Rules Based Web Applications Development

Developing a highly dynamic web application for a large bank using rules-based technology

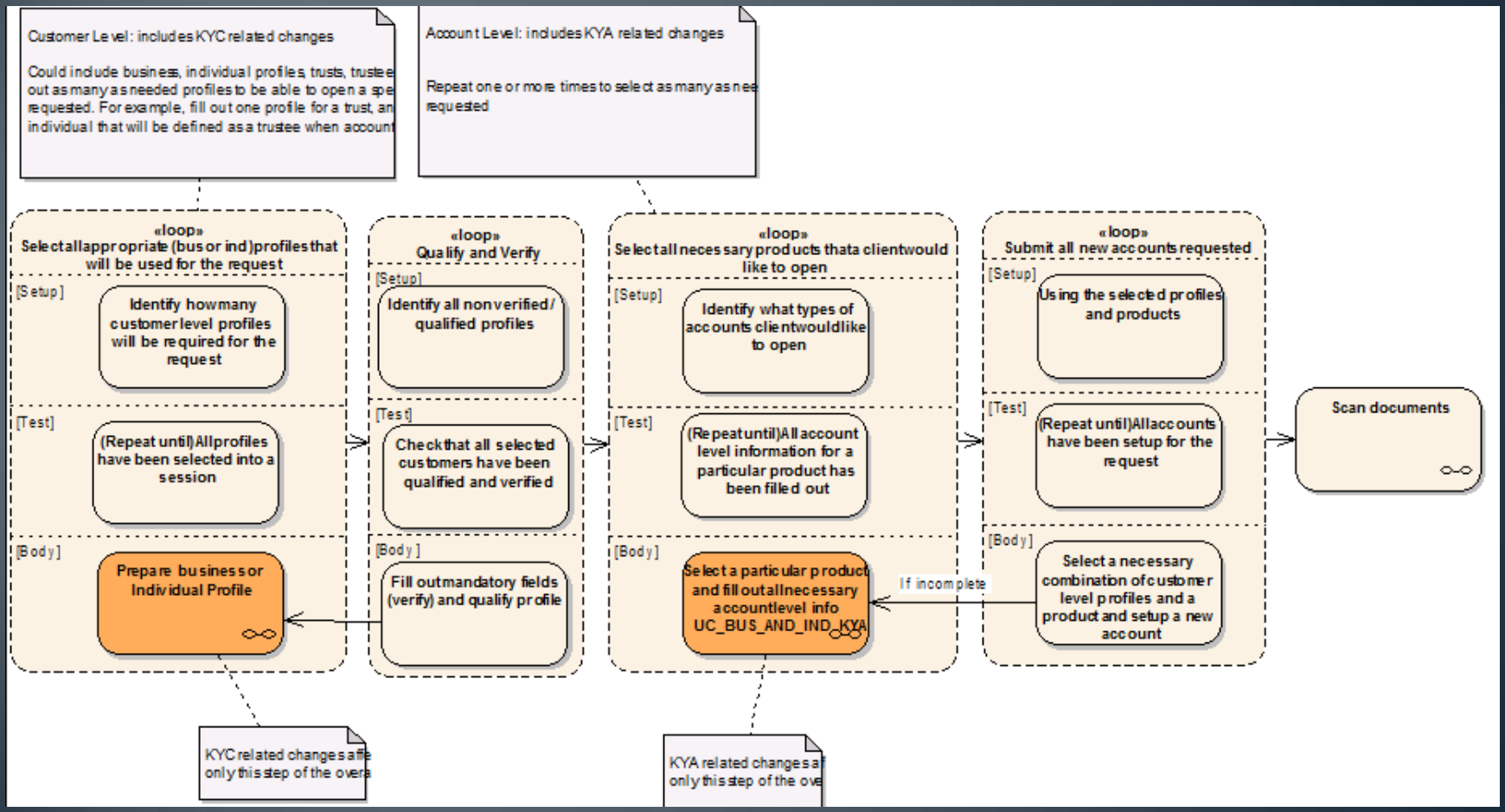
Topics

- Part 1: Requirements and zooming in on a solution
- Part 2: Design and development
- Part 3: Conclusion and lessons learned

Part 1: Requirements and zooming in on a development approach

- Requirements & Reference Architecture
- Changing directions
- Product / Vendor Options
- Selected Product and Reasons Why

