Accelerating Automotive Software Innovation:

GlobalLogic's SDV Cloud Framework and Eclipse Automotive Integration

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1 Executive Summary

The advent of Software Defined Vehicles (SDVs) has entailed a significant transformation among the automotive industry. GlobalLogic's SDV Cloud Framework, integrated with Eclipse Leda, offers a comprehensive solution to accelerate this transformation. This whitepaper details how OEMs can leverage these technologies to overcome recent challenges, enhance development processes, and achieve faster time-to-market, improved quality, and reduced costs.

2 Introduction:
The Transformation to Software Defined Vehicles (SDV)

The Software Defined Vehicle (SDV) is the key aspect of a profound transformation. Automotive technologies, strategies, and processes must be redesigned and rethought worldwide. Manufacturers and providers are confronted with the interface of innovation, sustainability, and social progress. In the 21st century, vehicles are no longer viewed merely as machines that transport passengers from point A to point B. Today's vehicles have evolved into digital platforms that, in addition to providing autonomous transportation, offer a rich array of software features in order to assist, entertain, and impress customers throughout their journey.

3 Current Challenges for OEMs

The changes that come with SDVs pose major challenges for OEMs and Tier 1s worldwide. They need to rethink their business models and ways of operating. Vehicle manufacturers are increasingly looking for new technologies and methods to significantly improve the overall user experience. The result is a dynamic process in which the classic sales strategy is replaced by a more sustainable model of ‘continuous interaction’.

The most common challenges OEMs face when transitioning to SDVs:

- Managing the complexity of software integration and lifecycle management.
- Adapting to modular, reusable software architectures.
- Ensuring robust software release management and Over-The-Air (OTA) updates.
- Overcoming the limitations of legacy quality management processes.
- Lack of experience in dealing with complex and networked IT systems.

Here, several causes contribute to the development of these challenges. So as to successfully overcome them, addressing the most pressing causes is crucial.

Inefficient Quality Management of Software Products

The legacy quality management processes and infrastructure of software products do not measure up to the newest requirements of an SDV and the exponentially growing amount of software. Efforts by OEMs and Tier 1s to develop suitable solutions themselves have led to a fragmented patchwork of ‘new-meets-old’ solutions, hindering software development in the automotive industry instead of catering to its advancement. Most OEMs struggle with realizing the potential of software to create additional value for clients when grappling with this complexity.

Transition to Cloud and Time-to-Market

While the SDV paradigm presents opportunities for a modular, reusable software architecture that could significantly shorten automotive development cycles from the current 3 years+ timeframe, delivering a continuously improving driving experience is no easy feat. Modular architectures are inherently more challenging to maintain and require robust, mature software development processes that are firmly ingrained within the company.

> *"Despite the complex challenges for companies, these changes won't drastically affect software developers. The software development process in the automotive industry will not undergo any drastic changes in tools or toolchains, everything will remain familiar to those whose job it is to ensure that the software in cars meets the best industry standards. The key difference is that the IT infrastructure for these tools and toolchains will reside in the cloud."*
>
> *Oleksandr Syvashenko,*
> *Director of Engineering at GlobalLogic*

4 GlobalLogic's SDV Cloud Framework (The Framework)

In order to address these challenges head-on and pave the way for automotive companies to fully realize the SDV vision, GlobalLogic has developed a highly flexible, scalable SDV Cloud Framework. This holistic solution provides a tailored infrastructure with a robust pool of relevant tools and services that enable OEMs and Tier 1s to effectively leverage existing systems while streamlining processes and aligning software development with new SDV principles.

Overview and Benefits

GlobalLogic's SDV Cloud Framework supports vehicle manufacturers in the development of the SDV by providing:

- A holistic perspective that unlocks a future which seamlessly integrates cutting-edge technologies and sustainable practices.
- Support for modular, reusable software architectures that shorten development cycles.
- Better accessibility, greater efficiency, and an improved quality of life for drivers and passengers.

