Exchange process

Title	Ref: (i.e.3C ID No.)	Date	Owner (dept., name, phone)	Accountable and Coach
Summary of request	Request ID	2016-02-05	BF53XXX, First Lastname, +46 31 xxxxxxx	First lastname

BACKGROUND **P**DCA

There is today no Information architecture or IT architecture that support the process for the physical testing (prepare and perform physical test). This makes it hard for all stakeholders to plan, re-plan and follow up the progress/status of the execution of the V&V-plan.

CURRENT SITUATION **P**DCA

• Different ways of working in the V&V organizations and between sites.

• Several different domains with specific needs, maturity and tool chains.

• No information architecture in place, no capability mapping is done and roadmap for existing tools are incomplete.
 Limited re-usage of metadata produced during test
 Difficult and time consuming to find metadata
 Copy of same data is stored in different systems and metadata owner for this data is not defined
 Data information exchange between different systems are not well defined or existing
 Plan and re-plan of the test related activities are time consuming, with a lot of manual work.

PURPOSE and TARGET **P**DCA

 Secure that the TCP supports the applications and tools included in the "Prepare and Perform Physical Test" process.
 Secure the needed metadata for all stages in the process, including metadata created in other interfaced processes (input and output).
 Create metadata once and re use / updates during the whole process.
 Implement a policy for lifecycle management of metadata / test data.
 Secure the needed metadata definitions.
 Support for planning and re planning of all test related activities.
 Documented and implemented information architecture and IT architecture

ROOT CAUSE ANALYSIS   ref GDI 968-08   **P**DCA

 No Global process implemented on all sites.
 There is no documented information architecture and IT architecture for "Prepare and Perform Physical Test" process.
 No capability mapping is done and roadmap for existing tools are incomplete.
 There is no function available for finding test data across individual solutions and sharing test data between sites
 We lack common metadata and structure from tests.
 There is no policy for lifecycle management of metadata / test data.
 Manual input from the V&V plan today, only excel doc exists.
 No follow up if the process and methods are in place and works.
 Several different V&V domains with specific needs, maturity and tool chains.
 No general definition of roles.
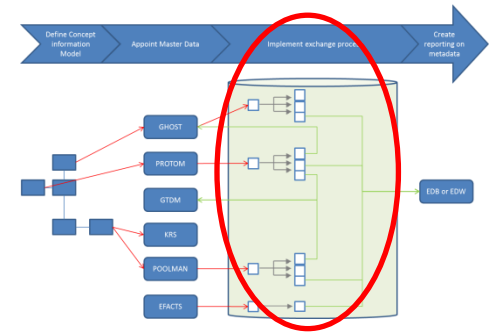 Tests done with out any test requests.

EVALUATION OF COUNTERMEASURES **P**DCA

• Text

ACTION PLAN P**D**CA

• Text

FOLLOWUP PD**C**A

• Text

STANDARDIZE PDC**A**

• Text

TCP TEST COLLABORATION PLATFORM

Test Collaboration Platform

GTDM Scope

Up-date

Re-plan

GHOST Incl Test Module?

HPG Planning tool

BOSS

AXXOS

Test Manager

PROTUS

Vehicle Logging Tool

Analyze/Reporting

Latest V&V-plan incl. cost estimate, risk and PDP

Test Request

mpleted test object

Plan activities and resources

Activities and resources planned

Perform start up meeting

Test Engineer

Start up meeting protocol

Prepare for test

Test preparation completed

Initiate engineering report (ER)

Engineering Report (ER) initiated initiated

Perform test

Test performed

Restore test object, test rig and measurement equipment

Restored test object, test rig and measuring equipment

Measured and/or collected information

Analyze the measured and/or collected information

Protus report (if needed)

Protus Lab report (L)

Status Report (if needed)

Finalize the initiated Engineering Report (ER)

Protus Lab report (L)

Engineering report (ER)

Measuring data to MDA (if applicable)

Measuring data to Key Reference Signal database (KRS) (if applicable)

V&V plan
Defines acceptance criteria and methods. Selecting test objects and create time plan.

Test request
Based on V&V plan the test should be initiated e.g. n-8 weeks before the actual test should start. In order to secure parts, material, resources and test object build. Quotation secured.

Plan activities and resources
All needed resources and budget is secured.

Prepare for test
The test object is e.g. prepared with measurement equipment. The test procedure and method is prepared and secured.

Perform test
Measurement systems and tools are efficient and control and give support during the test execution. E.g. test procedure, KPI, progress and status is available (results/running/faults found).

Data handling
Results and data are analyzed, documented and published. The data is also made available to upload for analysis or as input for future testing.

GHOST incl Test Module ?

