WHITEPAPER

THE COMPLEXITY TAX

Why telecom's most sophisticated operators still run critical processes by hand — and what it costs the P&L.

codaxy

In collaboration with
Cambridge Management Consulting

THE COMPLEXITY TAX

The telecommunication industry has continued to invest heavily into digitisation, OSS/BSS modernisation, automation, and, increasingly, Artificial Intelligence (AI).

Yet, across many operators, some of the most commercially important processes, such as invoicing, remain fragmented, manual, and dependent on people bridging the gap between systems.

The question, '**Why does the invoice amount not reflect the order amount?**', might seem like a simple one, albeit an important one, but it often leads to a more complex inquiry: **how much time, cost, and investigation does it take to find out why, and then to rectify it?**

Between emails, meetings, and spreadsheets shared from the Sales team to Service Delivery and Finance, the problem is ultimately resolved, but all with the time and expense associated with a manual solution.

This reduces the experts in the telecommunications industry to middleware: reconciling data, moving information between systems, interpreting requirements, correcting orders, validating inventory, and compensating for processes that do not work end-to-end.

This is the **'Complexity Tax'**, and can be identified from common symptoms:

- Higher OPEX
- Slower customer response
- Costly rework
- Delayed revenue
- Revenue leakage
- Longer order-to-activation cycles
- Employees spending their time administering complexity rather than creating value

TM Forum identifies manual complex-enterprise quoting as a source of slow responses, lost opportunities, configuration problems, costly rework, and revenue leakage. [1]

Similarly, McKinsey reports that network complexity continues to increase while telecom operators face long-term structural pressure on network economics; its analysis suggests AI-driven operational use cases could contribute to reductions of 15-30% in total network OPEX where the technology is combined with genuine process and operating-model redesign.[2]

Demonstrating this, TM Forum also cites Telstra achieving a 20% OPEX reduction and 30% faster time-to-market in a 5G network-slicing example.[3]

The opportunity, therefore, is considerably larger than just introducing more automation. It is about removing complexity from the path between customer intent and revenue, and ergo reducing the cost of complexity.

[1] TM Forum, The big deal - Phase II (Catalyst project C26.0.967) https://www.tmforum.org/catalysts/projects/C26.0.967/the-big-deal-phase-iii

[2] Gustav Grundin, Sebastian Cubela, and Tomás Lajous, "Issue Brief: AI-driven Telecom Networks", McKinsey & Company, 2026 https://www.mckinsey.com/issue-brief-ai-driven-telecom-networks/

[3] Dawn Bushaus and Richard Webb, "How Telcos Worldwide Are Implementing AN", TM Forum, 2026 https://inform.tmforum.org/features-and-opinion/how-telcos-worldwide-are-implementing-an

AUTOMATION OVER SIMPLIFICATION

Telecommunication is one of the world's most technologically sophisticated industries. It is also one of the most operationally complex.

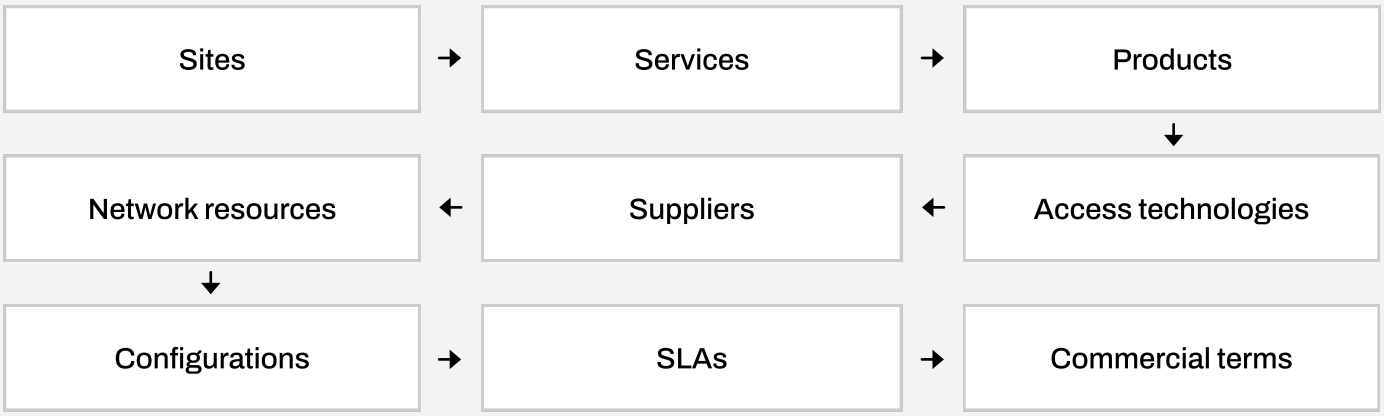
Decades of network evolution, product expansion, acquisitions, regulatory change, and technology transformation have created environments that contain some combination of:

