

WHITEPAPER

AI-DRIVEN LEGACY MODERNIZATION

A controlled, auditable, and scalable approach to transforming
business-critical systems

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WHO THIS IS FOR:

- CIOs and CTOs evaluating modernization strategies
- Engineering leaders managing legacy systems
- Product owners planning digital transformation
- Business stakeholders seeking ROI clarity

EXECUTIVE SUMMARY

Many organizations depend on legacy systems that continue to run core business operations reliably. These systems, often built on technologies such as COBOL and Delta COBOL, Progress/ABL, C++, SAS (Statistical Analysis System), Assembler, PowerBuilder, Delphi, Perl, ABAP, FoxPro, or early-generation frameworks, are stable, but increasingly difficult to evolve.

The challenge today is no longer whether modernization is required, but how to modernize without disrupting the business, increasing operational risk or committing to long, uncertain transformation programs.

At Qubiz, we approach legacy modernization as a controlled engineering pipeline, supported by AI but governed by deterministic rules, strong validation, and business involvement. This enables organizations to modernize incrementally, safely, and with full auditability—starting with a pilot and scaling only once outcomes are validated.

EXECUTIVE OUTCOME: BUSINESS VALUE FIRST

Modernization Without Fear

Organizations rarely avoid modernization because of technology.
They avoid it because the **risk of breaking core business behavior is unacceptable**.
For executives and boards, the desired outcome is clear:

- Business-critical systems continue to behave exactly as they do today.

- Regulatory and audit confidence increases, not decreases.

- Change becomes predictable, incremental, and reversible.

- Modern platforms are adopted without a “big-bang” rewrite.

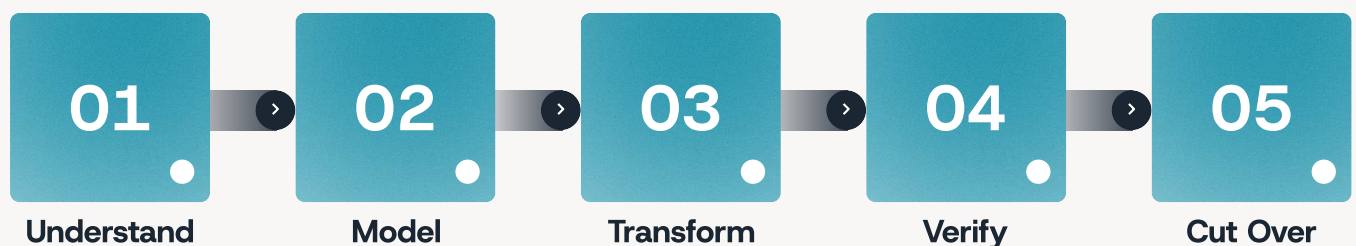
- Modernization is approved as a controlled investment, not a gamble.

Qubiz enables organizations to modernize legacy systems without losing business meaning, and to prove it at every step.

This shifts modernization from a one-time transformation initiative into a repeatable, governed capability that can be applied safely across systems.

OUR DESIGN PRINCIPLE: MODERNIZATION AS A PIPELINE

Qubiz treats migration, optimization and refactoring as a structured delivery pipeline:



Legacy modernization should not be a one-time project. It should be a repeatable, governed pipeline that can be applied incrementally across an organization's systems.

TARGET OUTCOMES WE OPTIMIZE FOR:

Behavioral equivalence

The modernized system must behave identically to the legacy system for all critical workflows

Incremental delivery

Modernization must happen in small, verifiable increments with measurable progress.

Auditability and traceability

Every business rule and workflow must be traced back to its legacy source.

Operational safety

The business must be protected from disruption through continuous validation

STEP 1: UNDERSTAND AUTOMATED SYSTEM ANALYSIS

Before writing any specifications, we use AI to analyze the legacy codebase, runtime behavior, and data flows. This produces a structured understanding of what the system actually does.

