

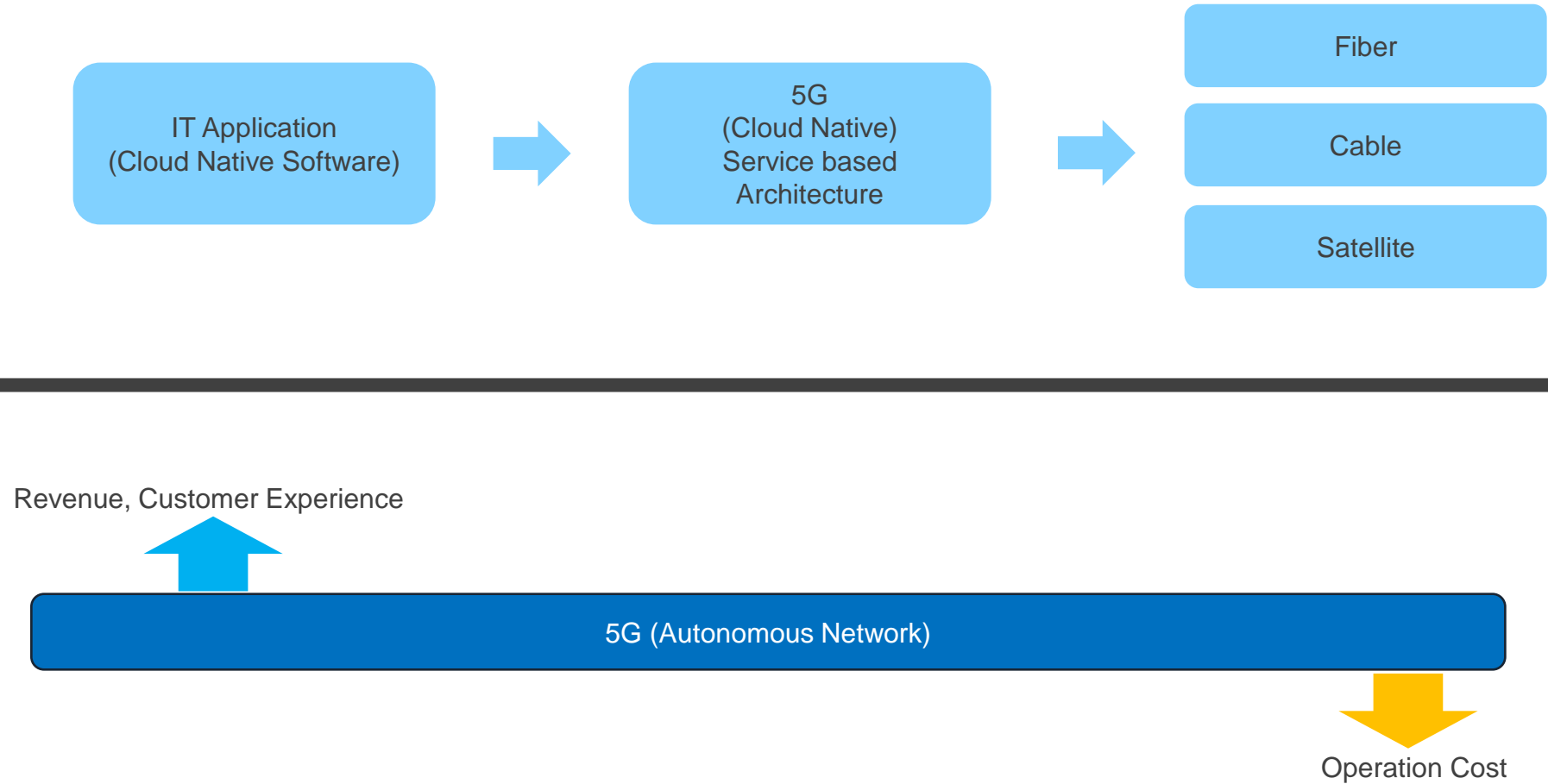


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# Autonomous Networks Transformation

