

ICAP: A real world SOA and JRules Success Story

Andy Williams, ICAP, Development Manager

Simon Farrow, Icon, Integration Architect

June 2012



Agenda

Company Introductions

Initiation

- Project Background
- Initial Approach
- Architecture
- Application Development
- Where we ended up

Evolution

- Phase II plan
- Expanded Architecture
- Where we ended up

Q & A

ICAP

Highlights

ICAP has created a powerful combination: the world's largest voice and electronic interdealer broker and provider of post trade risk and information services. ICAP provides specialist intermediary broking services to trading professionals in the wholesale financial markets.

With more than 4,800 staff, ICAP has a strong presence in each of the three major financial markets; London, New York and Tokyo, together with a local presence in more than 36 countries and more than 70 locations globally.

ICAP has grown rapidly through acquisition with 6 major and many smaller acquisitions and 2 mergers in the last 13 years. Average daily transactions of \$1.4 trillion globally.

ICAP is a FTSE 100 company with a strong balance sheet to meet the commercial demands of customers and to comply with regulatory capital adequacy requirements.



Icon Background



- Delivering IT consultancy, integration and applications development services for 15+ years
- Core clients in Financial Services but also cross industry, including Public Sector, Retail and Government sectors
- IBM Premier Business Partner
 - Close working relationship with IBM Software Group and ISS and Global Business Services
- 33+ staff – a team of high calibre consultants
- Support Services for customers in the UK and US - 24/7
- Based in Wimbledon, London





Services

- Enterprise Architecture
- Solution Architecture
- Business Analysis
- Systems Analysis
- Project Ownership and Delivery
- Off-shore Facilitation
- 24/7 Support Function

Products

- IBM Software Reseller
 - WebSphere products
 - Incl. Message Broker, MQ, BPM 7.5
 - Datapower
 - Cast Iron
 - Rational Tooling
 - IM, etc.
- Icon Integration Toolkit
- ALCRM
- AIFG

Some Customers



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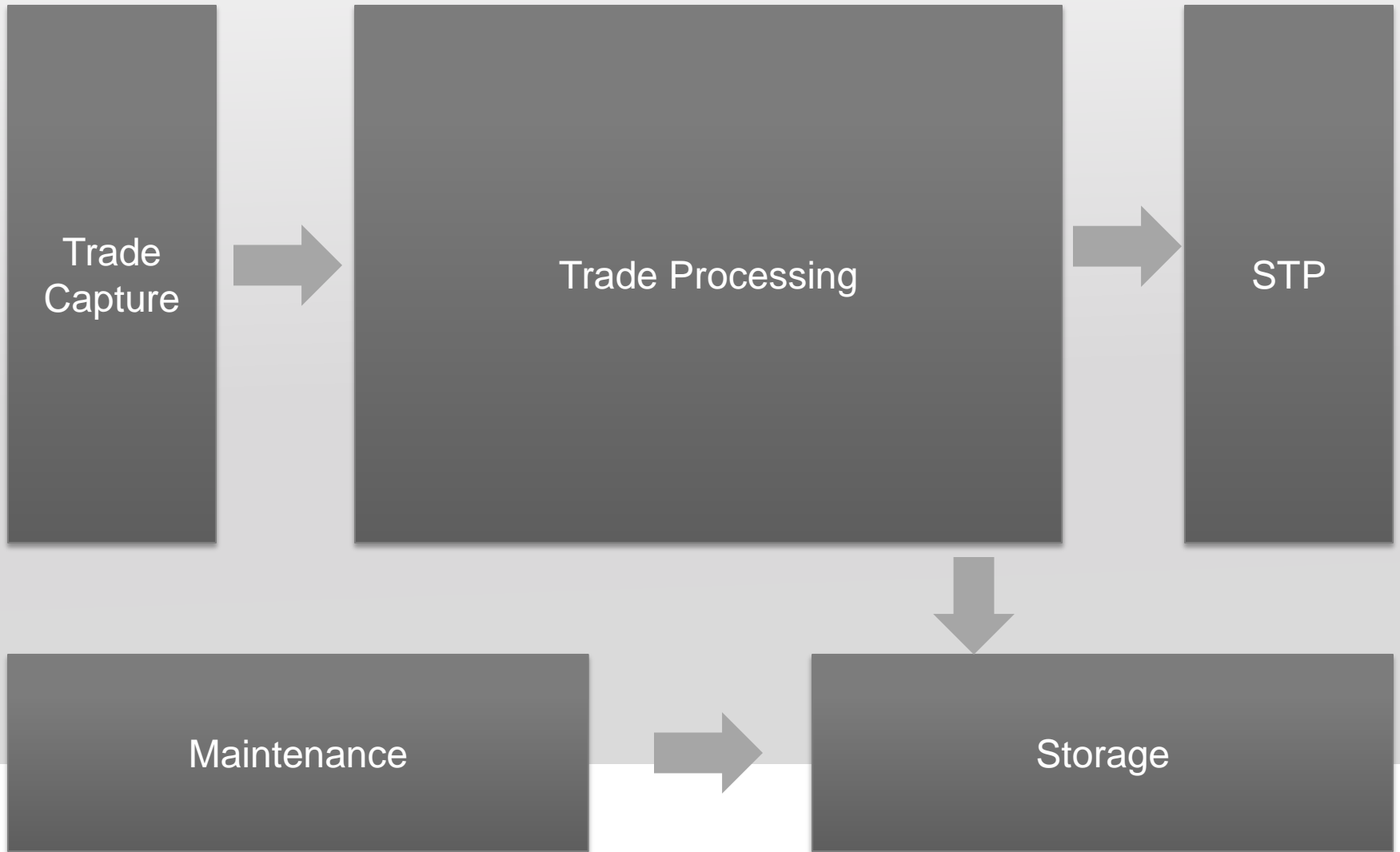
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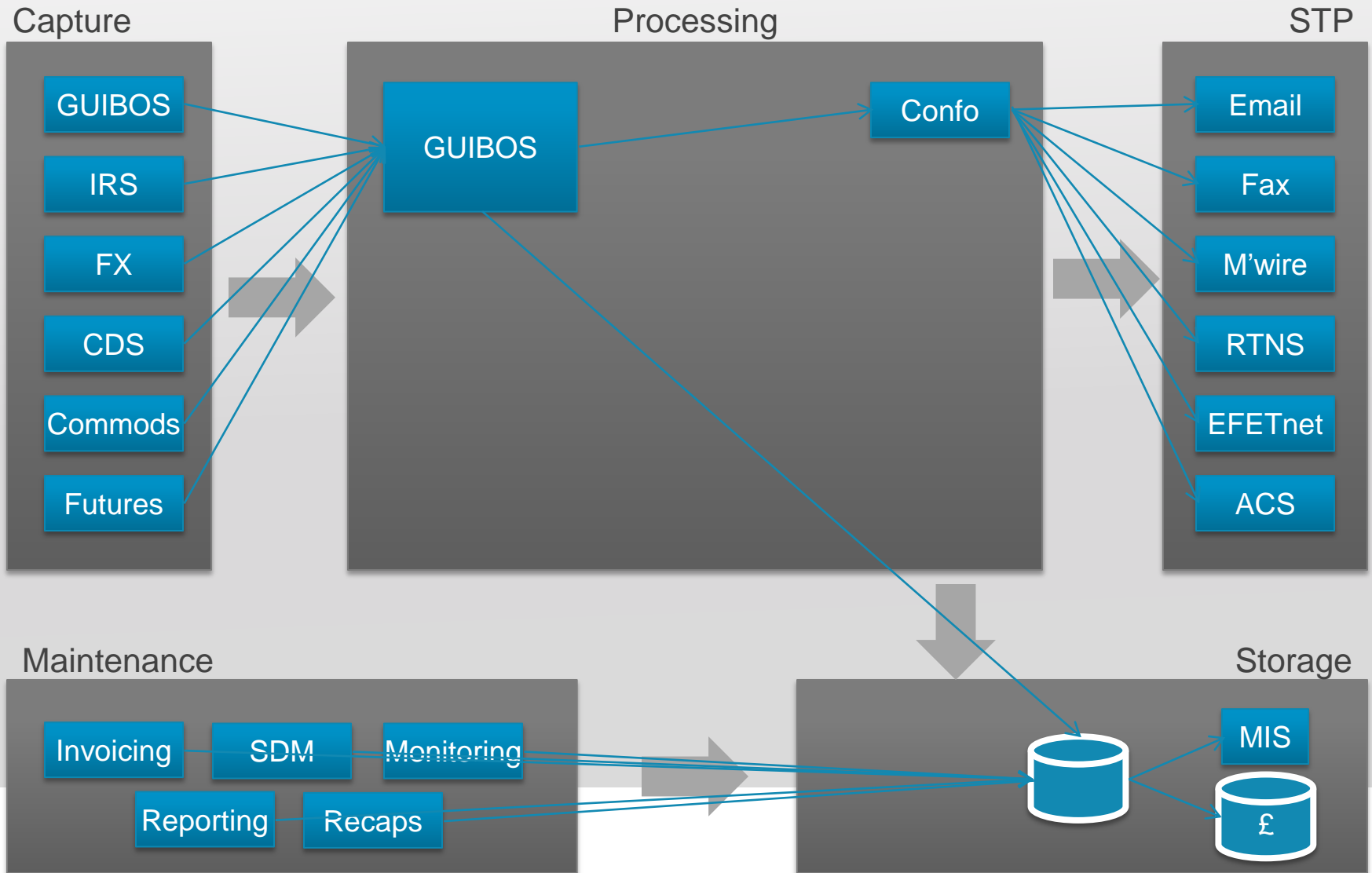
ICAP's Back Office System

GUIBOS

GUIBOS High level overview



GUIBOS Overview



Historic Problems

Business problems:

- Slow to change
- Inflexible
- Slow performance

Technology problems:

- Closed System
- Unsupported Technology
- Out-dated Technology



AGILITY



Business Needs:

- Quick to change
- Flexible
- Performant
- Simple to integrate

Technology Needs:

- Increased code deployment cycle
- Easy to understand and maintain
- Componentised Architecture
- Removal of bespoke legacy systems

