



# IT Architecture overview

May 10th 2018



# Content

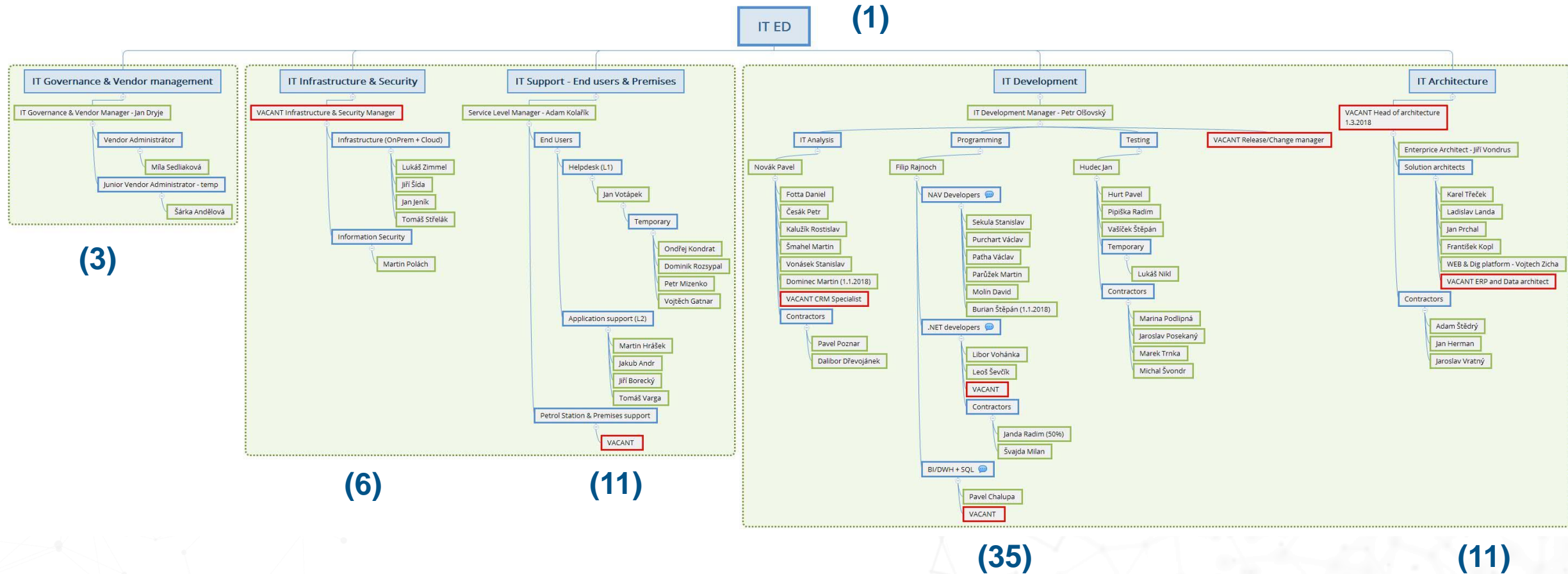
1. IT Context (2)
2. Agile Approach (4)
3. Architecture Overview (10)
4. Core Systems transformation (7)
5. Innovation Activities (8)
6. IT Strategy (3)
7. IT Roadmap (4)



# IT ORGANIZATION



# IT Organization diagram



# AGILE TEAMS and MOVING on 4th FLOOR

IT architecture	IT analysis	Development	Testing	Business
				ERP
				WEB
				DATA
				CRM
				...

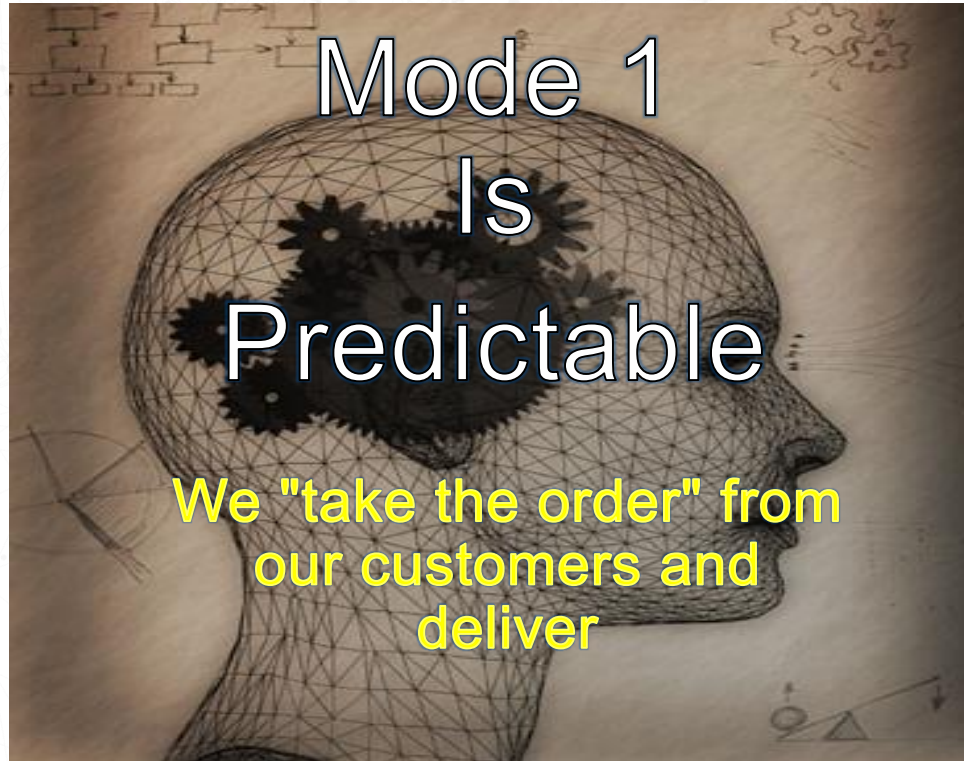
- Team HUBs creation - specialization to defined area (system)
- DEVOPS approach
  - focus on production support, technical debt, small development, projects and R&D in single area



# AGILE APPROACH



## Two Modes of Working





# Business & IT Engagement in Mode 1 and Mode 2

**Business → IT → Business → Customer**



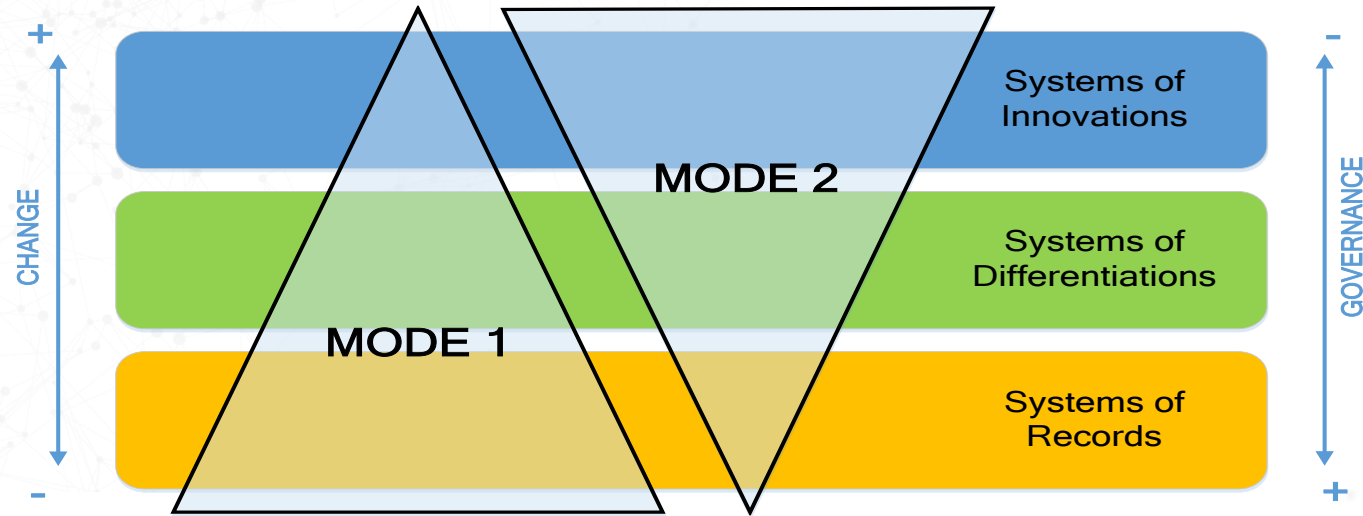
**Mode 1 Business Engagement is Linear**

**Mode 2 Business Engagement Is Clustered**





# Pace Layering and Bimodal IT are complementary



## Mode 1 - Business as Usual

- When you're certain you know where you're going
- The tried and true way
- One-off, one-and-done, 18 to 36 months
- Predictable: Plan ahead for everything, then march to orders
- Don't change much: Schedule, scope, people, target
- Big bets: Hard to reverse or recover if wrong ...

**CERTAIN**



## Mode 2 - Business as Unusual

- Not sure of direction or path
- Need to do things ... and fast
- Experiment and explore new things
- Travel light
- Try multiple things
- Clarify outcomes to target (not "no plan")
- Test to verify outcomes and assumptions
- Change direction fast (pivot) or reverse
- Harvest those that work

**UNCERTAIN**



# Paced Layered IT Landscape



## Systems of Record

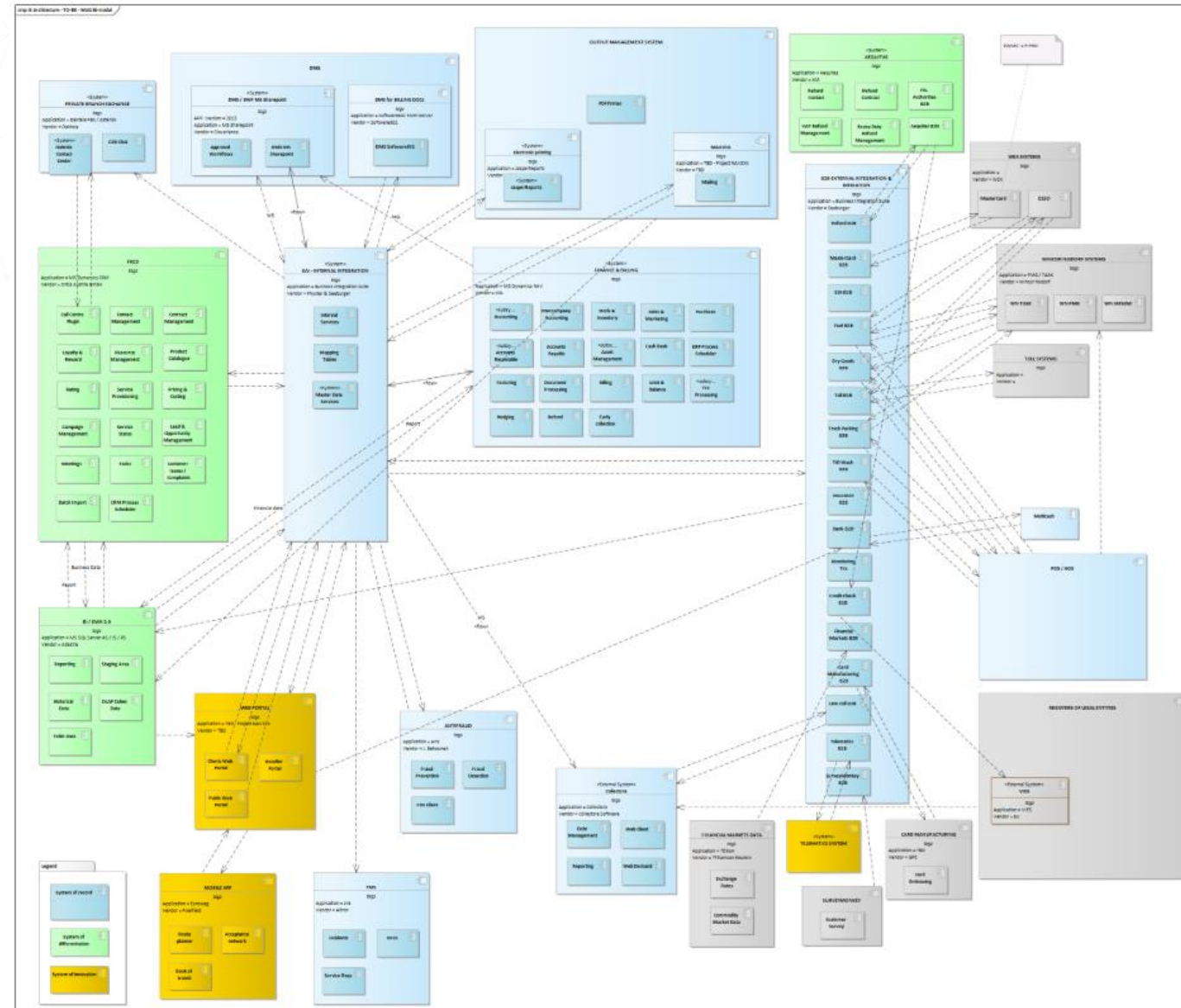
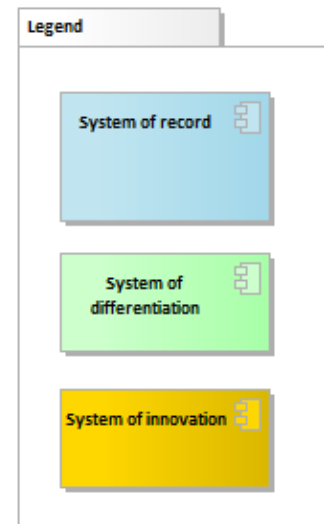
- ERP
- DMS
- TMS

## Systems of Differentiation

- CRM
- BI/DWH
- AEQUITAS
- ESB

## Systems of Innovation

- Web Selfcare
- Telematics Systems
- Mobile Apps





# IT ARCHITECTURE



# Infrastructure Architecture

## 1. Datacentres

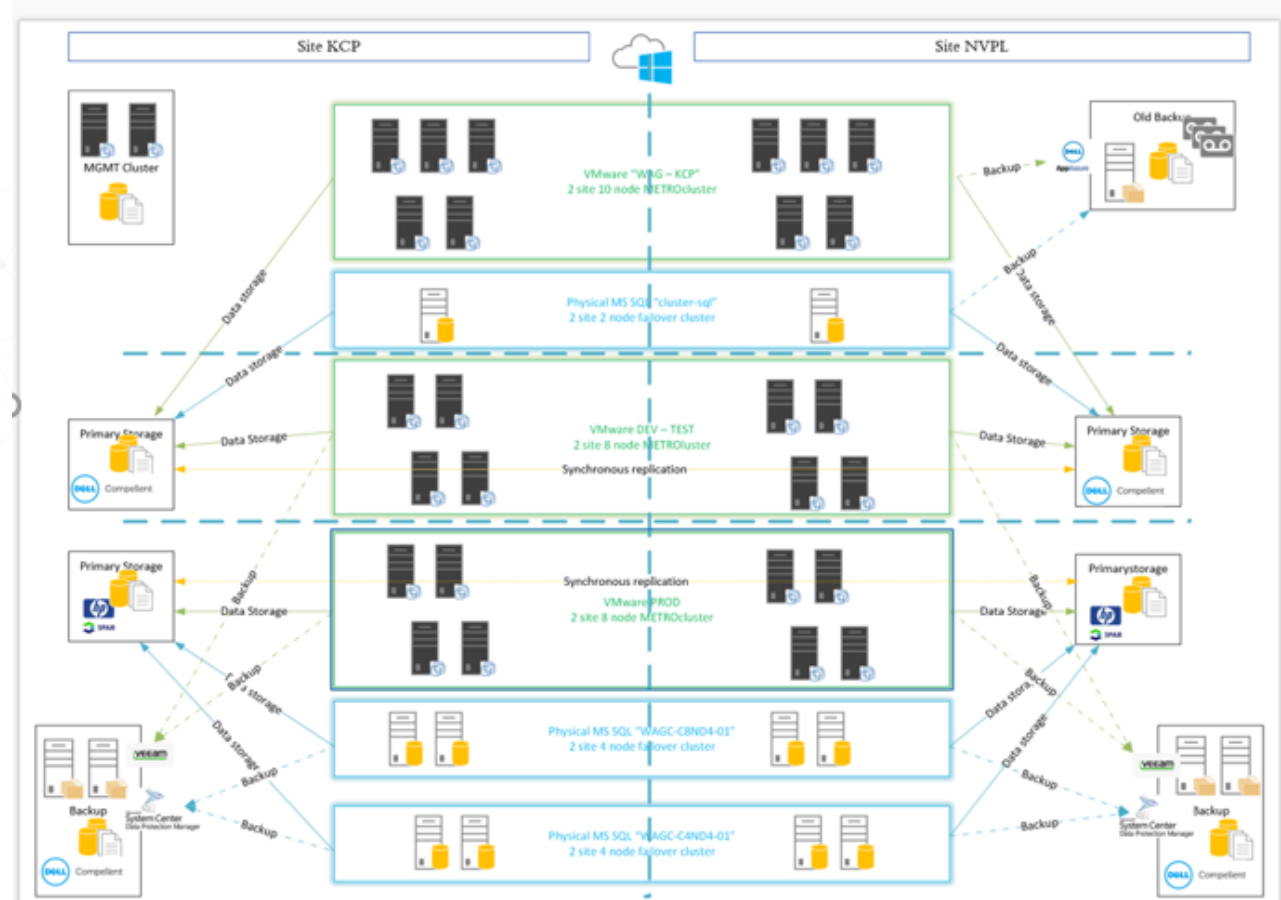
1st in WAG headquarter  
2nd in commercial datacentre (T-Mobile)  
WAG datacentres fully mirrored,  
build for high availability mode  
(+ new acquisition 3x

## 2. Hardware

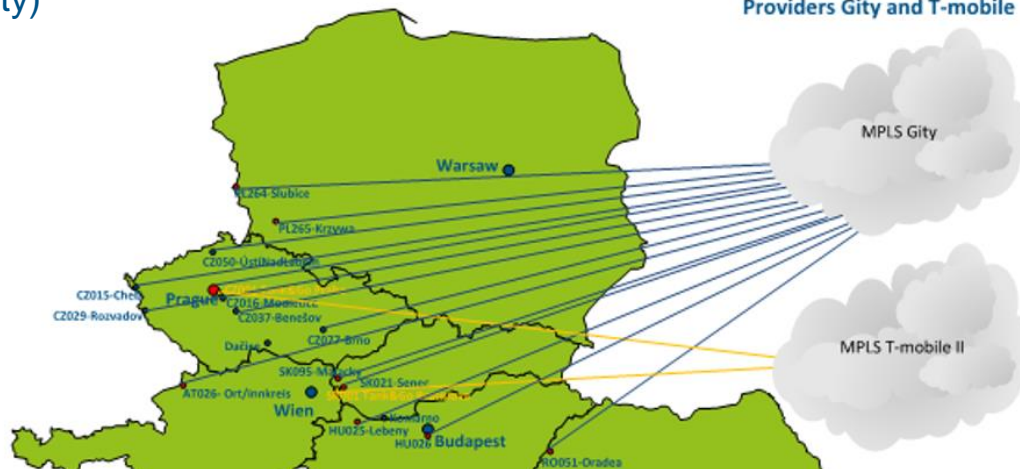
Servers – Intel platform + VMware  
Storages – Dell Compellent and new HP 3Par  
Network – HP, CISCO