Data information exchange
"Test Collaboration Platform"
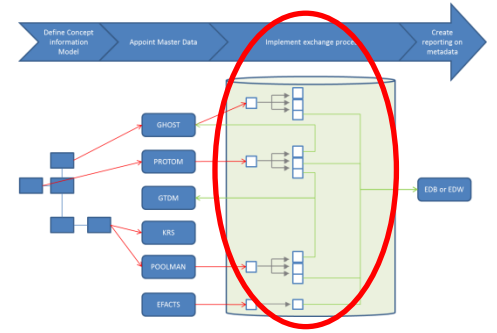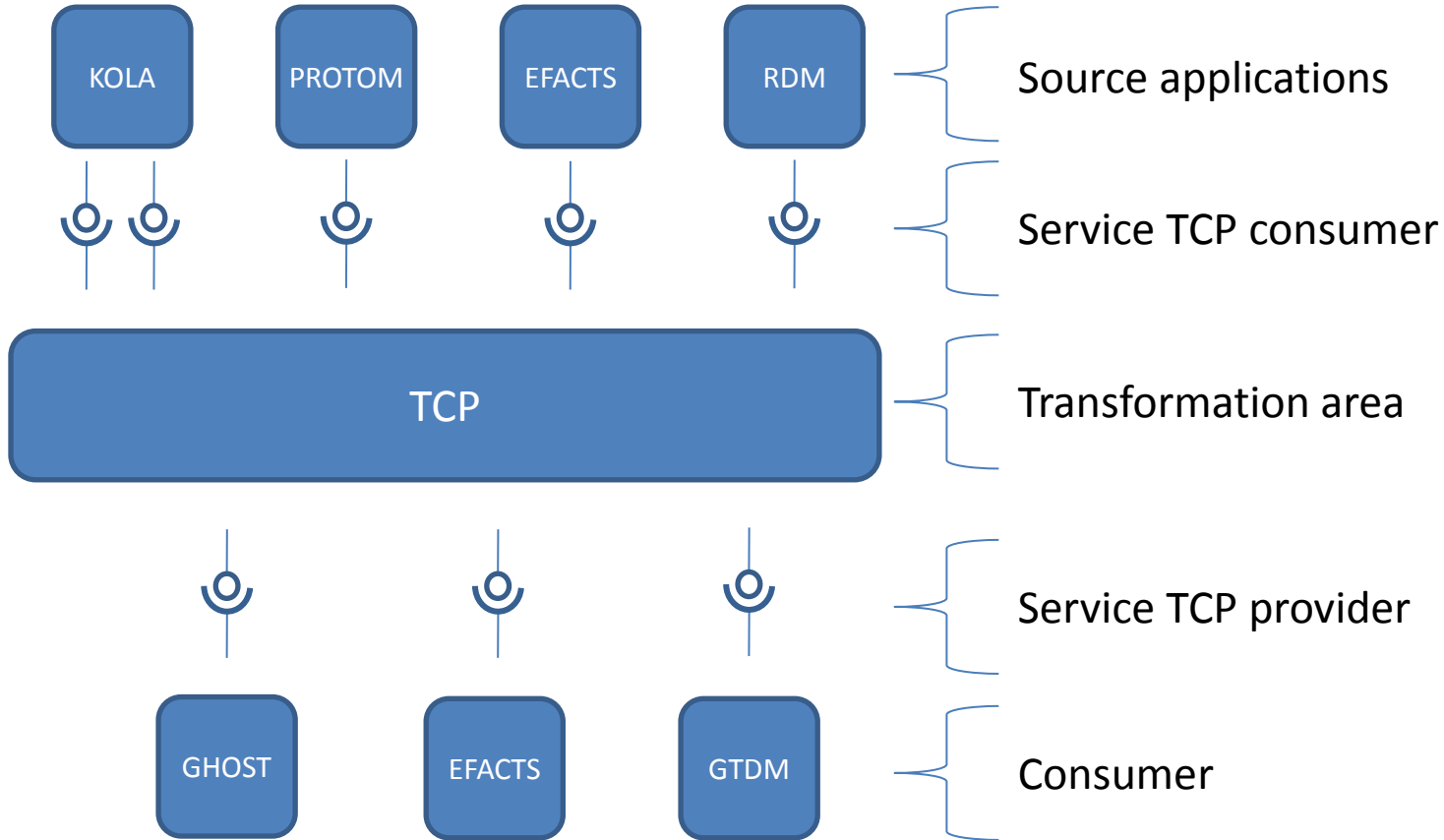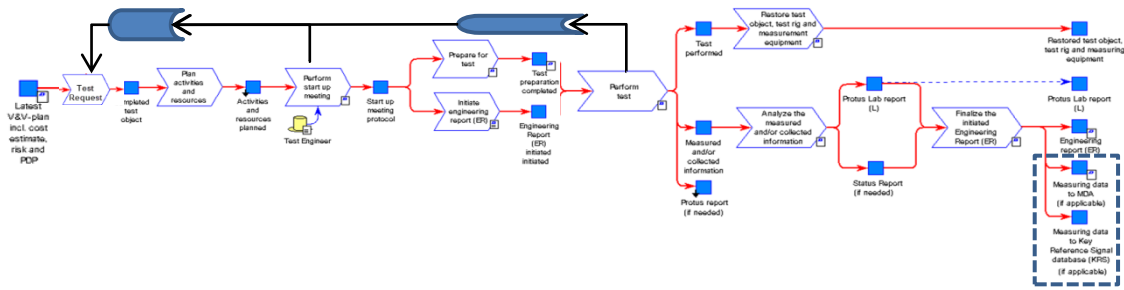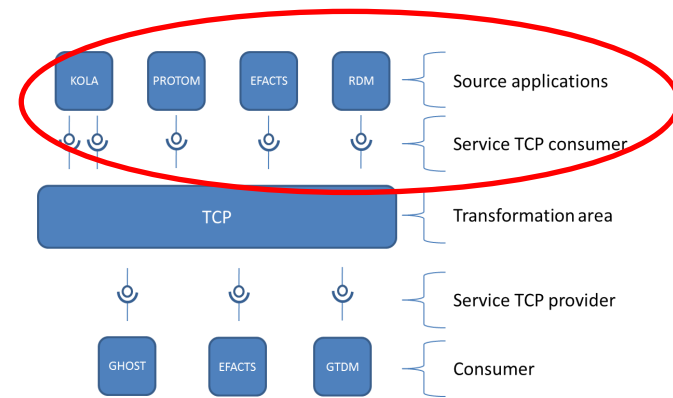
TCP Workflow
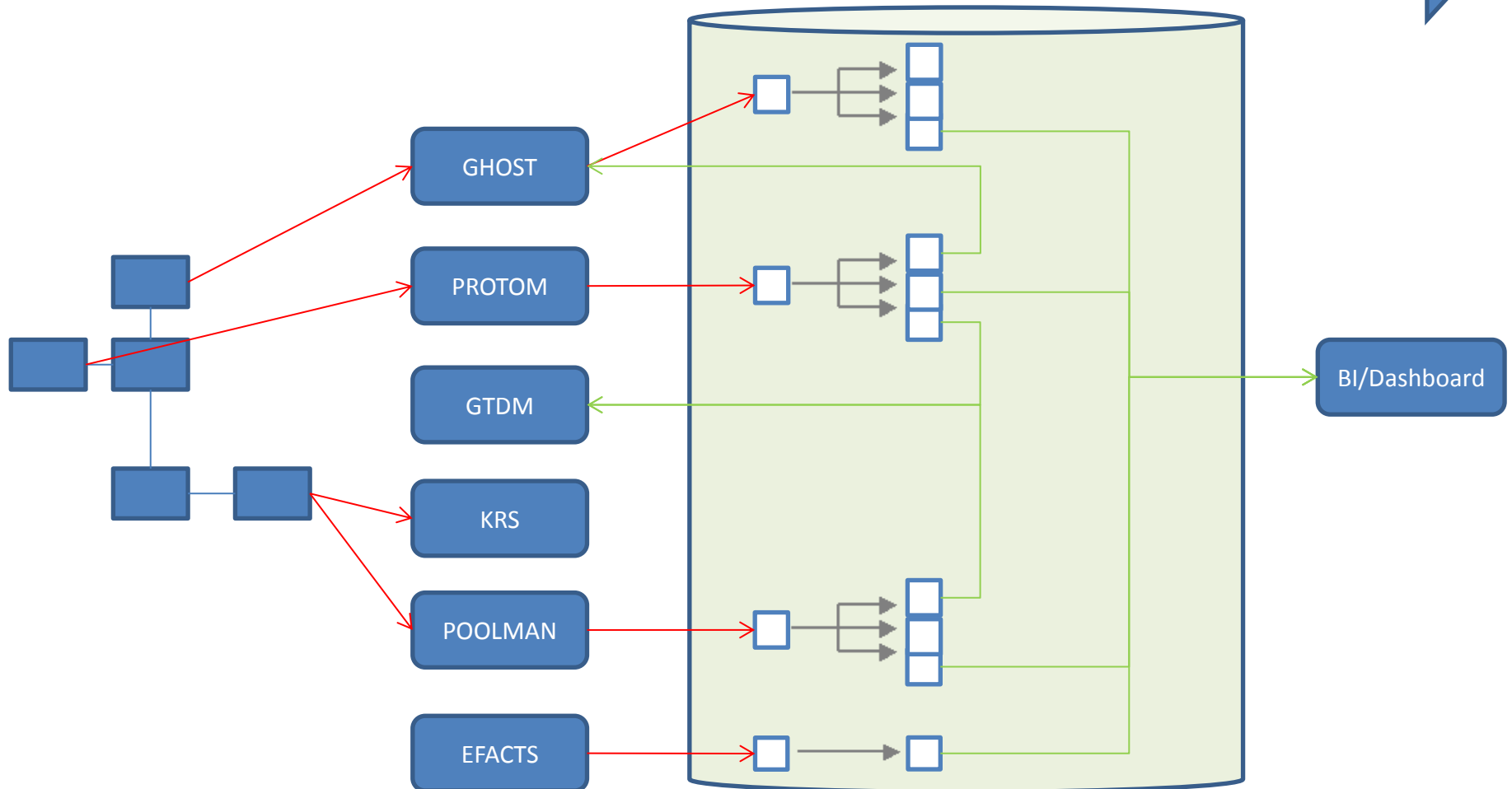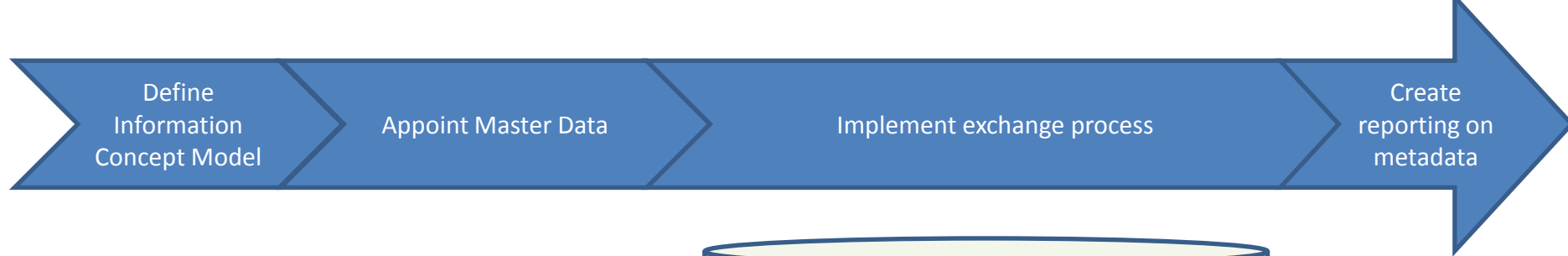
STEP 3: Exchange process