As is: the original onboarding Process



New Requirements

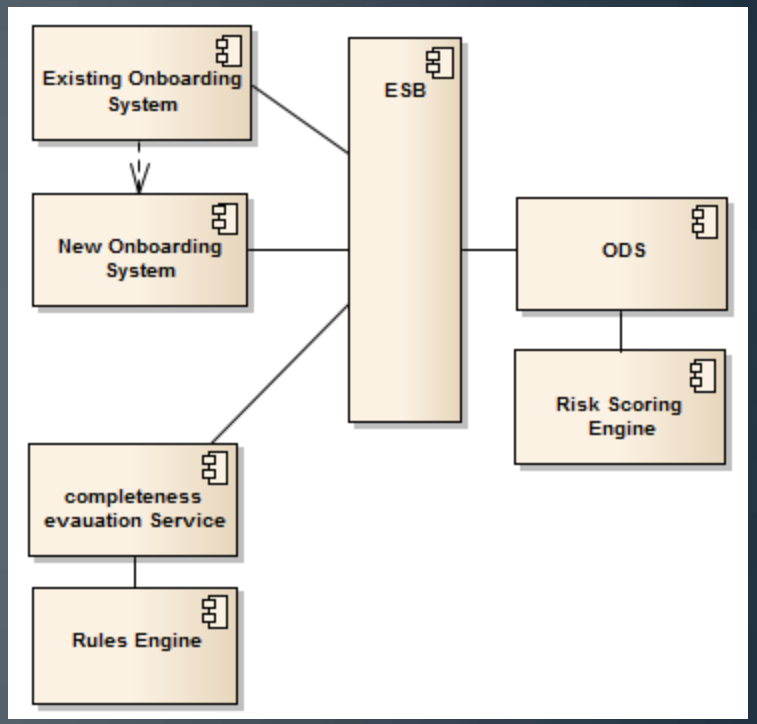
The new onboarding process:

- Has to seamlessly extend current onboarding process (the existing system) including matching UI experience
- Has over 300 new questions to ask depending on customer or account types, planned account activities and previously provided answers.
- Has to implement dynamic flows with overlaying complex UI Interactions:
  - Different UI operating modes
  - Conditional warning messages on many of the user actions.
    - Hard stops
    - Save / cancel behavior
- Not movable Delivery Deadline
  - Facing regulatory sanctions if not delivered.
  - Need to account for lead time needed to develop training materials and provide necessary training in 6000 + branches.

Design & Reference Architecture

The project involves 6 major components and several external vendors and systems:

- Existing onboarding System A (vendor #1)
- New System B used to extent the onboarding System A (vendor #2) that implements vast majority of the new questions / logic / complexity (over 90%).
- ESB / ODS as communication integration hubs / channels for data flow into a Risk Scoring Engine as the final destination (components 2,3 and 4)
- Rules based profile completeness evaluation service
- The new application is a separate application, but has to look and feel exactly like the existing one
- Has to integrate with ESB to receive / pass data.



Original Direction, Setback and looking for a solution

Upon finalizing design, cost and schedule and 3 Months before delivery date - a major set back from vendor #2:

- Some of the "must have" requirements cannot be met.
- Overall cost and schedule is longer than originally estimated

Need to find a solution that will:

- Implement functionality AND Meet all of the must have requirements that the current vendor cannot meet
- Return project back to original cost and schedule

Looking for Options

Based on:

- cheer amount of logic required for the dynamic application to function
- Short project timeline left
- Requirements to use rules engine as one of the components anyways

The call is made to use rules driven UI framework to try to build the new application.

Go/No Go Decision:

- Quick POC to prove that it might be a viable approach:
  - Must have requirements to be implemented as part of the POC
  - Most complex section of the dynamic forms must be implemented as part of the POC

Other Major (must have requirements) for the framework for the Go/No Go decision.

- Robust Rules Management UI – to many to manage otherwise (over a thousand that needs to be built within a few months)
- Cost - there are more than 6000 thousand regular users, so seat licenses or any other complex licensing requirements may impair the project progress
- Dependency on other components, availability of ready to start resources, or inflexible development lifecycle is a MAJOR risk– only 2 months to deliver.

The rules based web frameworks considered:

- Appian
- IBM ILOG
- OpenRules ORD.