### 3. IP Network

Connected offices in Europe (MPLS T-Mobile)  
Connected Petrol Stations (MPLS Gity)  
POS Terminals (partner network)



W.A.G. Payment solutions, a.s. / International MPLS networks  
Providers Gity and T-mobile





# Payment network



## 1. EW Cards

Magnetic stripe cards with PIN  
and online authorization

Authorization centre outsourced  
to Wincor-Nixdorf and operated in Prague

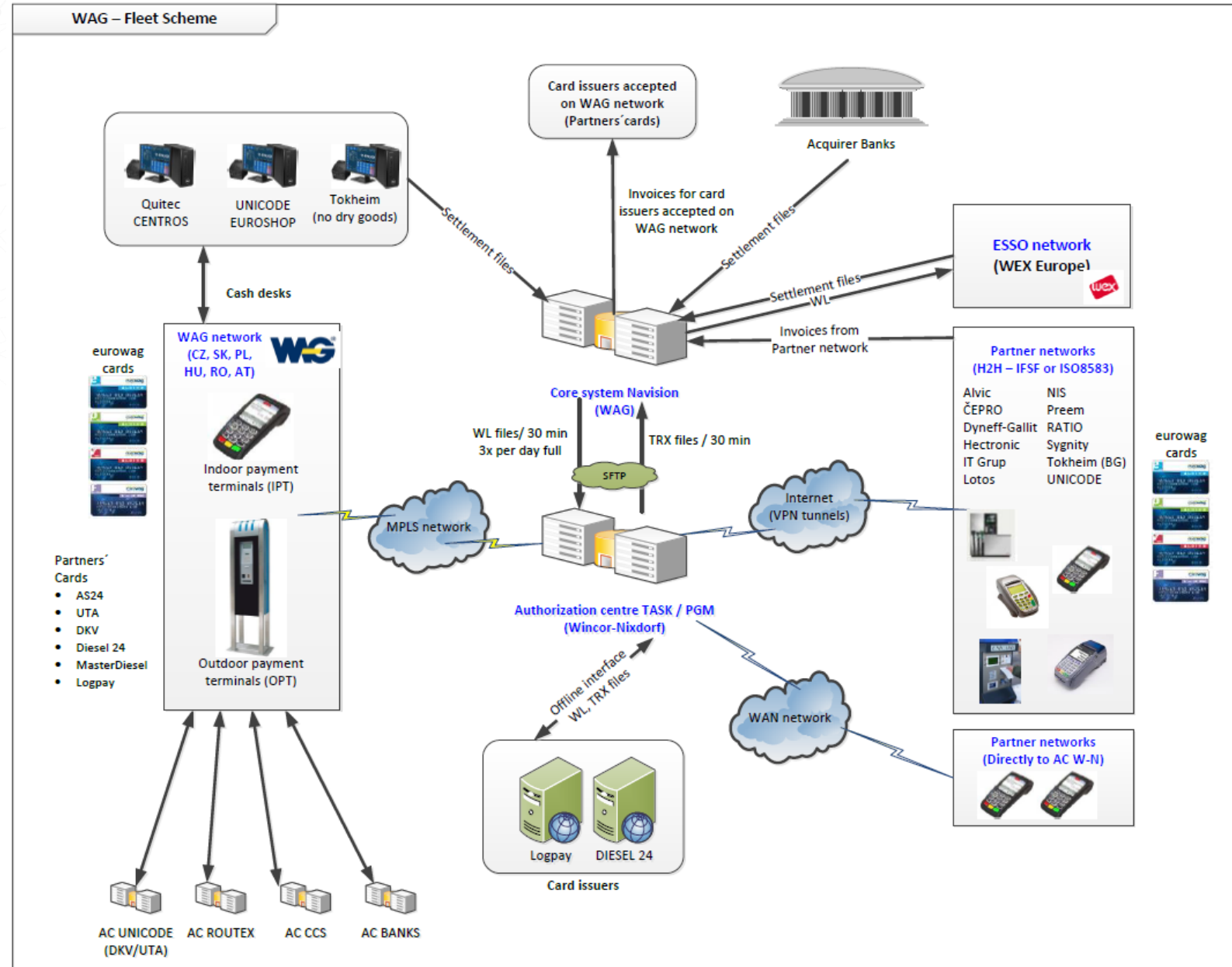
## 2. ESSO Cards

partner product for wider acceptance

## 3. Master Cards (EWMC)

open loop network

online charging mode (prepaid)  
operated in UK by PPRO



# Application architecture 2017 – AS-IS/WAS

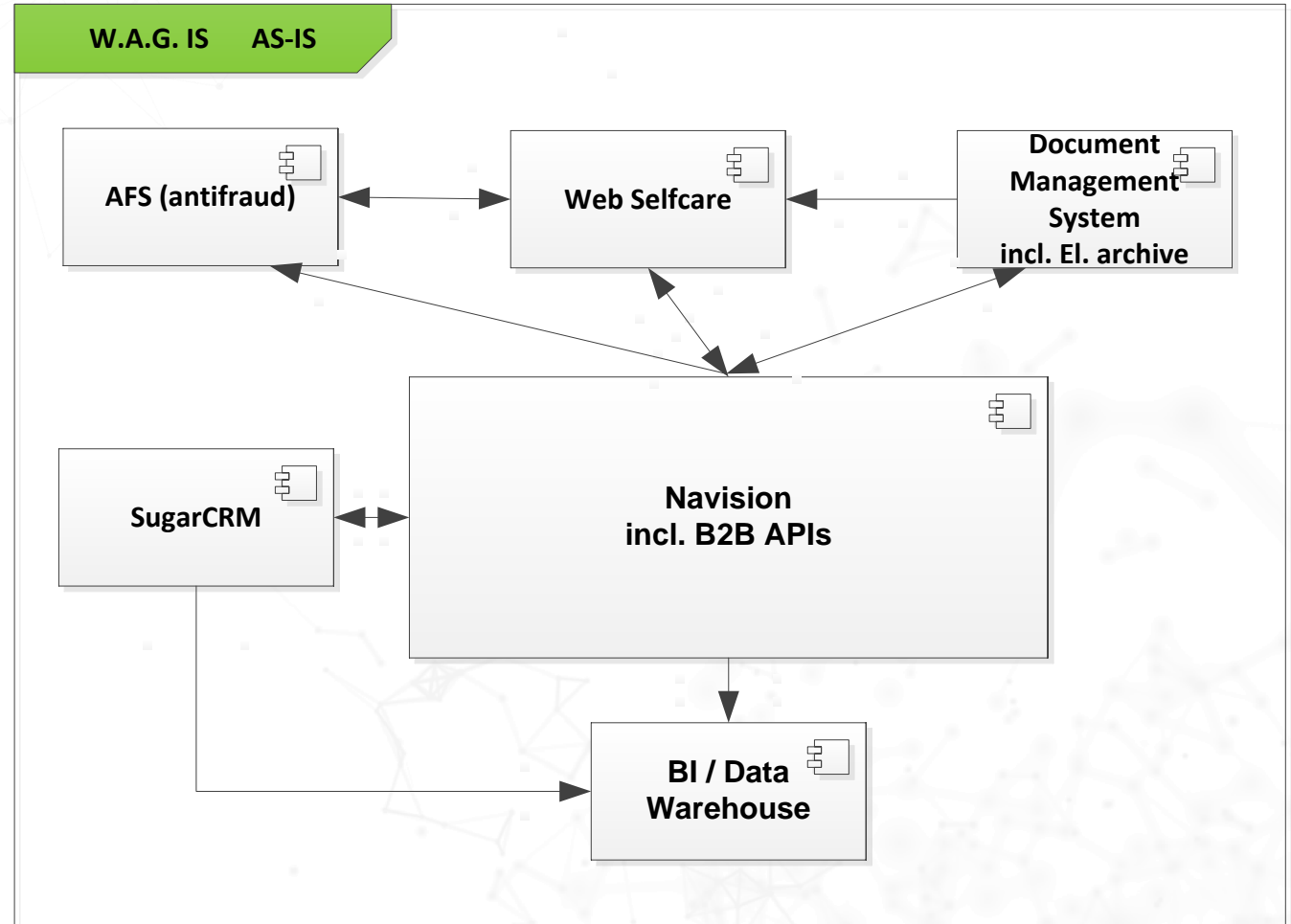


## Software platforms

- Majority systems on Microsoft platform
- Server virtualization VMWare
- Virtual desktops – CITRIX, Thin Clients

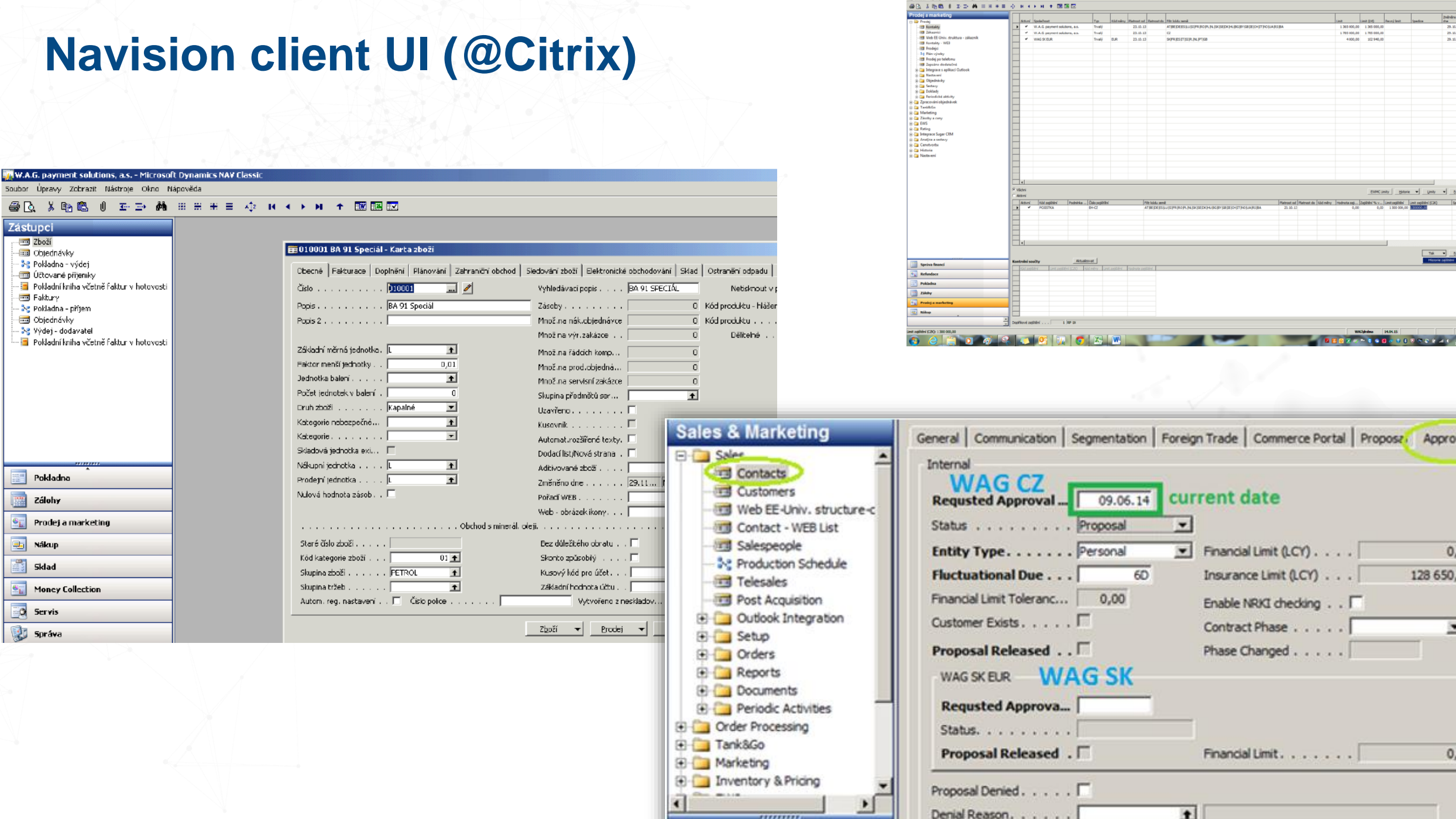
## Key application systems

1. ERP - MS Dynamics NAV
2. DWH – MS SQL + PowerBI
3. Antifraud System - (.NET cust.dev.)
4. Client WEB (.NET cust.dev.)
5. DMS - SW602
6. Sugar CRM (PHP)

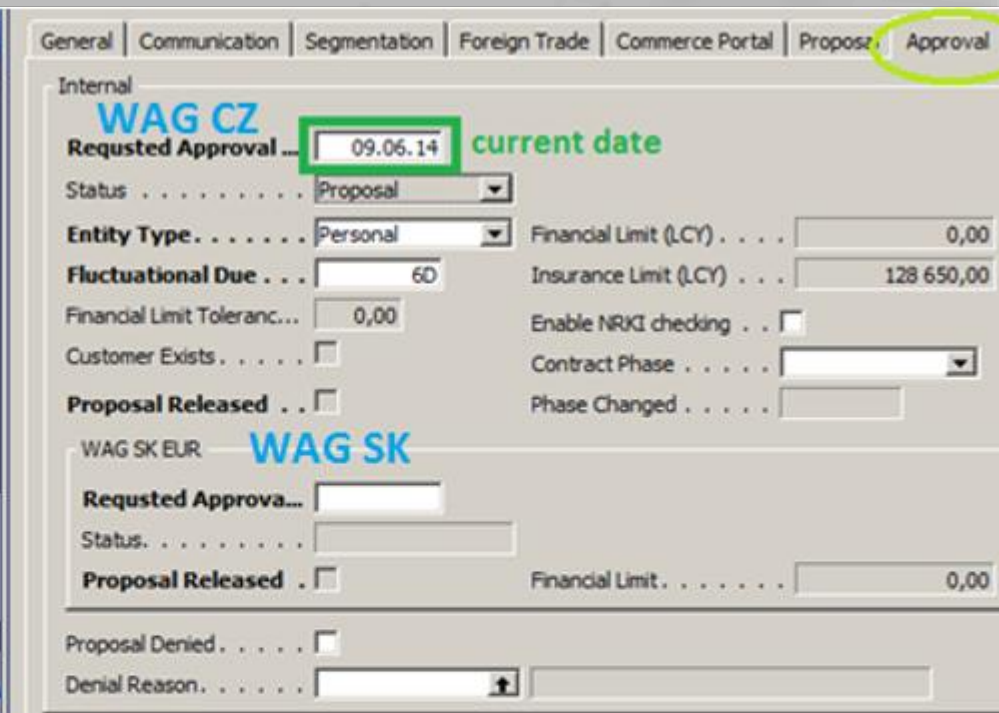
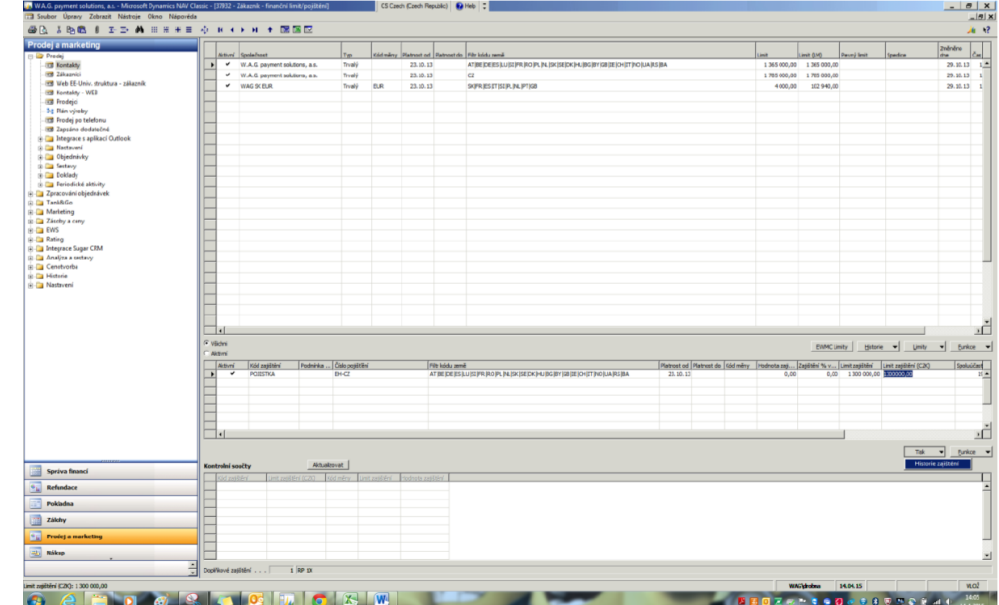




# Navision client UI (@Citrix)



The image displays three screenshots of the Navision client UI, which is a Microsoft Dynamics NAV Classic application. The top-left screenshot shows the 'Zastupci' (Representatives) window, listing various representatives and their details. The top-right screenshot shows the 'Prodej a marketing' (Sales and Marketing) window, displaying a list of sales and marketing activities. The bottom screenshot shows the 'Sales & Marketing' window, featuring a tree view of sales and marketing activities, and a 'Requested Approval' form with fields for status, entity type, financial limit, and insurance limit.



# Client Web UI

### Registration for toll charges


Select the country in which you would like to register toll. You can find an overview of the payment conditions [here](#).

