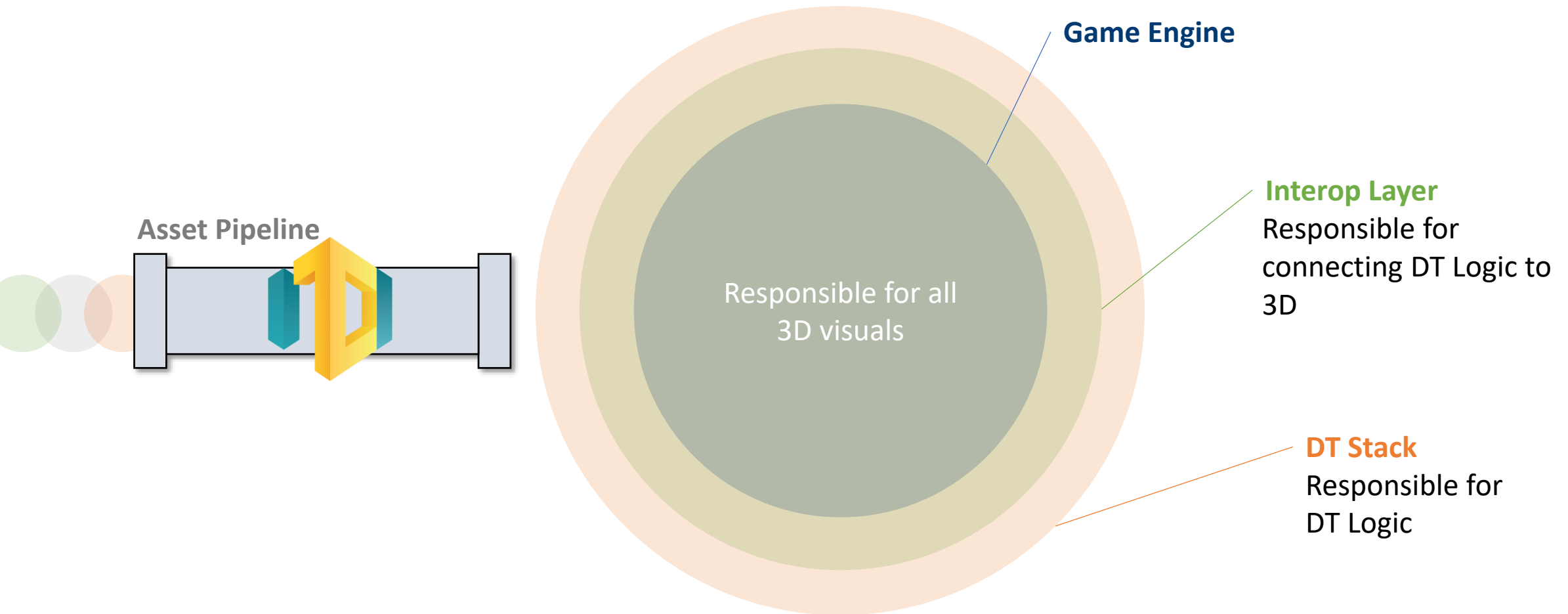
A Game Technology Approach

CONTINUOUS IMPROVEMENT



**Continuous
Improvement
InDI**

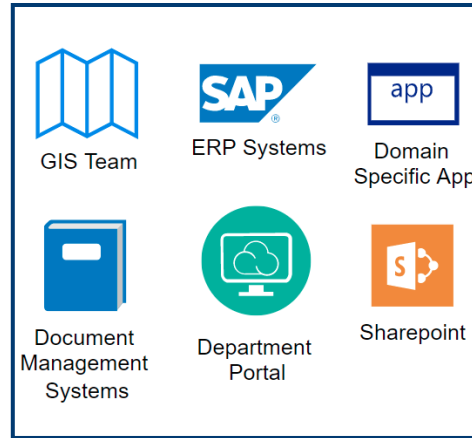
A Game Technology Approach



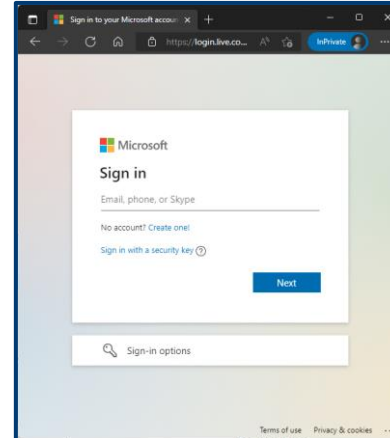
Case Study

Problem

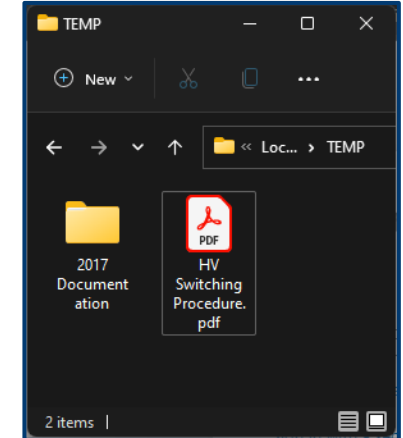
- Major Australian Miner
- Serious incident resulted from use of uncontrolled, old documentation
- A more practical user centric method for accessing documentation was required



Too many places to look



Too many auth hurdles



Local copies of safety critical documents

Solution

Operational DT with:

- Asset centric data access
- Multi-platform aggregation and single search + authentication
- Single Click Document Access



Spatial Interface

Type your search text here:

Simple, Powerful Search



Single Click to Data

Case Study



Development Challenges

- Massive Sites.
- No consistent standards in the source models.
- Extremely limited corporate hardware (8MB ram with integrated graphics).
- Site based internet connections.

Outcome

- Customer's Australian sites all live
- Now connected to 6 different data sources
- >100 of MAU of the platform.
- Over \$3mill/y estimated savings from improved efficiency

