Renovation of the CERN Controls Configuration Service
Lukasz Burdzanowski, Chris Roderick
CERN Geneva, Switzerland

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Renovation Strategy

1. All of renovation aspects are closely related as suppression of technical debt is essential in order to advance the architecture, whilst taking into account necessary architectural and design decisions prevent further "erosion" in the system and limit existing technical debt.

2. The adapted software development process facilitates implementing changes enabling a lower overall cost of development and increased agility.

3. The first two aspects are a mid-to-long-term perspective. The implementation of the Kanban is already well advanced and can be considered finished by the end of 2015.

4. Kanban

- The Kanban emphasizes continuous improvement, importance of human factors and stringent maintenance value to the organization

Addressing technical-debt

1. By visualizing the work on a Kanban board, bottlenecks that occur and impediments that delay delivery can be seen. The visual nature of the Kanban board helps to identify where changes and tasks need to be delayed to order to advance the overall system.

2. By changing the way tasks are prioritized and visualized, has led to a reduction in pressure and stress on the development team. The visual nature of the Kanban board helps to identify where changes and tasks need to be delayed to order to advance the overall system.

3. By attaching state information to core domain entities in the system, has helped to reduce the number of technical debt by providing a clear visibility of the state of the development process.

4. By moving to widely adapted solutions of Java based RESTfull technologies, has helped to reduce the number of technical debt by providing a clear visibility of the state of the development process.

Architecting for the future

1. By abstracting away some information from the database, the system is now automatically notified when users interested in it. This has helped to improve the performance of the system.

2. The high-level domain specific events, i.e. FEM Reconstructed, give the developers an opportunity to make more detailed and precise changes to these areas which are particularly important.Workflow based transition of data in the system and guide helps users while limiting potential errors.

3. The first database database was introduced in 1998. Since then the scope, functionality and complexity of the service has grown. The database has been used heavily and its complexity has increased.

4. The CCS is essential for proper accelerator configuration and start-up – lowering: the total cost of delivery, likelihood of risk, lowering: the total cost of delivery, likelihood of risk, maintenance.

Addressing technical-debt

1. The static code analysis (SCA) is the analysis of code software execution in order to convey its dynamic impact, which is based on code execution.

2. Commons4Oracle provides a custom SCA framework which includes a pre-defined set of analysis rules, which can be customized and extended.

3. The analysis results, fluctuations and evolution of the metrics are the inputs to quality improvement analyses, e.g. as a basis for future planning. This work requires summarization of the rule violations, analysis of trends and factors. The report usually suggests changes to identify areas for in-depth analysis and planning of the refactoring.

In summary

- By changing the way tasks are prioritized and visualized, has led to a reduction in pressure and stress on the development team.

- Regular retrospectives and critical analysis of changes applied to the working process have positively transformed the way the CCS team works.

Conclusions

- The Kanban very noticeably improved the CCS team's productivity and contributed to increased user satisfaction. New architecture solutions lay foundations for an enhanced, cohesive and agile system that embraces the current and future challenges. By visualizing the work on a Kanban board, bottlenecks and impediments that delay delivery can be seen. The visual nature of the Kanban board helps to identify where changes and tasks need to be delayed to order to advance the overall system.

- The Kanban emphasizes continuous improvement, importance of human factors and stringent maintenance value to the organization.

References


Abstract

The Controls Configuration Service (CCS) is a key component in CERN’s data-driven accelerator Control System. Based around a central database, the service provides a range of client and web APIs and user interfaces enabling configuration of the accelerator Control System (CCS). The service has been heavily used for over 30 years. CERN, Geneva, Switzerland. (2015)

The purpose of the on-going renovation efforts started mid-2014 is to tackle the aforementioned issues, whilst ensuring overall system stability. In particular, this paper covers architectural changes, the agile development process in place at CERN and the documentation approach taken for the technical debt. Collectively, these efforts are leading to a successful renovation of a core element of the Control System.