Volvo HANA story, financial and performance results

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SAPSA VårlImpuls 2016
The Volvo Group, which employs about 100,000 people, has production facilities in 18 countries and sales of products in more than 190 markets.
On the road

In the city

Off road

At sea

WHAT WE DO

Volvo Group IT
Volvo HANA SAPSA VårImpuls
3 4/29/2016
The employer of choice

Customer success
We make our customers win.

Trust
We trust each other.

Passion
We have passion for what we do.

Change
We change to stay ahead.

Performance
We are profitable to shape our future.
What HCL is helping us with in IT and what we keep in Volvo Group

HCL Technologies Signs a Global IT Transformation Deal with Volvo Group [1]

Published Date:
Feb 16, 2016

Also acquires Volvo’s external IT business, adding 40 new customers to its European portfolio.

Noida, India; Gothenburg, Sweden, February 16, 2016 - HCL Technologies [2] (HCL) a leading global IT services provider, today announced the signing of a significant IT outsourcing deal with the Volvo Group, one of the world’s leading manufacturers of commercial vehicles and the customers of its external IT business. HCL also acquired Volvo’s external IT business, adding 40 new customers from the Nordics and France to its portfolio, further enhancing its market leading position in these regions. Approximately 2,500 highly skilled people working for the Volvo Group will transfer to HCL across 11 countries. The deal is one of the largest IT deals signed by any Indian IT company, and a first in the industry to use principles of Vested Sourcing as the basis of the relationship for an IT outsourcing engagement of this size and magnitude.
Volvo SAP Solution Center:
A true Global Organization...

Total Strength: 417
Employees: 267
Contractors: 150

SAP Skillwise Distribution

Region wise distribution

<table>
<thead>
<tr>
<th>Region</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Americas &amp; Sweden</td>
<td>23%</td>
</tr>
<tr>
<td>APAC</td>
<td>50%</td>
</tr>
<tr>
<td>EMEA</td>
<td>27%</td>
</tr>
</tbody>
</table>

Average SAP experience 10 years
HANA at Volvo – Current status and background...

- HANA migration program running since 2014, 42 Productive SAP systems at Volvo today, 3 DB in use (HANA, ORACLE & DB2):
  - 8 systems now already on HANA (1 SCM, 4 ECC, 2 BW, 1 MII)
  - 2 HANA projects running, go live later in 2016, 1 BW and 1 SCM.
  - 5 systems still on Oracle (1 SCM, 1 CRM, 1 BW and 2 ECC). 2 will go to HANA later 2016.
  - The others are using DB2 and many will do so also in the future.

- HANA journey Business Case
  - Consolidation of systems gives run-time cost (RTC) savings
  - Savings on database cost
  - Savings on server platform (AIX->Linux)
HANA project set-up at Volvo

- CPM, Chief Project Manager, Overall responsible and running business project
  - Stakeholder management
  - Information/communication
  - User Acceptance Testing
- IT-project manager, running IT project
  - Planning: personnel, hardware, resources
  - Custom code adjustment
  - Demand towards sub-contractor, SAP
  - Interface change
  - IT testing
## Project Example Factory Master to HANA

- **Testing Activities:**

<table>
<thead>
<tr>
<th>Test level</th>
<th>Test Type and Scopes</th>
<th>Sys.</th>
<th>Tool</th>
<th>Resp.</th>
</tr>
</thead>
</table>
| **Unit Test**      | • **Functional DB Prog. Test**  
                      Custom code validation and test (475 programs) | VQH  | N/A           | ITS & Project team     |
|                    | • **Performance DB Prog. Test**  
                      Performance benchmark test from custom code change  
                      (Max 150 programs) | VQH  | N/A           | ITS & Project team     |
| **Integration Test** | • **Key Business process**  
                      Identified 80(out of 121) Key business process (302 programs) | QCE  | HPQC          | ITS & Project team     |
|                    | • **Interface regression test**  
                      187 interface with 70 applications | QCE  | Team place (Task Log) | ITS & Project team     |
|                    | • **DB link program**  
                      (58 programs with Flexnet, VPM and FTA) | QCE  | Team place (Task Log) | ITS & Project team     |
| **Performance Test** | • **SAP VTO(Volume Test Optimization) – 1st & 2nd**  
                      137 SAP standard program | VQH/QCE | Load Runner | SAP, TCoE & ITS        |
|                    | • **Performance Test for Y&Z**  
                      (Top 53 by longer response time) | QCE  | Load Runner   | ITS, TCoE & Project team |
|                    | • **Background job & Batch program test**  
                      (Top 50 by longer response time) | QCE  | Team place (Task Log) | ITS & Project team     |
|                    | • **Stress & Load Test**  
                      (Mass execution of load runner script) | QCE  | Load Runner   | ITS, TCoE & Project team |
| **User Acceptance Test** | • **Major programs of business process from each region**  
                      (Approx. 2200 programs) | QCE  | HPQC (by ITS) | Volvo CE Key User      |
Project Example Factory Master to HANA
- Dry Run & Production Cutover:

Complex Cut Over migration activities with:

- **2 dry runs** to fine-tune & confirm all migration steps
- **Detailed ITS & Biz Go Live checks** to confirm post migration data base consistency:
  - Oracle & Hana database comparisons for +100 tables, and key transactions & operational / financial reports.

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**Cutover Schedules**

<table>
<thead>
<tr>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW 42</td>
<td>CW 43</td>
<td>CW 44</td>
<td>CW 45</td>
</tr>
</tbody>
</table>

Dry Run
- 1st
- 2nd

Prerequisite Validation

Dec 10

1st Go / No go decision

Dec 11

Uptime Migration

Dec 23

Ramp down Activity

Dec 24

Downtime Mig.

Dec 28

2nd Go / No go decision

Dec 29

Post Go live Safeguard

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Dec 27

Dec 28 (Mon)

24:00 03:00 06:00 09:00 12:00 15:00 18:00 21:00 24:00

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Ramp Down
- User ID Block
- Prepare Backup data
- Batch job deactivation
- Stop Interface
- Application Server Backup

Down Time Migration Activity by SAP

Post activity by Volvo
- File system check
- VCOM installation
- Integration check
- Validation by ITS & Key user

Interface change in partner system

Go Live preparation
- Activate interface & Batch Job
- Unlock user ID
- SOLMAN Activation

Roll Back process
- Clean up & Roll back
- HANA DB by SAP
- Application server roll back
- Communication with partner
  system for integration roll back
Project Example Factory Master to HANA
- Post Go live support :

- Implementation of an **optimized Go Live & Go Live support organization** to secure an efficient & fast support to all Volvo CE plants in 3 different time zones with:
  - FM Maintenance team organized in 3 shifts from Dec. 29th until End of January.
  - 2 weeks hypercare support from SAP AG (Go Live check service)
  - Extended support from SAP Security to solve quickly all authorizations issues linked with the application upgrade (EHP)
Project Example Factory Master to HANA
- Go live issues:

- Despite the numerous testing activities performed by ITS & Volvo CE, **170 issues** have been reported and solved since Dec. 29th:
  - 19 Critical *
  - 78 High
  - 98 Medium
  - 69 Low

* short term production impact if not solved immediately

48% of all issues faced are related to **Program errors (standard & custom)**, 44% linked in **EHP pack upgrade regressions** and 13% with authorizations.

![Table of Issue IDs and Column Labels]

![Status per Type of Issue]

Volvo Group IT
Volvo HANA SAPSA VårImpuls
12 4/29/2016
- Average monthly response time was improved by 25%
  1.2 sec to 0.9 Sec
- Total database size was reduced by 73% (7 TB)
  9.7 TB to 2.6 TB
Main lessons learned from the migration projects:

- No big problems found during migration to HANA, however first projects were underestimated affecting both timeline and project costs.
- Still some amounts of pilot notes required to solve some functional problems and also improve performance. Some issues with new HANA optimized transactions.
- Important to keep in sync with support packs and Java / HANA releases.
- Custom code optimization and tests are the main drivers for project duration & costs. Prioritization of efforts often required depending on number of objects to be corrected (can vary a lot between systems).
HANA at Volvo – Lessons learnt from projects…

