UPS Automated Arrival and Departure

An Integration Use Case

June 2015

Introduction

- Application Architect – UPS

- 27 years (and counting) with UPS

- Experience in several Transportation domains including UPS Airlines, UPS Automated Hub (Worldport), UPS Ground Systems

- Infrastructure and Systems Programming background

Agenda

Overview

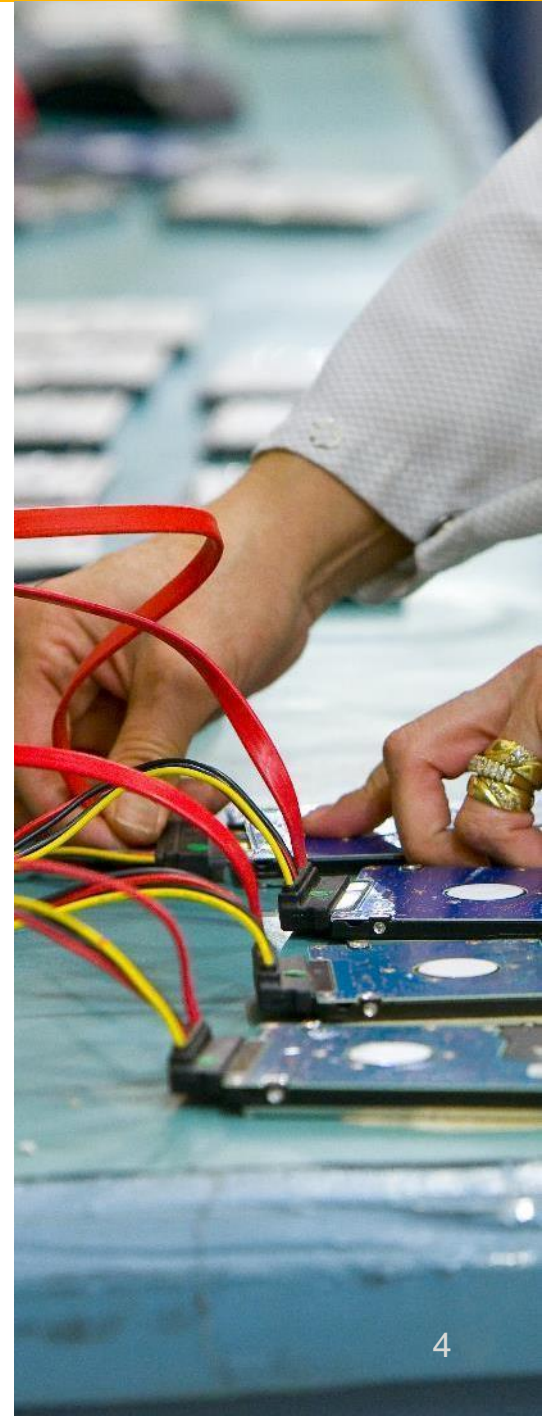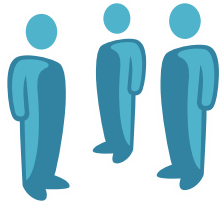Integration Opportunity

Solution Description

Technology Approach

Vision

Q&A

UPS Enabling Our Customers Through Technology

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Overview

Auto Arrive and Depart

- AAD was the first of several initiatives in the Feeder Efficiencies program that will automate activities in the Feeder process reducing manual intervention, increasing productivity and saving money.

- AAD eliminates manual key entry of arrival and departure information on-property and load tracking systems by leveraging data available from driver-recorded events transmitted from the in-cab device.

Opportunity

- For many years, UPS tractor trailer drivers (UPS calls them "feeder drivers") had to stop at the gate of hub locations, pick up a phone, and exchange information with the dispatch office to relay what equipment or loads they were bringing into or removing from the property.

- The dispatch office then manually keyed the information into several systems to record the arrival or departure event. The process took several minutes, delaying inbound trailers getting to their unload locations or outbound trailers on their way to the next destination.

Solution

- Once a site is enabled for AAD use, the driver records arrivals and departures with the press of a button on his/her in-cab device. The arrival and departure information is then transmitted to the appropriate Feeder applications for processing.

