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Case Study

How Autoliv Transformed Its Embedded Code Quality with CodeSonar®

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Autoliv, a leader in automotive safety systems, develops critical applications for steering wheels, seatbelts, and airbags based on a complex software architecture. Before adopting CodeSonar®, teams used static analysis tools that had several limitations: difficulty centralizing warnings and justifications, merge issues when uploading reports, and tedious manual tracking of compliance with safety standards and MISRA rules.

The integration of CodeSonar allowed Autoliv to centralize analysis results, manage priorities and justifications directly within the **Eclipse IDE**, and detect critical vulnerabilities, particularly those related to memory and buffers. Adoption was fast and intuitive for the 60 developers involved, with over **12,000 analyses** performed across twenty projects, averaging approximately **150,000 lines of code** per project. Thanks to CodeSonar, Autoliv has improved its code quality, strengthened product safety, and simplified reporting, while paving the way to extend the tool to other entities and project types.

“CodeSonar fits our needs perfectly and integrates seamlessly into our development environment, allowing us to achieve considerable time savings. Furthermore, CodeSonar detects a significantly higher number of warnings than traditional static analysis tools.

It is a valuable asset for guaranteeing the quality and safety of our critical software.”

Mickael Pastor

Software Quality and Process

Context and Challenges

Autoliv develops critical embedded systems for the automotive sector, where safety is an absolute priority. The electronics division designs software applications for products such as steering wheels, seatbelts, and airbags. These applications rely on a common software architecture. While this model encourages high code reuse, it also requires rigorous management of justifications and warnings across all levels.

Before adopting CodeSonar, the teams faced several challenges:

- **Centralization Issues**
Difficulty centralizing warnings and justifications across projects and platforms.
- **Merge Conflicts**
Concurrent access and merge issues complicated report generation.
- **Manual Tracking**
Monitoring MISRA and cybersecurity rules was time-consuming, error-prone, and costly.
- **Code Reuse**
Sharing code between platforms made it difficult to standardize justifications and analyses.

These challenges led Autoliv to seek a more modern, high-performance static analysis solution capable of detecting complex vulnerabilities while facilitating the development workflow.



Implementation

After a detailed benchmarking of several tools, Autoliv chose CodeSonar for its ability to detect complex vulnerabilities, particularly memory and buffer overruns.

- **Technical Integration**
Analyses are launched via the command line, and results are imported directly into the Eclipse IDE.
- **Workflow**
Developers manage justifications and prioritize fixes directly within the IDE, simplifying daily tasks.
- **Automation**
Analysis automation was easily implemented via scripts integrated into the build environment (dashboards).
- **Adoption**
The tool is intuitive, requiring minimal support, and was quickly adopted by 60 active developers.

Benefits

- **Centralization**
Sharing of warnings and annotations with uniform tracking across projects.
- **Efficiency**
Time savings in reporting thanks to exports to Power BI and custom Python scripts.
- **Security**
Detection of critical vulnerabilities (buffer overruns, poor memory management) that were difficult to identify with previous tools.
- **Seamless Integration**
Rapid adoption and a natural fit within the team's workflow.
- **Compliance**
Full coverage of MISRA and cybersecurity standards, ensuring compliance for critical projects.
- **Scalability**
Potential to extend CodeSonar to other entities and project types, including Java mobile applications for various international sites.

In two years, the teams performed over 12,000 analyses on roughly twenty projects. By using CodeSonar, Autoliv has improved code quality, reduced the risk of critical vulnerabilities, and optimized team productivity while simplifying the reporting and justification process.



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