General Industry Challenges

Game Engine

! Performance Constraints

- ? Further optimizations
- ? GPU Streaming
- ? Time

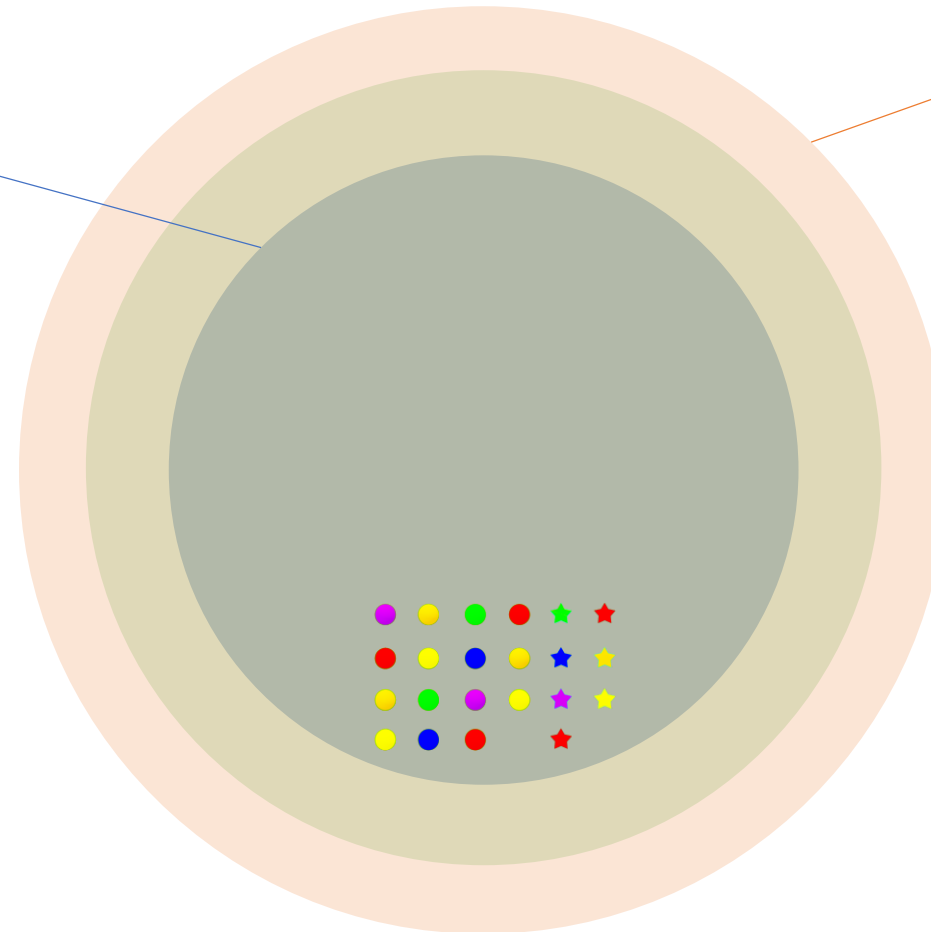
General

! UX

- ? Hire more programmers!

! Managing Complexity