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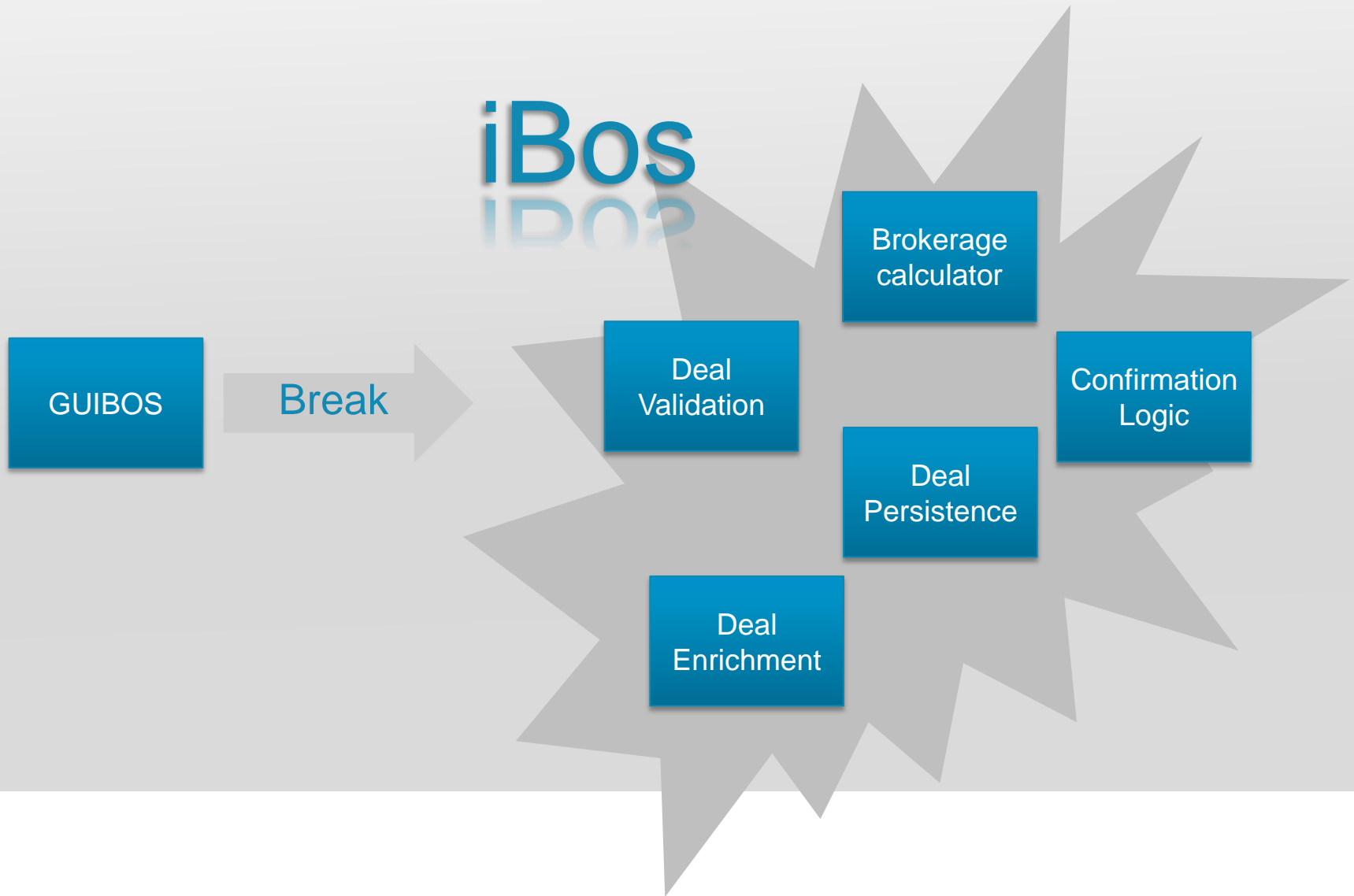
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Initial Approach

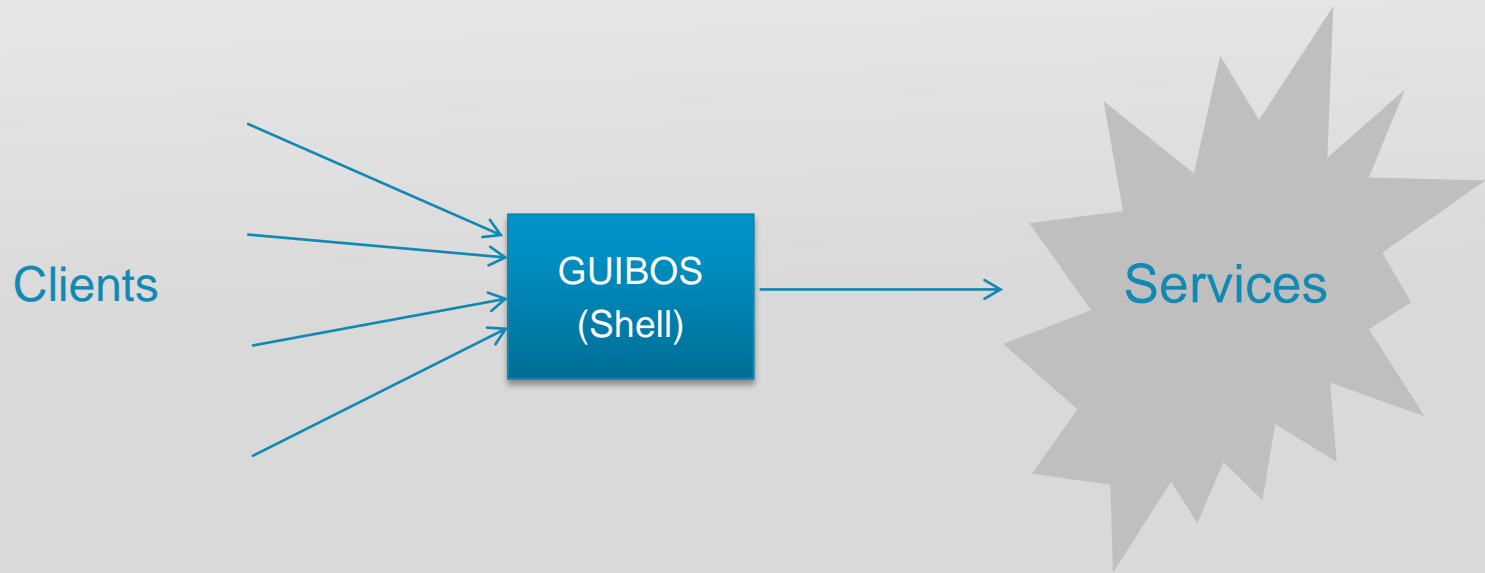


Realisation

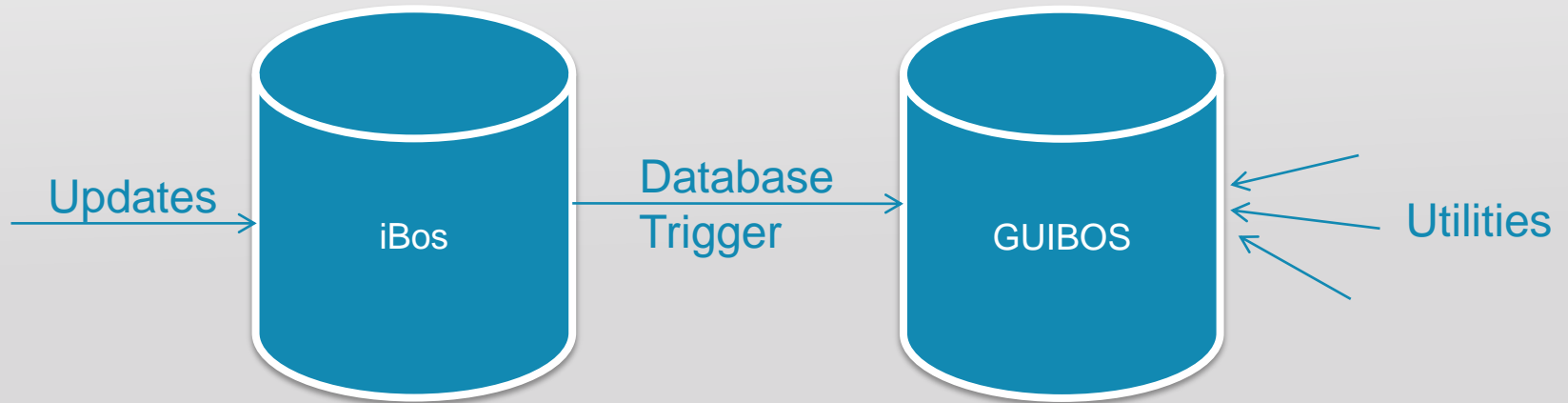
Needs to run side by side with old system



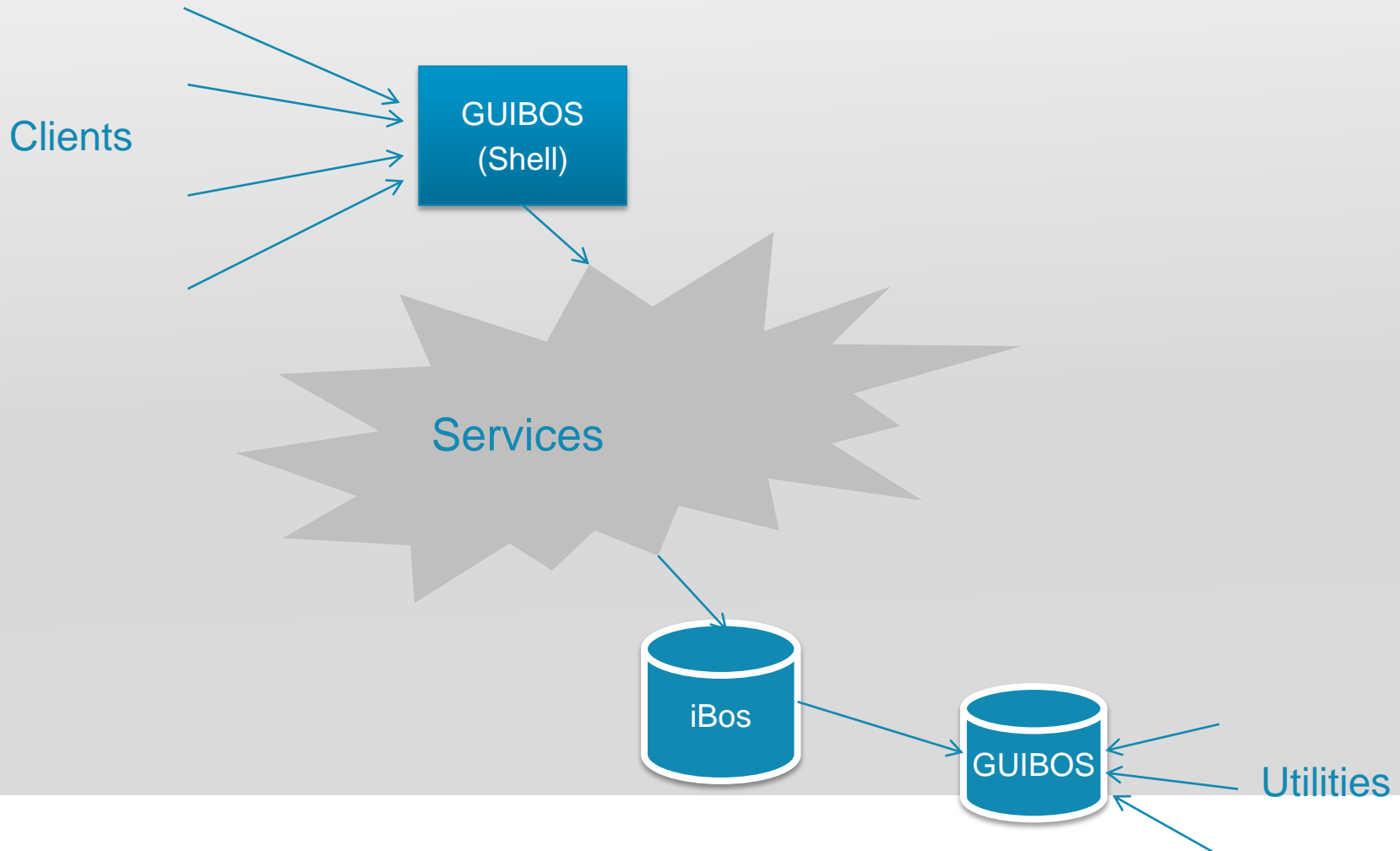
Compatibility – Front End



Compatibility – Back End



Plan 'A'



