Cingular Wireless: Successfully Executing on SOA

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About Cingular Wireless

- Cingular Wireless is the largest wireless company in the United States, with more than 54 million subscribers who use the nation's largest digital voice and data network. Cingular is dedicated to providing customers with wireless technology designed to enrich their lives.
- Year 2004 pro forma annual revenue was more than $32 billion.

ENVIRONMENT PRIOR TO SOA

- 2000 Java/J2EE/RMI developers
- Using a proprietary middleware solution with limited adoption
- Unable to encourage adoption of any new technology standards regardless of productivity gains and demonstrated ROI
- Faced with aggressive project deadlines affecting largest customer and parent company
- Need to expose critical billing, provisioning and customer information across systems and partners
- Need to establish roadmap for future services to handle all billing and customer interaction
- Need to integrate core applications more effectively

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WHY SOA

The ABC's Behind SOA:

- The Services layer provides abstraction from the back office systems and eliminates the need for each development team to understand how to communicate with the back office systems. The effort to understand the back office systems is estimated to be 30% to 50% of the development cycle
- The Business Process layer is duplicated across each development team. By creating business process modules the code can be reused across the various development teams as a WebService or a Portlet included in the application being developed
- SOA allows the application development teams to focus on the needs of the business versus navigating the intricacies of legacy "stovepipe" applications

CSI—COMMON SERVICES INTERFACE

- CSI is an initiative to implement a Service Oriented Architecture (SOA) within Wireless.
- Why would Cingular Wireless want to implement SOA?
  - To meet business requirements of advanced 2G and 3G services
  - To reduce time-to-market on IT support of new products and services
  - To implement an abstraction layer to facilitate the introduction of “plug-n-play” components into the IT infrastructure. Plug-n-play facilitates:
    - IT and OSS Collapse Strategies
      - The ability to support M&A OSS Collapse

        OSS Collapse involves
    - Vendor independence
      - The ability to plug in vendors with “best of breed” capabilities with minimal upstream efforts
      - The ability to negotiate lower total cost of ownership with key technology vendors
    - Respond to new business demand
      - SOA facilitates the need to respond to competitive threats to rapid adoption of new business initiatives

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CORE SERVICES INFRASTRUCTURE TEAM

- Own the overall architecture for core customer-related services that span billing systems, provisioning and customer
- Architect, Design, Develop and test reusable solutions for use across multiple applications within Wireless
- Ongoing re-factoring of solutions based on feedback from Delivery teams and improvement opportunities identified within the Solution Architecture team
- Identify needs for sourcing of products to meet solution requirements and participate in selection and proof of concept for the selected product
- Establish standards for web services, process automation, B2B, EAI, messaging, and related technologies

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Our Vision

- A common access point for communication to Cingular back office systems
- Service Operations designed to support business use cases
- Abstraction from back office systems
- Highly reusable data model for creating new services
- Pattern Based Architecture based upon Vendor-neutral W3C recommendations
- Reduced points of failure through flattening existing architecture

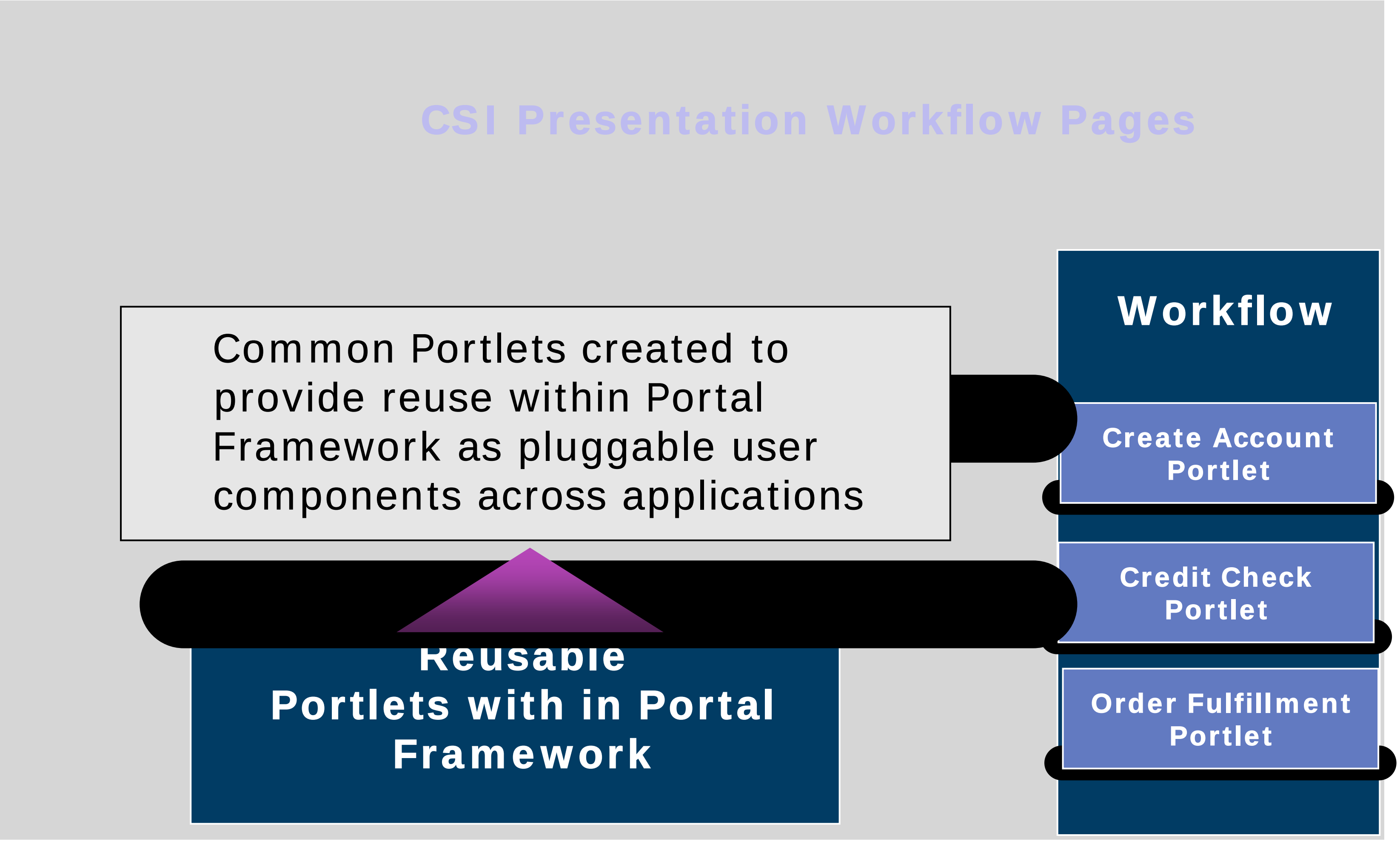
Definition of Services

- Designed to standardize communications between client applications and Cingular back office systems
- Utilizes Web Services Description Language (WSDL) to describe services
- Communicates using Simple Object Access Protocol (SOAP) messages and XML messaging
- Supported transports for Hypertext Transfer Protocol (HTTP) and Java Messaging Service (JMS)

Definition of Services

- Abstracted
  - Hides complexity
  - Makes conversations simpler
  - Reduces the conversation to important elements
- Modular
  - Complex systems are broken into smaller reusable parts
- Service Based
  - Exposes the functionality of the Service Provider Entity via services
- Loosely Coupled
  - Exposes as little of the Service implementation as possible to meet the business requirement

CSI FRAMEWORK



CSI Presentation Workflow Pages

Common Portlets created to provide reuse within Portal Framework as pluggable user components across applications