- ? Re-work



DT Stack

! Lack of Standards

- ? Development of Standards
- ? Automated processing
- ? Manual labour

! Specialised Use Cases

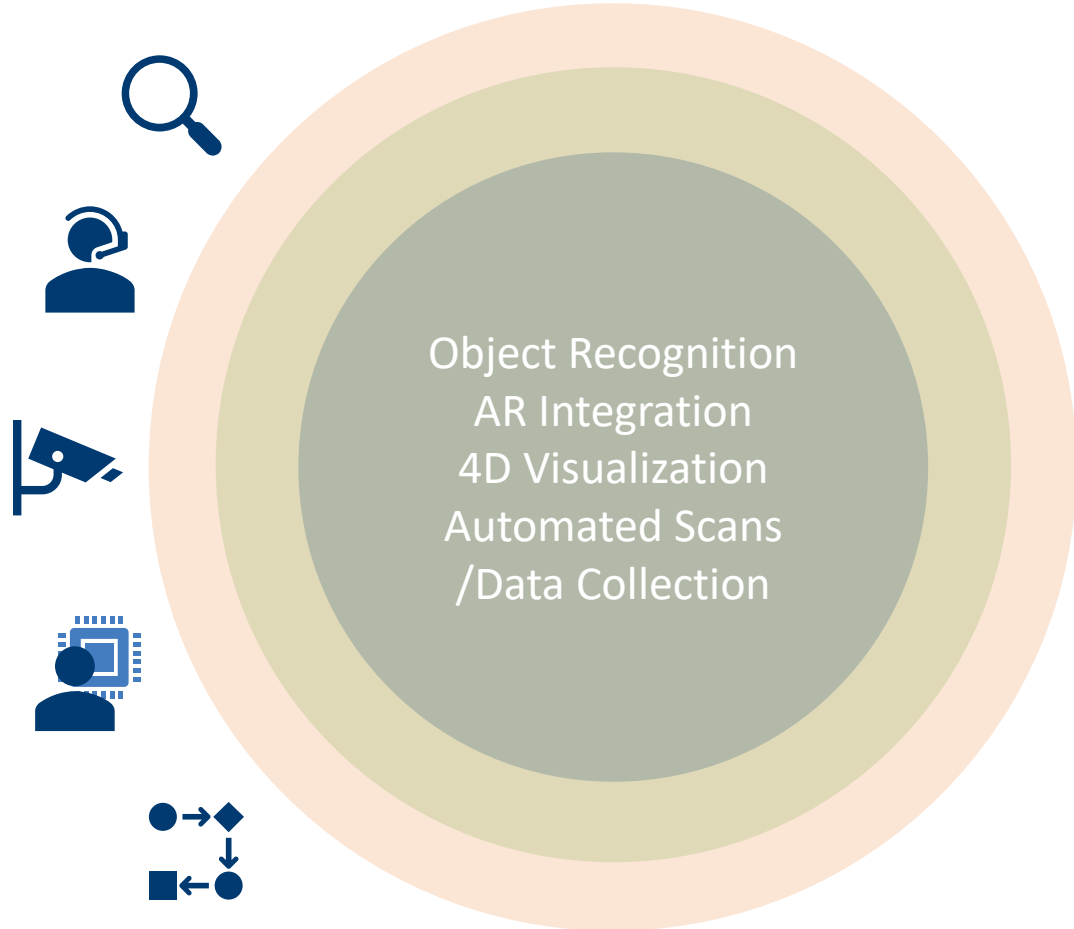
- ? Low code / no code solution
- ? Increased dev literacy