- Arrivals will initiate feedback to the driver including, a bay assignment instructing them where to place each inbound trailer. All of this occurs in a matter of seconds and without the driver and dispatcher having to directly communicate.

- Through studying the current manual arrival and departure processes and envisioning automated solutions, the team designed both new processes for the driver and dispatch office as well as a new information brokering service to tie together all of the required transportation systems, ensuring the same checks and balances that occurred manually would continue to occur in the automated solution. **In addition, this new brokering framework which was designed around the enterprise Fuse Message Broker infrastructure has benefited subsequent projects by providing a new backend communication platform to use as a springboard for quicker time-to-market.**

- Today, when a UPS feeder driver drives onto UPS property, he or she can choose the AAD Express Lane and make use of the new innovative processes implemented through the mobile device, avoiding the manual procedures of the past.

Results

- AAD was recently deployed to one thousand one hundred ninety five (1195) centers and one hundred twenty five (125) sort facilities. These locations are now able to automate nearly 80% of arrivals and departures, driving a 14% reduction in total dispatch costs.
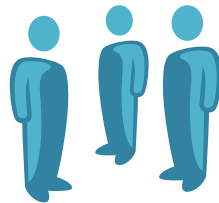
How did we do it?

It starts with people…

Traditional Application Boundaries

- App Teams support multiple protocols (FTP, MQ, HTTP/S, etc.)

- Limited reusability of Integration Services

- Data is "closed" unless App team "compelled" to expose and support

Organizational Boundaries

Business Area #1

App Teams

Front-end

Back-end

Integration

Business Area #2

App Teams

Front-end

Back-end

Integration

Business Area #3

App Teams

Front-end

Back-end

Integration

Quality Assurance

Shared Services
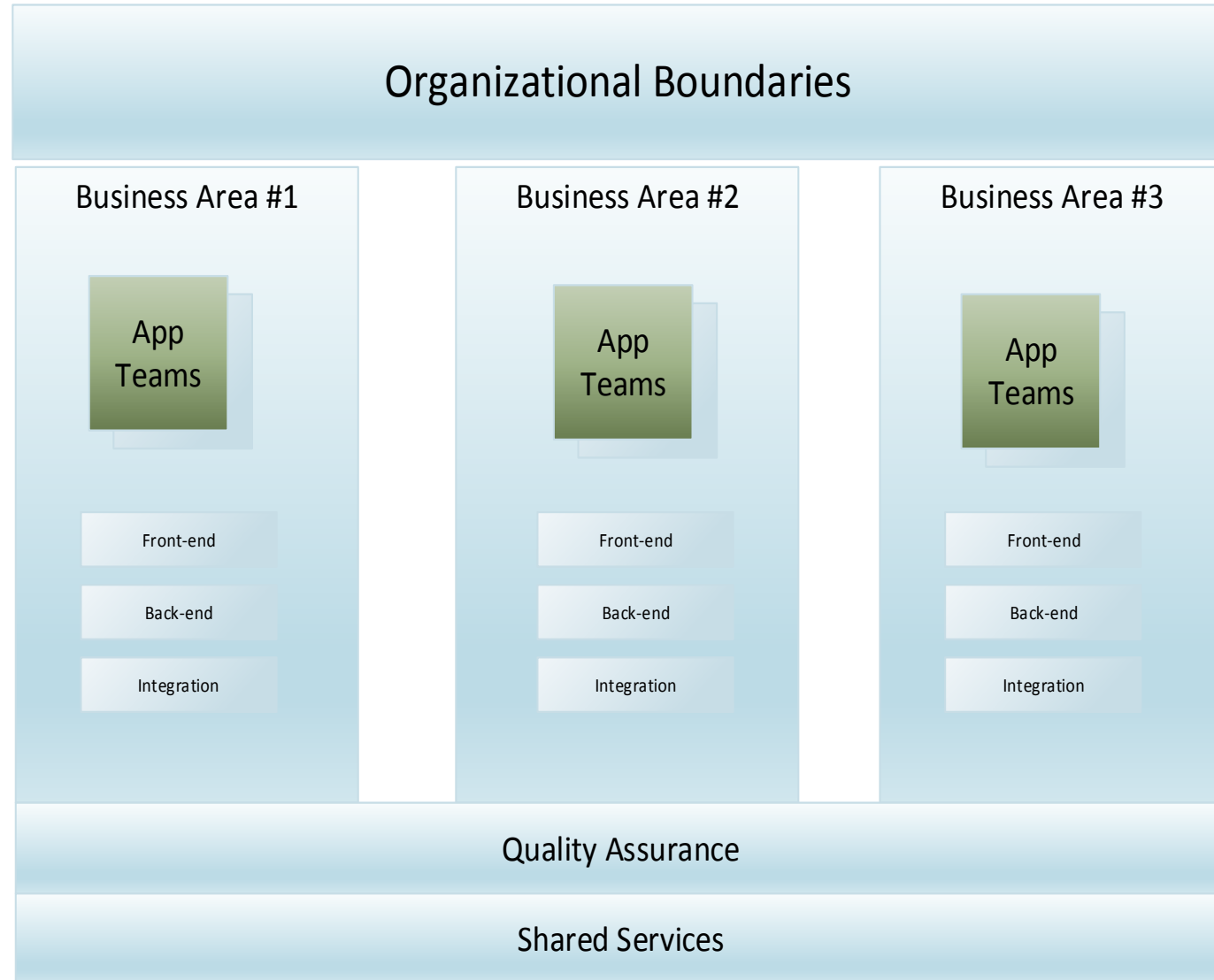
High Performing Integration Team with Governance