Reusable Portlets with in Portal Framework

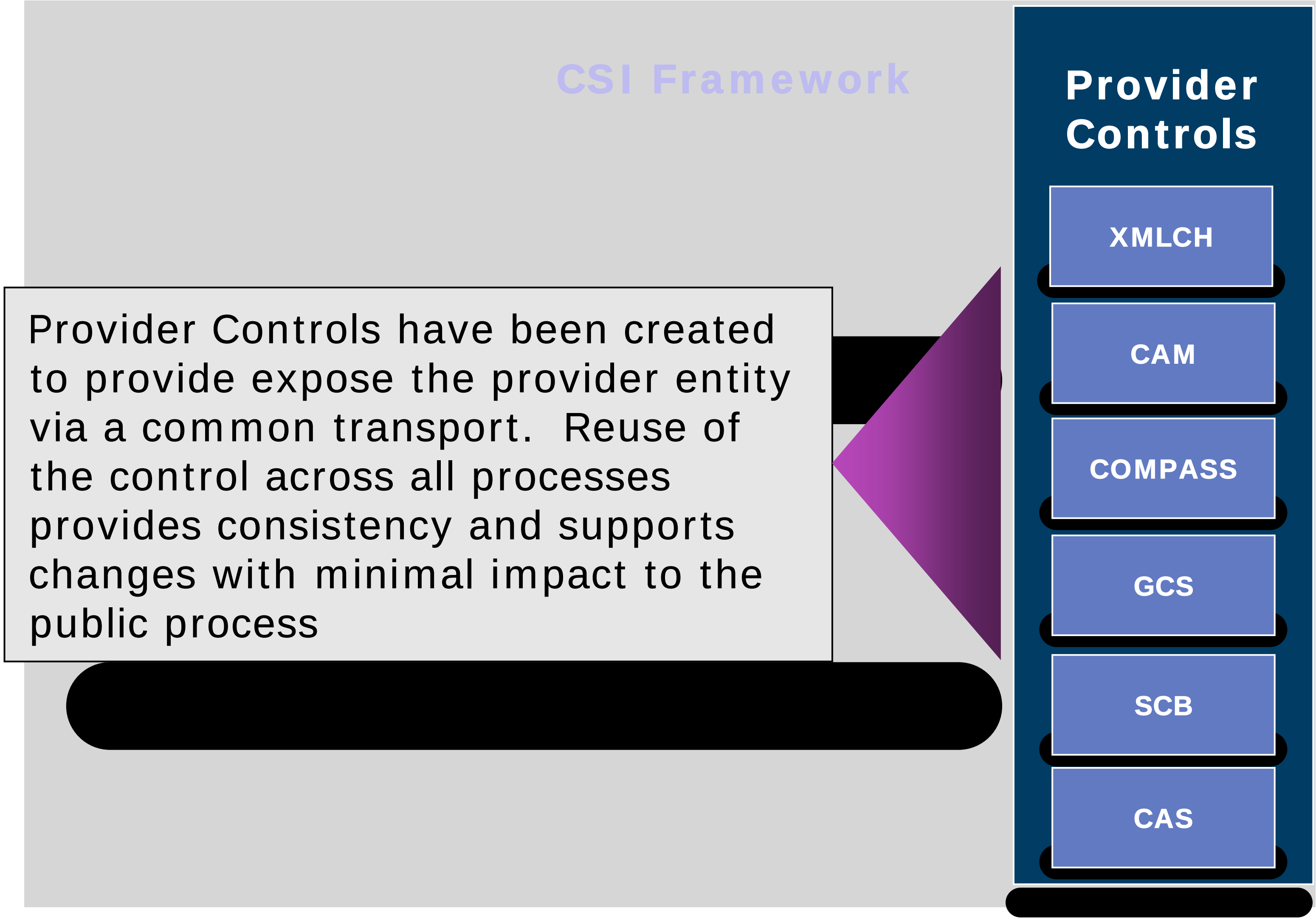
Workflow

Create Account Portlet

Credit Check Portlet

Order Fulfillment Portlet

CSI FRAMEWORK



CSI Framework

Provider Controls

Provider Controls have been created to provide expose the provider entity via a common transport. Reuse of the control across all processes provides consistency and supports changes with minimal impact to the public process

XMLCH

CAM

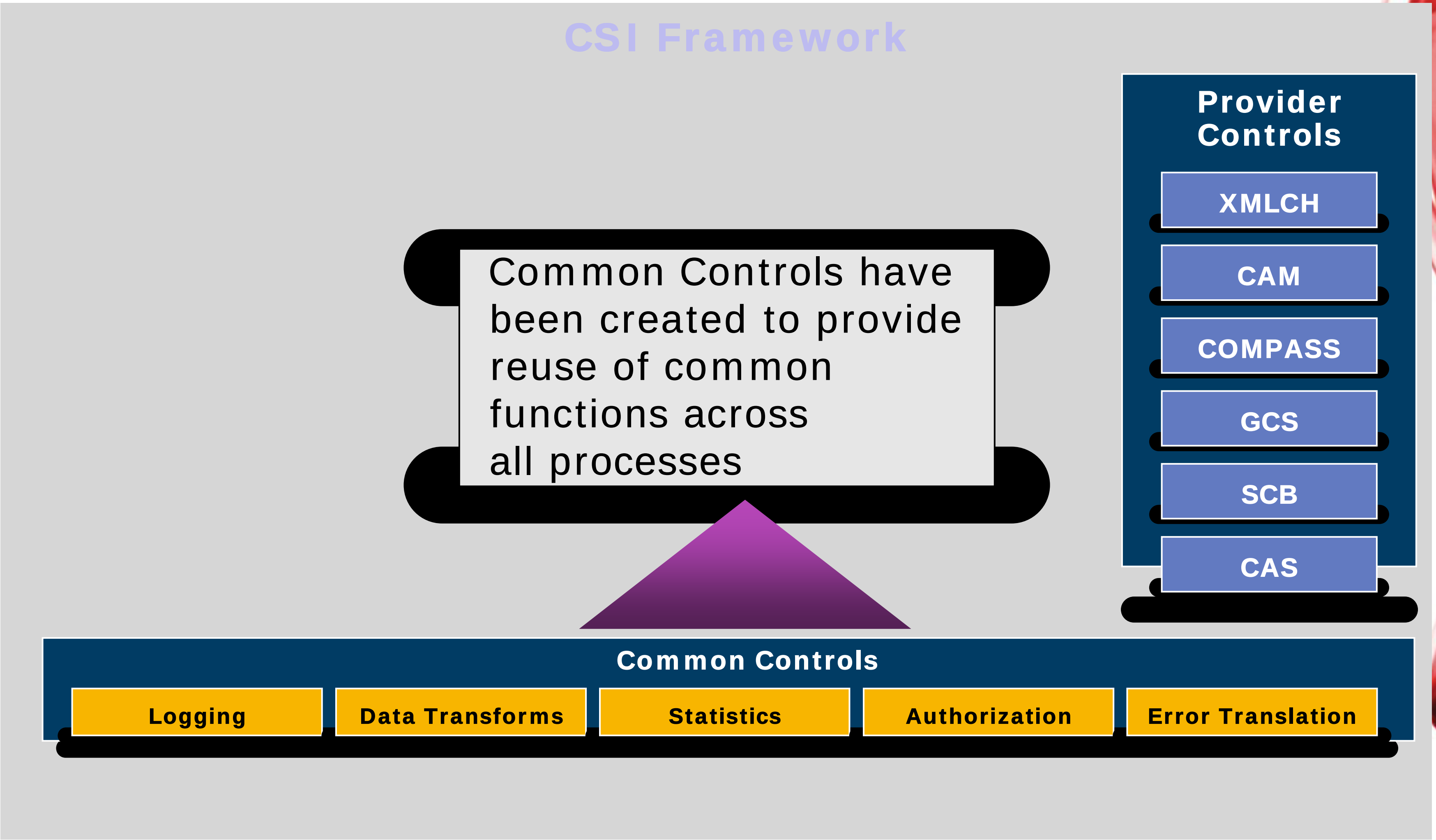
COMPASS

GCS

SCB

CAS

CSI FRAMEWORK



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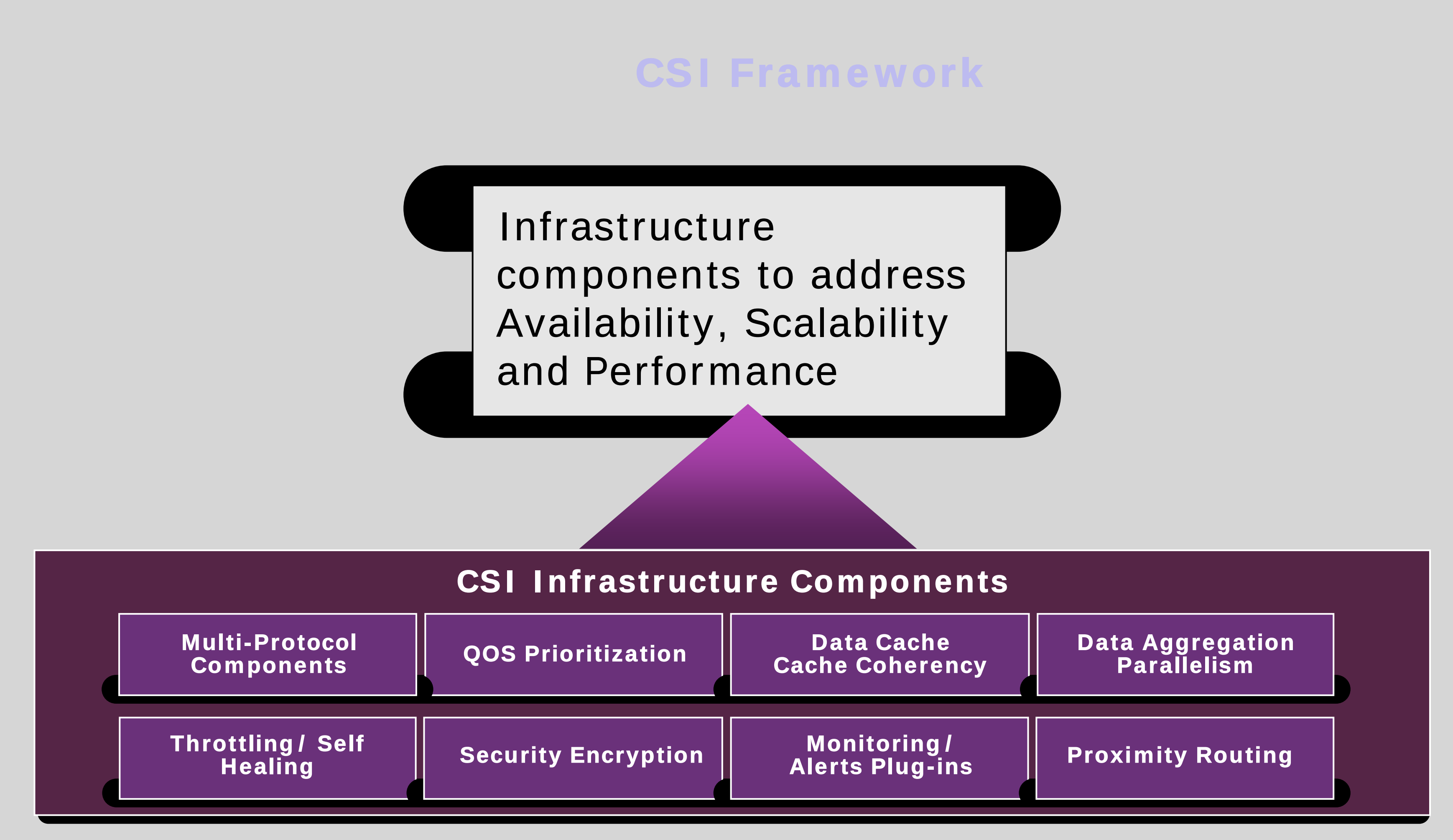
CSI FRAMEWORK