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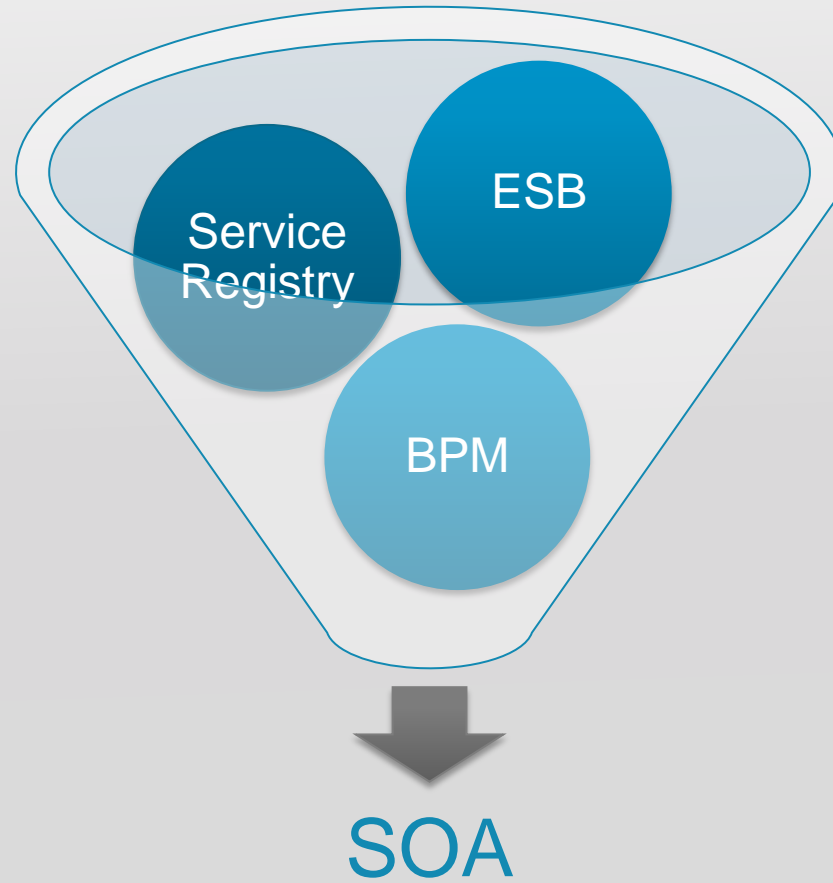
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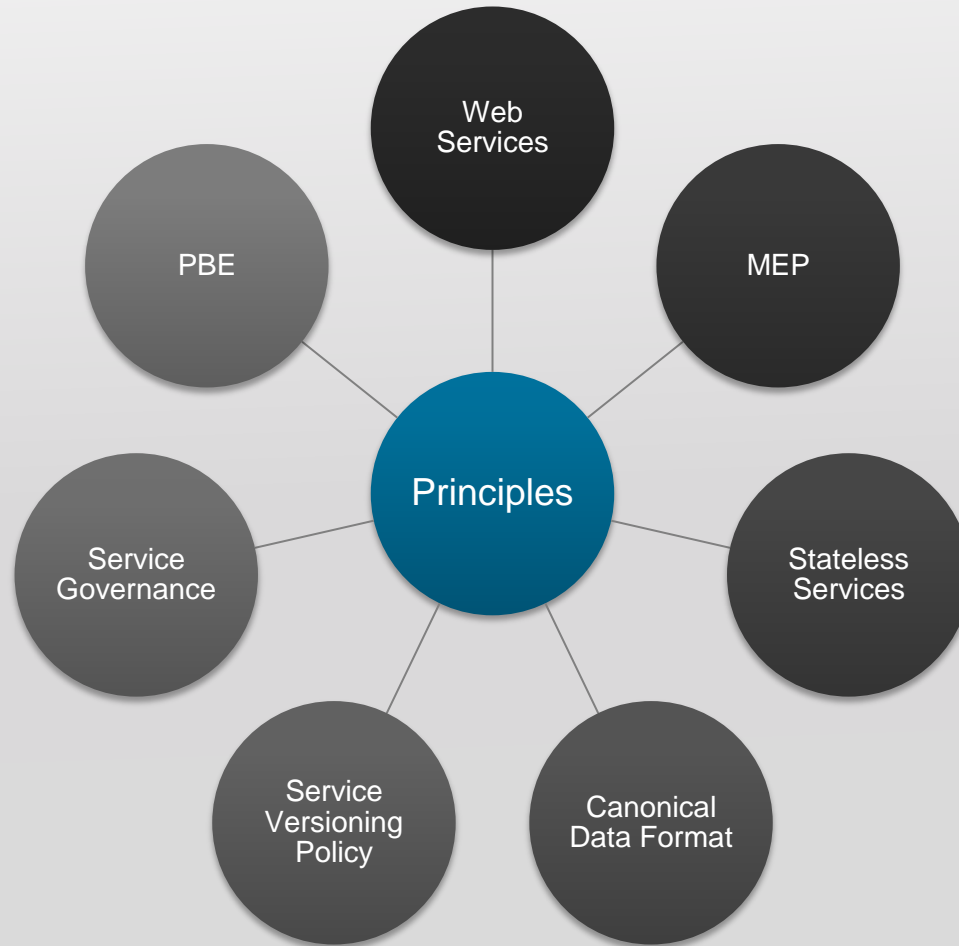
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Q & A

Architectural Approach



Architectural Principles



Standards based interfaces

- Service interfaces based on:
 - SOAP 1.1/1.2
 - WSDL with MQ, JMS and HTTP URI schemes
 - WS-Addressing
 - Action
 - ReplyTo
 - MessageId
 - RelatesTo
- Service Versioning
 - Uses namespace for versioning i.e <http://icap.com/backoffice/DRNService/2009/03>
 - New version only required for non-backward compatible changes

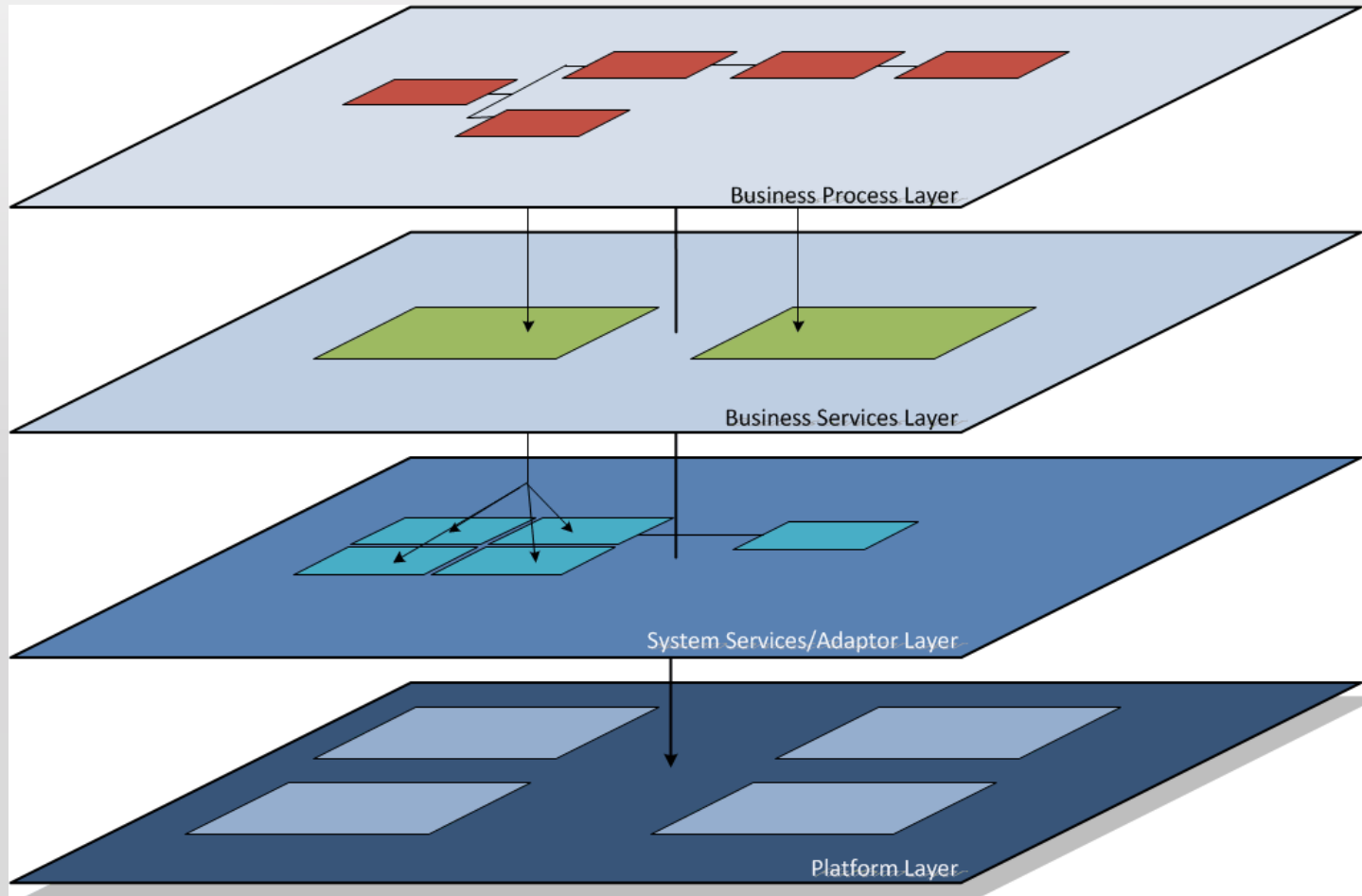
Pattern Based Engineering

- Model driven development
- Code generation using JET2 templates
 - ESQL
 - XSD/MXSD
 - P/SQL
 - C# classes
 - BOM
- Started with JET syntax, moved to Java