! Security Challenges

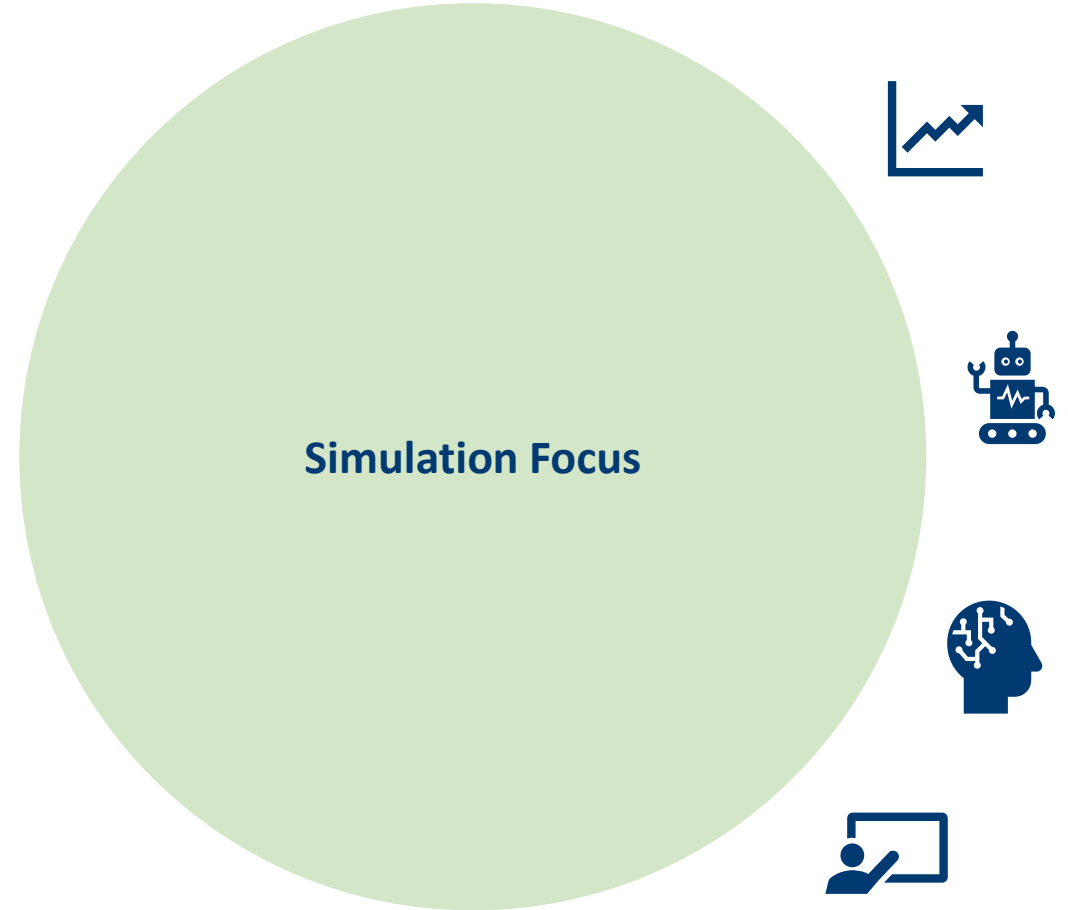
- ? Consolidation in specialists
cloud providers.

Looking forward

Workflow Focus



Simulation Focus



Lessons we've learnt on the way

- 1 Start with a clear and simple use case
- 2 Prototype quickly and don't get caught up in mega-features
- 3 Leverage standards but manage dependencies
- 4 Focus on developer workflow - Don't be afraid to take the time to do things right (re-write!)

"We need to be able to find our equipment"

"We need common access to our systems"

"We want a digital twin"

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The Importance of Systemic View in Accident/Incident Investigation

Presented by
Dr. Asieh Soltani - EIT Lecturer

3:00PM - 4:00PM (AWST)
Thursday 28 July, 2022

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Presented by
**Professor Akhtar Kalam
EIT Academic Board Chairman**

4:00PM - 5:00PM (AWST)
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Q&A

Thank you for attending.

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Courses

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