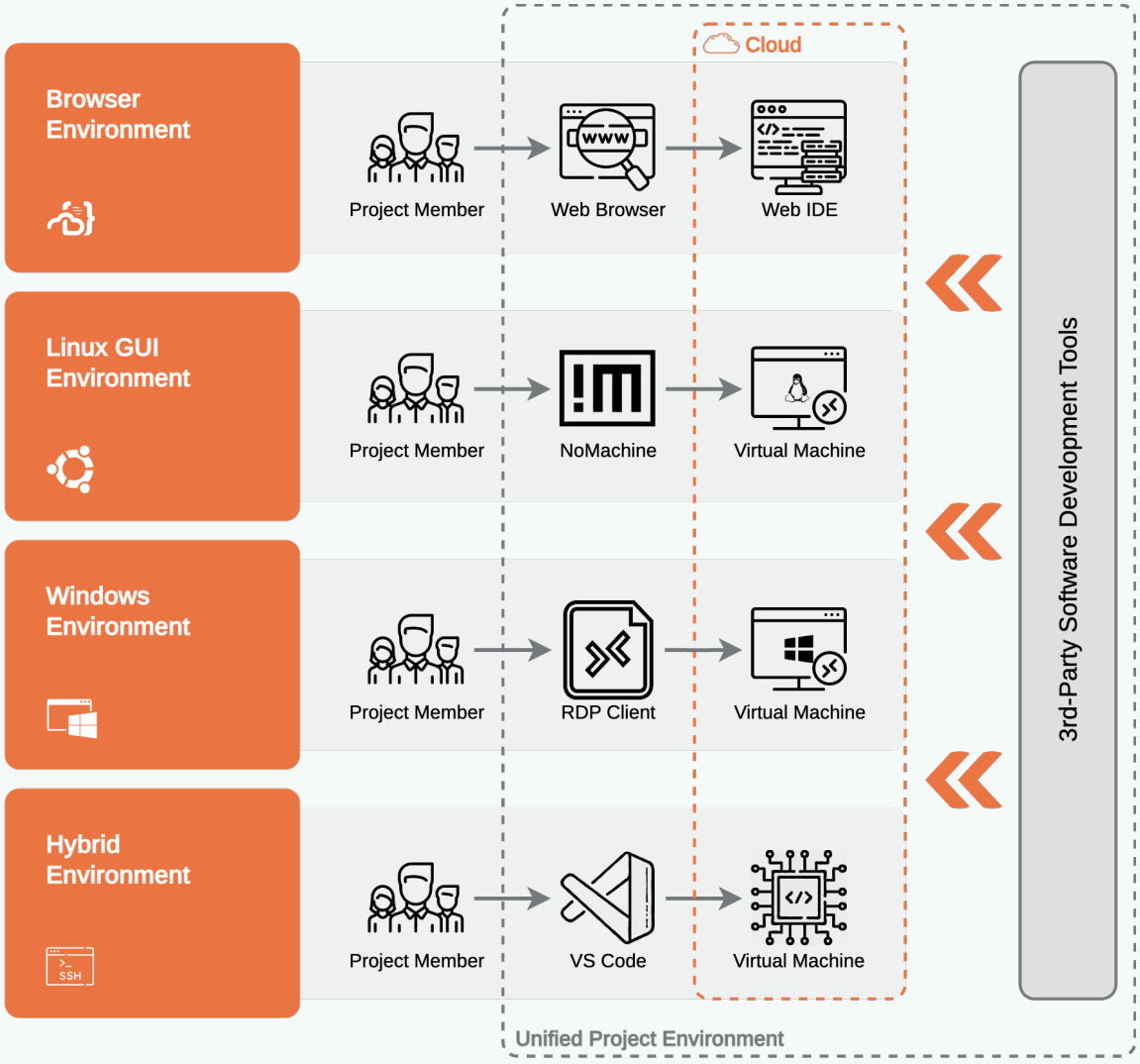
Key Components

- **Modular Deployment Kit:** Builds customer-oriented infrastructure.
- **Cloud Engineering Environment:** Tailored for automotive software development.
- **Quality Assurance Services:** Ensures integration and qualification of automotive software.
- **Integrated Data Lake:** Ingests and analyzes data collected by Electronic Control Units (ECUs).

