

Inside insight: Building surgical vision from requirements to real-time



The Client

[UnivLabs Technologies](#) (founded 2015, Gurugram, India) designs and manufactures advanced yet affordable devices for minimally invasive surgery, serving 2,000+ hospitals.

R&D accounts for 70% of the company's ~100-strong team, based in Bangalore and Lille. The ISO 13485 certified manufacturing facility is centred in Gurugram.

The Project

The UnivLabs Verification & Validation (V&V) team assures the safety, reliability, and regulatory compliance of surgical endovision software across four product lines:



- **Surgical camera software:**
Real-time image processing supporting visualization during minimally invasive procedures
- **Light source software:**
Regulates LED or Xenon light brightness with efficiency, safety, and auto-adjustment.

- **CO₂ insufflator software:**
Controls flow and pressure with real-time safety and precision.
- **Irrigation pump software:**
Manages surgical fluid flow with precision, safety, and real-time control.

These are safety-critical projects, so adherence to standards is vitally important to UnivLabs – especially the V&V team.

The Decision

To meet regulatory expectations, UnivLabs adopted [IEC 62304](#) and enforces [MISRA C](#) compliance. “Our criteria included ease of use, the cost of the solution, and static and dynamic analysis capabilities. The increasing importance of cybersecurity was also a consideration,” said Gurpreet Kohli, Department Head of V&V with UnivLabs.

“These criteria placed the LDRA tool suite firmly onto our shortlist, and the positive evaluation experience enhanced by the support of the LDRA team made the ultimate decision easy” he said.

Today and Tomorrow

[LDRA tools](#) are now deployed across camera, light source, insufflator, and irrigation pump projects - detecting defects early, enforcing coding standards, and validating real-time performance.

“LDRA verification and validation tools played a central role,” noted Gurpreet.



“We have used static code analysis and code coverage tools throughout to detect defects early, enforce MISRA C compliance, and verify critical real-time processing functions,” he said.

Looking ahead, UnivLabs plans to scale domestic manufacturing and continues to partner with LDRA. “We truly appreciate the partnership and look forward to future endeavours” Gurpreet concluded.

A full-length version of the case study is available [here](#).

[Blog Page](#)

Inside this issue

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Continuous Verification in CI/CD for Critical Software

The pace of embedded software development is faster than ever. But for teams in aerospace, automotive, medical, rail, and other critical sectors, speed cannot come at the cost of safety, security, or compliance. This is where [Continuous Verification \(CV\)](#) comes in – embedding rigorous checks into the Continuous Integration and Continuous Delivery (CI/CD) pipeline to ensure that quality and compliance are assured throughout.

“The missing link between man and the apes... is us.”

Konrad Lorenz, zoologist and Nobel laureate

At LDRA, we see Continuous Verification as the “missing link” between agile innovation and the assurance demanded by regulators and certification authorities.

Why CI/CD alone isn't enough

CI/CD pipelines are powerful. They merge code quickly, automate builds, and accelerate releases. But standard CI/CD pipelines are designed for speed, not for the assurance demanded by safety-critical development.

They often fall short in several key areas:

- **No built-in compliance** with standards like [DO-178C](#), [ISO 2626](#), [IEC 61508](#), or [EN 50716](#)
- **Shallow verification** that omits advanced checks such as structural coverage, data/control coupling analysis, and requirements-based testing.

- **Limited traceability**, making it difficult to show regulators how requirements link to design, code, and tests.
- **Unqualified tooling** without the evidence needed for certification.

In critical systems, a defect found late can cost millions. Earlier discovery means cheaper and faster fixes – and that makes Continuous Verification essential.

