

Microsoft  
Partner

Silver Data Analytics  
Silver Security  
Silver Cloud Platform



Meta Quest

Meta Quest for Business ISV  
@QuantumVerse

# Architectural Design Document (ADD) Azure Industrial MetaVerse-as-a-Service (MVaaS)

## Business in the Metaverse Economy

### living document (ld)

*Prepared for*

**Microsoft Marketplaces Consulting Services**

**November 2022**

**Version 3.8**

*Prepared by*

**Dr. Olaf Cames, DBA, MSc(Dist)**

MSc in IT with Distinction (Information Security)  
Doctor of Business Administration



[customerservice@action-science.org](mailto:customerservice@action-science.org)

[info@quantumverse.media](mailto:info@quantumverse.media)

**Metaverse Economy Architects**

## Change Record

Date	Author	Version	Change reference
November 2022	Dr. Olaf Cames, DBA, MSc(Dist)	3.8b draft	Commercial marketplace consulting service offer

Copyright: VBIC

## Contents

Business in the Metaverse Economy.....	1
Change Record .....	2
Executive Summary .....	8
Adaptation of an Azure Industrial MetaVerse-as-a-Service Design Strategy .....	8
Chosen pattern:.....	8
1. Background .....	9
1.1. Enterprise Business in the Metaverse Economy Design Strategy .....	9
1.1.1. Part I: Transformation of an industrial physical environment into mixed reality .....	9
1.2.1. Process Overview.....	9
1.2.1.1. Metaverse Workrooms/Workplaces Template Process Flow (MWWTPF) .....	9
1.2.1.2. Business in the Metaverse Economy Enablement Process .....	11
2. High-level Functional Use Cases .....	11
3. Business Objectives (Goal) and Critical Success Factors .....	12
3.1. Micro-Approval request.....	12
3.1.1. Micro-Approval request for Use Case 5.....	13
4. Business Process Context, Scope .....	16
4.1. Actors .....	16
4.1.1. Use Case 5: Micro-Approval request (sample/template) .....	16
4.2. Actors .....	17
4.2.1. Use Case 1 .....	17
4.2.2. Use Case 2 .....	17
4.2.3. Use Case 3 .....	17
4.2.4. Use Case 4 .....	17
5. Establishing shared experiences in Microsoft Mixed Reality across many AR/VR metaverse Architecture Pattern (MRMVA) .....	18
5.1 Software Defined AR/VR Metaverse Interconnects (MSDCI) .....	18
5.2 Metaverse Client Pattern (MVCP) .....	19
5.3 Metaverse Branch Connectivity Automation Pattern (MVCA) .....	20
6. Software-Defined Metaverse Interconnects Landing Zone Pattern (SDMIZ).....	21
6.2. Azure Multi-Tenant Regulatory Compliance Deployment Governance Pattern (AMDP).....	22
6.3. Microsoft Mixed Reality Shared Experiences Device Routing Pattern .....	23
6.3.1. HoloLens 2 .....	23
6.3.2. iOS.....	23

6.3.3.	Meta Quest Pro VR .....	23
6.3.4.	HP Reverb G2.....	23
6.3.5.	Desktop.....	23
6.3.6.	Android .....	23
6.3.7.	iOS devices (PARP).....	23
6.4.	Dynamics 365 Mixed Reality Automated Field Service Pattern (DNRFSP) .....	24
6.5.	Azure Cross-Metaverse persistence of virtual content in the real-world Landing Zone Architecture Pattern (CMLZP).....	25
6.6.	Combination of DNRFSP and CMLZP Pattern .....	26
6.6.1.	Microsoft Mesh micro-approval approval embedded in target Dynamics Remote Assist, Dynamics Mixed Reality and Microsoft Teams Architecture (sample/template) .....	26
6.8.	Industrial Metaverse Monetization Pattern (PKP) .....	27
6.8.4.	Metaverse Monetization Protection Pattern (MMPP) .....	27
	28	
6.8.5.	Azure Spatial Anchors Services.....	29
6.8.5.1.	Cross-platform persistence of virtual content in the real-world.....	29
6.8.5.2.	Contextual information in HoloLens 2, iOS, and Android devices.....	29
7.	Part III: Set up multi-tenant company deployments, enabling vendors and contractors to use Remote Assist, or to use Microsoft Teams (PCTIP).....	32
7.1.	32	
7.2.	Build, customize, operationalize, and monetize business in the Metaverse economy by combining .....	32
7.2.1.	Azure Mixed Reality Services.....	32
7.2.1.1.	Microsoft Mixed Reality Tool KIT.....	32
7.2.1.2.	Dynamics 365 Mixed Reality.....	32
7.2.1.3.	Dynamics 365 Field Service .....	32
7.2.1.4.	Microsoft Mesh.....	32
7.2.1.5.	Meta Horizon Worlds .....	32
7.2.1.6.	Meta Horizon Workrooms.....	32
7.2.2.	Analysis .....	32
7.2.3.	Activity documentation, synthesis, and correlation.....	32
	References .....	34
	Glossary	35
Appendix A:	.....	38
	Azure Metaverse-as-a Service Regulatory Compliance Assurance Controls.....	38
Subject:	.....	38
Status:	38	
▪	Overview.....	38