Sanjay Verma

# Autonomous Network (AN)

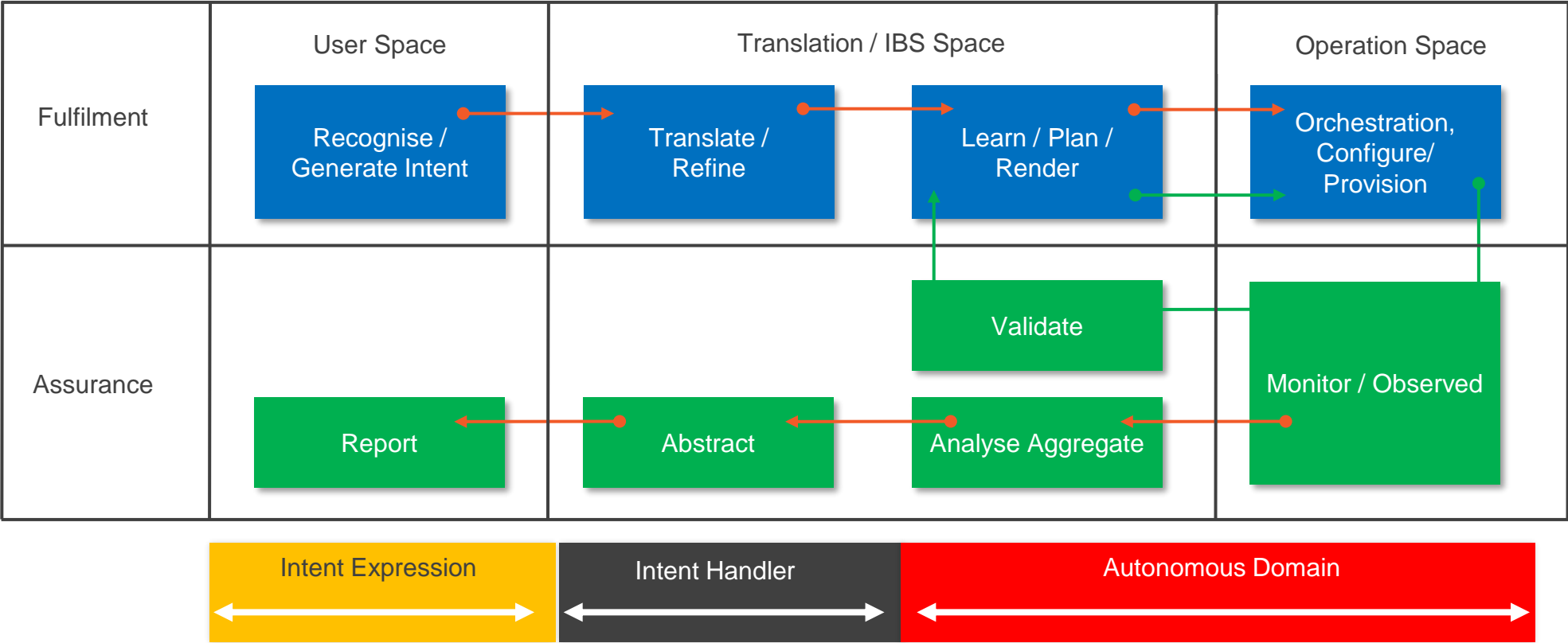


# Autonomous Network – TM Forum Research Report

CSPs globally are prioritizing “AI driven Network” investments for improving Autonomous Network Maturity Level

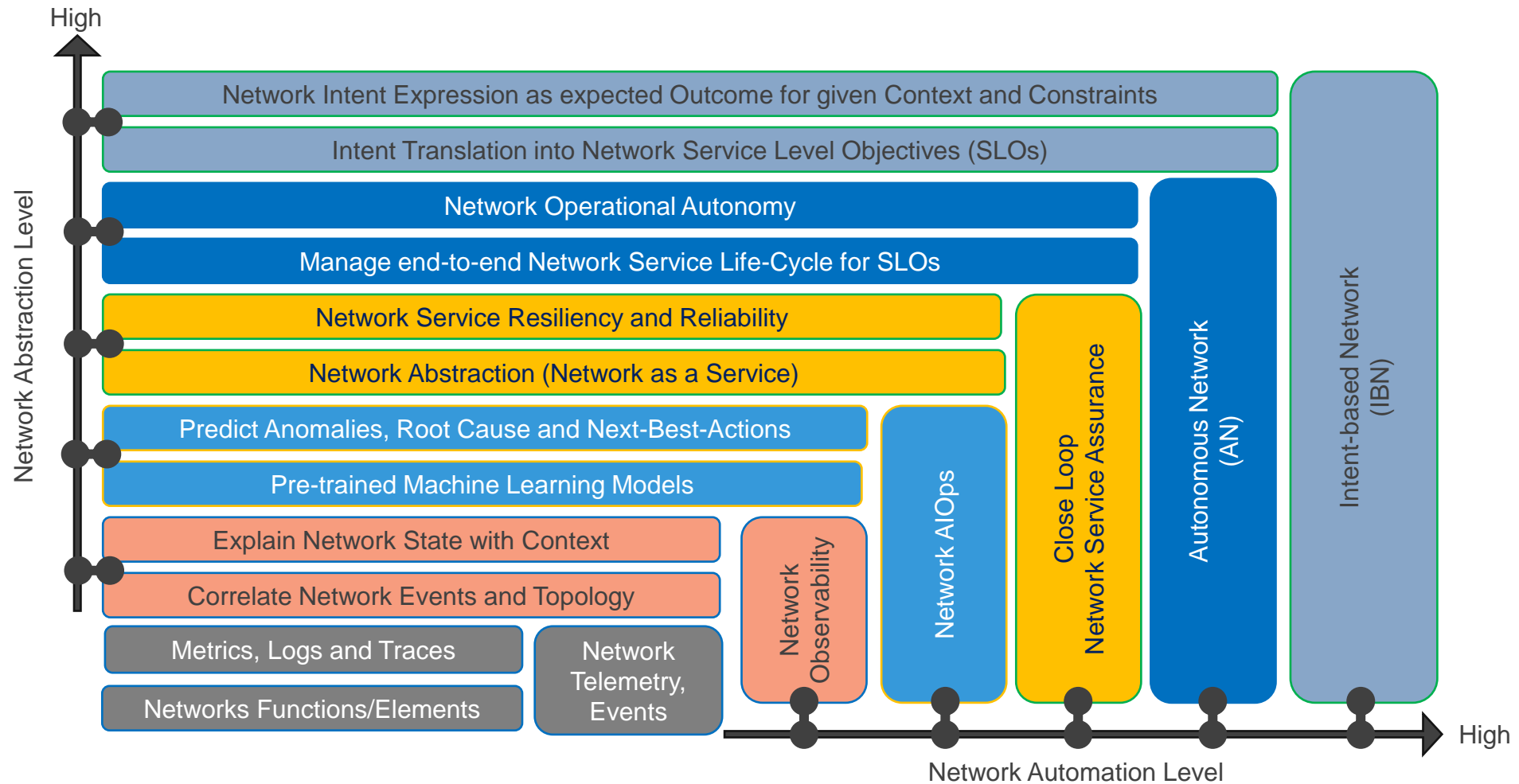
Scope Priority Where should it be applied?			Business Objectives What are Expected Outcome?			Operations Benefits Which Operational KPIs benefit most?			Top Challenges What are key Constraints?		
1	Service Assurance	62%	1	Improved Customer Satisfaction & Experience	71%	1	O&M Cost Reduction	57%	1	Integration Challenges across different layers	58%
2	Service Delivery	62%				2	Network/Resource Utilization	38%	2	End-to-End Architecture Design & Roadmap	45%
3	Quality Optimization	45%	2	Simplify O&M and Improve Efficiency	62%	3	Ratio of Manual Work	27%	3	Skills & Capabilities Gap	43%
4	Network Deployment	35%	3	Agile Service Delivery & Monetization	55%	4	Service Provisioning	27%	4	Lack of Methodology	41%
5	Planning and Design	27%				5	Fault Handling	26%	5	Evaluation Tools	36%
6	Troubleshooting	26%				6	QoE Monitoring & Diagnosis	21%	6	Maturity of Required Technology	35%
7	Energy Usage Optimization	24%				7	Operation Duration	21%	7	Misaligned Process	32%
8	Network Changes	22%							8	Optimization & Network Upgrade	25%
9	Complaint Handling	17%	4	Increase Resource Utilization	55%				9	Clarity of Business Objective Strategic Vision & Planning	19%
			5		53%					Maturity of Industry Standards	
			6	Reduce O&M Costs	41%						
			7	Closed-Loop Ops	33%						
			8	Network as a Service	26%						
			9	Proactive Service	21%						
			10	Optimization Energy Savings Partner Management	10%						