[Austria](#)  
[Belarus](#)  
[Czech Republic](#)  
[France](#)

[Germany](#)  
[Great Britain](#)  
[Italy](#)  
[Poland](#)

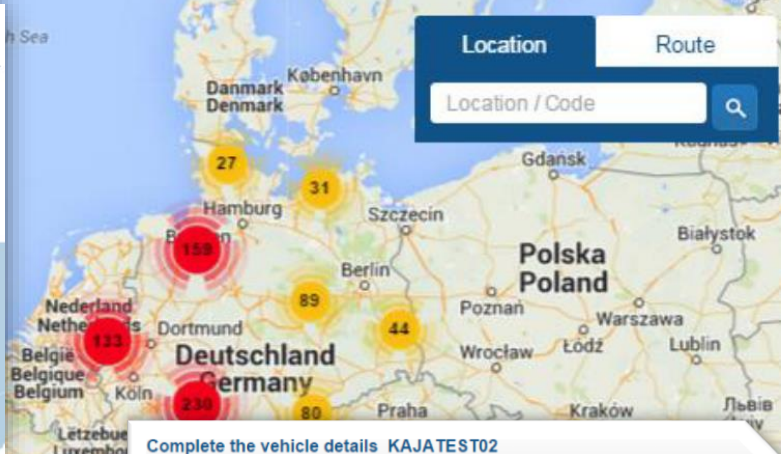
[Portugal](#)  
[Slovakia](#)  
[Slovenia](#)  
[Spain](#)

[Switzerland](#)  
[Eurovignette](#)  
[Fréjus & Mont Blanc tunnels](#)



LocationRoute

Location / Code



Complete the vehicle details KAJATEST02

Operational weight0 Kg

Emission class

Weight allowed0 Kg

Vehicle category

Overall unit weight0 Kg

Country

Unit axle count

Number of vehicle axles

☒ Relationship to vehicle ☒ Owner ☐ Leasing contract ☐ Lease contract

Eurowag cards

Eurowag Esso cards

Search

DELETE FILTER

Cards list

Export: [XLS](#) / [CSV](#) / [XML](#)

Card/card detail	Vehicle licence plate	Limit	Validity of limit (days)	Limit valid from	
<a href="#">789663010157172</a>	1B9 8430	500 litres	1 day	15.04.2015	<a href="#">BLOCK</a>
<a href="#">789663010157222</a>	3B3 8592	600 litres	1 day	15.04.2015	<a href="#">BLOCK</a>
<a href="#">789663010157230</a>					

Outstanding documents

All bills

Set-offs

VAT refunds

Document No.

Invoices and fines

CONFIRM

☒ All ☐ Before due date ☐ After due date

TEST WAG CZ

☐ Not downloaded PDF

Number of lines15

XLS

EXPORT

Number	VAT taxation date	Due date	Amount	Outstanding payment	Currency	E-invoice		
3216402205	29.10.2014	12.11.2014	963.59	963.59	EUR	30.10.2014		<a href="#">Detail</a>
3102427736	16.12.2014	13.01.2015	6,816.01	6,816.01	EUR	17.12.2014		<a href="#">Detail</a>

EW AT-2

[Back to country selection](#)

Prices valid:15.4.2015

CONFIRM

Country: AT

Export: from15.4.2015to15.4.2015

Current source

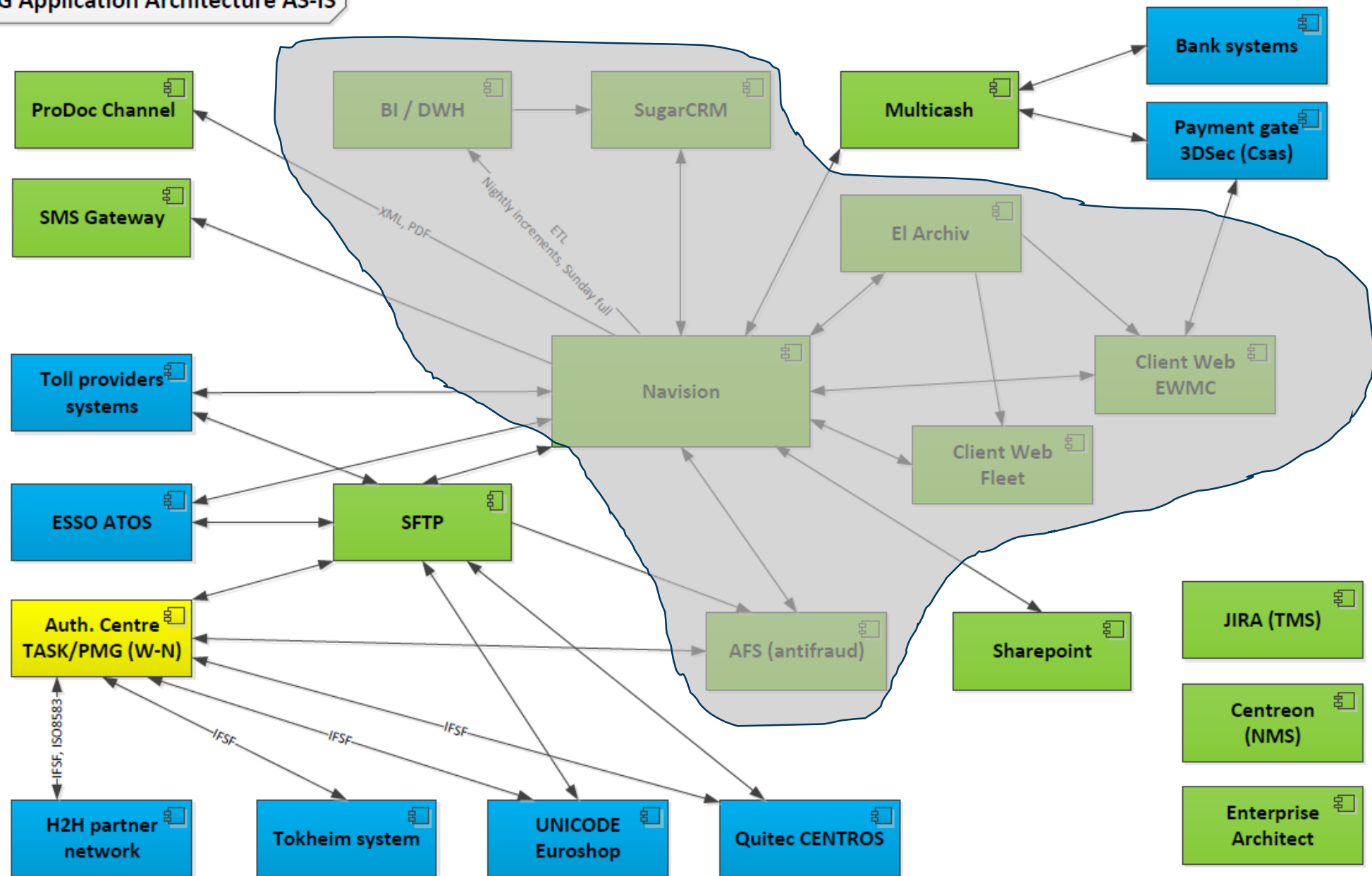
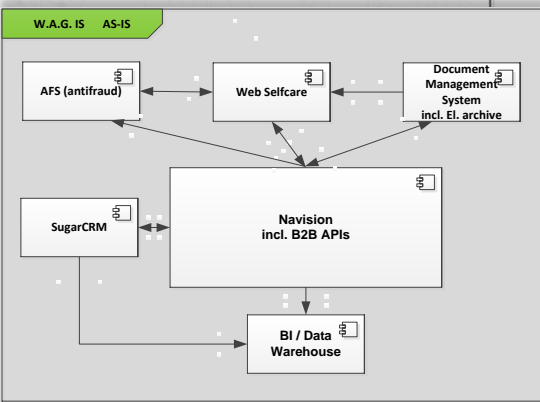
CSV

CONFIRM

<a href="#">Petrol station</a>	<a href="#">Address</a>	<a href="#">Special discount (EUR/l)</a>	<a href="#">Price (EUR/l)</a>
<a href="#">Leitner - Spielfeld</a>	Bundestrasse 228	0.010	0.926
<a href="#">Diesel24 - Anfelden</a>	A1 Exit Ansfelden , Gewerbepar	-	0.936
<a href="#">Diesel24 - Klagenfurt</a>	A2 Exit Klagenfurt Ost, Thomas	-	0.936

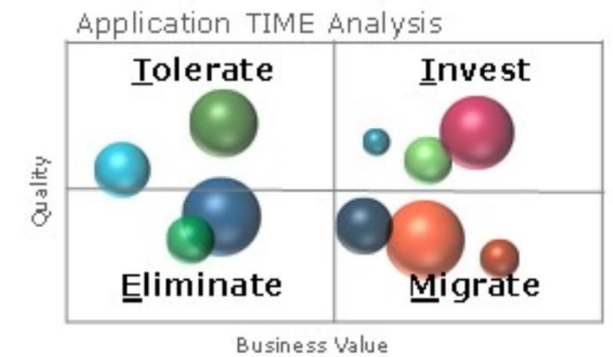
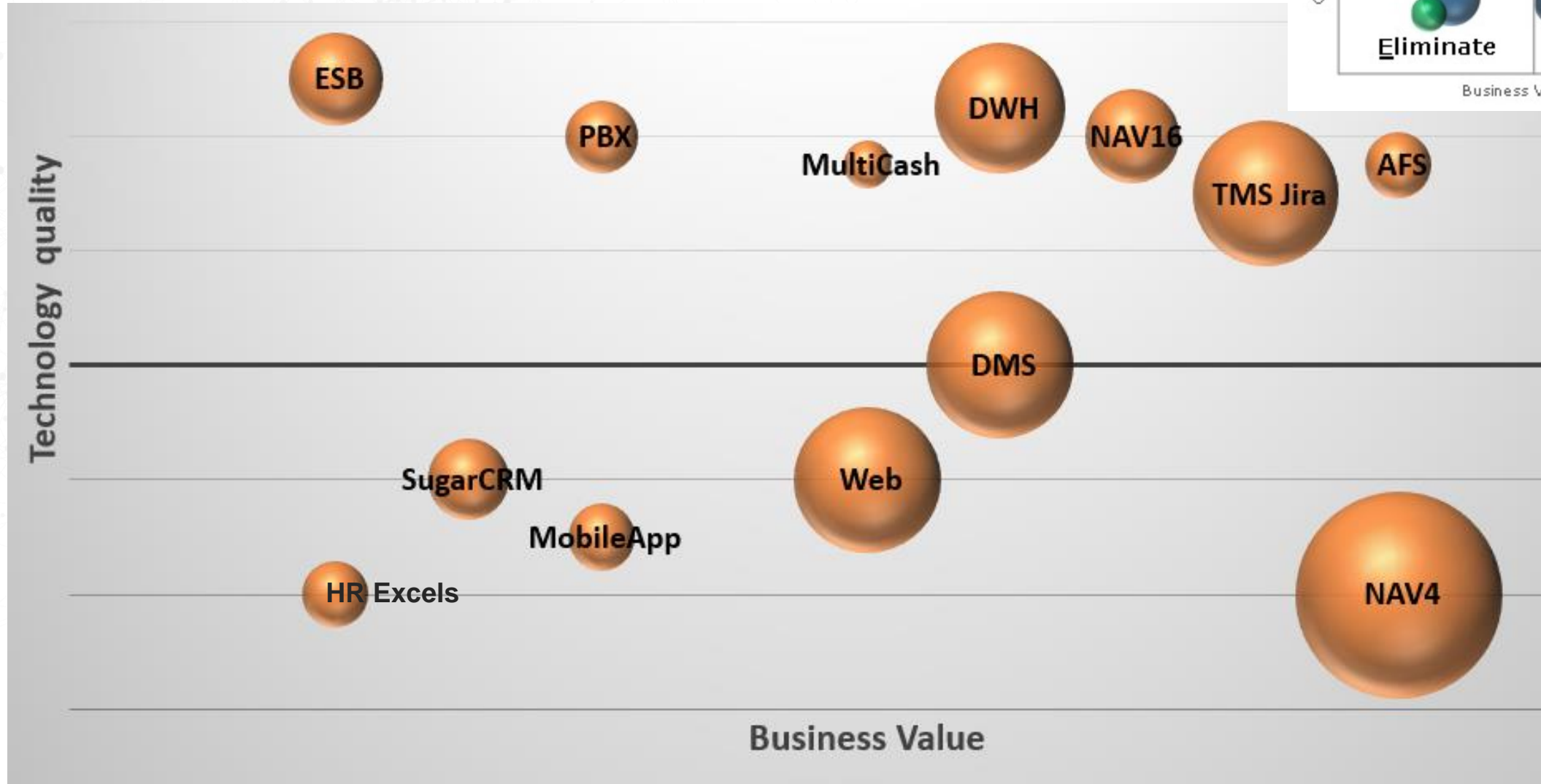


# WAG Application Architecture AS-IS



More details ....

## Systems Assessment - Gartner TIME



# ERP Transformation

## Key architecture challenges

- All directly linked with Navision ERP
- Single vendor strategy => limited resources

Plan is to use SOA oriented landscape and decouple Navision 2004 functionalities into:

### A, NAVISION 2016

- **Financial Management & Accounting**
- Invoicing and **Cover Letters**
- **Balances and Transactions Processing**
- **Payments processing & reconciliation**
- **Accounts & Banks Management**
- Stock Management

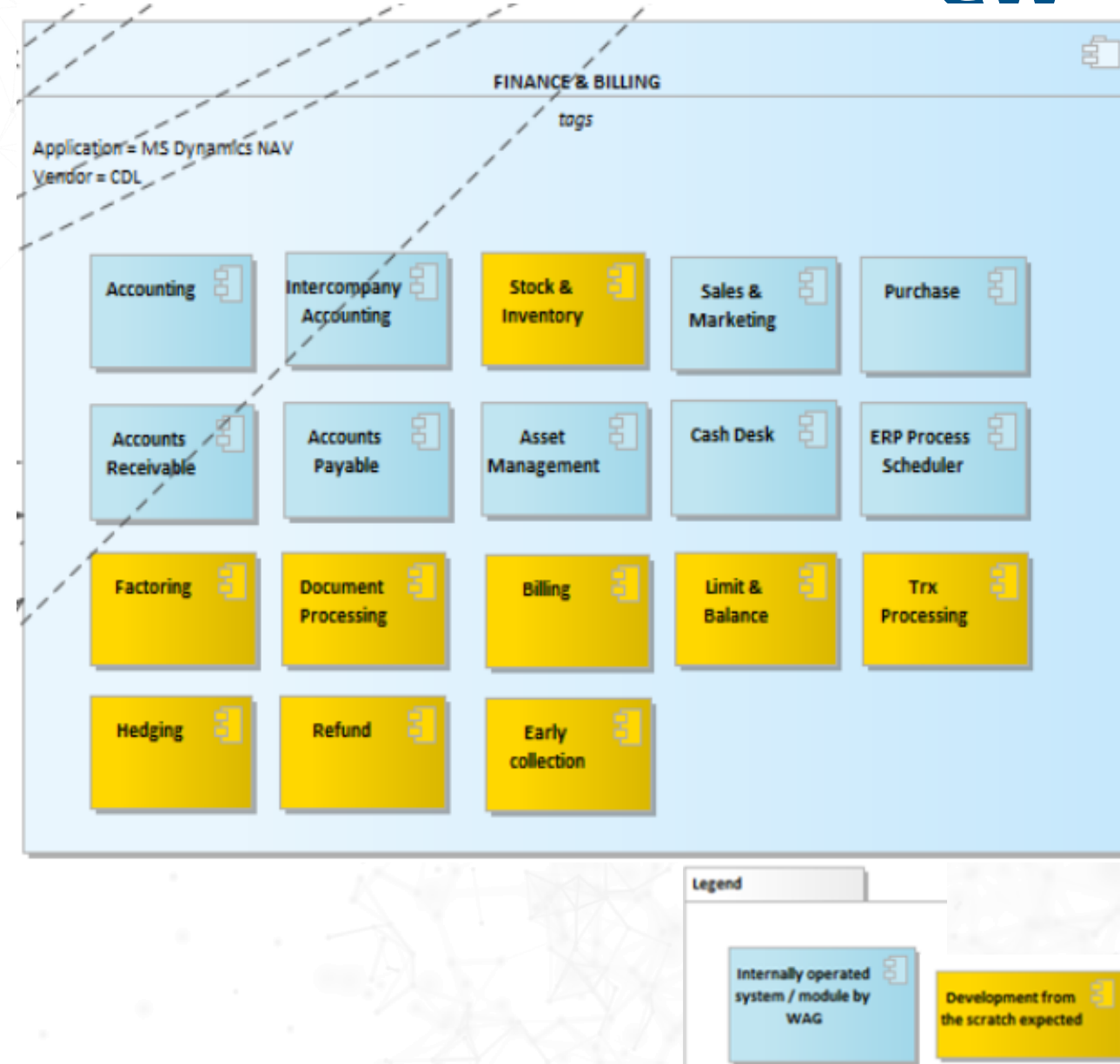
### B, Output Management Systems

- **Bill formatting and printing**

### C, CRM

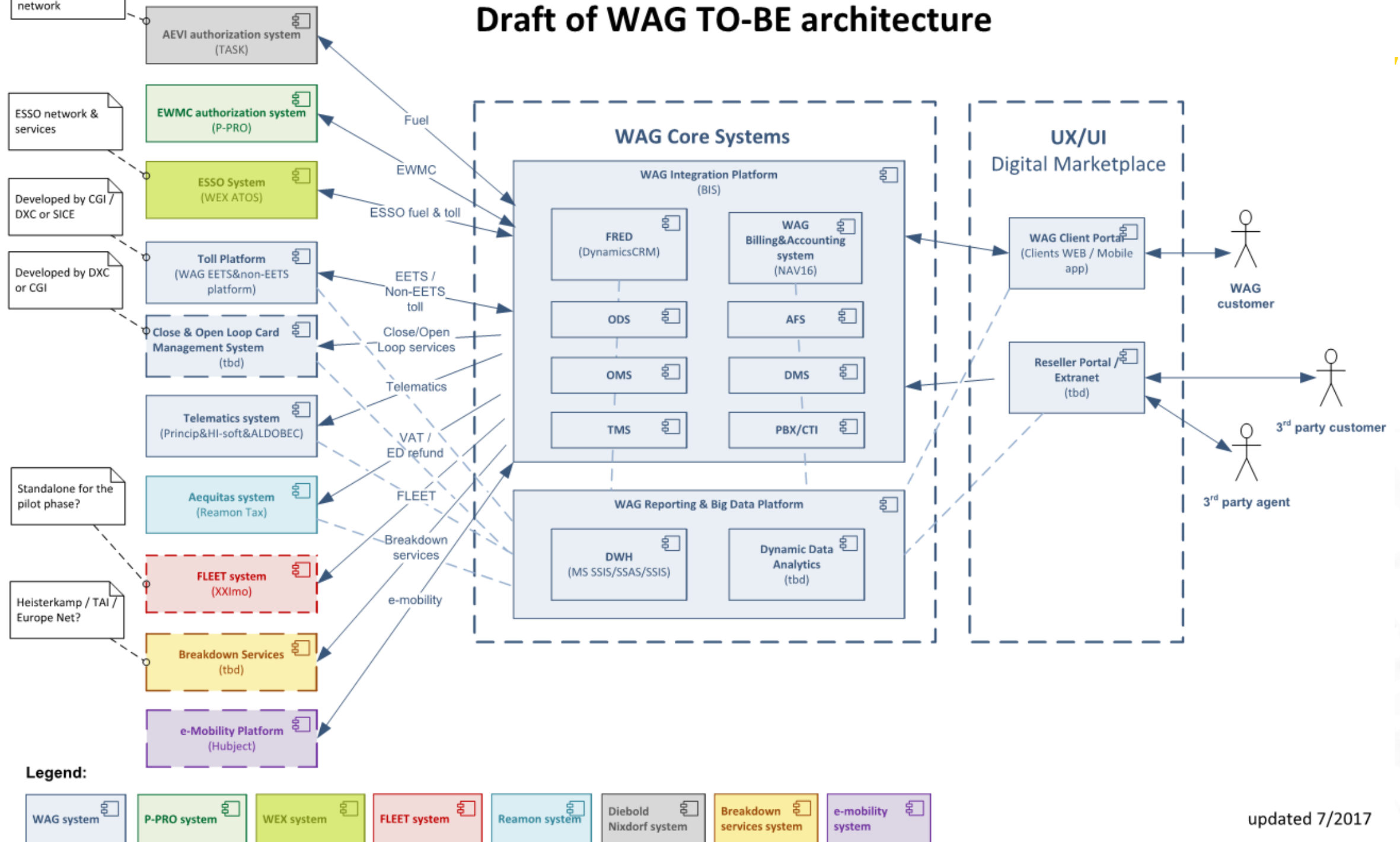
- **Lead and Opportunity Management (MVP1)**
- Customer & Suppliers data management
- Contracts preparation and management
- Products Catalogue management
- Workflow automation
- Pricing setup

