

Susan Hert, Senior Software Engineer

# Business Process Workflows

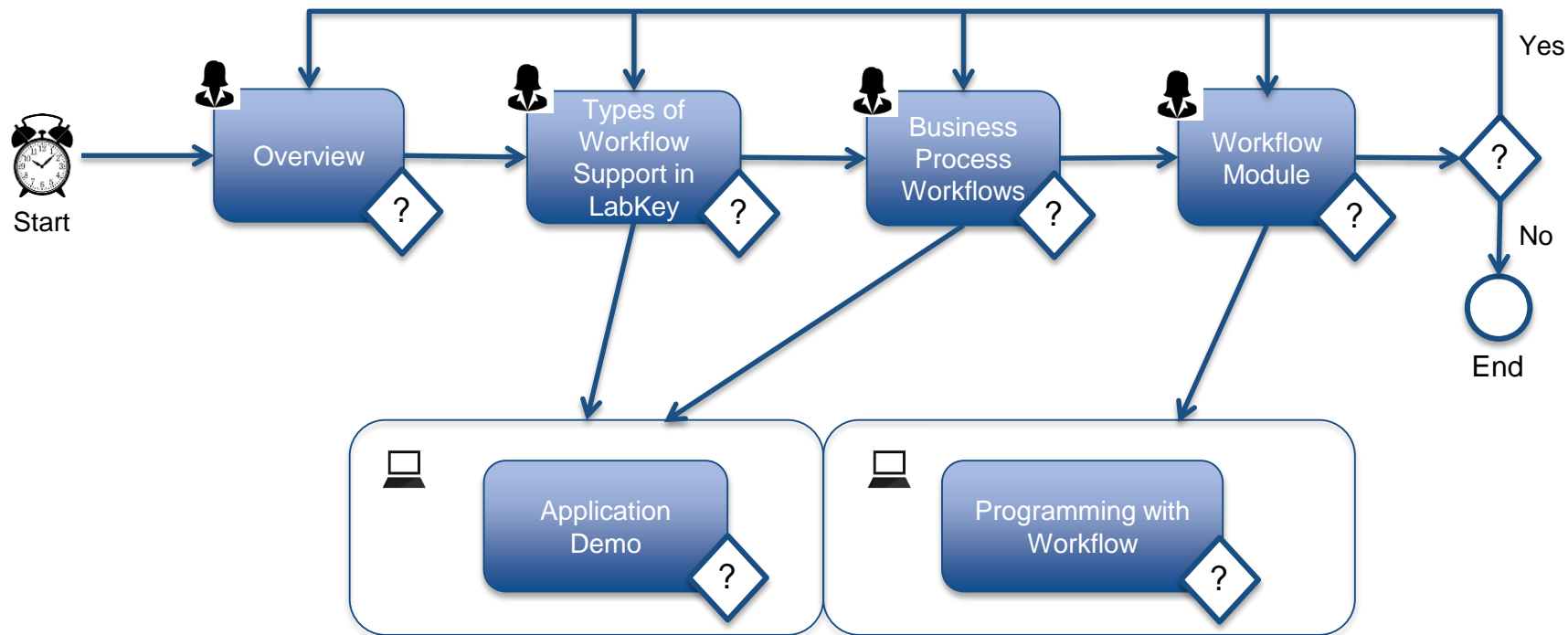


# Goals

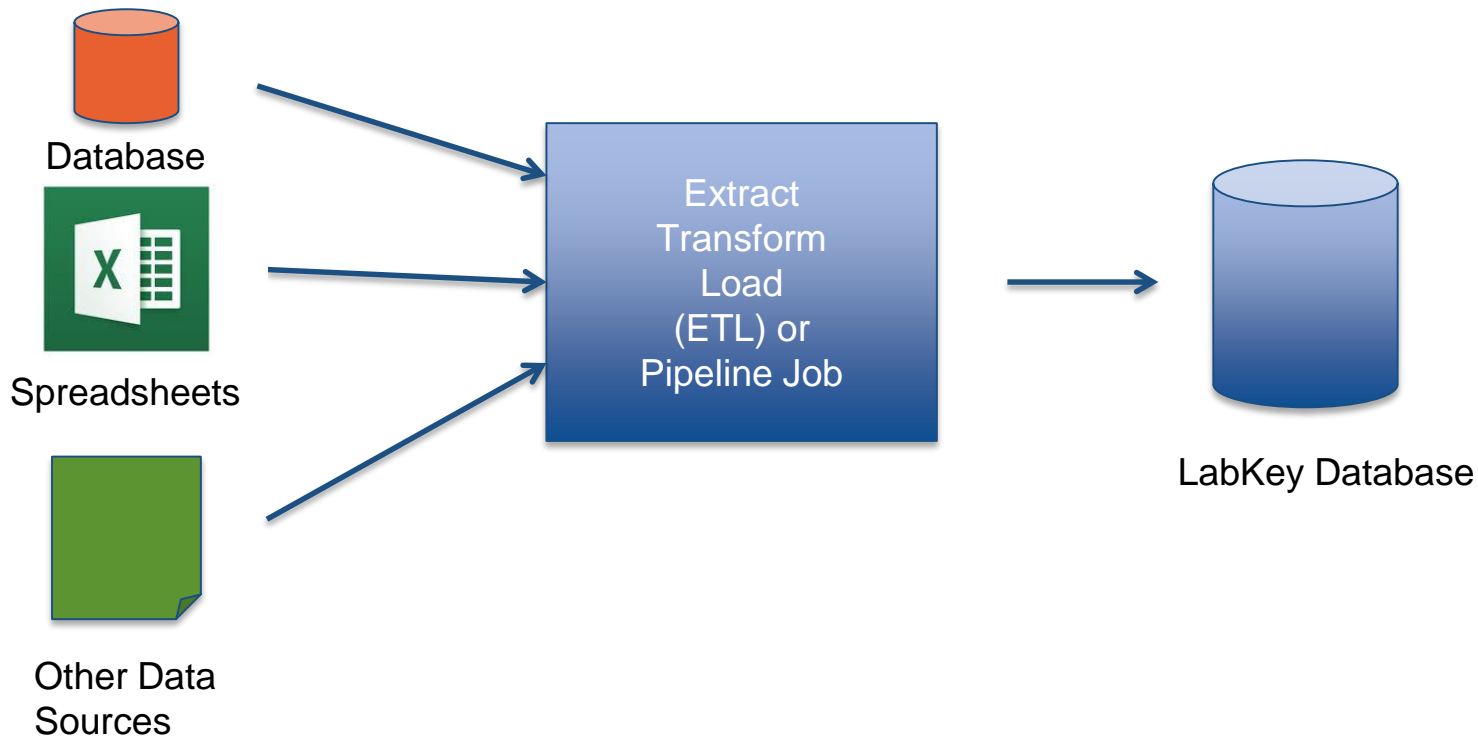


- **Which type(s) of LabKey workflow do you need?**
- **How do you begin programming with the workflow module?**