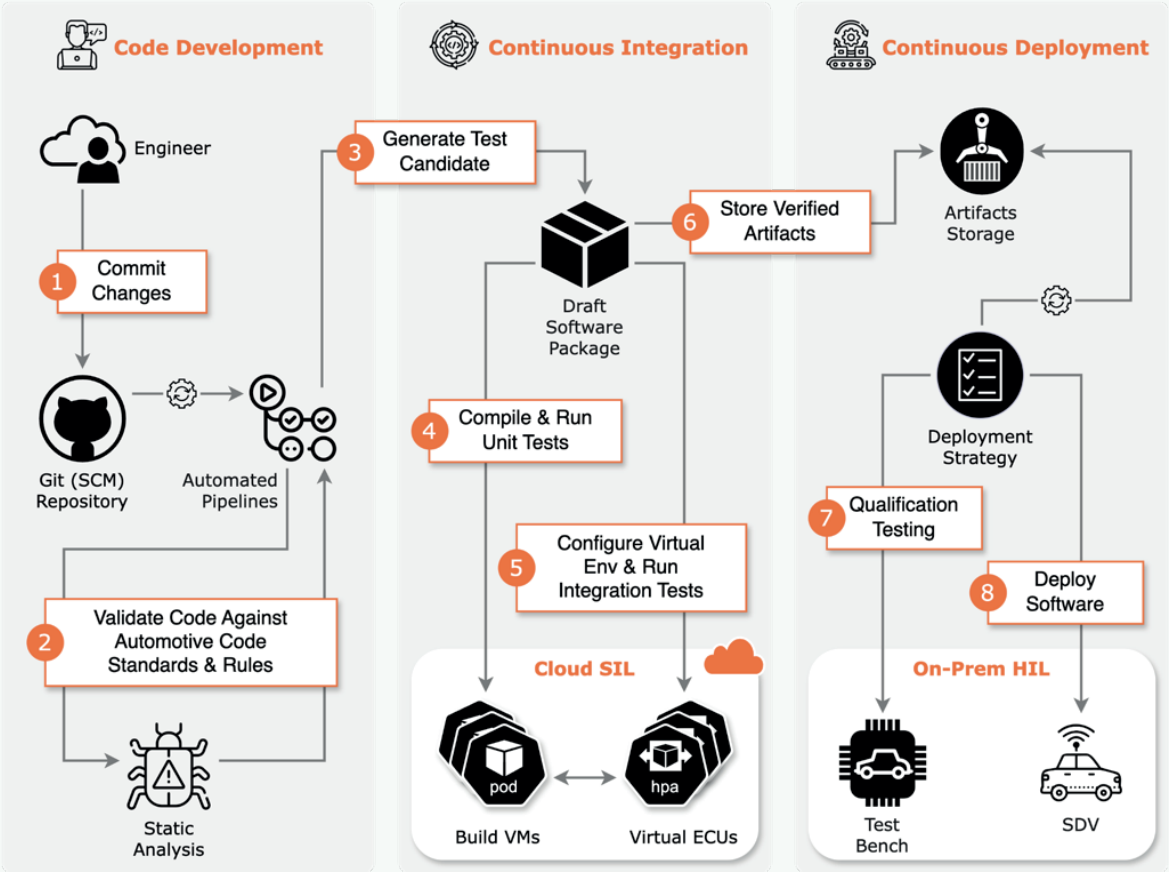
5 The Role of the Framework in SDV Development

Importance and Functionality

The Virtual Workbench is a key component of GlobalLogic's SDV Cloud Framework, designed to meet the high standards of safety and reliability prescribed by the automotive industry. This integrated engineering environment, in conjunction with Integration and Validation pipelines, provide developers with a unified, controlled, and secure platform that mimics real-world vehicle conditions, eliminating the need for physical vehicles and thus significantly cutting down costs.



Benefits of Virtualization



The virtualization of the development environment entails several key advantages:

- **Cost Savings:** By reducing the reliance on physical vehicles, the Virtual Workbench decreases the costs associated with traditional testing methods.
- **Efficiency:** Virtual environments enable faster iterations and more frequent testing, in turn accelerating the development process and enhancing software quality.
- **Collaboration:** The Virtual Workbench fosters better collaboration among different teams involved in SDV software development by providing a shared platform that integrates tools and workflows.

