A Lightweight Approach to Service Design Specifications

The Open Group Enterprise Architecture Practitioners Conference
July 2007

Dan Hughes
Principal Consultant, Systems Flow, Inc

Graham Williams
Manager - Integration Architecture & Design Team, Vice President, Citizens Bank Financial Group

Abstract

Somewhere between “not enough” and “too much” lies the correct scope of artifacts documenting service designs. This presentation will explore a service design methodology that is based on design best practices, and implemented and refined within the SOA organization of a large enterprise. Content, format, and a “how to” approach will be discussed as well as challenges and strategies for handling them.

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Overview

- Citizens Overview
- Genesis of this Work
- A Process and Artifacts "Roadmap"
- *Tangent: Why Leverage UML?*
- Elements of a Service Design Specification
- Challenges
- Success Strategies

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Citizens Overview – The Enterprise

About Citizens Bank Financial Group	
8th Largest Commercial Banking Company in the US	
40	States
26,000	Employees
$155 Billion	In Assets
1600	Branches
3800	ATM's
1700	Call Center Agents

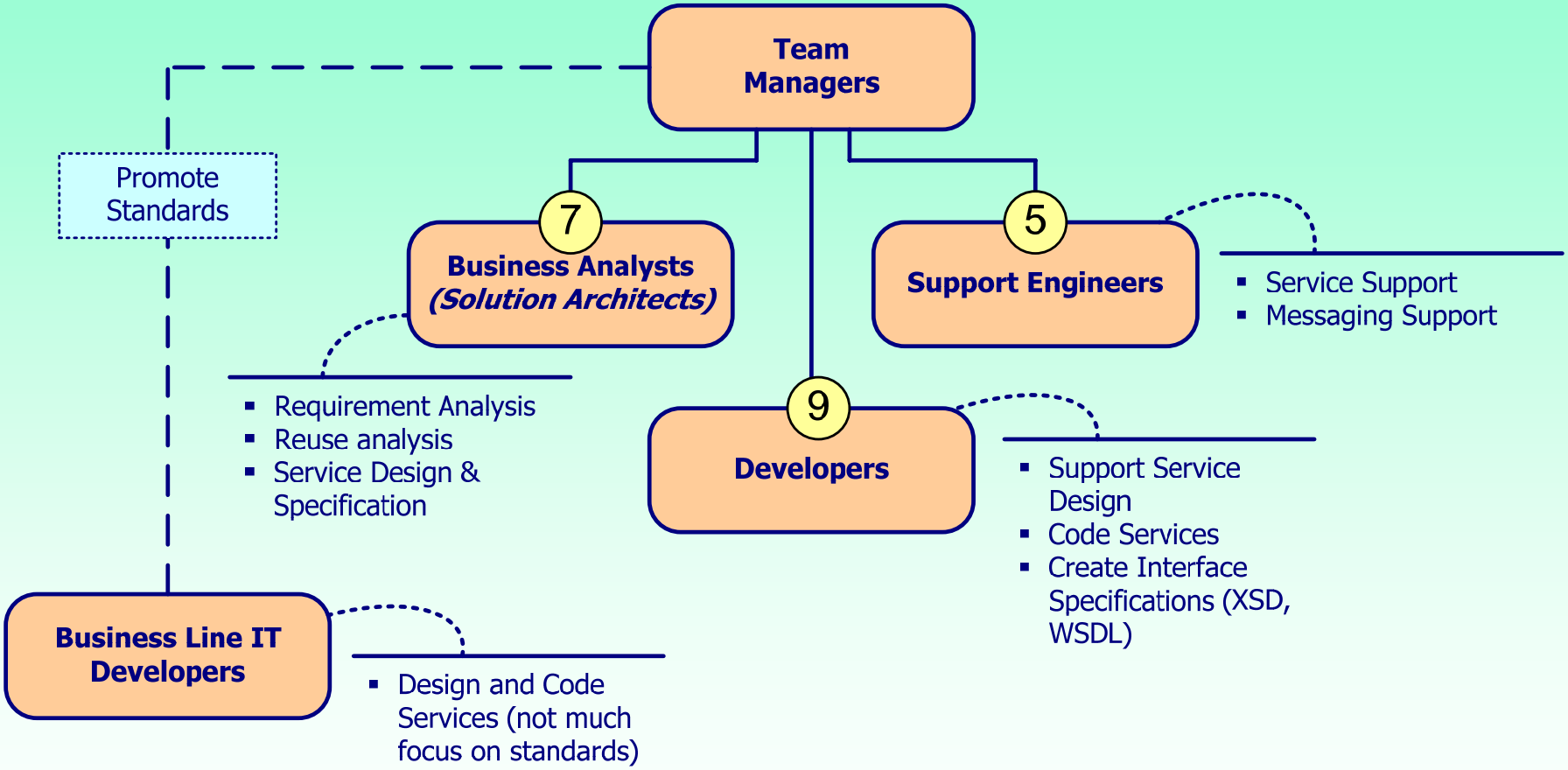
About the Citizens Bank Environment

- Centralized Infrastructure Support
- Specialized Technology Groups
- Some Distributed Business Line IT
- Heterogeneous Computing Environment
  - Legacy Mainframe
  - Growing Distributed Activities
  - 25,000 Microsoft Desktops
  - 500 Unix Servers
  - 2100 Windows Servers
- Buy vs. Build with heavy customization (COTS)
- Introduced Enterprise middleware in 2002 (basis for SOA)
- 200 Annual Technology Projects