CSI Framework

Infrastructure components to address Availability, Scalability and Performance

CSI Infrastructure Components

Multi-Protocol Components

QOS Prioritization

Data Cache Cache Coherency

Data Aggregation Parallelism

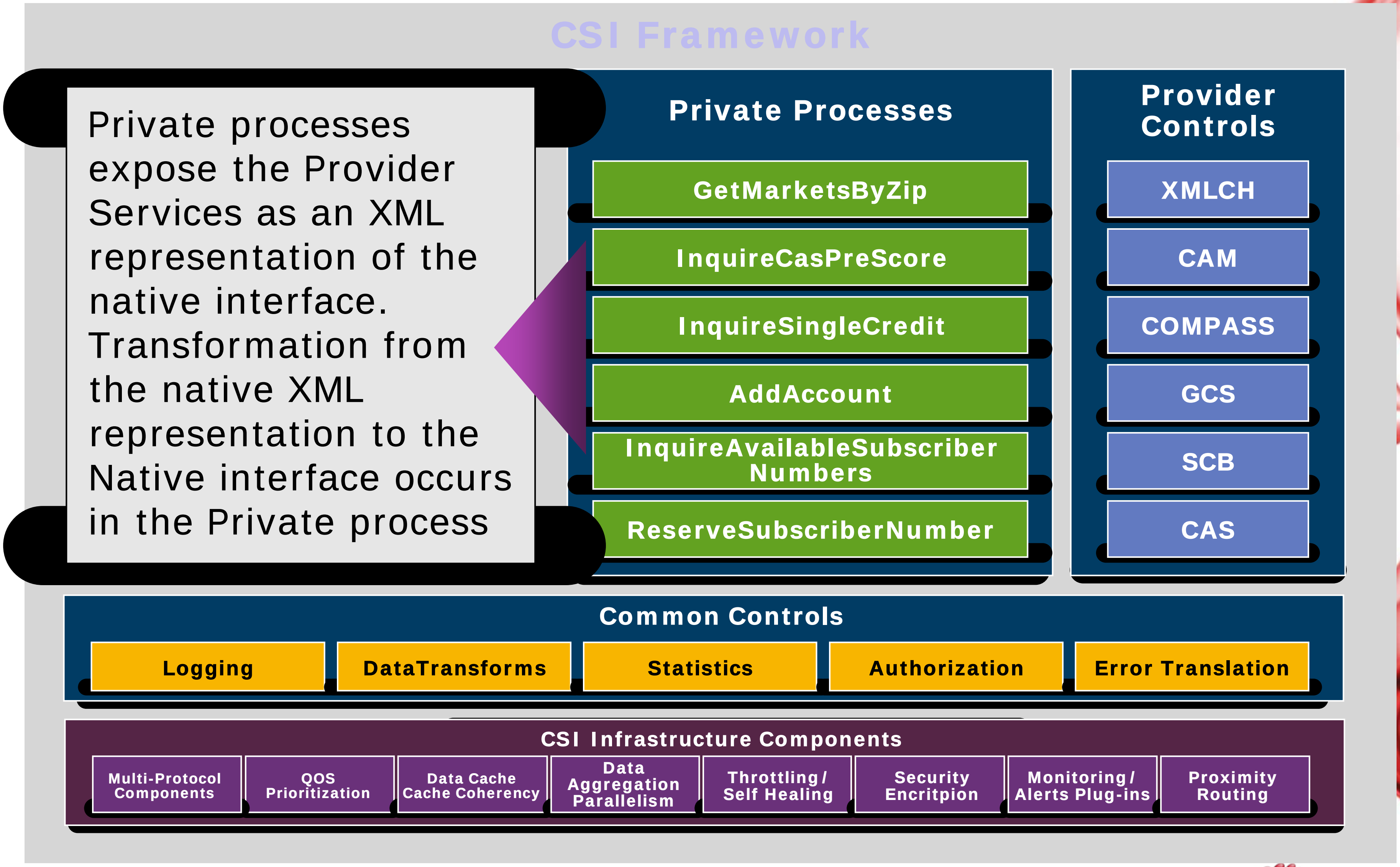
Throttling / Self Healing

Security Encryption

Monitoring / Alerts Plug-ins

Proximity Routing

CSI FRAMEWORK



CSI Framework

Private processes expose the Provider Services as an XML representation of the native interface. Transformation from the native XML representation to the Native interface occurs in the Private process

Private Processes

GetMarketsByZip

InquireCasPreScore

InquireSingleCredit

AddAccount

InquireAvailableSubscriber Numbers

ReserveSubscriberNumber

Provider Controls

XMLCH

CAM

COMPASS

GCS

SCB

CAS

Common Controls

Logging

DataTransforms

Statistics

Authorization

Error Translation

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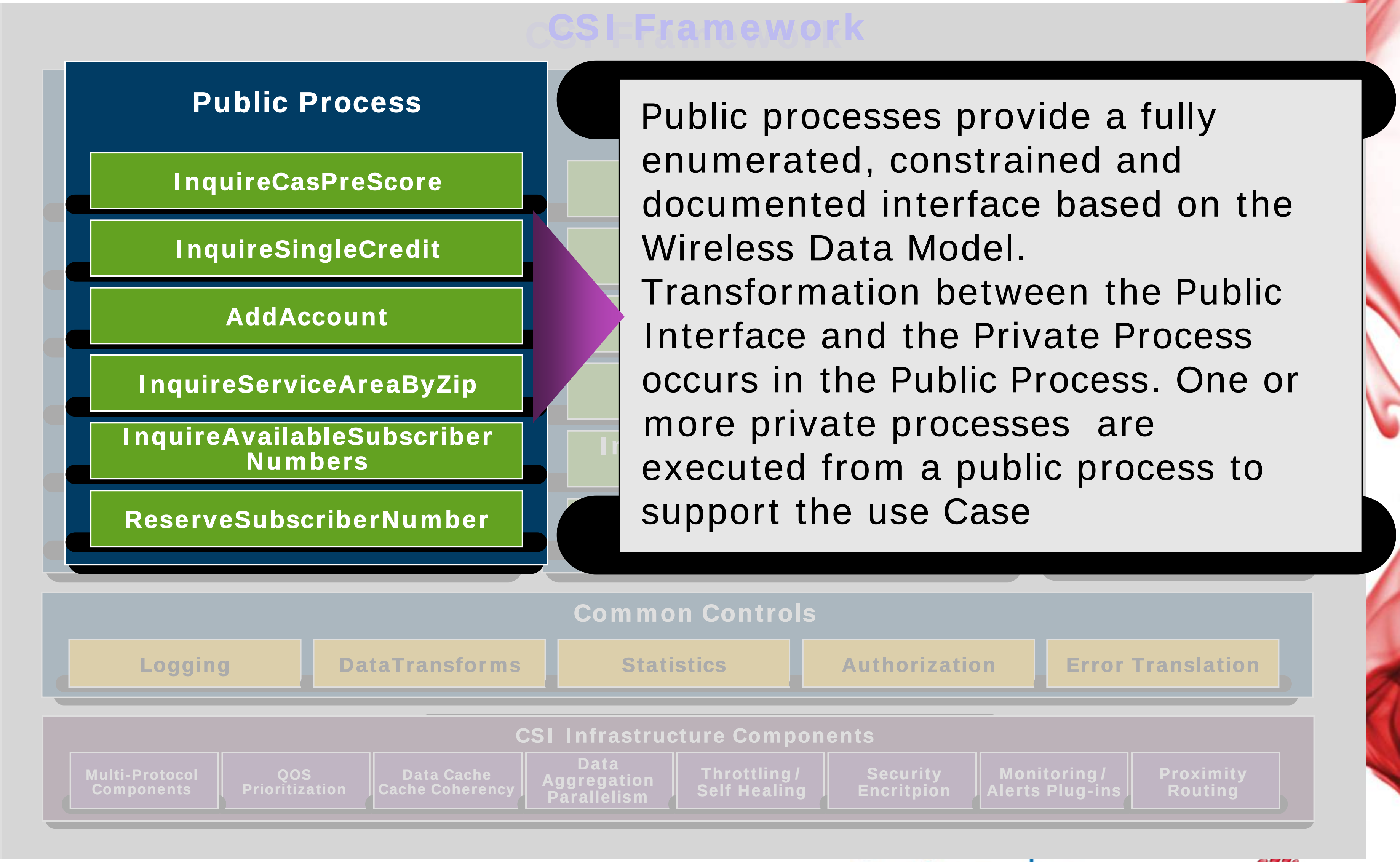

