MetaCase

EADS Case Study

MetaEdit+ has played an important role in fulfilling EADS's ambition to become a leader in the TETRA terminal market, by providing a robust and reliable development environment that enables EADS to introduce new members to its TETRA terminal family in record time.

TErrestrial Trunked RAdio (TETRA) is an open digital trunked radio standard defined by the European Telecommunications Standardisation Institute to meet the needs of the most demanding professional mobile radio users. With TETRA, public safety organisations and their officers can use powerful data and voice applications, such as group calls, scan communication groups and communicate in push-to-talk mode. TETRA also makes special applications – for example automatic vehicle location – practical at a reasonable price for the first time.

EADS is a frontrunner in TETRA technology, currently offering a range of modern end-to-end radio communications solutions that incorporate the latest TETRA technology, mobile data applications and related systems integration and support services.

Software plays an ever-increasing role in the success of these products on the market. A major component of the TETRA terminal software is the User Interface (UI): a complex and demanding domain, which must continuously evolve to meet customer requirements. Therefore, terminal UI engineering receives special attention, with most software developers focusing on this area.

CHOOSING THE RIGHT DEVELOPMENT TOOL

From the very beginning, EADS understood the value of quick and robust software development, however very few tools offered the flexibility and support EADS needed for its TETRA terminal software development.

Initially, the development of both protocol and UI software of the TETRA terminals was carried out using SDL, a telecom-dedicated development language dating back to the 1970's. Soon however, as the complexity of the software increased, EADS found itself in need of a better development approach and a tool. As Chief Engineer, Antti Raunio from EADS TETRA UI developers puts it: "It would be practically impossible to implement the current software with SDL. The code is much larger and more complex and SDL simply would not scale up to meet these challenges".

After careful evaluations, EADS chose MetaEdit+ as the development environment for TETRA terminals, due to its unique set of features: flexibility, support for UI terminals architecture, full executable code generation and documentation capabilities, as well as its ease of use. "The advantage of using MetaEdit+ is that we can create and use our own in-house modelling language. The modelling language is thus more flexible and we can modify it to fit our needs, unlike fixed modelling languages such as SDL", says Raunio. "This capability, along with the possibility for integrating with existing code, made MetaEdit+ an attractive choice for the TETRA terminal development team", summarizes Chief Engineer Antti Raunio.

THE SOLUTION: METAEDIT+

In domain-specific modelling, one expert defines an in-house modelling language containing the domain's concepts and rules, and specifies the mapping from that to code in a domain-specific code generator. Other developers then make models with the modelling language and the final code is automatically generated. The modelling language is based on the concepts already known and used in the domain, making it familiar, easy to understand and remember for all developers.

The same dual structure is behind the architecture of MetaEdit+. MetaEdit+ Workbench supports rapid development of the modelling language and stores it as metamodels in the repository. In EADS, MetaEdit+ Workbench was used to describe the concepts and rules of the mobile phone domain, its graphical notations, code generators and document generation templates.

MetaEdit+ reads these metamodels and provides customised CASE functionality for modelling with that language. This is a groundbreaking feature of MetaEdit+: users can model directly with domain concepts and rules. They no longer need to map their ideas from domain terms into the concepts of a different modelling language, and further into the concepts of the programming language used. In EADS TETRA Terminals, UI software engineers apply MetaEdit+ to design UI features in models and generate working product code for TETRA terminals.

BENEFITS ACHIEVED

The introduction of MetaEdit+ allowed EADS TETRA Terminals to raise the level of abstraction of UI development, while at the same time narrowing down the design space to TETRA terminal product family. The main benefits of MetaEdit+, as seen by EADS TETRA Terminals, include the following.

Faster development

A comparison with the old development approach is often difficult to make, as the software developed today is much more complex and provides more features than earlier products. When compared to use of SDL, MetaEdit+ has clearly boosted development speeds due to its capabilities for supporting extensive reuse and managing variation within the terminal product family. According to EADS UI developers, it would be impossible to apply SDL for today's complex domain and large amount of design specifications.

Quality of product code improved

As Antti Raunio says, "the quality of the generated code is clearly better, simply because the modelling language was designed to fit our terminal architecture. This rules out errors, eliminating them already in the design stage. If applications were coded by hand there would be a lot of errors and the range of error types would be wider". Similarly, other empirical studies in the telecommunication field indicate that the use of domain-specific modelling languages significantly decreases the number of errors (for more information contact MetaCase).

Hiding complexity makes development easier

The domain-specific modelling language, supported by MetaEdit+, enforces UI architectural rules and hides implementation details, making UI development easier and safer. Even new developers with less C code experience can effectively develop features using MetaEdit+, since it supports the rules of the TETRA handset domain, guiding model-based design work and preventing developers from creating erroneous designs. This is a result of the domain-specific modelling language and generators: new developers do not need to understand all the details (or even look at the code) as the tool directs the development work and allows development to take place at a higher level of abstraction.

Up-to-date documentation

As documentation and code are both generated from the same models, EADS's design, code and documentation are now always up-to-date and in sync. The quality of design documentation was also improved as MetaEdit+ generates it in accordance with corporate's documentation standards. As the information in models is expressed in domain terms, the documentation is easily understandable and supports reviews.

MetaEdit+ users require less support from experts

According to EADS TETRA terminals, once the domain-specific modelling language is implemented, expert support is practically not needed. The expert's

knowledge has been embedded in the tool, so developers no longer need to solve the problem of mapping domain ideas into quality code by themselves, time after time. "Also tool support is not needed when everything works fine, and that has been the case with MetaEdit+. MetaEdit+ is a stable and robust product", summarises Raunio.

For a developer experienced in the domain, designing and implementing a domain-specific modelling language using metaCASE technology is not a time-consuming process. After a few man-weeks from the expert, all other developers can develop like experts too!

CONCLUSION

EADS is a leader in the TETRA solutions market and it has also initiated a number of technological improvements in the TETRA standard itself. The EADS TETRA Solution combines all the technology benefits of the TETRA standard with ease of use and high performance. EADS offers a large selection of handheld and mobile TETRA radios, with functions to match the needs of different user groups.

MetaEdit+ has played an important role in fulfilling EADS's ambition to become a leader in the TETRA terminal market, by providing a robust and reliable development environment that enables EADS to introduce new members to its TETRA terminal family in record time.

YOUR NEXT STEP

Visit us at http://www.metacase.com to see how MetaEdit+ can speed up your software development!

MetaCase