# Beginning of Intent based Autonomous Network Concept

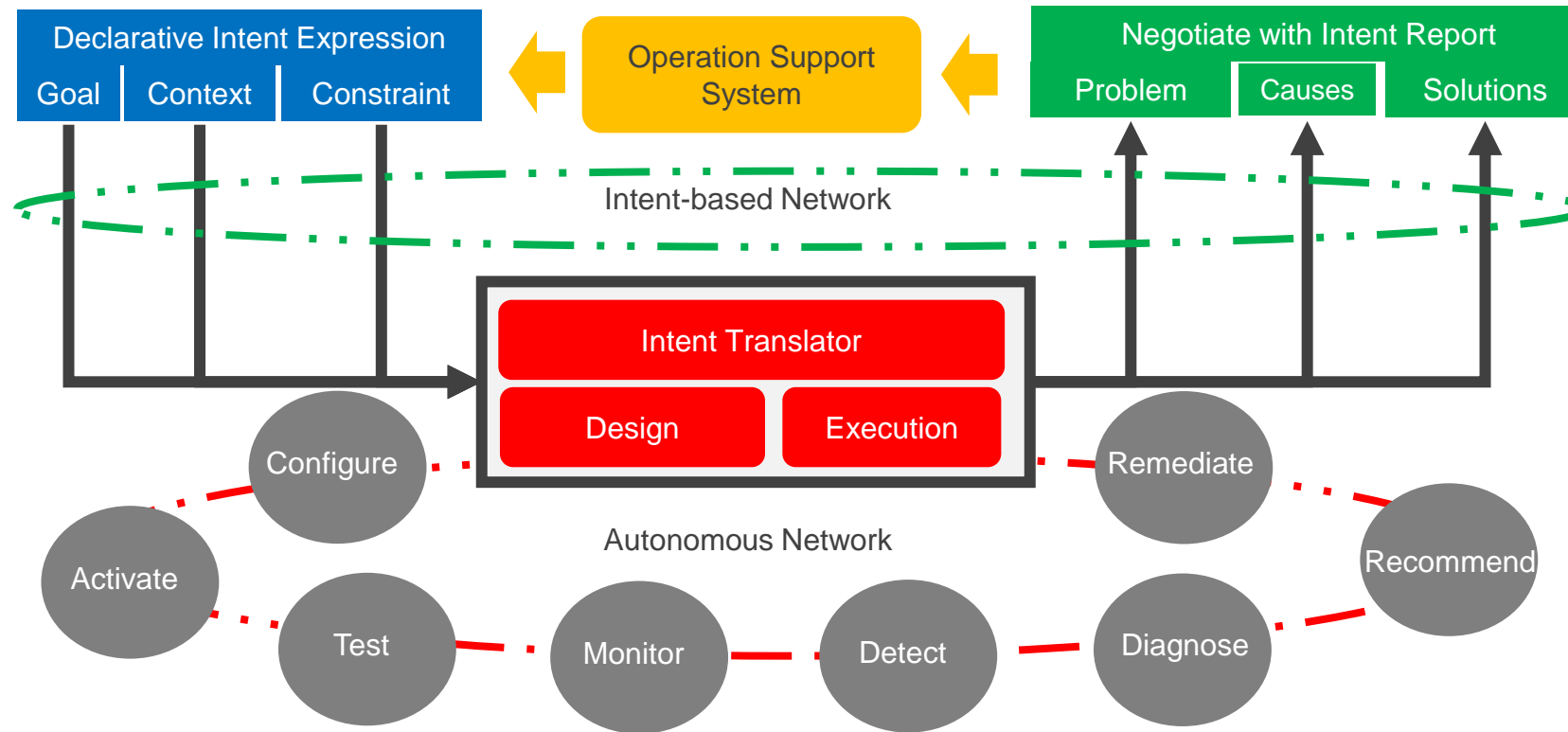


Source: IETF RFC 9315

