Unlocking Medical Records with Natural Language Processing

LabKey User Conference
October 1st, 2015

FRED HUTCH
CURES START HERE™

Informatics at Fred Hutch – Overview of the Cancer Consortium

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UNIVERSITY of WASHINGTON

Seattle Children's — HOSPITAL · RESEARCH · FOUNDATION

SEATTLE CANCER CARE ALLIANCE

FRED HUTCH — CURES START HERE

| Admin | Clinical Research | Human Biology | Basic Sciences | Public Health Sciences | Vaccine and Infectious Diseases |

| IT | Facilities | Legal | Finance | Shared Resources | HR | ..... |

| Informatics | Customer Service | Infrastructure Operations | Scientific Computing | Solutions Architecture | Enterprise Software Solutions | Information Security | Projects and Business Ops |

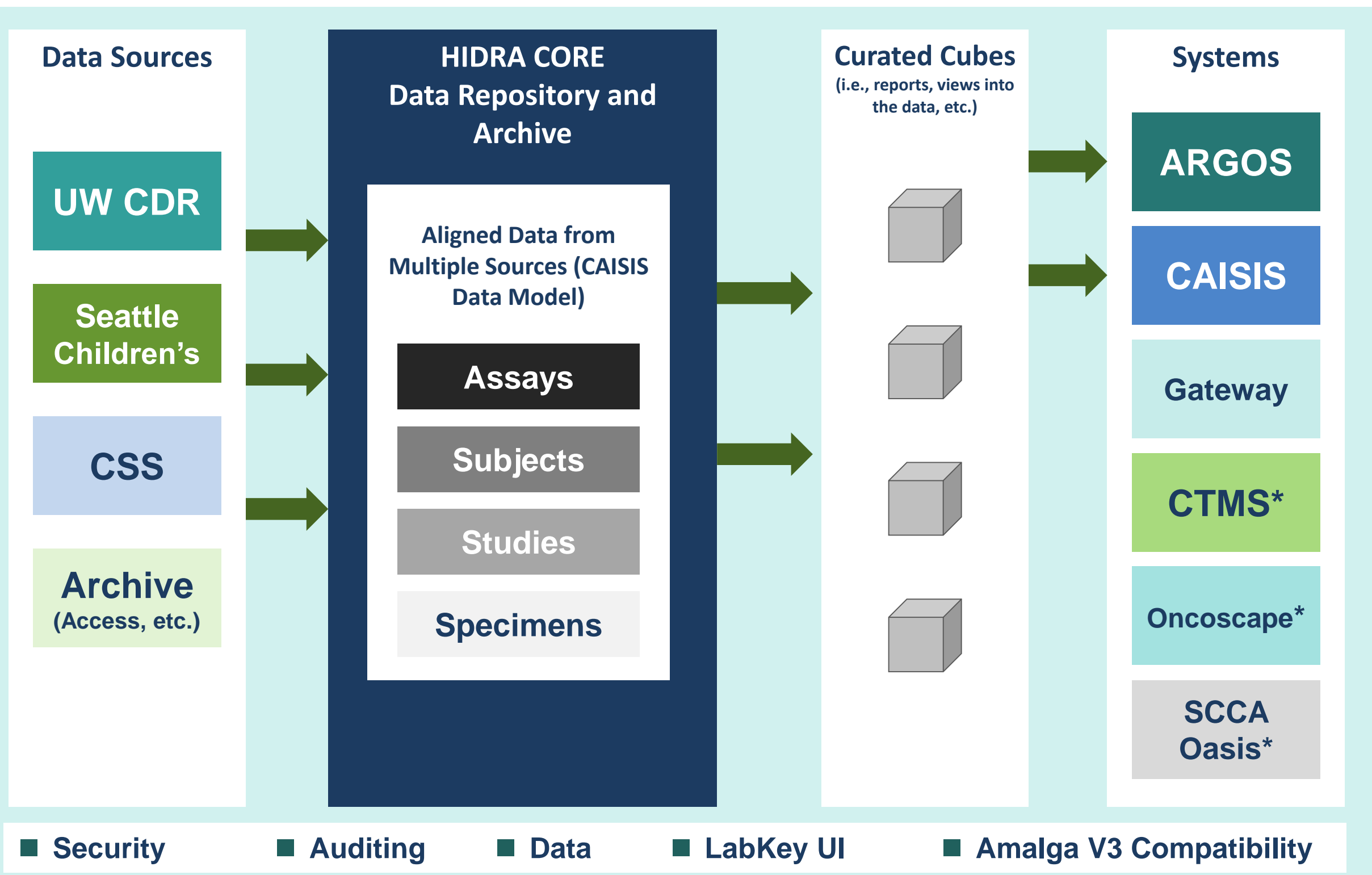| Program Operations | Analytics and Data Systems | Application Development |