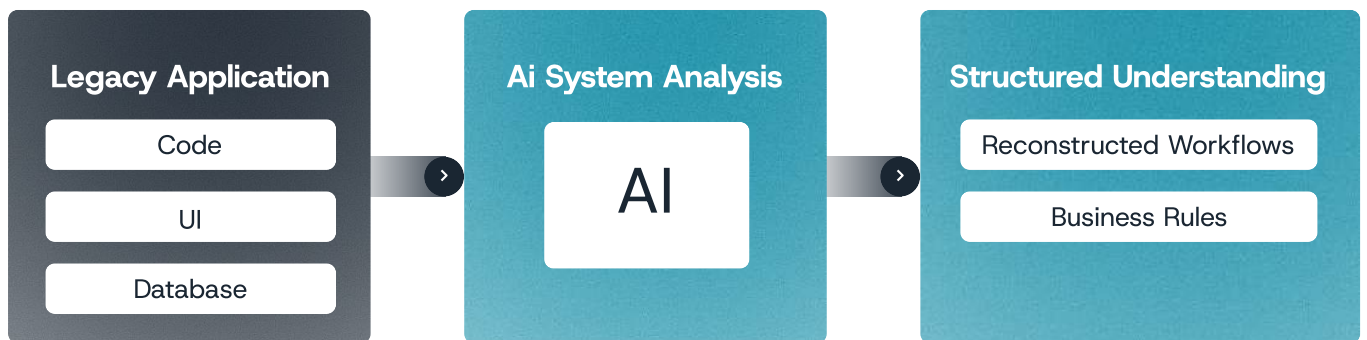


FIGURE 1 – FROM LEGACY TO STRUCTURED UNDERSTANDING

WHAT WE EXTRACT:

- Business workflows and rules embedded in code
- Data models and schemas
- Dependencies and integration points
- UI flows and user interaction patterns

EXECUTIVE VALUE:

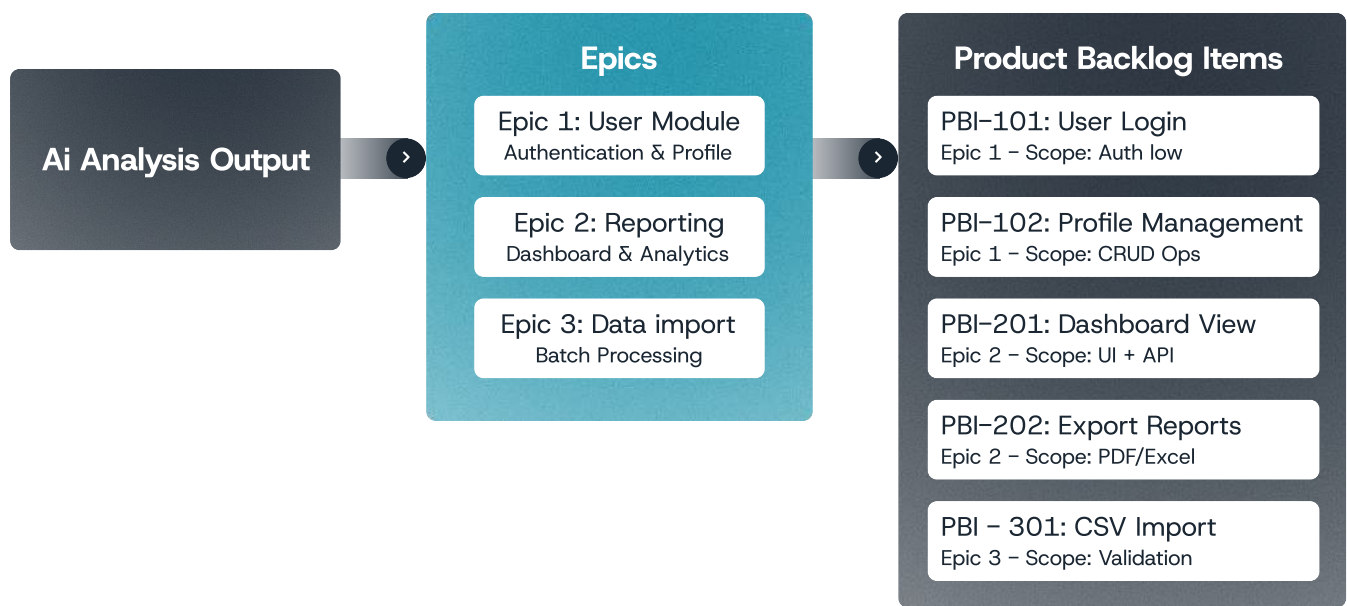
No need for scarce legacy experts. The system itself becomes the source of truth.