CSI Framework

Public Process

- InquireCasPreScore
- InquireSingleCredit
- AddAccount
- InquireServiceAreaByZip
- InquireAvailableSubscriber Numbers
- ReserveSubscriberNumber

Public processes provide a fully enumerated, constrained and documented interface based on the Wireless Data Model. Transformation between the Public Interface and the Private Process occurs in the Public Process. One or more private processes are executed from a public process to support the use Case

Common Controls

- Logging
- DataTransforms
- Statistics
- Authorization
- Error Translation

CSI Infrastructure Components

- Multi-Protocol Components
- QOS Prioritization
- Data Cache Cache Coherency
- Data Aggregation Parallelism
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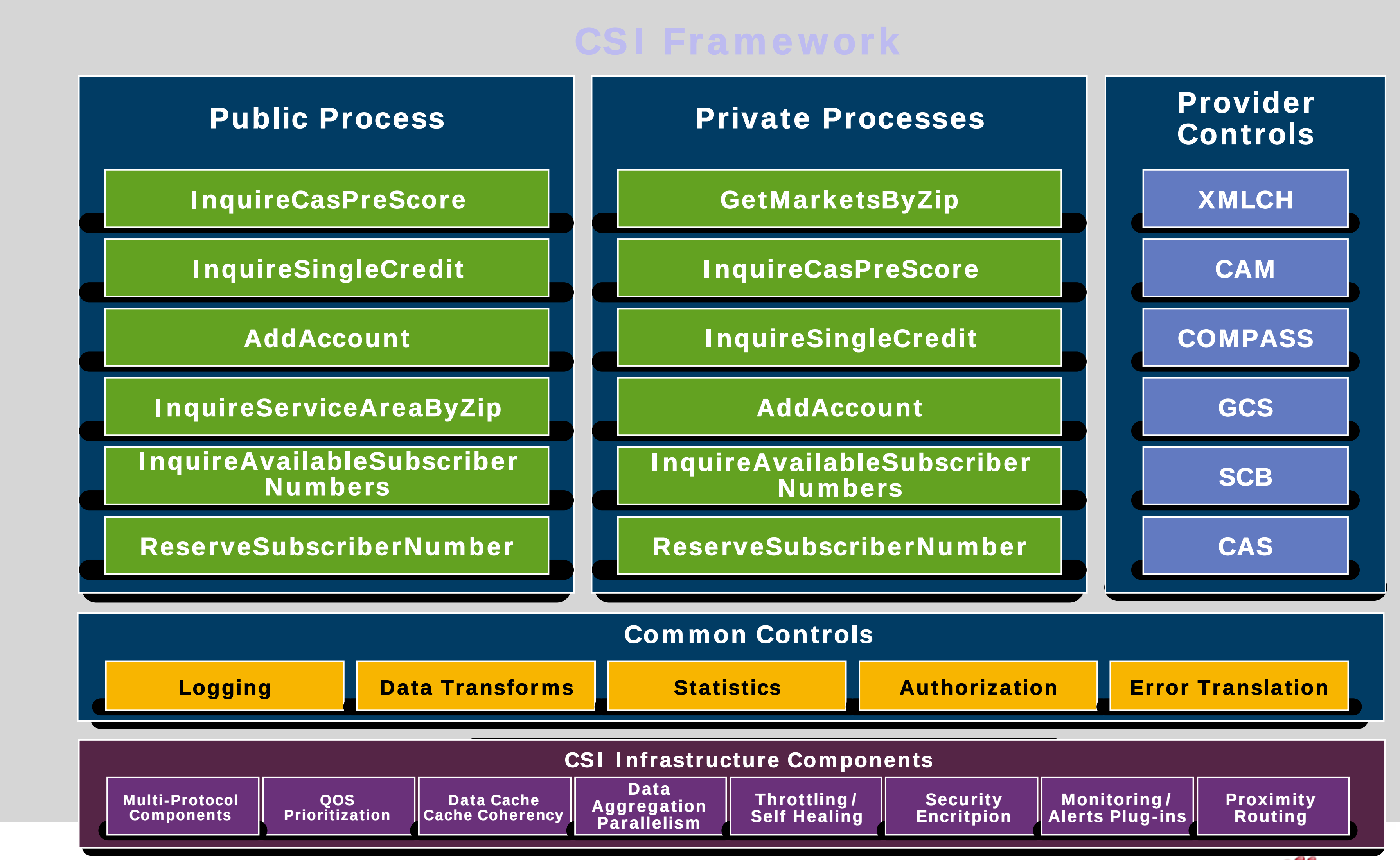

CSI Framework

Public Process
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Private Processes
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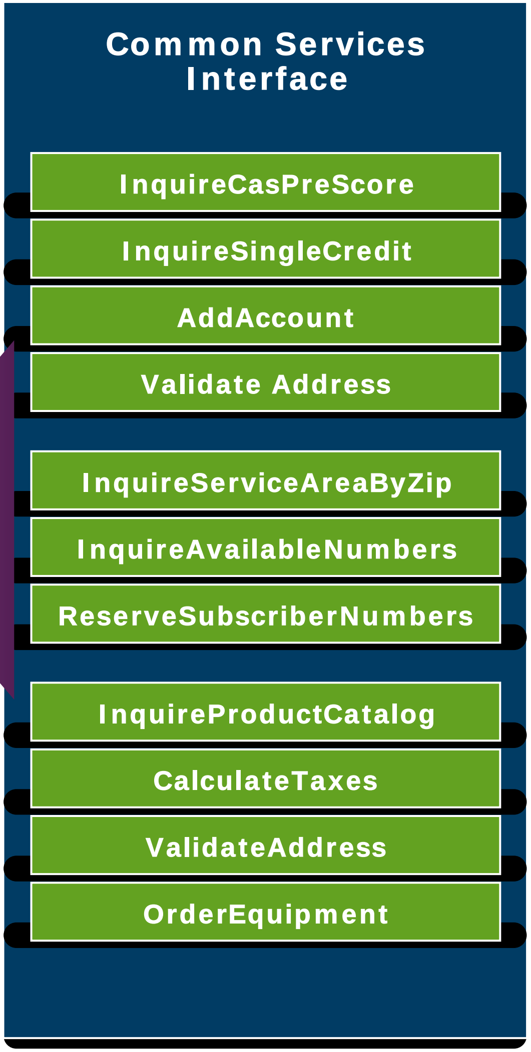
SOA ARCHITECTURE

The Services provided in CSI are the foundation of the Wireless SOA.



Common Services Interface

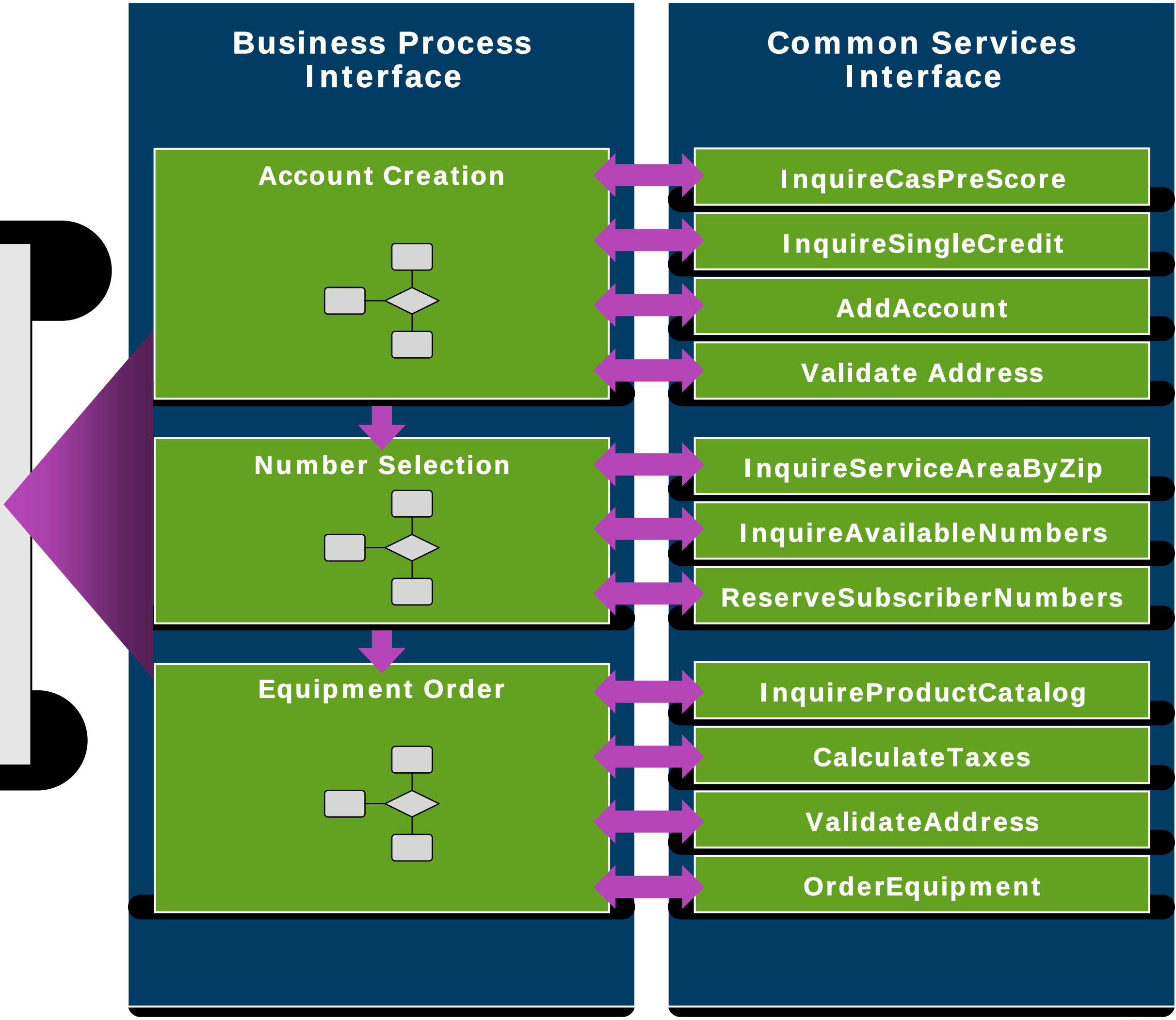
- InquireCasPreScore
- InquireSingleCredit
- AddAccount
- Validate Address

