CASE STUDY

GEODIS CAPITALIZES ON CUSTOM CODE AND ELIMINATES IBM i SKILLS SHORTAGES, MODERNIZING APPLICATIONS WITH ARCAD MAAS (Modernization as a Service)

The Customer

GEODIS

GEODIS is one of the leading supply chain companies in its field worldwide. Part of the SNCF Group, GEODIS is the number one Transport and Logistics operator in France and ranked number four in Europe.

The company has a direct presence in 67 countries and a global network spanning over 120 countries, providing end-to-end supply chain management solutions for its customers, across five Lines of Business: Supply Chain Optimization, Freight Forwarding, Contract Logistics, Distribution & Express and Road Transport. ◆

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>
> Hugues Clement, IT Manager at GEODIS

IT Challenges

GEODIS runs several application-based solution centers. The organisation's core mission-critical warehouse management system (WMS), ALTESSE, was developed on the IBM i (aka iSeries, AS/400) platform in 1993 using the CA 2E (Synon) 4GL.

The ALTESSE application manages warehousing across a number of market lines, including FMCG, Retail, Industry, Healthcare, and Spare parts. It is deployed in 14 countries to 45 sites and 1900 end-users - including IBM itself in Endicott, NY for the reverse logistics activity.

The IBM i platform is strategic to GEODIS thanks to its high reliability and low total cost of ownership (TCO). The WMS team at GEODIS were facing two main challenges in delivering against application maintenance objectives:

- Being written in CA 2E Synon, the ALTESSE application was **unable to exploit the latest technology on IBM i**, especially the new database capability. For example, from Synon, it was impossible to manage sound, image and large objects (LOBs) such as video - an absolute requirement for GEODIS, needed for data exchange with other applications such as their robotics-based warehouse control system (WCS).

- Synon **development skills were hard to find**. This made staffing the ongoing enhancement of ALTESSE a critical issue.

Hugues Clement, IT Manager at GEODIS summarized the situation: "We are committed to the IBM i as the most secure, cost-effective and dependable platform for our business. But our 4GL language was holding us back from exploiting the latest IBM i features. Synon has not evolved in 15 years and the "gap" was growing with every new release of IBM i. In addition my team were often unable to find Synon skills to staff our projects. We had to find a solution to modernize our application, safeguard our investment in development, and keep closer to IBM i standard development tools to avoid having same issue in the future".

In the remainder of this document, Hugues Clement describes the characteristics, challenges and achievements of the SYNON Modernization project at GEODIS. ◆

Modernization as a Service (MaaS)

In 2016 GEODIS took the strategic decision to remain on IBM i and undertake the modernization of our ALTESSE WMS application. Modernization, as opposed to migration, would preserve the competitive advantage of our in-house developed code.

We needed to achieve a complete end-to-end modernization, covering:

• conversion of application source code, database and the user interface (UI)
• new DevOps development methods and tools

Given the scale of this project, we needed a highly automated "push-button" conversion, to avoid human error and ensure consistent results across all the converted code.

In late 2016, we selected ARCAD Software as IBM i modernization partner, for a number of key reasons:
• relationship of trust with ARCAD from previous projects (e.g. Application Lifecycle Management)
• ARCAD was the only vendor to combine DevOps and Modernization solutions in a fully integrated range
• ARCAD were able to guarantee the non-regression of the modernized application

To minimize risk and avoid delays, we opted for ARCAD's Modernization as a Service (MaaS) rather than a completely in-house project. With MaaS, our teams could continue development as usual on their maintenance code branch, while ARCAD staff performed code conversions on a parallel branch, merging in bug fixes and enhancements during the project.

The modernization project using ARCAD's MaaS integrated the following solutions:

• conversion of source code to RPG Free Form (ARCAD-Transformer RPG)
• conversion of DB2 database (DDS) to full SQL (ARCAD-Transformer DB)
• conversion from 5250 to Web screens (Profound UI)
• new DevOps development methods and tools (ARCAD for DevOps)

A key advantage of ARCAD's MaaS was the **continuous regression testing by default.** ARCAD for DevOps has ARCAD-Verifier test automation built-in. Test scenarios were recorded on ALTESSE before project start, and then re-run after each conversion operation to detect any errors as early as possible in the project.

Project Phases

We performed the modernization project in 4 phases:

1) Convert from COBOL/RLA to RPG/SQL
2) Convert Physical/Logical files to DB2 (tables/Indexes/view)
3) Convert RPG/SQL/DB2 to Free Form RPG/SQL/DB2 (with automatic code improvements based on SYNON program structures to facilitate application maintenance)
4) Convert 5250 screens to Web Screens

Over an elapsed period of 6 months, the entire ALTESSE WMS application was successfully converted to Free Form RPG and SQL with Web-based UI, covering:

- 7 700 Programs
- 5 500 Screens
- 1 900 tables
- 31 million lines of code

Gains from the "Developer" Perspective

Prior to the modernization project, the majority of developers knew only the highly specific SYNON 4GL development environment – they had no experience in "classic" development using languages such as RPG, COBOL or C.

After one month of training in RDi, SQL, Free Format RPG, and the ARCAD solutions, the team was already up and running with the new language and tools. They became autonomous in their use of the new technology after a 2-week ramp-up period with a technical specialist. The build-up of skills is progressive and it is important to organize knowledge sharing within the team to assist the more reticent team members.