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Citizens Overview – The SOA Organization



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Citizens Overview – The SOA Environment

Overview

Initial Service Capabilities

- Mainframe Integration using IBM WebSphere MQ and XML messages to interface with custom Cobol services
- External Service Provider Mediation

Next Phase Service Capabilities

- J2EE Business Focused Orchestration Services
- "Screen Scraping" Services
- 3rd Party Service Implementations
- Enhanced SOA (Business Metrics, Diagnostic Logging, Exception Handling)

Consumer Statistics

- 38 Service Consumers
- 11 Very Large Scale Direct Customer and Branch Applications
- Remainder service 'Back office" users

Service Statistics

- 99 IBM WebSphere Message Broker Integration Services
- 30 J2EE Business Services
- 18 Web Services
- 12 "XML over MQ" Services

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Citizens Overview – The Existing SOA Design Landscape

- Prior approach for XML / MQ Services
  - Created sequence diagrams to show interactions with external systems
  - Services were not heavy in business logic so this worked well
  - Created mapping spreadsheets
  - Created separate XSD Request/Response schemas for each service

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Genesis of this Work

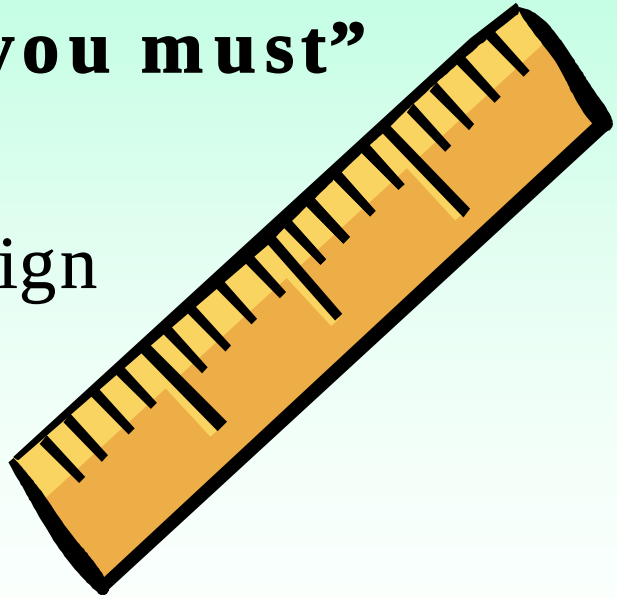
- Need emerged during a large, multi-channel, multi-vendor solution implementation with clear "enterprise service" ramifications
- Architecture team viewed solution as SOA opportunity, so engaged beyond architecture design
- Systems Flow augments the architecture team and had worked previously with Citizens to design and implement artifact approaches in other areas:
  - Functional Design / Requirements Engineering
  - Logical Design / Enterprise Architecture

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Rubrics for a Service Design Specification

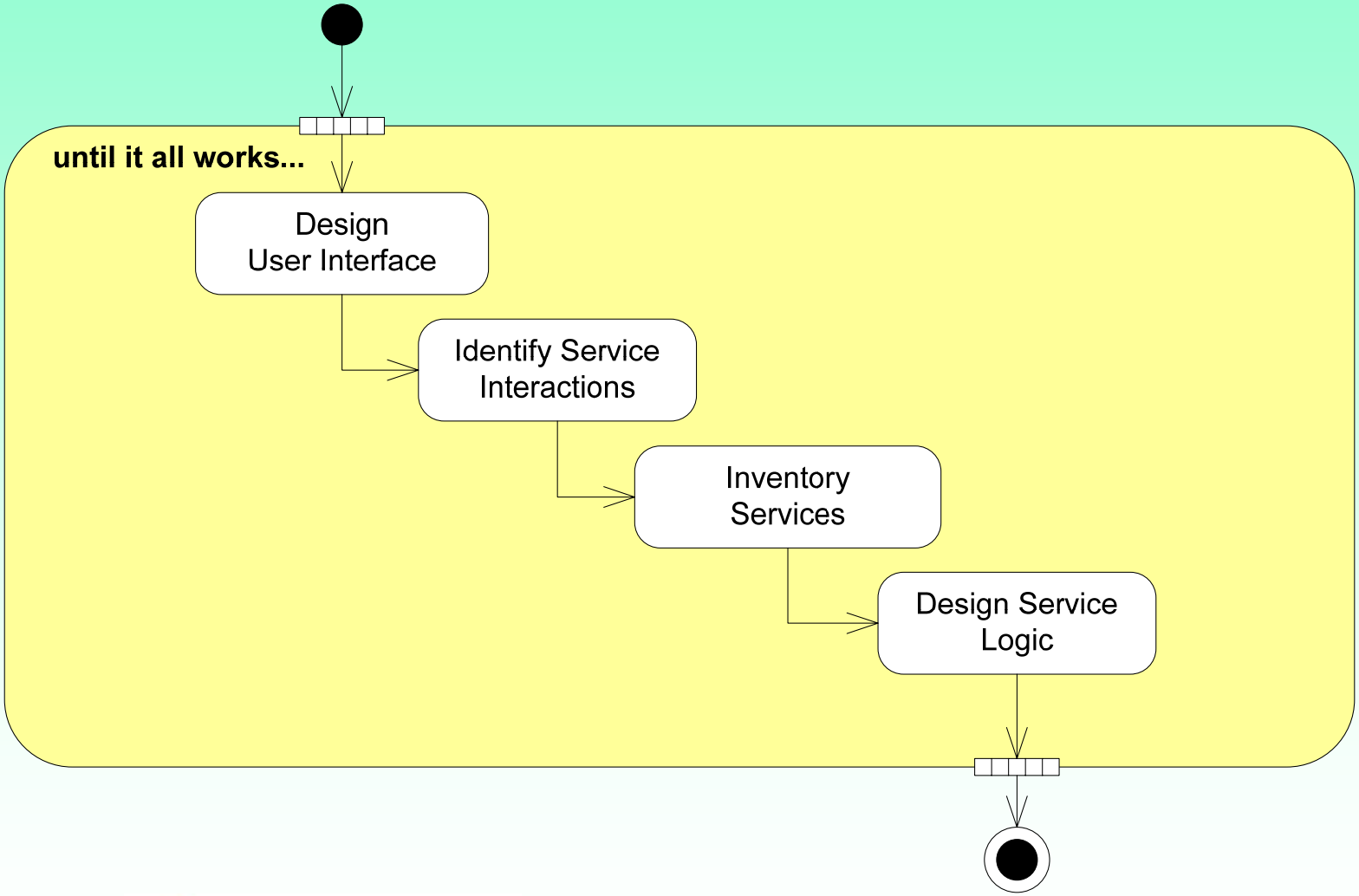
- Must be tool agnostic
- Must be lightweight enough for a rigor-challenged enterprise, but heavyweight enough for success – **"Do only what you must"**
- Must be analysis oriented
- Must be integrated into the design process