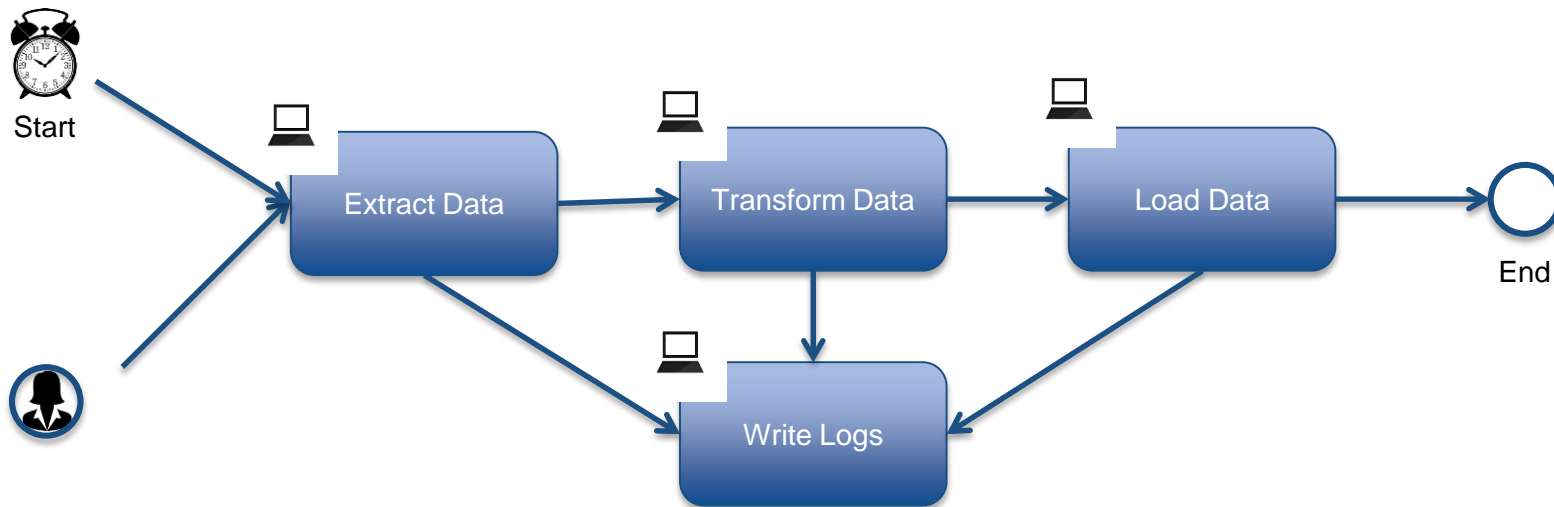
# Overview



# Data Integration & Pipeline



# Data Integration

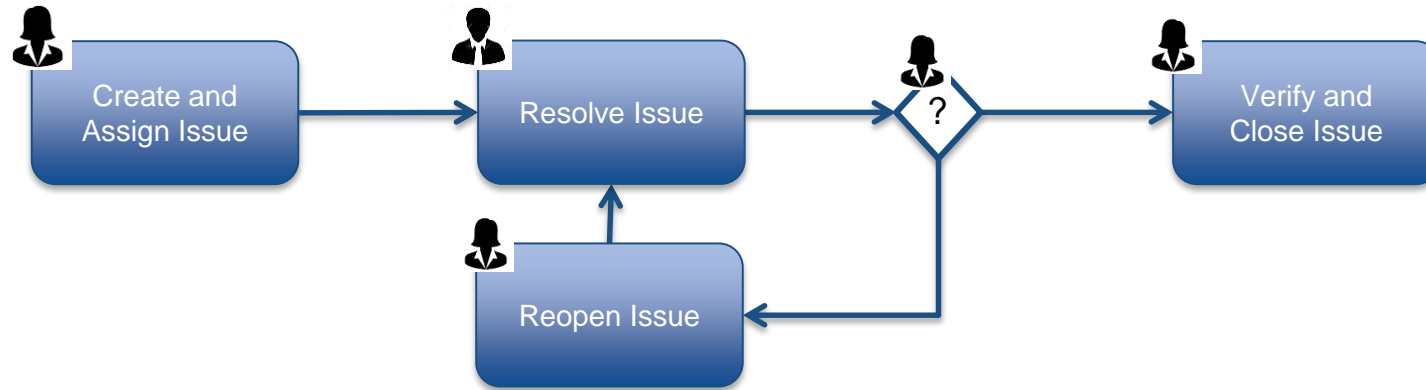


# Data Integration & Pipeline Jobs



- **For data workflow**
- **For long-running, complex processing**
- **Normalize data from different systems**
- **Move data in scheduled increments**
- **Log and audit migration processes**

# Issue Tracker



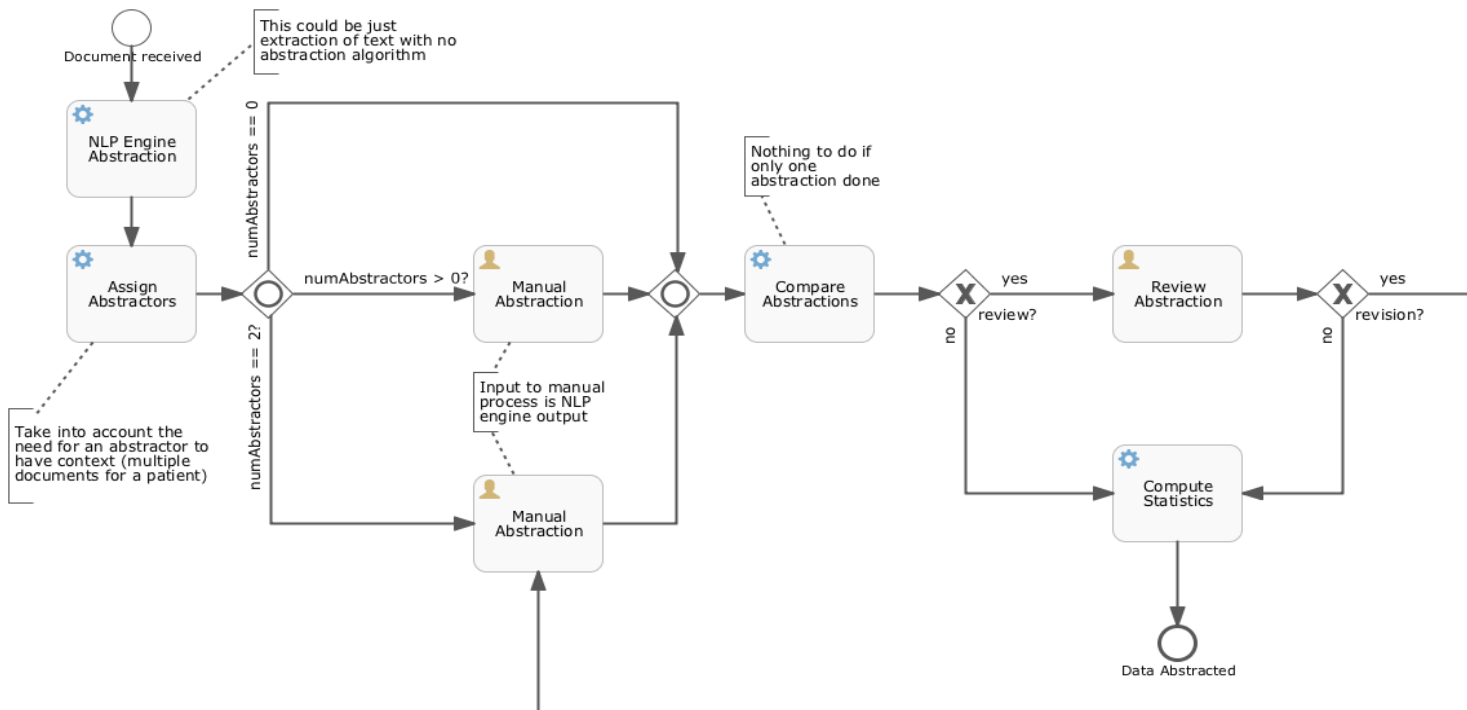
# Issue Tracker



- **For human processes**
- **Customizable forms for defining parameters of request**
- **Grid of data related to the issues that can be analyzed as standard LabKey data grids**



# Business Process Workflows



# Workflow, What Is It Good For?

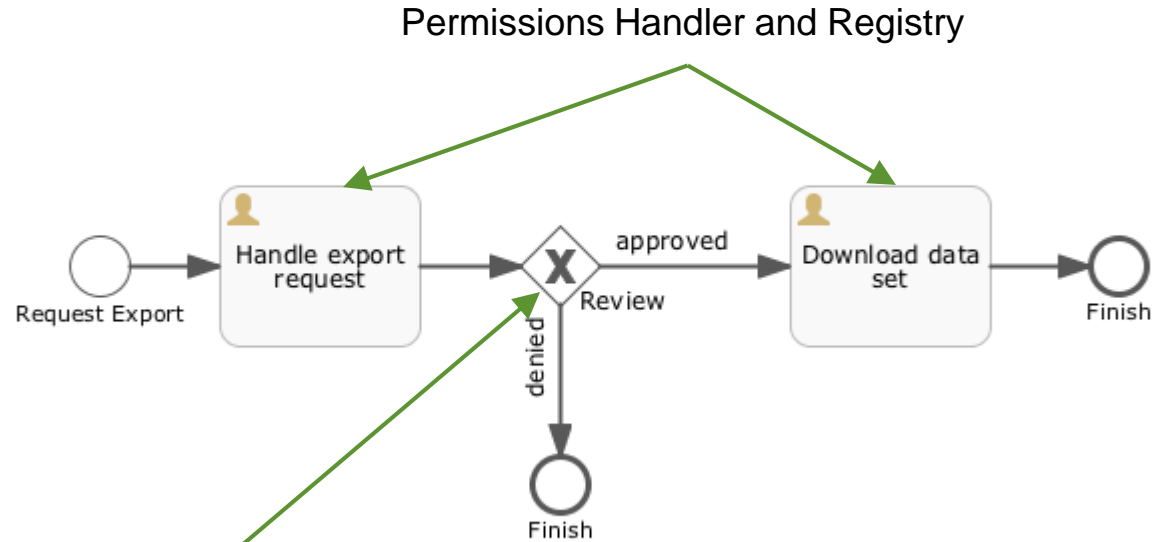


- **The work involves both system tasks and human tasks**
- **There are decision points within the flow**
- **The flow potentially involves parallel tasks**
- **There are repeating tasks or tasks that have time limits or activation times**