Traditional methods that rely heavily on physical testing environments are not only cost-prohibitive but also inefficient. The Framework addresses these challenges by creating a virtualized environment for testing and development. This platform makes possible the simulation of various vehicle conditions, enabling comprehensive testing and validation without the need for physical prototypes.

The Framework offers a range of capabilities designed to support the development of SDVs:

- **Integrated Tooling:** It integrates a variety of development tools and services, thus creating a seamless environment for developers.
- **Realistic Simulations:** The platform supports detailed simulations of vehicle behavior, providing a realistic testing ground for software features.
- **Accessibility:** Developers can access the Virtual Workbench remotely, leading to a flexible and collaborative working environment.

By enabling more efficient and effective processes, the Framework transforms the software development lifecycle. Developers can conduct complex tests and validations on virtualized Electronic Control Unit (ECU) simulation clusters, reducing the reliance on physical hardware. In addition to speeding up development cycles, this also enhances the accuracy and reliability of the software.

Use Cases and Real-World Applications:

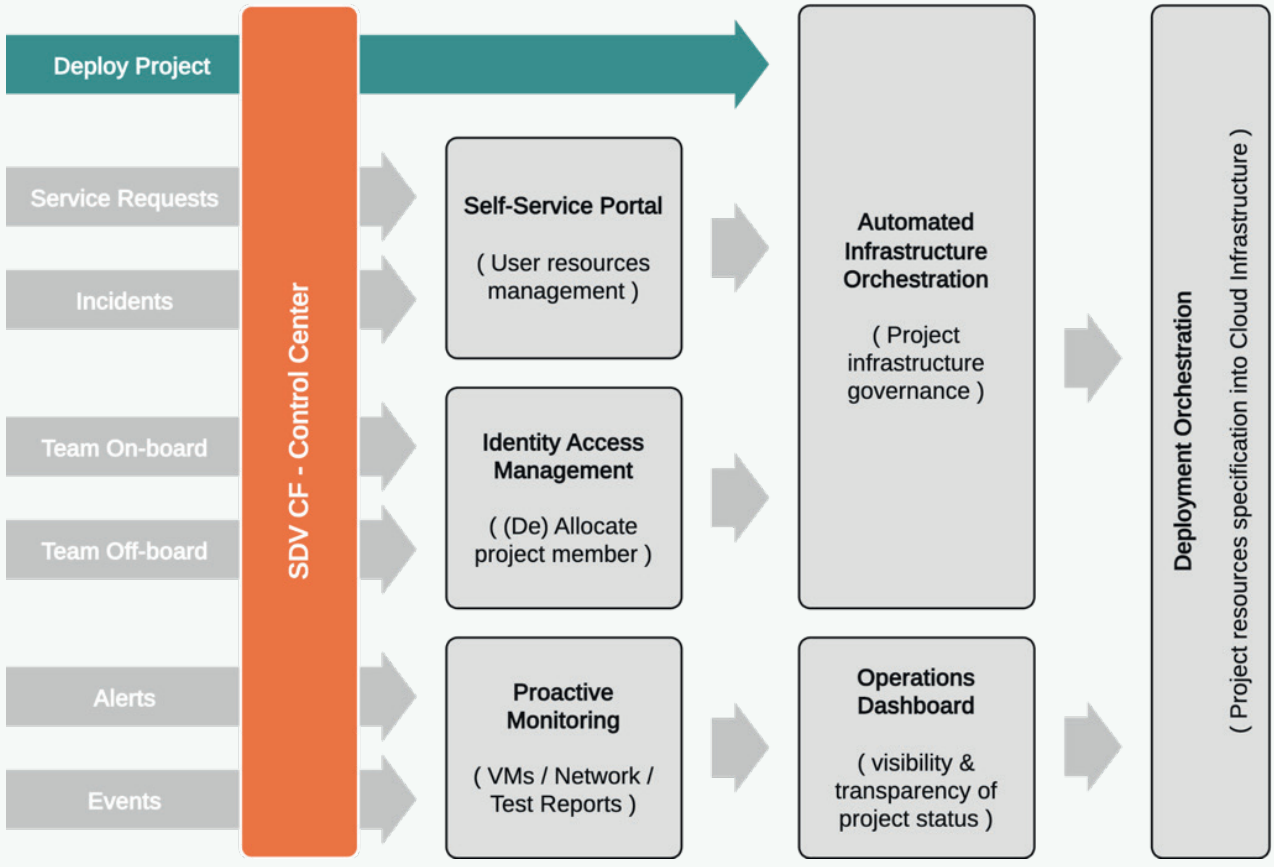
- **Prototyping:** Accelerates early-stage development by creating virtual prototypes that can be tested and iterated quickly.
- **Testing and Validation:** Allows extensive validation of software features under numerous conditions.
- **Continuous Integration/Continuous Deployment (CI/CD):** Supports CI/CD practices by enabling automated testing and deployment processes, resulting in the rapid and reliable delivery of new features and updates.
- **Autonomous Vehicle Development:** Facilitates the safe and efficient testing of autonomous driving algorithms in a controlled environment.
- **Infotainment System Testing:** Provides a platform for testing and integrating advanced infotainment systems without physical hardware.