Main requirements:

- Real time management
- Data historization
- Create global output with main metadata
- Have capacity to manage Request & Reply

STEP 3:
Exchange process

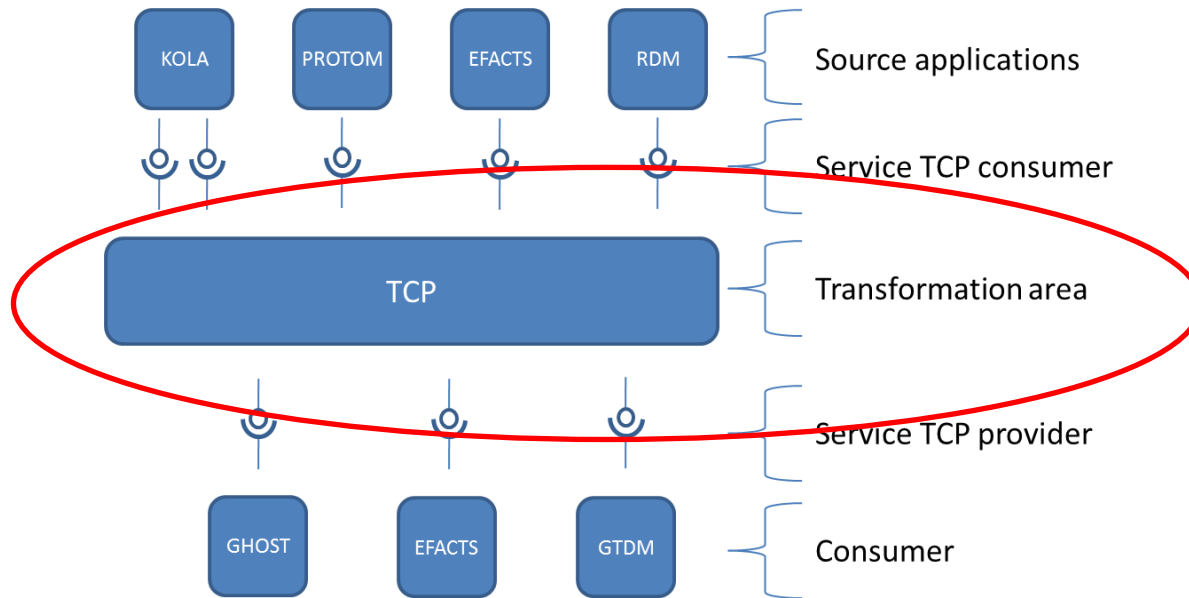Source applications

Service TCP consumer

TCP — Transformation area

Service TCP provider

Consumer

Source application and Service TCP Consumer

All metadata linked to a test could be integrated to TCP from master source system.