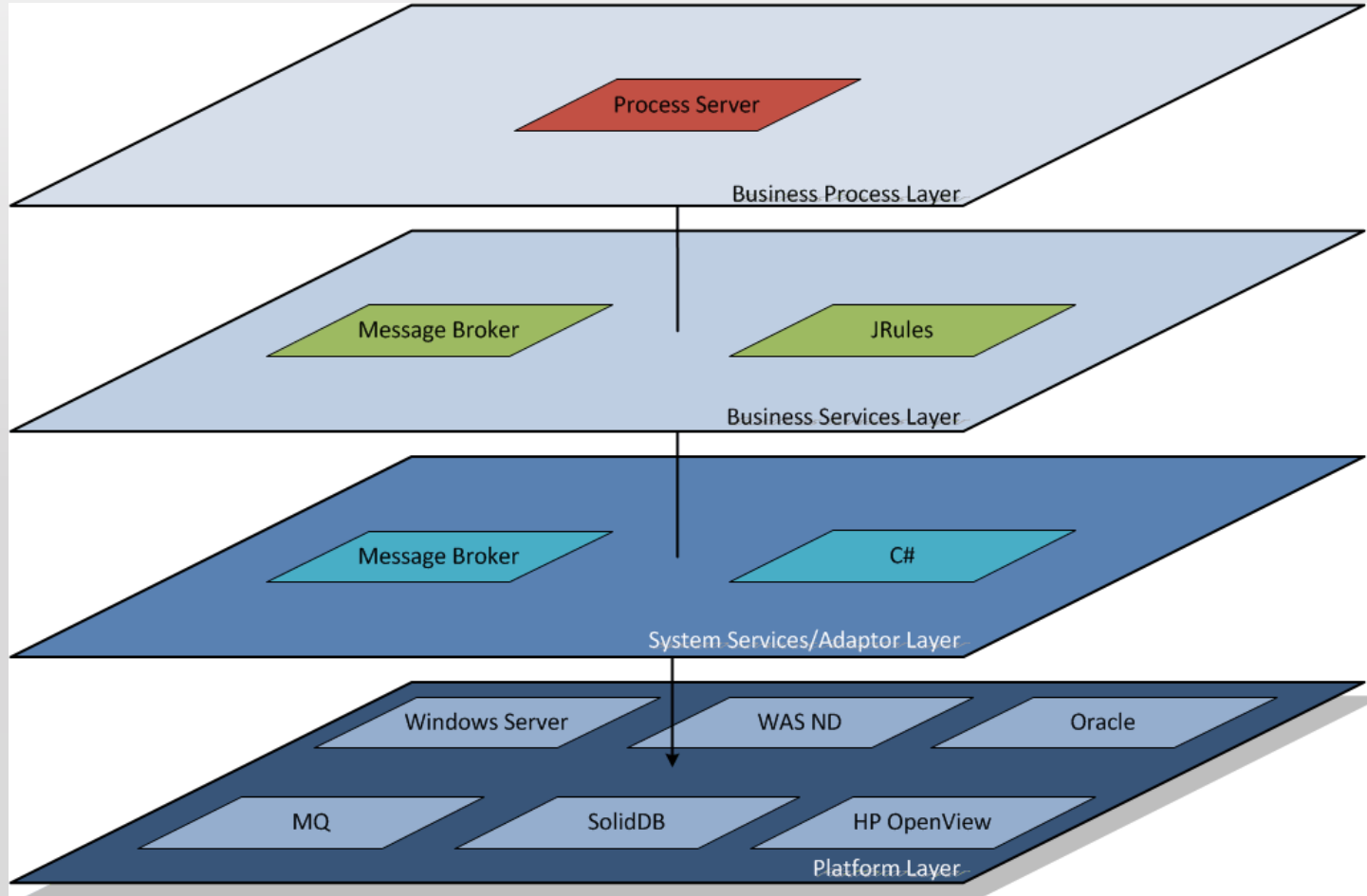
Canonical Data Format

- A single data format used to represent a Deal across the system
- Physical format is XML
- Base Deal type is extended for each financial instrument
- Generated using Pattern Based Engineering (PBE)
- Stored as XML documents on Oracle database

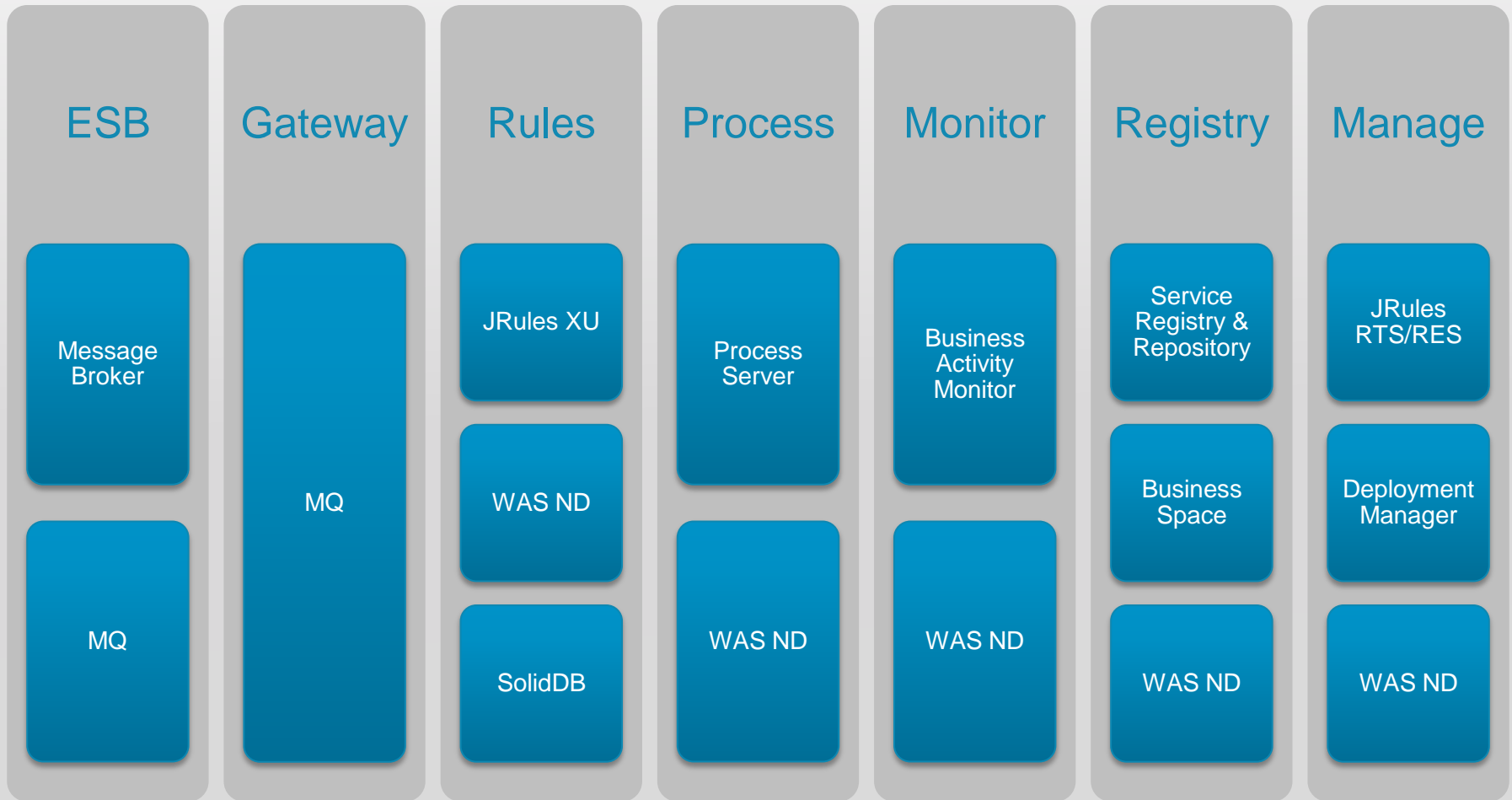
Service Layering



Technology Mapping



Physical Topology - Middleware



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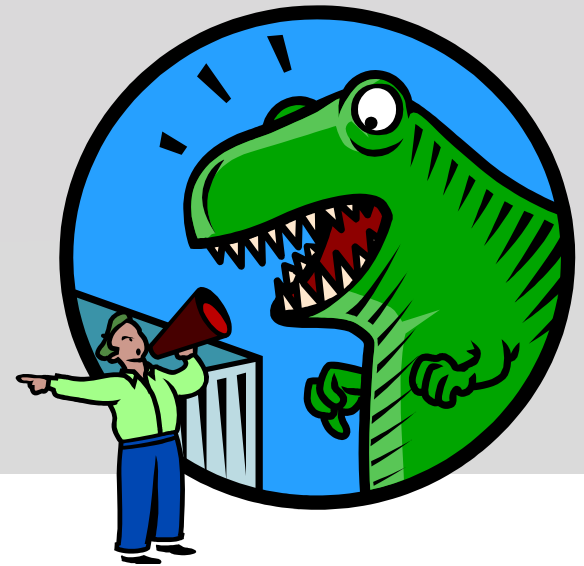
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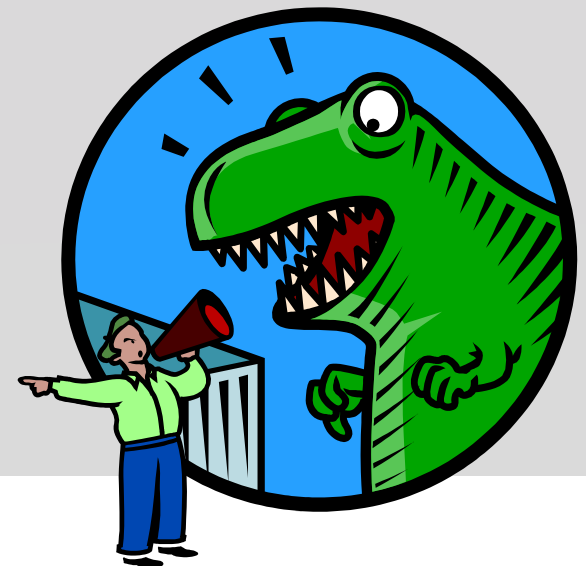
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Q & A