Integration Development Team

Qualifications

1. OO Knowledge

2. Tech Savvy

3. Business Domain Knowledge

4. "Can Do" Attitude

- Integration Competency Center
    - (ICC)

Organizational Boundaries

Business Area #1	Business Area #2	Business Area #3	
App Teams	App Teams	App Teams	Arch & Gov.
Front-end	Front-end	Front-end	
Back-end	Back-end	Back-end	

Integration Development

Quality Assurance

Shared Services

Vision

AAD - Conceptual Architectural

Business Capabilities

Driver Dispatch
Load Forecasting
Auto Arrive
Schedule Update
Auto Bay Assignment
DOT Rule Enf
Auto Depart
Transportation Inbound Views
Exception Queue

Deliver content to end user via Content Services, and Composite Apps utilizing the Business/Data Services

Business Applications

Composite Applications

Publish events to Business Apps

Consume business events via connectivity Adapters

Dispatcher

Inbound Trailers
Repair Queue
Content Services
Inbound Loads

Adapters
Wireless Terminal
Web Svc
AMQ
MQ
GPS
Arrive
Depart
Driver Activity & Comm
Message Routes

Integration & Common Services Backbone

Business Services
- Schedule Visibility
- Load Dispostion
- ETA Calc
- Trailer ID Reconciler
- Forecasting
- Exception Gen

Data Services
- CRD
- Driver Sta
- Location
- Audit Lo

Services

Execute "Integration Routes" (e.g., Arrive, Depart,...)

Utilize reusable Business & Data Services to execute logic, enrich events and update data