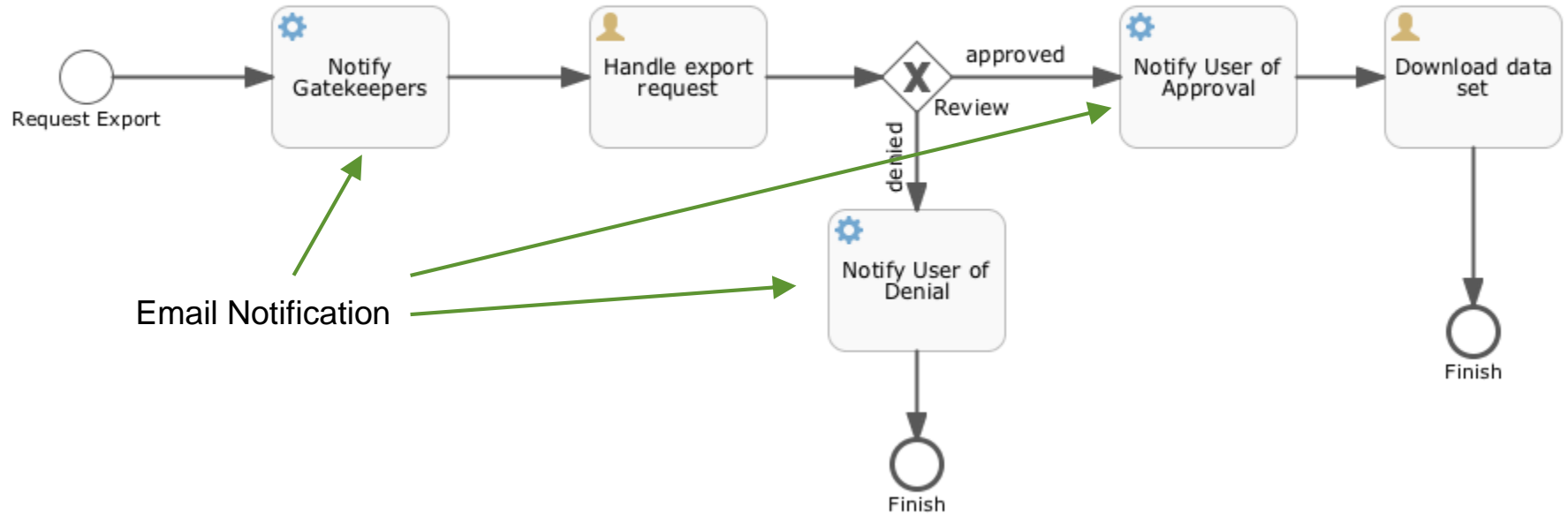
- **Business Process Modeling & Notation 2.0**
- **Graphical notation for representing *business processes***
- **Meant to provide a standard notation readily understandable by business stakeholders**
- **Not intended to represent data flow**