Partnership



Agile



Quality

CONTINUOUS INTEGRATION

UNIT TESTS

MOCKING FRAMEWORKS

SERVICE TESTS

CODE STANDARDS

PEER REVIEW

CODE COVERAGE

PAIR PROGRAMMING

AUTOMATED UI TESTS

DEPENDENCY INJECTION

MVVM

COMPOSITE APPLICATION

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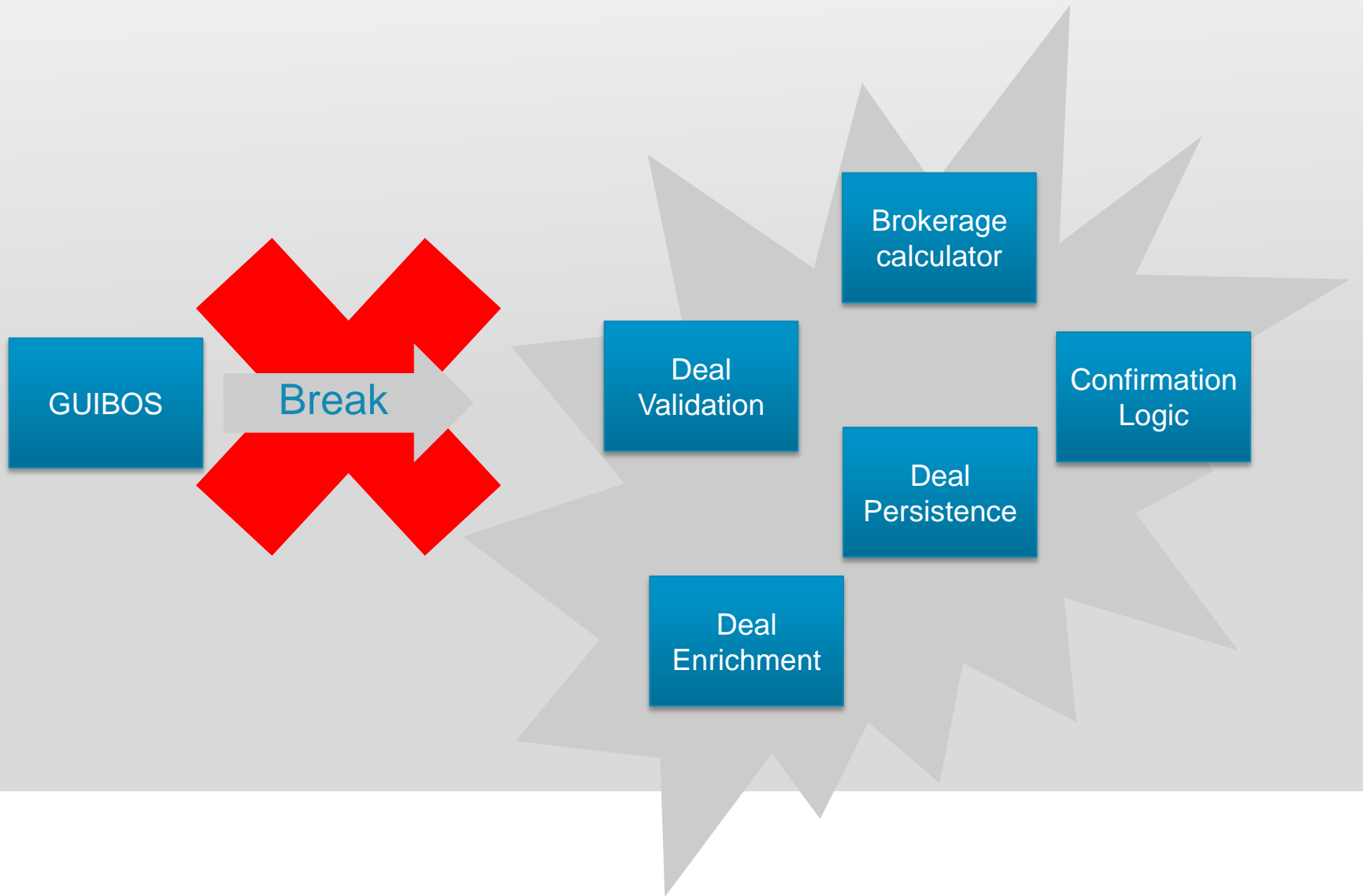
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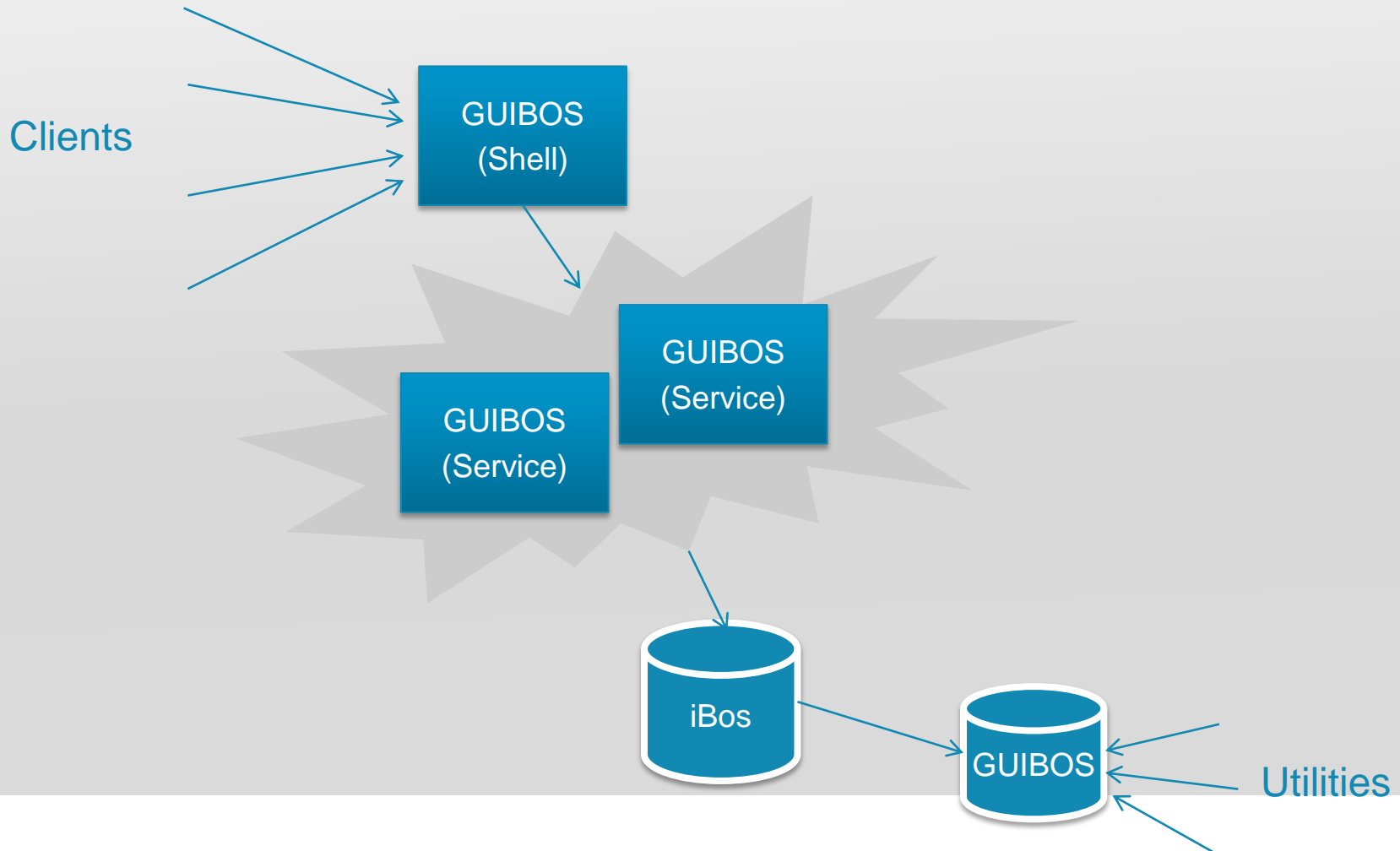
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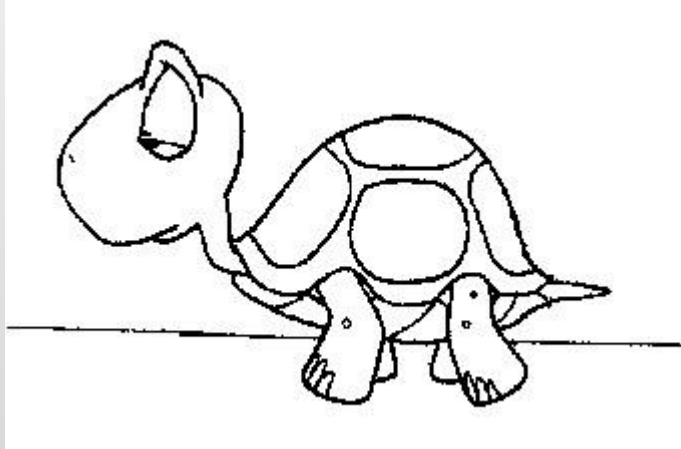
Major Problem



Plan 'B'



