ITEA 4

Project Results

VISDOM

Bringing visualisation to the world of DevOps

Thanks to a novel reference architecture and a new way of aggregating data from multiple sources, the ITEA project VISDOM (Visual diagnosis for DevOps software development) promotes visualisation in the DevOps approach to software development.

As software complexity increases, so too does the need to accommodate different viewpoints and abstractions. However, data engineers are typically hired to visualise business data and can miss development time data. In order to optimise decision-making, developers also require the ability to understand, reuse and integrate software at a fast pace while effectively communicating with stakeholders – yet visualisation, a powerful tool for this, is currently underutilised in DevOps.

The VISDOM project aimed to meet these needs by combining different visualisations into one dashboard view that stakeholders can use to understand and discuss their software system and make more informed decisions. With a mix of industrial and research partners in Finland, Spain and the Netherlands, the consortium has developed a reference architecture for this dashboard system alongside use-cases in their various domains. By aggregating data from multiple sources and tailoring dashboards to stakeholders, VISDOM is part of a shift towards quicker, more effective and more collaborative software development.

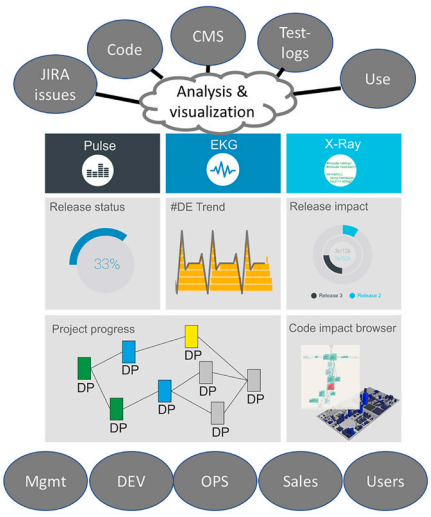
Technology applied

The basis for VISDOM is a reference architecture with common code that can be reused for different applications, serving as a pipeline from data source to visualisation. An important element is the use of data fetchers to draw raw data from all kinds of sources, such as version control systems, e.g. Git and project management tools, e.g. JIRA and Trello. A data adapter then refines this data and stores it as a data model. This data model is used to form visualisations which can be implemented as micro-frontends on dashboards, such as screens in a meeting between business developers and engineers. Use-cases demonstrating this architecture have been developed across three areas: quality aspects of software, business aspects of software and training aspects for software developers.

A key innovation in the former category is a tool by the University of Groningen and Canon Production Printing to uncover and visualise technical debt, the cost of rework due to cutting corners. Areas affected by technical debt can thus be targeted to speed up development. Regarding business aspects, a highlight is the Roadmapper tool of VINCIT and the University of Oulu where different stakeholders can rate work items based on value and complexity, generates item relationships (such as dependency) and visualises roadmaps. This provides a unique means to visualise the value produced for each customer of a Software-as-a-Service (SaaS) product. Finally, for training aspects for software developers, TAU and the University of Oulu have created an application that visualises software engineering student progress, such as grades and participation. This dashboard can be used, for instance, to detect whether a student is likely to fail a course ahead of time.

Making the difference

In terms of results, a major success for VISDOM has been the creation of completely new innovations: prior to the project, there were no tools to capture, measure and visualise architectural technical debt in DevOps, no visualisations combining data from multiple sources to analyse hot paths through software and no visualisations for teaching software engineering



VISDOM dashboard

processes or project management using real data from various tools. While tools for configurable dashboards previously existed, these did not offer visualisation and were restricted to big players like Microsoft. In addition to creating these tools, VISDOM has made several of them open source (such as Roadmapper) to provide competitive opportunities for smaller companies and push forward visualisation in DevOps as a whole.

Regarding business impact, the project consisted of two types of industrial partners. For tool providers of DevOps visualisation, VISDOM has led to increased revenues via new metrics, application areas and customers. TIOBE, for example, has seen a 2% revenue boost for fix rate metrics and 10% for generic metrics while Invenco has gained a product business growth of around 10-15%. For partners with internal applications, results are measured in terms of improved control and quality of software development. For instance, Canon has reduced software regression to around zero (versus an estimated person month additional QA effort to find and solve regression problems in the situation prior to the project), can update machines in the field every few months rather than yearly and can monitor field performance effectively enough to react to issues within a day. This offers cost benefits via less downtime and faster development.

As demand for DevOps engineers is high, VISDOM has also served as a useful environment for developing the knowledge and competences of the consortium and the general field. As a result, VINCIT has been able to grow by five developers and 37 bachelor's or master's theses, PhDs and postdocs have been (or are being) carried out in relation to the project. As collaboration within ITEA has been a positive experience, several partners are now working on an idea for a new project on making software-intensive systems more sustainable in terms of both power consumption and changes to the code. This will help to keep VISDOM's results alive in the long term while expanding it into an area which is increasingly important for customers and society at large.

Major project outcomes

Dissemination

- More than 20 conference and journal publications (e.g. IST 2021, ESE 2022 and Journal of Software Quality)
- Over 35 theses
- 8 open source tools published

Exploitation (so far)

- Vincit Roadmapper tool for building better roadmaps taking into account different stakeholder viewpoints
- Dashboard to provide information to help practitioners monitor self-admitted technical debt (SATD) in different sources (i.e., source code comments, issue trackers, commits, and pulls)
- Canon Production Printing's new infrastructure to gather data from various sources to show on dashboard data for several DevOps phases: Develop, Build, Test: Regression dashboards, Living documentation dashboard
- TIOBE's improved product contains TQI developed in the VISDOM project

Standardisation

- Contributions to Agile and DevOps standardisation still under consideration

VISDOM

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Partners

Finland

- Invenco Oy
- Qentinel Quality Intelligence Oy / Copado Robotic Testing
- Softagram Oy
- Tampere University
- University of Oulu
- Vincit Oy

The Netherlands

- Canon Production Printing Netherlands B.V.
- TIOBE
- University of Groningen

Spain

- Experis ManpowerGroup S.L.U.

Project start

October 2018

Project end

June 2022

Project leader

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Project website

https://visdom-project.github.io/website/

https://iteavisdom.org/