Continuous Verification

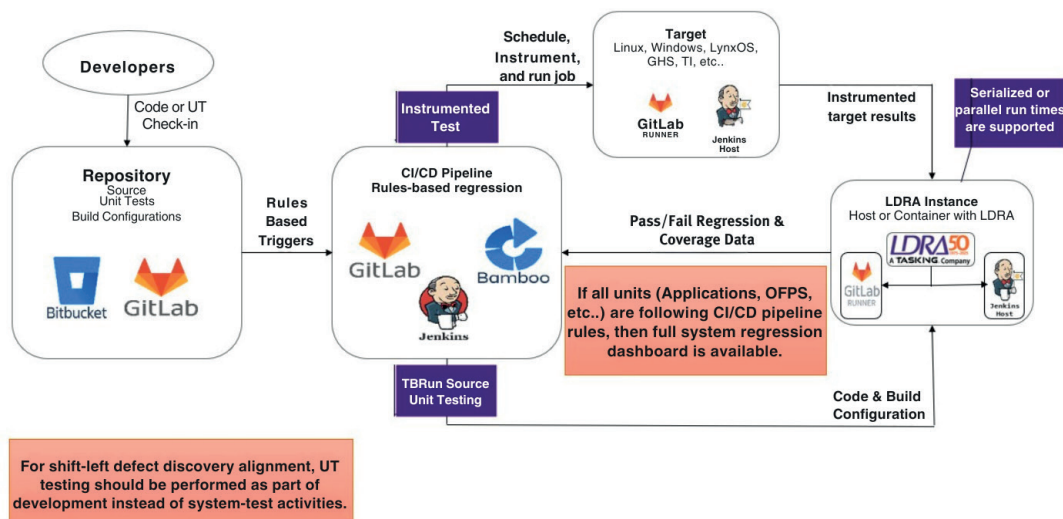
Continuous Verification (CV) integrates quality, compliance, and safety checks as natural extensions to the CI/CD pipeline. Instead of waiting until the end of the project for reviews and audits, CV ensures that every change is automatically subjected to the same rigour regulators demand at release. This keeps compliance evidence continually up to date, reducing the risk of late rework and costly surprises.

*“I’m always doing the right thing
I’m doing the right thing.”*

David Byrne

In practice, CV adapts to the needs of each project and the standards it must satisfy. A new commit might trigger checks against industry coding rules, together with static and dynamic analysis to spot issues early. Tests can run automatically at unit and integration levels, providing confidence that changes behave as intended both in isolation and when combined. [Structural coverage analysis](#) – perhaps including [MC/DC](#) and [OCV](#) – will likely also be applied, while requirements are traced in both directions to maintain a clear picture of compliance and assurance.

By embedding these activities into the development flow, CV turns verification into an ongoing process.



rather than a final hurdle, helping teams move quickly while maintaining the standards essential to safety- and security-critical software.

Balancing efficiency and oversight

Crucially, CV also accommodates the human oversight required by standards which are otherwise missing from CI/CD. Independent reviews, stage-gate approvals, and [Stages of Involvement \(SOI\)](#) checks are built into the process. Automation takes care of the repeatable checks, while defined points for human intervention ensure independence and rigour.

“Efficiency is doing things right; effectiveness is doing the right things.”

Peter Drucker

The result? Verification evidence is always up to date, certification readiness is never in doubt, and teams can move quickly without compromising quality — or compliance.

CV in action with LDRA

LDRA tools integrate seamlessly with platforms such as [Jenkins](#), [GitHub Actions](#), [GitLab](#), [Docker](#), and [Azure DevOps](#), turning the idea of Continuous Verification into everyday practice.

In the past, it was common for developers to hand code over to a system test team, who would then run tests on it at a later stage. That approach neither aligns with today’s shift-left philosophy nor takes full advantage of CI/CD regression and automation. Catching defects as early as possible implies writing code, creating unit tests that exercise its functionality and drive coverage, and checking everything into the repository to see

the immediate impact on both the application and, in some cases, the wider system.

By tackling issues in-phase, bugs can be resolved early and often, keeping momentum in the development cycle. The system-test phase is then freed to focus on independent verification against requirements — fulfilling the independence clauses demanded by the standards, without duplicating work.

Traceability reporting links requirements to both code and tests, so evidence is always clear and complete. Dedicated evidence packs support stage-gate reviews and certification audits.

The net result is a pipeline built for rapid delivery and backed by the assurance needed for certification.