STEP 2: MODEL

BUSINESS-VALIDATED REQUIREMENTS

AI-generated insights are transformed into a structured product backlog. Business stakeholders validate and prioritize the scope.

Business-Validated Scope and Traceability



Every requirement traced from legacy to modern implementation

FIGURE 2 – BUSINESS-VALIDATED SCOPE WITH FULL TRACEABILITY

WHAT WE EXTRACT:

- Epics organized by business capability
- Full traceability to legacy source code
- Product Backlog Items (PBIs) with acceptance criteria
- Effort estimates for planning

WHY THIS MATTERS:

Stakeholders can see exactly what will be built, in what order, and why—before development begins.

THE QUBIZ MODERNIZATION PIPELINE

STEP 3: TRANSFORM

AI PROPOSES. DETERMINISTIC VALIDATORS DECIDE.

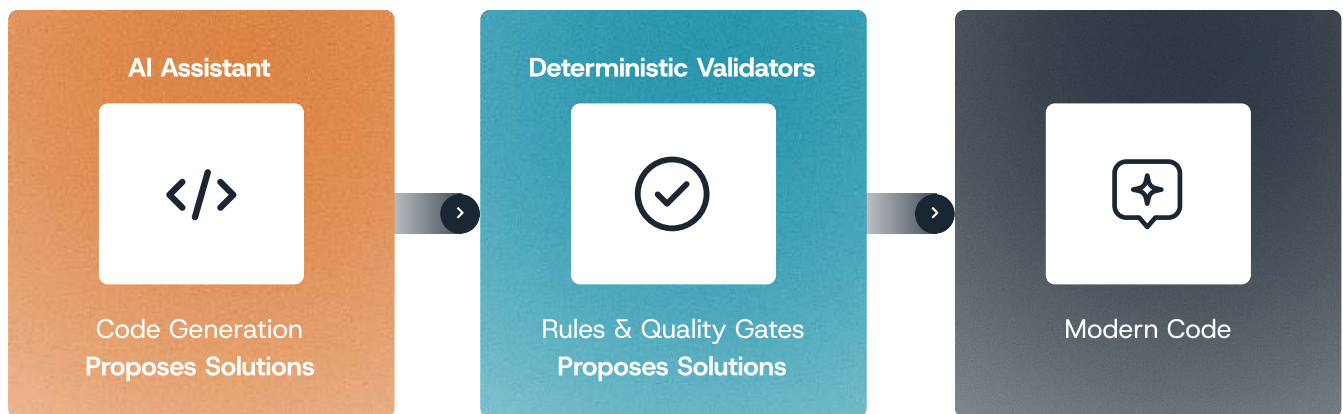


FIGURE 3 — THE TRANSFORM PROCESS: AI + DETERMINISTIC VALIDATION

Code Generation

- ✓ AI-assisted code generation
- ✓ Pattern-based transformations
- ✓ Enterprise standards alignment

Human Ownership

- AI-assisted code generation
- Pattern-based transformations
- Enterprise standards alignment

RESULT:

Reliable, repeatable production of modern, maintainable code that meets enterprise quality standards and can be validated at every step.

STEP 4: VERIFY

Verification is a first-class concern, especially for regulated industries. Our approach provides proof, not assumptions, that modernized systems behave correctly.