- InquireServiceAreaByZip
- InquireAvailableNumbers
- ReserveSubscriberNumbers

- InquireProductCatalog
- CalculateTaxes
- ValidateAddress
- OrderEquipment

SOA ARCHITECTURE

Addition of a business process layer will support combining of individual services to support common business processes



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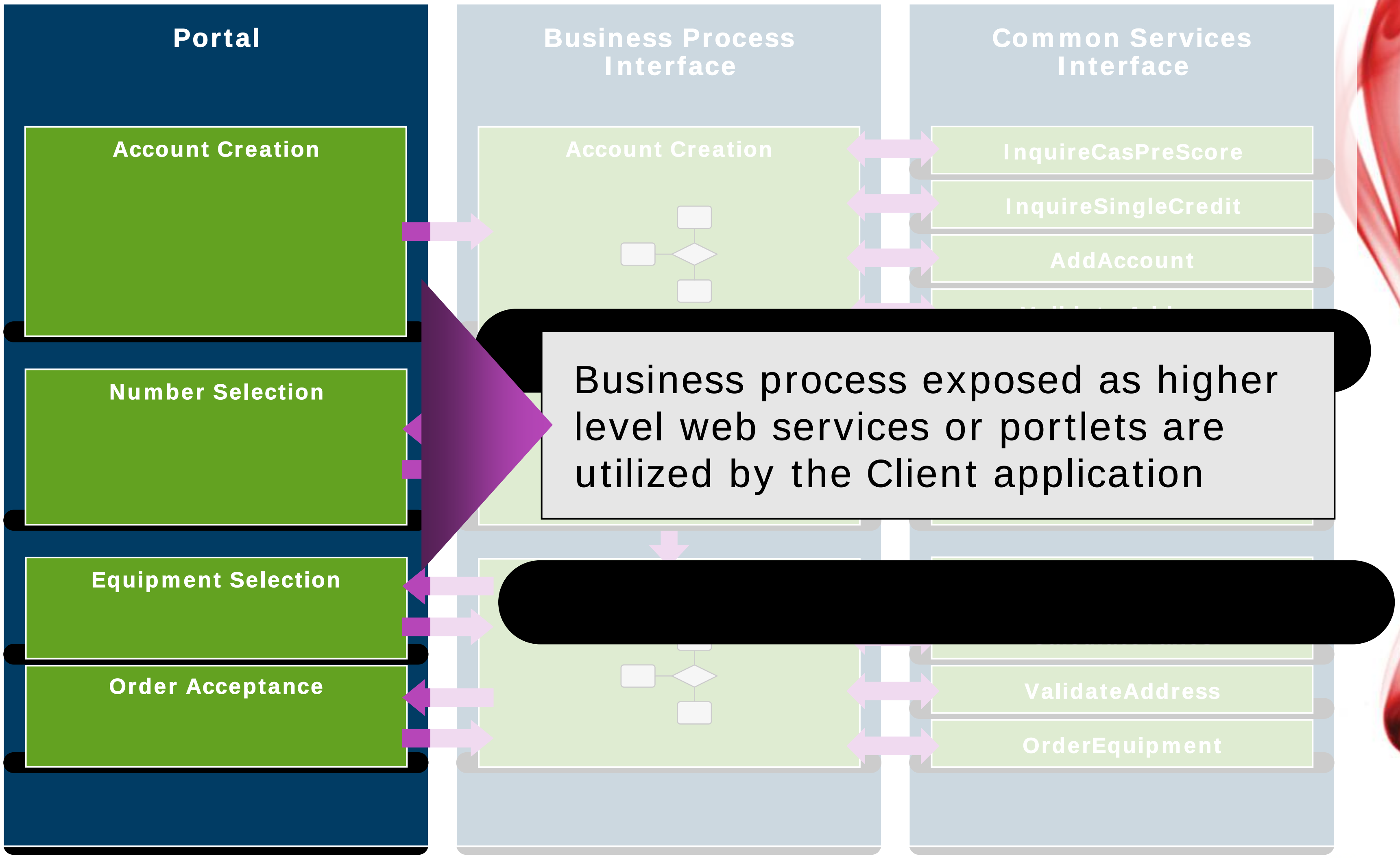
SOA ARCHITECTURE



Business process exposed as higher level web services or portlets are utilized by the Client application

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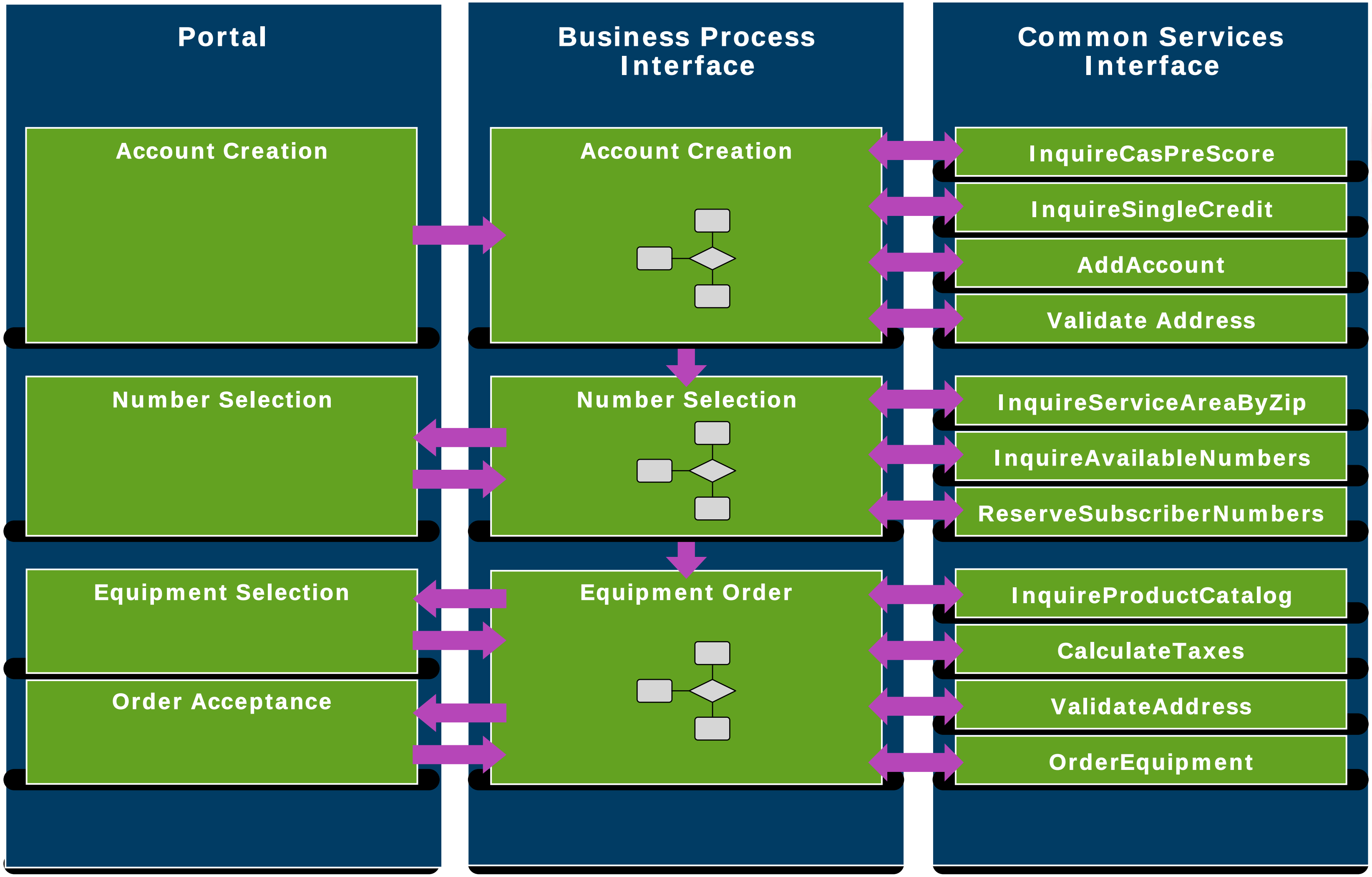
SOA ARCHITECTURE