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

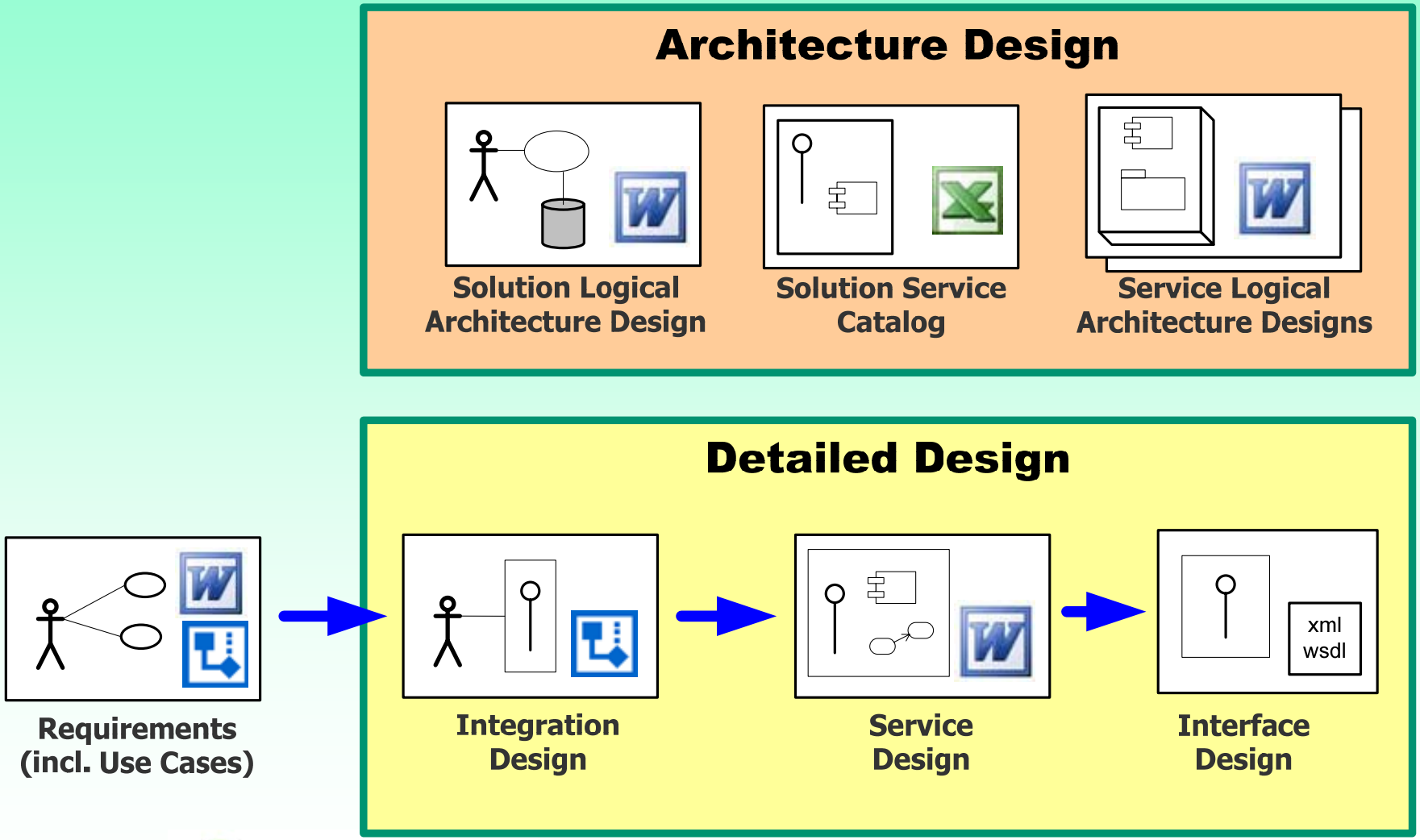
Our Service Design Approach



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Artifacts Roadmap



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

What is UML?