In conclusion, the Virtual Workbench within GlobalLogic's SDV Cloud Framework represents a transformative tool for the automotive industry. By providing a flexible, efficient, and collaborative environment for SDV development, it allows OEMs and Tier 1 suppliers to accelerate their development cycles, reduce costs, and enhance the overall quality and reliability of their software.

6 Control Center:
Streamlining SDV Management

The GlobalLogic SDV Cloud Framework contains a clear objective that does not halt at migrating to a solution, but instead creates a comprehensive ecosystem for developing and distributing software. This ecosystem is aligned with defined vehicle characteristics, enabling modular software development that can be reused across different vehicle models and shared among various projects. The need for such a robust environment resulted in the creation of the Control Center, a web-based governance platform that centralizes project infrastructure management.

The Control Center is a critical component of GlobalLogic's SDV Cloud Framework, designed to cater to heads of engineering, project managers, DevOps teams, and project members. It facilitates seamless coordination and oversight across the entire SDV development process.



The Control Center offers several key benefits:

- **Centralized Management:** Provides a unified dashboard for monitoring and managing project infrastructure.
- **Role-Based Access:** Tailors access and functionalities based on user roles, ensuring secure and efficient management.
- **Proactive Monitoring:** Enables heads of engineering to monitor project landscapes and avoid potential issues by way of proactive oversight.

By addressing the specific needs of each user group, the Control Center ensures that all aspects of the SDV development process are managed effectively, promoting a collaborative and efficient environment. This centralized approach helps automotive companies maintain production environments with ease, yielding the seamless execution of projects across various vehicle capabilities.

- **Heads of Engineering:** These leaders require visibility into the project's landscape, overseeing all projects within a business unit or the entire company. The Control Center provides a proactive monitoring dashboard, offering essential information to avoid project bottlenecks and to ensure smooth operations.
- **Project Managers:** Responsible for team onboarding and offboarding, project managers use the Control Center to manage the installation of legacy tools, configure access, and deprecate resources securely when team members leave. This prevents security vulnerabilities and safeguards efficient resource management. Additionally, project managers benefit from detailed analysis of test reports, helping them maintain a comprehensive view of all resources allocated to specific projects.
- **DevOps Teams:** The Control Center empowers DevOps professionals to manage all deployed components and resources, monitor deployment procedures, and troubleshoot infrastructure issues with ease. This centralized control streamlines their workflow, in turn enhancing operational efficiency.
- **Project Members:** For developers and other team members, the Control Center provides easy access to all assigned resources, such as Virtual Workbenches and repositories. It supports self-service capabilities for requesting additional resources and reporting issues, simplifying complex system management and improving overall productivity.

7 Eclipse SDV Leda:
Enhancing SDV Development

Eclipse SDV Leda is an integral part of the Eclipse SDV ecosystem, designed to support the development of complete software modules for vehicles. By integrating Eclipse Leda with the Virtual Workbench, GlobalLogic provides OEMs and suppliers with a powerful, pre-configured environment that accelerates development and improves collaboration.

Benefits for OEMs and Suppliers from the integration of Eclipse Leda:

- **Developer Agility:** Provides a comprehensive environment for testing and validation, enhancing developer productivity.
- **Seamless Integration:** Facilitates end-to-end transparency between traditional tools and new development platforms.
- **Collaboration:** Supports collaboration within the Eclipse SDV ecosystem, enabling the integration of tools and plugins from multiple vendors.