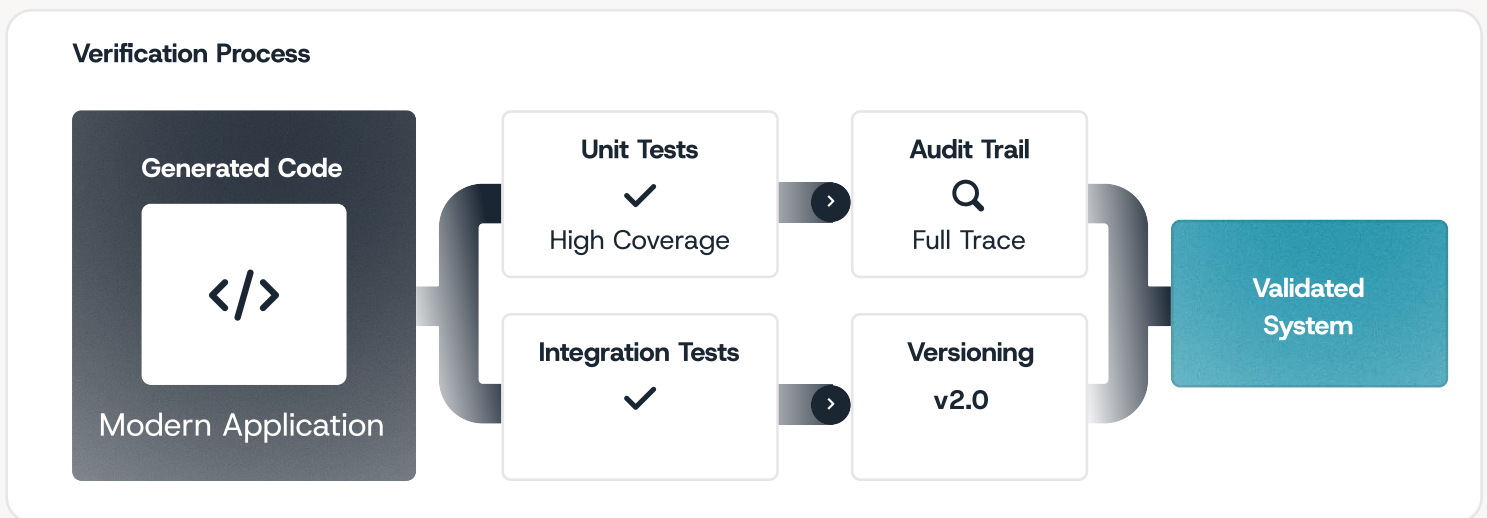


FIGURE 4 — COMPREHENSIVE VERIFICATION PROCESS

Every line of generated code is validated through automated testing and full audit trails, ensuring compliance and behavioral correctness.

Testing Coverage

- ✓ Unit tests with high coverage
- ✓ Integration testing
- ✓ Regression test suites
- ✓ End-to-end validation

Full Audit Trails

- ✓ Legacy behavior traced
- ✓ Requirements linked
- ✓ Code changes documented
- ✓ Test results validated

Version Control

- ✓ Tagged releases
- ✓ Change tracking
- ✓ Git integration

Compliance Ready

- ✓ SOX compliance
- ✓ Regulatory audits
- ✓ Quality assurance

STEP 5: CUT OVER

Modernization executes incrementally with full safety controls, ensuring operational continuity throughout the transition. No big bang deployments—just controlled, reversible steps.

Safe Incremental Cut Over

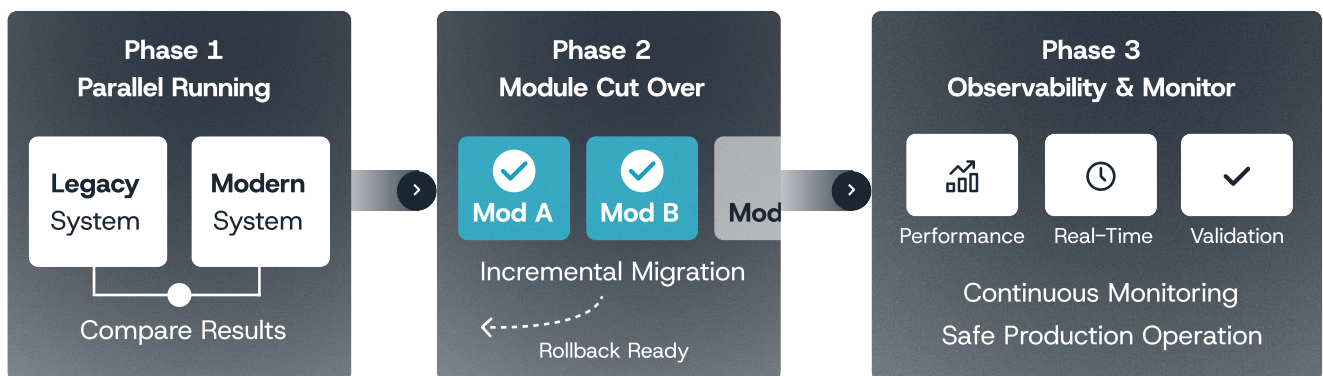


FIGURE 5 — SAFE INCREMENTAL CUT OVER PROCESS

THREE-PHASE TRANSITION STRATEGY

- 1 Parallel Running** Both legacy and modern systems run side-by-side. Results are compared to ensure behavioral equivalence before switching traffic
- 2 Module-by-Module Cut Over** Each module transitions independently. Rollback capability remains available at every step, minimizing risk exposure.
- 3 Full Observability & Monitoring** Real-time performance monitoring, error tracking and behavioral validation ensure the modernized system operates correctly in production.