"The Unified Modeling Language (UML) is a general-purpose visual modeling language that is used to specify, visualize, construct, and document the artifacts of a software system."

Rumbaugh, Jacobson, Booch.
The Unified Modeling Language Reference Manual
2nd Edition.

Foundational Tangent

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Why Leverage UML?

- Notation evolved out of 10+ years of refinement
- Industry standard diagramming notation Standards "come with":
  - Books, articles, training, and online guidance
  - Tool adoption and templates
  - Pre-trained resources
  - Market value attached to the skillset

Foundational Tangent

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Why Leverage UML?
(continued)

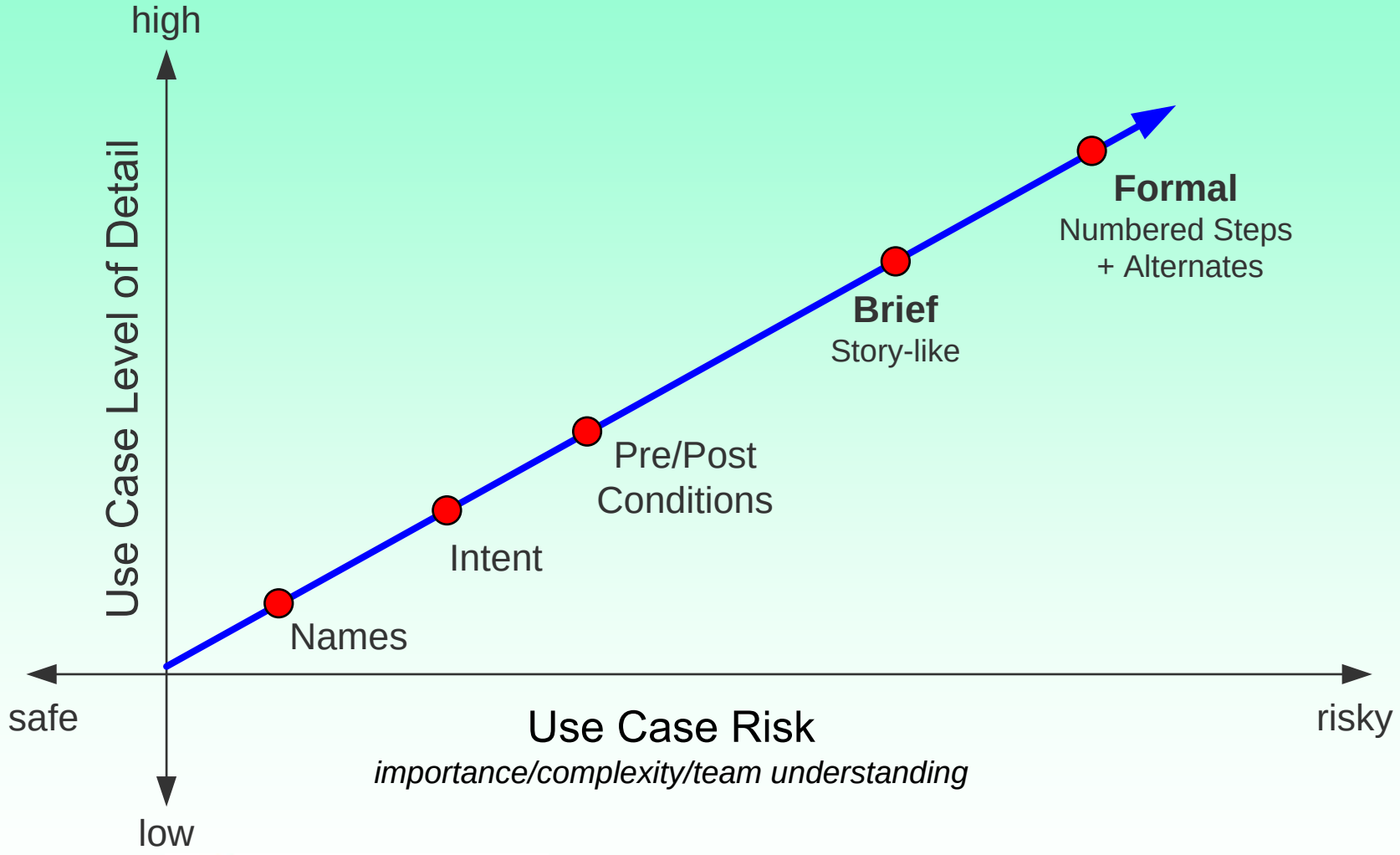
- Precise structure assists with consistency, completeness, and scope
- "Fit for purpose" diagrams force a separation of concerns
- Core notation is simple and consistent – allows a focus on content vs. form