Content Based Routing
Transformation
Data Enrichment
Transaction Mgmt

Transportation Data Store (TDS)
Corp Ref

Sensors
Vehicle Bus

Key:
New Route
New Business Service
New Data Service
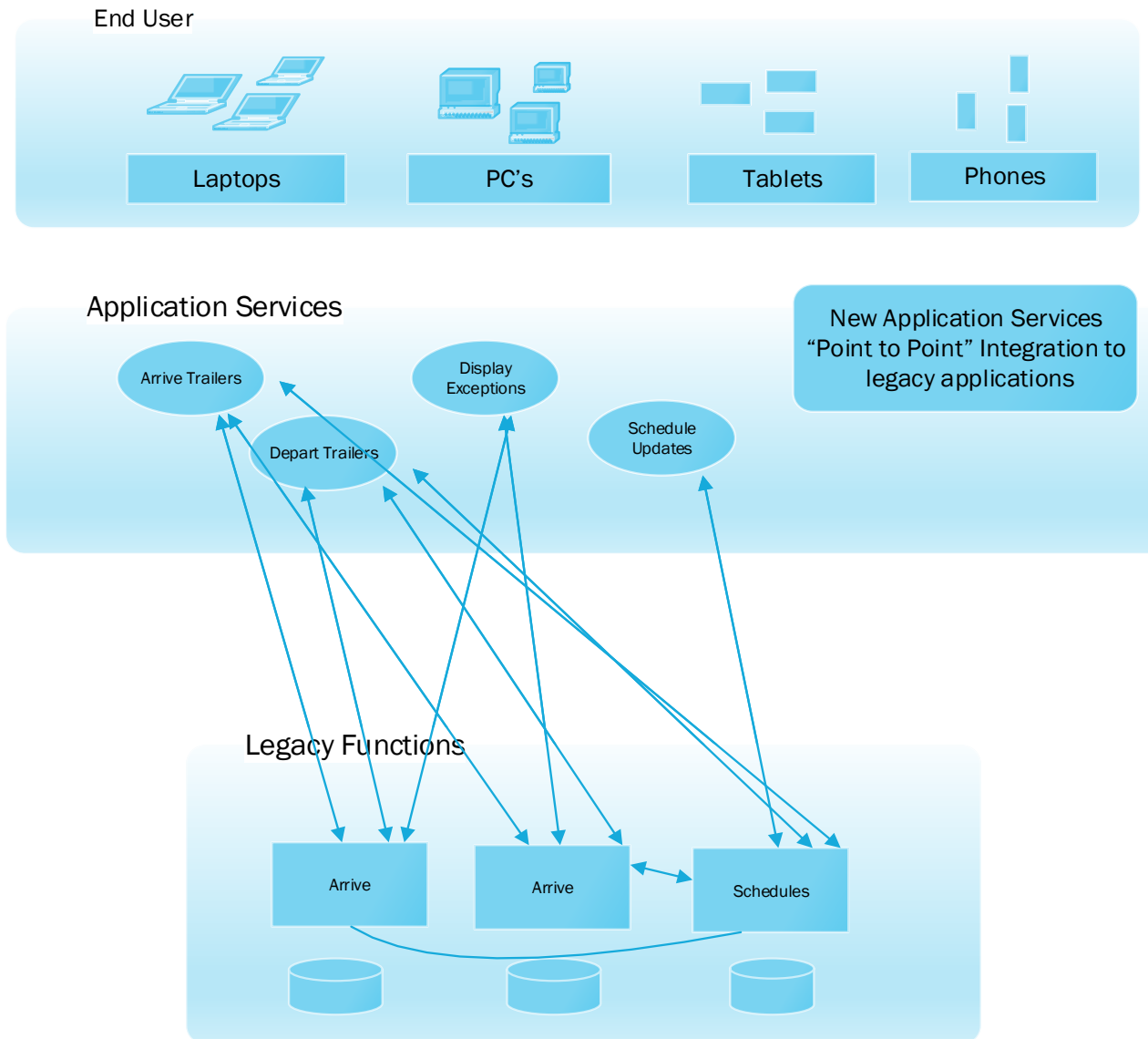Existing Service