TCP integration has to be in line with the Integration policy from Volvo group:
- Integrate data directly from master source system
- Reuse existing service from source application if it's possible
- Used MQ technology to exchange information.
- Create adaptor in TCP side if it's required

Transformation area

Why we would like create a common transformation area?

- More than 100 source applications (provider)
- More than 100 target applications (consumer)
- Without common « adapter », how many exchange process?
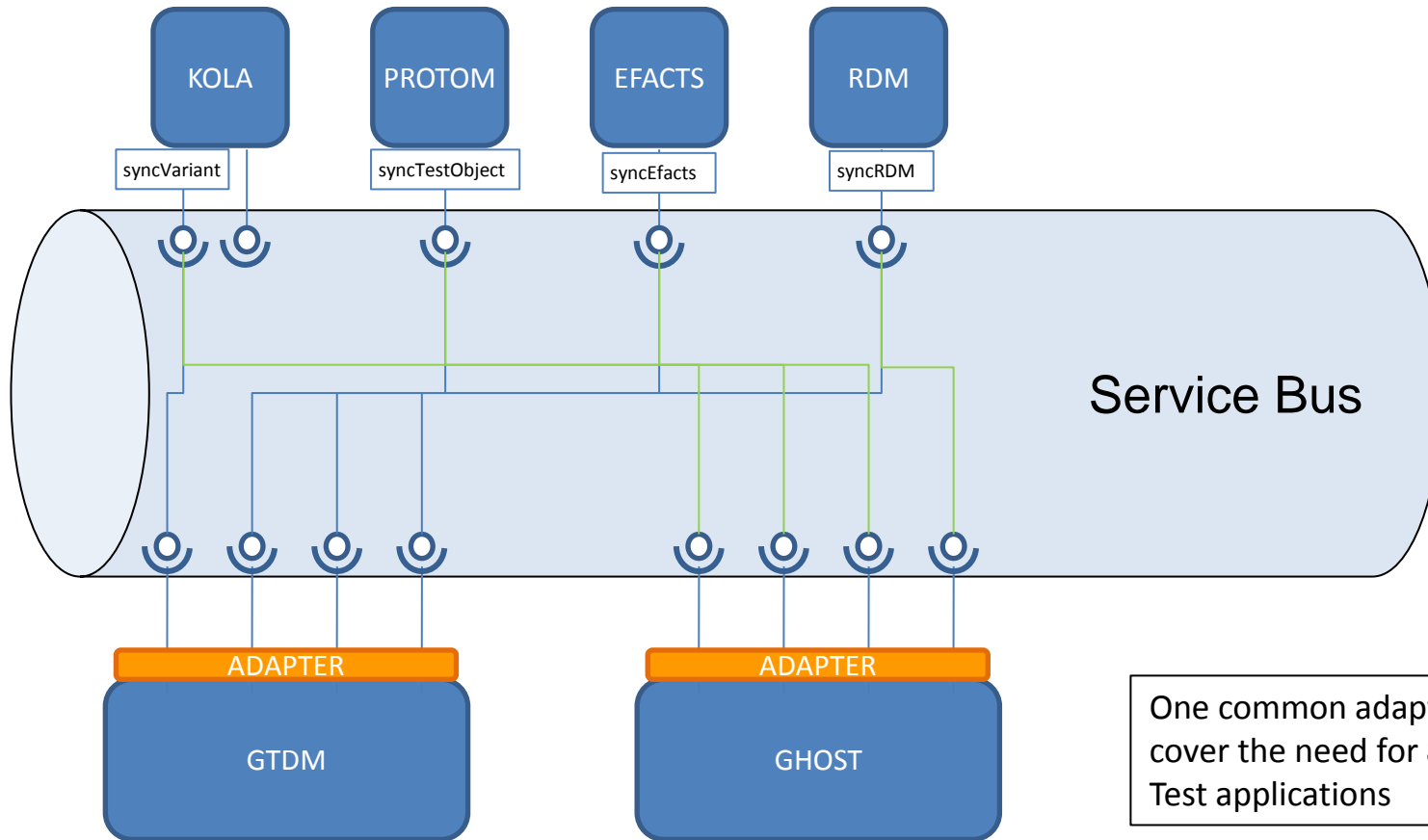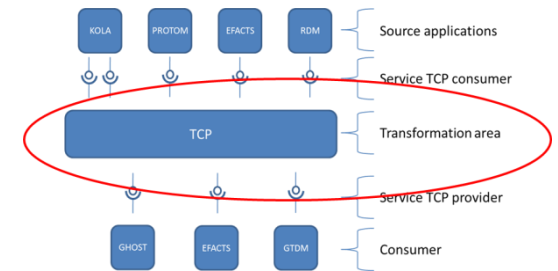
One common adapter could cover the need for 80% of GTT Test applications