Foundational Tangent

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

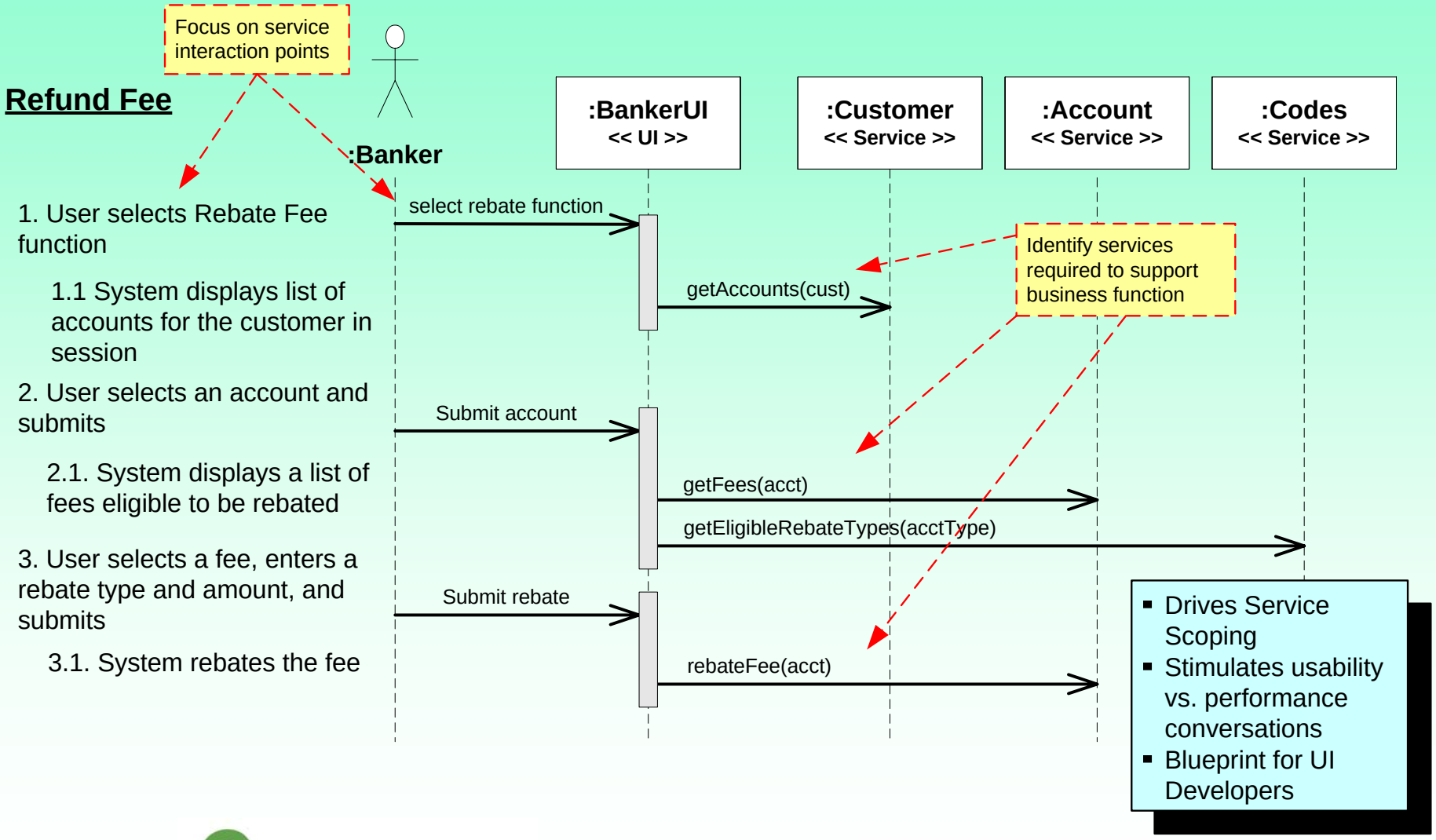
Business Design – Use Cases



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Interaction Design

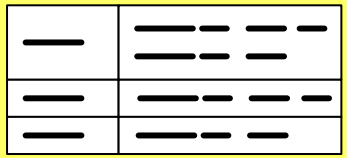


SYSTEMS FLOW INCORPORATED

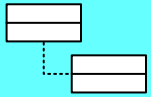
Citizens Financial Group, Inc.™

Service Design

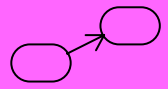
Service Descriptor



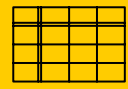
Design Model



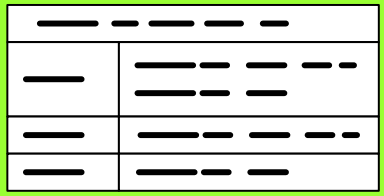
Logic Model



Data Model



Design Decisions