- Multiple OSS and BSS platforms
- Legacy applications
- Overlapping product catalogues
- Fragmented network inventories
- Multiple CRM and commercial systems
- Bespoke integrations
- Inconsistent service models
- Disconnected datasets
- Spreadsheets and manual processes
- Substantial amounts of specialist institutional knowledge

While individual systems may function effectively, problems may arise when they need to work together. As such, the issue is not necessarily the technology, but the way the technology is interconnected, and the data, processes, and organisations that use them. This complexity comes with a cost.

COMPLEX ENTERPRISE QUOTING: WHY THE BIGGEST DEALS COST THE MOST TO WIN

The problem frequently occurs before an order is even made; a complex enterprise opportunity can contain many requirements, all of which have to pass through a chain of hands. These requirements exist across:



TM Forum's work on complex B2B telecom quoting identifies a continuing dependence on manual processes, which can decelerate and complicate this process due to slow responses, lost opportunities, configurations that cannot be properly validated, manual rework, and revenue leakage.[4] The result is an uncomfortable commercial reality: that the larger and more valuable the enterprise opportunity becomes, the more difficult, expensive, and time-consuming it can be to sell.

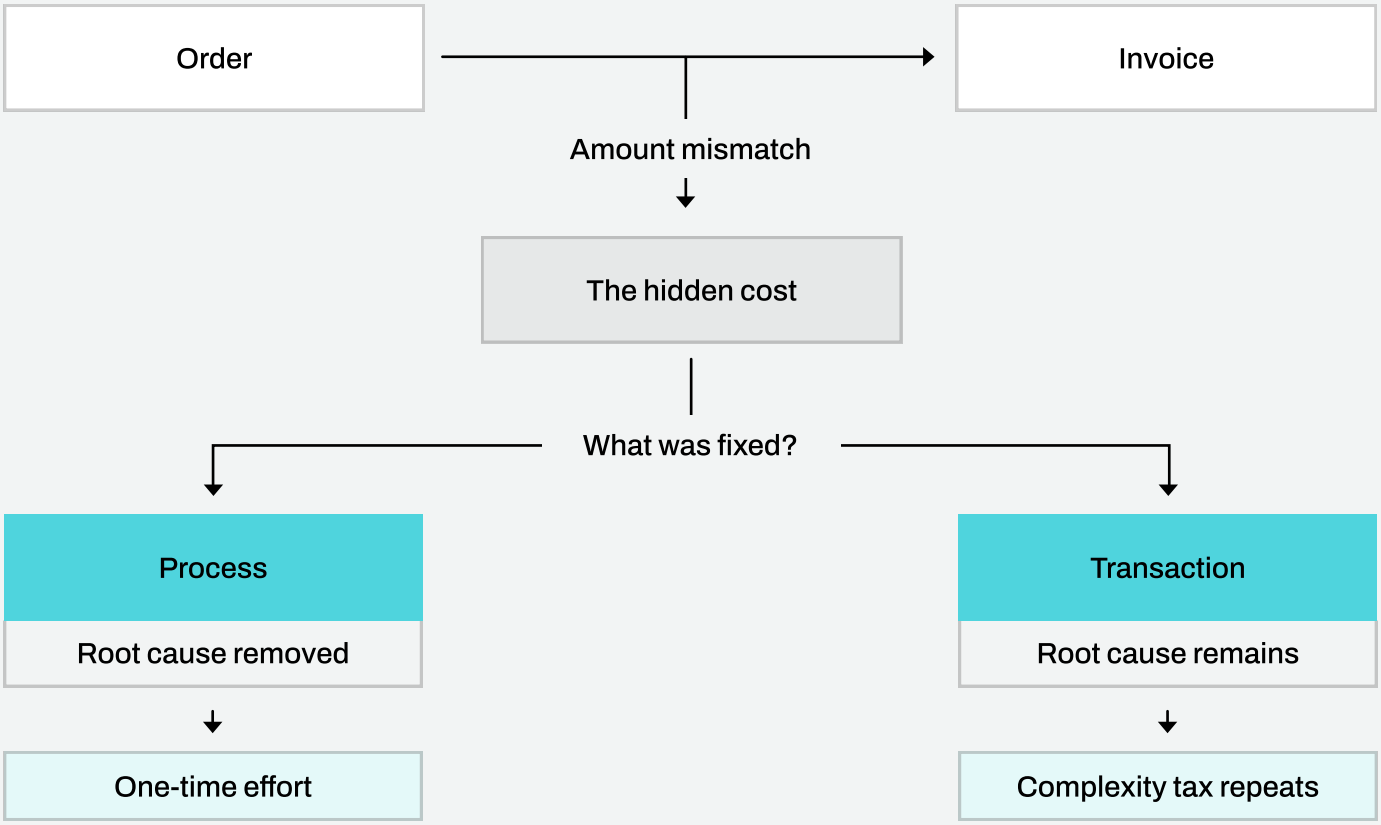
The impact of this is not purely administrative. Slow quotation affects competitive win rates, incorrect configu- ration affects margin, manual rework increases the cost of sale, and poor handoffs create fulfilment problems. Errors created during quoting travel downstream into ordering, provisioning, and eventually billing, at which point a commercial inefficiency has become an operational one, and, ultimately, a financial one.