### D, specific systems for TOLL, CARDS, TAX, ...

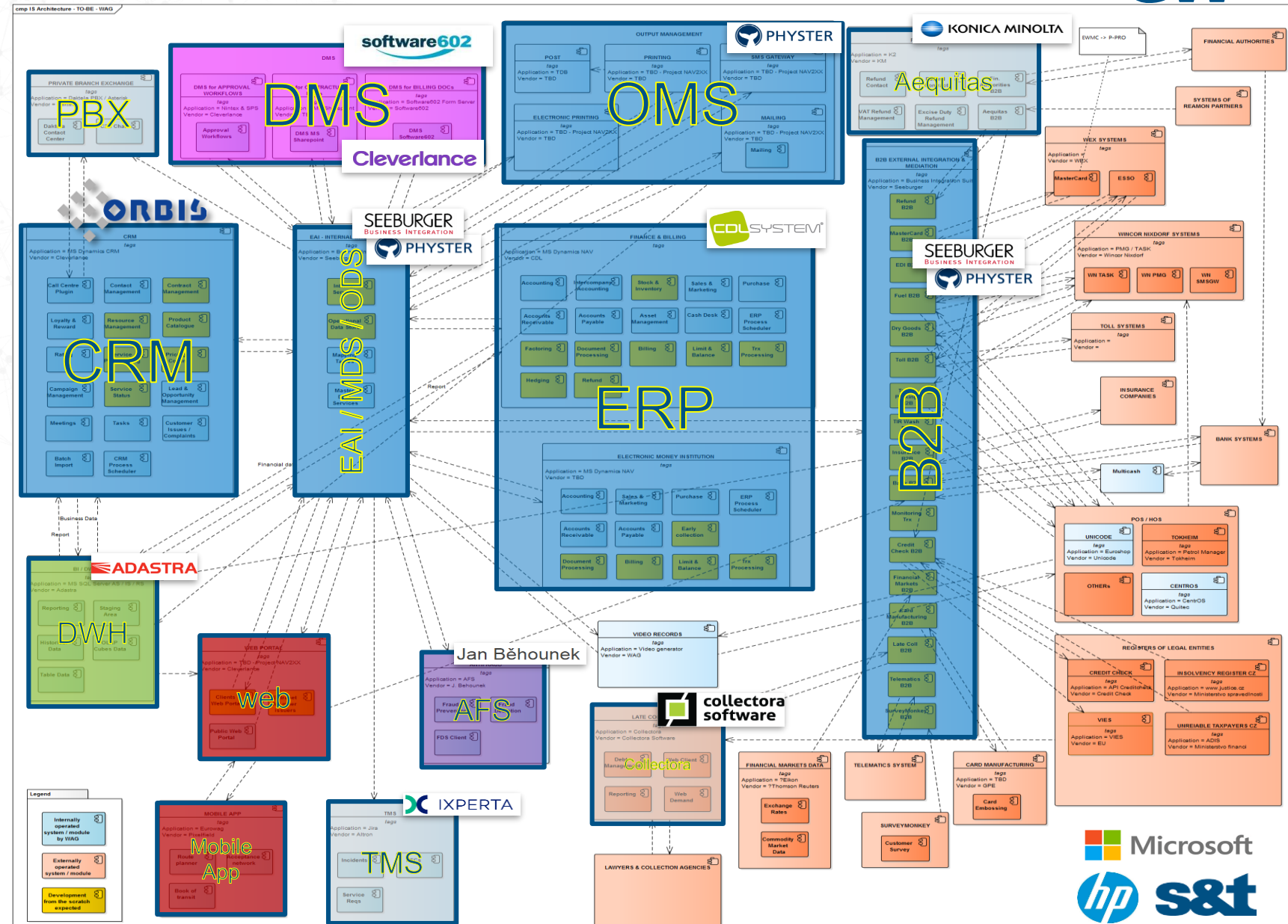
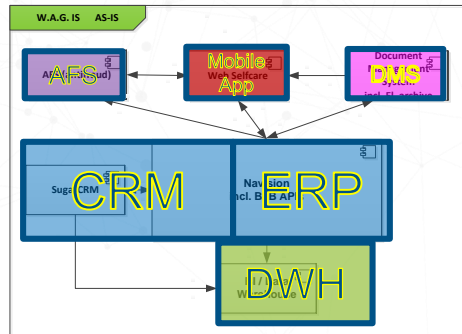




# Draft of WAG TO-BE architecture



# Transition Architecture 2018



# CORE SYSTEMS TRANSFORMATION

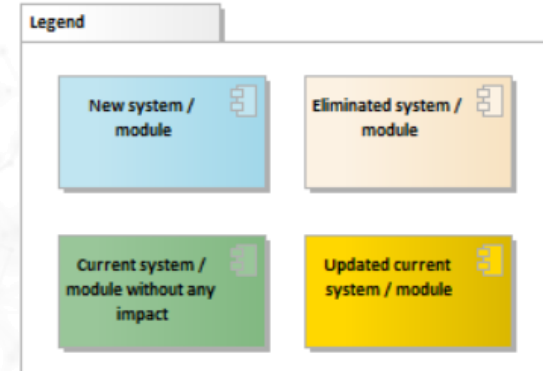
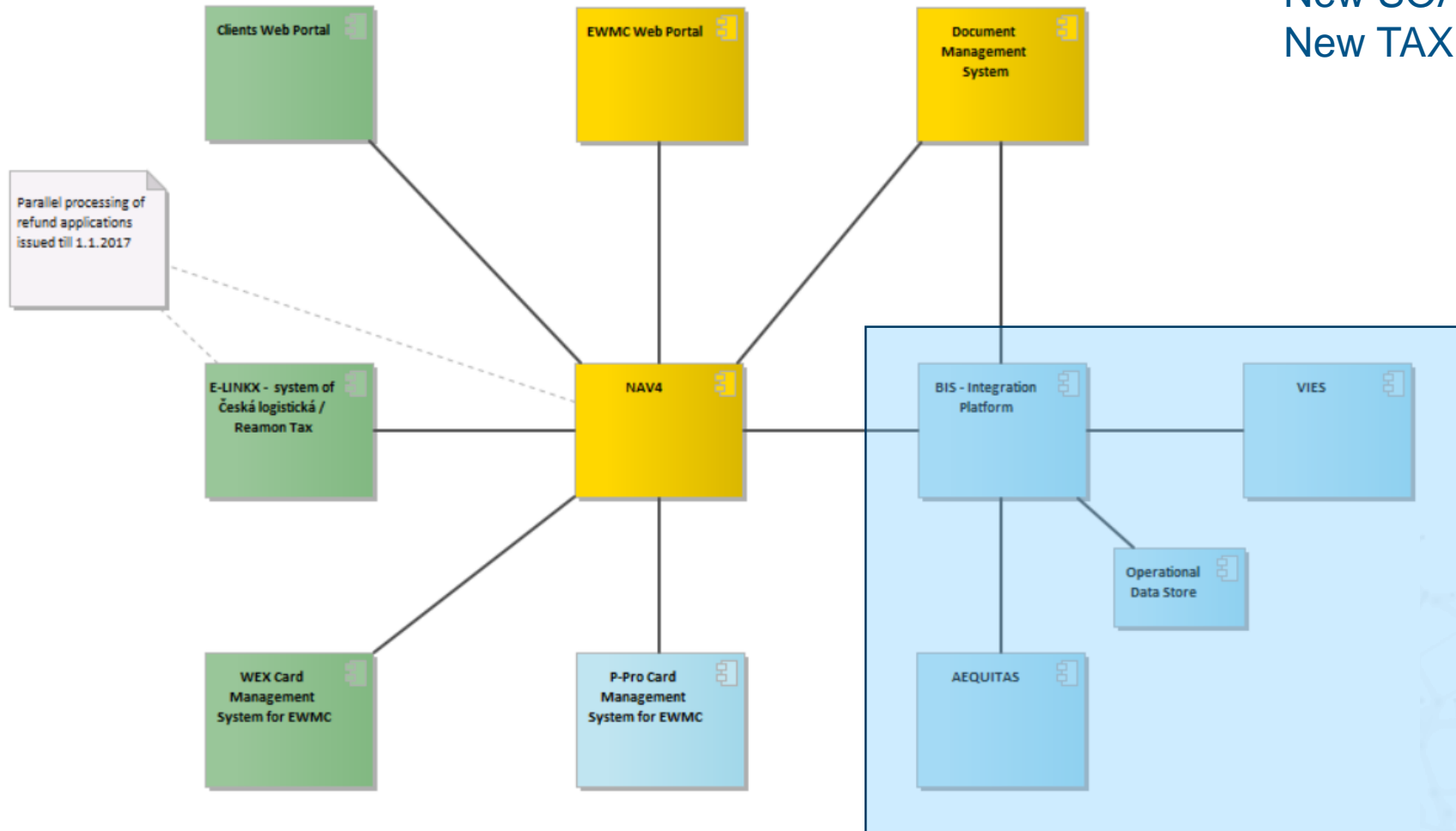




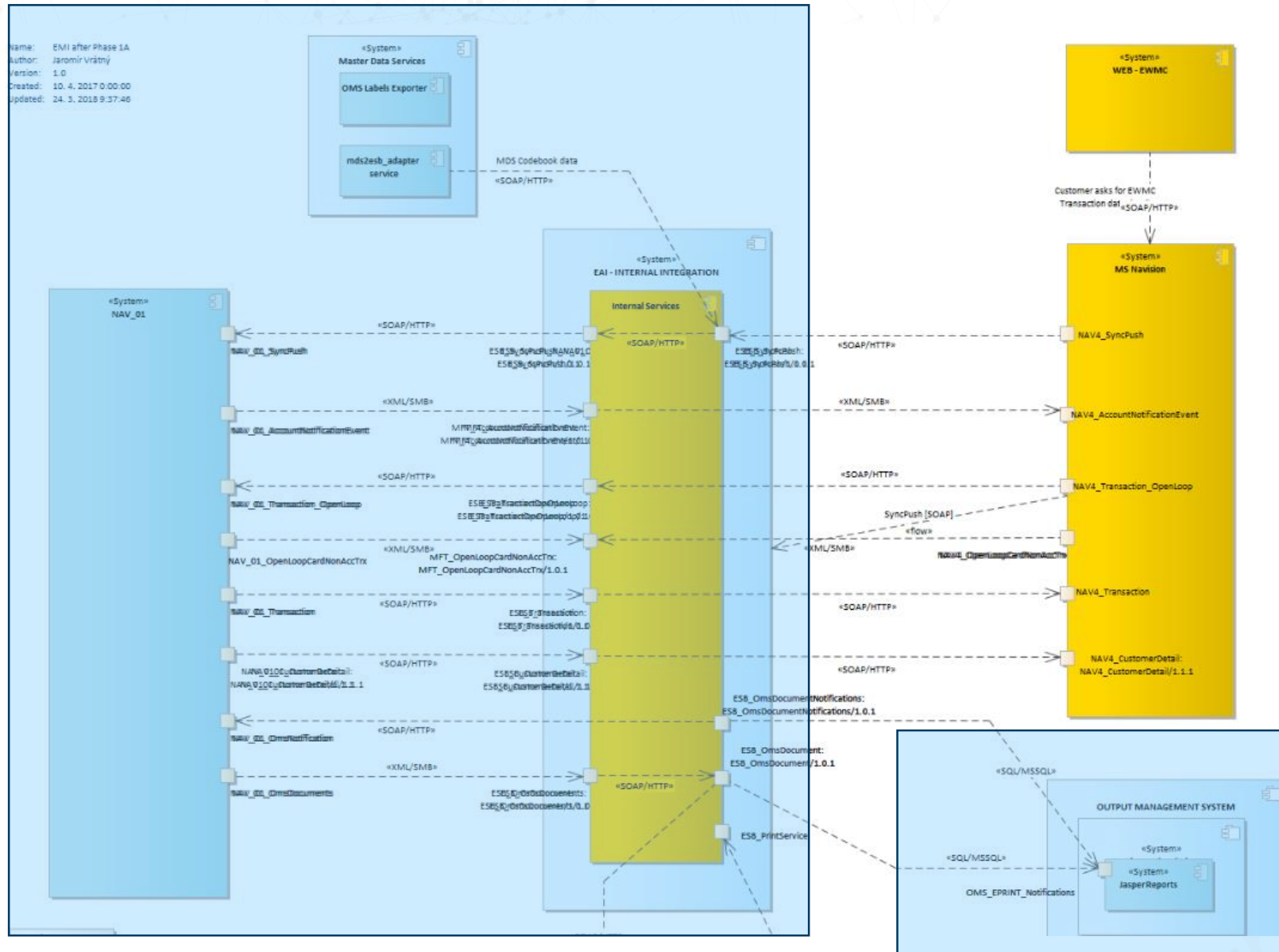
# Phase 1 - AEQ & ESB

Q2/2017

New SOA Integration Platform (BIS)  
New TAX processing system (AEQUITAS)



# Phase 2 (EMI1a) – NAV16 + OMS + MDS



Q3/2017

New system introduced  
ERP 2016  
Output Management  
**Master data mgmt.**

Legend

New system /  
module

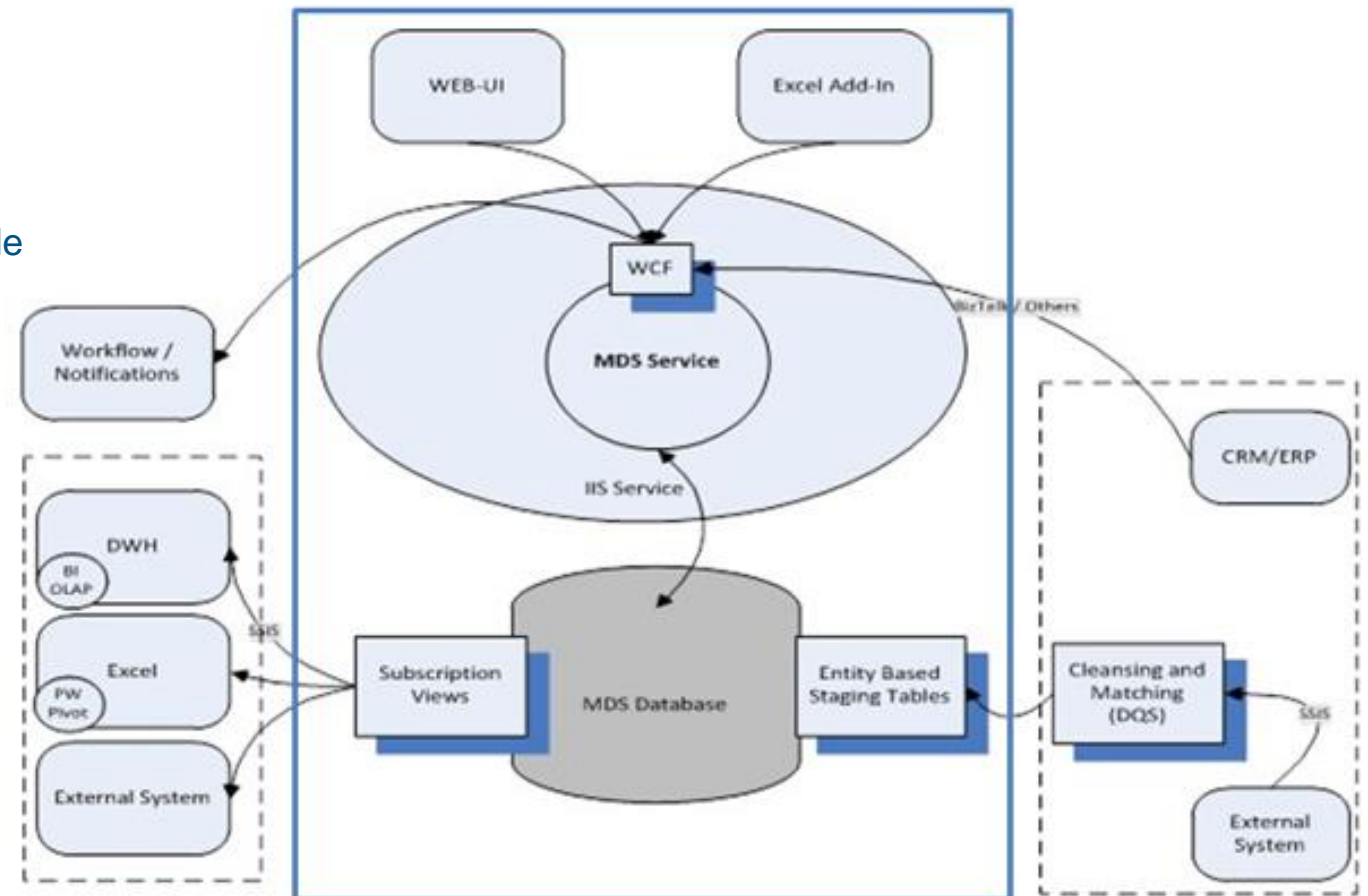
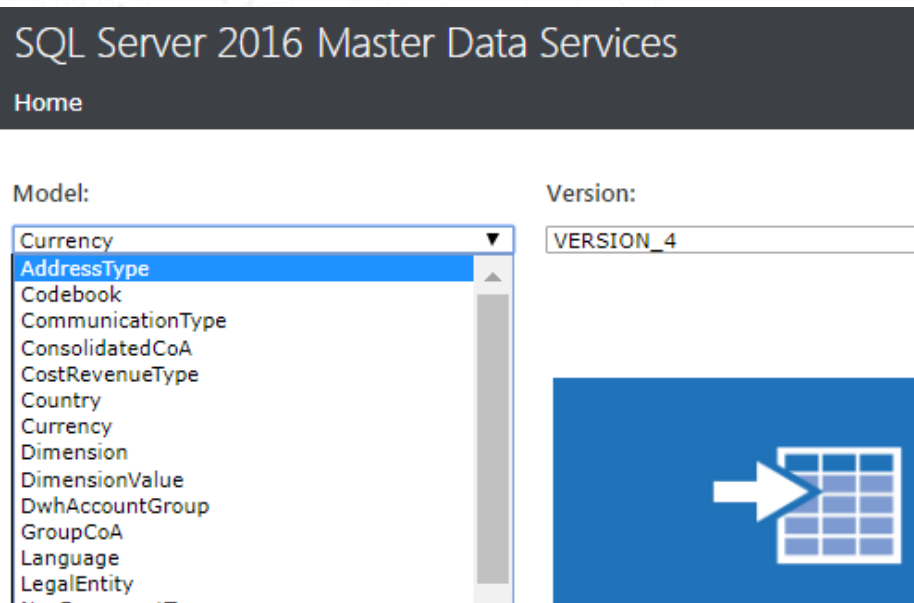
Eliminated system /  
module

Current system /  
module without any  
impact

Updated current  
system / module

# New ODS/MDS system

- Master Data Services is a Microsoft product for developing MDM solutions that is built on top of SQL Server database technology for back end processing.
- Master Data Management (MDM) defines a process of collecting enterprise data from various sources, applying standard rules and business processes, building a single view of the data, and finally distributing this 'golden' version of data to various systems in the enterprise, thereby making it accessible to all consumers.