# Simple Workflow

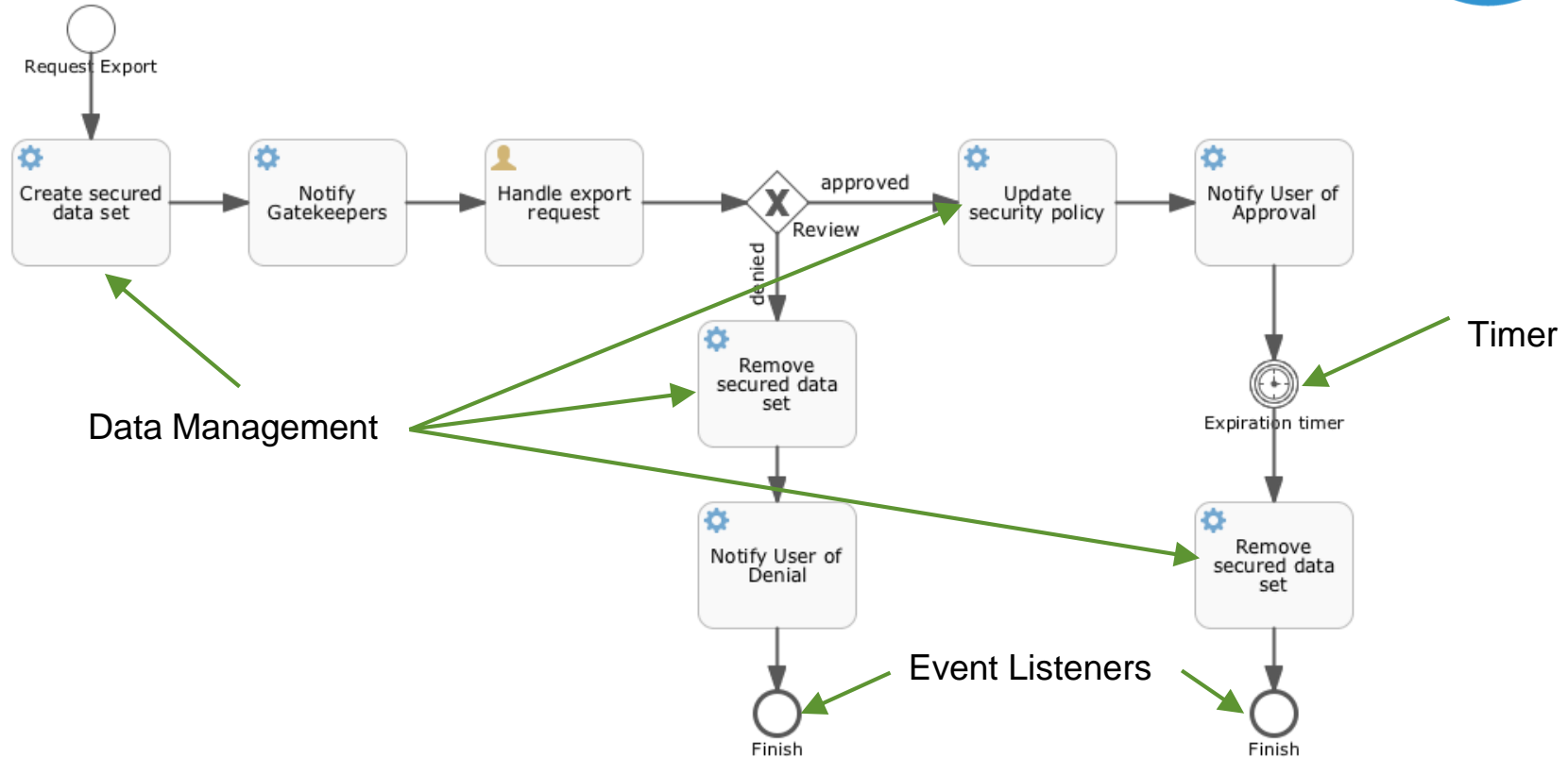


Exclusive Gateway

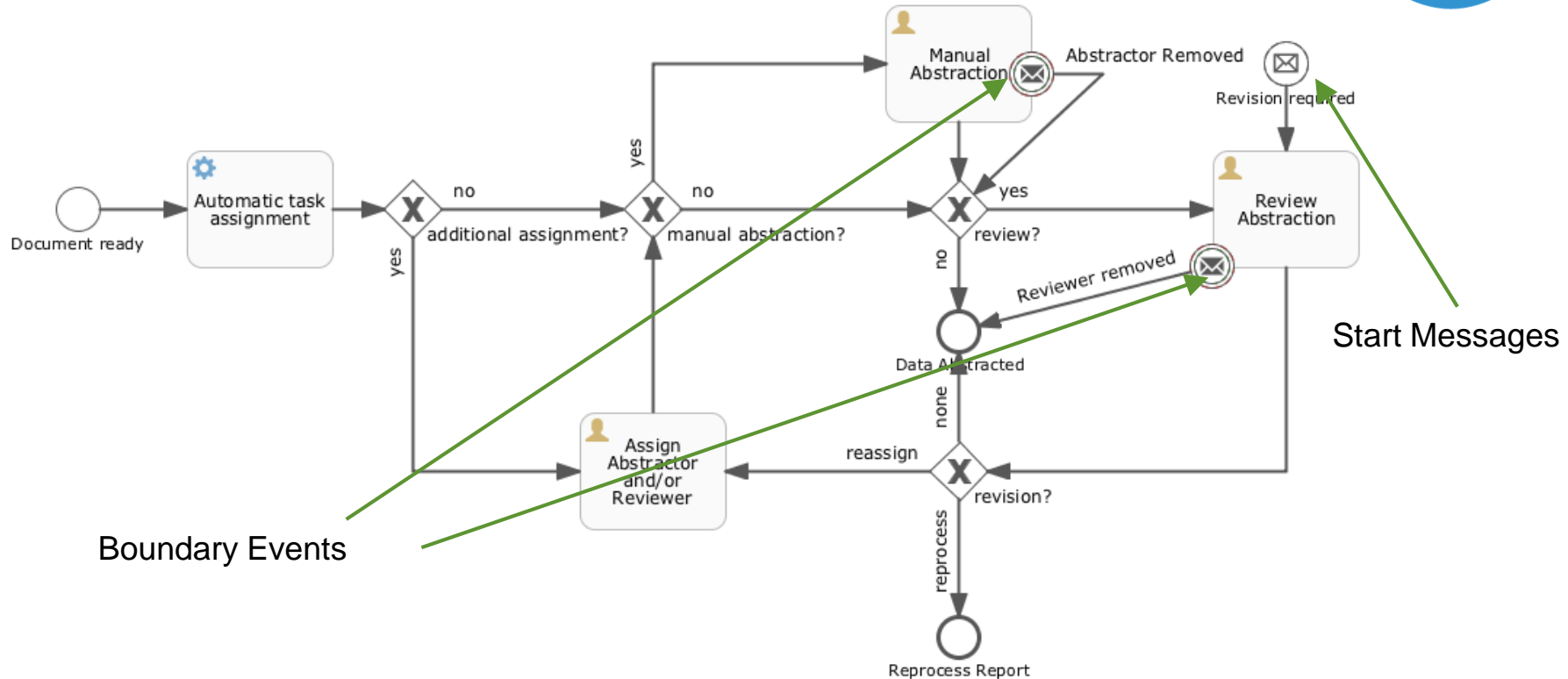
# ... with email



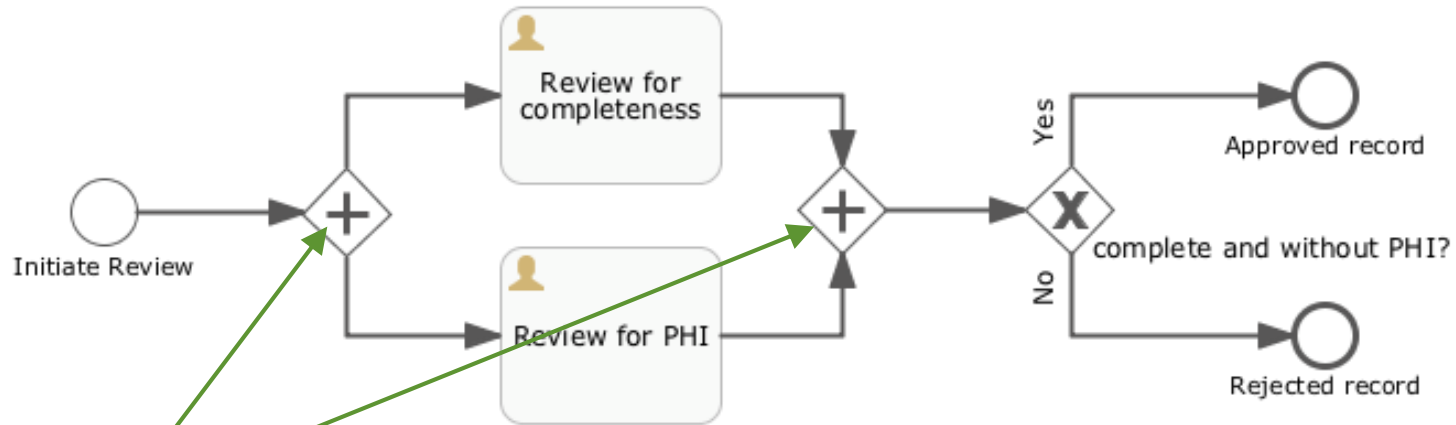
# ... with data management, timers, event listeners