[4] TM Forum, The big deal - Phase II (Catalyst project C26.0.967) https://www.tmforum.org/catalysts/projects/C26.0.967/the-big-deal-phase-iii

FOLLOW THE ORDER, THEN FOLLOW THE MONEY

When an invoice amount does not immediately reflect the order amount, the plausible explanations are numerous. For example, the product configuration may have changed, an agreed charge may not have transferred correctly, or a discount may have been interpreted differently. However, all of this only accounts for the visible cost.

What comes next is the hidden cost, formed of the manual efforts to retrace the discrepancy and resolve it. But what has actually been fixed in this instance? If the underlying process has been corrected, then this hidden cost has been worthwhile. However, if an employee has simply corrected this one transaction, the root cause remains and the organisation will pay the complexity tax again. Across thousands or millions of products, services, assets, orders, and invoices, isolated discrepancies become an operating problem.



YOUR PEOPLE ARE YOUR MOST EXPENSIVE AUTOMATION TOOL

This exposes one of the least discussed characteristics of complex telecom environments: **members of staff are often the most expensive automation tool an operator owns.**

WHERE PEOPLE FILL THE GAPS

- When systems do not communicate, people transfer information
- When data does not reconcile, people reconcile it
- When inventory cannot be trusted, people validate it
- When an order fails, people investigate it
- When a customer asks for an update, people search multiple systems
- When billing does not match the order, people work backwards through the process
- When a workflow breaks, experienced employees know the workaround

THE REAL COST OF COMPLEXITY

People have effectively become the integration layer between systems. Operators invest heavily in sophisticated technology, yet some of their most experienced and expensive employees spend substantial time compensating for the weaknesses between those technology platforms.

Those employees are not the problem; their knowledge and commitment are frequently the reason the operating model continues to function at all. But they should be creating value, not compensating for complexity.

THE CFO'S CHALLENGE: COMPLEXITY HAS A P&L

The complexity tax eventually reaches the financial statements.