From DevOps to DevSecOps

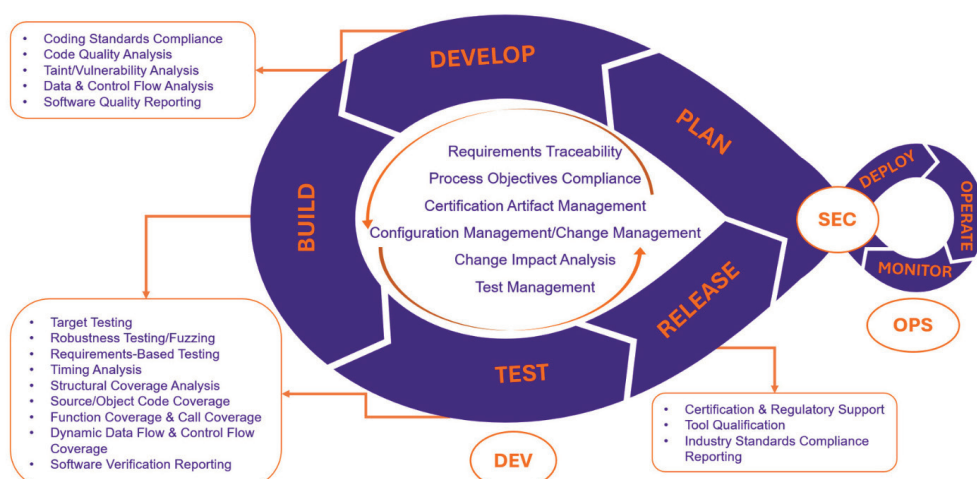
Just as safety-critical considerations must be built into the pipeline, so too must security. Continuous Verification makes that possible, extending DevOps into [DevSecOps](#) by embedding compliance and protection at every stage (below). The outcome is rapid delivery, backed by the assurance that both safety and security requirements are met.

Need more information?

“Hand in hand, we can make it.”

Freddie Perren and Dino Fekaris

If you’d like more information on how LDRA’s approach to Continuous Verification can help with your safety- and security-critical developments, please do get in touch. Details are on the next page.





Partner Network News



Renesas processors power many safety- and security-critical systems across the sectors, including A&D, automotive, medical, industrial, and rail. Meeting the compliance demands of associated standards such as [ISO 26262](#), [IEC 61508](#) and [EN 50716](#) requires close integration between hardware and verification tools.

LDRA has joined the and the [Renesas Ready Partner Network](#) and the [R-Car Consortium](#) to help developers achieve exactly that. Through this partnership, LDRA tools integrate tightly with Renesas platforms, enabling teams to generate the evidential artefacts certification requires.

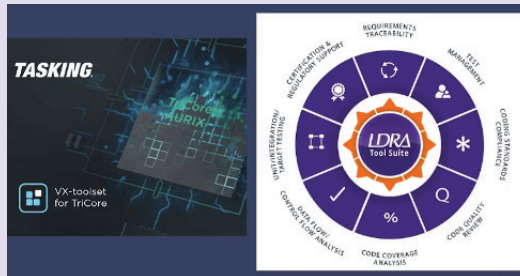
Read the full announcement in our [press release](#).



LDRA Newsroom

Stronger Together: From Code to Compliance

As part of [TASKING](#), LDRA is helping to deliver an end-to-end toolchain for automotive software development, taking projects seamlessly from coding through to compliance, illustrating how the two companies are beginning to work more closely across the sectors.



The combined strength of TASKING's development tools and LDRA's verification expertise underpins compliance with [ISO 26262](#) and automotive cybersecurity standards (typified by [ISO/SAE 21434](#)), ensuring traceability, testing, and evidence generation throughout the life cycle. Read more in this [press release](#).



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Dates for your diary

Training		
Understanding MISRA C:2025 (2 days)	11-12 Nov 2025	Michigan, USA
	11-12 Feb 2026	Wirral, UK & Online
Webinars		
Ensuring Safety and Security of Collaborative Robotic Systems Applications Development	12 Nov 2025	On line
Conferences & Exhibitions		
Embedded World North America	4-6 Nov 2025	Anaheim, CA
Automotive Toolchain Symposium	4 Nov 2025	Livonia, MI
	6 Nov 2025	Santa Clara, CA, USA
NXP Tech Day	12 Nov 2025	Gaydon, UK
HIS Conference	12 Nov 2025	Newport, Wales

[Visit the LDRA events page](#)



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