GDB d.o.o. Gorenjska CIM Project

We do IT in power

Elektro Gorenjska CIM Project

CIM Integration Platform
Project stakeholders

Elektro Gorenjska:
- Slovenian utility with approximately 90,000 consumers
- 20 Substations, with networks on 110, 20 and 0.4 kV
- Key IT systems: SCADA/DMS (GE), ERP & Asset Management, GIS, etc.

GDB:
- IT oriented power engineering company
- CIM based integration: 2 projects (Elektro Maribor, Elektro Gorenjska), several prospects in Slovenia and abroad.
- Application of SCADA/DMS: 2 major projects (Elektro Maribor, Elektro Gorenjska)
- Substation automation projects
ESB based integration

- Compared to P2P integration – benefits become increasingly apparent as the pool of integrated IT systems grows.
- Company-level integration strategy
- Elektro Gorenjska strategies:
  - New IT systems implementation
  - IT systems integration

Strategy and planning is essential when trying to maximize the benefits of ESB based integration
IT strategy of Elektro Gorenjska

Current status at EG
<table>
<thead>
<tr>
<th>Project phase</th>
<th>Project subject</th>
<th>Approx. duration</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Getting to know CIM and tools related to CIM</td>
<td>6 months</td>
<td>Own EIMV consultant</td>
</tr>
<tr>
<td>2</td>
<td>Creation of a pilot model of a part of a network and data engineering</td>
<td>6 months</td>
<td>Own EIMV consultant</td>
</tr>
<tr>
<td>3</td>
<td>Additional analysis of the pilot model and determining the vision and strategy of integration</td>
<td>6 months</td>
<td>Own EIMV consultant</td>
</tr>
<tr>
<td>4</td>
<td>Defining the implementation process. Testing on actual use case (MV grid model exchange between Cimphony and Network analysis tool via CIM XML files)</td>
<td>12 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
<tr>
<td>5</td>
<td>Integration platform implementation in accordance to IEC 61968-100 and implementation of related software (CIM repository)</td>
<td>12 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
<tr>
<td>6</td>
<td>1st integration project: Integration of EAM/GIS and Network analysis tool</td>
<td>12 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
<tr>
<td>7</td>
<td>2nd integration project: Integration of SCADA/DMS</td>
<td>6 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
<tr>
<td>8</td>
<td>3rd integration project: Integration of operational measurements system</td>
<td>6 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
<tr>
<td>9</td>
<td>4th integration project: integration of the SCALAR system (outages caused by lightning)</td>
<td>6 months</td>
<td>Own EIMV consultant EIMV</td>
</tr>
<tr>
<td>10</td>
<td>5th integration platform: integration of MDMS</td>
<td>12 months</td>
<td>Own EIMV consultant 3rd Party</td>
</tr>
</tbody>
</table>
Integration strategy

Gradual integration

First phase (currently being implemented):

- Implementation of CIM Integration Platform – infrastructure for CIM based integration of IT systems.
- Integration of 2 IT systems, 2 use-cases each:
  - SCADA/DMS: CIM Repository population, SCADA measurements return
  - Operational Measurements System: Measurement point creation in SCADA/DMS via CIM, Measurement values return

Next phases:

- Expansions on the scope of data exchange within the existing integrations
- Additional integrated systems: MDMS, SCALAR, GIS, Asset Management, ERP, etc.

Providing scalable Integration Platform is a must
Requirements - 1st phase

- CIM Integration Platform with SIDM based messaging system according to IEC 61968-100 using Web Services
- Implementation of the following integration patterns:
  - Synchronous request/reply
  - Asynchronous request/reply
  - Publish/subscribe
- Performance: 1s for message delivery, 30ms for object insertion
- Scalability: 1 million CIM objects supported in CIM repository
- Redundancy: Failover cluster on message broker and CIM repository
- Interoperability: Clients can be platform independent
- Security: Communication must be encrypted and authenticated
- CIM export/import in RDF format
- Implementation process support - one of the most important
WEB.CIM features

- Based on WCF Framework
- CIM Repository – OODB on Oracle 12c
- Reliable message delivery implementation using MSMQ
- User access management – Transport with message credentials
- CIM data model is implemented (entirely) on:
  - CIM Repository
  - SIDM Interface
- Generic Web Service operations on SIDM interface
Conditions for gradual integration

- Provided infrastructure a cornerstone
- Gradual integration follows the specified use-cases
- Implementation process support is crucial when considering long-term integration process.
Use-case definitions

Taking into consideration the desired integration output they specify:
- data transformations and mappings
- data flow across the integrated IT systems

Predicted at the beginning of each phase of integration process
For this phase they were already outlined in the tender

Defined in detail soon after kick-off:
- Tight collaboration between customer and vendor is essential
  - Customer defines the desired integration output and interprets data across the existing IT systems
  - Vendor recommends the optimal integration patterns and data flow as well as data transformations & mappings
- Output of this process should be well documented

Use-cases are implemented on the client side. Integration Platform is only messaging and integration infrastructure.
Elektro Gorenjska defined the desired integration output as follows:

- **SCADA/DMS** will populate CIM Repository with network-related and SCADA-related data:
  - Network model
  - Connectivity
  - SCADA point values (switch positions)

- **SCADA** will provide its historical accounts data for analog measurements of electrical quantities (P, Q, U, I)

- **Operational Measurements System** will import network-related data from CIM Repository and add additional measurement points to SCADA/DMS (via CIM) on the corresponding locations

- **Operational Measurements System** will provide its historical accounts data for analog measurements of electrical quantities (P, Q, U, I)
Implementation process support

Purpose: Customer is independent from vendor when implementing new use-cases or integrating new IT systems via CIM Integration Platform

- Partially provided by implementing the entire CIM model and generic methods to manipulate data in CIM Repository

In addition, the following must be in customer domain:

- CIM model version update & model extensions of CIM Repository and SIDM Interface
- Implementation of additional CIM profiles via adding Web Service operations

Achieved by:

- Providing 3rd party code engineering software (Enterprise Architect by Sparx) to generate the required code
- Proprietary tools for database schema generation
- Proprietary tools for web service generation
- Organizing the projects to enable exposing the necessary parts of source code and compiling the project without required vendor interference
Future Expansions

- MDMS: provides data on LV network
- SCALAR: acquires data in case of lightning storms and seeks correlation between SCADA events and weather conditions
- GIS: provides GPS coordinates to each CIM Equipment. Long-term chances for auto-generation of geographical diagrams based on CIM
- Asset Management (ERP): More accurate network model data than that in SCADA/DMS. SCADA/DMS database will be populated by CIM
- DMZ zone: During security-related reviews of several IT systems some existing P2P integrations were recommended to be run through DMZ zone. CIM proves to be a viable alternative.
1st phase can be considered an investment into IT systems integration infrastructure

Benefits become more apparent in later stages:

- Lower IT system administration costs
- Additional functionalities to each system
- Better data quality
- Better organization prospects
Thank you

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