- Every unnecessary intervention creates cost
- Every delayed quotation increases pursuit cost
- Every incorrect configuration generates rework
- Every order correction consumes margin
- Every delayed activation postpones revenue
- Every service delivered but not billed correctly creates leakage
- Every unnecessary truck roll or engineering intervention adds OPEX

And every transformation programme that introduces another technology layer without addressing the underlying process can increase complexity rather than reduce it. McKinsey describes telecom network economic as facing long-term structural pressure while network complexity continues to rise.

Its research[5] suggests AI-enabled network operations could contribute to:

Reduction in total network OPEX	Lower greenfield rollout CAPEX	Lower network upgrade CAPEX
15-30%	**10-20%**	**15-35%**

[5] Gustav Grundin, Sebastian Cubela, and Tomás Lajous, "Issue Brief: AI-driven Telecom Networks", McKinsey & Company, 2026 https://www.mckinsey.com/issue-brief-ai-driven-telecom-networks/

These figures should not be read as guaranteed savings from deploying AI. They point to something more strategically important: substantial economic value is trapped inside operational complexity.

The CFO's opportunity therefore extends beyond cost reduction to margin protection, reduced revenue leakage, faster time-to-revenue, working capital improvement, better capital allocation, lower cost-to-serve, and higher operational leverage.

The financial question becomes how much operating cost is being spent on managing complexity.

THE COO'S CHALLENGE: PAYING FOR WORK THAT SHOULD NOT EXIST

For the COO, complexity shows up across thousands of small operational activities. People investigate, reconcile, validate, escalate, coordinate, and correct.

Individually, the tasks look insignificant. Collectively, they can consume substantial operational capacity. Consider measuring the hours spent:

- Reconciling systems
- Validating orders
- Correcting configuration errors
- Investigating billing discrepancies
- Locating information
- Manually transferring data
- Managing avoidable exceptions
- Correcting previously completed work
- Maintaining legacy workaround

Most operators know their headcount, but not necessarily how much of that headcount is consumed compensating for complexity. That question reframes the objective of operational transformation.

The purpose of automation is to release scarce human capability for the work where judgement, customer understanding, engineering expertise, and creativity actually create value.

THE CIO'S CHALLENGE: AUTOMATING A BROKEN PROCESS ONLY MAKES IT FASTER

The telecom industry is understandably enthusiastic about AI, but AI does not compensate for poor underlying architecture. Automating a fragmented process does not necessarily simplify it. Connecting an AI agent to inconsistent datasets does not make those datasets accurate, adding another technology platform does not automatically eliminate legacy complexity, and automating a broken workflow can simply allow the organisation to make mistakes faster.

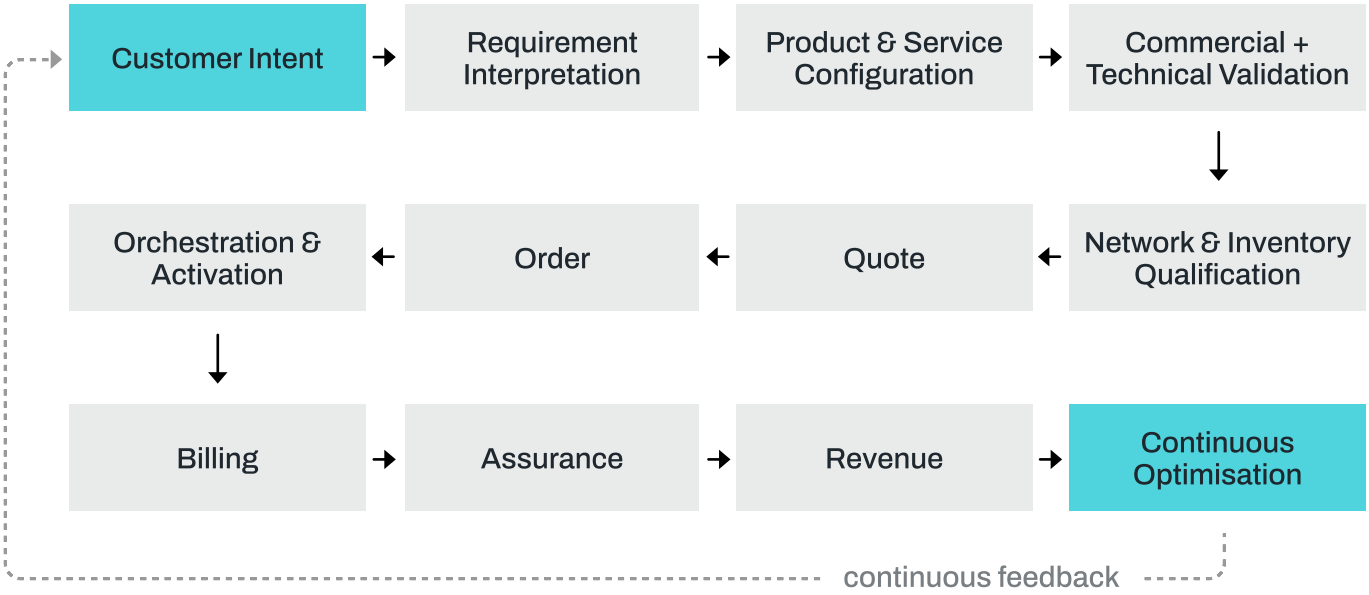
McKinsey's research makes an important distinction:

> **Significant benefit requires operators to redesign processes, workflows, roles, and governance rather than simply layering AI onto existing operations.[6] Without trusted data, interoperability, and consistent service models, AI risks becoming another silo.**

[6] Gustav Grundin, Sebastian Cubela, and Tomás Lajous, "Issue Brief: AI-driven Telecom Networks", McKinsey & Company, 2026
https://www.mckinsey.com/issue-brief-ai-driven-telecom-networks/

MAKING WHAT WAS SOLD, DELIVERED, AND INVOICED AGREE

A different model is emerging. The objective is not simply to automate individual tasks; it is to create an increasingly connected digital thread across the lifecycle:



CONTINUITY ACROSS EVERY STAGE

At each stage, information should become progressively richer rather than repeatedly recreated. Commercial intent should survive the transition into technical design, technical design should survive the transition into fulfilment, fulfilment should inform billing accurately, and billing should reflect the commercial agreement.

The ambition is therefore deceptively simple: what was sold, what was ordered, what was delivered, and what was invoiced should agree. Where they do not, intelligent processes should surface the exception before the customer or finance team discovers it.

FROM PEOPLE FINDING PROBLEMS TO PROBLEMS FINDING PEOPLE

This represents an important shift in operating philosophy, and it can be summarised as a series of moves:

FROM		TO
People finding information	→	Information finding the right people
People reconciling systems	→	Systems reconciling automatically
People searching for exceptions	→	Exceptions surfaced proactively
People discovering that an invoice does not match an order	→	The discrepancy prevented before the invoice is generated
People manually coordinating workflows	→	Intelligent orchestration across workflows
People compensating for complexity	→	People creating value

THE TELSTRA EVIDENCE: WHAT THE NUMBERS ACTUALLY SHOW

TM Forum reports that Telstra achieved a 20% OPEX reduction and 30% faster time-to-market in a cited 5G network-slicing example.[7] A separate TM Forum case study describes Telstra's development of a network-service automation approach using a Knowledge Plane, intended to capture the relationships and dependencies that historically relied upon specialist engineering knowledge.[8]

TM Forum reports that the initiative:

- ✓ Reduced processing time by 30%
- ✓ Increased order-processing capacity
- ✓ Improved NPS
- ✓ Reduced service creation and onboarding from 12-18 months to three months[9]

[7] Dawn Bushaus and Richard Webb, "How Telcos Worldwide Are Implementing AN", TM Forum, 2026 https://inform.tmforum.org/features-and-opinion/how-telcos-worldwide-are-implementing-an

[8] TM Forum, "Telstra revolutionizes network service automation with 'Knowledge Plane' innovation", 2024 inform.tmforum.org/research-and-analysis/case-studies/telstra-revolutionizes-network-service-automation-with-knowledge-plane-innovation