# ... with boundary events and multiple starts



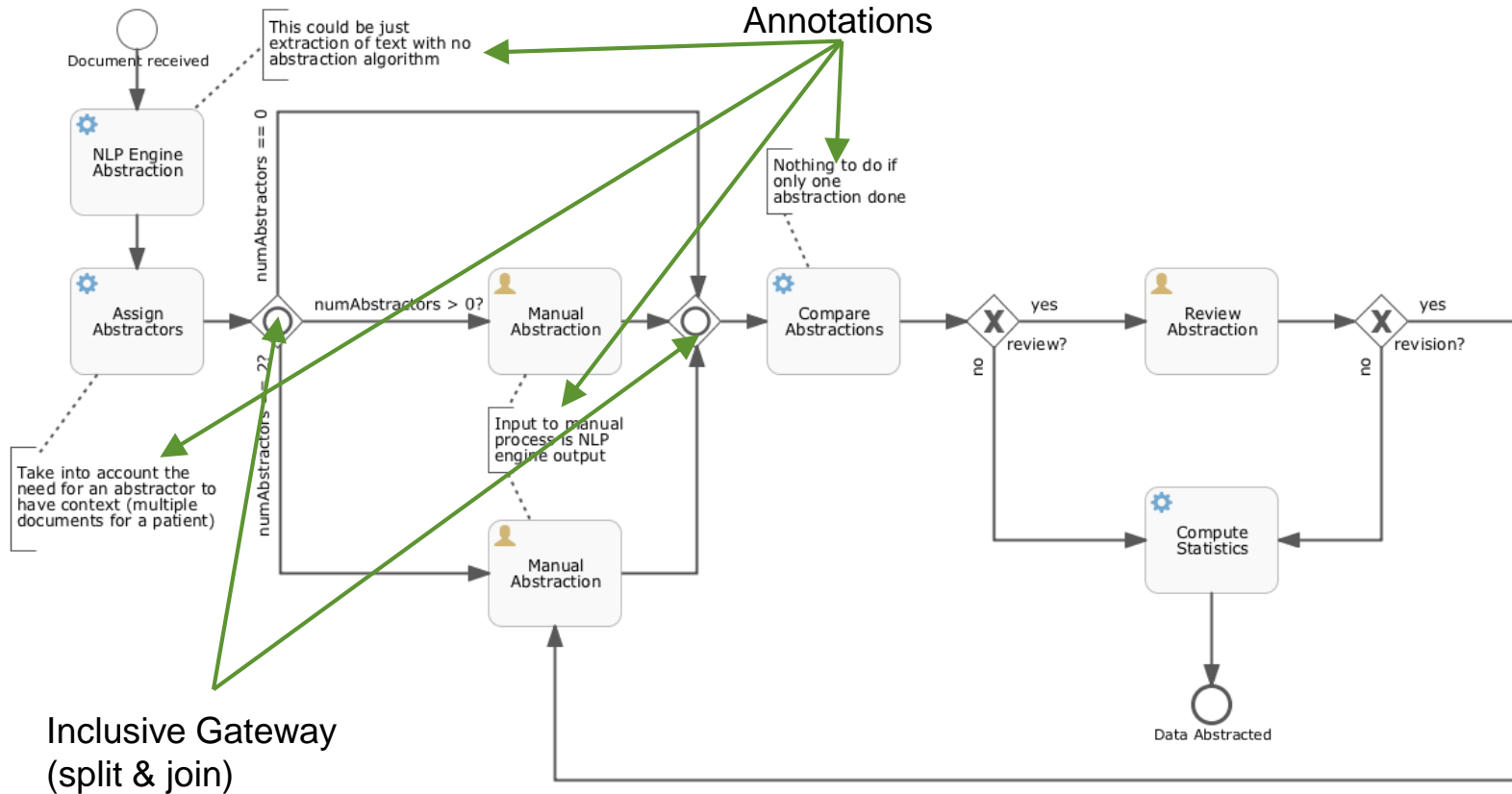
# ... with parallel tasks



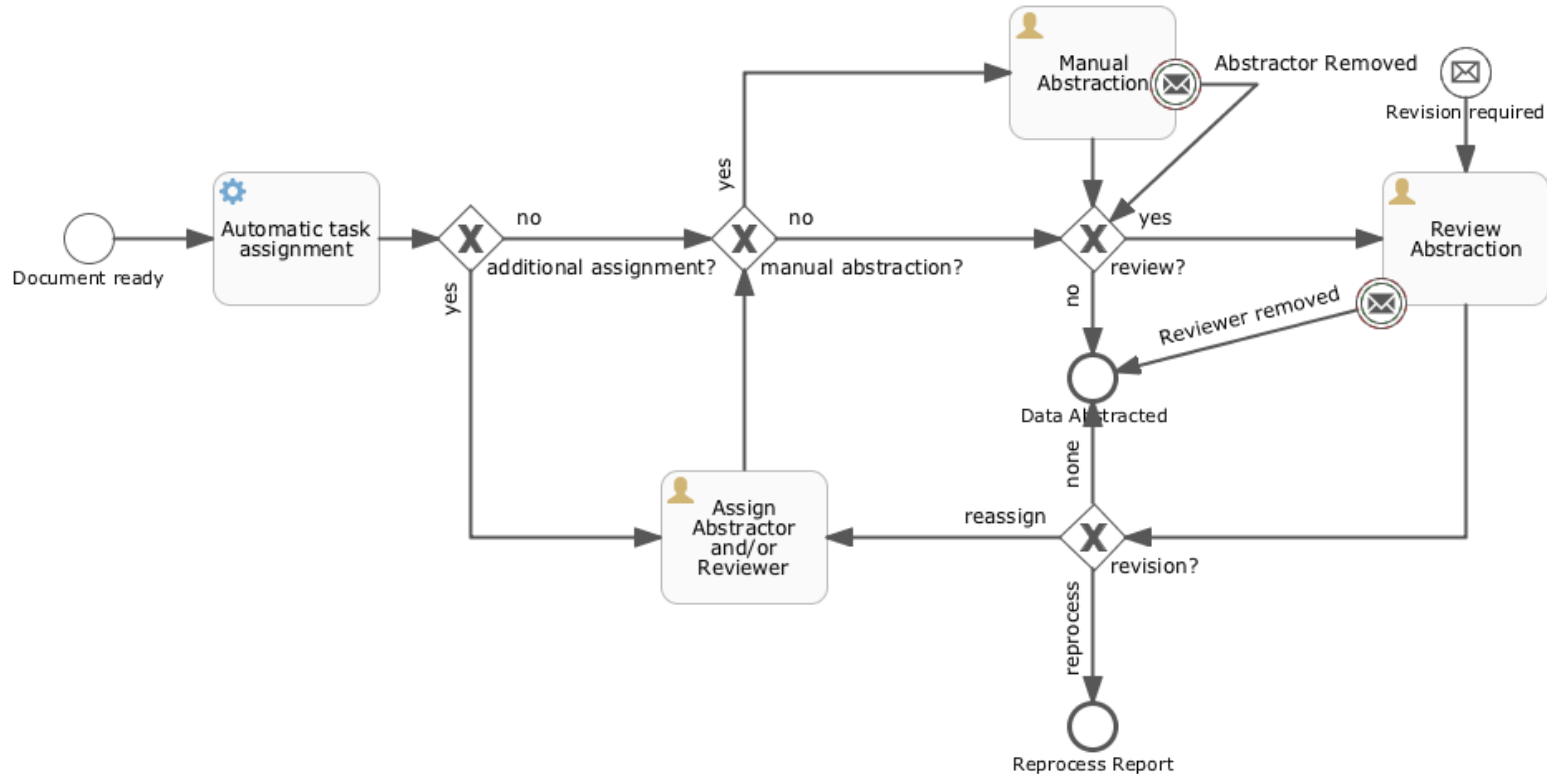
Parallel Gateway  
(split & join)



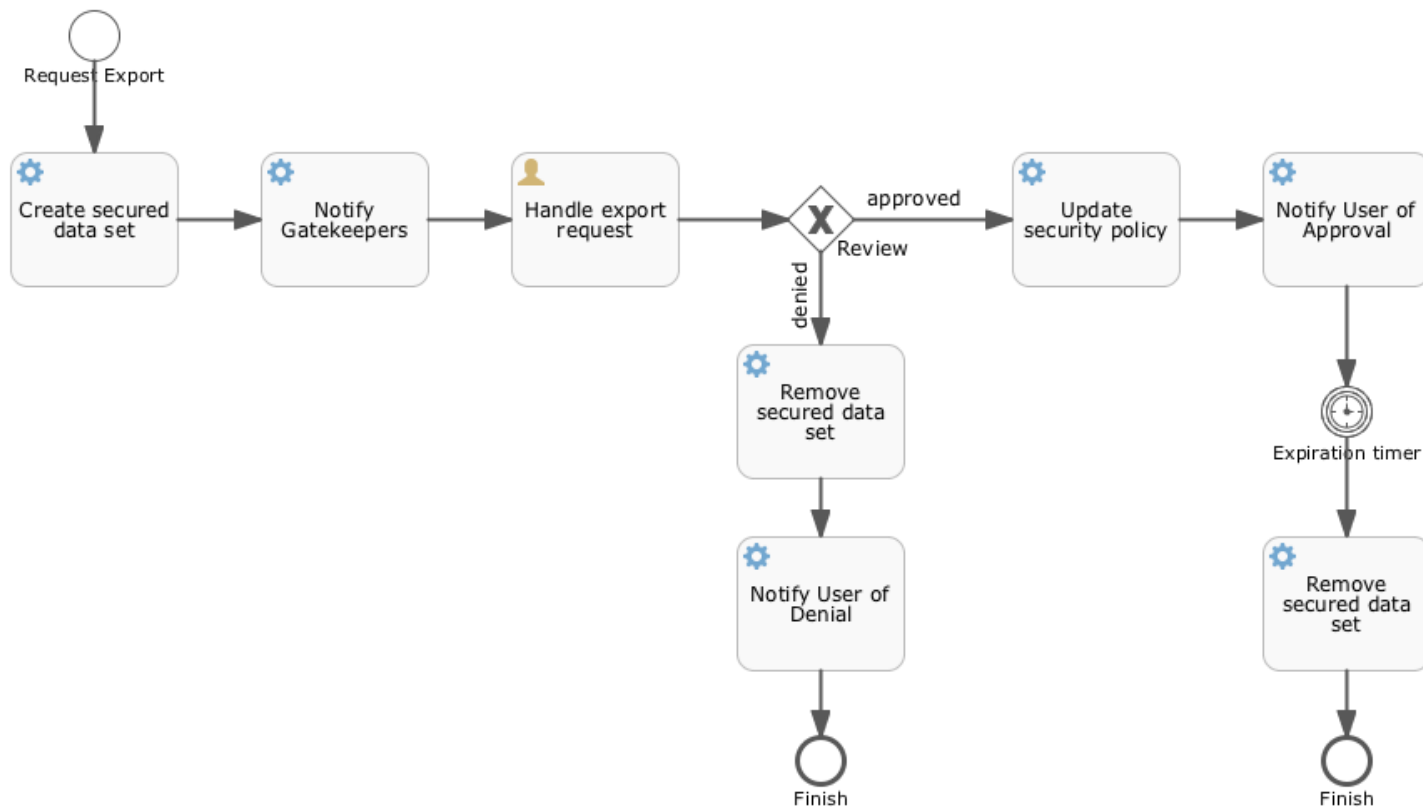
# ... with conditional parallel tasks



# Document Abstraction with NLP



# Argos Data Export Request



Argos

localhost:8080/labkey/argos/Argos/Brain/app.view#reports/reports/datagrids/db%3A188

Apps LabKey LabKey Software Mail Issue Tracker PostgreSQL Git Development Languages Hutch Build Argos-NLP-01 Test...

argos Brain Group Research with Waiver of HIPAA Authorization/Consent, IRB 1234 | Coded/No PHI (All dates are masked) SIGNOUT

