Modelling the impact of platform modularity choices

Vanderlande – ESI project
Jan – Mar 2022

Riné Pelders, Vanderlande, Sr Platform Architecture owner
Ben Pronk, TNO ESI, System Architect
Vanderlande Introduction
About Vanderlande

Global market leader

Established since 1949

> 6,500 employees

1.6 billion revenue

Innovative systems

Intelligent software

Life-cycle services

AIRPORTS

600

Airports including 12 of the world’s top 20

> Orlando International Airport
> London Heathrow Airport
> Hong Kong Int. Airport
> Amsterdam Airport Schiphol
> Istanbul Airport

WAREHOUSING

Many of the largest

Global e-commerce players

> Amazon
> Lidl (part of Schwarz Gruppe)
> Zalando
> Digitec Galaxus
> Albert Heijn (part of Ahold Delhaize)

PARCEL

48 million parcels sorted every day

5 Largest parcel and postal companies

> UPS
> DHL
> FedEx
> Nova Posta
> DPD
Industry segments: Airports
Industry segments:
Warehouse
Industry segments: Parcels
From Engineering to Order
to Configure to order
Winning with Smart Platforms - objectives: **customer first**

- Shorter lead times
- Cost-effective solutions
- Reliable solutions

### Key Performance Indicators

- **80% platform-compliancy in sales and execution**
- **25% reduction lead time**
- **25% reduction cost**
Runbase 2 project
RunBase2 Project Question

what is the optimal “granularity”
to supply “modules” to projects?
Equipment Modules: Level 2 vs Level 3

L2: a single Material Handling function
- Unload
- Infeed
- Merge
- Identification
- Transport
- Sorting
- Load

L3: a complex Material Handling functionality
- Line sort Area
PLATFORM GRANULARITY, A SHORT STUDY
The RunBase 2 project:

- A three months investigation (Jan – Mar 2022)
- Part of an ongoing collaboration between Vanderlande and TNO-ESI

Goals:

- Conceptual model describing the impact of granularity choices on business parameters
- Allow reasoning about and comparison between different granularity choices
- Supporting platform architecting decisions
OUTSIDE IN VIEW

• Literature:
  - Software platforms and modularization
  - Hardware platforms: focuses on high volume cost reduction
  - Little to no attention to Granularity level
  - No readily available solution for Vanderlande

• Expert consultancy
  - There is significant platform experience in the ESI-network
  - Interviewed a few dozen experts in academia and industry
GRANULARITY OF PLATFORMS

• Multiple levels of granularity (2 ..n)
  - From basic decomposition to pre-integration
  - Different drivers for modularity levels
  - Basic component level:
    • Technical and functional de-coupling
    • Standardization/outsourcing
    • Minimize Update/maintenance cost
  - Pre-integration level(s):
    • Reduce integration effort and risk for projects
    • Support flexibility for the market diversity

Integration effort
Preconfigured components
Basic, smaller components

Flexibility / Reuse

An initiative of industry, academia and TNO
FROM PLATFORM CHOICES TO BUSINESS IMPACT

Platform Strategy, Choices

- Architecture
- Sourcing strategy
- Scope
- Organization
- Governance

Granularity

Technology

Results in

Business parameters
- Effort/product
- Flexibility for customer special
- Quality
- Cost/product
- Cost of maintenance and upgrades
- Etc.

Many parameters determine the effect of a platform approach

An initiative of industry, academia and TNO
RUNNING THE VANDERLANDE CASE STUDY

Using the model:
- Most significant parameters identified
  • Only need to evaluate the differences

- Limited impact on:
  • Product cost (no volume effects)
  • Service and maintenance

- Major impacted parameters
  • Development / test effort L3
  • Project effort and lead time
  • Quality / risk reduction

Parameter relations and data of various complexity
- Simple additions, multiplications,
- Others much more complex, how much speed is gained when using pre-integrated components
- Some data available from project databases
- Others can only be (gu)estimated
- Results are not better than quality of estimates
Conclusions and next steps
General Conclusions

‘reasoning’ model alone gives insufficient confidence

- Relationships between factors is more complex as viable for ‘reasoning’

- Availability of the right quality data
  
  › L3 module definition under development
  
  › Impact data hard to estimate, making ‘Guestimates’ found to be difficult

  › Model is very sensitive for some parameters
Next steps for granularity model

We need a tool to support architects:

- Part of MBSE model
- Linked to project cost database (historical data)
- Build expert database
  - Understanding complex relationships
  - Previous experience and their relevance/context

Learning by doing
Feedback from projects
The impact on platforming objectives

- Shorter lead times
- Cost-effective solutions
- Reliable solutions

80% platform-compliance in sales and execution

25% reduction lead time

25% reduction cost

L2
Maximal flexibility of the solution
Integration of customer specific solutions

L3
Pre-integration and pre-testing

L1
Standardization → savings in supply chain
VANDERLANDE
MOVING YOUR BUSINESS FORWARD