Selection of OpenRules ORD

OpenRules Framework was selected based on combination of all factors:

- Cost and Schedule
- A competed POC to prove the ability to meet business the business requirements
- Excel based UI for entering rules
- Simple rules configuration logic
- Simple licensing requirements
- Positive reference checks

Part 2: Design and Development

TOC:

- **Section A:** Running OOTB solution based on templates as a starting point for new application development and structure of typical apps

- **Section B:** Summary of framework and support provided by OpenRules to build the dynamic web applications
  - ORD Templates
  - Data Binding and Special Tags

- **Section C:** Design and Development to specific requirements:
  - Rules based web forms design
  - UI Look and Feel
  - Back End Integration
  - Any Other Customizations

Section A: Running OOTB solution based on templates as a starting point for new application development

Setup of an OOTB Solution based on a Dialog Credit Card App and structure of typical app

- Required Software:
  - Java
  - Tomcat
  - Ant
  - OpenRules libraries (openRules.config)
  - Sample Template: Dialog Credit Card

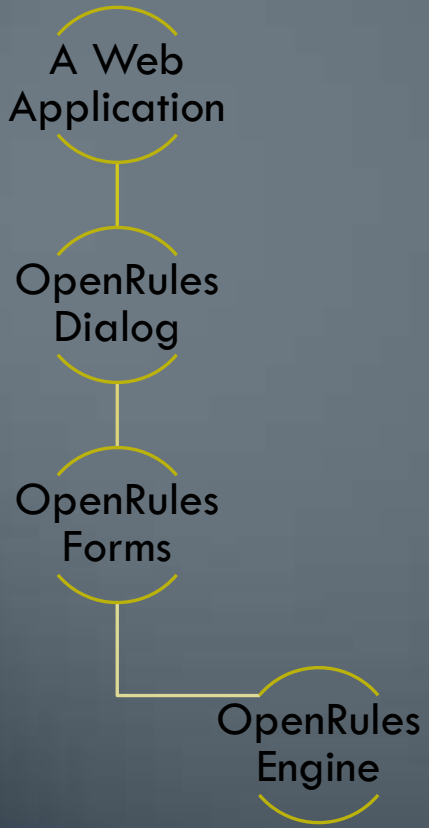
- Demo: Installation and Deployment of a complete OOTB solution
  - Configure deploy settings
  - Start tomcat
  - Run deploy.bat

- Demo: A working dynamic web Application
  - Navigation
  - Dynamic Question / Answers
  - Automated pre-fills based on answers

Section B: Summary of framework and support provided by OpenRules to build the dynamic web applications

Summary of the framework and features provided by OpenRules for building apps

- Summary of the OpenRules based Web Application architecture.

