REES

System Lifecycle Management

A Modern Approach to Legacy Monitoring Systems

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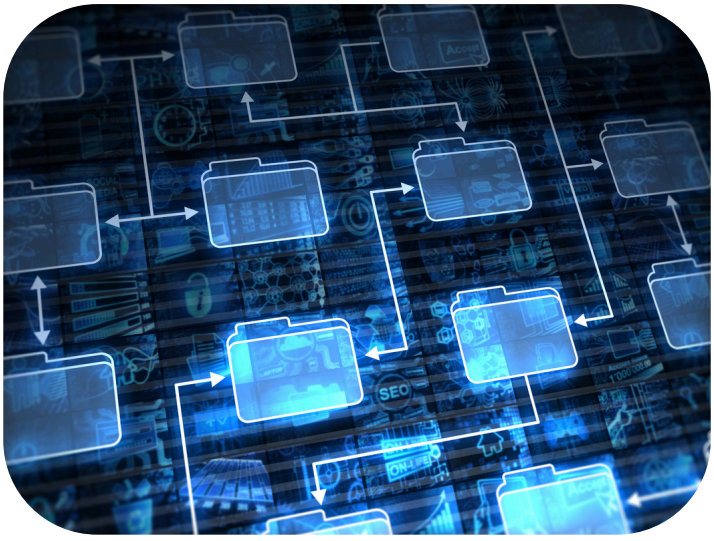
Introduction: The Challenge of Expanding Legacy Systems

As life sciences organizations evolve, their monitoring systems often do not evolve with them. A system initially designed to monitor a handful of freezers or incubators may be gradually expanded over the years, adding points here, transmitters there, without a unified strategy for scalability, redundancy, or futureproofing. The result? A monitoring infrastructure that is functional but is often inefficient, outdated, and increasingly difficult to expand without added complexity, cost, or risk to compliance.

This issue often becomes clear during moments of growth. Many of our long-standing clients have found that when it's time to expand, whether adding equipment, sites, or capabilities, their systems struggle to keep up. What once worked well begins to show its limitations, revealing gaps in scalability, redundancy, and long-term support.



By taking a step back to evaluate the full system architecture and align upgrades with change control processes, life sciences organizations can proactively plan for what's ahead. This approach lets them evolve outdated, piecemeal setups into robust, scalable platforms that uphold compliance, boost efficiency, and enable long-term operational excellence.

It's not about starting over, it's about strategically reworking what's already in place. A strong lifecycle management plan ensures that monitoring systems remain audit-ready, risk-resilient, and scalable, regardless of how the organization evolves. By building in regular performance assessments, clear documentation, and targeted training, teams gain the insight and confidence to integrate new technologies smoothly. This continuous approach helps maintain system reliability, strengthen data integrity, and support measured growth, all while maximizing the value of your existing infrastructure.

Why System Modernization Matters

Modern science requires modern infrastructure. In regulated environments, monitoring systems are not just tools, they are compliance assets, quality gatekeepers, and critical components of business continuity. When these systems fall behind, so does the organization's ability to scale, respond, and innovate. This lag slows progress and heightens the risk of losing critical assets like research samples, blood products, or vaccines due to monitoring gaps or system failures.

Legacy systems often:

- Have out-of-date alarm notifications and call lists
- Depend on outdated or obsolete modules that cannot support new technologies
- Require manual configuration workarounds to accommodate additions
- Have network or power limitations that bottleneck expansion

As new equipment is introduced or additional spaces come online, such as expanded cleanrooms, upgraded freezers, or off-site storage, these weaknesses surface. What should be a straightforward enhancement becomes a logistical and financial burden.

By modernizing these systems with a lifecycle management approach, organizations benefit from:

- Accurate and up-to-date call lists
- Faster implementation of new points and devices
- Reduced risk of downtime or data loss
- Better integration with Quality Management Systems (QMS)
- Infrastructure that can grow with evolving scientific and regulatory needs

And just as importantly, they future proof their infrastructure, ensuring that as science advances and compliance standards evolve, their systems evolve too.

Strategic Lifecycle Planning: Building a Future-Ready Monitoring System

Modernizing a monitoring system isn't just a technical task, it's a strategic necessity. Facilities in the pharmaceutical, biotech, and healthcare sectors are continuously adapting to new regulations, evolving workflows, growing businesses, and emerging technologies. System lifecycle management provides a structured approach to ensuring your monitoring infrastructure can keep pace with these demands.

A strategic lifecycle process includes:

Discovery & Planning
This phase is about understanding where the system stands today and where it needs to go:

- Identify current system limitations and user pain points, such as difficulties with departmentalization, challenges reviewing system reports or data trends, and the complexity of adding new monitoring points. The goal is to uncover where the system hinders ease of use, visibility, and flexibility.

- Evaluate how the system supports (or disrupts) daily workflows by examining how data is reported and interpreted. Are reports easy to read? Do they provide actionable insights? If not, consider opportunities to reorganize the system by department, group, or site to better align with how teams operate and interact with the platform.