- Main lessons learned from the migration projects (continued):
  - Many SAP tools to be combined for the code optimization phase (SAT/ATC, SCI, SQLM/SQLMD, SWLT). Static checks + Runtime monitoring
  - Most of our projects are also integrating an upgrade to the latest release or EHP (one way to optimize test efforts and costs)
  - BW migrations requires specific activities (Dual stack ABAP / JAVA split, new authorization concept when coming from older BW releases, Infocube remodeling activities)
  - SAP « DMO Migration » approach working well, SAP performing the migrations as work package and MaxAttention helping with services like Volume Tests Optimization, Go-live checks and support
    - Double maintenance on 2 chains (Old chain + New HANA chain), driving efforts and “double“ runtime costs but giving also easy fallback plans around go-live
    - Some challenges faced at beginning with the brand new HP HANA appliances, and also to operate those new environments (failover issues, learning curve for basis teams)
For next steps: 2 prioritized areas have been investigated:

- Remaining BW solutions: since biggest performance improvements and best business benefits, some solutions facing large volumes and/or some performance problems
- Remaining ORACLE solutions: since significant savings can be achieved (DB size shrinking, ORACLE licenses can be released)
- However question around next SAP release S/4HANA: should we still perform HANA migrations or wait for S/4HANA migration?

Preliminary conclusions:

- VOLVO will focus first on remaining BW systems and Business Suite components on ORACLE at least in 2016…
- … and will investigate in S/4 HANA (“Simple Finance” & “Simple Logistics”) for remaining ECC components
Lessons learned from SAP HANA migrations
Some figures on results

• HANA migrations driving significant runtime cost decrease, various factors impacting decrease (DB volumes, AIX/Oracle or Linux/DB2, size of appliance, Database planned growth, consolidation degree…).

• Some examples:
  – BW RTC decreased by 58%, DB costs decreased by 71%
  – APO RTC decreased by 7% (small system), DB costs decreased by 20%
  – ECC (Production Controlling) RTC decreased by 22%, DB costs decreased by 50%
  – ECC (Finance) RTC planned to decrease by 41%
  – ECC (Manufacturing) RTC planned to decrease by 35%
Lessons learned from SAP HANA migrations
Performance impacts and benefits

- ECC (Production Controlling) on HANA (SAP Early Watch Alert report)
  - DB size decreased by 79%
  - Average response time for dialog tasks improved by 26%
  - Average response time for DB requests improved by 50 to 80%

<table>
<thead>
<tr>
<th>PTP</th>
<th>Avg Nov 2014</th>
<th>Avg Mar 2015</th>
<th>Change in %</th>
</tr>
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<tbody>
<tr>
<td>Active Users (&gt;400 steps)</td>
<td>66</td>
<td>72</td>
<td>9</td>
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<tr>
<td>Avg. Response Time in Dialog Task (ms)</td>
<td>1076</td>
<td>799</td>
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<tr>
<td>Max. Dialog Steps per Hour</td>
<td>3902</td>
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<tr>
<td>Avg. Response Time at Peak Dialog Hour (ms)</td>
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<tr>
<td>Avg. Response Time in RFC Task (ms)</td>
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<td>Max. Number of RFCs per Hour</td>
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<td>45493</td>
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<td>Avg. RFC Response Time at Peak Hour (ms)</td>
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<tr>
<td>Avg. DB Request Time in Dialog Task (ms)</td>
<td>678</td>
<td>117</td>
<td>-83</td>
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<tr>
<td>Avg. DB Request Time for RFC (ms)</td>
<td>187</td>
<td>78</td>
<td>-59</td>
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<tr>
<td>Avg. DB Request Time in Update Task (ms)</td>
<td>330</td>
<td>155</td>
<td>-53</td>
</tr>
<tr>
<td>DB Size</td>
<td>2966</td>
<td>627</td>
<td>-79</td>
</tr>
</tbody>
</table>
Lessons learned from SAP HANA migrations
Performance impacts and benefits

- **1st BW on HANA**: Significant performance improvement reported
  - DB size went down from ~ 3 TB to ~650GB (78%)
  - Reporting: 5 to 100x faster
  - Loading of the cubes: up to 48x faster, 5x average
  - Data available couple hours earlier everyday for Asian time zone
Lessons learned from SAP HANA migrations
Performance impacts and benefits