[9] TM Forum, "Telstra revolutionizes network service automation with 'Knowledge Plane' innovation", 2024 inform.tmforum.org/research-and-analysis/case-studies/telstra-revolutionizes-network-service-automation-with-knowledge-plane-innovation

AI IS AN ACCELERATOR, NOT THE STARTING POINT

The industry conversation is increasingly dominated by AI, but successful transformation should begin with the business outcome. A practical maturity path runs as follows:

1. **DIGITISE**: Remove unnecessary paper, spreadsheets, and unstructured information.
2. **CONNECT**: Bring together the systems and data required to execute the process.
3. **UNDERSTAND**: Create consistent representations of customers, products, services, resources, and dependencies.
4. **AUTOMATE**: Remove repetitive activities and manual handoffs.
5. **ORCHESTRATE**: Coordinate decisions and actions across commercial, operational, and network domains.
6. **OPTIMISE**: Use AI and increasingly autonomous decision-making to improve outcomes continually.

Trying to begin at stage six while ignoring the five that precede it is one reason AI programmes can struggle to move beyond pilots.

THE COMPLEXITY TAX: TWELVE QUESTIONS FOR YOUR LEADERSHIP

The opportunity can be exposed through a relatively simple exercise. Ask the leadership team the following questions.

THE COST

01. How frequently does the invoice not match the underlying order?
02. How much revenue is potentially being lost as a result?
03. How much does it cost us to determine why?

THE EFFORT

04. How many employees touch the process?
05. How much of their time is spent finding, validating, transferring, or reconciling information?
06. How frequently is work repeated because information is incorrect or incomplete?

THE FRAGMENTATION

07. How many systems must be accessed to establish a single version of the truth?
08. How accurately does inventory represent what is actually deployed?
09. How much customer effort is created by our internal complexity?

THE RISK

10. Which critical processes depend upon knowledge held by a small number of experienced people?
11. Are we automating genuinely redesigned processes, or simply adding AI to existing complexity?
12. If we removed that complexity, what would it be worth?

YOU DO NOT NEED ANOTHER MULTI-YEAR REPLACEMENT PROGRAMME

Solving this problem does not necessarily require another multi-year OSS/BSS replacement programme. A more pragmatic approach is to identify where complexity is destroying the greatest value, and to work outwards from there.

1

FIND THE PROBLEM:

Identify a process with measurable financial or operational consequences.

2

ESTABLISH THE BASELINE:

Quantify time, cost, manual interventions, errors, leakage, and customer impact.

3

CONNECT THE NECESSARY DATA:

Create sufficient visibility across the relevant systems and processes.

4

AUTOMATE INTELLIGENTLY:

Remove repetitive intervention and unnecessary handoffs.

5

MEASURE THE OUTCOME:

Demonstrate financial and operational value.

6

SCALE:

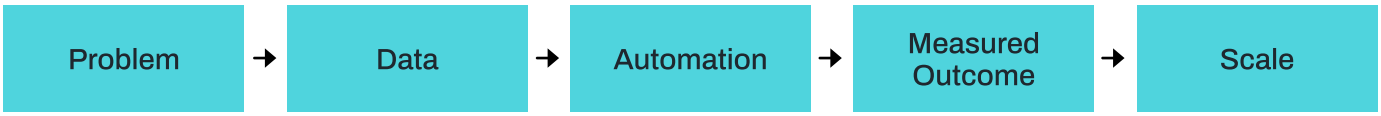
Extend the capability into adjacent processes.

This changes the transformation model from:

FROM



TO



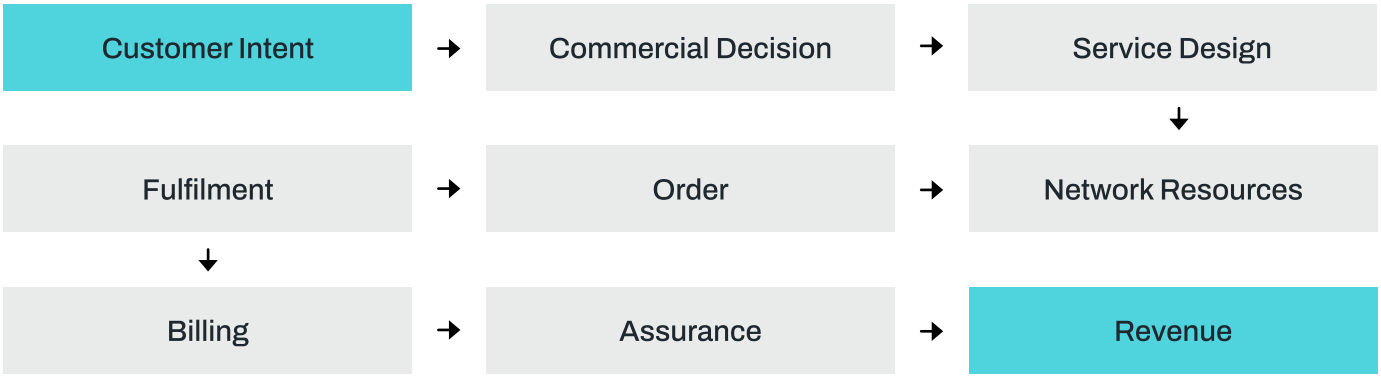
That reduces transformation risk and allows executive confidence to be built through evidence.

THE CODAXY PERSPECTIVE: CONNECT WHAT EXISTS RATHER THAN REPLACE IT

Codaxy's approach starts with a straightforward principle: **do not solve complexity by adding another layer of complexity.**

The objective is to establish the connective intelligence that enables existing commercial, operational, OSS/BSS, and network environments to work together more effectively.

Rather than assuming wholesale replacement of the technology estate, the opportunity is to connect and orchestrate the information and processes that already exist, progressively linking:



The purpose is to create the visibility required to answer fundamental questions quickly:

- Can we deliver what we are quoting?
- Does the order reflect what was sold?
- Does the network reflect what was ordered?
- Does the invoice reflect what was delivered?
- Are we billing for everything we provide?
- Where are our people compensating for gaps between systems?
- What is that complexity costing us?

> These are not primarily technology questions, they are **business performance questions.**

AUTOMATION IS NOT A HEADCOUNT CONVERSATION

For years, automation has been associated with reducing headcount. That framing is too narrow. The more powerful opportunity is removing unnecessary work, because your people are already your most expensive automation tool.

If skilled employees are routinely transferring information, reconciling data, validating configurations, correcting orders, and investigating billing discrepancies, the organisation has already automated the process – **it has simply done so using humans.**

The opportunity is not to remove those people. It is to remove the unnecessary work consuming their capacity, releasing them to focus on customers, innovation, engineering, commercial decision-making, and growth.

CONCLUSION: THE WINNERS WILL NOT BE THOSE WITH THE MOST AI

Telecom networks will continue to become more sophisticated. Customer expectations will continue to increase. Margin pressure is unlikely to disappear, and AI will become increasingly pervasive.

The operators that succeed will not necessarily be those deploying the greatest number of AI tools. They will be those that first establish the data, process, and orchestration foundations that allow automation and AI to operate across the enterprise. An operator that can respond to a complex customer requirement faster has a sales advantage. One that can translate an order into service without repeated human intervention has an operational advantage.

One that can ensure invoices accurately reflect contracted and delivered services has a financial advantage, and one that releases skilled employees from repetitive reconciliation has a productivity advatage. An operator capable of connecting commercial intent directly with network execution has a potentially significant competitive advantage.

ABOUT CODAXY

Founded in 2010, Codaxy builds products that remove the complexity between technology, people and processes.

We connect existing systems, data and processes, automating the work that happens between them. That means less manual work, fewer errors, and lower operating costs, without replacing the technology already in place.

One of our core products, CxOrchestrator, connects commercial, operational and network systems for telecom operators, automating and speeding up the processes that sit between order, network and billing. Built on TM Forum Open APIs, it fits into existing OSS/BSS environments rather than replacing them.

No rip and replace. Just simpler, more connected operations, with a foundation for intelligent automation and AI.

CxOrchestrator

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