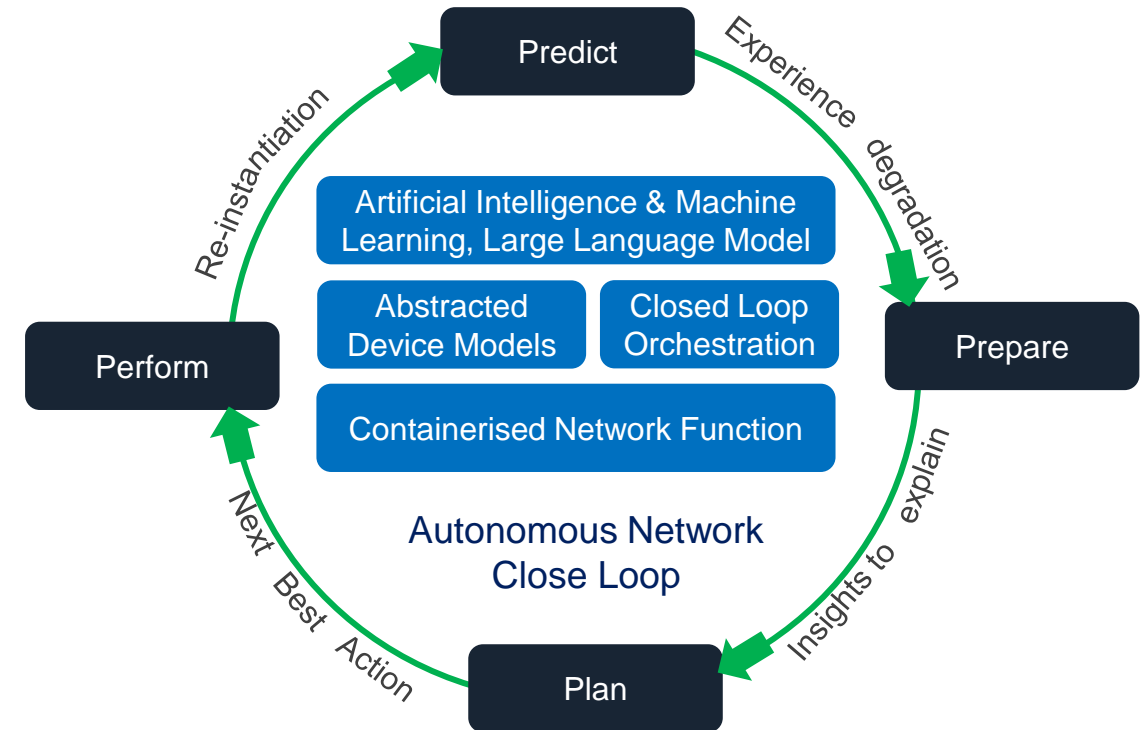
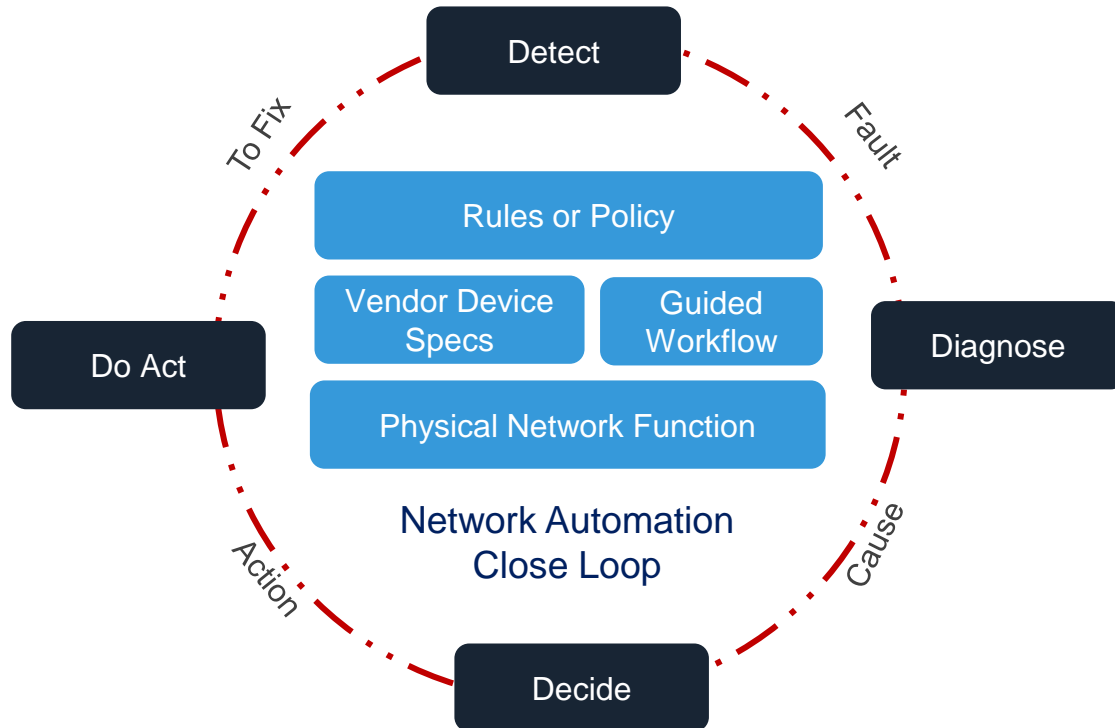
# Autonomous Network related Buzzwords...