IT Solutions

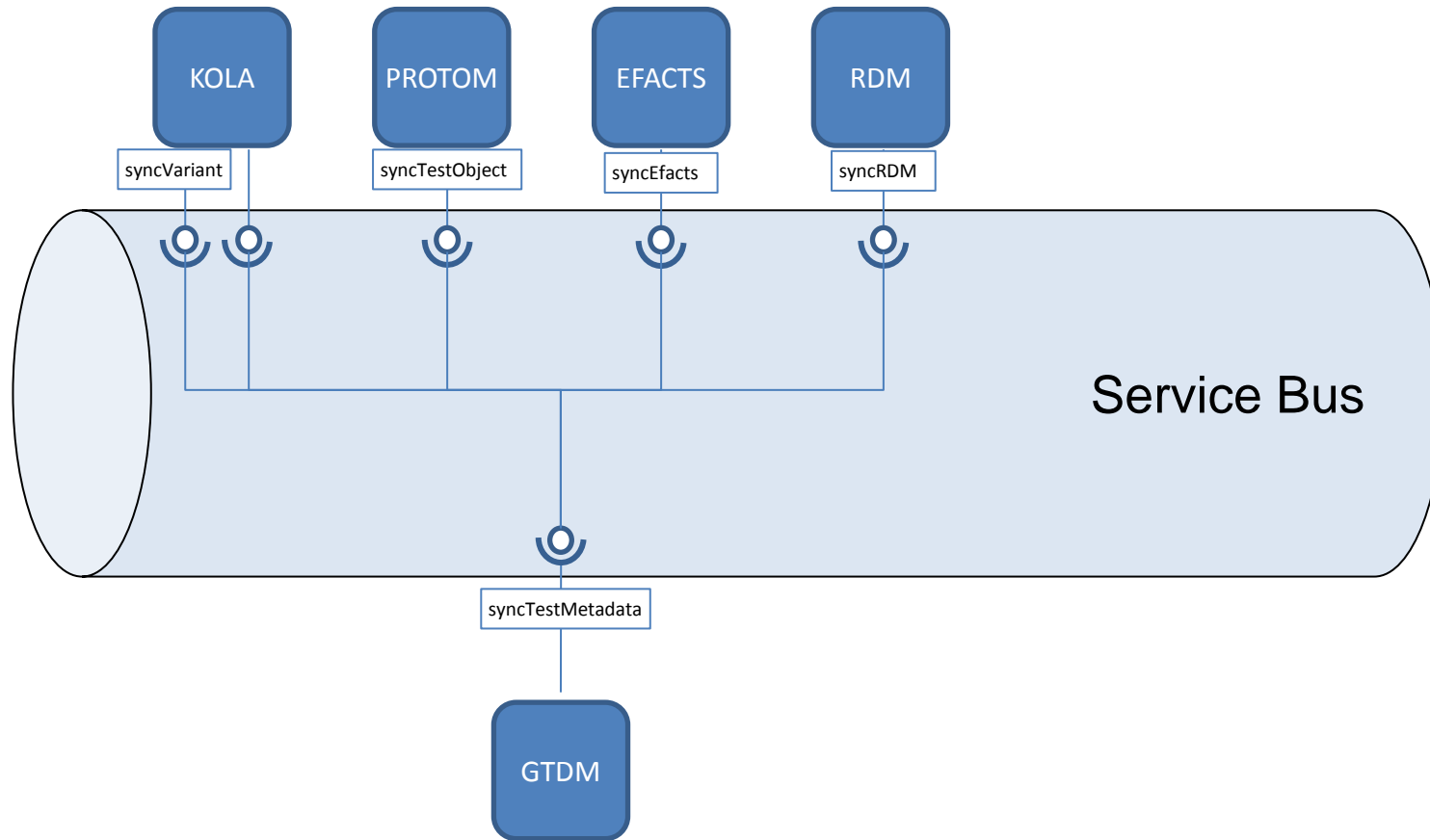IT Solutions for TCP:
- PLM BUS
- New Database
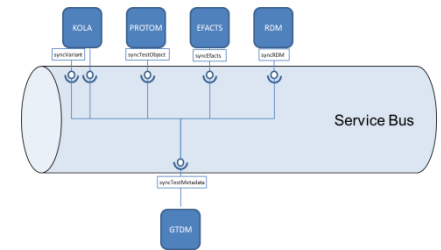   - HUB Layer
    - HUB/MDM/DWH Layers
- GHOST
- EDB
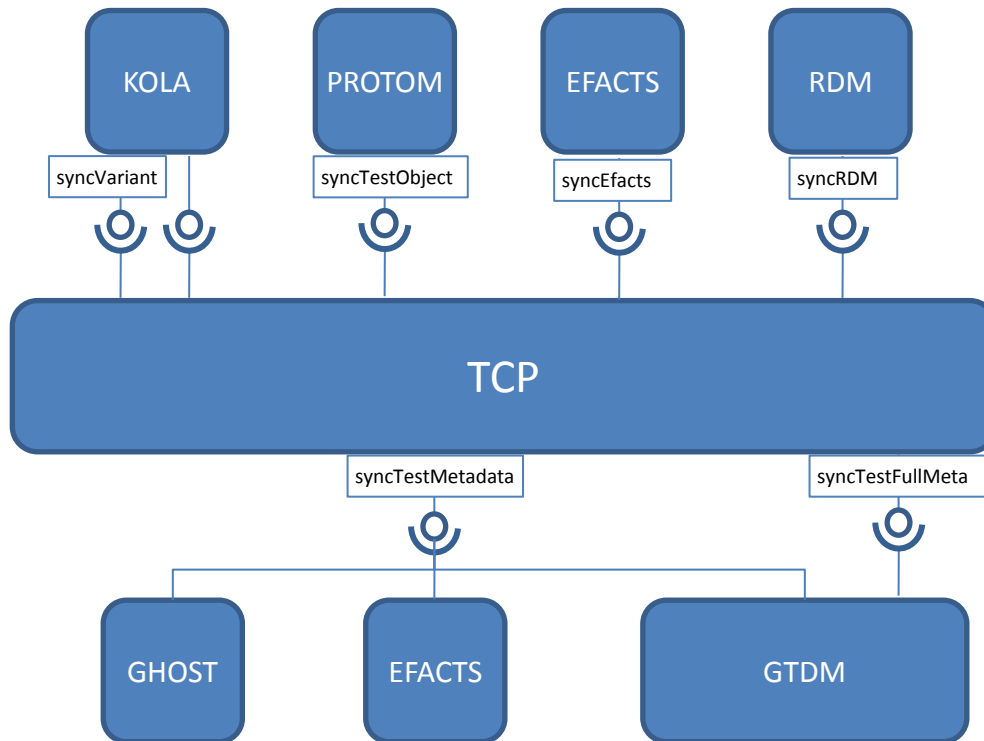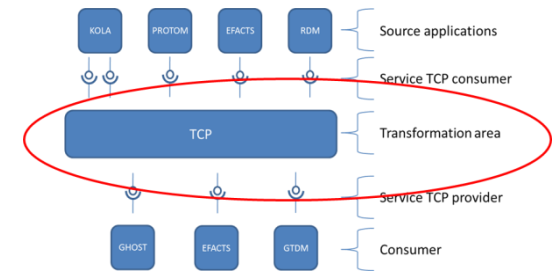
- Real time management
- Data historization
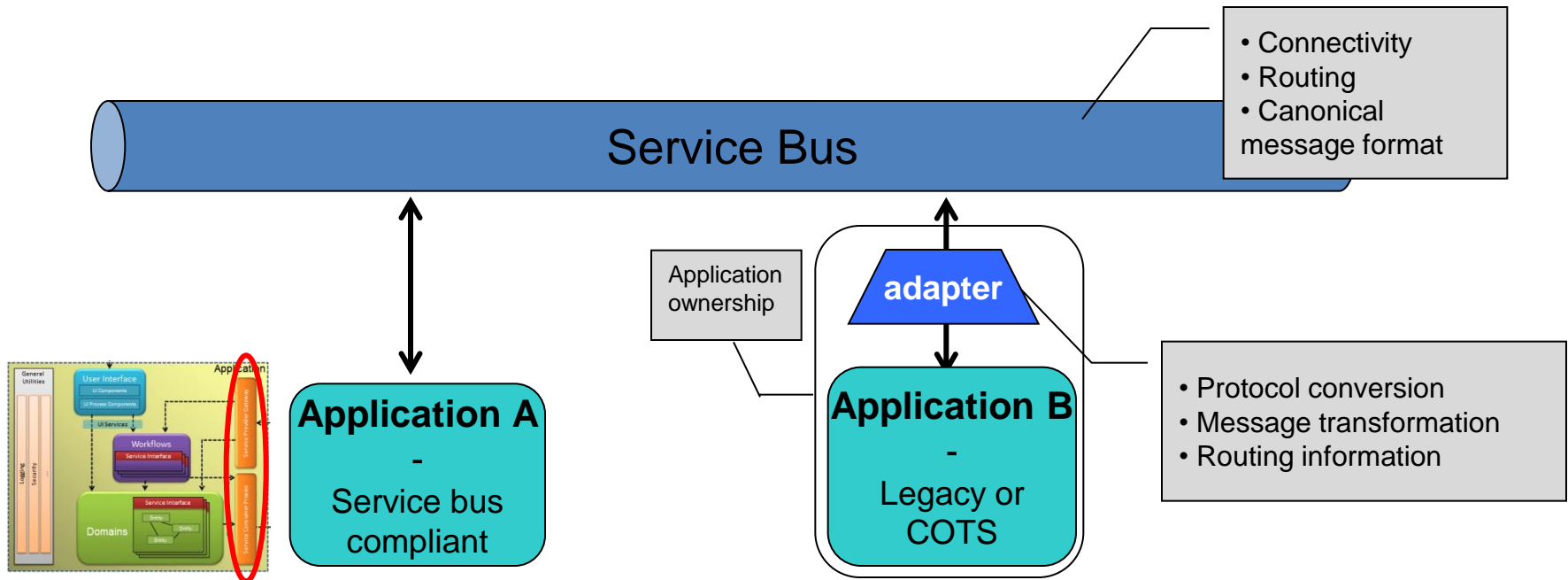- Create one global output with main metadata
- Merge for specific output