Portal

Account Creation

Number Selection

Equipment Selection

Order Acceptance

Business Process Interface

Account Creation

Number Selection

Equipment Order

Common Services Interface

InquireCasPreScore

InquireSingleCredit

AddAccount

Validate Address

InquireServiceAreaByZip

InquireAvailableNumbers

ReserveSubscriberNumbers

InquireProductCatalog

CalculateTaxes

ValidateAddress

OrderEquipment

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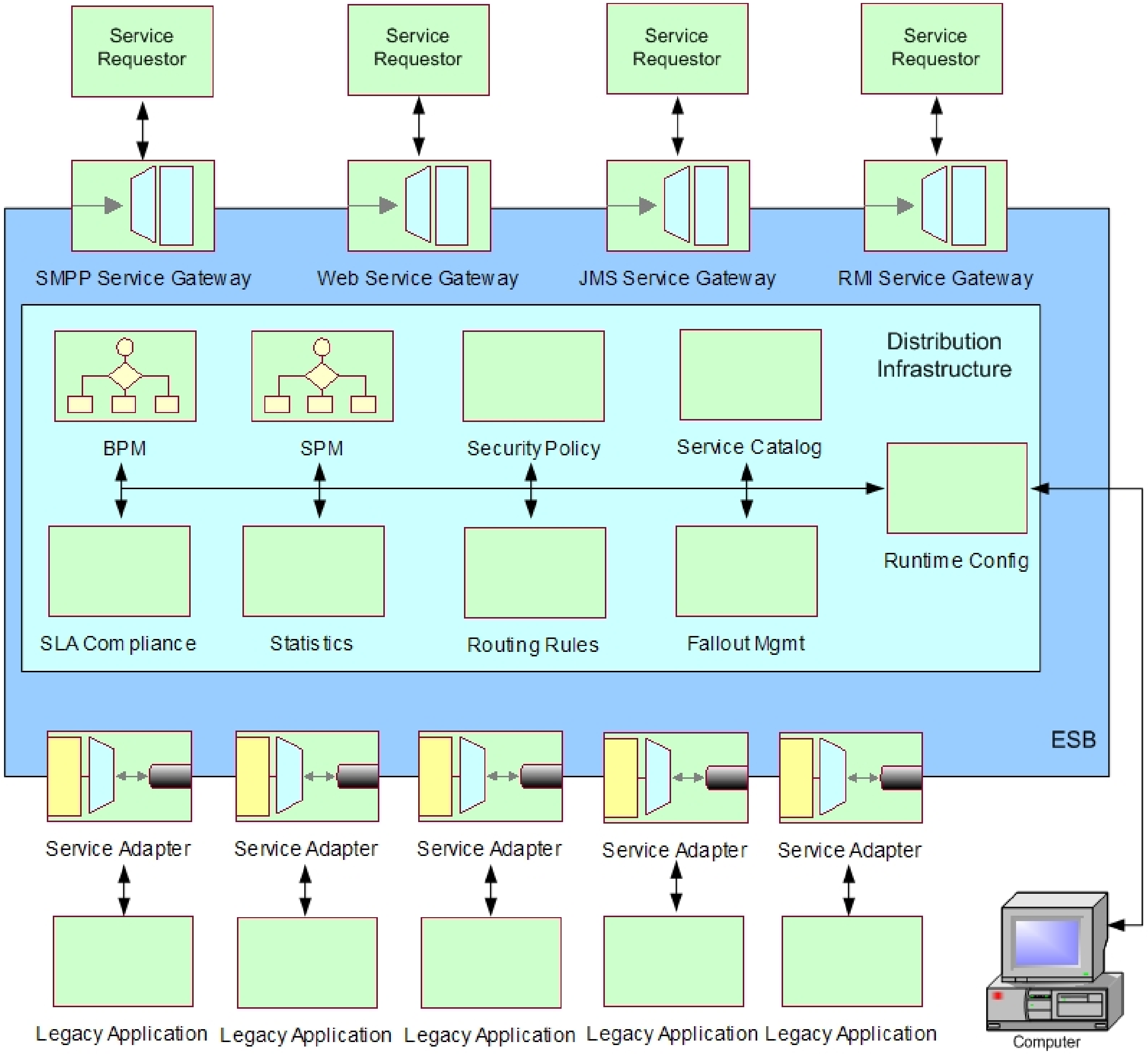
Service Oriented Architecture



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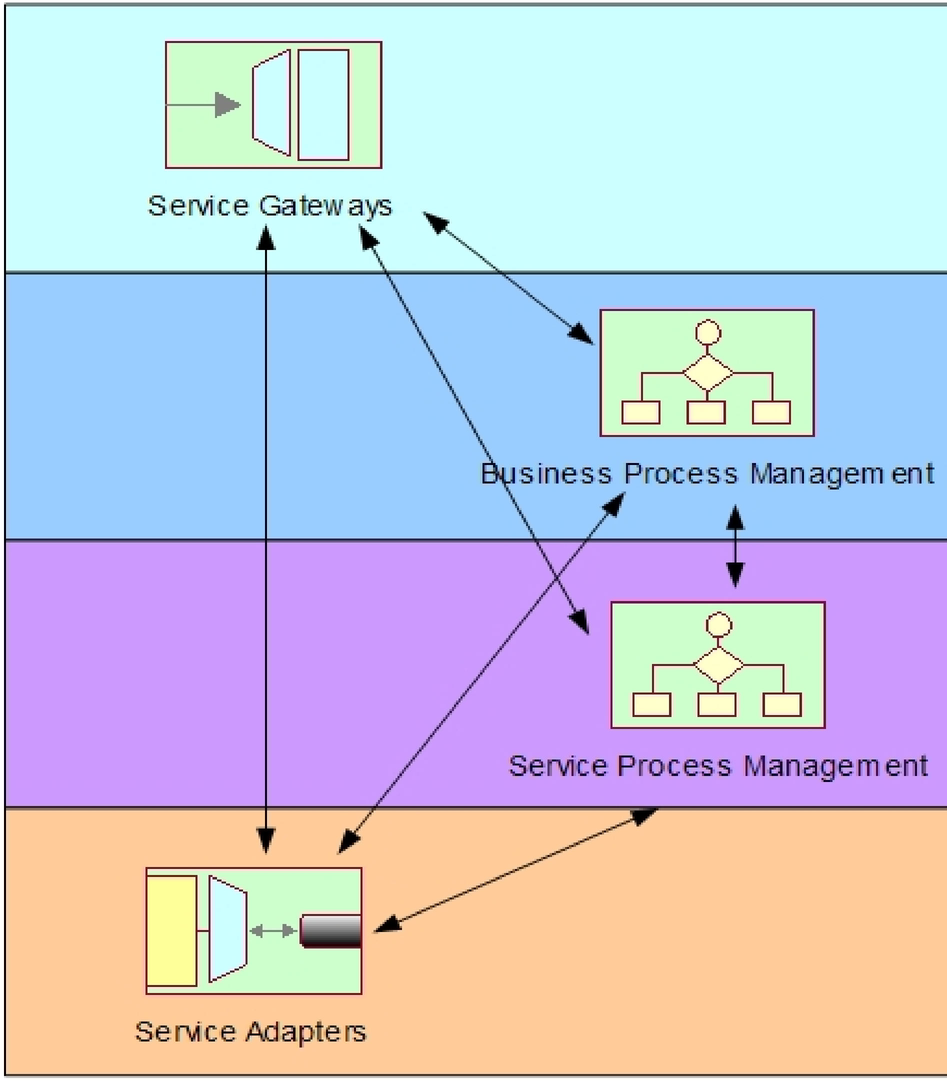
High Level Architecture



Service Gateways provide the interface into a SOA. Security, Protocol Transformation, and Message Transformation are provided by the Service Gateways

Business Process Managers Support the execution of complete Business Processes as a single Service. Business Processes are accessible via the Service Gateways for Clients of Common Services.

Service Process Managers Support the execution of complete unit of work associated with a Business Process. Service Process are used by the Business Process Managers and are accessible via the Service Gateways for Clients of Common Services

Service Adapters provide access to the Cingular Back Office Systems in compliance with the Common Services Canonical Data Model. Services are Aggregated by the Service Process Managers, Business Process Managers and accessible via the Service Gateways for Clients of Common Services.