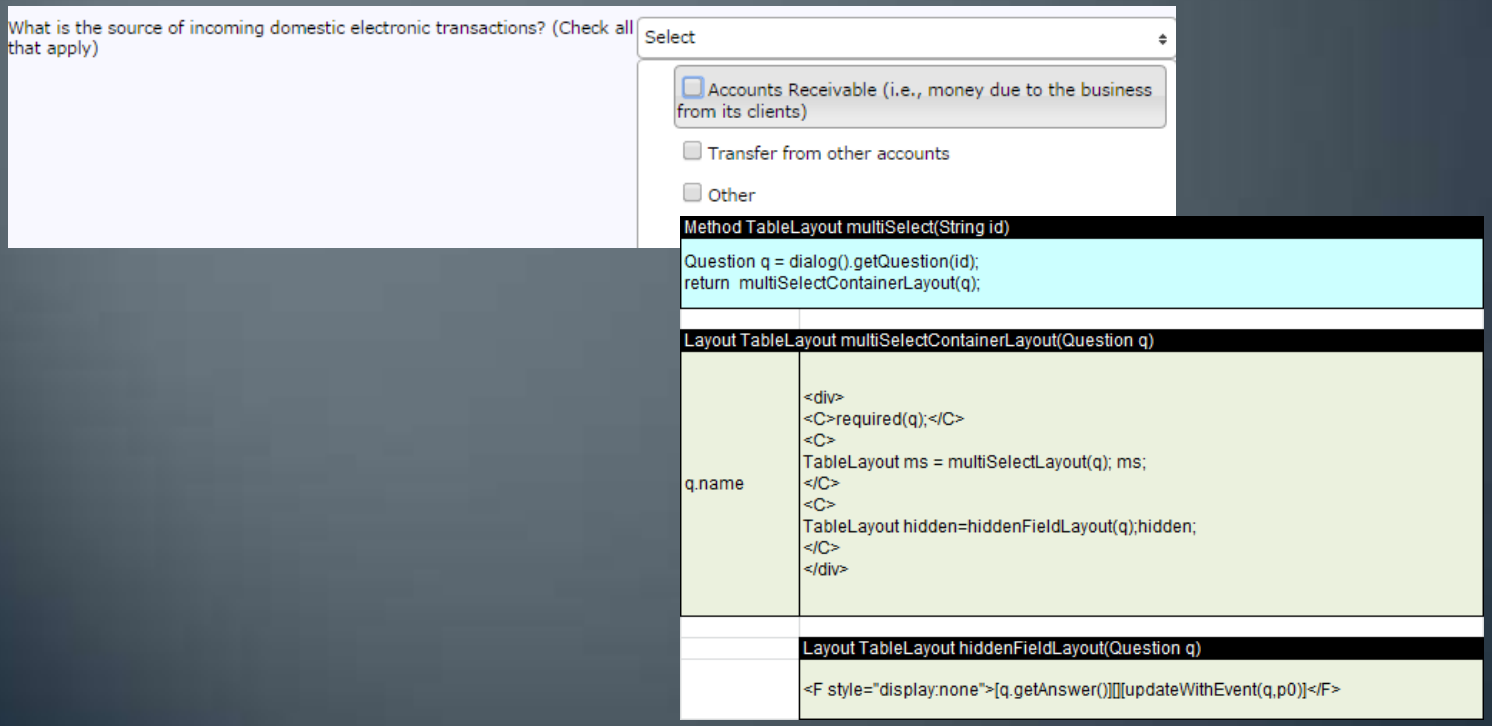


- Demo: Rules for defining structure and dynamic aspects of the web forms (ORD based):
  - Static definition of Pages, Sections, Questions, Answers, Auto-Responses, Custom Controls
  - Dynamic aspects: defining navigation (pages or tabs) templates, hiding/showing sections, questions children of questions, resetting of sections, answers, defining and processing events.

- Underlying Forms Support (Example – Next Page):
  - <F> tag for data binding and actions
  - <C> tag for including any code
  - Layout marker to create any HTML content
  - Method marker to write any java based code right within the excel

Section B: Example of built-in Web Forms Support Features