- 2nd BW (incl SEM/BCS) on HANA – QA figures

- Response time improved on average by 43% for main transactions, many with much higher impact

- Database size
  - Oracle : 700 GB
  - HANA : 280 GB

NB: HANA migration does not solve front end performance problems in BEX
Lessons learned from SAP HANA migrations
Performance impacts and benefits

- SCM on HANA (small system / few users) (SAP Early Watch Alert report)
  - DB size decreased by 29%
  - Average response time for dialog tasks improved by 37%

<table>
<thead>
<tr>
<th>Area</th>
<th>Indicators</th>
<th>Oracle</th>
<th>HANA</th>
<th>Change in %</th>
</tr>
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<tbody>
<tr>
<td>System Performance</td>
<td>Active Users (&gt;400 steps)</td>
<td>5</td>
<td>10</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Avg. Availability per Week</td>
<td>100%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time in Dialog Task</td>
<td>502</td>
<td>317</td>
<td>-37%</td>
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<tr>
<td></td>
<td>Max. Dialog Steps per Hour</td>
<td>302</td>
<td>213</td>
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<tr>
<td></td>
<td>Avg. Response Time at Peak Dialog Hour</td>
<td>508</td>
<td>271</td>
<td>-47%</td>
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<tr>
<td></td>
<td>Max. Number of RFCs per Hour</td>
<td>37</td>
<td>956</td>
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<tr>
<td>Hardware Capacity</td>
<td>Max. CPU Utilization on DB Server</td>
<td>52%</td>
<td>5%</td>
<td>-90%</td>
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<tr>
<td>Database Performance</td>
<td>Avg. DB Request Time in Dialog Task</td>
<td>47</td>
<td>39</td>
<td>-17%</td>
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<tr>
<td></td>
<td>Avg. DB Request Time for RFC</td>
<td>110</td>
<td>16</td>
<td>-85%</td>
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<tr>
<td></td>
<td>Avg. DB Request Time in Update Task</td>
<td>263</td>
<td>73</td>
<td>-72%</td>
</tr>
<tr>
<td>Database Space Management</td>
<td>DB Size</td>
<td>77,51</td>
<td>54,9</td>
<td>-29%</td>
</tr>
</tbody>
</table>
Lessons learned from SAP HANA migrations
Consolidation of our Financial landscape

1. It is possible to consolidate, even with a complex starting point!

Global financial systems, supporting AA, AP, AR, GL, Reporting for 115 legal companies, 10,000 users. Regions:

- Fx4 ERP: 001
- Fx5 ERP: 002, 004
- Fx6 ERP: 001, 002, 003, 004
- Fx3 ERP: 001
- FxC ERP: 001
- F0R ERP: 001*
- FMD ERP: 900*

As-Is Landscape

New consolidated HANA environment

7 Systems
11 Production clients
2 supporting clients
Lessons learned from SAP HANA migrations
Consolidation of our Financial landscape

2. We have achieved a lot during this first project, but not everything

- **Business**
  - Business optimization
  - Business harmonization

- **Application infrastructure**
  - Consolidation
  - HANA migration
  - Upgrade 4.7 -> 6.0 EHP7
  - Unicode conversion

- **Support & maintenance**
  - Operations optimization
  - Maintenance optimization
  - License optimization

Not included in project, Next step? Simple finance?
3. It is a large/long project, a lot has gone well e.g. migrations outsourced to SAP. However, we have had project plan adjustments and cost over runs. How dependent a large project like this is on project team quality and project management drive, can not be underestimated. Choose carefully.
HANA at Volvo – Summary of results:

- Significant cost savings on runtime costs achieved when migrating from ORACLE/AIX to HANA/LINUX:
  - First systems migrated from ORACLE to HANA driving significant cost savings (between 20 to 50%)
  - Migrations from DB2/LINUX do not drive significant additional cost savings

- Significant improvement on performance and DB size demonstrated:
  - Performance improvements seen in all areas (at least 30%)
  - Biggest improvements in BW solutions, reports running 5 to 100x faster, loads also much faster enabling to release system earlier
  - DB size shrinking by 30 to 80%