# Intent based AN – Transforming Interaction & Incident Operations



# Automation is not Autonomous...



# AN Maturity Levers defined for Telcos

Autonomous Levels	L0: Manual Operation & Maintenance	L1: Assisted Operation & Maintenance	L2: Partial Autonomous Networks	L3: Conditional Autonomous Networks	L4: High Autonomous Networks	L5: Full Autonomous Networks
Execution	P	P/S	S	S	S	S
Awareness	P	P/S	P/S	S	S	S
Analysis	P	P	P/S	P/S	S	S
Decision	P	P	P	P/S	S	S
Intent/Experience	P	P	P	P	P/S	S

Operational Capability	L-0	L-1	L-2	L-3	L-4	L-5
	Automation		Hyper Automation		Autonomous	
1. Intent / Experience Declare Objectives	Operation KPIs (at Network Operation level) <i>Managed by Human</i>		Network SLO, SLA (at Network Service level) <i>Managed by Human</i>		Intent Expression ( at Network Experience Level) <i>Managed by Systems (and sometime Human)</i>	
2. Awareness Detect deviation	Use static rules <i>to create new events, plan, requirements</i>		Use programable policies <i>to create new events, plan, requirements</i>		Use ML models <i>to create new policies, event, plan, requirements</i>	
3. Analysis Diagnose Cause, Alternate Options	Use Instruction Sets <i>Leverage procedure, human experience, system reports for finding causes, solutions</i>		Use Data Analytics <i>Leverage data correlation insights for cause analysis and solution discovery</i>		Use ML Models <i>Leverage ML for identifying causes and suggesting possible next-best-actions (solution)</i>	
4. Decision Decide Final Solution	Use Standard Operating Procedure (SOP) <i>to finalise the solution from available options</i>		Use Policy along with Data Insights <i>To weigh the solution options</i>		Use ML Models and Digital Twin <i>Simulate options to finalise effective solutions</i>	
5. Execution Do act by execution (or implementation)	Use Guiding workflow <i>remediation process has human embedded in the loop for doing tasks</i>		Use human designed Orchestration <i>remediation process has human designed Orchestration</i>		Use AI rendered Orchestration <i>Remediation process has human for overseeing AI designed Orchestration</i>	



# Journey of the Telecom Sector Towards AN

## Current state

- A large majority of telcos **~84% are either at Level 1 or Level 2 autonomy** for their overall networks
- Most of the telcos **~61%** aspire to reach at least Level 3 autonomy by 2028
- Only **1% expect to attain Level 5 and 16% to attain Level 4** overall (including operations) by 2028
- **Most of the autonomous networks use cases are at the POC** (proof of concept) / pilot stage
- Telcos expect to **invest \$87mn** on average in autonomous networks over the next five years