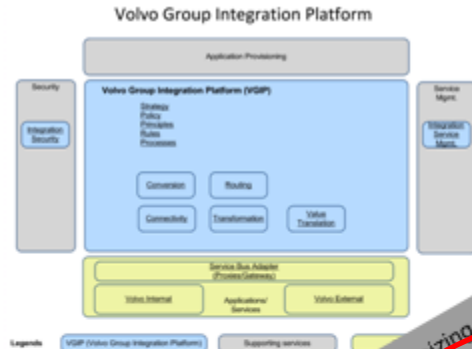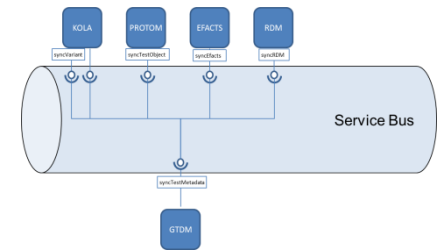# No new application: Manage transformation via the service bus
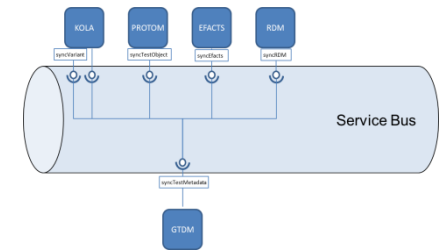
Service Bus Concept

- A Service Bus will provide at least Connectivity, Routing and a common information model implemented by a canonical message format (maybe more than one)
- New applications should be Service Bus compliant (will reduce future maintenance cost)
- Implement adapters for non compliant applications

Service Bus

- Connectivity
- Routing
- Canonical message format

Application A
-
Service bus compliant

Application ownership

adapter

Application B
-
Legacy or COTS

- Protocol conversion
- Message transformation
- Routing information

2016-10-26

Staircase model

Volvo Group Integration Platform

Business Process Integration
Used by applications to implement workflow functionality.

Value translation
Value translation is a function to change values in a message.

Transformation
Required when applications use different message formats.

Routing
Routing is a mechanism to forward messages to the intended recipient(s).

Conversion
Required when applications use different connectivity options.

Connectivity
Used by applications to connect to the Integration Platform

The staircase model enables flexibility & rightsizing for integration solutions

ITA education

Volvo Group Integration Office, N.N.