- Layout marker
  - To create any HTML content
- Method marker
  - To write any java based code right within the excel
- <F> tag
  - Data binding controls
- <C> tag
  - including any code



Section C: Design and Development to specific requirements

Building Your own Dynamic Web Application

TOC:

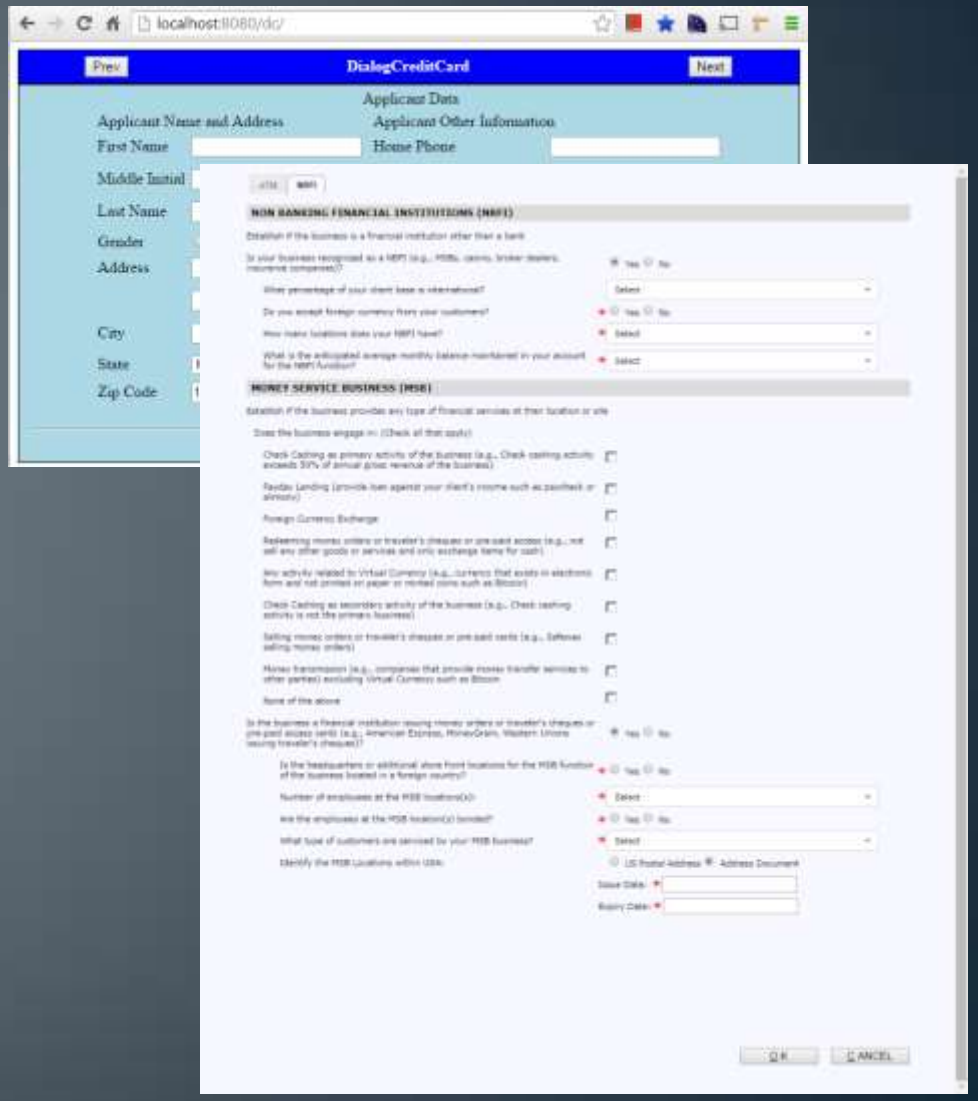
- Extending User Interface: Using HTML / JavaScript / CSS, and OpenRules templates to create reach user interface
  - Using / Modifying default look and feel using css and page, section, question templates
  - Extending existing or building new Question/Answer Templates
  - Adding reach GUI elements and interactions