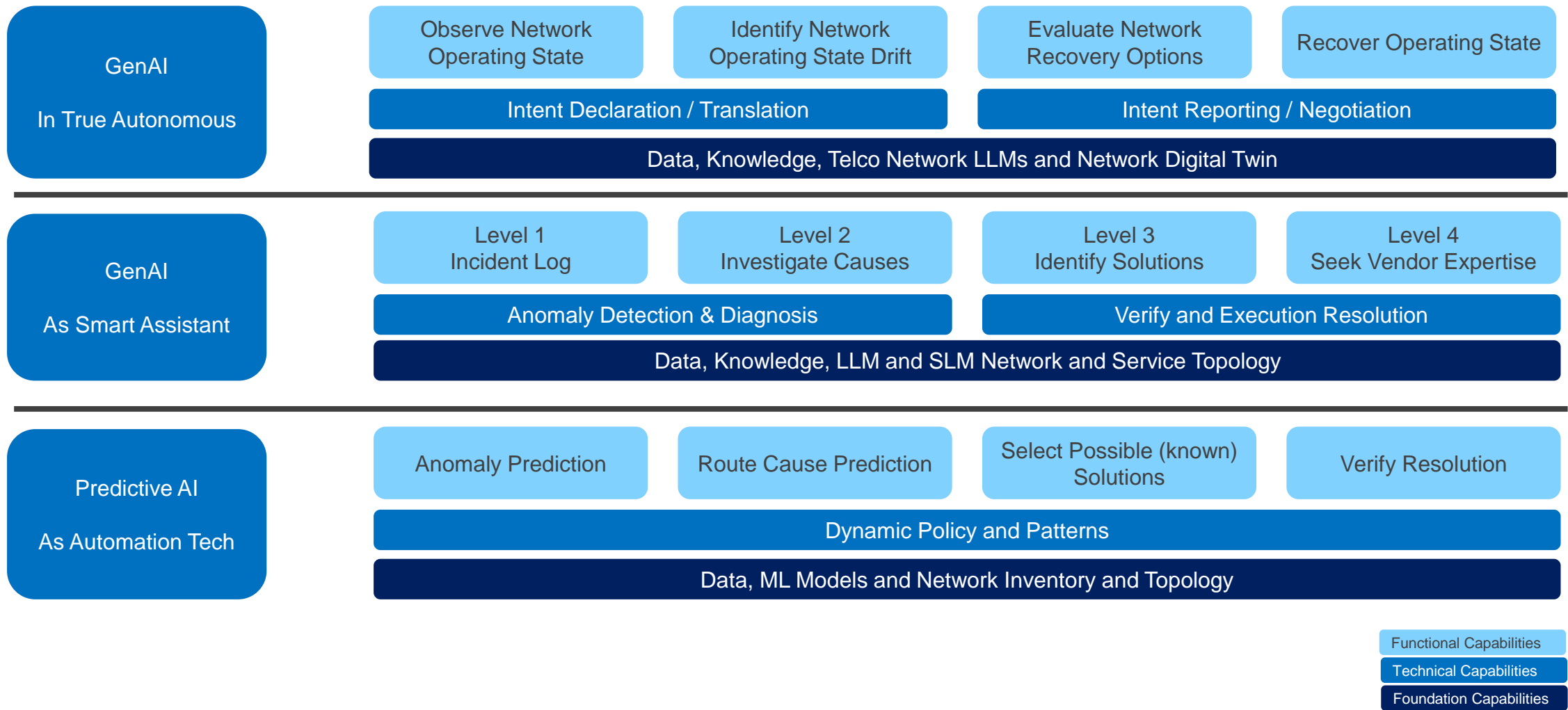
## Key challenges faced

- Telcos have cited employee mindset, integration issues, and data sovereignty concerns as top challenges hindering adoption
- 50% of telcos have a roadmap that covers only the next 1-2 years
- Only one in five telcos (15%) has a comprehensive autonomous networks transformation strategy with well-defined goals and target timelines
- Fewer than one in five organizations (15%) has appointed a dedicated leader for autonomous networks, and 31% are in the process of finding one

Status of CSPs AN level (TM Forum)– current and future (2028)

Percent of telcos in the category	L0: Manual operation and maintenance	L1: Assisted operation and maintenance	L2: Partial autonomous networks	L3: Conditional autonomous networks	L4: Highly autonomous networks	L5: Fully autonomous networks
End-2023	9%	42%	42%	6%	1%	0%
End-2028 (projected)	0%	8%	31%	44%	16%	1%

# AI and Gen AI role in Autonomous Network



# AI Techniques for improving Network Automation Maturity Level

## AN Assessment – Define Target Maturity >> Get Functional Scope

### 1. Autonomous Network

- 1.1 Awareness / Observability
- 1.2 Analysis / NetOps AI
- 1.3 Decision / Network Service Mgmt.
- 1.4 Execution / Network Orchestration
- 1.5 Intent / Intent Handler & Mgmt.

### 2. Network Domains

- 2.1 RAN
- 2.2 Transport / Fixed (Optical Access, IP)
- 2.3 Mobile Core
- 2.4 Infrastructure (Private & Public Cloud)
- 2.5 Office | IT | Ent. Networks