No new application: Manage transformation via the servive bus
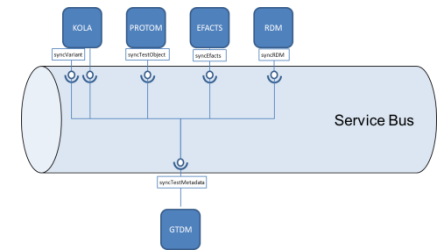
Consume even driven messages? Y
Provide even driven messages? Y
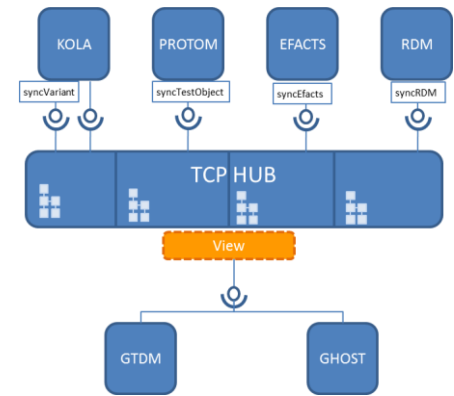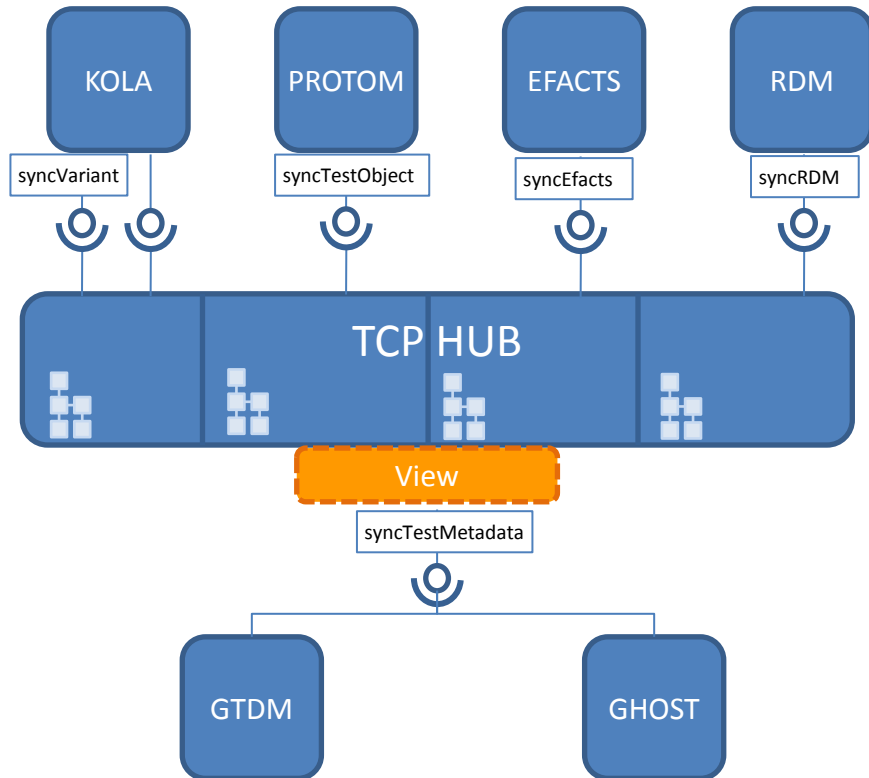**Data transformation capacity? N : No capacity to merge several sources**
Service capacity? Y
Historization/Versionning capacity? N: No capacity to store data.

PLM Service Bus could not be used for the transformation area.
However, it could be interesting to provide TCP Service via the PLM Service Bus.

New application: HUB Database

Integration from Event Driven services. API to read MQueue

SQL Server Database. One schema per source system. Modelisation in line with source system. Historization and versionning

Provide data via services (several integrations pattern). Output could be based on View (Adapter layer).
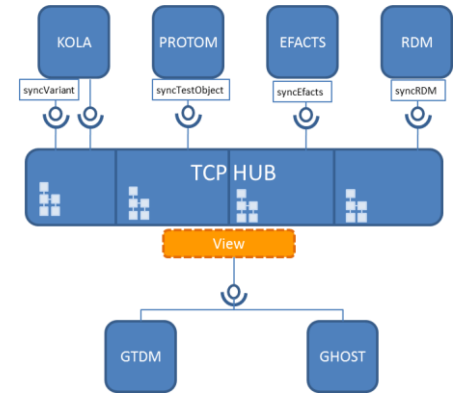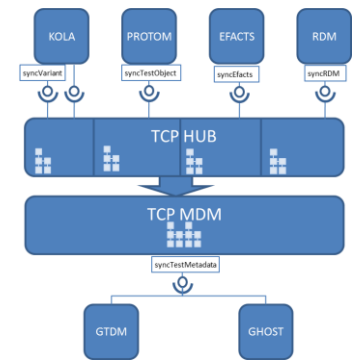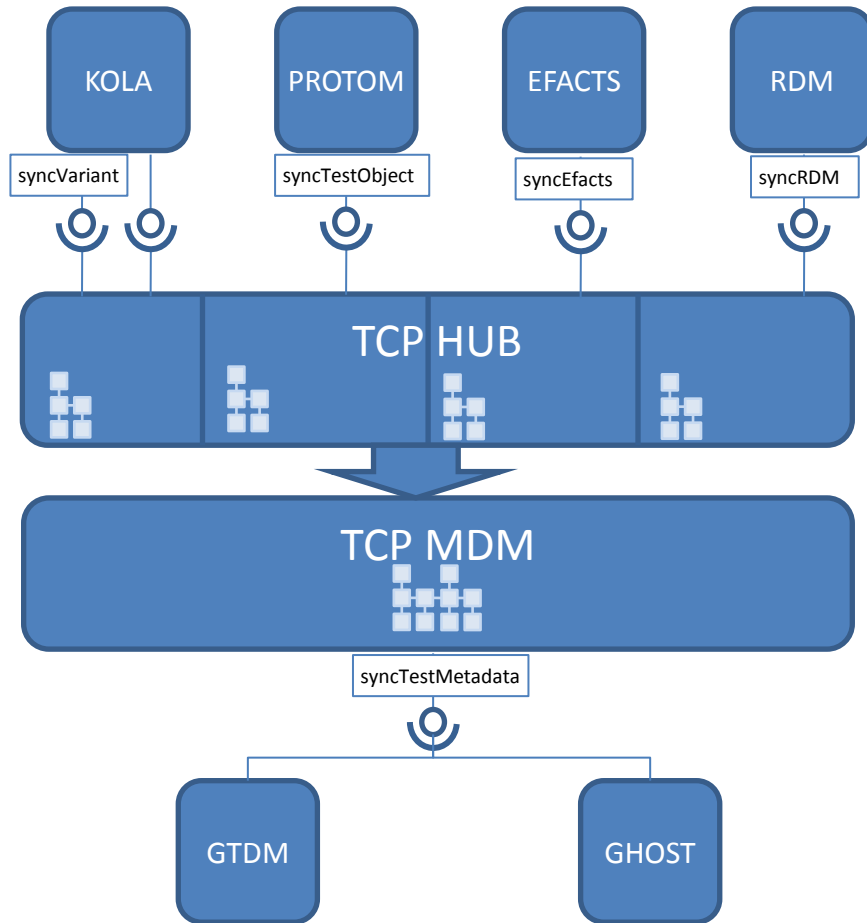
New application: HUB Database