Name: EMI after Phase SCP  
Author: Jan Prchal  
Version: 1.0  
Created: 9. 10. 2017 0:00:00  
Updated: 22. 1. 2018 16:05:37



```

sequenceDiagram
    participant NAV_01 as «System» NAV_01
    participant EAI as «System» EAI - INTERNAL INTEGRATION
    participant MS_NAV as «System» MS NAVision
    participant NAV_01_Ext as NAV_01_CustomerDetail: NAV_01_CustomerDetail/1.1.1
    participant NAV_01_WF as NAV_01_WF_Management
    participant NAV_01_Billing as NAV_01_BillingCycleManagement: NAV_01_BillingCycleManagement/1.0.1
    participant NAV_01_Assign as NAV_01_Assignment
    participant NAV_Data as NAV_DataExchangeService

    NAV_01->>EAI: NAV_01_Transaction «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_Transaction «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_Transaction «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_Transaction «SOAP/HTTP»

    NAV_01->>EAI: NAV_01_OpenLoopCardNonAccTrx «XML/SMB»
    EAI->>MS_NAV: NAV_01_OpenLoopCardNonAccTrx «XML/SMB»
    MS_NAV->>EAI: NAV_01_OpenLoopCardNonAccTrx «XML/SMB»
    EAI->>NAV_01: NAV_01_OpenLoopCardNonAccTrx «XML/SMB»

    NAV_01->>EAI: NAV_01_LimitBalance «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_LimitBalance «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_LimitBalance «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_LimitBalance «SOAP/HTTP»

    NAV_01->>EAI: NAV_01_CustomerDetail: NAV_01_CustomerDetail/1.1.1 «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_CustomerDetail: NAV_01_CustomerDetail/1.1.1 «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_CustomerDetail: NAV_01_CustomerDetail/1.1.1 «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_CustomerDetail: NAV_01_CustomerDetail/1.1.1 «SOAP/HTTP»

    NAV_01->>EAI: NAV_01_WF_Management «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_WF_Management «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_WF_Management «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_WF_Management «SOAP/HTTP»

    NAV_01->>EAI: NAV_01_BillingCycleManagement: NAV_01_BillingCycleManagement/1.0.1 «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_BillingCycleManagement: NAV_01_BillingCycleManagement/1.0.1 «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_BillingCycleManagement: NAV_01_BillingCycleManagement/1.0.1 «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_BillingCycleManagement: NAV_01_BillingCycleManagement/1.0.1 «SOAP/HTTP»

    NAV_01->>EAI: NAV_01_Assignment «SOAP/HTTP»
    EAI->>MS_NAV: NAV_01_Assignment «SOAP/HTTP»
    MS_NAV->>EAI: NAV_01_Assignment «SOAP/HTTP»
    EAI->>NAV_01: NAV_01_Assignment «SOAP/HTTP»

    NAV_01->>MS_NAV: NAV_DataExchangeService «SOAP/HTTP»
    MS_NAV->>NAV_01: NAV_DataExchangeService «SOAP/HTTP»

    Note over NAV_01, EAI, MS_NAV: Direct integration for NAVision data exchange
  
```

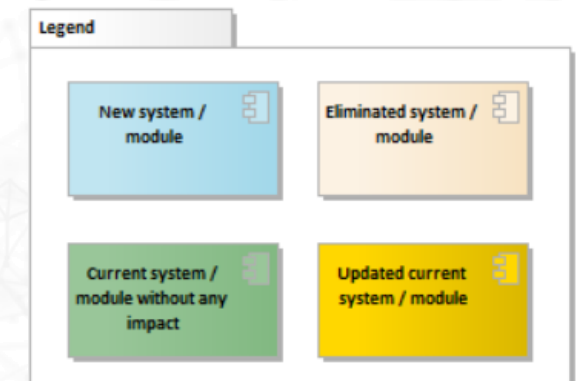
The diagram illustrates the integration of NAV 01, EAI - INTERNAL INTEGRATION, and MS NAVision systems. The systems are represented as lifelines, and the messages are shown as arrows with their respective protocols and content.

- NAV 01** (System) is the primary system on the left.
- EAI - INTERNAL INTEGRATION** (System) is the central system, containing **Internal Services**.
- MS NAVision** (System) is the system on the right.

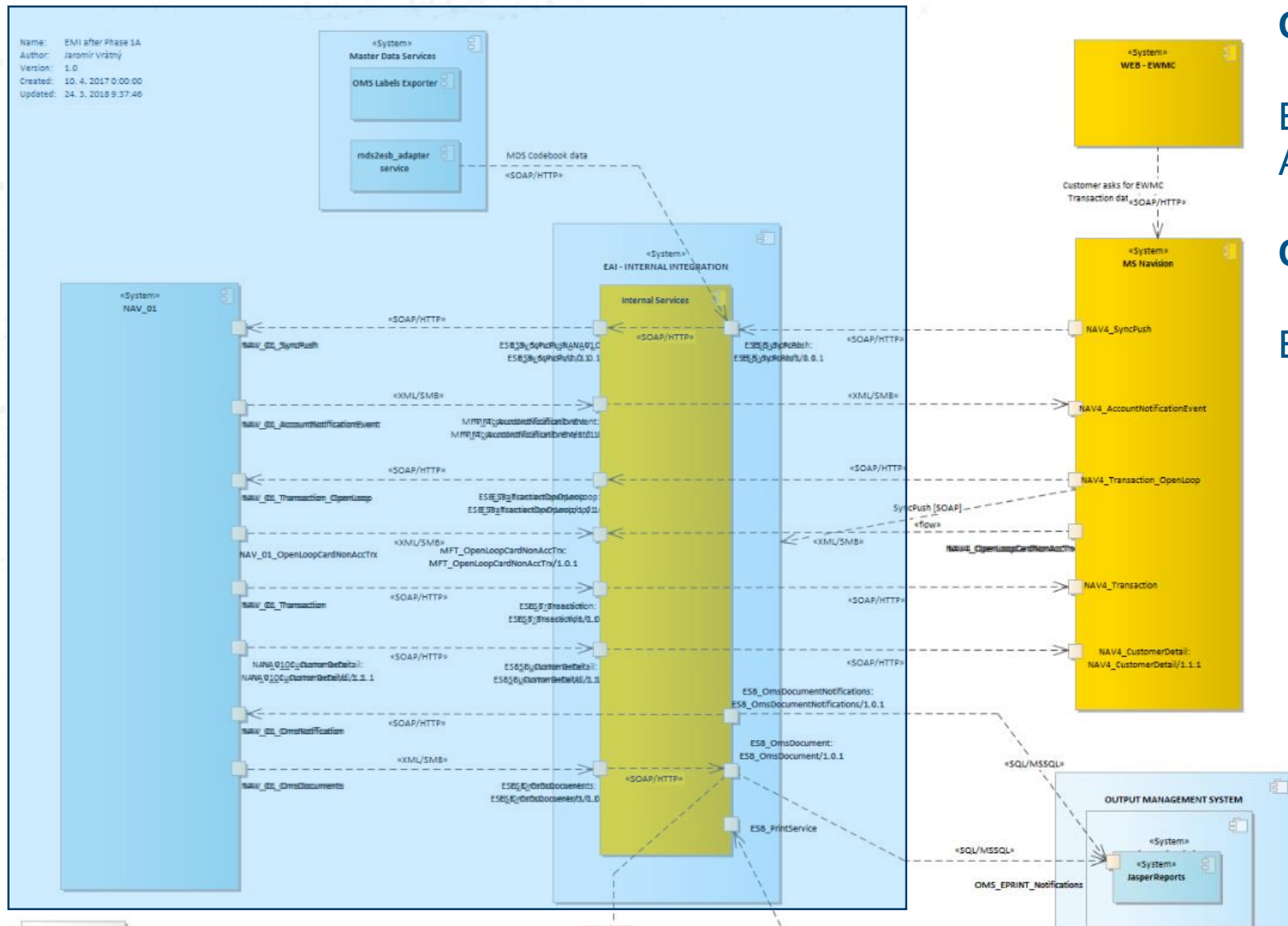
The messages and their protocols are as follows:

- NAV 01** sends **NAV\_01\_Transaction** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_Transaction** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_Transaction** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_Transaction** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_01\_OpenLoopCardNonAccTrx** to **EAI** via **«XML/SMB»**.
- EAI** sends **NAV\_01\_OpenLoopCardNonAccTrx** to **MS NAVision** via **«XML/SMB»**.
- MS NAVision** sends **NAV\_01\_OpenLoopCardNonAccTrx** to **EAI** via **«XML/SMB»**.
- EAI** sends **NAV\_01\_OpenLoopCardNonAccTrx** to **NAV 01** via **«XML/SMB»**.
- NAV 01** sends **NAV\_01\_LimitBalance** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_LimitBalance** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_LimitBalance** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_LimitBalance** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_01\_CustomerDetail: NAV\_01\_CustomerDetail/1.1.1** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_CustomerDetail: NAV\_01\_CustomerDetail/1.1.1** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_CustomerDetail: NAV\_01\_CustomerDetail/1.1.1** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_CustomerDetail: NAV\_01\_CustomerDetail/1.1.1** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_01\_WF\_Management** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_WF\_Management** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_WF\_Management** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_WF\_Management** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_01\_BillingCycleManagement: NAV\_01\_BillingCycleManagement/1.0.1** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_BillingCycleManagement: NAV\_01\_BillingCycleManagement/1.0.1** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_BillingCycleManagement: NAV\_01\_BillingCycleManagement/1.0.1** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_BillingCycleManagement: NAV\_01\_BillingCycleManagement/1.0.1** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_01\_Assignment** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_Assignment** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_01\_Assignment** to **EAI** via **«SOAP/HTTP»**.
- EAI** sends **NAV\_01\_Assignment** to **NAV 01** via **«SOAP/HTTP»**.
- NAV 01** sends **NAV\_DataExchangeService** to **MS NAVision** via **«SOAP/HTTP»**.
- MS NAVision** sends **NAV\_DataExchangeService** to **NAV 01** via **«SOAP/HTTP»**.

The diagram also shows a **Direct integration for NAVision data exchange** between **NAV 01** and **MS NAVision**.



## Phase 4 – TOLL

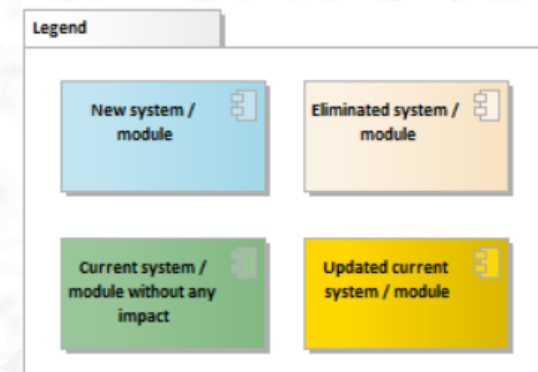


## Q3/2018

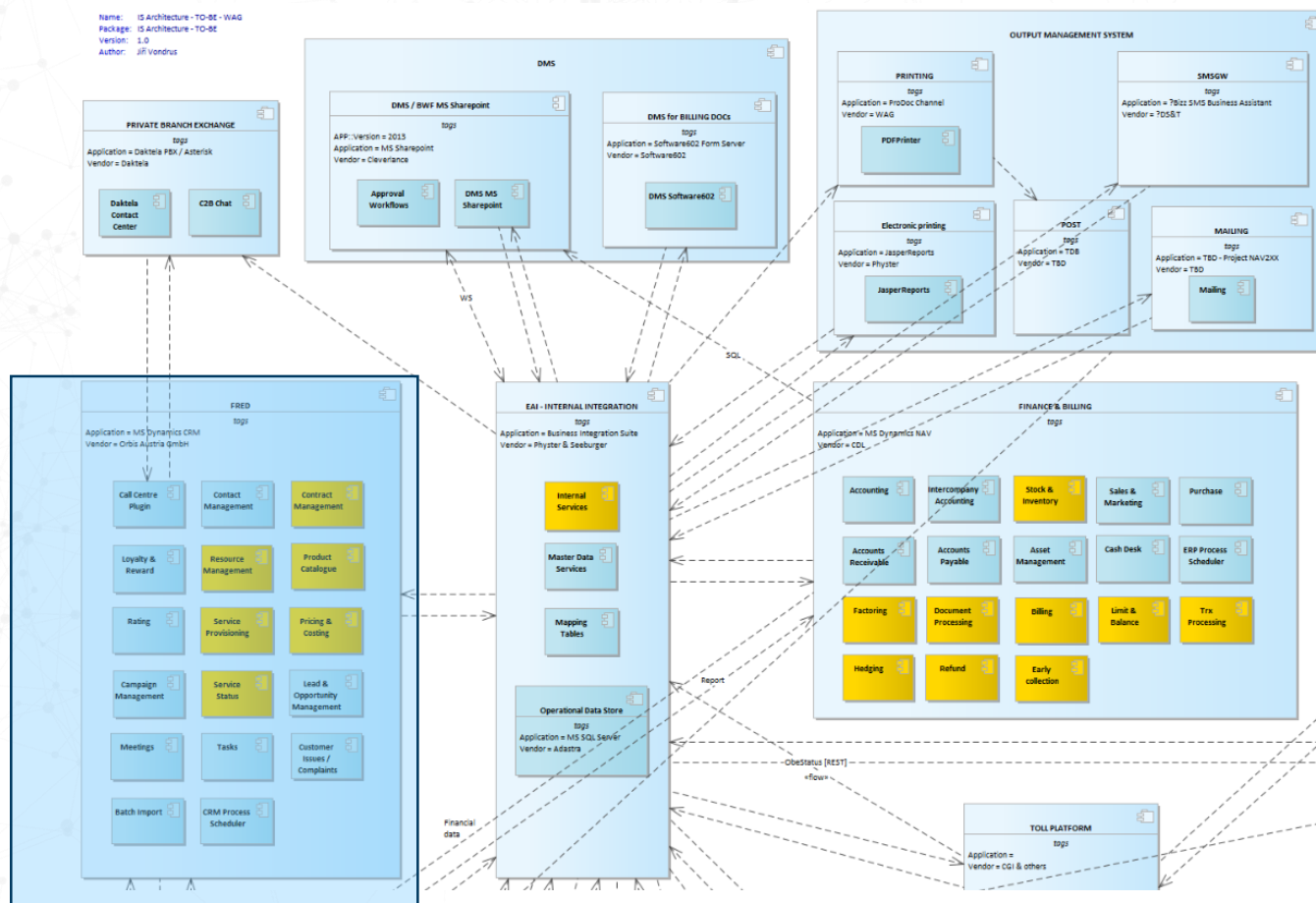
ERP2 - TOLL Invoicing in NAV16  
AEQ3 - TAX refunds interface

## Q4/2018

## ERP4 - TOLL VAT Invoicing in NAV16

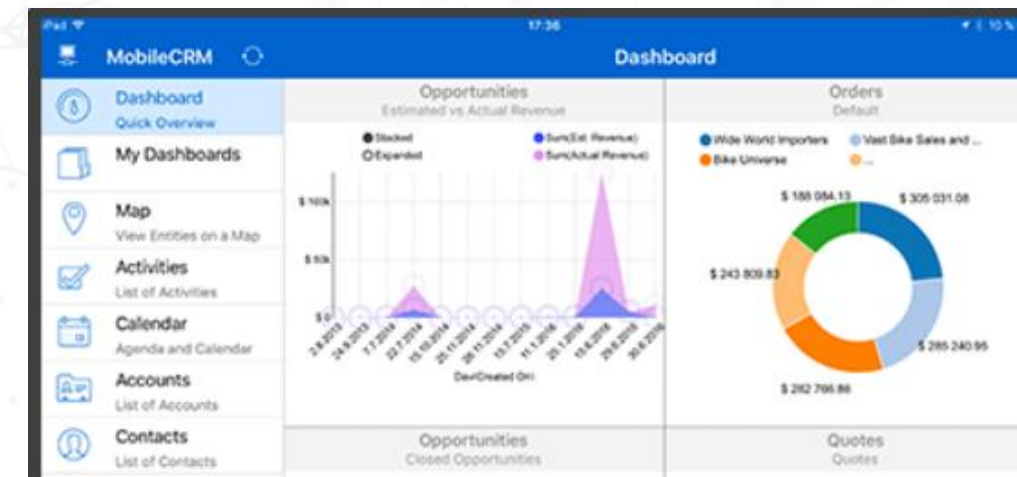


# Phase 5 – CRM



## Q3/2018 (MVP1)

- New SaaS system to replace SugarCRM
- Baseline for Agile development
- Power-BI Analytics for Sales