## AN Design – Applying AI for Networks >> Get Design Specifications

### Agentic AI Workflow

LLM Model

AI Agents

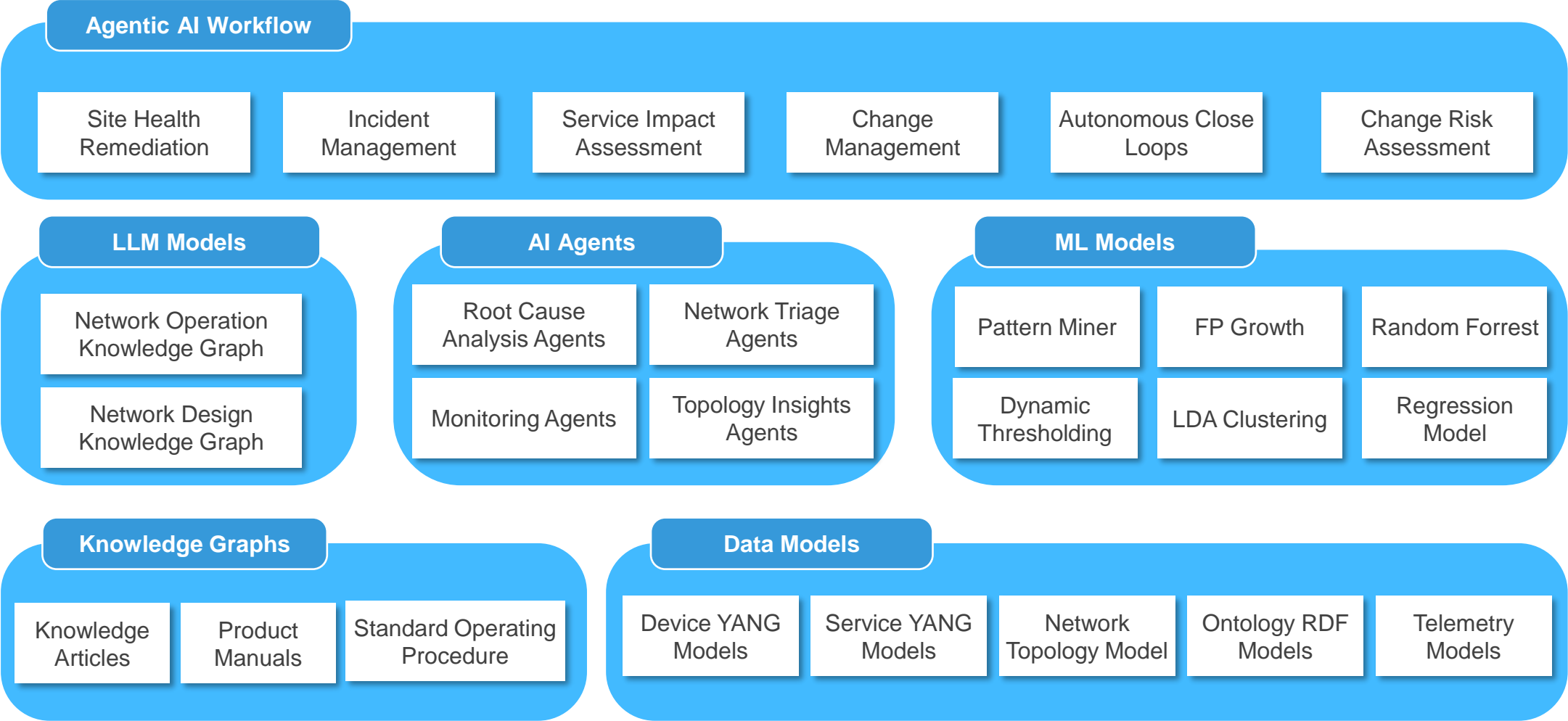
ML Models

Knowledge

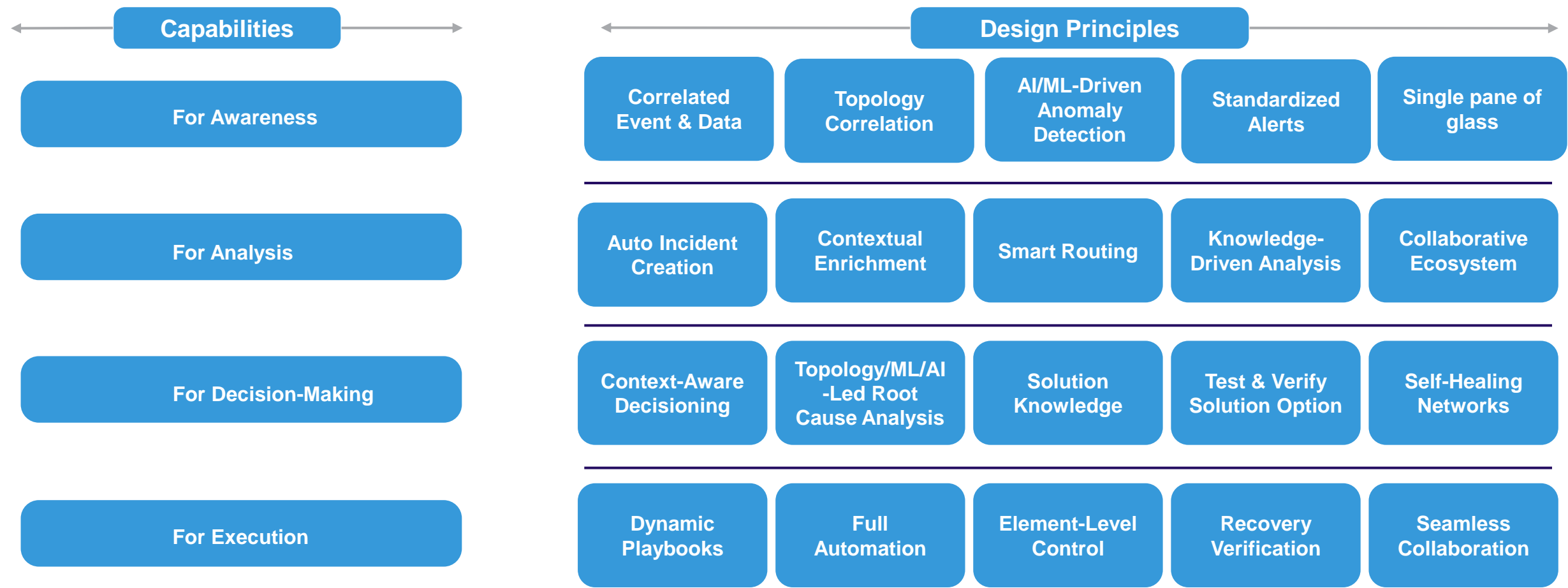
Operational Process

Data Model & Products

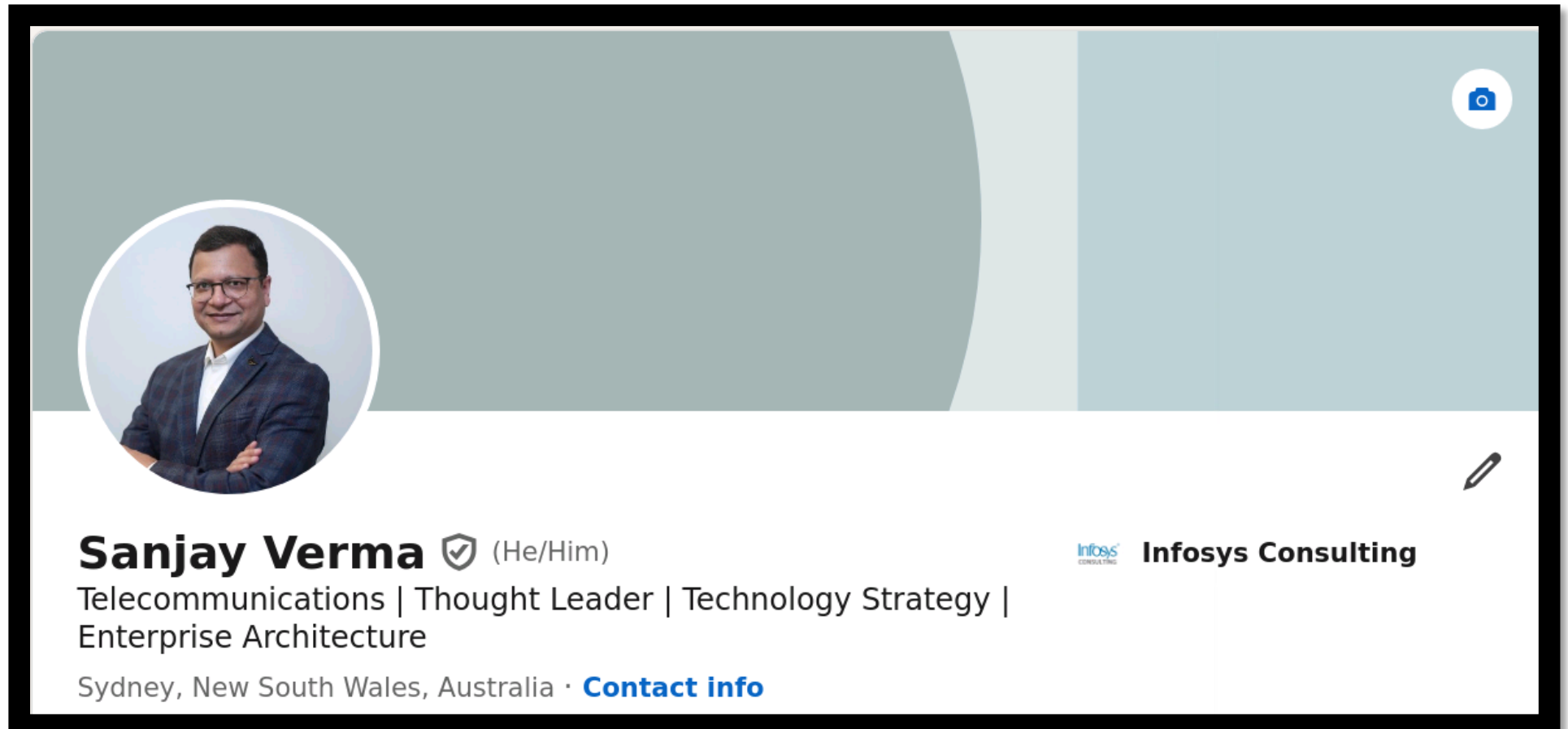
# Building Block for AI Driven Network Operation Automation



# Emerging Design Principles for AI Driven Autonomous Network



# Let's connect, collaborate and create...



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# THANK YOU



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