REPORTSDATA GRIDS (selected)SAVED FILTERSREQUESTS

Data GridsPatients 60-69

DELETESHARE (selected)REQUEST EXPORT

Coded Id ↑	Disease	Dx Date	Result	Side	Type
5	Brain	2012-07-05	Status Post GTR		MRI
8	Brain	2012-05-04	Status Post GTR		MRI
13	Brain	2008-08-15	Status Post Subtotal Resection		MRI
14	Brain	2008-08-31	Status Post Subtotal Resection		MRI
21	Brain	2012-08-29	Status Post Subtotal Resection		MRI
22	Brain	2011-09-27	Status Post GTR		MRI
30	Brain	2013-09-03	Status Post Subtotal Resection		MRI
33	Brain	2014-01-14	Status Post Subtotal Resection		MRI
34	Brain	2015-03-21	Status Post Subtotal Resection		MRI
44	Brain	2011-10-31	Status Post GTR		MRI
45	Brain	2008-02-27	Status Post Subtotal Resection		MRI

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Displaying 1 - 11 of 11

DASHBOARD

PATIENTS

SPECIMENS

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REPORTS (selected)

282 Patients

553 Specimens

67 Studies

Active Filters

In Saved Group (none)

New Filters (none)

SAVE FILTER

SAVE FILTER AS

Argos

Susan

localhost:8080/labkey/argos/Argos/Brain/app.view#reports/reports/datagrids/db%3A188

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33	Brain	2014-01-14			MRI
34	Brain	2015-03-21			MRI
44	Brain	2011-10-31			MRI
45	Brain	2008-02-27			MRI

Request Data Export

Request export of the current data grid

REASON FOR REQUEST

I need this data for my research

FORMAT

Excel (.xlsx)

You will receive an email once your data export request has been reviewed by an administrator.

CANCELMAKE REQUEST

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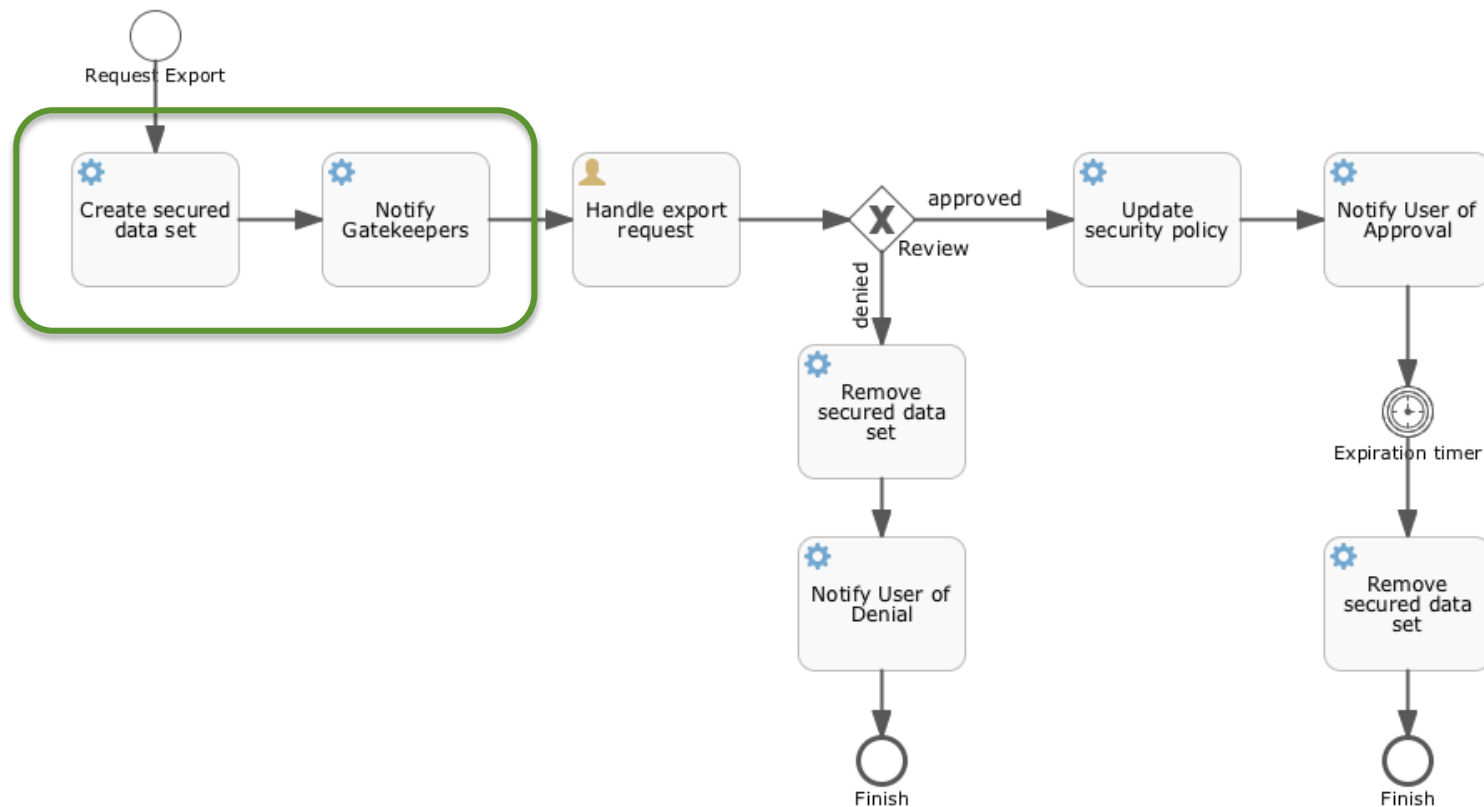
SAVE FILTER

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Displaying 1 - 11 of 11

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localhost:8080/labkey/argos/Argos/Brain/app.view#reports/reports/requests

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REPORTSDATAGRIDSSAVED FILTERSREQUESTS

Active Export Requests

☒ Show all approved requests

Request ID	Requested	Resolution	Resolved	Expires	Requestor	Assignee	Link
742539	2016-09-28	Pending			susanh		See Details
710052	2016-03-22	Pending			susanh		See Details
685001	2015-11-20	Pending			susanh	gatekeeper	See Details
477503	2015-10-07	Pending			Tester	gatekeeper	See Details

Inactive Export Requests

Request ID	Requested	Resolution	Resolved	Expired	Requestor	Assignee	Link
712507	2016-03-23	Approved	2016-03-23	2016-05-11	doctor	gatekeeper	See Details
702501	2016-03-22	Approved	2016-03-22	2016-05-11	susanh	susanh	See Details
702573	2016-03-22	Approved	2016-03-22	2016-05-11	doctor	gatekeeper	See Details
682541	2015-11-20	Approved	2015-11-20	2015-11-20	Tester	susanh	See Details
685037	2015-11-20	Approved	2015-11-20	2015-11-20	Tester	susanh	See Details
677501	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
677537	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
677573	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680001	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680037	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680073	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details

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REPORTSDATA GRIDSAVED FILTERSREQUESTS

Export RequestsDetails

Requested by susanh on 2016-09-28

Columns requestedCoded Id, Disease, Dx Date, Result, Side, Type

Filters appliedPatients with  
Patient (SurgeryAge):  
- 60-69

User comments  
I need this data for my research

ResolutionPending

Assignee

Reviewer comments

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Reviewer comments  
Abstraction Admin  
gatekeeper  
susanh

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Argos

Local MSSQL LabKey Server: / / X

Susan

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Apps LabKey LabKey Software Mail Issue Tracker PostgreSQL Git Development Languages Hutch Build Argos-NLP-01 Test...