Problems

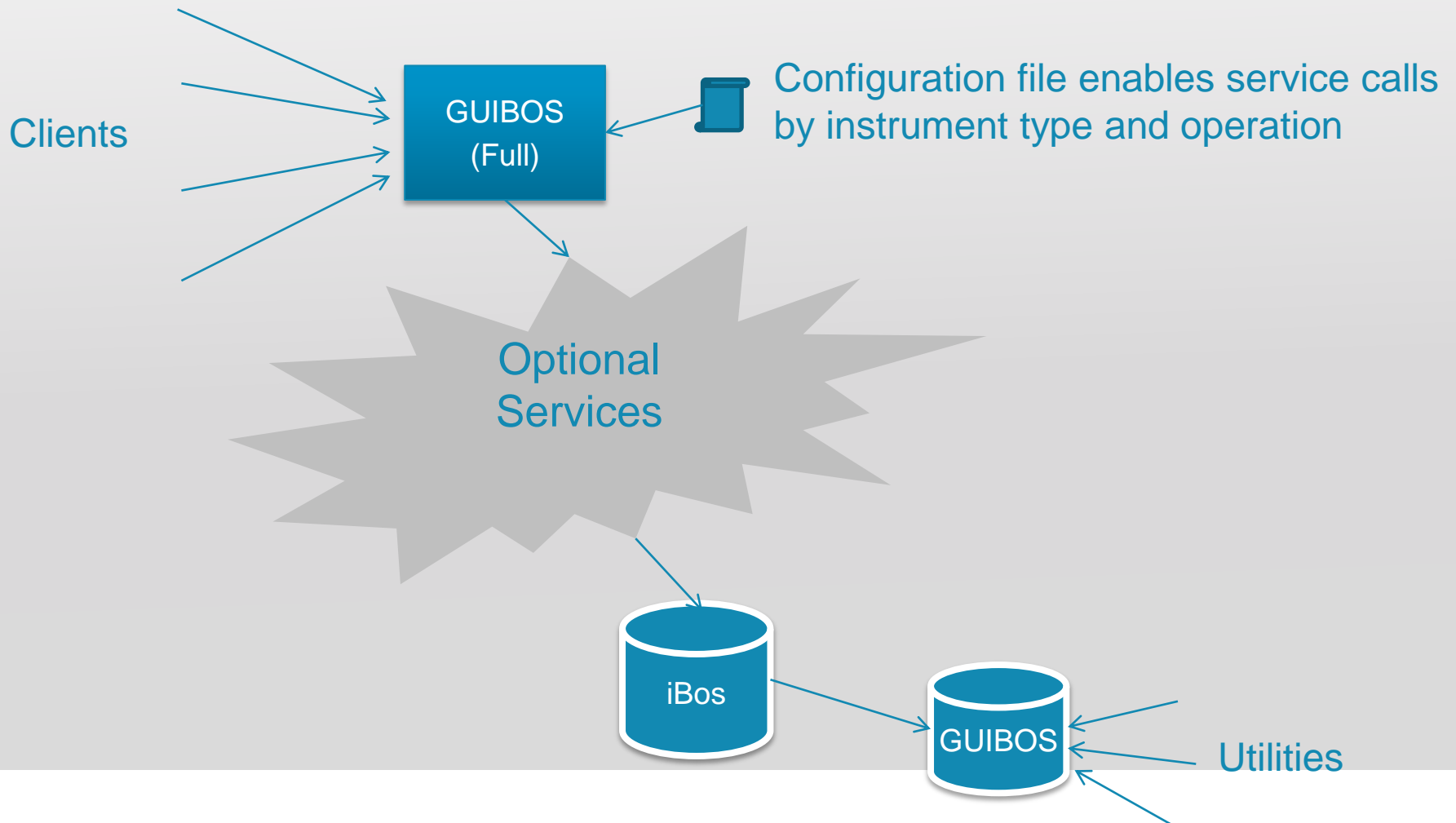


Slow to run

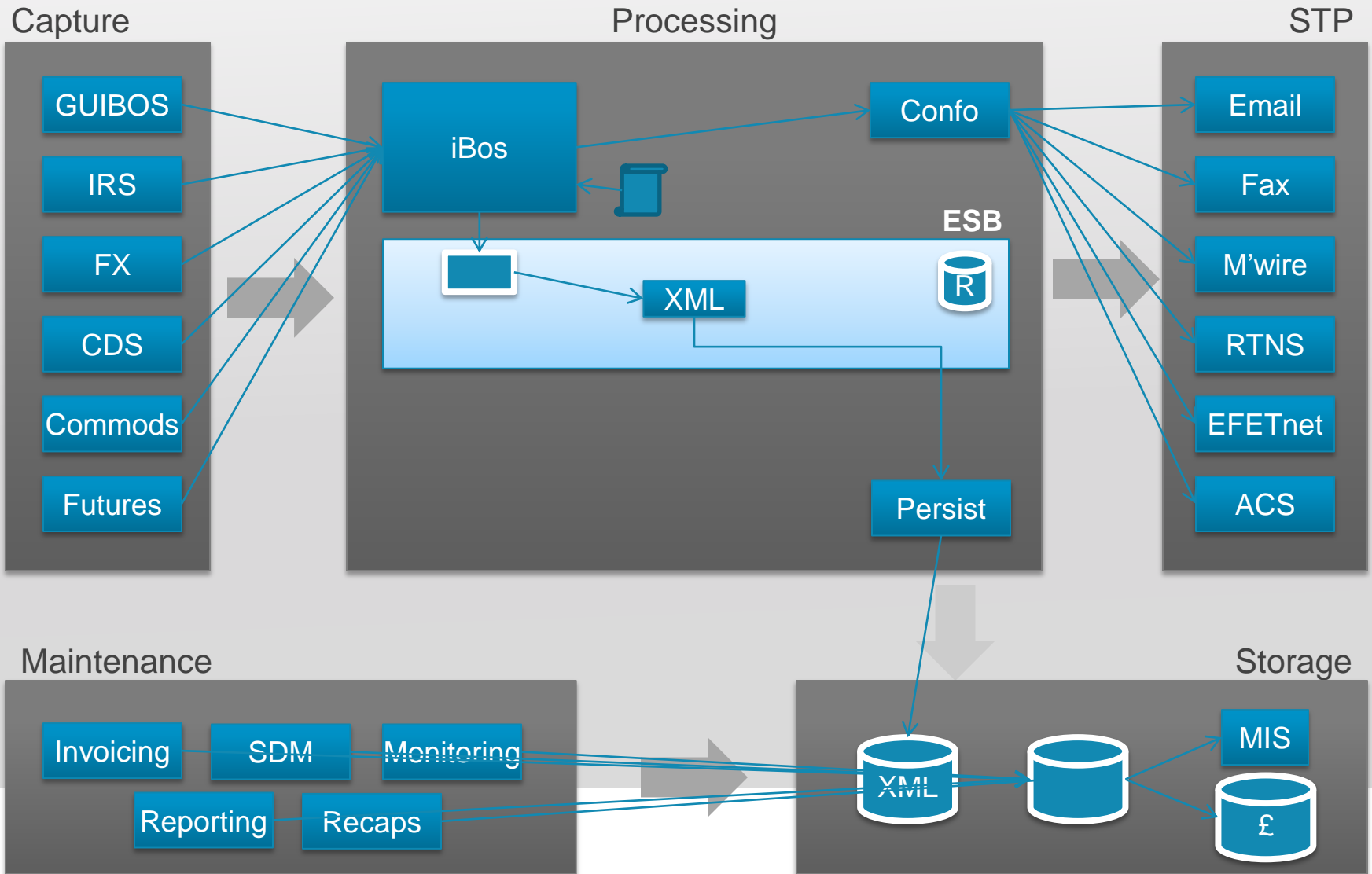
Slow to change



Plan 'C'



iBos – March 2010



Benefits

- Middleware strategy
- XML Messaging and PBE
- Compatibility achieved
- Could extend with new services
- Team knowledge

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Q & A

A full deal flow for FX



ALL NEW

Deal Feed

Feed from existing trading system

Requires all standard deal processing:

- Unique deal reference number (DRN)
- Enriched with trade defaults by market
- Brokerage calculated

Requires additional interface specific business logic

- Entity Mapping
- Cross company deals



Deal Capture

New client application

Used for off screen deals and by back office staff

Requires same business rules and processes

Is interactive!