WHY THIS MATTERS:

Operational continuity is maintained throughout modernization. Business operations never stop and teams can roll back if needed, ensuring zero-risk transitions.

CONTINUOUS VALIDATION & AUDITABILITY

Throughout the modernization pipeline, automated validation ensures behavioral equivalence. Every change is traceable back to the legacy system.

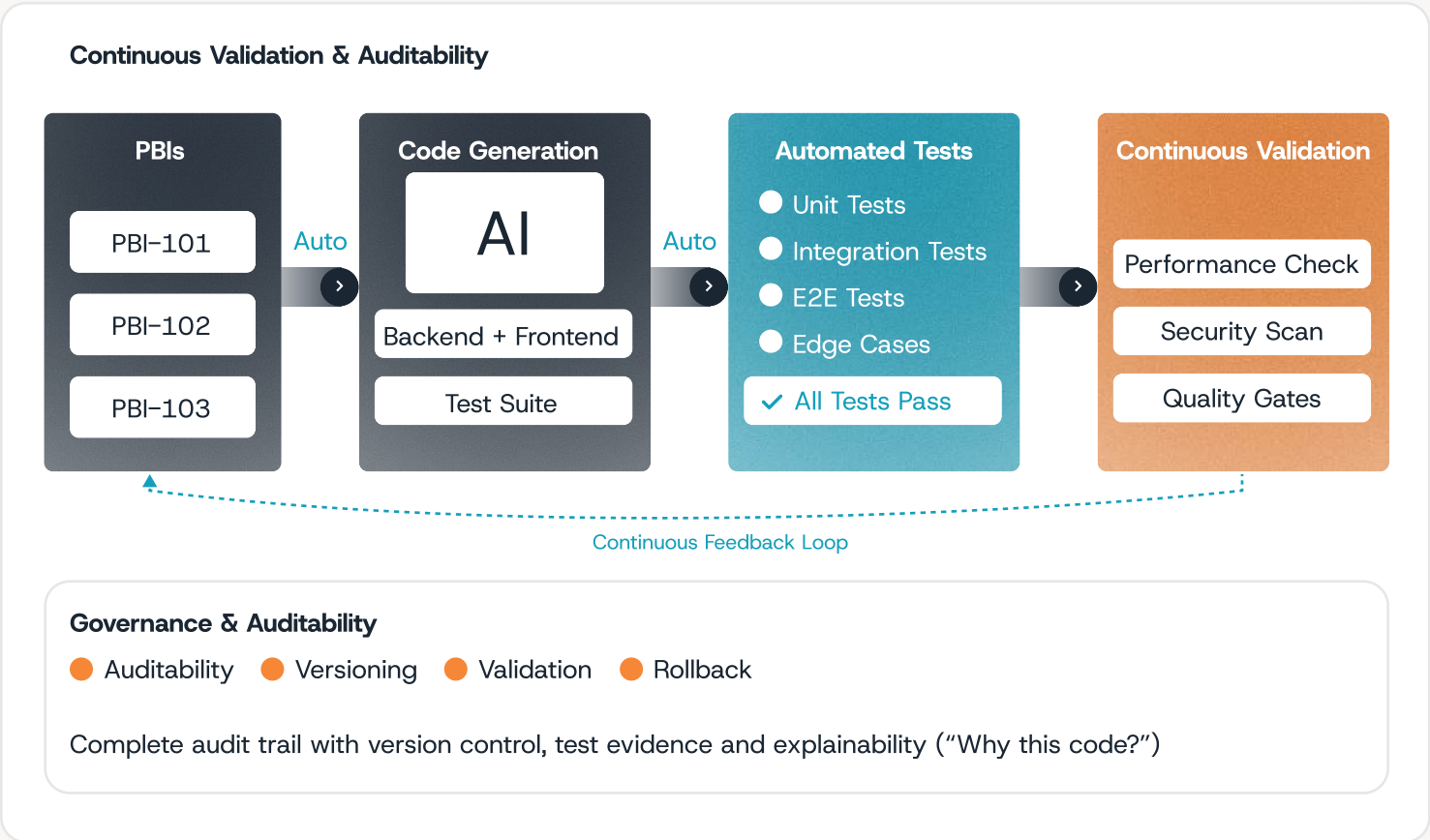


FIGURE 6 — AUTOMATED DELIVERY PIPELINE WITH CONTINUOUS VALIDATION

Continuous Validation

Automated tests verify that every sprint delivers functionality that matches legacy behavior.