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REPORTS DATA GRIDS SAVED FILTERS REQUESTS

Export Requests Details

Requested by susanh on 2016-09-28

Columns requested Coded Id, Disease, Dx Date, Result, Side, Type

Filters applied Patients with Patient (SurgeryAge): - 60-69

User comments I need this data for my research

Resolution Approved

Assignee gatekeeper

Reviewer comments I approve this message

CANCEL SAVE

DOWNLOAD

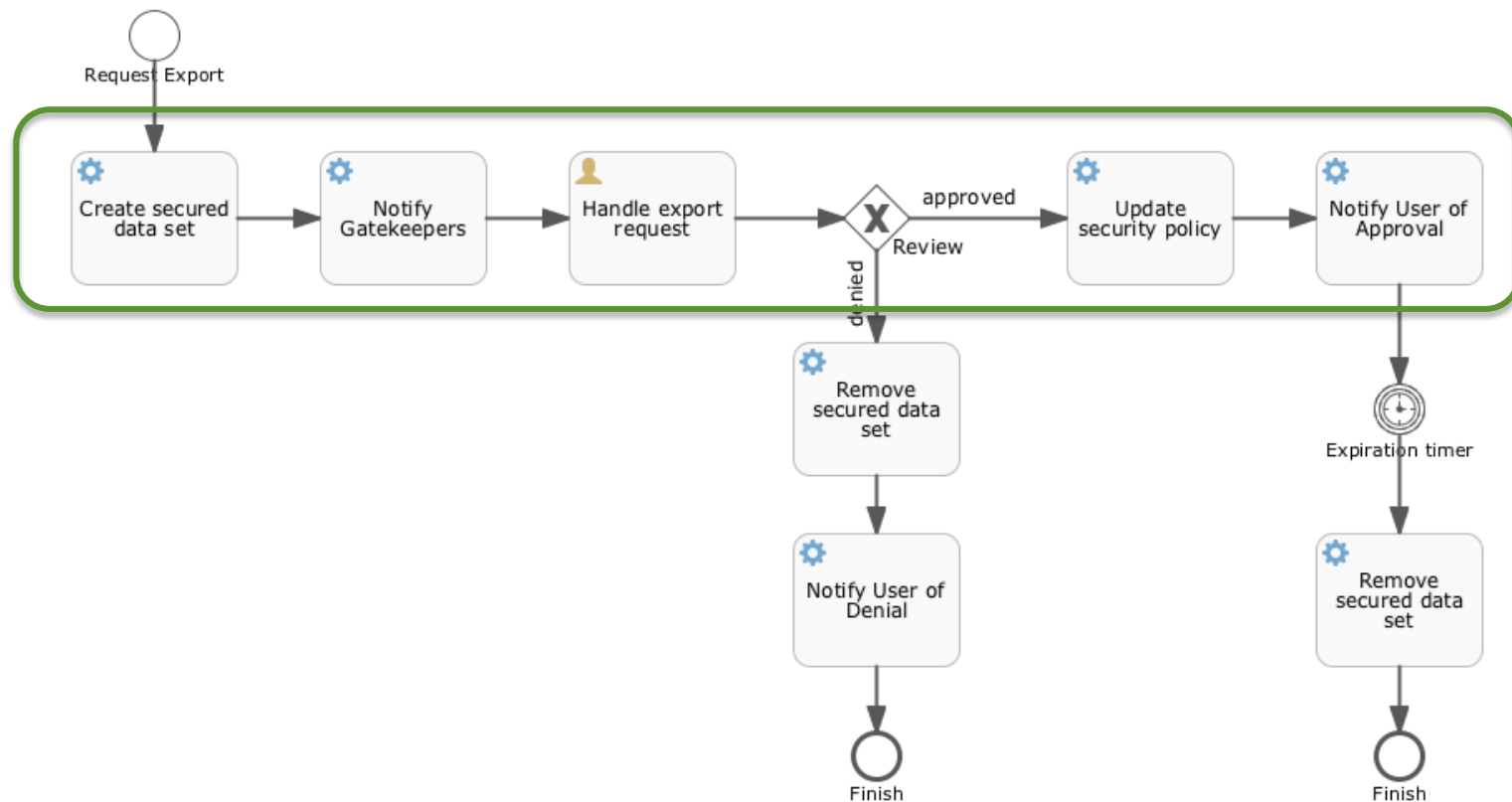
DASHBOARD PATIENTS SPECIMENS STUDIES ASSAYS REPORTS

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SAVE FILTER SAVE FILTER AS

# Argos Data Export Request



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Local MSSQL LabKey Server: / /

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argos

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680001	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680037	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680073	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details
680109	2015-11-19	Denied	2015-11-19		susanh	susanh	See Details

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Local MSSQL LabKey Server: / x

Susan

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Apps LabKey LabKey Software Mail Issue Tracker PostgreSQL Git Development Languages Hutch Build Argos-NLP-01 Test...

argos

Brain Group

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SIGNOUT

REPORTS

DATA GRIDS

SAVED FILTERS

REQUESTS

Export Requests

Details

Requested by susanh on 2016-09-28

Resolution Approved on 2016-09-28 by gatekeeper

Expires on 2016-10-28

Columns requested

Coded Id, Disease, Dx Date, Result, Side, Type

Filters applied

Patients with

Patient (SurgeryAge):

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User comments

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Reviewer comments

I approve this message

DOWNLOAD

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In Saved Group

(none)

New Filters


(none)

SAVE FILTER

SAVE FILTER AS

# Workflow Engine



-  **Activiti™ BPM Platform ([activiti.org](https://activiti.org))**
- **Embedded library, configurable with Spring Beans**
- **Large subset of BPMN 2.0 standard implemented**

# Workflow Module



- **API**
  - wrapper around Activiti objects
  - interfaces and base classes for various types of workflow activities
- **Database – workflow schema in which Activiti tables are created**
- **Resources – workflow process definitions**

