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| PGE Logo | |
| Component Specification | |
|  |  |

SCHEMATICS CHANGE DETECTION 1

(Change Source)

Prepared by:

IBM

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| *Revision History* | | | |
| Document # | Date | Author | Summary of Changes |
| Schematics Change DetectionSpecification | 10/30/2013 | Philip Penn | Initial Draft |
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|  |  |  |  |
|  |  |  |  |

## Security Classification

## Retention Requirements

## Document Audience

# Introduction

## Goals and objectives

The purpose of this document is to detail the architecture, configuration, and implementation of custom functionality to be developed by for PG&E ED GIS Asset Management Project. This document covers all the custom components that fall under the Editing General functional group and is required for the implementation of Schematics.

Specifications of each component of the proposed solution are described here and could be used by technical staff to develop the extensions components.

The intended audience includes project leads, technical leads and technical staff such as programmers/developers.

## Referenced documents

| Title | Source | Type | Date | Revision |
| --- | --- | --- | --- | --- |
| Schematics\_Maintenance\_Component\_Specification.docx | IBM | Word |  | 1.0 |
| Change Detection Functional and Technical Design EDGIS.xls | IBM | Word |  | 1.0 |
| Schematic\_Functional\_Specification\_V3.1.docx | IBM | Word |  | 3.1 |

## Business Requirements

Implements the following requirements:

| Requirement | ID | Notes | Source |
| --- | --- | --- | --- |
| The solution shall ensure that when the geospatial placement of a feature(s) is changed in the ED Default DB, a session will be created in the Schematic Editor Work Queue and a Schematic Update Polygon (SUP) around the feature(s) will be created. | SCHEM0003 | This document covers enabling Change Detection to use Session IDs |  |

## Statement of scope

### In – Scope

This document covers only the publishing (change source) side of Schematics Change Detection.

### Out of scope

This document does not cover the subscriber (change consumer) side of Schematics Change Detection. That will be covered in Schematics\_ChangeDetection\_2\_EDER\_Component\_Specification.docx.

## Software context

This section defines the software requirements for implementing the custom extensions with specific version numbers. The software requirements are

ArcFM 10.0.3

ArcGIS 10 SP3

.Net 3.5

Oracle 11g

The development of custom components will be carried out using C# as the programming language.

## Major assumptions

* The components are designed to work in ArcMap and ArcFM.
* The converted data must be consistent with and will adhere to all the label text rules that are specified in this document.

# Component Design

**DataCondition Level (DatCon)**

Components often fit into a larger context of data integrity and data validation. The concept of DatCon is meant to illustrate a point in the editing process at which time a components can be executed and perform some sort of data integrity check: auto-populate fields, verify data conditions, final verification, follow-up reporting of data conditions. The following is a brief description of the various working DatCon levels.

1. **DatCon 1:** This is the first opportunity to provide data integrity checks in the ArcFM environment. Typically, these components are written as ArcFM Autoupdaters and are executed in response to user edit events. OnCreate, OnUpdate, or OnDelete are the events that are typically used. Here the component can auto-populate fields or provide first defense data integrity checks which can optionally cancel any critical violations of data integrity.
2. **DatCon 2:** Data integrity checks are executed any time during a typical edit session. They can be executed immediately before completion of a job, or multiple times over multiple days in the lifecycle of a job. Here, components are typically written as ArcFM Validation Rules. Data integrity checks in this category are not as critical and can be allowed to exist until the user fixes them.
3. **DatCon 3:** Data integrity checks at this level are executed prior to submitting the job for posting to the default version. These checks are typically written as ArcFM Validation Rules and are executed manually by a QA/QC Officer before they are posted. Optionally, additional ArcFM Products can prevent jobs from posting to the default version if there are any violations that are not manually corrected by the QA/QC Officer.
4. **DatCon 4:** Finally, ad-hoc reports can be executed at any time against any subset of the database in order to further verify and check for data integrity errors. These components are typically ArcFM Validation Rules, but can also be custom rules executed as part of a stand-alone application or database query. These errors are not typically critical as they can exist in the database indefinitely and can be corrected at any time during an actual job or simply in an ad-hoc session.