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

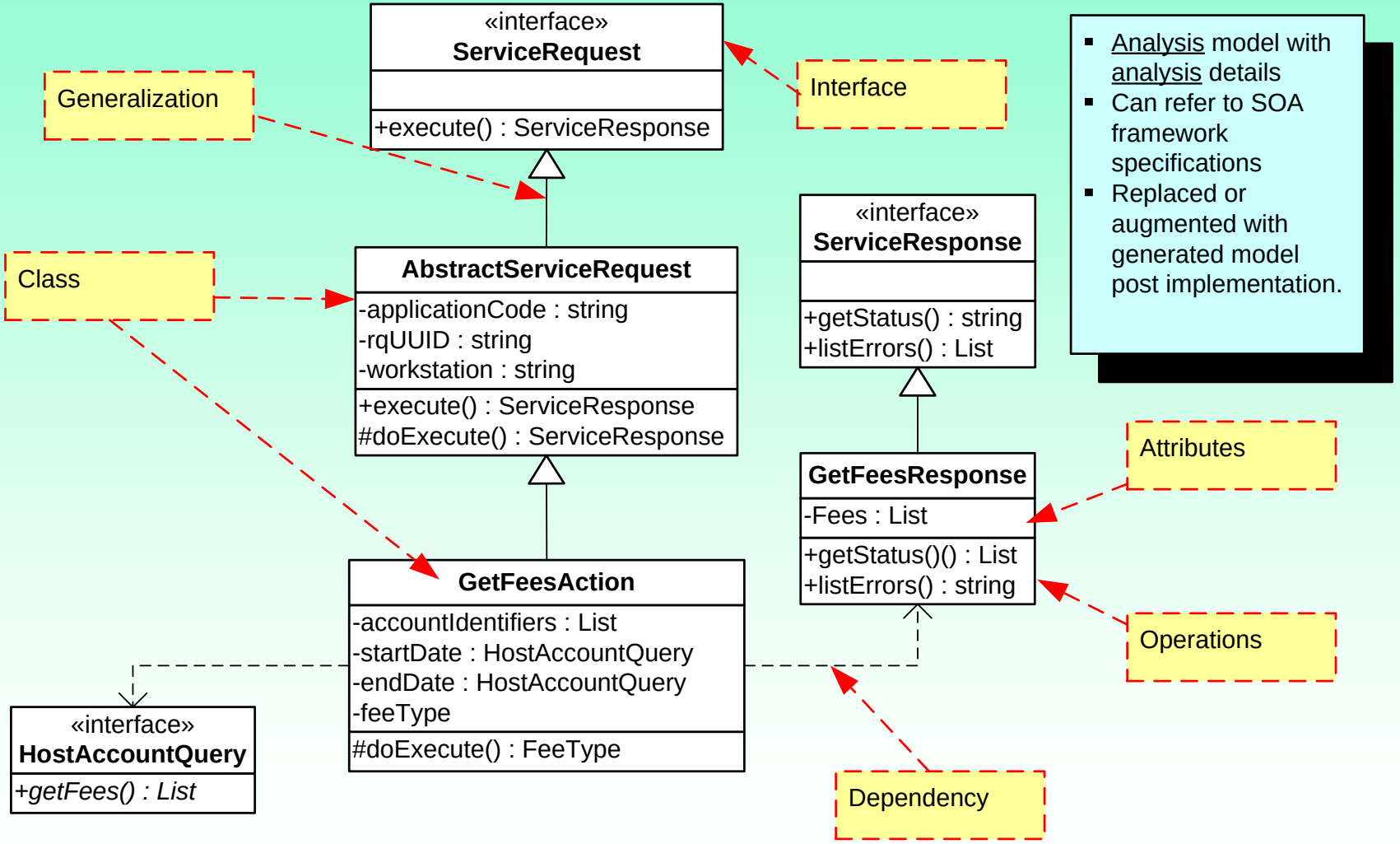
Service Design – Service Descriptor

Intent	Brief description of the goal of the service. *To return all fees associated with one or more accounts belonging to the same customer*
Inputs	High level abstraction of the service inputs. •*One or more Account Identifiers (Type and Number)* •*Fee Date Range* •*Fee Type (optional)*
Outputs	High level abstraction of the service inputs. •*List of Fees with some fee details (including fee type, amount) for each account that was specified*