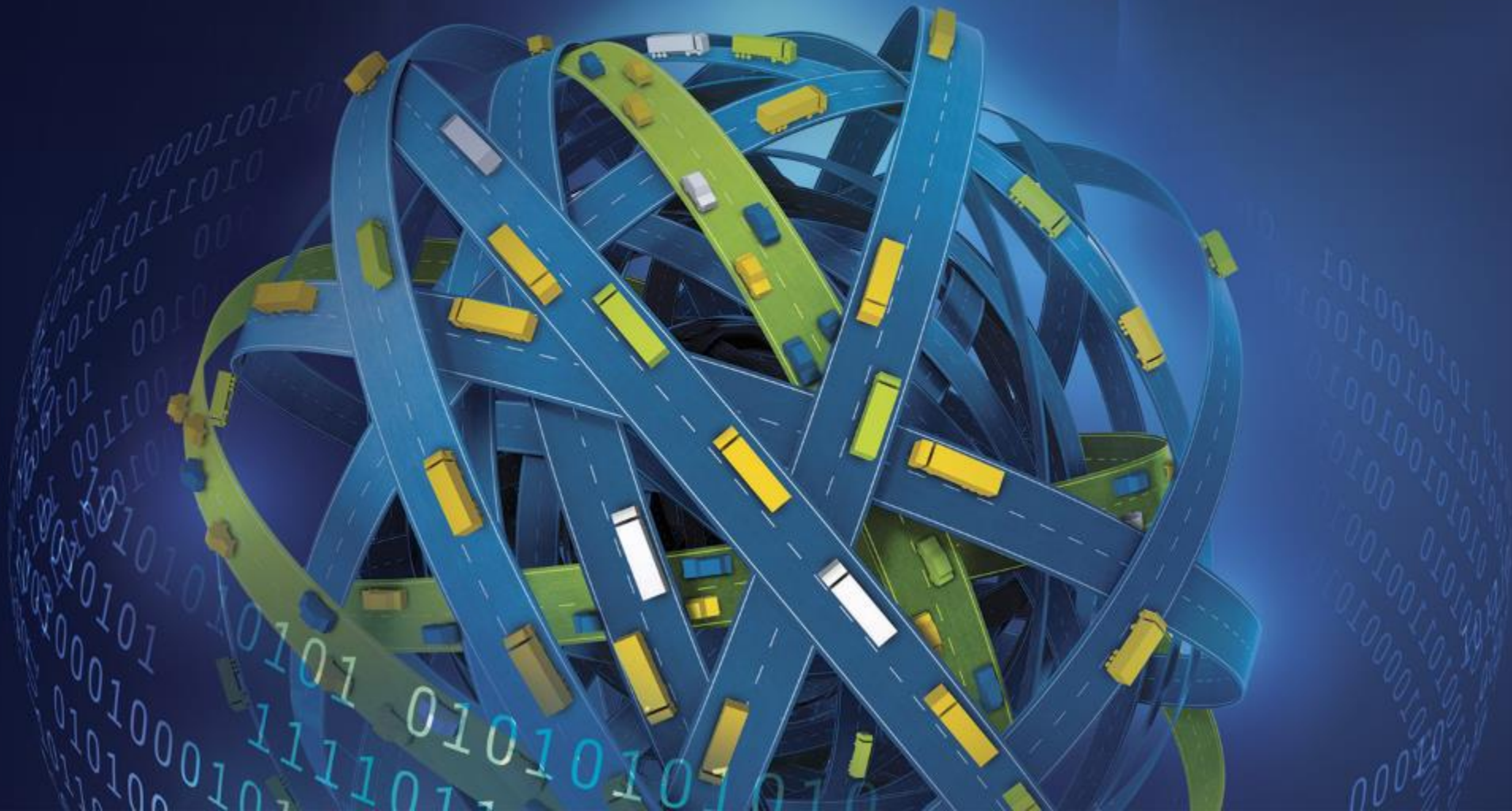




## Next steps

- Migrate Fuel Invoicing to NAV2016 (project for 2019)
- Prepare business specification for Pricing
  - complex model will be difficult to implement (CRM x custom dev.)
- RFI for Card Management System (CMS) – large project

# Innovation Activities



# 1. Big Data Analytics

## Hadoop Cluster Data processing

Location data analytics

Usage data analytics

## Use Cases

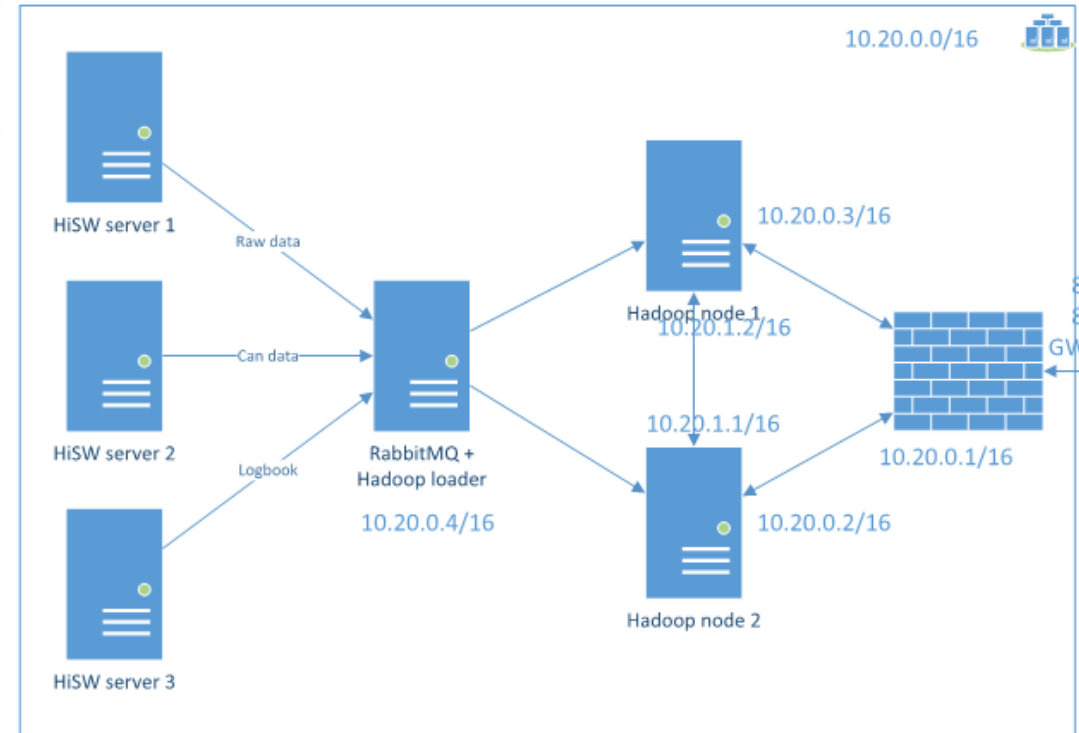
A = Adhoc process

R = Real-time process

U = Repeated process

## Software components

OS	Centos 7.4
Java	JDK 1.8.0_77 or higher
Python	2.7.5
Hadoop distribution	Hortonworks HDP 2.6.4
Hadoop cluster management	Ambari 2.6.1.x
Metadata db	MariaDB 10.1.x





## 2. Web SSO

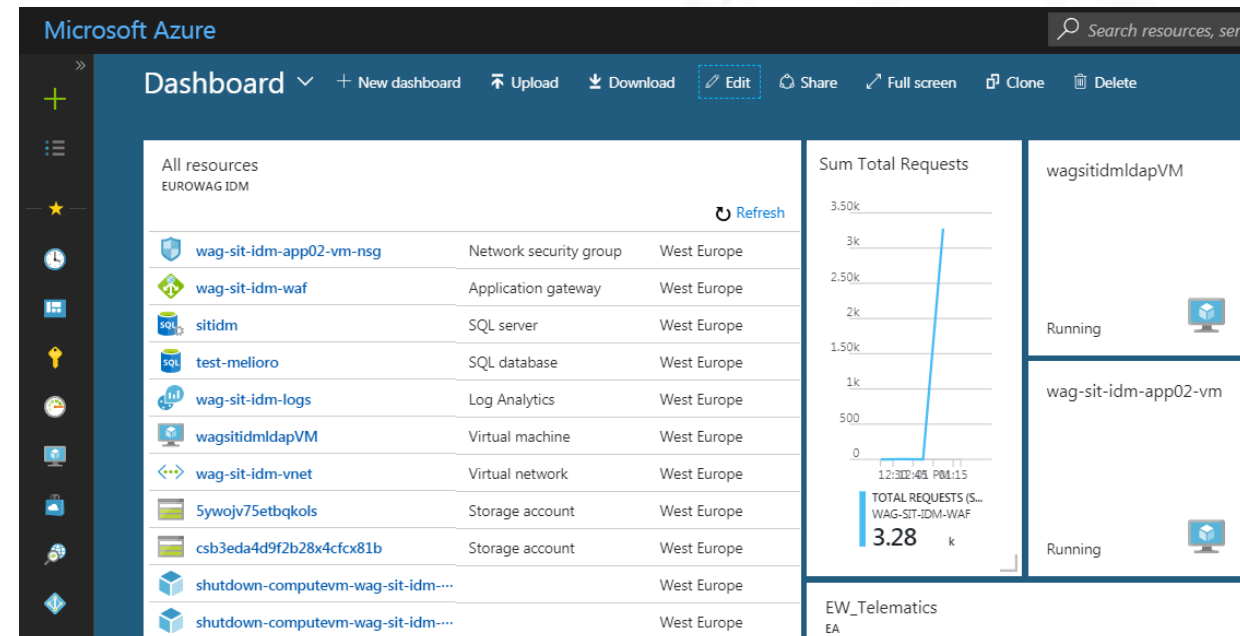
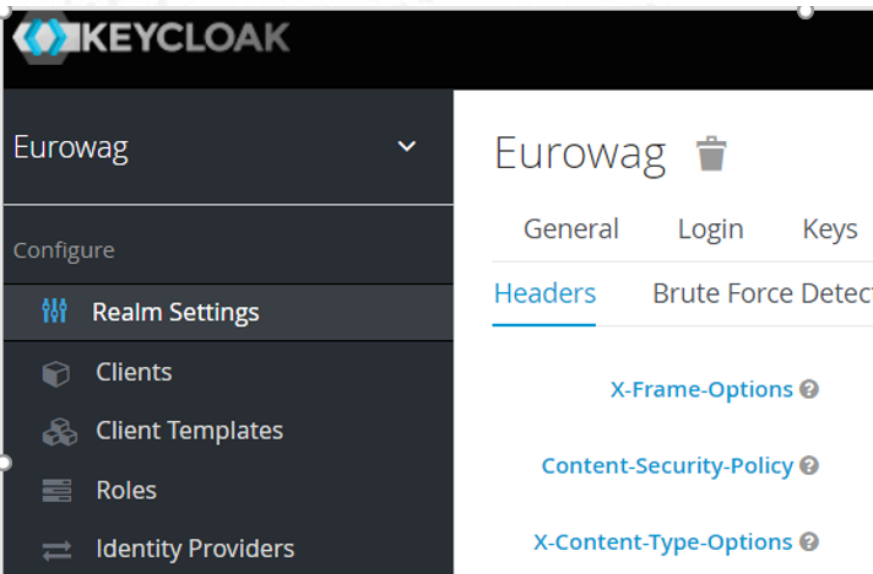
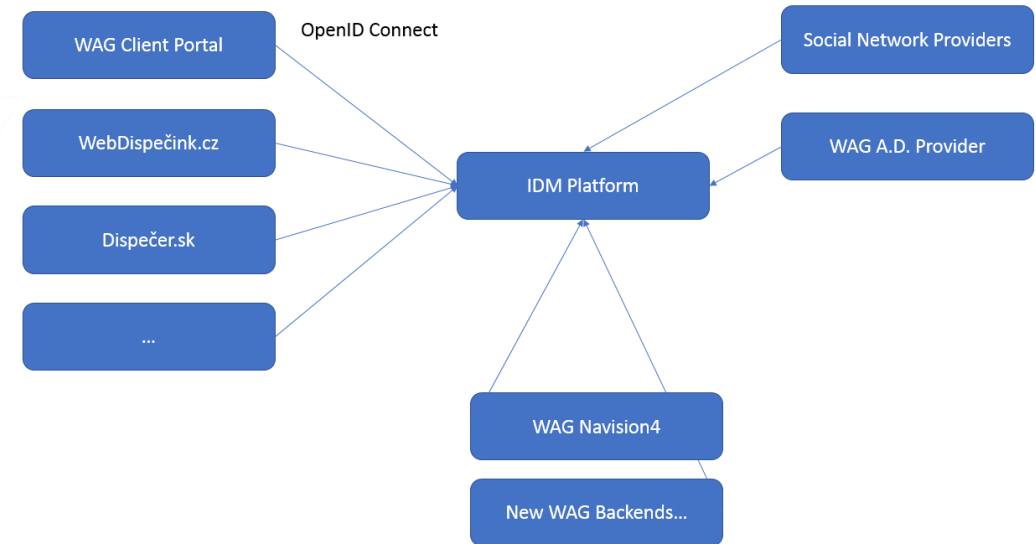


### CIAM – Customer Identity and Access Management

- Single Sign On for Web Portals (OpenID)
- SFTP identity (LDAP)

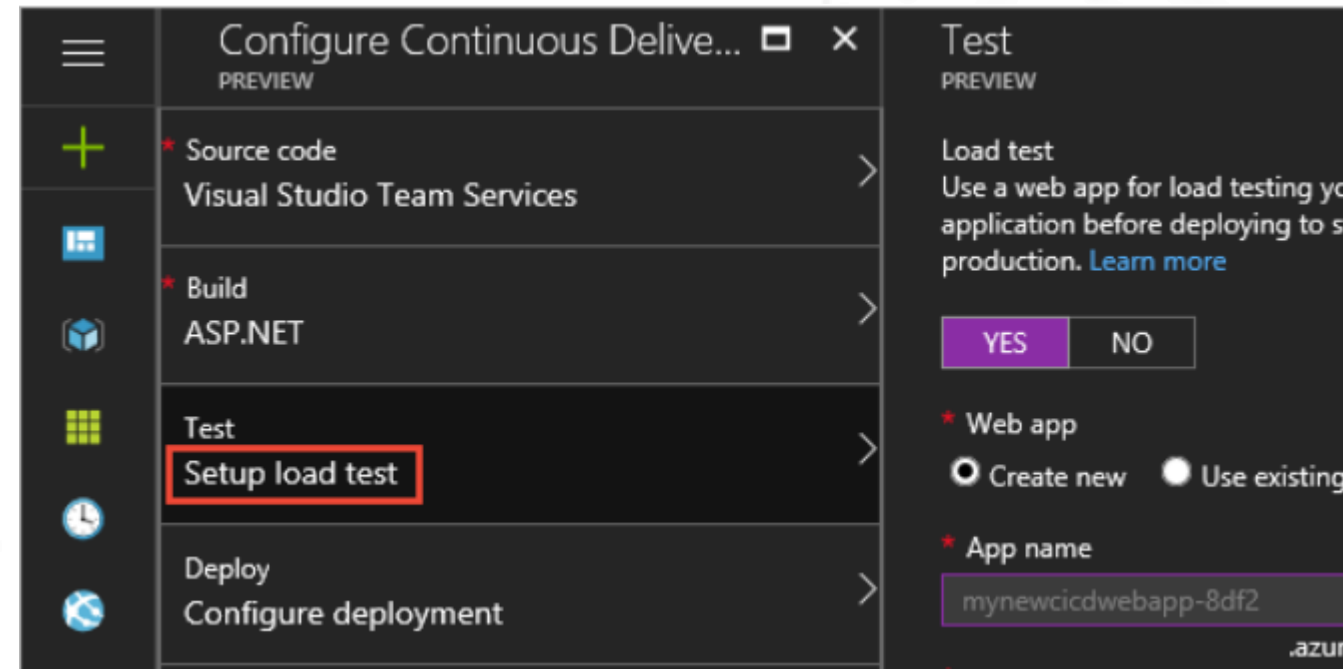
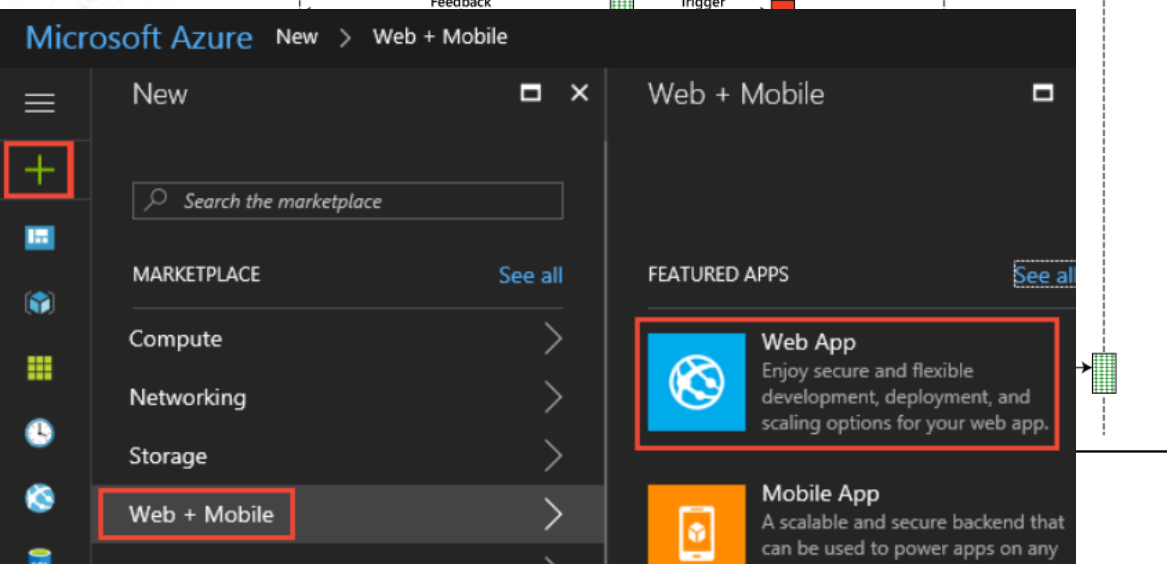
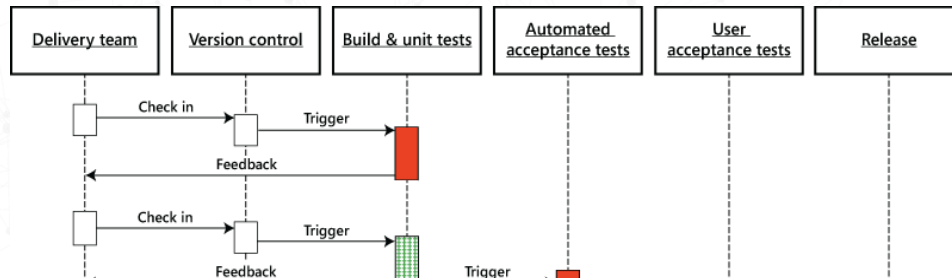
### Software components

- Open source product Keycloak.org
- Azure cloud deployment
- Centos, PostgreSQL (DBaaS)



# 3. Web Development Automation (CI/CD)

Microsoft Developer tools in Azure Cloud (VSTS)  
Source code repository (GIT)  
Automatic build & test  
Multivendor collaboration (Slack -> Teams)  
New stack for Single Page Applications (React )