By providing a pre-configured Virtual Workbench with Eclipse Leda, GlobalLogic offers customers all the tools they need to start development immediately. This out-of-the-box solution accelerates the development process, leading to consistency and fostering collaboration throughout the SDV ecosystem.

Eclipse Leda's integration with the SDV Cloud Framework enables a unified development approach by supporting multiple vehicle targets and providing custom extensions. The flexibility and modularity ensure that OEMs can adapt quickly to changing market conditions and customer requirements, fostering innovation and improving time-to-market.

Use Cases and Real-World Applications:

- **Vehicle Software Development:** Enables the development of robust software modules for various vehicle functions.
- **Integration with Traditional Tools:** Facilitates seamless integration with traditional requirements management tools such as IBM Doors and Codebeamer.
- **Multi-Vendor Collaboration:** Supports collaboration among multiple vendors and partners, creating a cohesive development environment.
- **API and Plugin Integration:** Makes possible the development and integration of custom tools and plugins, enhancing flexibility and functionality of the development ecosystem.

8 Business Value of the SDV Cloud Framework and Eclipse Leda Integration

The integration of GlobalLogic's SDV Cloud Framework and Eclipse Leda offers substantial business value, transforming the way automotive software is developed and managed. This powerful combination provides several key benefits:

Accelerated Time-to-Market

- **Standardized Processes:** Reduces errors and rework.
- **Early Problem Identification:** Enables rapid response to market changes.
- **Continuous Interaction:** Transforms the classic sales strategy into a sustainable model of continuous interaction.

Enhanced Quality and Reduced Costs

- **Quality Pipelines:** Ensures timely product quality.
- **Collaboration:** Improves communication and reduces costs.
- **Virtual Testing:** Reduces costs and simplify change management through complex tests on virtualized ECU simulation clusters.

Expanded Business Opportunities

- **Modular Architecture:** Enables tailored SDV solutions for customer requirements.
- **Scalability:** Quick support and easy scaling of SDV infrastructure.
- **Adaptability:** Adapts to changing market conditions and requirements of the automotive industry.

Increased Developer Agility and Productivity

- **Developer Environment:** An environment for natural testing and validation of HIL development is provided.
- **Integration:** Ensures end-to-end transparency and seamless integration with tools like IBM Doors or Codebeamer.
- **Unified Tool Chain:** Enables tools to speak a common language via APIs or definitions, fostering compatibility and usability across multiple vendors.

Collaboration and Ecosystem Benefits

- **Ecosystem Integration:** Collaboration with multiple partners within the Eclipse SDV ecosystem, defining common standards and integrating tools seamlessly.
- **Plug-in Flexibility:** Offering tools as plug-ins, allowing OEMs to integrate tools from various partners into their development process.
- **Specialized Tools Development:** Developing precise, specialized tools to address unique OEM challenges, ensuring consistency and acceptance within the ecosystem.

By integrating the SDV Cloud Framework with Eclipse Leda, automotive companies can not simply streamline their software development processes but also drive innovation and efficiency. This strategic alliance enhances the ability to respond to market changes quickly, ensures high-quality product delivery, and opens up new business opportunities through scalable, adaptable, and modular solutions.

If you're ready to revolutionize your automotive software development and stay ahead in the competitive landscape, contact us today to learn more about how GlobalLogic's SDV Cloud Framework and Eclipse Leda integration can benefit your organization.

9 Conclusion

GlobalLogic's SDV Cloud Framework, combined with the powerful Eclipse Automotive integration, showcases a significant advancement in automotive software development. This innovative solution provides OEMs and Tier 1 suppliers with the tools and infrastructure needed to navigate the complex landscape of Software-Defined Vehicles efficiently. By enabling faster development cycles, reducing costs, and fostering seamless collaboration, GlobalLogic empowers automotive companies to deliver high-quality, innovative software that improves the driving experience. As the automotive industry continues to evolve, embracing these advanced technologies will be crucial to being competitive, driving innovation, and meeting the ever-growing demands of the market. With GlobalLogic's comprehensive solution, the future of automotive software development entails great possibilities.

Ready to accelerate your automotive software innovation?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