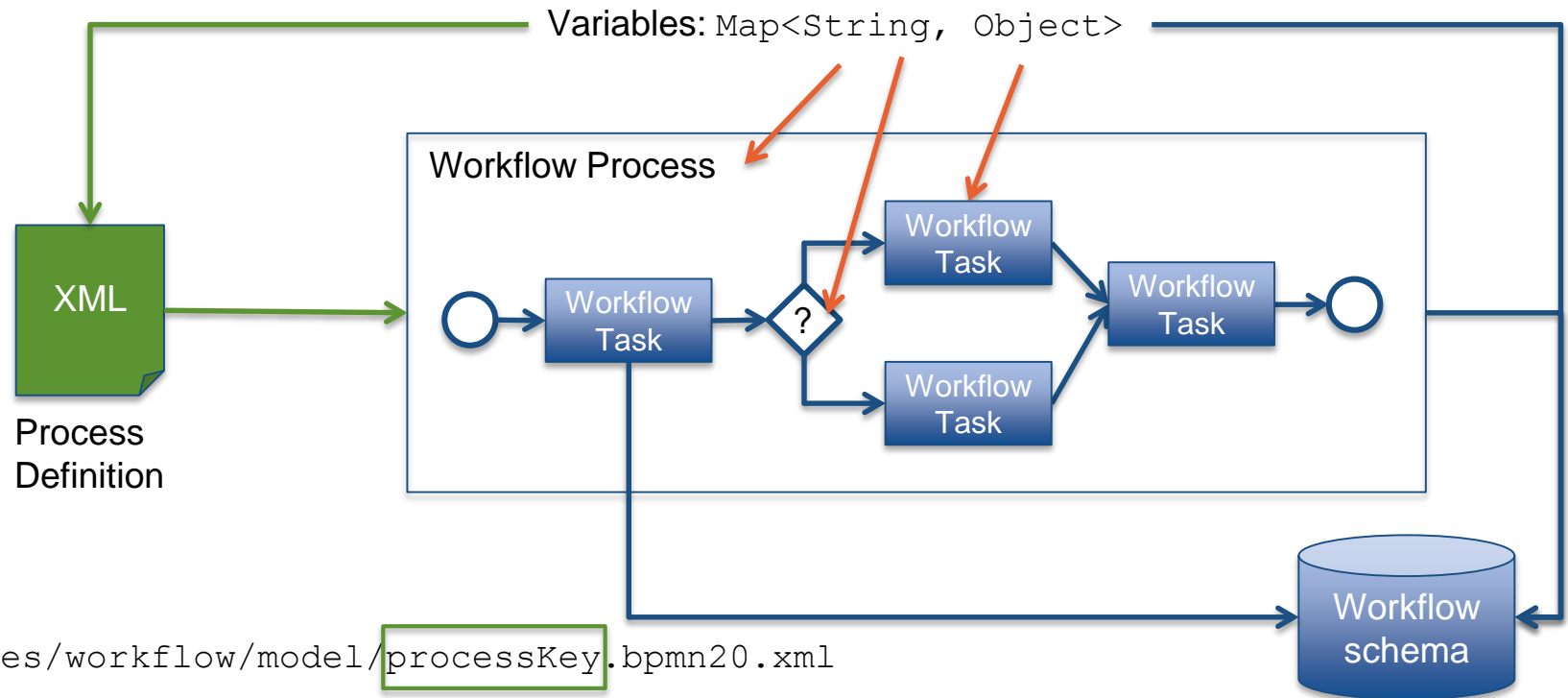


# Workflow Module

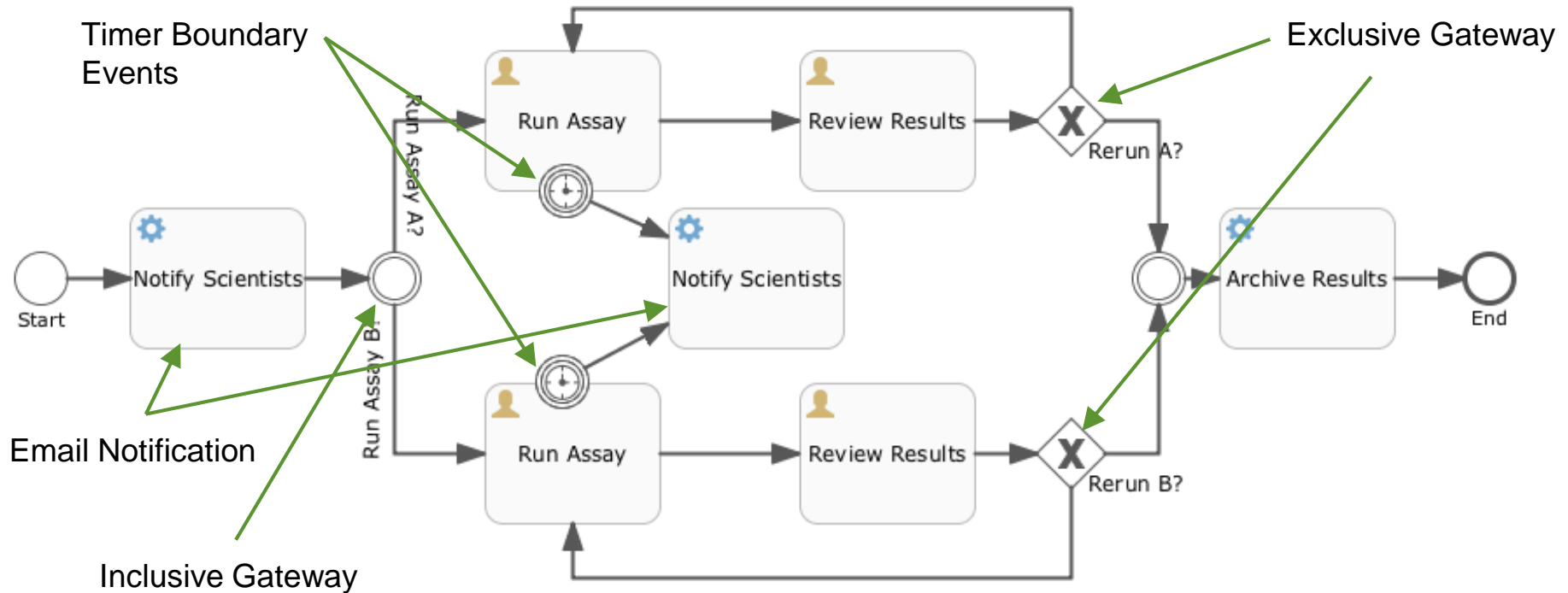


- **Permissions Handler**
- **Email Notifier**
- **System Task Runner**
- **Boundary Event Handlers**

# Workflow Terminology



# My Lab Workflow Process



# Incorporating a Workflow Process



- **Create a process definition**
- **Start a new workflow process**

# Create a Process Definition



- **Location:**

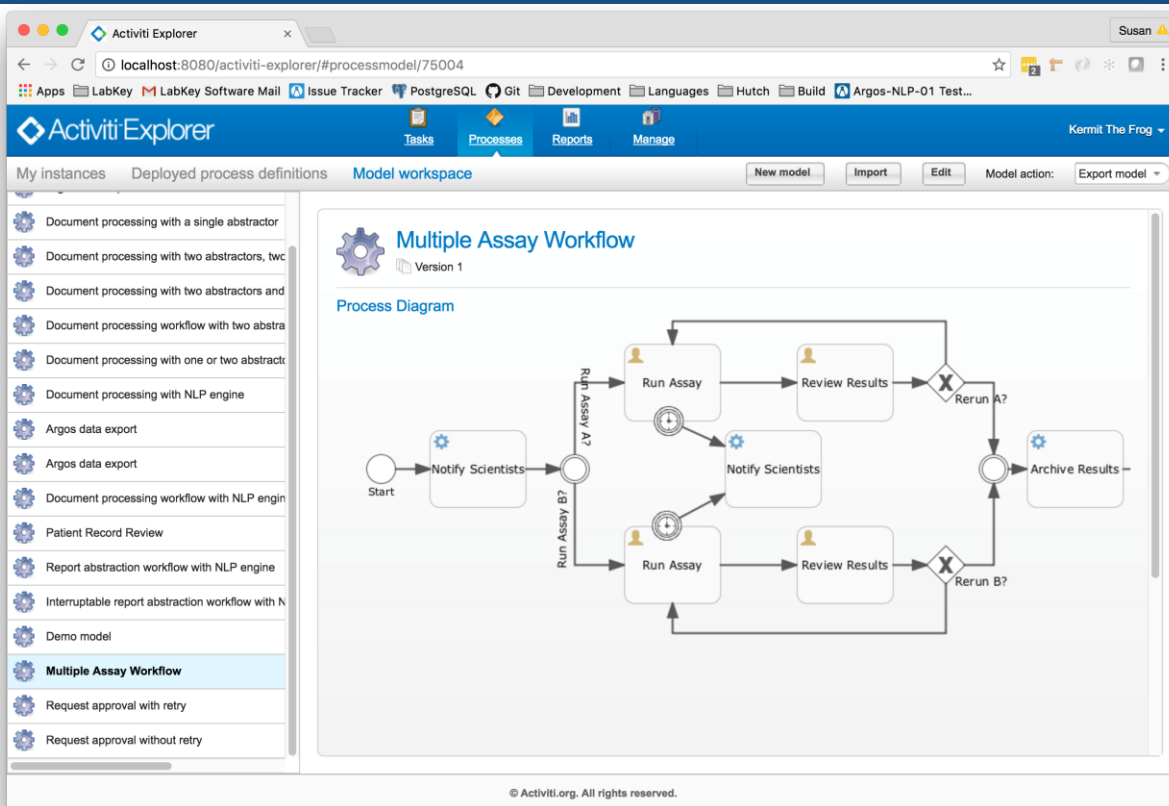
`<module>/resources/workflow/model`

- **Name:** `<processKey>.bpmn20.XML`

**e.g.**

`labWorkflow/resources/workflow/model  
/labWorkflow.bpmn20.xml`

# Activiti Modeler



# Start a Workflow Process



```
WorkflowService s = ServiceRegistry.get(WorkflowService.class);
```

```
Map<String, Object> vars = new HashMap<>();
```

```
vars.put("initiatorId", uidString);
```

```
vars.put("container", container);
```

```
s.startWorkflow("module", "processKey", "Description of  
process", vars, container);
```

# Enhancing a Workflow



- **Associate system task classes**
- **Define and register a permissions handler**
- **Register email templates**



# Associate System Task Classes



- **Define Java class to do the task**
- **Update process definition to reference class**

```
<serviceTask id="archiveResults"  
  activiti:class="org.labkey.workflow.delegate.SystemTaskMa  
  nager">
```

...

```
</serviceTask>
```

# Define & Register Permissions Handler



- **Extend** `org.labkey.api.workflow.PermissionsHandler`
- **Implement**
  - `getCandidateUserPermissions (WorkflowTask)`
  - `canView (WorkflowProcess)`
  - `canView (WorkflowTask)`
  - `canStartProcess (String)`
  - ... etc.

# API Methods



- `StartProcess`
- `RemoveProcessInstance`
- `ProcessInstanceData`
- `ProcessInstanceListData`
- `UpdateVariables`
- `TaskData`
- `CompleteTask`
- `ClaimTask, DelegateTask, AssignTask`
- . . .

# Things to Remember



- **The process definition is part of the program**
- **Get data about the work from the workflow module; get data about what is being worked on elsewhere**
- **Use process and task variables to tie them together**
- **Be careful of serialization**

# Which Flow is Right for You?



## Data Integration or Pipeline

- Data processing
- Define extraction source
- Define transformation
- Define load target

## Issue Tracker

- Human processes
- Define custom fields
- Define and populate lookup tables or lists

## Workflow

- Business process with most flexibility
- Define process
- Add UI for human tasks
- Add actions for system tasks