Abstraction Through Canonical Modeling

Understanding the Data Model

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Standard Vocabulary for Service Names

<Verb>	+	<Noun>	+	<Qualifier>
Add		Account		Billing Telephone Number
Calculate		Subscriber		Billing Account Number
Inquire		Device		Subscriber Number
Order		Offering		Profile
Remove		Credit Card		
Reserve		Address		
Update				
Validate				

Update Account Profile

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Consistent Naming of Elements

Data Model Element	Billing System A	Billing System B	Order Fulfillment
offeringCode	**socCode**	**billCode**	**Soc**
offeringDescription	**socDescription**	**billCodeDesc**	**featureDesc**
featureCode	**featureCode**	**N/A**	**featureCode**
featureDescription	**featureDesc**	**N/A**	**featureDesc**

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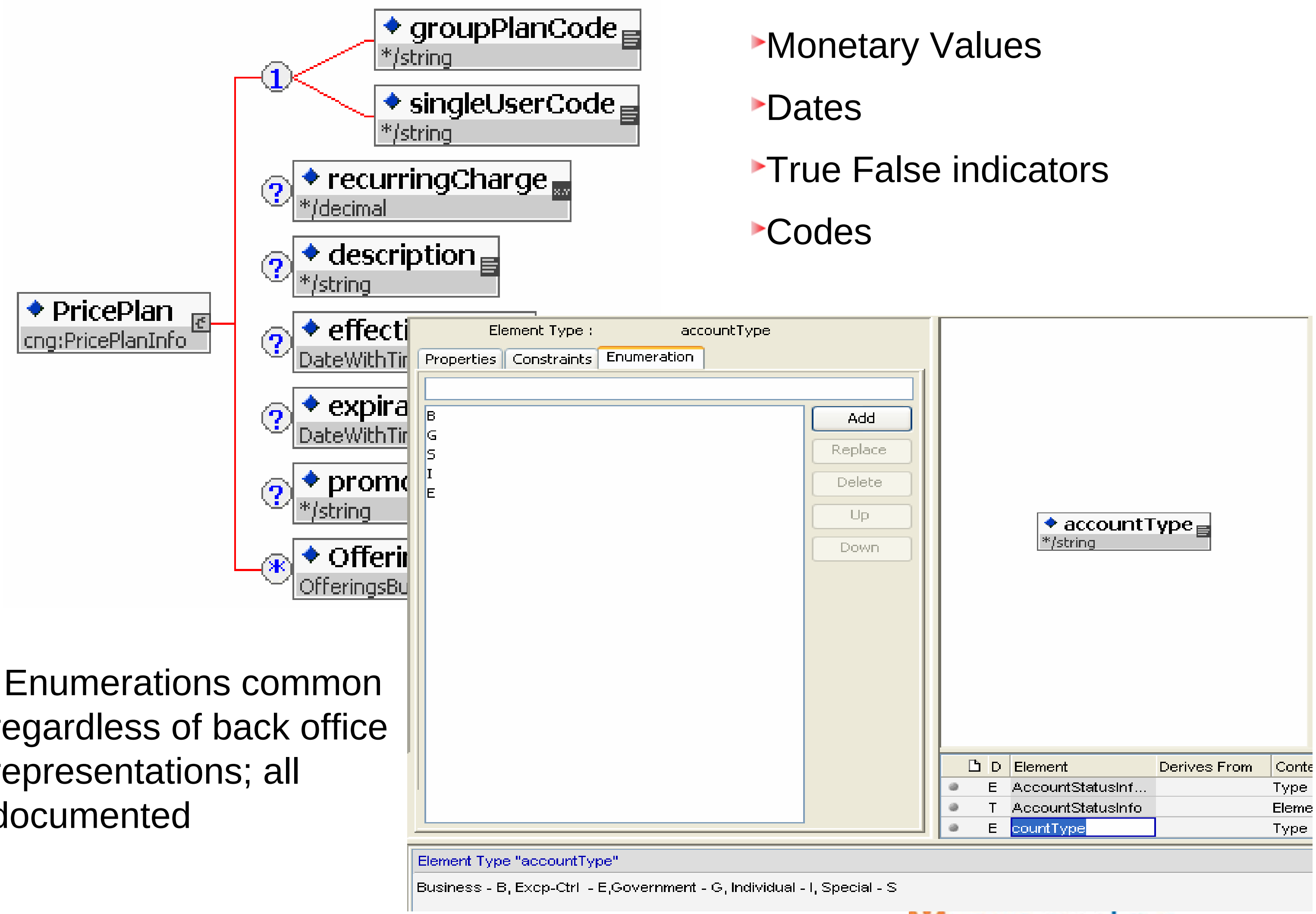
Consistent Use of Data Types

- Monetary Values
- Dates
- True False indicators
- Codes



D	Element	Derives From	Conte
E	AccountStatusInf...		Type
T	AccountStatusInfo		Eleme
E	countType		Type

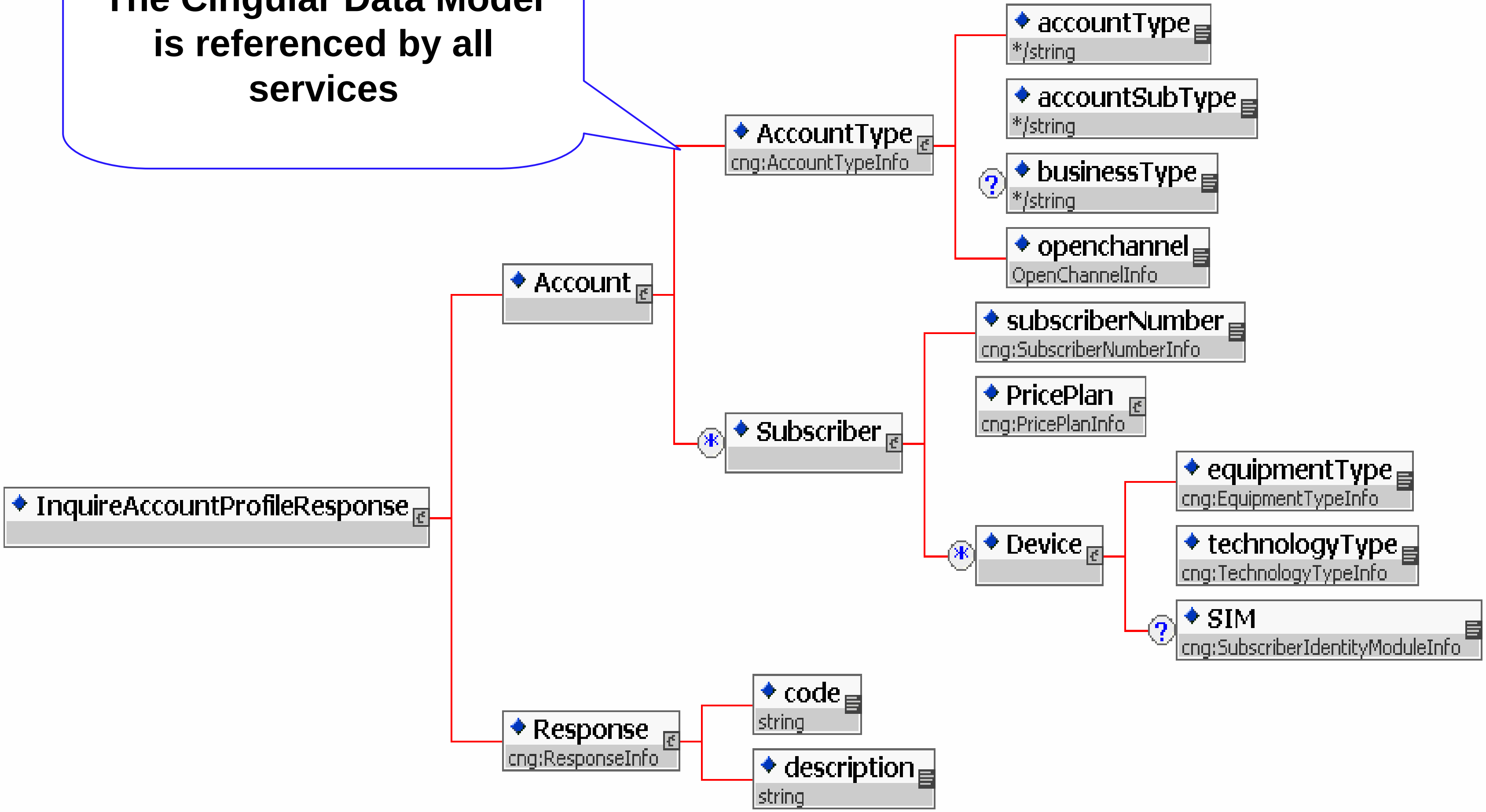
Element Type "accountType"