## Change Detection High Level Design

Change Detection processes deltas between the default view/version of the database at timed intervals.

It is configured to decouple data sources (publishers) from consumers (subscribers).



Schematics requires more than just the Inserts/Updates/Deletes. It requires the changes to be grouped by Session.

## Schematics Change Detection Publishing

In order to support grouping edits by Session, an AU/Field/Table approach has been adopted.

For each Schematics-aware featureclass, an edit AU will be applied to record session information to a SessionName attribute for inserts/updates and a SessionDeletes table for deletes.

### Insert/Update Workflow

Each Schematics-aware featureclass will have the VersionName recorded against it. The Default view will show the most recently posted version.



### Delete Workflow

Deletes cannot be stored as a field and so will be recorded in a separate table:



It will be the subscriber’s responsibility to remove processed deletes.

## PGE Record Version AU

**Name**: PGE Record Version AU

**Enabled**: EDSCHEM\_CHANGEDETECTION modelname has been assigned

**Purpose**: A single AU, “PGE Record Version”, will be created to handle both insert/update and delete workflows.

### Pseudocode

If Edit is an Insert/Update Then

Update the VersionName field with the current version

Else

Insert a new row into the Version Deletes table

End If

### Class Model

The AU will be a façade into the RecordVersionChange class. This class will have the RecordDelete() and RecordInsertUpdate() methods.



### Configuration

#### New Class Model Names

|  |
| --- |
| ***Model Name*** |
| PGE\_ EDSCHEM\_CHANGEDETECTION |
| PGE\_ EDSCHEM\_VERSIONDELETEPOINT |
| PGE\_EDSCHEM\_VERSIONDELETELINE |

#### New Field Model Names

|  |
| --- |
| ***Model Name*** |
| PGE\_VERSIONNAME |

#### Class Model Name Assignment

|  |  |
| --- | --- |
| ***Object Class*** | ***Model Name*** |
| CapacitorBank | PGE\_ EDSCHEM\_CHANGEDETECTION |
| DeviceGroup | PGE\_ EDSCHEM\_CHANGEDETECTION |
| DistBusBar | PGE\_ EDSCHEM\_CHANGEDETECTION |
| DynamicProtectiveDevice | PGE\_ EDSCHEM\_CHANGEDETECTION |
| ElectricStitchPoint | PGE\_ EDSCHEM\_CHANGEDETECTION |
| FaultIndicator | PGE\_ EDSCHEM\_CHANGEDETECTION |
| Fuse | PGE\_ EDSCHEM\_CHANGEDETECTION |
| OpenPoint | PGE\_ EDSCHEM\_CHANGEDETECTION |
| PrimaryGeneration | PGE\_ EDSCHEM\_CHANGEDETECTION |
| PrimaryRiser | PGE\_ EDSCHEM\_CHANGEDETECTION |
| PriOHConductor | PGE\_ EDSCHEM\_CHANGEDETECTION |
| PriUGConductor | PGE\_ EDSCHEM\_CHANGEDETECTION |
| Switch | PGE\_ EDSCHEM\_CHANGEDETECTION |
| Tie | PGE\_ EDSCHEM\_CHANGEDETECTION |
| Transformer | PGE\_ EDSCHEM\_CHANGEDETECTION |
| VoltageRegulator | PGE\_ EDSCHEM\_CHANGEDETECTION |
| PGE\_VERSIONDELETEPOINT | PGE\_ EDSCHEM\_VERSIONDELETEPOINT |
| PGE\_VERSIONDELETELINE | PGE\_ EDSCHEM\_VERSIONDELETELINE |