- Easy to add new source
- Flexibility
- Capacity to manage realtime
- AGIL Compliant

- Limitation on MDM/No business knowledge
- Limitation to merge information « Adapter layers »

New application: HUB/MDM/DWH Database

Integration from Event Driven services. API to read MQueue

SQL Server Database. One schema per source system. Modelisation in line with source system. Historization and versionning

Create common DWH to create links between metadata. Do master data management to clean information.

Provide data via services (several integrations pattern). No adapter is required .
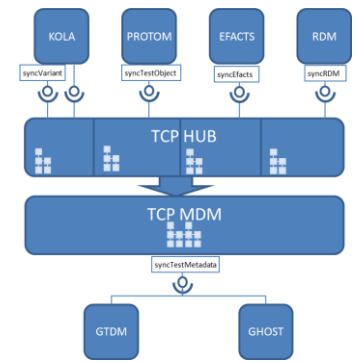
New application: HUB/MDM/DWH Database

☺
- Provide knowledge to downstream applications
- Easy to add new specific extraction
- Huge capacity to transform data

☹
- Need huge maturity on metadata
- Expensive and time consuming for new implementation
- Complexity to manage real time

GHOST

Infra:
- SQL Server 2012
- Object oriented model based on key value → Flexible model
    - Operational database for GHOST
    - Capacity to store other application on other schema

Event driven integration capacity:

  Not yet develop but could be implemented.

Real time capacity (output)

  Complexity to manage real time.

Data transformation capacity

  ORM: NHIBERNATE (Between database)

  .NET (for In House)

Service capacity

  OK

Volume capacity

  SQL Server 2012

Historization/Versioning capacity

  OK

GHOST

- Contains already DWH level
- Have already data from several steps of process
- Main application for test and MDM for the first step
- Capacity to transform data

- Relational database: need huge maturity.
- Expensive and time consuming to add new information.
- Interface dependencies for the back-end
- Complexity to implement real time between layers

EDB Platform

Licensed software

Operating System
- Linux Redhat Enterprise Edition
- Solaris 10 x86

Applications
- Oracle Database Enterprise Edition.
- Oracle Instant Client 11.1.0.x.0
- Enterprise Manager.
- SQL Developer

Software – No licence cost

Editors
- Emacs
- Nedit

Volvo In-House
- Volvo Server 1.0
- Volvo Client 3.1.2
- Lib1-8.

Open Source
- C/C++ Compiler GCC/G++ version 4.1.2.
- Libxml2 Version 2.6.8
- PHP Version 5.2.2
- Apache Version 2.2.9.
- Mozilla 1.7.3 LDAP SDK
- Cgic Version 1.0
- GNU Make 3.81

To Be Updated

EDB Platform

> **ROADMAP:**
> EDB target is not to be a HUB.
> EDB is already a operational database and a reporting application. Let see EDB as Reporting tools for TCP.

- Contains already DWH level
- Have already data from several steps of process and master data (KOLA...)
- Have knowledge...

- Relational database: less flexibility, need huge maturity
- Interface dependencies for the back-end
- Complexity to implement real time between layers
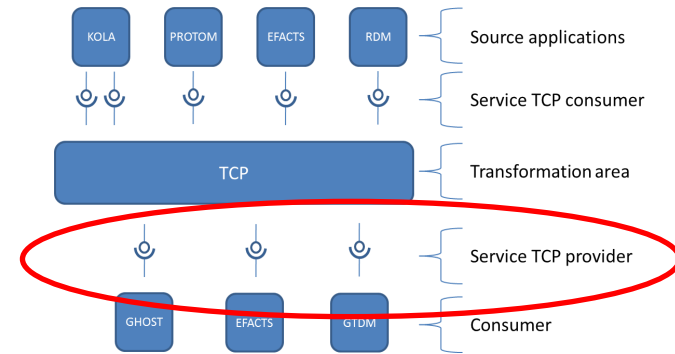- → New source : Big cost and time needed

No investigation requested

Transformation Area
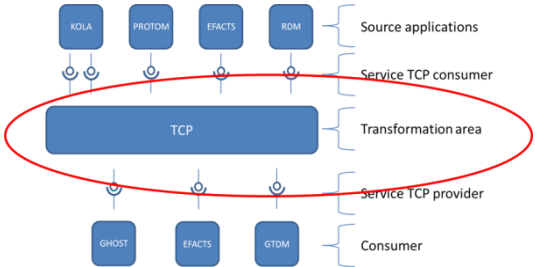
	Capacity: Real Time	Capacity: Data Historization	Capacity: Transformation	Flexibility	One-Time	Run-Time	Architecture principles
Service Bus	🟩	🟥	🟥	🟩	🟩	🟩	🟩
Database Hub	🟩	🟩	🟧	🟩	🟩	🟩	🟧
Database DWH	🟧	🟩	🟩	🟧	🟧	🟩	🟧
GHOST	🟥	🟩	🟩	🟧	🟧	🟧	🟧
EDB	🟥	🟩	🟩	🟧	🟧	🟧	🟧

EDB Roadmap

Service TCP Provider

The aim of TCP is to provide new service to cover needs from several consumer.
This service:
- Merge information from several source system. If consumer would like information from one source system, it has to reuse source system service.
- Could be implemented with several pattern (Pub/Sub, Request/Reply) following the downstream application requirements
- Could be implemented on the PLM service bus