STP

DEAL AFFIRMATION

Clients may require electronic acceptance



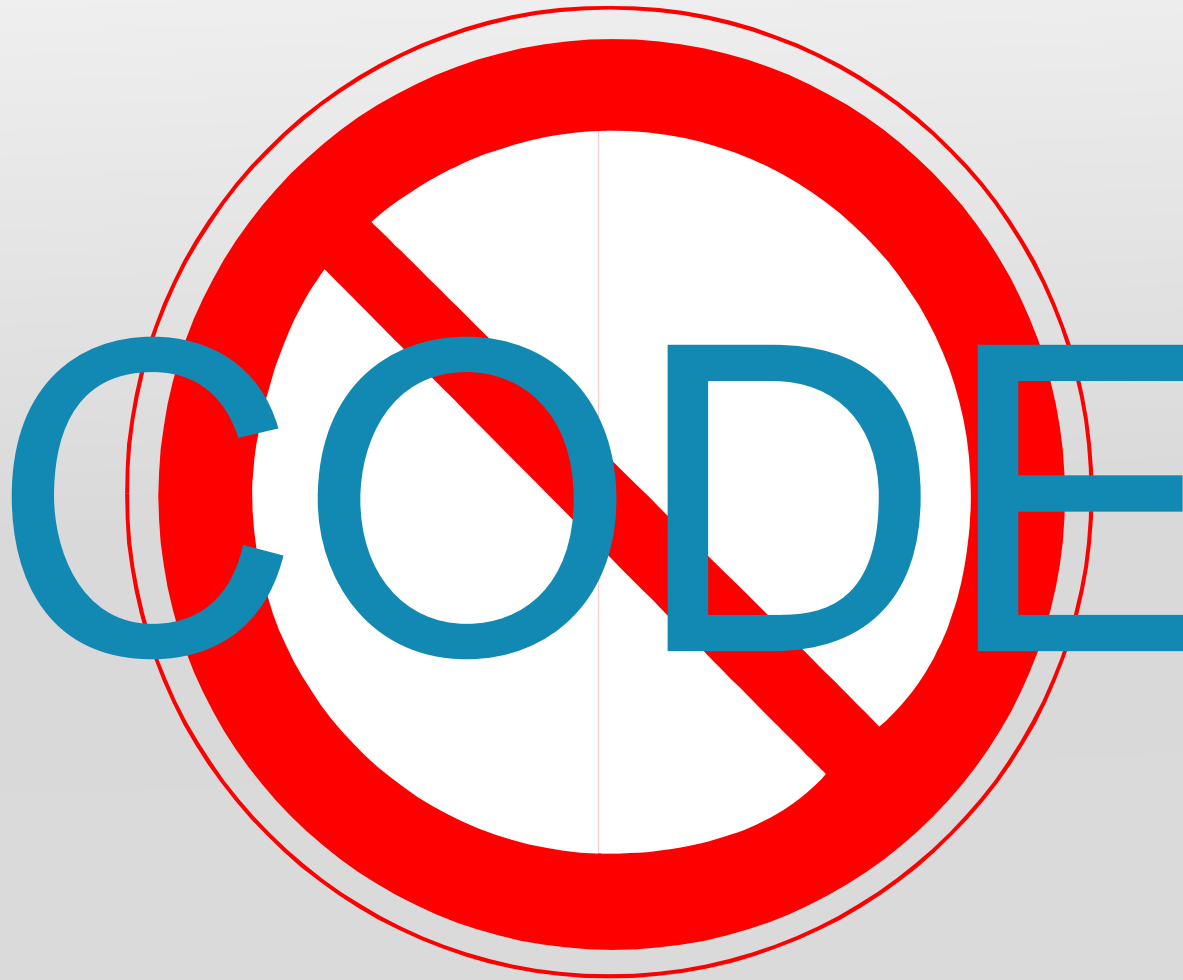
DEAL CONFIRMATION

Clients may require paper or electronic confirmations



These may be linked

Design Philosophy



CODE

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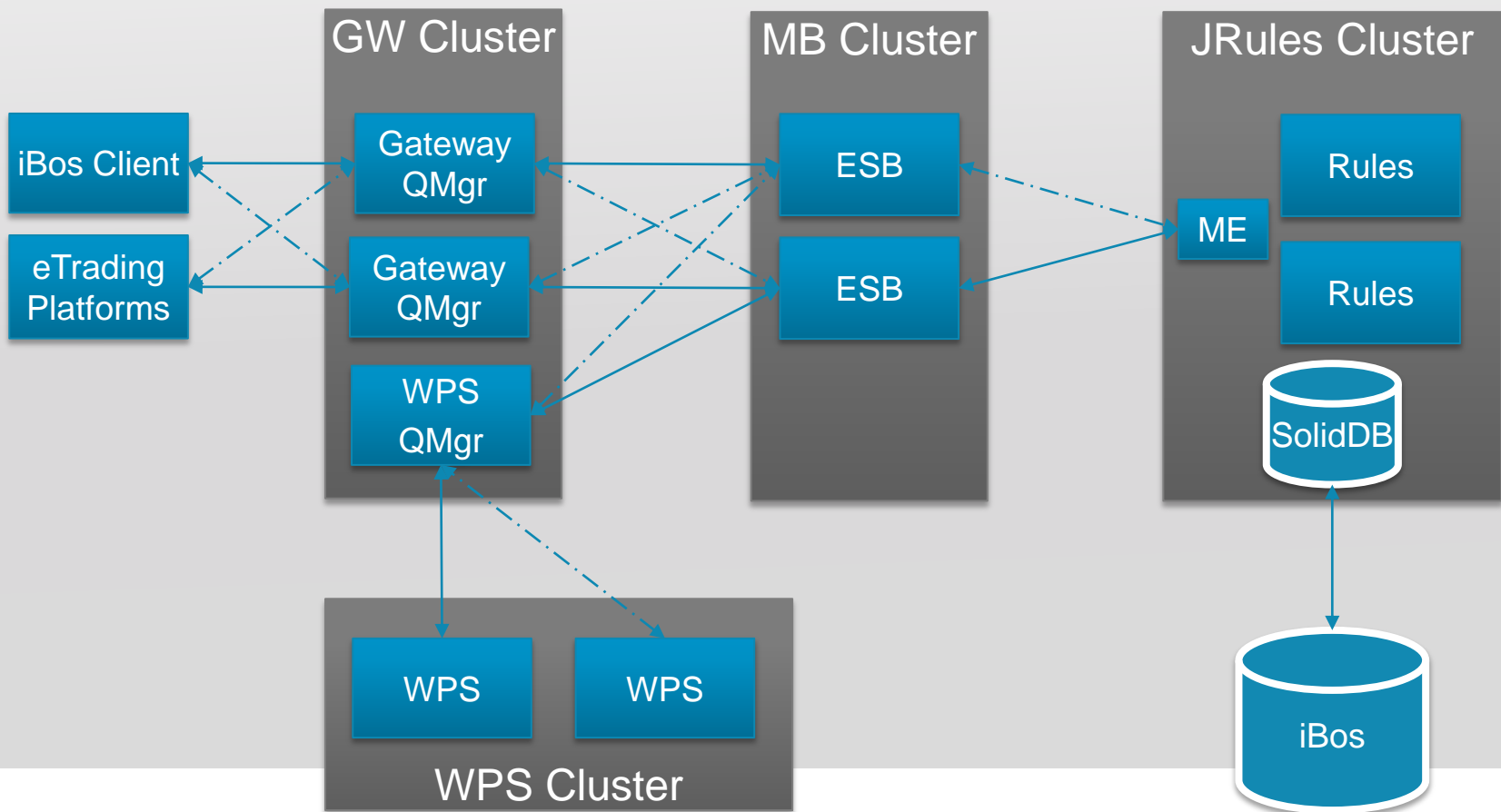
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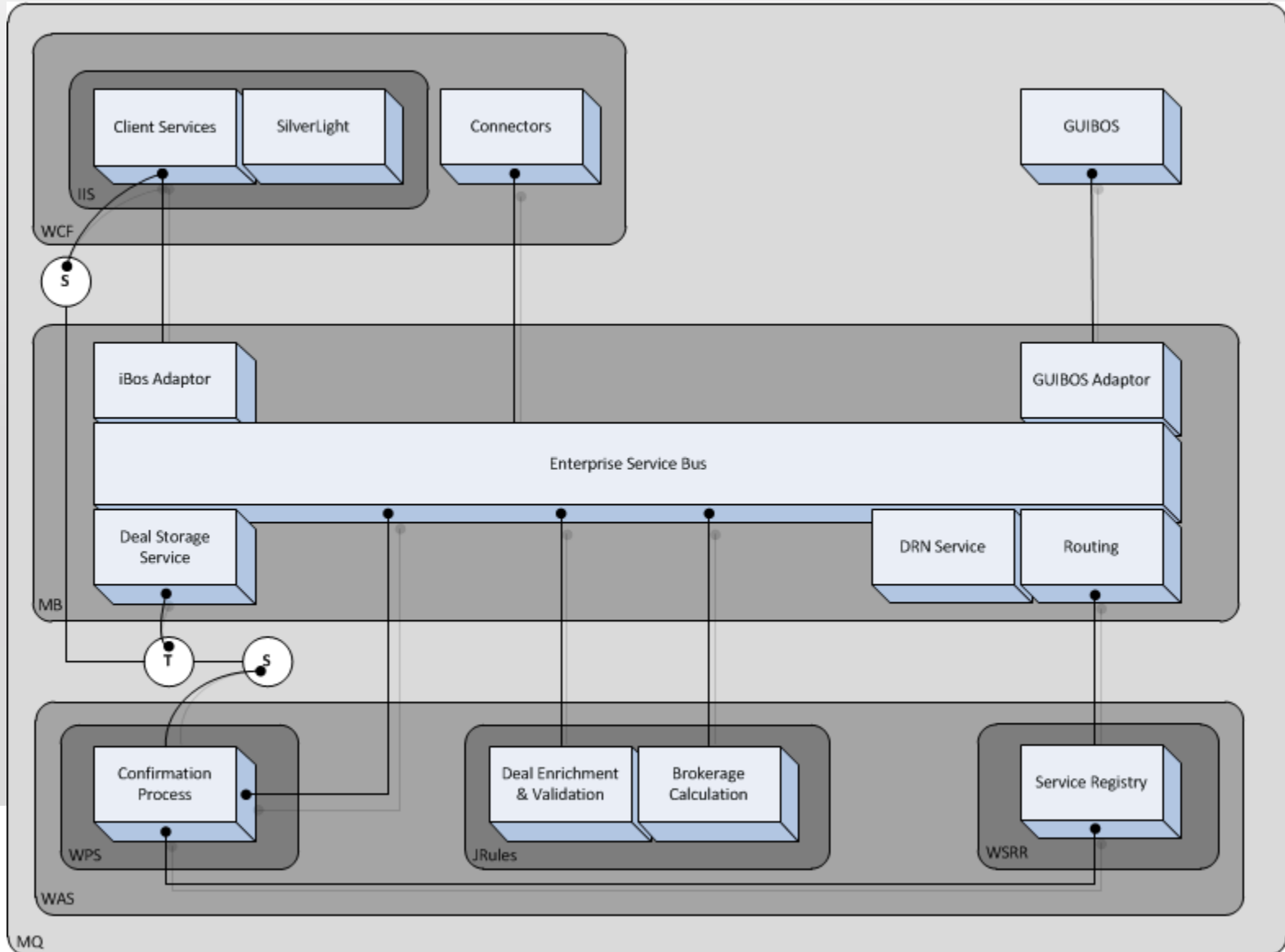
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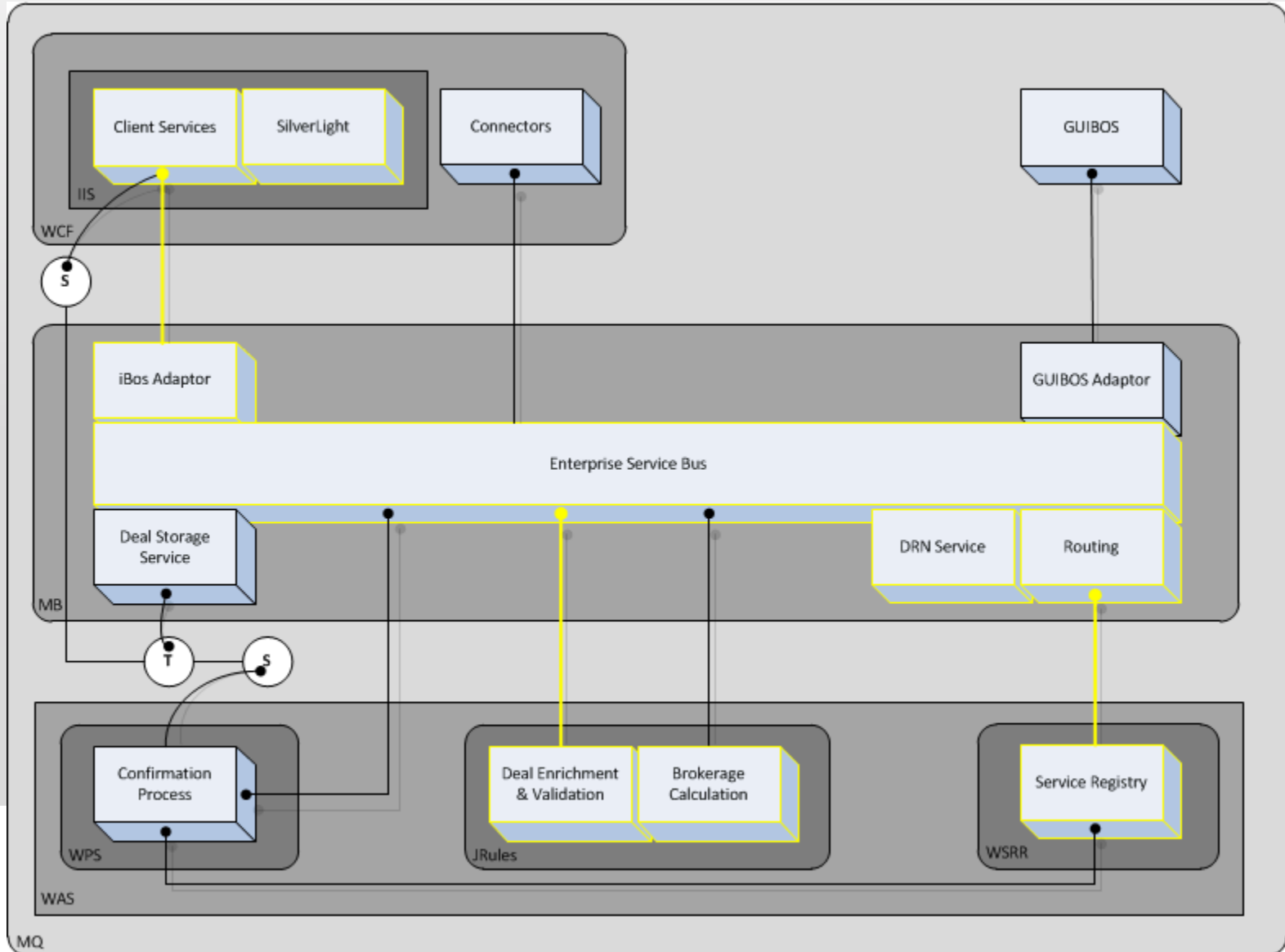
Logical Architecture