Business - B, Excp-Ctrl - E,Government - G, Individual - I, Special - S

- Enumerations common regardless of back office representations; all documented

Utilize Complex and Simple Types

The Cingular Data Model is referenced by all services



InquireAccountProfileResponse

Account

AccountType
cng:AccountTypeInfo

accountType
*/string

accountSubType
*/string

businessType
*/string

openchannel
OpenChannelInfo

Subscriber

subscriberNumber
cng:SubscriberNumberInfo

PricePlan
cng:PricePlanInfo

Device

equipmentType
cng:EquipmentTypeInfo

technologyType
cng:TechnologyTypeInfo

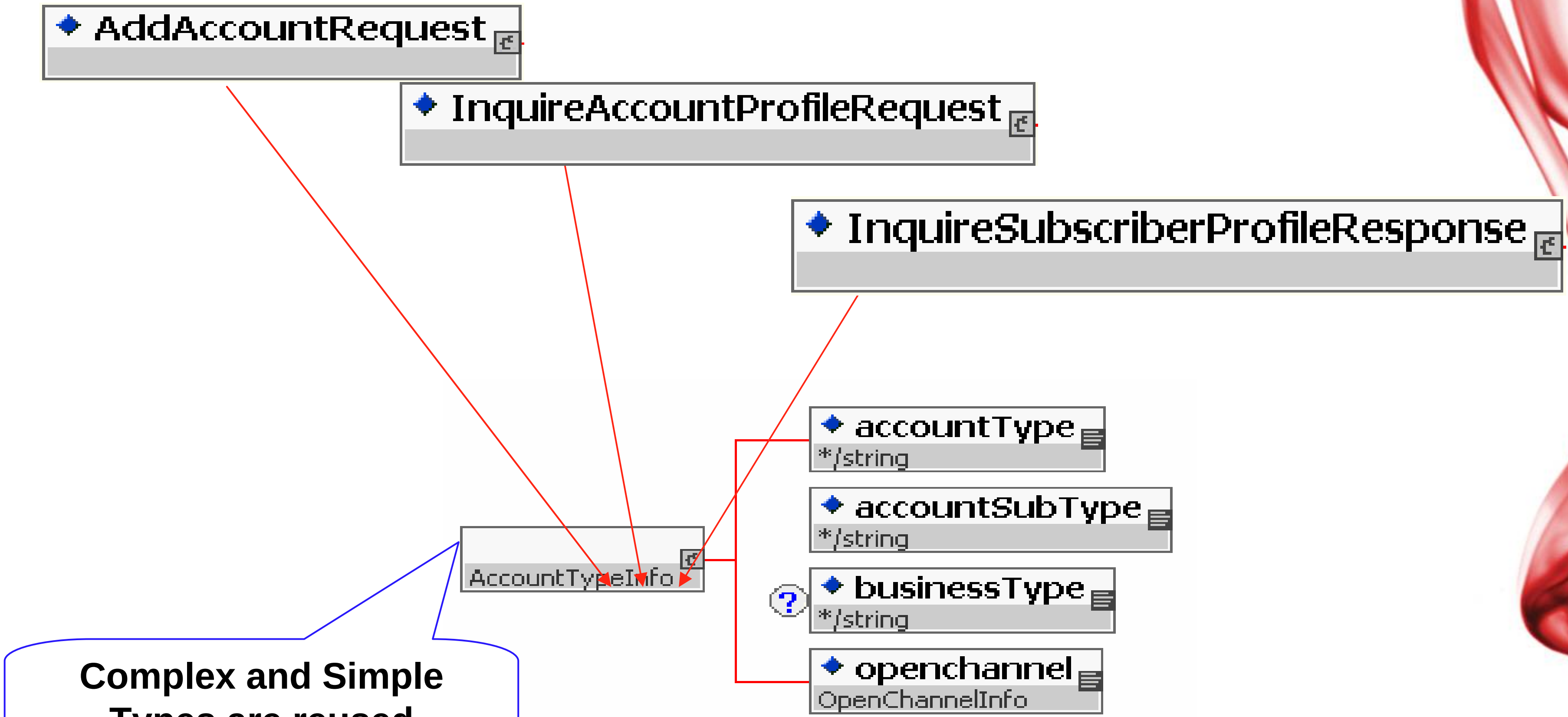
SIM
cng:SubscriberIdentityModuleInfo

Response
cng:ResponseInfo

code
string

description
string

Reuse Data Types For All Schemas



AddAccountRequest

InquireAccountProfileRequest

InquireSubscriberProfileResponse

AccountTypeInfo

accountType
*/string

accountSubType
*/string

businessType
*/string

openchannel
OpenChannelInfo

Complex and Simple Types are reused

SOA Components

Security

- CSI security MUST provide the following minimal functionalities:
  - PKI & Key Management
  - Authorization & Access Control
  - Centralized Security Policy Management & Policy Level Support.
  - Single-Sign-On (SSO)
  - Credential Cache Management
  - Centralized Identity Management (idM) compatibility
  - Web Services Security Multi-hop Assertions (SAML)
  - Message Body, Element, Attribute, Envelope, Token Encryption/Signing/Certificates
  - Federated Services (chains & transactions)
  - WSDL security and filtering
  - Message inspection prior to service request.
  - Performance and scalability

Service Catalog

- As part of the SOA implementation there will be a service catalog functionality which would allow customers and internal users to identify and understand the interfaces which the SOA environment offers.
- Customers will be able to interrogate the environment and understand what is readily available before they decide to build a possibly redundant functionality with some other application.
- The service catalog will also provide comprehensive documentation on the service, service level agreements, real time/historical reporting of service performance and UDDI like capabilities.

Infrastructure

- Common Services Project Office
- Fallout Management Team
- Client Relationship Management
  - CSI’s deployment has been to partners, eTailers, resellers initially
- Client Reporting
  - Errors
  - Response time
  - Metrics
  - Common errors

APPROACH

- Less paper more deliverables
- Design, design, design
- Parallel delivery model
  - Concrete interfaces for public/private interaction
  - Deep design discovery with customer
  - Control Factory
  - Process Templates
  - Core Web Services
  - Business Web Services
- Focus on migration to WebLogic Integration 8.1
  - Mixed delivery team of partners and Wireless FTE to encourage shadowing
  - Impromptu OJT in multiple geographies
  - Tight communication

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SAMPLE PROJECT RESULTS

- Design and development to QA in approximately four months
- Redesigned and enhanced core services in parallel to delivery
- Trained and mentored a team of 16 Wireless FTE’s without prior knowledge of SOA-based development in WebLogic Integration
- Migrated legacy infrastructure, WSDL definitions and interfaces to WebLogic Integration platform
- Now embarking upon multiple parallel SOA initiatives

ARCHITECTURE ENHANCEMENT

Legacy Architecture	WebLogic Integration SOA
● Built-in core services such as logging were dependent upon the running integration engine ● Unique Web Services approach ● Palettes with vendor supplied connectivity–unmodifiable ● Built on Java but not J2EE or BEA compatible	● Control architecture that provide multiple layers of encapsulation and exposure for optimal integration and openness ● Enhanced ability to support parallel development efforts ● Web Services flexibility ● Enhanced layer segregation ● Greater compatibility and adoption in the enterprise infrastructure framework ● Releases now six-eight weeks

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GOING FORWARD:
REFOCUS ON COMPETENCY

- Challenge is adoption of new services and approaches to SOA delivery—Requires a new platform for sharing and publication of reusable artifacts and standards
- Sharing through education of broader Wireless development community—Focus on building mentors internally
- Altering the process for interaction with the Architecture Group through revised competency center approach
- Establishing a culture of open design and architecture review with multiple partners, constantly enhancing commonality of services
- Enhancing core services technology
  - Introducing Service Choreography solutions for Business Process Work Flow. Includes business process Web Services and portlets
  - WLS Security compliance
  - Introducing UDDI Solution for Common Services
  - Architecting to support dynamic WS execution model
  - Focus on marrying SEDA and SOA

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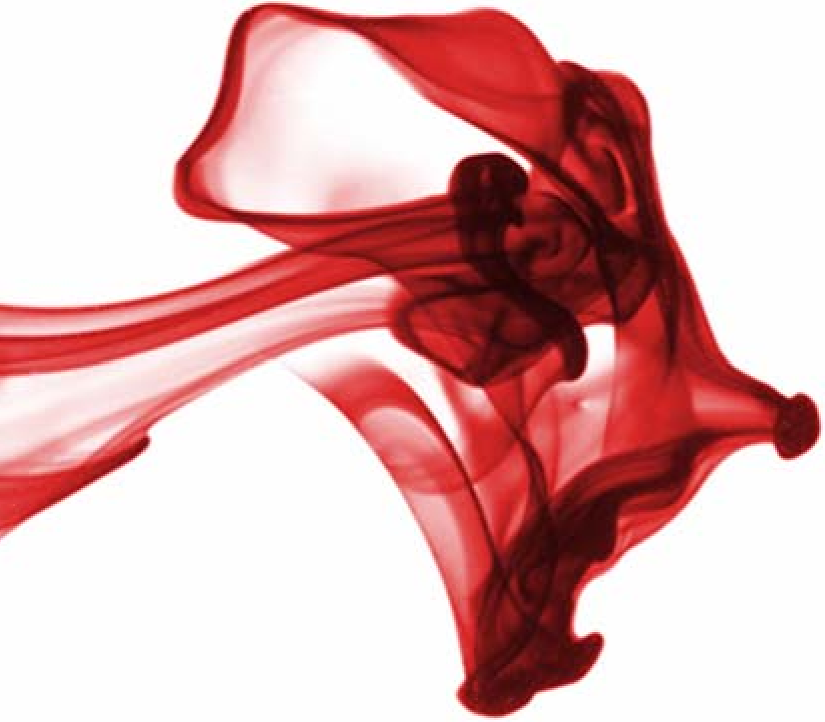
FINAL THOUGHTS

- SOA is a long term strategy
- Attain Business Buy In early
- Properly Assess current state and map to desired end state expressed in Business Value
- Incremental delivery of SOA (no big bang!)
- Establish SOA strategy that addresses organization, processes, and culture as well as technology
- Balance Strategic with Tactical
- Need a solution that is:
  - The **Best Fit** for your IT and business lines
  - Highly **Adaptable**
  - Delivers **Faster Time to Value** for new systems, functionality, and applications



THANK YOU!