- What are the goals for expansion, compliance, and data visibility?
- How can upcoming changes align with broader organizational goals?

Rather than jumping straight to hardware upgrades, this stage prioritizes strategic clarity and alignment with internal stakeholders, from lab managers and facilities teams to quality assurance and IT.

Comprehensive System Assessment
Once goals are defined, a full audit of the current monitoring system is essential to ensure it can support future expansion and compliance needs. Key focus areas include:

Node Configuration Review
Assess how well current components are positioned to support performance and scalability. This includes, but is not limited to:

- Transmitter-to-receiver ratio
- Signal reliability of transmitters
- Quantity and placement of receivers
- Hardware version and compatibility

Infrastructure Gap Identification
Pinpoint areas where physical or digital infrastructure may limit performance or expansion. Examples include:

- Power availability and distribution
- Network operating systems on computers hosting the system infrastructure

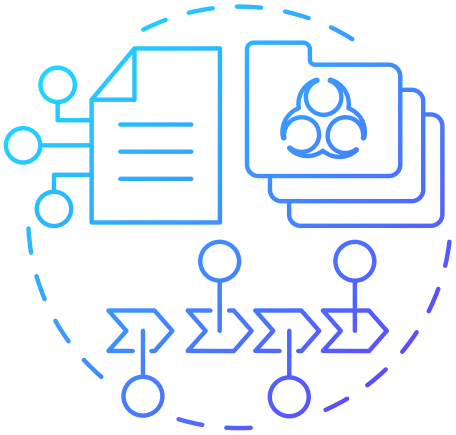
Environmental constraints, such as wall materials or nearby equipment, that may affect signal quality or installation logistics.

Evaluating how well the system supports current SOPs, alerts, audit trails, and compliance protocols

What makes this step so critical is that it reveals the "invisible" barriers, limitations that may not affect day-to-day operations but can significantly hinder future growth, complicate audits, and drive up IT costs. For example, unclear or poorly formatted system reports often lead to increased scrutiny and questions. When data isn't easily interpreted, IT teams may intervene unnecessarily by adding security layers or restricting access to certain services.

This can result in unintended consequences, such as blocking essential ports, disabling key system services, restricting web interface access, or halting outgoing email alerts, all of which compromise the functionality of the monitoring system. By combining these technical assessments with user interviews and on-site walk-throughs, organizations gain a complete 360-degree view of both technical gaps and workflow misalignments, providing a clear roadmap for where improvements are most urgently needed.

Risk Categorization & Prioritization
After assessing the system, findings should be classified by risk level:



- High risk: Gaps that could lead to data loss, audit failures, inability to scale, or compromised alarm notification lists
- Medium risk: Performance inefficiencies, manual workarounds, or degraded reliability
- Low risk: Non-critical enhancements that improve user experience or system usability

This framework helps teams prioritize remediation efforts based on business impact and compliance urgency.

Modernization Through the Lens of Change Control

Change control is often one of the biggest concerns when modifying or expanding a validated system. In regulated environments, no change can occur without a documented process that addresses risk, outlines justification, and aligns with the organization's quality standards.

A successful modernization effort must support, not disrupt, the existing change control process. This includes:

- **Traceable Documentation**: Every system modification should include before-and-after diagrams, revised equipment lists, and updated SOP references. These materials support approval processes and provide auditors with a clear trail of accountability.
- **Alignment with SOPs and QMS**: Rather than forcing new procedures onto the facility, any updates should be integrated into the current Quality Management System (QMS) and mapped to established SOPs. This allows teams to maintain operational continuity without retraining or rewriting policy unnecessarily.
- **Risk Management Integration**: Proposed changes should include a formal risk analysis (e.g., FMEA or risk matrix), showing the potential impact on product quality, data integrity, and regulatory compliance. This not only facilitates approval but builds stakeholder confidence that enhancements have been rigorously evaluated.
- **Lifecycle Traceability**: Once changes are approved and implemented, the system must maintain a digital audit trail that logs every update, user action, and system behavior. This continuous traceability is critical for maintaining compliance with 21 CFR Part 11 and EU Annex 11.

Digital Audit Trail

By embedding lifecycle upgrades into the organization's existing QMS processes, stakeholders can modernize with confidence, minimizing operational disruption and ensuring that every improvement strengthens, rather than jeopardizes, audit readiness and maintains operational control.

Why Rees Scientific Is the Right Partner

The truth is, most companies don't fail to modernize due to a lack of intent, they fail because they lack a partner who knows how to do it right. Successful modernization requires a deep understanding of how to navigate regulated environments without disrupting compliance, daily operations, or budget constraints.

At Rees, we operate at the intersection of technical expertise, operational efficiency, and regulatory precision—delivering upgrades that are both seamless and sustainable. That's what sets us apart.