#### Field Model Name Assignment

|  |  |  |
| --- | --- | --- |
| ***Object Class*** | ***Field Name*** | ***Model Name*** |
| CapacitorBank | VERSIONNAME | PGE\_VERSIONNAME |
| DeviceGroup | VERSIONNAME | PGE\_VERSIONNAME |
| DistBusBar | VERSIONNAME | PGE\_VERSIONNAME |
| DynamicProtectiveDevice | VERSIONNAME | PGE\_VERSIONNAME |
| ElectricStitchPoint | VERSIONNAME | PGE\_VERSIONNAME |
| FaultIndicator | VERSIONNAME | PGE\_VERSIONNAME |
| Fuse | VERSIONNAME | PGE\_VERSIONNAME |
| OpenPoint | VERSIONNAME | PGE\_VERSIONNAME |
| PrimaryGeneration | VERSIONNAME | PGE\_VERSIONNAME |
| PrimaryRiser | VERSIONNAME | PGE\_VERSIONNAME |
| PriOHConductor | VERSIONNAME | PGE\_VERSIONNAME |
| PriUGConductor | VERSIONNAME | PGE\_VERSIONNAME |
| Switch | VERSIONNAME | PGE\_VERSIONNAME |
| Tie | VERSIONNAME | PGE\_VERSIONNAME |
| Transformer | VERSIONNAME | PGE\_VERSIONNAME |
| VoltageRegulator | VERSIONNAME | PGE\_VERSIONNAME |

#### PGE Record Version AU Assignment

|  |  |  |  |
| --- | --- | --- | --- |
| ***Object Class*** | ***On Create*** | ***On Update*** | ***On Delete*** |
| CapacitorBank | Yes | Yes | Yes |
| DeviceGroup | Yes | Yes | Yes |
| DistBusBar | Yes | Yes | Yes |
| DynamicProtectiveDevice | Yes | Yes | Yes |
| ElectricStitchPoint | Yes | Yes | Yes |
| FaultIndicator | Yes | Yes | Yes |
| Fuse | Yes | Yes | Yes |
| OpenPoint | Yes | Yes | Yes |
| PrimaryGeneration | Yes | Yes | Yes |
| PrimaryRiser | Yes | Yes | Yes |
| PriOHConductor | Yes | Yes | Yes |
| PriUGConductor | Yes | Yes | Yes |
| Switch | Yes | Yes | Yes |
| Tie | Yes | Yes | Yes |
| Transformer | Yes | Yes | Yes |
| VoltageRegulator | Yes | Yes | Yes |

#### Restrictions / limitations

#### Performance issues

#### Assumptions

1. The database table for the deletes will have to have WRITE permissions to the users.

# Data Design

## Datamodel Changes

### Field Changes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Object Class Name*** | ***Action*** | ***FieldName*** | ***Datatype(Length)*** | ***Domain*** | ***Action*** |
| CapacitorBank | Modify | VersionName | Text(64) |  | Add |
| DeviceGroup | Modify | VersionName | Text(64) |  | Add |
| DynamicProtectiveDevice | Modify | VersionName | Text(64) |  | Add |
| DistBusBar | Modify | VersionName | Text(64) |  | Add |
| ElectricStitchPoint | Modify | VersionName | Text(64) |  | Add |
| FaultIndicator | Modify | VersionName | Text(64) |  | Add |
| Fuse | Modify | VersionName | Text(64) |  | Add |
| OpenPoint | Modify | VersionName | Text(64) |  | Add |
| PrimaryGeneration | Modify | VersionName | Text(64) |  | Add |
| PrimaryRiser | Modify | VersionName | Text(64) |  | Add |
| PriOHConductor | Modify | VersionName | Text(64) |  | Add |
| PriUGConductor | Modify | VersionName | Text(64) |  | Add |
| Switch | Modify | VersionName | Text(64) |  | Add |
| Tie | Modify | VersionName | Text(64) |  | Add |
| Transformer | Modify | VersionName | Text(64) |  | Add |
| VoltageRegulator | Modify | VersionName | Text(64) |  | Add |