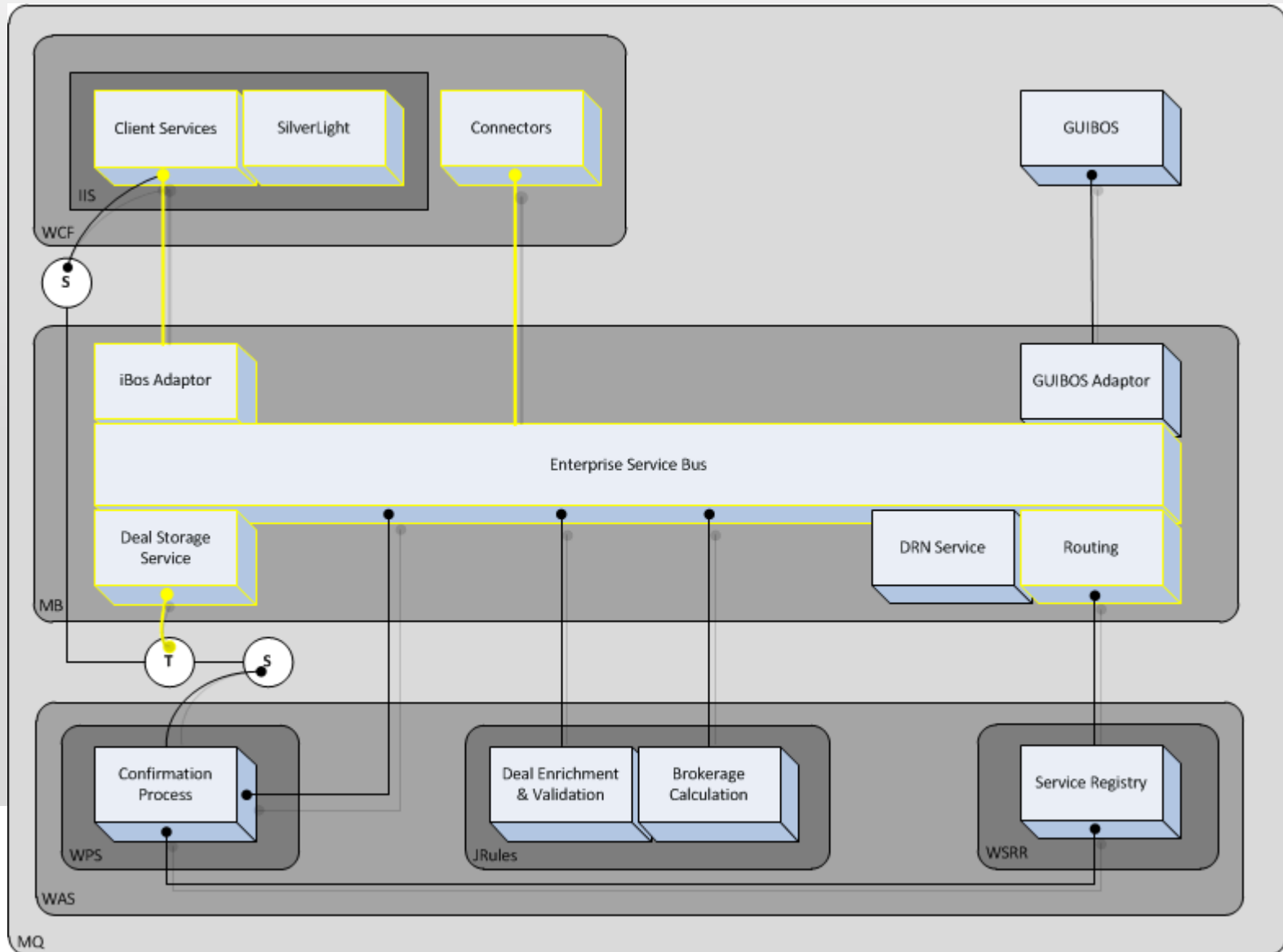
Application Architecture



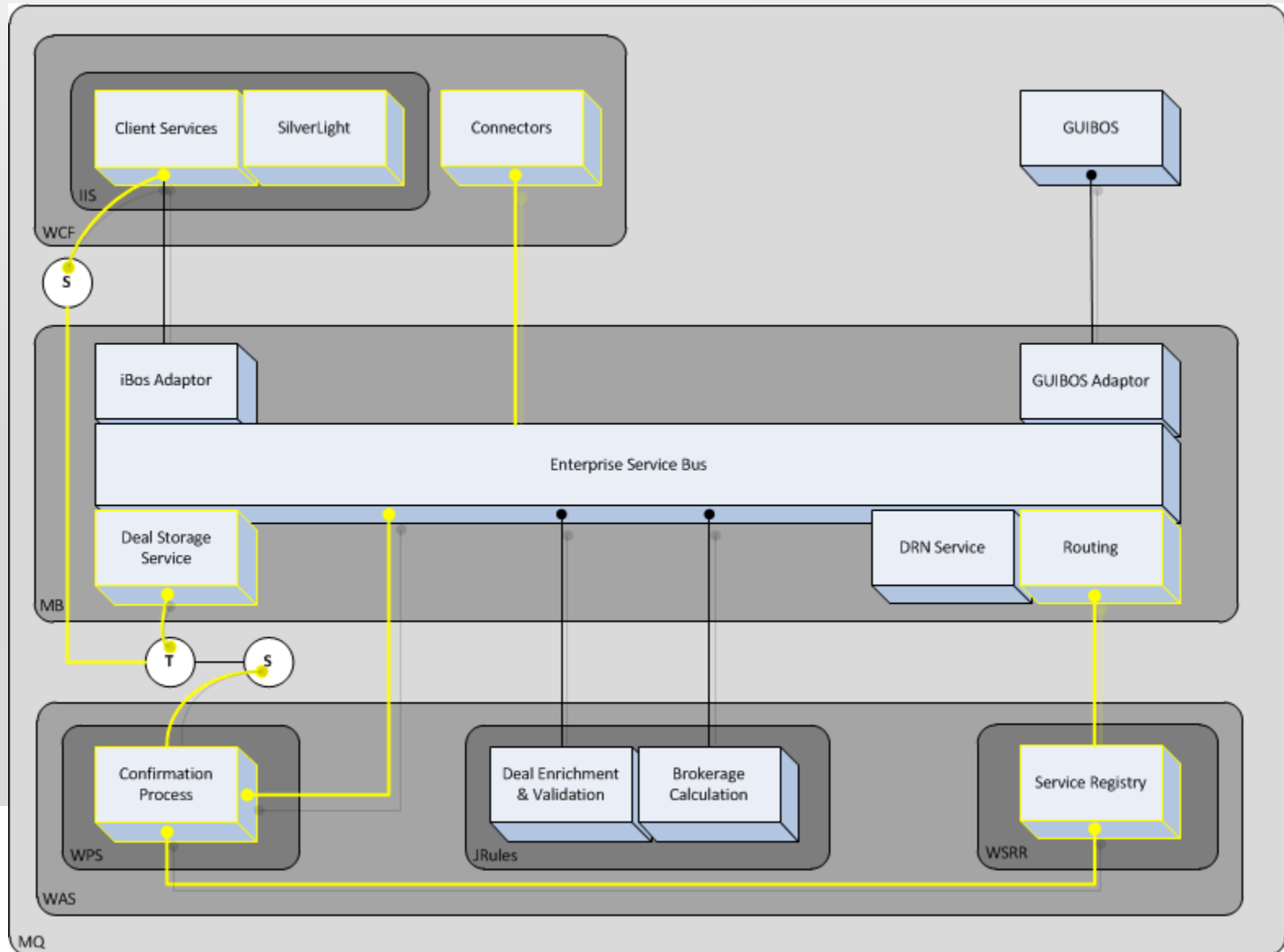
Entering a Deal



Saving a Deal



Confirmation Process



Event Driven

- MQ Publish & Subscribe
 - Topic Driven (not content)
 - Scalable topic tree – ICAP\IBOS\BROKERING\desk
 - Dynamic data in selectors i.e. Deal Reference Number
 - Single event data structure extended via XML inheritance
- Used for:
 - Dynamic client UI updates
 - To drive Confirmation business process
 - Business Activity Monitoring

Technology Focus – Message Broker

- Implements the Enterprise Service Bus
 - Routing via WSRR
 - Transformation from GUIBOS legacy XML to Canonical XML
 - Generated using PBE
 - Hosts services
 - DRN
 - Deal Storage
 - Common exception handling routines

Technology Focus - JRules

- JRules is used to implement:
 - Deal Enrichment
 - Deal Validation
 - Brokerage Calculation
 - Confirmation Selection
- All happens in real-time as client enters deal information
- XML based XOM
- PBE used to generate virtual BOM methods
- Call-out to SolidDB for Standing Data

Technology Focus – Process Server

- Implements the Confirmation Process
- Event Driven
- Integrates with multitude of services asynchronously
 - Deal Storage Service (MB)
 - Confirmation Logic Service (C#)
 - Communication Connectors (C#)
 - Can add new connectors dynamically
- Uses WSRR for routing

Challenges

- SOAP 1.2 not supported over MQ by WPS
- SOAP Faults not handled when using MQ bindings
- Generating BOMs from XSDs not a good idea
- .NET generated WSDLs are not standard (use contract first)
- Performance issues with Oracle XML

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Q & A

Deal Entry

Browser: http://ibosuut/ | iBos Version 3.0.50404.1

iBos Environment: UAT | **TEST SYSTEM** | Home | User Guide | **ICAP**

User: Andy Williams | NDF | SP OT | SW AP

Deals | Deal: FX NDF Deal (LGEU) - 5D5L7NH1

Enquiries | Confirmation Status | Custom Enquiry

Lists | My deals | Desk deals | Deals to proof

Admin | Templates | System Alert

General Deal Details

Deal Type	DRN	Status	Condition	Clearing	Netting Agency
NDF	5D5L7NH1	Unproofed	Saved	OTC	NAME GIVE UP

Key Deal Details

Deal Date	Deal Time	Value Date	Currency 1	Amount 1	Currency 2	Rate
05 Apr 2012	08:20	11 Apr 2012	EUR	10,000,000	USD	1.23

Non-Deliverable Details

Settl Ccy	Fixing Date	MAR Date	Time	Centre	Centre Name	Documentation	Reference Page
EUR	09 Apr 2012			NYK	NEW YORK	EMTA	REUTERS

Buyer

Customer: 50417 | MILLENIUM - TEST 1+1 LDN

Via: Code | Name

Trader: USER 1

Brokerage

Desk	Broker	Rate	Currency	Amount
FB	D03 JACKSON, CHRIS	0	USD	1,000

Type: NORMAL | Billing Method: Normal

Seller

Customer: 50418 | MILLENIUM TEST 2 NYK

Via: Code | Name

Trader: CRISTIANO RONALDO

Brokerage

Desk	Broker	Rate	Currency	Amount
FB	D01 HALSEY, LEE	0	GBP	1,000

Type: NORMAL | Billing Method: Normal

Audit Trail & Notes (0)

Entering User	Entering Time	Proofing User	Proofing Time	Last Modified User	Last Modified Time
Lee Halsey	05/04/2012 13:43:10	D01	05/04/2012 13:43:41	Lee Halsey	05/04/2012 13:43:41

Home | Desk deals | NDF - 5D5V571 [1] | NDF - 5D5V5K1 [1] | **NDF - 5D5L7NH1 [1]**

Alerts (0) | Locked Deal 5D5L7NH1 | 13:47 UK

Confirmations

The screenshot displays the iBos TEST SYSTEM interface. At the top, the user is identified as Andy Williams, and the environment is UAT. The system title is TEST SYSTEM, and the ICAP logo is visible in the top right corner. The main header shows the deal ID 5BEY7Q21 and navigation options for NDF, SP/OT, and SW/AP. The left sidebar contains navigation links for Deals, Enquiries, Lists, and Admin. The main content area is titled 'FX NDF Deal (LGEU) - 5BEY7Q21' and features a 'Confirmation' tab. Below this, there are sections for 'Buy' and 'Sell' orders, both marked as 'Enabled'. Each section includes checkboxes for TRTN, ACS, Email, and Fax, and a 'Description' field. A 'Buy Email' button is visible. The central pane shows a confirmation email from ICAP Europe Limited, dated 14FEB2012, for a non-deliverable forward transaction of USD 1,000,000.00. The email text includes the ICAP logo, contact information, and the following details:

TO : FIXING TEST 1 LDN
DEALTBY : SUHAIL
FROM : ICAP EUROPE LIMITED, LDN
WE ARE PLEASED TO CONFIRM THE TRANSACTION WE HAVE ARRANGED FOR YOU AS FOLLOWS:
PRODUCT : NON-DELIVERABLE FORWARD
CONTRACT DATE : 14FEB2012
AMOUNT : TWD 1,000,000.00
AGAINST CCY : USD

The interface also shows a 'Pages' indicator for '1 of 1' and a 'Confirmation' button. The bottom status bar indicates 'Loaded deal 5BEY7Q21' and the time '16:20 UK'.

Powered by JRules

Defaults:

if

the version of **'the deal'** is 0

then

set the invoice date of **'the deal'** to the last day of the month ;

Validation:

if

the deal date of **'the deal'** is after the current trade date in standing data for the company of **'the deal'**

then

add the error **"The deal date is after the current trade date"** to the deal date field of **'the deal'** ;

Brokerage Calculation:

if

'brokerage amount' is more than 0 *and* **'brokerage currency'** is not null

then

set **'brokerage amount'** to the amount of **'brokerage amount'** rounded
to the expected number of decimal places for **'brokerage currency'** decimal places ;

Benefits

- Agile – 40 changes delivered in 1 week
- Compliance - Explicit business rules
- Resilient, scalable and performant
- Maintainable high quality code
- Looks good!

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Presented by

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