- Back end integration activities and customizations: building connectors into external systems.
  - Integration with Vendor A
  - Integration with Enterprise Service Bus (ESB)

- Extending default capabilities of ORD.
  - Support for multiple questionnaires in a session
  - Support for ability to copy a portion of answers from another questionnaire in the session
  - Support for tabs rather than pages
  - Adding client / server side logic as per requirements to control conditional actions, modes, hard stops

Extending User Interface: Look and Feel

- Summary:
  - html / css touch up to existing default templates to have a required look and feel
- Example:
  - Appearance made to match the existing requirements
    - Removed regular header and replaced it with tabs
    - Added “Ok / Cancel” Footer
    - Indented parent / child questions
  - Different operating modes (required more work):
    - Prospecting (questions are not required)
    - Required (the same questions become required)



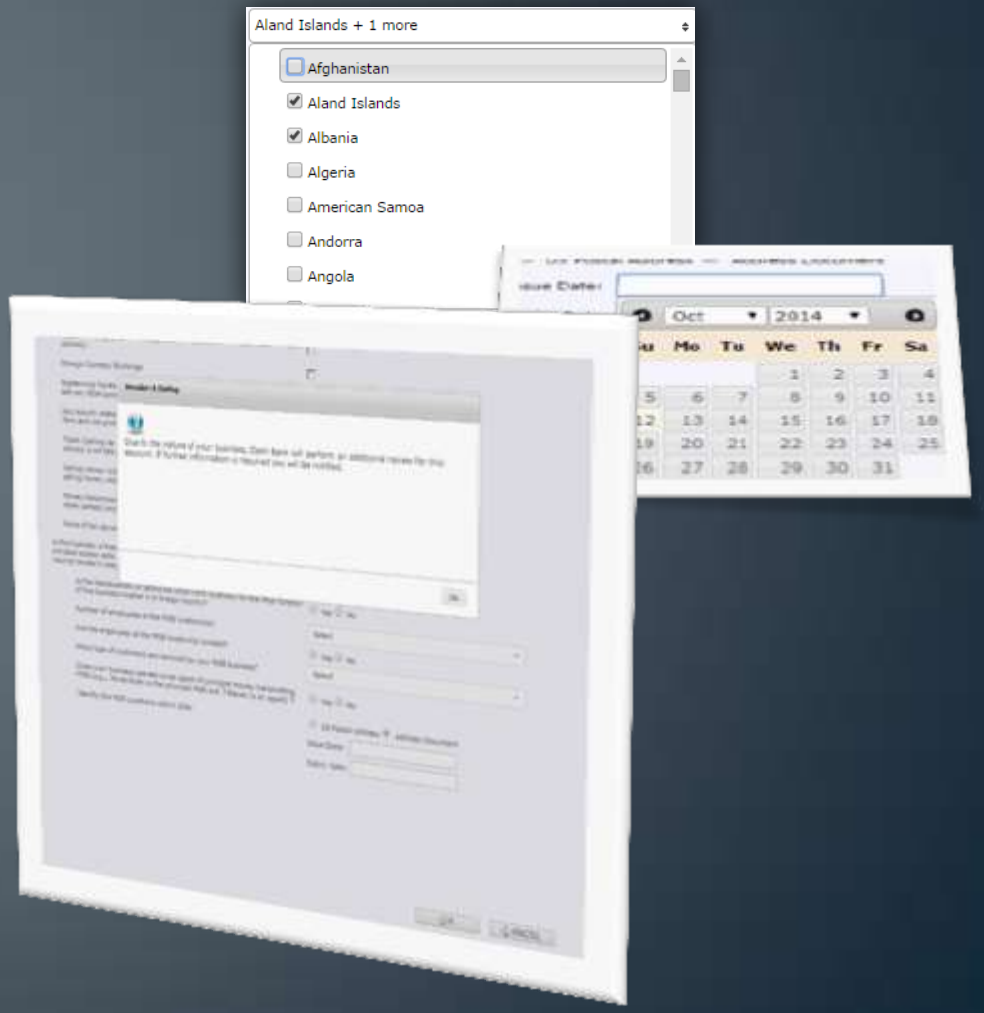
User Interface: Rich GUI Elements

Summary:

- Using more JavaScript, CSS, ORD templates create reach GUI: different type of controls, additional dialog boxes for alerts, confirmations.

Highlights:

- Use ANY js/css frameworks: jquery ui, tw bootstrap, etc.



Example: Extending existing templates

There are dozens of pre-built templates:

- Demo of the question templates
- Demo: extending template as Date Picker:
  - Use existing template (TextBox)
  - Define the hook class in Questions section
  - Configure control behavior in JavaScript


```
setDatePickers : function() {
    $(".question-date").datepicker({
        changeMonth : true,
        changeYear : true,
        yearRange : '1914:2124',
        buttonImage: "calendar.gif",
        onClose: function(dt,obj){
            $(cdd.form).submit();
        }
    }).change(function(){
        cdd.submitForm();
    });
},
```

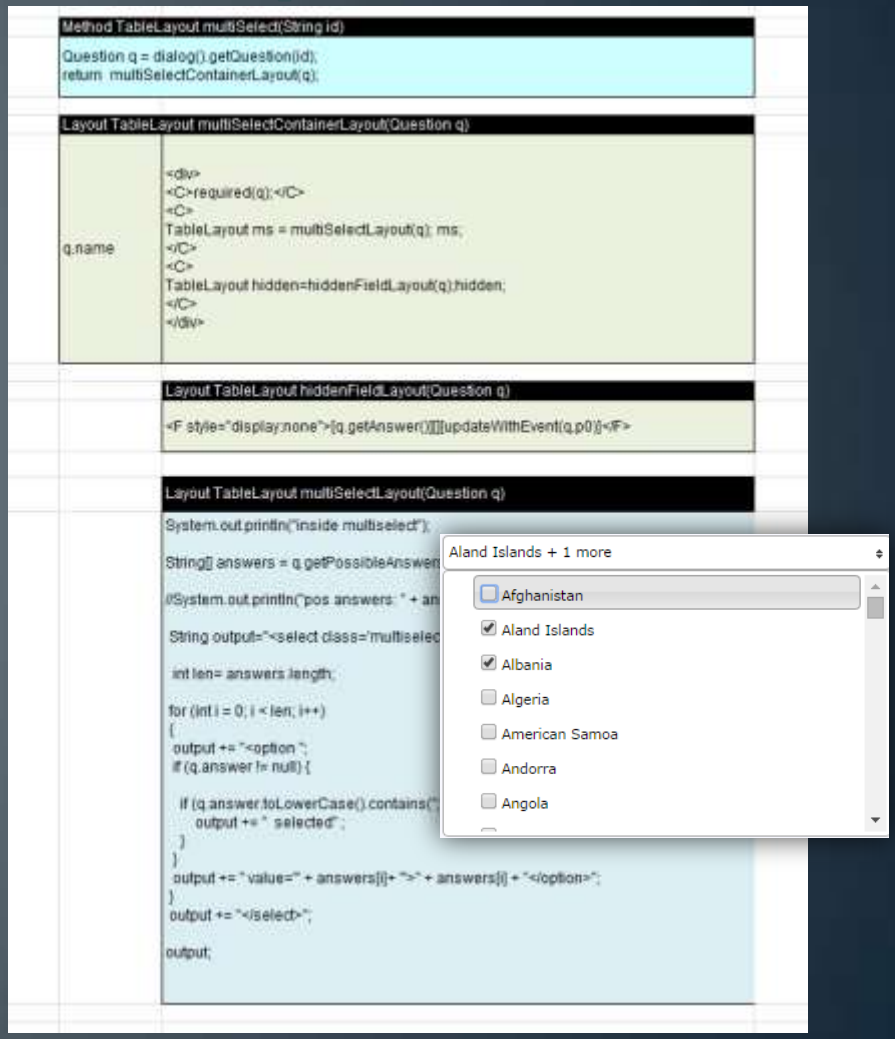
Rules questions extends questionsTemplate