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

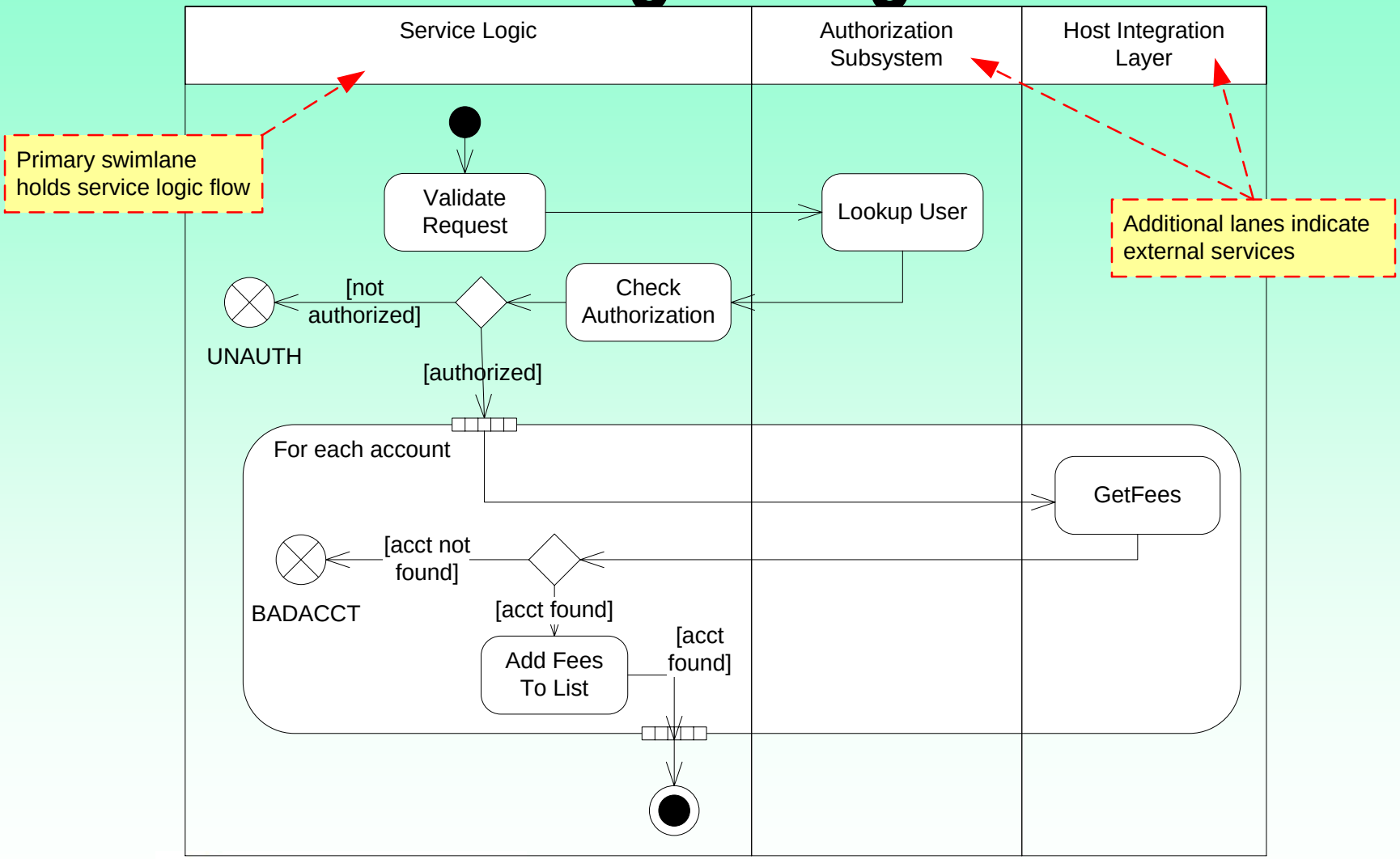
Service Design – Design Model



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

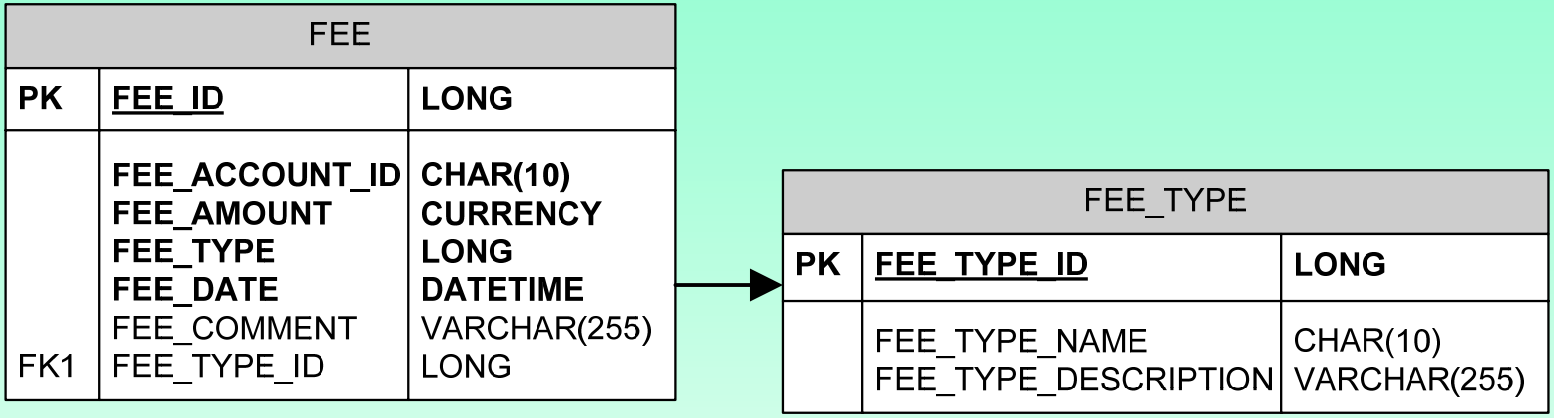
Service Design – Logic Model



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Service Design – Data Model



The data model often references an external published data model.

This section might also contain SQL code, stored procedure code, or references to external stored procedure specifications.

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Service Design – Design Decisions

- Three reasons to include a design decision:
  - A decision is **not obvious** given the scoped content of the document
  - **Analysis or debate** went into arriving at a decision
  - A **tactical decision** is being made and should be highlighted as a tactical choice
- The goal is to minimize narrative documented decisions!

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Service Design – Design Decisions

A decision is stated as a fact. The decision itself is the only thing considered "in scope" for the design. The rest is just supporting information. *e.g. Users will be authorized via a LDAP query to Active Directory*	
Analysis	Every decision includes an analysis section that describes how the decision was determined.
End State	If a decision is tactical, the desired end state is identified if known.
Reasons for not achieving End State	The reasons the end state was not achieved are inventoried.

