CROSS-FUNCTIONAL BUSINESS ANALYTICS AT VOLVO CARS

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Agenda

The automotive industry is changing
Data and advanced analytics
Starting the Analytics Journey
Project Examples
What We Learned
Conclusions & Moving Forward
The automotive industry is changing
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Digital transformation
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Autonomous driving
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Sunfleet Carsharing
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Secure deliveries to the boot of cars
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Volvo On Call app
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

The Sensus Cloud links the car to your services and needs
Why data, analytics & innovation are the differentiators for Automotive

Automotive industry changes

Personal Services Technician
Data and advanced analytics
Analytics: Moving up the Value Ladder

Business Analytics mission to enable data-driven decisions and innovations across the whole company
Information must be seen as a corporate asset

Issues with Data Quality
Inconsistent standards for naming

Problems Master Data Management
Which is the master/reference?

Who has Access?
How to connect with the data without being an SQL programmer

Good analytics requires good data – managing data and information across the enterprise is a must.
Data as an integral part of the Advanced Analytics process
Separation of application and data is fundamental
Another view of our data and analytics landscape
Starting the analytics journey
Volvo cars has a great improvement potential in terms of business analytics.

Based on the interview survey “Volvo Cars Analytical Capabilities”

Analytical Scale from The Analytics Mandate, MIT Sloan Management Review, David Kiron, Pamela Kirk Prentice, and Renee Boucher Ferguson, May 2014
The 2 Volvos – industrial vs consumer

**As a car-centric industrial operation**

A great engineering company
The car is at the heart of the business
Engineers and R&D people use analytics routinely
Lots of on-board analytics, now increasing with connected cars

**As a consumer-products company**

It’s a consumer operation
The customer is at the heart of the business
Less standardized analytic processes are used
Tradition of buying answers to predefined questions
External data is blended with Volvo supplied data
The situation and why an analytics approach was needed

**Situation**

**Some clear past successes**

**Just some analytical islands**
- Scattered competence
- No coordination

**Continuing building**
**“local” data warehouses**

**Lack of analytics culture**
- Lots of ideas but lack of analytics execution
- Analytics seen as “black magic”, limiting understanding of its potential

**Challenges getting to analytics approach**

- People challenge
  - Establish broad analytics culture
  - Build competency in analytics
  - Enhance analytical communication

- Value challenge
  - Management experience sometimes preferred over analysis
  - Funding for analytics often not a priority
  - Ensure operationalization and quantified business value from advanced analytics

- Data & delivery challenge
  - Data challenges:
    - Data quality
    - Data availability and/or accessibility
    - Data understanding
  - Over reliance on external vendors
  - Lack of agility to get the results from analytics
Executive Approval for Resources, Data Management and Centre of Excellence

Decision taken

- Create a Business analytics hybrid organization
  - Central Business Analytics hub
  - The assignment of business representatives in all business functions creating the Business nodes
- Recruitment of 1 senior analyst
  (internal/external recruitment)
- Agreed the intention to enlarge the team with 2 analysts (internal/external recruitment) during 2015
- Agreed the central elements of the Enterprise Information Management
- Assign a Business Analytics Governance Team
- Quarterly report out to EMT through Quality/Product Board

Get started!

- Prediction of customer behaviour
  - Complete (360°) view of our customers
  - Web analysis
  - Connected cars
- R&D – Knowledge-based engineering
  - Connected cars
- Supply & distribution chain
- New businesses based on selling data and analytics

Evolution – not revolution!  Come back with business cases!
Centre of excellence - Why a hybrid organization?
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Executive sponsor:
SVP of Marketing,
Sales and Service (MSS)
Centre of excellence - Why a hybrid organization?

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BA Centre of Excellence
Team set-up
Head of BA
3 Analysts
1-2 IT persons

EMT
SVP of Quality
VP of Corp Quality

Purch. & Manuf.
Finance
HR
Quality
Centre of excellence - Why a hybrid organization?

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Product Strategy R&D MSS

EMT
SVP of Quality VP of Corp Quality

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Within Corporate Quality:
- Central Corporate function
- 6 Sigma competence centre
- Overall process ownership

Purch. & Manuf. Finance HR Quality
Centre of excellence - Why a hybrid organization?

Executive sponsor: SVP of Marketing, Sales and Service (MSS)

Nodes in the functional areas
- Analysts with focus on the Business Questions
  - Organized in the Strategy or Operational Development teams

EMT
- SVP of Quality
- VP of Corp Quality

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< Purch. & Manuf.
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Product
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R&D
MSS
Centre of excellence - Why a hybrid organization?

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- Analyst network
  - Analytics process development
  - Requirement on IT & Data architecture
  - Competence development
  - Recruitment
  - Education
  - Interface with academia

- Within Corporate Quality:
  - Central Corporate function
  - 6 Sigma competence centre
  - Overall process ownership

- Nodes in the functional areas
  - Analysts with focus on the Business Questions
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our driving principles

- Evolution - not revolution!
- Aligned with executive strategy priorities
- Come back with business cases!
- Be sure to make a difference!
- Consumer data privacy as a given
CONSUMER DATA Privacy as a given

Volvo Cars applies the same strict rules to protect the integrity of the end-users in a connected car as it applies to general safety issues.

It will always remain the end-user’s decision if he or she would like to transmit personal data to another party.