### Object Class Changes

Two versioned feature classes, PGE\_VERSIONDELETEPOINT and PGE\_VERSIONDELETELINE are to be created:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***FeatureclassName*** | ***PGE\_VERSIONDELETEPOINT*** | | | | |
| ***FieldName*** |  | ***Nullable*** | ***Datatype(Length)*** | ***Domain*** | ***Comment*** |
| OBJECTID |  | No | Long Integer |  | Automatic |
| FEATURECLASSID |  | No | Long Integer |  |  |
| FEATUREGUID |  | No | Guid |  |  |
| VERSIONNAME |  | No | Text(64) |  | Index |
| DATEDELETED |  | No | Date |  |  |
| SHAPE |  | No | Geometry |  | Point |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***FeatureclassName*** | ***PGE\_VERSIONDELETELINE*** | | | | |
| ***FieldName*** |  | ***Nullable*** | ***Datatype(Length)*** | ***Domain*** | ***Comment*** |
| OBJECTID |  | No | Long Integer |  | Automatic |
| FEATURECLASSID |  | No | Long Integer |  |  |
| FEATUREGUID |  | No | Guid |  |  |
| VERSIONNAME |  | No | Text(64) |  | Index |
| DATEDELETED |  | No | Date |  |  |
| SHAPE |  | No | Geometry |  | Line |

## Error Handling

Log4Net will be used for standard error handling.

### Error: Unable to Write to Delete Feature Class

Resolution: Verify that the model names are assigned properly.

# Unit Test

The purpose of the unit test is to indicate the methodology to use in order to accomplish a test of the functionality that would mimic real world use by PG&E.

Insert Test

1. Start an Edit Session in a named (non-Default) version e.g. EDGIS.SN\_12345
2. Add a Schematics-aware feature
3. Ensure that the VersionName attribute has been set to the name of the version.

Update Test

1. Start an Edit Session in a named (non-Default) version e.g. EDGIS.SN\_12345
2. Edit a Schematics-aware feature
3. Ensure that the VersionName attribute has been set to the name of the version.

Repeat these tests for editing SDE.DEFAULT version and ensure that that version is recorded.

Delete Test (Point)

1. Start an Edit Session in a named (non-Default) version e.g. EDGIS.SN\_12345
2. Delete a Schematics-aware feature (point)
3. Ensure that the feature is copied to the Version Delete Point table with appropriate information

Delete Test (Line)

1. Start an Edit Session in a named (non-Default) version e.g. EDGIS.SN\_12345
2. Delete a Schematics-aware feature (point)
3. Ensure that the feature is copied to the Version Delete Point table with appropriate information

# User interface design

## UI

There is no UI associated with this functionality. All processes are internal to the application and require no user interaction.

# Security

## Security Matrix

Data Sensitivity Levels

|  |  |  |  |
| --- | --- | --- | --- |
| **Sensitivity Level** | **Rating** | **Description** | **Example** |
| 4 | Critical | Any Information where an unauthorized disclosure to unintended recipients could result in financial loss, loss of life, damage to company reputation, or cause significant risks | Customer Information under SB1386, confidential databases, trade secrets, inventions, financial reports prior to release. |
| 3 | High | Any Information that, if disclosed to or modified by unauthorized individuals, might result in the risk of significant loss, significant productivity loss, or significant embarrassment to PG&E | Non-administrative passwords, customer Information, shareholder Information, labor and employee relations data |
| 2 | Medium | Information which does not meet the risk criteria for higher Sensitivity levels and, If disclosed or modified by unauthorized individuals, might result in the risk of some monetary loss, some productivity loss or some embarrassment to PG&E. Sensitivity Level 2 information is often collected for internal use. | Corporate Policies, directories of employee information, organizational charts, contracts (unless otherwise classified) |
| 1 | Low | Anything produced for Public review. At this level any disclosures could reasonably expect not to have an adverse affect. Unintentional alteration or destruction is the primary concern for Sensitivity Level 1 information. | Public information on [www.pge.com](http://www.pge.com) public news releases |

|  |  |
| --- | --- |
| **Security** | **Usage** |
| Data Privacy Level |  |
| Activity Performed |  |
| GIS Application Security |  |