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Interface Specification

- For XML / MQ services
  - XML Schema
  - WebSphere MQ Request Queue Name
- For SOAP / HTTP Services
  - WSDL file with imported XML Schemas

```
<?xml version="1.0" encoding="UTF-8" ?>
- <definitions xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
    xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
    xmlns:s="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:s0="http://tempuri.org"
    xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
    xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/" targetNamespace="http://tempuri.org"
    xmlns="http://schemas.xmlsoap.org/wsdl/">
  - <types>
    - <s:schema targetNamespace="http://tempuri.org">
        <s:import namespace="http://schemas.xmlsoap.org/soap/encoding/" />
        <s:import namespace="http://schemas.xmlsoap.org/wsdl/" />
      - <s:complexType name="Contact">
        - <s:sequence>
```

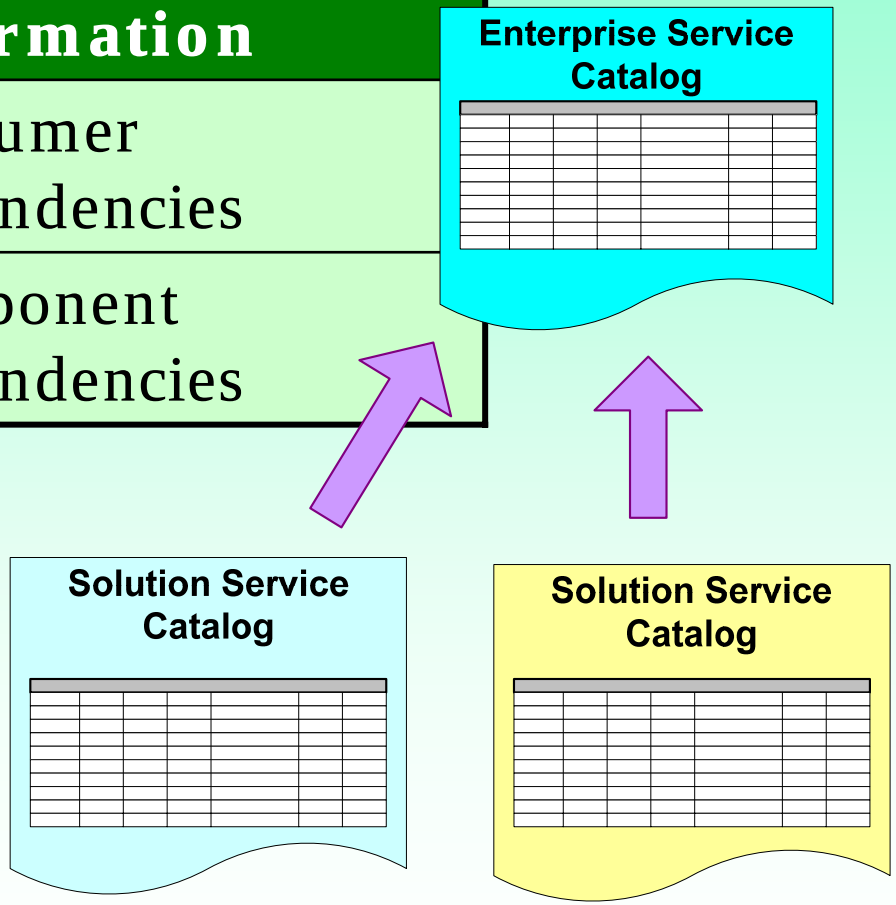

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Service Catalog

Service Information
Unique Identifier
Name
Intent
Interfaces Supported
Implementation Technology
Link to Design Artifacts

Dependency Information
Consumer Dependencies
Component Dependencies



SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Challenge Areas

- Applying specification standards across large projects with external vendors performing design functions
- Getting business line IT departments to document service designs
- Assessing “legacy” need for end-to-end data-mapping documents
- Determining correct level of engagement with application programmers / business analysts in the service design process

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Success Strategy

- Use specifications as an analysis and design tool – the resulting artifacts are useful by-products
- Integrate into the design process
- Create risk-based specifications – limit specification details to minimum required
- Hold training – formal and informal
- Provide templates, guidelines, and samples
- Design review content and form
- Use specification criteria checklist to evaluate 3rd party specifications

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

Questions?

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™

About the Authors

Dan Hughes (dh@sysflow.com) is a principal consultant with Systems Flow, Inc., www.sysflow.com. Systems Flow helps organizations dramatically improve their competitive advantage through the practical, effective application of best practices in enterprise architecture and software development. He is engagement lead at Citizens Bank where he guided the launch of the enterprise architecture practice and is currently lead architect for Citizens Bank's Basel II implementation. Dan has 16 years of software engineering experience spanning a broad range of technologies and techniques. Startup to enterprise, he has launched, managed, and executed all aspects of both product and enterprise life cycle for clients in industries ranging from industrial automation to banking and insurance. He maintains a blog on software engineering at www.xengineering.com.

Graham Williams (graham.williams@citizensbank.com) is a solution architect with 10 years of experience designing, developing, and supporting enterprise technology solutions for the financial services industry. Graham currently works for Citizens Bank, where he leads a team responsible for the integration & services architecture used by multiple customer delivery channels, including the Call Center, Online Banking, and the Branch. He has a B.S. in Chemical Engineering from Oklahoma State University and an Masters in Business Administration from the University of Oklahoma.

SYSTEMS FLOW INCORPORATED

Citizens Financial Group, Inc.™