C1	A1					A6	A2			A5
Question Id	Question Name	Question Type	Size	Hidden	Validation	Required	Unique Tag	UI Class: chose one or several separated by a space question-date	Hard Stop if answer is	Parent Question
MSBProgram10	Request training materials:	CheckButton		Yes		Yes	MSB/ComplianceTrainingMaterialsProvided			MSBProgram7
MSBProgram11	Issue Date:	TextBox		Yes		Yes	MSB/ComplianceTrainingMaterials/IssueDt	question-date		MSBProgram10
MSBProgram12	Expiry Date:	TextBox		Yes		Yes	MSB/ComplianceTrainingMaterials/ExpDt	question-date		MSBProgram10
MSBProgram13	Is an independent review performed on your business to monitor your BSA/AML program?	RadioButtonSubmit		Yes		Yes	MSB/ComplianceProgramReviewed			
MSBProgram14	Request date of last review:	TextBox		Yes		Yes	MSB/LastComplianceReviewDt	question-date		MSBProgram13
MSBProgram15	Request examination report (if available):	CheckButton		Yes		Yes	MSB/ExamReportProvided			MSBProgram13

Example: building a completely new Question/Answer Control Template

If not enough, steps to create your own: Multiselect Control example

- Requirements:
  - Ability to select more 1 entry
  - Ability to open / hide sections / questions based on values selected.
- Steps to build
  - Define a new template
  - Call it using configuration
  - Enhance with JS/CSS behavior - just as any other template.



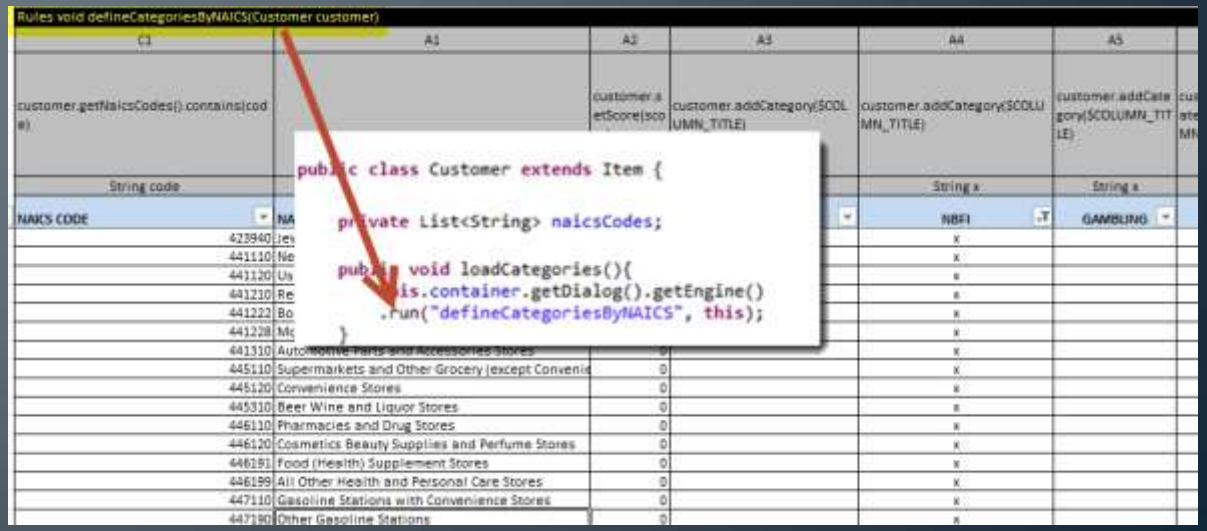
Demo of rules breakdown to support the final structure, flow of the application