Governance & Auditability

Full traceability from legacy code to modern implementation, meeting regulatory and compliance requirements.

FOR EXECUTIVES:

Continuous validation reduces operational risk and ensures compliance throughout the modernization lifecycle.

IS THIS ACHIEVABLE?

CREDIBILITY & REALISM

Modernization Without Fear

This approach does **not** assume perfect automation or unchecked AI.
It is built on three practical realities:

1 AI accelerates understanding and transformation, but **does not replace ownership**

2 Business validation happens **before implementation**, not after

3 Proof is generated **continuously**, not retroactively

In practice, this means:

- Legacy behavior is reconstructed from code, not inferred from documentation
- Business stakeholders validate scope before delivery begins
- Every migrated component is tested, traceable, and auditable

FOR EXECUTIVES:

Organizations do not need to believe in the outcome.
They **see evidence first and decide with confidence.**

PILOT FIRST, THEN SCALE

Throughout the modernization pipeline, automated validation ensures behavioral equivalence. Every change is traceable back to the legacy system.

Continuous Validation & Auditability

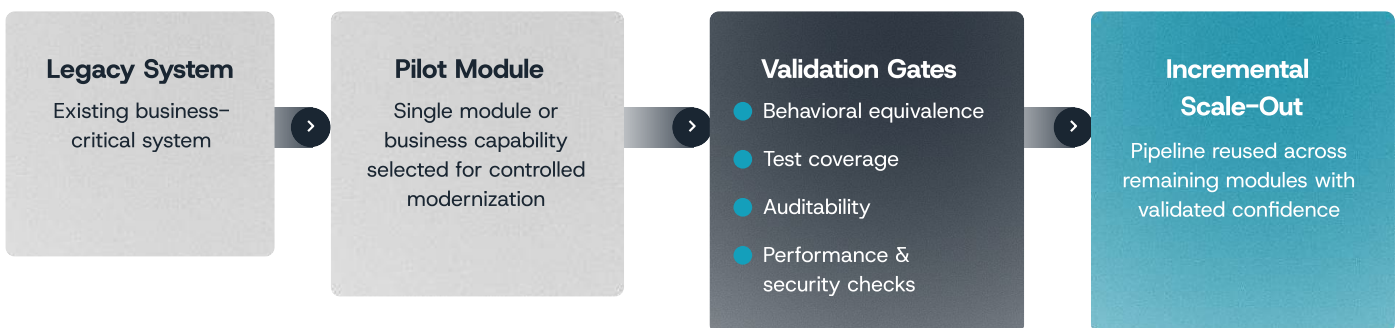


FIGURE 7 — PILOT-FIRST MODERNIZATION APPROACH

Rather than committing to a full system rewrite upfront, organizations begin with a pilot modernization of a single module or business capability. This pilot serves as a controlled validation of the modernization pipeline before any broader rollout.

THE PILOT ALLOWS ORGANIZATIONS TO:

- Validate behavioral equivalence
- Measure delivery speed and quality
- Assess auditability and operational safety
- Build organizational confidence

Once validated, the same pipeline is applied incrementally across the system, reducing risk while accelerating modernization.

PILOT SCOPE & INDICATIVE TIMELINE

WHAT A PILOT TYPICALLY COVERS:

The pilot is designed to validate the approach without committing to full-system modernization.
A typical pilot focuses on:

- One business capability or coherent functional module

- End-to-end behavior (backend, frontend, data access)

- Real workflows and edge cases

- Full validation, traceability, and audit evidence

THE GOAL IS CONFIDENCE, NOT VOLUME.

INDICATIVE PILOT TIMELINE

The timeline below reflects a **governed, audit-ready pilot**, not an experimental prototype.
Actual duration depends on system complexity and organizational context.