1. Deep Domain Expertise in Regulated Environments

With over 40 years of experience exclusively serving pharmaceutical, biotech, research, and healthcare organizations, Rees understands the complexities of regulated industries. We don't just install systems, we interpret regulations, anticipate audit expectations, and align modernization efforts with your QMS, change control, and validation frameworks.

2. The Largest Dedicated Field Service Force in the Industry

Rees offers the largest network of full-time, field-based environmental monitoring specialists in the industry. Our field teams:

- Deliver faster, more consistent support
- Understand your site, system, and SOPs
- Provide in-person assistance for complex upgrades and change controls
- Reduce project delays and communication gaps

3. Turnkey Lifecycle Support from Start to Finish

Rees is one of the few providers that can manage every step of the modernization journey:

- Discovery workshops and strategic planning
- On-site system assessments
- Infrastructure design and network optimization
- Complete documentation packages (change control, IQ/OQ, mapping, etc.)
- Scalable rollout support across departments and locations

4. Proven Results Across the Industry

Our systems are trusted by:

- 8 of the top 10 pharmaceutical companies
- 72% of the top 50 biotech firms
- A wide network of clinical labs, academic research centers, CDMOs, and hospital systems

We've helped organizations transition from outdated, inefficient systems to fully modernized, scalable infrastructures that meet today's standards and tomorrow's challenges.

5. Long-Term Partnership and Support

With Rees, support doesn't end after implementation. Clients benefit from:

- 24/7/365 product support
- ISO 9001-certified processes and ISO/IEC 17025-accredited calibration services
- Ongoing consultation to support future planning, risk mitigation, and continuous improvement

Real-World Impact: A Prestigious Healthcare Facility in New England

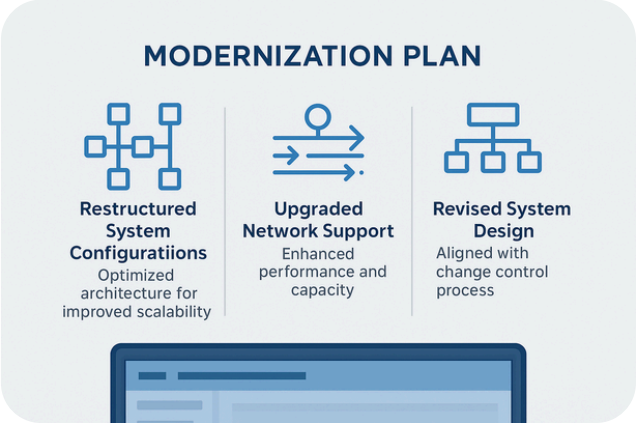
A well-regarded medical and research institution in New England faced a significant challenge: its original monitoring infrastructure, built more than a decade ago, had reached a breaking point. Adding new equipment was taking 8 to 10 weeks, with each addition requiring unexpected retrofits for power, network access, signal stability, and administrative oversight.

The core issue? The system was never designed with long-term growth in mind. As more endpoints were added over the years, the infrastructure expanded reactively and was built to meet immediate needs without a scalable foundation. Still reliant on outdated module versions, the system struggled to manage the increasing load. Signal integrity declined, system responsiveness lagged, and the risk of non-compliance began to rise.

A strategic lifecycle assessment was conducted, revealing:

- Data transmission issues caused by node overload
- Lack of available infrastructure to support additional power and network requirements
- Misalignment between system architecture and regulatory audit expectations
- Limited scalability of the system's alarm notification process, with outdated call lists that were difficult to update without incurring significant effort or cost

The facility implemented a multi-phase modernization plan that included restructured system configurations, upgraded network support, and a revised system design that allowed for seamless future expansion. Most importantly, all changes were embedded within their existing change control protocols, with full traceability and documentation.



The outcome was a modern monitoring infrastructure that not only solved immediate challenges but positioned the facility for future scalability, with less risk, greater responsiveness, and improved audit performance.

The Bottom Line: Future-Proof Your Monitoring Strategy

Legacy systems were not built for the pace and complexity of today's scientific landscape. With increasing regulatory pressure, rapidly evolving technologies, and growing operational demands, the cost of inaction is no longer just inefficiency, it's real, measurable risk.

Lifecycle management transforms that risk into opportunity. Whether you're planning for expansion, facing current limitations, or taking a proactive step toward modernization, it's never too late to take control. A well-executed lifecycle strategy provides the clarity, structure, and scalability needed to ensure your monitoring system evolves with your organization, not against it.

The first step is simple: assess where your system stands today and start building the roadmap for where it needs to go tomorrow.

Ready to Get Started?

If your monitoring system is limiting your growth, you're not alone, and you're not stuck. Rees Scientific offers strategic lifecycle assessments to help you uncover hidden risks, streamline performance, and design a future-ready infrastructure that aligns with your goals.

Contact us today to schedule a system review and take the first step toward a smarter, scalable, and compliance-ready monitoring strategy.

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