- Demo of using rules outside of ORD templates
  - hard Stops, high risk checks, NAICS codes

FYI: Keeping code clean using rules…

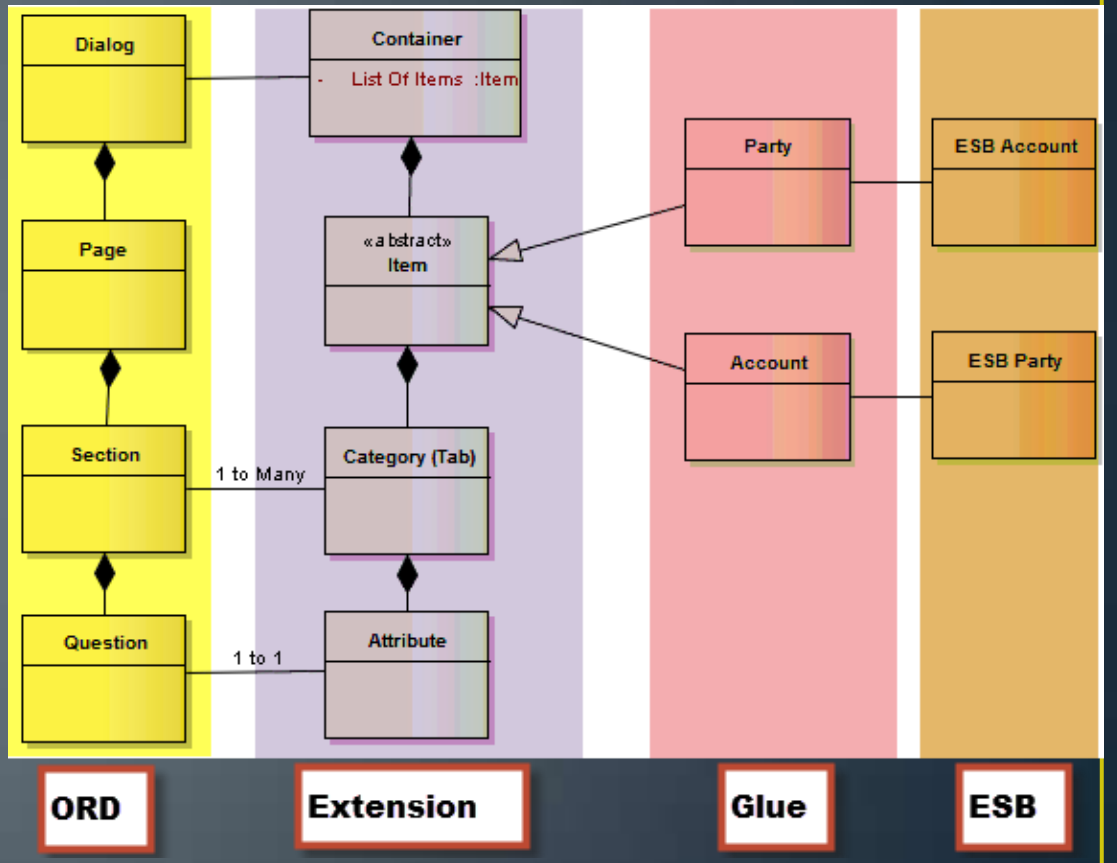
Externalize rules out of java code when possible.

Example/Demo: NAICS categories



Extending default behavior of ORD

- By default ORD handled
  - One object in session at a time
  - Multiple pages but not multiple sections
- Our requirements:
  - Use tabs, not pages
  - Define tabs at run time based on objects loaded
  - Handle different types of objects
  - Handle multiple objects and switch between them on a fly
  - In case of multiple accounts, we should be able to copy information category by category



Conclusions and lessons learned

Conclusion:

- Very powerful yet intuitive rules and template architecture
- Short run / test cycles of building web forms using rules dramatically reduce SDLC
- All rules defined declaratively, externalized out of the application code

Suggestions:

- Consider splitting work into separate but parallel tracks using the OOTB template and independently working on UI, back end integration, structure of the web forms
- Building your rules:
  - Rules become as simple as they look ONLY for minds that are analytical in nature.
  - Have people with analytical mind to understand business requirements and translate them into rules.

Appendix (if time permits)

TOC:

- Demo: building forms for entering more than one row
- Demo: dealing with auto-responses.