PHASE	TYPICAL DURATION	OUTCOME
System Understanding	2–4 weeks	Structured view of actual system behavior
Business Modeling & Validation	2–3 weeks	Approved backlog with traceability
Pilot Transformation	3–6 weeks	Modernized, tested, auditable capability
Decision Point	Immediate	Scale, pause, or stop

Within **6–10 weeks**, organizations can decide, **based on evidence**, how to proceed.

PILOT SCOPE & INDICATIVE TIMELINE

WHAT THE PILOT PROVES

By the end of the pilot, organizations have validated:

- Behavioral equivalence between legacy and modernized functionality
- Effectiveness of automated testing (unit & UI)
- Auditability and traceability of generated artifacts
- Delivery predictability under real governance constraints

This evidence is then used to support a scale decision, not assumptions.

WHAT THE PILOT DOES NOT REQUIRE:

- Full-system scope definition
- Long-term commitment
- Large, dedicated internal teams
- Irreversible architectural decisions

The pilot is intentionally **low-risk and reversible**.

Pilot timelines are indicative and assume equivalent governance, validation and audit requirements.

TRADITIONAL VS AI-DRIVEN MODERNIZATION

TRADITIONAL MODERNIZATION

- ✗ Manual system analysis
- ✗ Manual specification creation
- ✗ Manual development and testing
- ✗ Long feedback cycles
- ✗ High uncertainty and operational risk

AI-DRIVEN MODERNIZATION

- ✓ Automated system understanding
- ✓ Generated backlog and specifications
- ✓ AI-supported implementation
- ✓ Continuous automated testing
- ✓ Faster feedback and lower risk

Traditional approaches rely heavily on manual discovery, documentation, and verification. This creates long feedback cycles, high dependency on scarce legacy skills, and limited confidence in outcomes.

AI-driven modernization introduces automation and validation into every stage of the pipeline, enabling faster feedback, lower risk, and predictable delivery.

Modernization shifts from a high-risk, one-time initiative to a governed, incremental process with measurable outcomes

RELATIVE IMPACT BY PROJECT SIZE

(S / M / L / XL)

The categories below are illustrative complexity buckets, not fixed project definitions. They normalize expectations under equivalent governance, audit, and validation requirements. Absolute timelines and costs depend on system characteristics and regulatory context.

PROJECT SIZE BUCKET (INDICATIVE)

Small Modernization (S)

- Single application or bounded module
- Low to moderate data volumes
- Limited integrations
- Clear functional boundaries

Medium Modernization (M)

- Single application or bounded module
- Moderate data volumes
- Moderate data volumes
- Business-critical scope

Large Modernization (L)

- Multiple interdependent systems
- High data volumes
- Complex workflows and data reconciliation

Extra Large Modernization (XL)

- System landscape with cross-domain dependencies
- Historical data, continuous regulatory oversight
- Very high data volumes

RELATIVE IMPACT BY PROJECT SIZE

(S / M / L / XL)

RELATIVE TIMELINE IMPACT (GOVERNANCE-EQUIVALENT)

Phase	Traditional (Baseline)	AI-Driven Pipeline
System understanding	100%	~40–60% of baseline
Specification & scoping	100%	~50–70% of baseline
Delivery of one business capability	100%	~50–70% of baseline
Testing & validation	Separate, late phase	Built-in and continuous (auto-generated unit & UI tests)

In the AI-driven pipeline, testing and validation are generated alongside code, including unit tests and UI automation tests, and executed continuously as part of delivery.

WHAT CHANGES BY PROJECT SIZE:

Size	Primary Benefit	Dominant Constraint
S	Faster clarity and validation	Governance overhead
M	Predictable delivery cadence	Business validation effort
L	Risk reduction and auditability	Integration and data complexity
XL	Governability at scale	Organizational coordination

These relative impacts are intended to support informed decision-making under equivalent governance, audit, and validation requirements.

BUSINESS IMPACT

ORGANIZATIONS ADOPTING THIS APPROACH TYPICALLY ACHIEVE:

- Faster modernization cycles
- Reduced dependency on scarce legacy skill sets
- Improved delivery predictability
- Higher software quality and test coverage
- Safer evolution of business-critical systems
- Clear visibility for technical, executive, and audit stakeholders

In practice, organizations often see weeks of manual discovery reduced to days, and feature-level changes delivered in days instead of months, while increasing confidence in every release.