The team now use Free Form RPG by default for development. In this transitional period, when there is a very complex maintenance task to achieve, it is possible to use SYNON in parallel with Free Form RPG which can assist some developers in finding their way more easily into the Free Form code. In time, once the developers are full skilled-up this will no longer be necessary.

The feedback from SYNON developers is very positive, and they found the transition easier than expected. Their main observations so far have been:

• The RDi development environment is more intuitive and user-friendly than the SYNON environment
• Debugging an application is easier with the new technology
• Passing parameters in function calls is a bit more complex (SYNON presented the list of parameters to

pass, whereas in RPG Free Form you need to refer to the function prototype declaration to code the function call)

• It is important when creating a new table to ensure that the fields from the data repository are used (if a nex field is not created)

We have made a very significant first step. We still have further to go because after 15 or 20 years of developing in SYNON, the team needs to extend their expertise in the new environment to become more productive than before.

Recommendations for a smooth transition

We have learnt several techniques to make the migration easier :

• It is important to define the naming rules of both :
o new components (Codes and/or literals) in order to easily find them in SYNON repository logic (components are linked to a table, search from table name, etc.)
o fields (use of long names at the table and code level to have more "readable" code, eg: Code_ Entrepot more readable than CDEN).

• Define development "Templates" by copying standard SYNON functions (DSPFIL, DSPRCD, EDTRCD ...) usable as a starting point for the development of new functions (these can even be created in SYNON so that they are « modernized » with the application).

Obstacles overcome during the project

We were the first customer to use ARCAD-Transformer to convert SYNON to Free Format RPG and DDL (SQL) on such a large scale, so we have contributed to the enhancement and « battle-hardening » of the tool.

In our specific case at GEODIS, because we used to generate COBOL (instead of RPG) from SYNON, we needed to add an extra phase at the start of the project. For the modernization to succeed we needed to switch to RPG IV generation, and around 15% of our SYNON components needed to be reworked to make them compatible with RPG IV.

We did counter some slowdowns in the project when modernizing complex SYNON elements (such as printer elements PRTFIL, PRTOBJ, and tables), but this was mainly due to challenges on our side in freeing up the resources needed due to customer-facing projects we were running in parallel, and also the lack of external resources available with SYNON skills.

The benefits of Test Automation in the modernization process

In our specific context, because we needed to switch from COBOL generation to RPG IV generation before starting on the modernization itself, we needed to check for non-regression at two points in the project :

After COBOL / RLA to RPG IV / SQL conversion

After RPG IV / SQL to Free / RPG conversion

By automating the regression testing with ARCAD-Verifier, we could compare results in identical contexts before and after the conversion, and report on any differences. This was very easy to do with ARCAD-Verifier because the tool manages the restore of test data transparently after every scenario execution.

The goal of these regression tests was not to functionally check the completeness of the converted application, but to check the conversion engine. For this, we took a sample of the application taking into account all the implemented SYNON components (integrated functions (date calculation, table management, numerical operations, string operations), basic functions (RTVOBJ, CRTOBJ, DLTOBJ, CHGOBJ, ...), batch functions (EXCINTFUN, EXTEXCFUN), functions with screen management (DPSFIL, EDTFIL, DSPRCD (1,2,3), EDTRCD (1,2,3), PMTRCD...), the printing functions (PRTOBJ, PRTFIL)), the parameter passing modes (FLD, RCD, KEY ... in II / ON ...). We have established 220 test scenarios to cover all the SYNON components used for our 7700 generated components.

In the end, a bug discovered after the conversion (but not detectable in a totally "Free" environment), the context being a parameter passed in "unused" mode (Mode N a set of fields of a record (RCD), which was initialized in the PGM called in SYNON and in the calling PGM in Free, causing a problem in delivering the component called in a COBOL environment (parameters not initialized in this case).

Our investment and time spent in creating these test scenarios will be highly valuable not only for the modernization project, but also in the future, as the scenarios can be re-used during any large maintenance project to ensure we catch defects early in the process and secure the non-regression of the application. The advantage of ARCAD-Verifier is its ease-of-use, meaning we can put the tool in the hands of our business users, for them to record their own QA-level tests.

Achievements

The main achievements we have made during the MaaS project are:

- Easier access and handling for employees and customers
- Improved performance in database access using SQL
- Management of wide range of objects at database level (images, documents, video, ...)
- Common development tools across multiple devices (PC, Tablets, smartphones)
- Easy onboarding of new development staff

Now in production, we are extremely satisfied with the results of this automated conversion project with ARCAD. Through modernization we have been able to leverage the 20 years' worth of functional enhancements to our application. Our customers have already perceived benefits in ease-of-use and enhanced performance. By migrating to modern technology on IBM i – Free Form RPG and SQL – we have succeeded in future-proofing our core application and resolving the resource shortage that was a threat to the sustainability of the most critical assets in our application portfolio. We have resolved the burning question of who is going to maintain our applications in the future – which will translate to less cost and risk in the years to come.

Next Steps

We are currently putting into production a pilot project using Delta drones for inventory control, as part of their WCS system. The modernization of ALTESSE on IBM i has enabled image and video data exchange between the WCS and WMS using Webservices.

As an extension to the WMS modernization project, warehouses will soon be equipped with Android mobile devices.

Also, to better support operations in China and Japan and handle DBCS requirements, we plan to migrate their database to Unicode, using the ARCAD-Transformer UNICODE solution.

*Testimonial from **Hugues Clement**,*
IT Manager at GEODIS

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