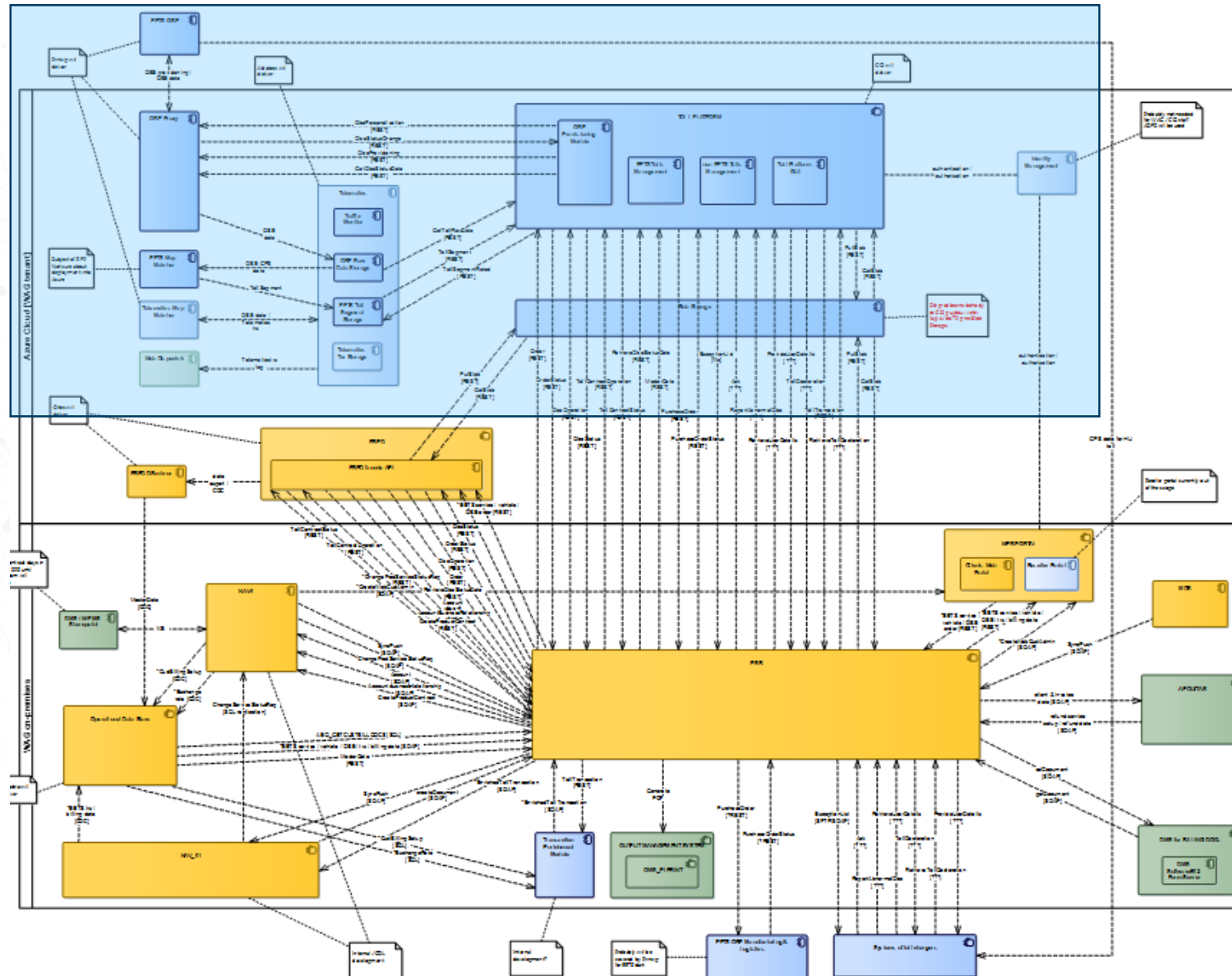
# 4.EETS - European Electronic Tolling Service

## TOLL PROCESSING in NEW PLATFORM

1. OBU HW
2. Telematics systems
3. Toll Platform

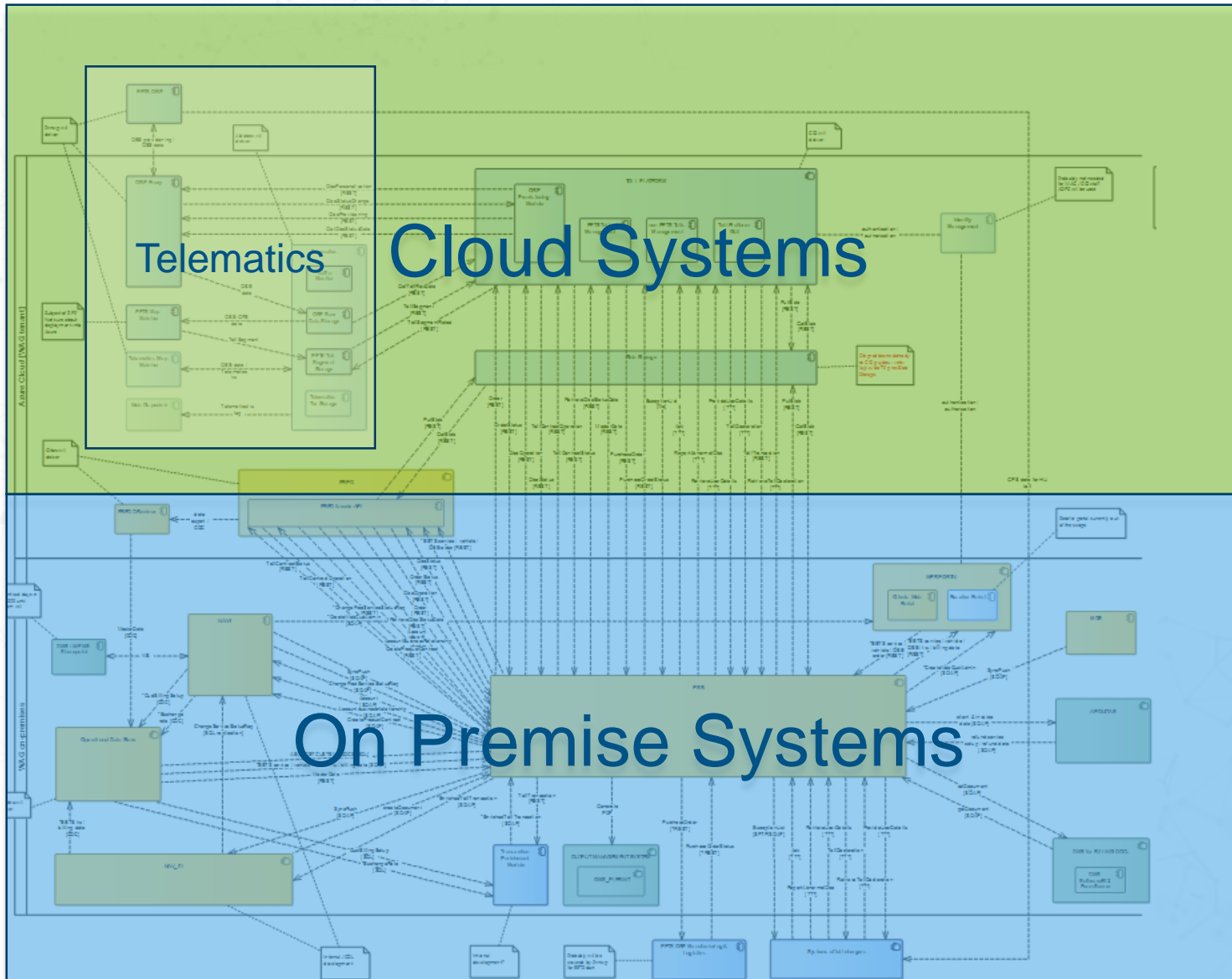
Q1/2019

Belgium go-live  
Other countries ....





# 5. Hybrid Landscape



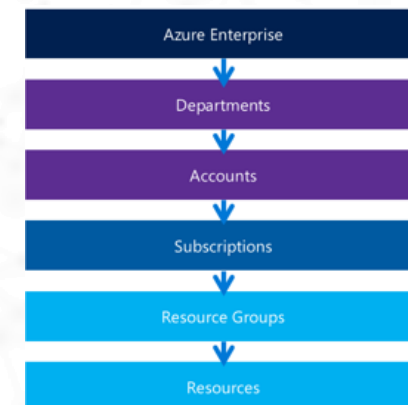
## Microsoft Azure Cloud

- SaaS - O365, CRM
- PaaS – DBs, Integration
- IaaS - VMs, Storages

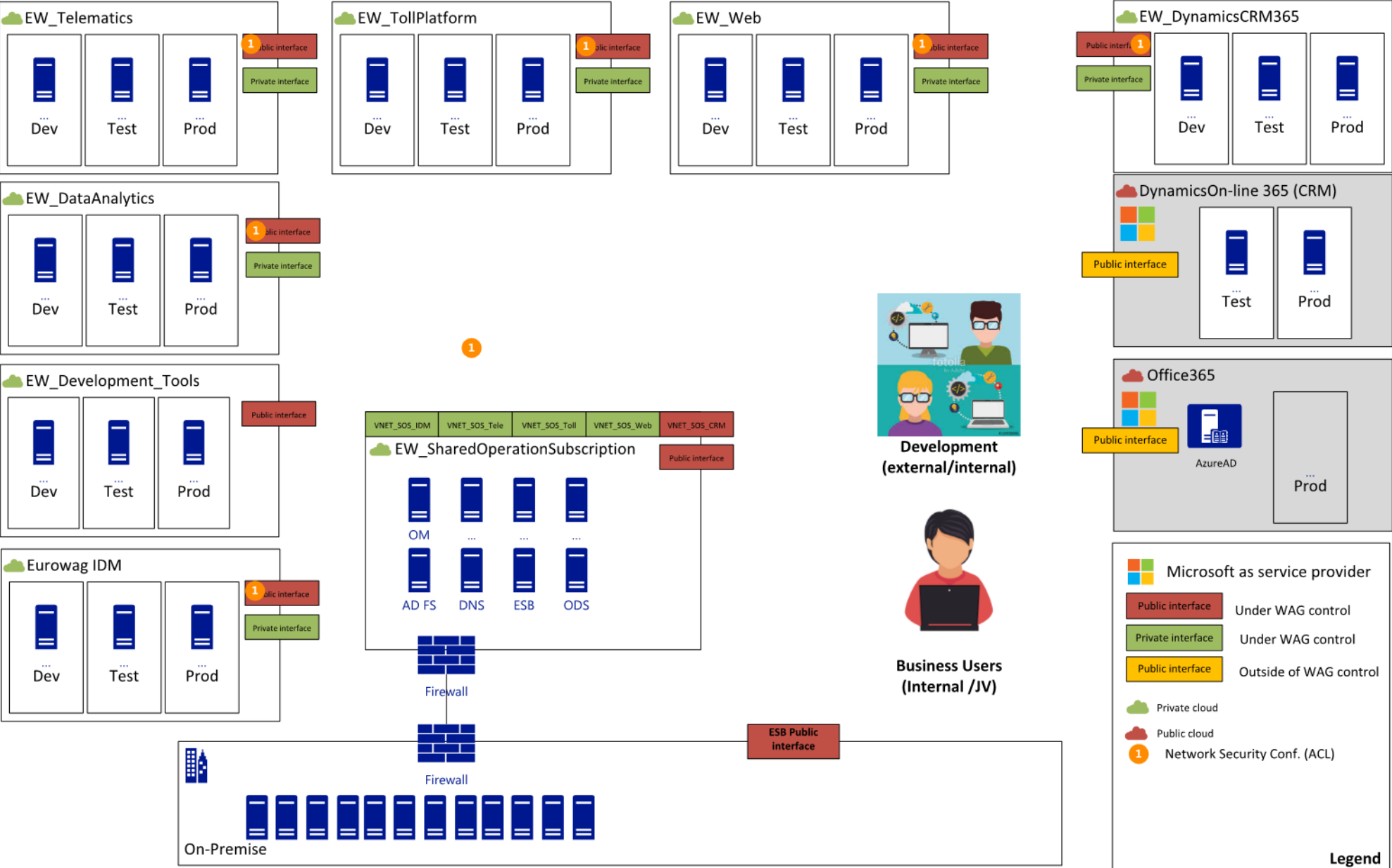
## Cloud Management tools

- Cost reports
- Dashboards
- Monitoring
- Security
- CI/CD tools

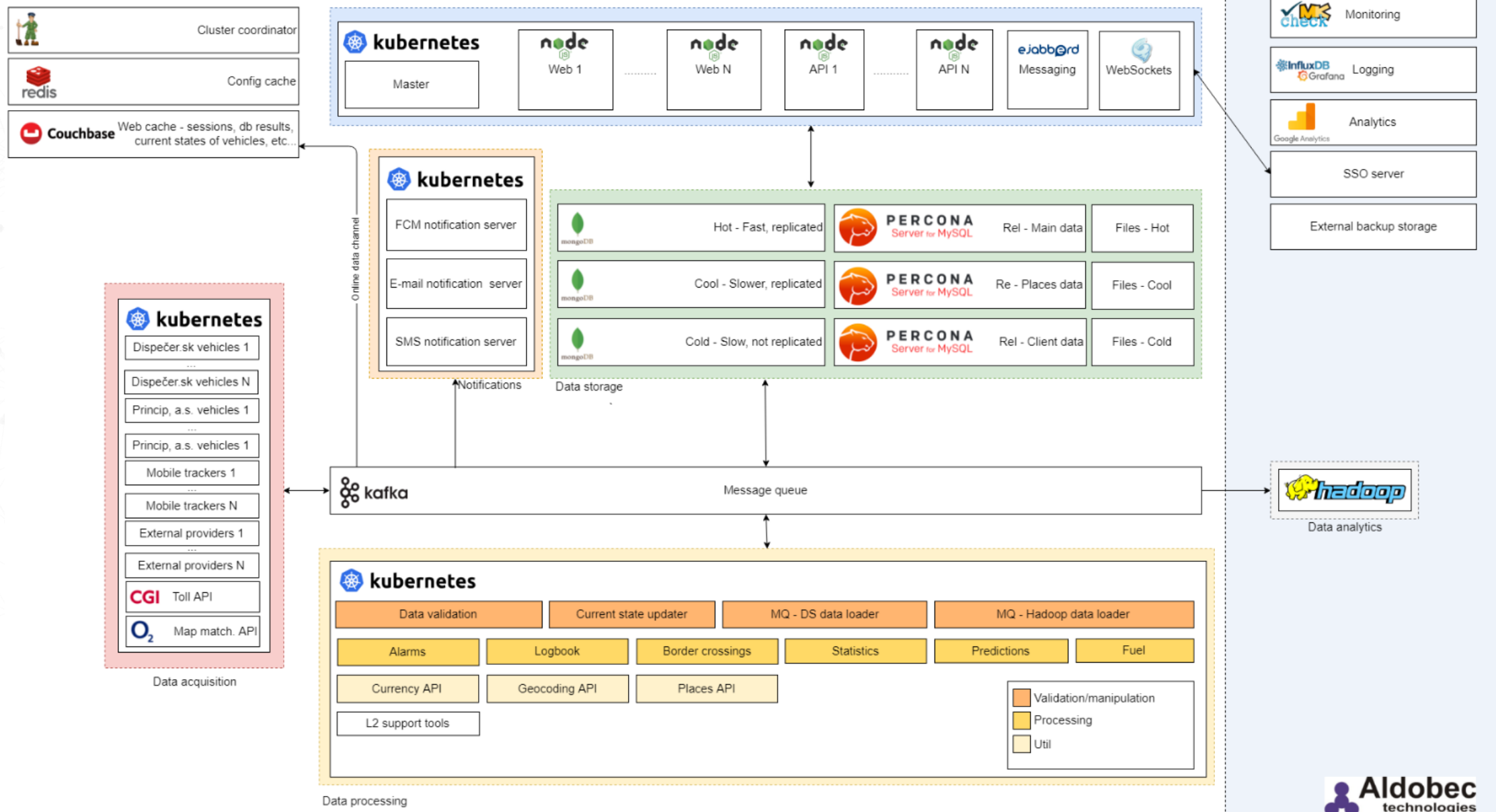
## Multivendor approach



# 2. Microsoft Azure Cloud



## 2. Telematics Systems





# W.A.G. group IT cooperation



## Short term strategy:

- Every company has to have own place for their work
- Use / share corporate benefits
  - Tenders, Purchase
  - Common dealing with technology vendors
  - Define common targets & future architecture

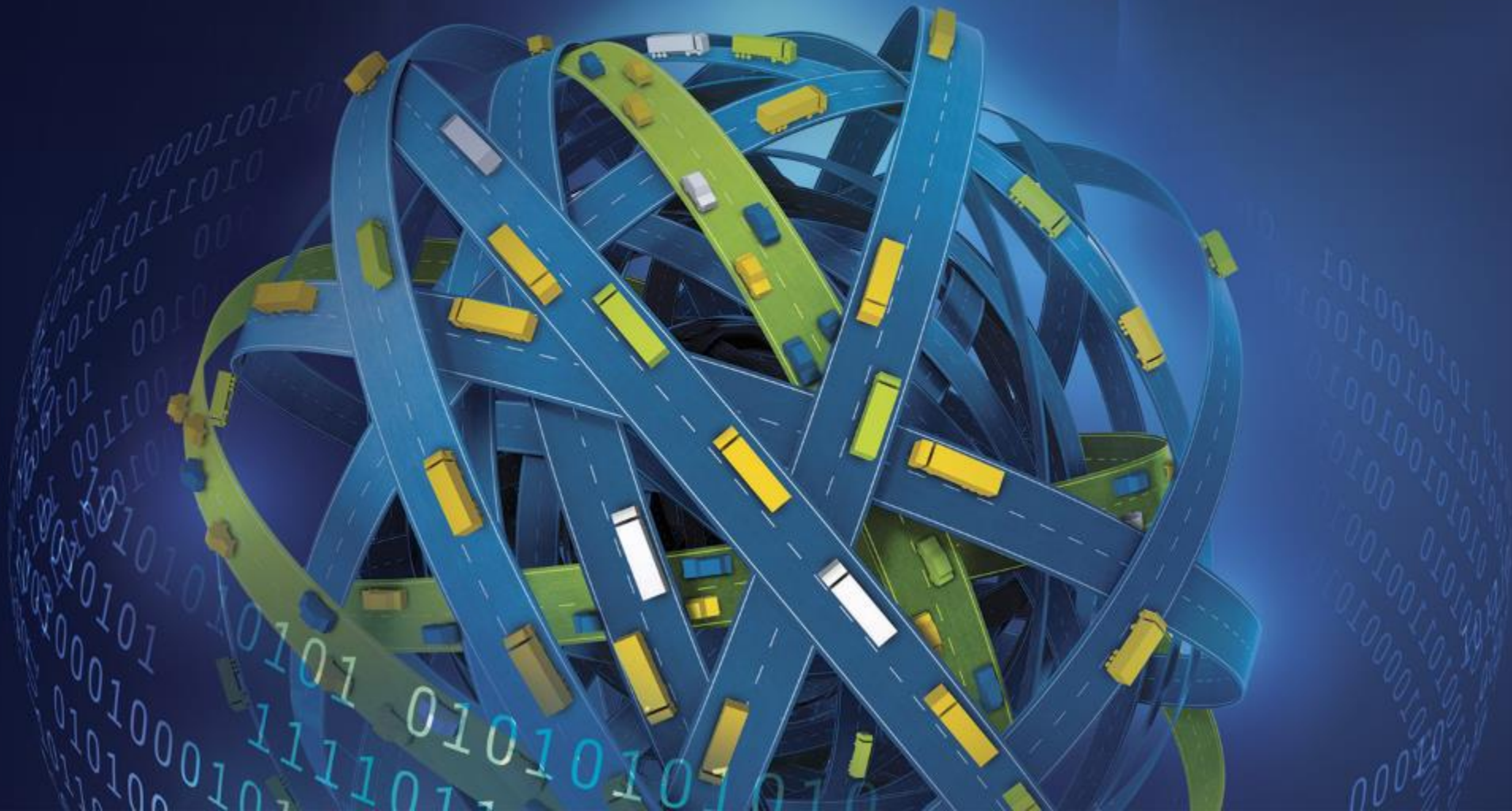
## Future strategy:

- Milestone: 1<sup>st</sup> common system in production
- Common tools – Office Support systems, security, regulation
- Share knowledge and teams cooperation



Geneve, rivers Arve and Rhone

# IT STRATEGY





# IT STRATEGY



## 1. EFFECTIVITY

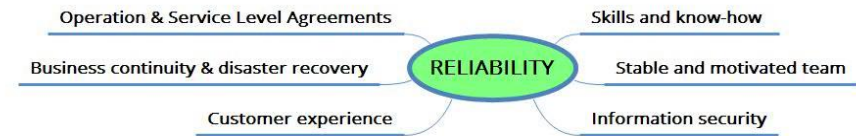
- Delivery of new SoA (new platform) components
- Demand, change, release management aligned with new SoA
- Deliver agreed business priorities
  - Main focus on New platform, EETS, Digital integrated products

## 2. RELIABILITY

- Focus on Problem management to keep operation service level
- Continue in BC and DR implementation

## 3. INNOVATION

- Go to cloud** with the first services, use SaaS and PaaS, possibly IaaS
- Adopt agile** (as complementary for waterfall) **and DevOps approach**
- By Information Security roadmap implementation increase security level for group



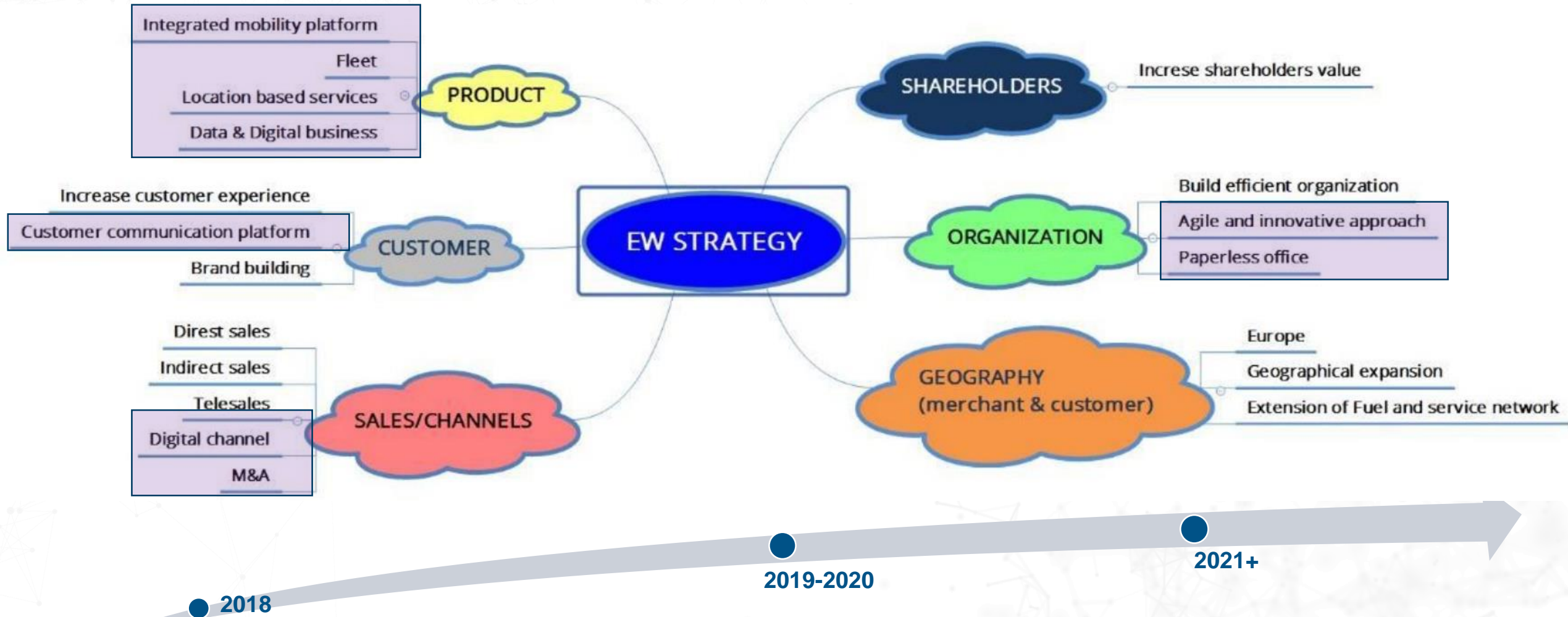
**MOVE FASTER...**  
**...SCALE FASTER**

IT Horizons		IT teams involved			
		OPS	DEV	ARCH	
H0	Operate AS-IS	X	-	-	Operate existing IT systems
H1	Bug-Fixes & small DEV	X	X	-	Optimize existing systems
H2	Organic grow	X	X	X	Grow the business in existing systems
H3	Transformation	X	X	X	Replace systems or add new ones
H4	Acquisitions	-	-	X	New systems of merged company
H5	Innovations	-	-	X	Technology PoCs, New business lines

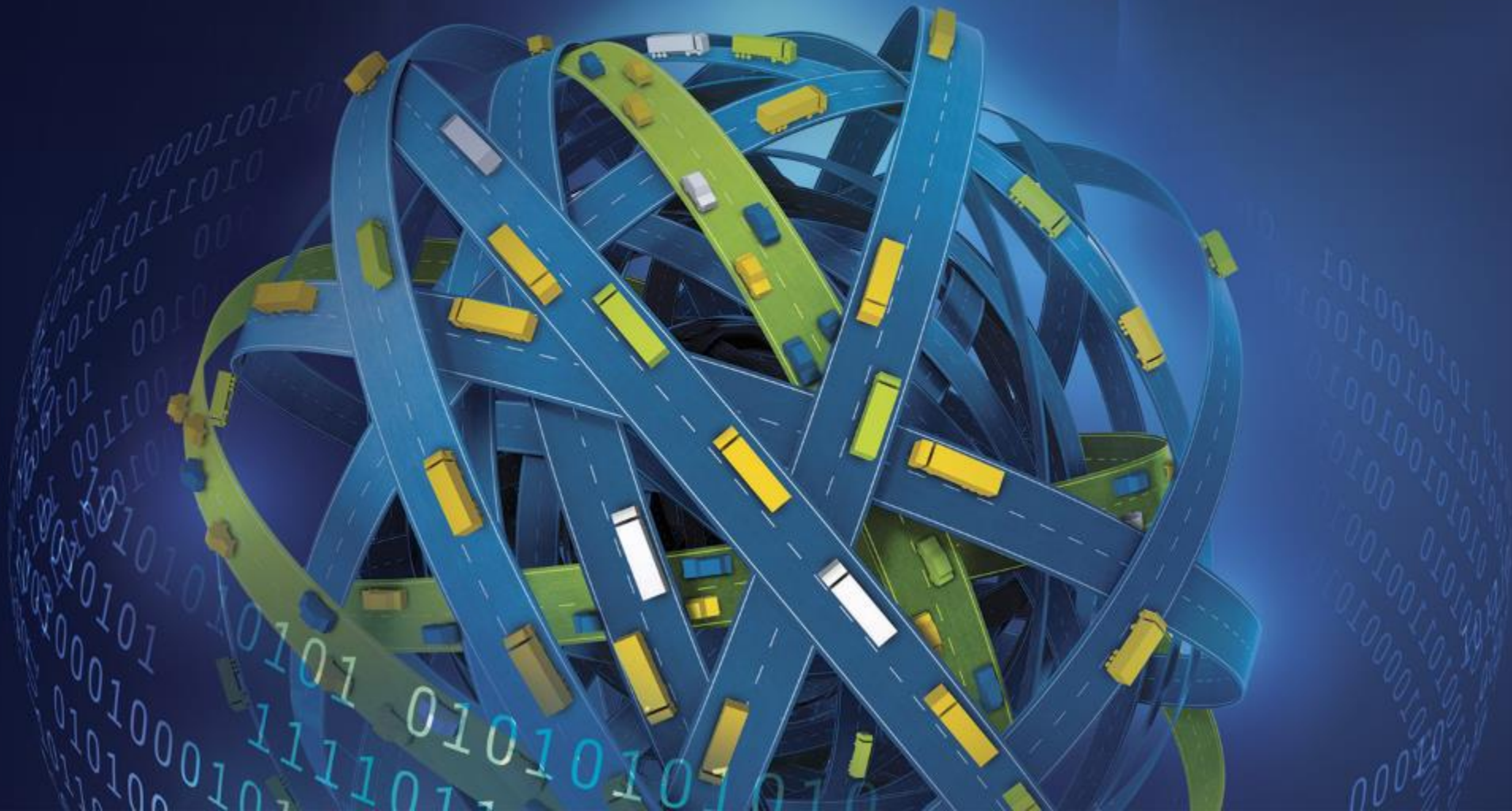




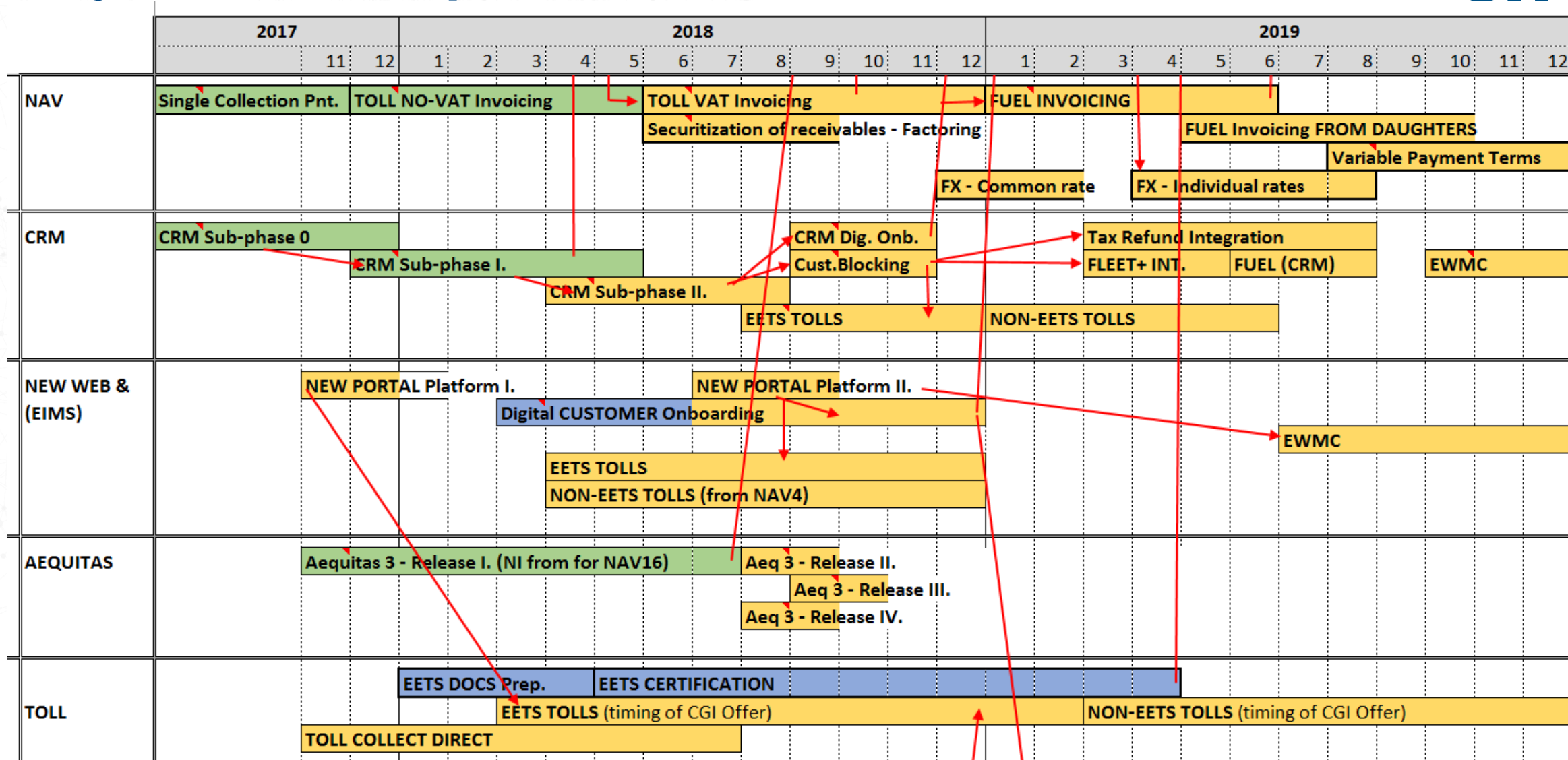
# EW Strategy - WINNING TOGETHER



# IT Roadmap

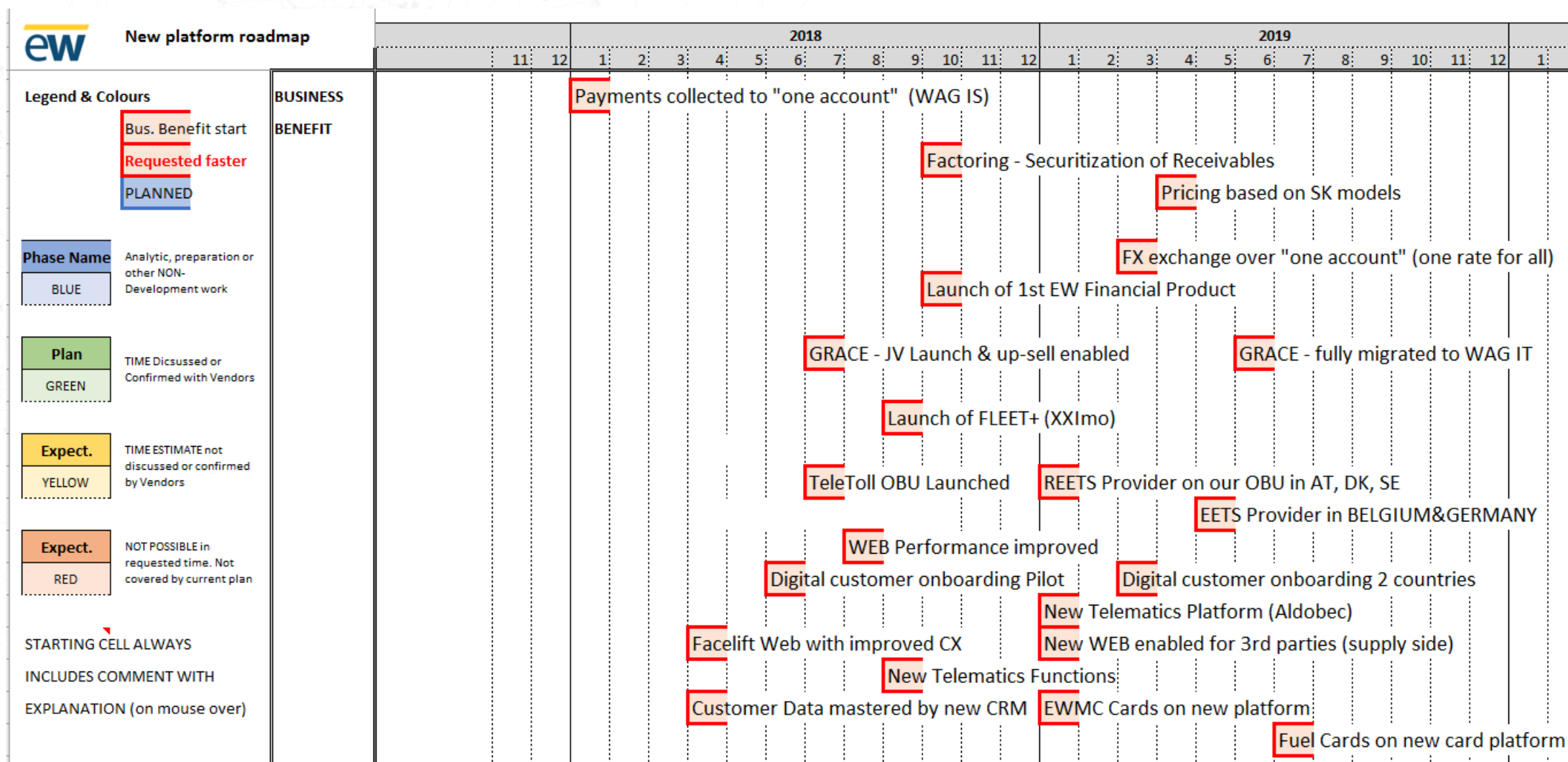


# Projects roadmap





# Projects roadmap



# IT Architecture Goals 2018



## 1. Support implementation projects :

- CRM Minimum Viable Product and decommission of SugarCRM (*FRED project*)
- System related impacts of General Data Protection Regulation (*GDRP project*)
- Migration of toll services Invoicing from NAV4 to NAV16 (*ERP2 project*)
- Operational Data Store as a key component in the transition architecture (*ODS & other projects*)
- Toll Platform for EETS & migration of non-EETS tolls (*EETS project*)
- New Digital Platform based on new cloud based Front-end (*EIMS project*)
- Integrated product(s) (Shop Goods, Telematics, Parking, Insurance, Breakdown Services...)
- Card Management System(s) & new Pricing – decision where, when & who

## 2. Create data architecture layer, data quality management

## 3. Create roadmap for hybrid architecture and migration to Cloud

## 4. Support for internal processes (e.g. new demand management process)



# IT Technology Debts

1. **Web optimization & refactoring (ODS/ESB implementation), go to Cloud?)**
2. **ESB performance tuning (simplification of operations, reduced logging & tracing)**
3. **NAV4 optimization (jobs performance and release mgmt.)**
4. **Monitoring and improvement of Whitelist generation process**
5. **Active directory cleanup (roles and groups stabilization)**
6. **DMS (S602) optimization & stabilization**
7. **Knowledge base using Confluence**





# Q & A





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