▪ Scope of this review .....	38
In-Scope.....	38
Out-of-Scope .....	39
▪ Cloud Governance .....	40
Platform Maturity Remaining Risk Statement.....	40
▪ Architecture Diagram .....	150
▪ Technical Details.....	151
▪ Business/Flow Details.....	151
▪ Authentication.....	151
▪ Authorization.....	151
▪ Audit and Logging.....	151
▪ Input Validation / Output Encoding .....	151
▪ Session Management .....	151
▪ Data Security .....	151
▪ Firewall Rules.....	151
▪ Potential Exceptions to Proposed Design.....	151
▪ QuickStart.....	151
RACI matrix.....	151
▪ Glossary .....	152
▪ References .....	152
Appendix B.....	155
Azure Mixed Reality Services Backup Recovery Services Vault.....	155
Subject:.....	155
Status: 155	
▪ Overview.....	155
▪ Scope of this review .....	155
In-Scope.....	155
Out-of-Scope .....	155
▪ Azure Mixed Reality Governance .....	157
Platform Maturity Remaining Risk Statement.....	157
Platform Automation Remaining Risk Statement .....	160
Platform Assurance Controls Remaining Risk Statement .....	165
▪ Architecture Diagram .....	185
▪ Technical Details.....	187
▪ Business/Flow Details.....	187
▪ Authentication.....	187
▪ Authorization.....	187

▪ Audit and Logging .....	187
▪ Input Validation / Output Encoding .....	187
▪ Session Management .....	187
▪ Data Security .....	187
▪ Firewall Rules.....	187
▪ Potential Exceptions to Proposed Design.....	187
▪ QuickStart .....	187
RACI matrix.....	187
ARM template .....	188
Template Deployment.....	192
▪ Glossary .....	192
▪ References .....	192
Appendix C.....	193
Decision record template for security pattern (draft).....	193
1. Prologue (Summary) .....	193
2. Discussion (Context).....	193
3. Solution (Decision) .....	193
4. Consequences (Results) .....	193
1. Prologue (Summary) .....	193
2. Discussion (Context).....	193
3. Solution (Decision) .....	193
4. Consequences (Results) .....	193
Appendix D .....	194
Lower-level augmentation indicator in the level 300 design strategy .....	194
Appendix E .....	195
Lower-level architectural design modification proposal .....	195
Appendix F .....	197
PolyCloud Cryptographically Isolating Single Tenant Instances Pattern (PCITP).....	197
Appendix G .....	198
Variational Quantum Eigensolver (VQE) .....	198
Stricter security requirements beyond semantic security: addressing remaining attack surfaces in homomorphic encryption .....	198

## Figures

Figure 1 Business in the Metaverse Economy Enablement Process .....	9
Figure 2 The PolyCloud (PC) Template Process Flow (PCTPC) deliverables .....	10
Figure 3 Business in the Metaverse Economy Security Architecture Risks - 2 dimensional statistics.....	10
Figure 4 The Metaverse Workrooms/Workplaces Template Process Flow (MWWTPF)- Business Enablement Process (BEP) .....	11
Figure 5 Establishing shared experiences in Microsoft Mixed Reality across many AR/VR metaverse Architecture Pattern (MRMVA).....	18
Figure 6 Adaptation of Software Defined AR/VR Metaverse Interconnects (MSDCI) Pattern .....	19
Figure 9 Metaverse Branch Connectivity Automation Pattern (MVCA) .....	20
Figure 10 Software-Defined Metaverse Interconnects Landing Zone Pattern (SDMIZ) .....	21
Figure 11 Microsoft Mixed Reality Shared Experiences Device Routing Pattern .....	23
Figure 12 Dynamics 365 Mixed Reality Automated Field Service Pattern (DNRFSF).....	24
Figure 13 Adaptation of enterprise-scale landing zone architecture (CMLZP) Pattern .....	25
Figure 14 Microsoft Mesh micro-approval approval embedded in target Dynamics Remote Assist, Dynamics Mixed Reality and Microsoft Teams Architecture via combination of DNRFSF and CMLZP Pattern .....	26
Figure 15 Industrial Metaverse Monetization Pattern .....	28
Figure 16 Rendering highly complex 3D models in the Azure cloud to stream them in real time Pattern .	29
Figure 17 RACI Chart - Best Practice - Build, customize, operationalize, and monetize business in the Metaverse economy .....	157
Figure 18 Azure Multiverse-as-a Service scaling solution cryptographically isolating single tenant instances available for AES 128-bit, 256-bit symmetric, and homomorphic keys secure regulatory compliant Azure multi-tenant deployment.....	197
Figure 19 Multiverse Variational Quantum Eigensolver (VQE).....	198
Figure 20 Quantum Homomorphic Encryption with a Metaverse Client .....	198