AI does not replace engineering judgment, it strengthens it.

By combining AI-assisted transformation with deterministic validation, strong testing, versioning, and active business involvement, Qubiz enables organizations to modernize legacy systems safely, auditable, and at scale.

Modernization becomes a governed, incremental decision, not a leap of faith.

ABOUT QUBIZ

Qubiz is a European technology services company specializing in the delivery and modernization of complex, business-critical software systems. We partner with organizations that depend on software to run core operations and require solutions that are reliable, auditable, and safe to evolve.

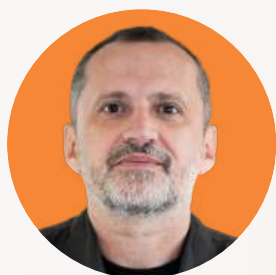
With teams across Romania, the Netherlands, the United Kingdom and Switzerland, we combine deep engineering expertise with strong governance practices. We operate in environments where correctness, traceability, and delivery predictability are essential, supporting both legacy and modern technology stacks while enabling safe, incremental modernization.

Qubiz approaches software delivery as a controlled, outcome-driven process, emphasizing clear scope definition, automated validation, and close collaboration between engineering and business stakeholders. AI and automation are applied in a human-governed manner, strengthening engineering discipline rather than replacing it.

We add the most value where systems are difficult to change, documentation is limited, and modernization must be executed safely, including financial services, logistics, healthcare, and other complex enterprise domains.

Our AI team is a dedicated and growing group of 20–30 specialists, combining software engineering, data, and applied AI expertise. The team focuses on delivering practical, production-ready AI solutions that integrate safely into existing systems, supporting modernization efforts without compromising governance, reliability, or transparency. As demand increases, the team continues to expand to strengthen Qubiz's capability to apply AI where correctness and control matter most.

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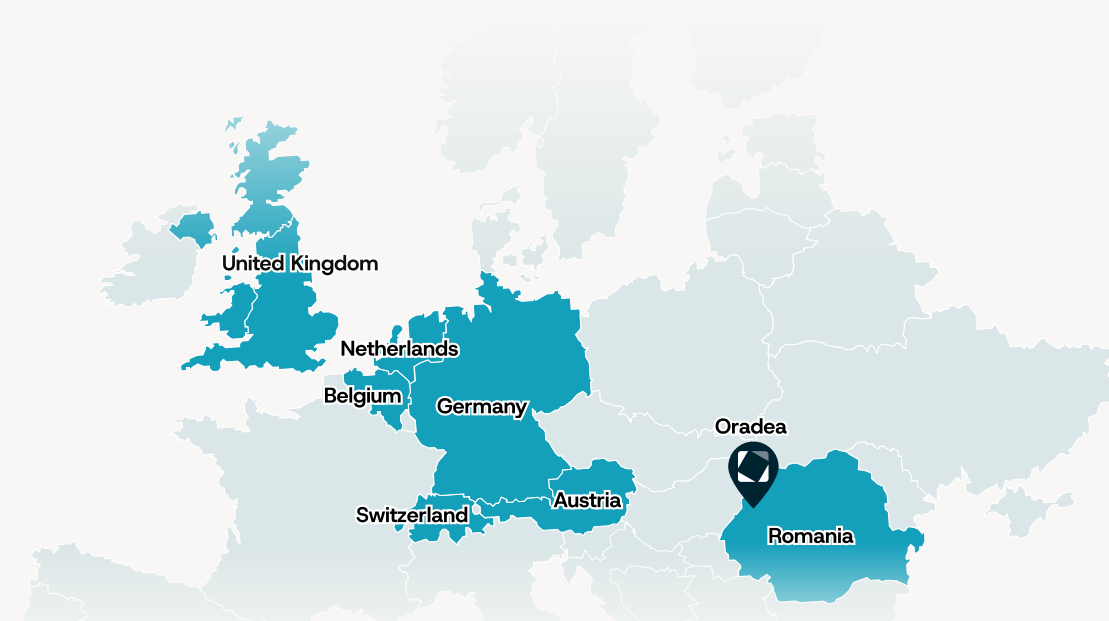


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Version 1.0

January 2026

Public