Repositories

Technical Barriers

Silo System Integration

Point to Point
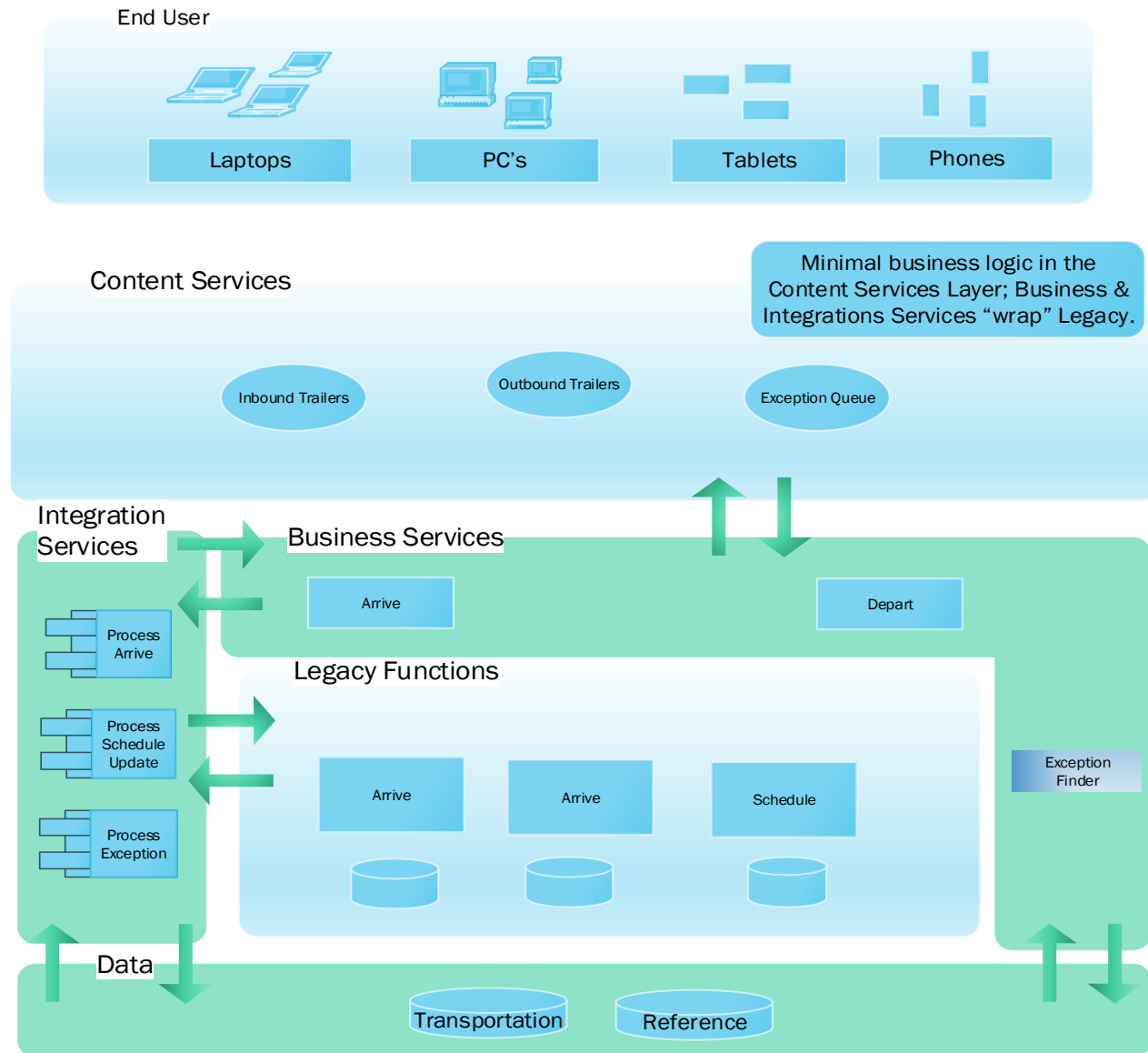
- Traditional Integration is tightly coupled