Volvo, however, believes that aggregated anonymized data from the whole Volvo car fleet can be useful to our customers – and society. For example, sharing information about road conditions, collected by several connected Volvo cars, can in the close future be shared with other cars and with road-maintenance authorities.
Project examples
Analytics in Customer service

- Multivariate data analysis to understand what is most important for workshop customers
  - Verified result by checking changes in IACS vs analyse weighting

- Research between customer satisfaction and increased loyalty for Volvo

- Adjusted our customer survey (CEM) to cover all important areas

- Based on analysis result, creating priority report for each dealer (44 markets)
  - Proven good result via CS-task force 2011-2013 (+12% Overall Satisfaction)

- Best practice actions available in each area, easy to create action plans for dealers

- Intuitive and easy to use layout with built in calculations to follow progress
ANOTHER GOOD VOLVO EXAMPLE - EARLY WARNING SYSTEM - DIAGNOSTIC READ OUT
(BUSINESS CASE BY REDUCTION OF WARRANTY PROBLEM RESOLUTION TIME – JUST SI6 MISFIRE DETECTION SAVED 26 MSEK)

Analysis/prediction engine

500 000 analyses / week

Diagnostic readouts
Repair reports

From

| Warranty data conclusions could just be made by warranty data specialists (10 – 20 persons). |
| Error prone analysis – many parameters to consider for correct statistics. |
| Data analysis only made when plausible reason |

To

| All engineering areas can follow the performance, based on weekly updates |
| The standard data model guarantees all considerations included in all statistics. |
| Prediction feature gives early warning. |

Top concerns

Data drilldown

Graphs and predictions

10-08
Proprietary Information
VIN profitability analytics

Business Analytics for Customer Order Production (COP)
EMT Strategy Project
Phase 1 – final report
7 July 2015
Are COP cars more profitable than STOCK Cars?
Customer Experience Management project
Shaping the future with connectivity data

**PROJECT SCOPE**

- Making sure overall uptime for connected car functionality
- Supervise and enable critical connectivity functions
  - Over The Air SW download
  - Connected Service Booking (CSB)
What we learned
The Centre of excellence needs to fill the analytics competence circle
Importance of analytics governance

Involve senior management to:

- Build analytics culture
- Establish vision, mission, strategy
- Set guidelines
- Evaluate business cases
- Create success metrics
- Monitor projects and standards
- And much more
Conclusions & moving forward
Conclusions

• Data is an asset and effective Enterprise Information Management is a must
• It’s not only about data, it is also about people, value/investment and analytics delivery
• Cross-functional is key – data/information, analytics, people, business
• Combining data sources enables new business and customer insights
• Importance of driving short-term value with long-term strategic direction
• Enable data- and analytics-driven decision making

Data + competence + business value = successful analytics
Where are we going next?

**Short term**
- Finalize the set-up of the analytics competence team
- Master Data Management
- Capitalize on connectivity and web data for understanding customer behaviour
- Continue to align with the strategic initiatives

**Medium and long term**
- Fill up the Analytics Evidence Book
- Continue unlocking of data
- In-sourcing of analytics
- Using analytics deliver a major portion of all corporate innovations
We would also like to enlarge our co-operation with CTH!

• An Analyst master program would be a major improvement – like LiTH - Statistics and Data mining
  • In dialogue with Morten Fjeld, Ivica Crnkovic from CTH and Jan Smith at IT Univ

Welcome Anders to Volvo Cars!
What is business analytics?

- **Wikipedia**: “Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods.

- (In contrast, business intelligence traditionally focuses on using a consistent set of metrics to both measure past performance and guide business planning, which is also based on data and statistical methods)

- BA excludes CAE being models of the physical car properties and CAM – the physical manufacturing of the car

- Excluded from the Business Analytics Initiative are also the traditional OD projects, basic analytics tasks as to create Xl-macros and the development of tools in the 6 Sigma toolbox.
Logical Data Warehouse (LDW)

- Analytics Visualization, Business Insights & Business Intelligence (BI Query and Reporting)
- Scientific Analysis
- Social Behavior
- Web Behavior
- Simulation Modeling
- Predictive Analysis
- Statistical Analysis
- Text Analytics
- Data Correlation
- Data Mining
- Statistical Model
- Maths
- Text Mining
- Data preparation for analysis
- Enterprise Data Warehouse
- Federation
- Search
- Hadoop
- MapReduce
- CEP
- Streaming
- Messaging
- Routing
- ETL
- Master Data Management & Data Quality
- Unstructured
- Quasi structured
- Semi structured
- Structured
- Internet
- Automotive
- Legacy
- Expected Data quality
- Lower
- Higher

Issuer: [Ove Samuelsson] [osauel2]; [61630]; [VC Analytical Computing Reference Architecture]; Security Class: [Proprietary]

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Different types of data and different types of analytics
Hybrid & Flexible Analytics Architecture

Data Sources
- Database
- Device logs
- E-commerce
- CDR Data Integration
- Logs Integration
- CRM integration
- Social Media integration
- Contact center integration
- Big data edition
- PowerCenter + Data Transformation

Real Time Analytics
- Event Processing
- CEP

Integration
- SYMPATHY
- Advanced Analytics
- Advanced Visualizations
- Information Services

Batch Analytics
- Teradata
- Apache Hadoop
- Apache Fuzzy Logix
- Python

Process Input
- Database

Discovery Analytics
- Teradata
- SYMPATHY
- Python
- Fuzzy Logix

Issuer: Bertil Angtorp, bangtorp, Group IT BDS, Big Data Analytics, Security Class: Proprietary

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