- Maintainability is difficult

- Reusability is very low

- Drives the wrong behavior

End User

| Laptops | PC's | Tablets | Phones |

Application Services

New Application Services "Point to Point" Integration to legacy applications

Arrive Trailers

Depart Trailers

Display Exceptions

Schedule Updates

Legacy Functions
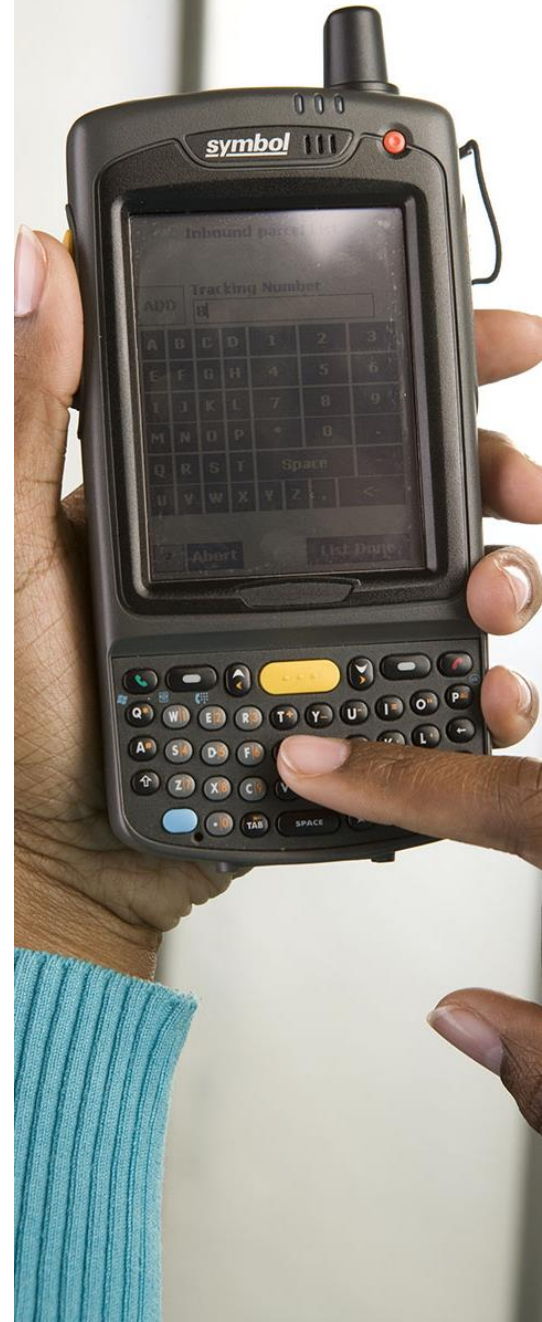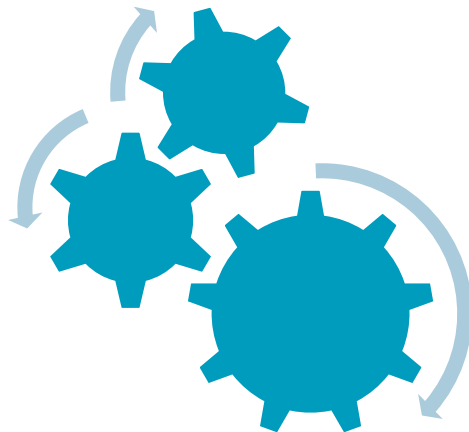
Arrive

Arrive

Schedules

Cross Domain Integration

Service Enabled

- Expose Business Services

- Eliminate Point to Point

- Wrap Legacy Functions

- Creates Agility and Reusability

End User

| Laptops | PC's | Tablets | Phones |

Content Services

Minimal business logic in the Content Services Layer; Business & Integrations Services "wrap" Legacy.

Inbound Trailers

Outbound Trailers

Exception Queue

Integration Services

Business Services

Arrive

Depart

Process Arrive

Legacy Functions

Process Schedule Update

Arrive

Arrive

Schedule

Exception Finder

Process Exception

Data

Transportation

Reference

The Right Technology

Container

OSGI

- Apache Servicemix
  - "Bundled" / Modular deployments
  - Quick response to changing requirements
  - Reusable services (via Declarative Services)
- Key Use Case
  - *Caching our services for quick lookup and database independency*

Frameworks

Camel and CXF

- Enterprise Integration Patterns

  - Apache Camel

    - Protocol Mediation

    - Context Based Routing

    - Reusable Routing

    - Transformations / Direct Java POJO Access

- Apache CXF

  - Reference Web Services

Messaging

ActiveMQ

- Light-Weight Messaging
  - Apache ActiveMQ
    - External Endpoints
    - Internal Endpoints

Receive		Process		Send
	AMQ		AMQ	

How to Achieve Agility

- AAD was only the beginning …
- Dozen of significant efforts have been accomplished in areas of:
    - Visibility
    - Integrating disparate sources
    - Enabling Legacy System Isolation
- Advice / Opinion
    - Define an Integration Effort that will enable the establishment of this Integration Pattern

Q & A

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Disclaimer

Any opinions expressed herein are solely my own and not necessarily representative of UPS strategic direction.

Thank you