What is HIDRA?

Hutch Integrated Data Repository and Archive

- *A broad and comprehensive database that combines patients' clinical records, tumor genetics and molecular data and related research information with the aim of eventually helping doctors choose the best targeted treatments for people with cancer.*

- *Hardware and software "plumbing" that bring multiple databases and data sources together into one high security environment.*

- *A data resource for the Consortium.*

- *A development platform for custom applications like Argos.*
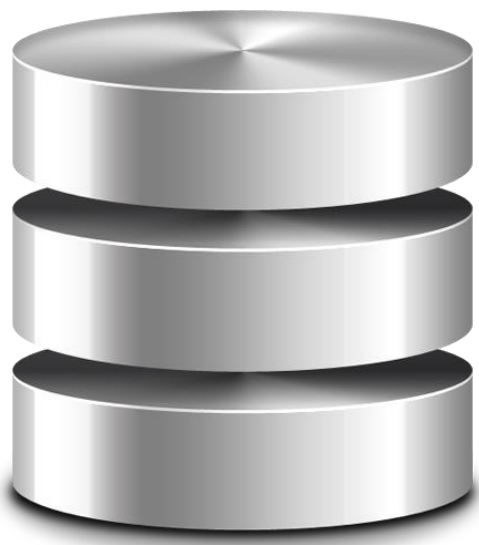
HIDRA Environment: Conceptual Diagram

FRED HUTCH

Data Sources
- UW CDR
- Seattle Children's
- CSS
- Archive (Access, etc.)

HIDRA CORE
Data Repository and Archive

Aligned Data from Multiple Sources (CAISIS Data Model)
- Assays
- Subjects
- Studies
- Specimens

Curated Cubes
(i.e., reports, views into the data, etc.)

Systems
- ARGOS
- CAISIS
- Gateway
- CTMS*
- Oncoscape*
- SCCA Oasis*

■ Security   ■ Auditing   ■ Data   ■ LabKey UI   ■ Amalga V3 Compatibility

* Denotes systems managed outside of CIT Informatics

3

HIDRA by the Numbers

Patients

- *335,000 total patients*

Size

- *809 million rows of data*
- *380 Gb of total storage space*

Example Data Elements

- *150 million lab chemistry results from 26 million orders*
- *48 million encounter events*
- *3 million diagnostic imaging orders and their results*

Research Tools

Caisis
- Provides a single-patient view of data
- Allows clinical data entry and update
- Is based on a cancer data model
- Receives data from HIDRA feeds
- Is the source of data for Argos

Argos
- A self-service reporting interface allowing researchers to access and explore the rich information currently collected, linked and stored in HIDRA databases
- Balances easy access with good security controls
- Developed in collaboration with LabKey Software.
- Presents aggregate data stored in Caisis, whether it was entered by abstractors, received from HIDRA feeds or imported from custom databases maintained by disease groups

Data Elements Feeding into CAISIS from HIDRA

Demographics
Address (line 1)
Address (line 2)
Birth Date
Birth Place
City
Country
E-mail
Ethnicity
First (Given)
Gender
Language
Last (Surname)
Middle
MRN
Postal Code
Race
Religion
State
Phone Numbers

Diagnostics
Date
Indication
Notes
Type

Diseases
Disease

Lab Tests
Date
Lab Abnormal
Lab Test
Normal Range
Result
Units

Pathology
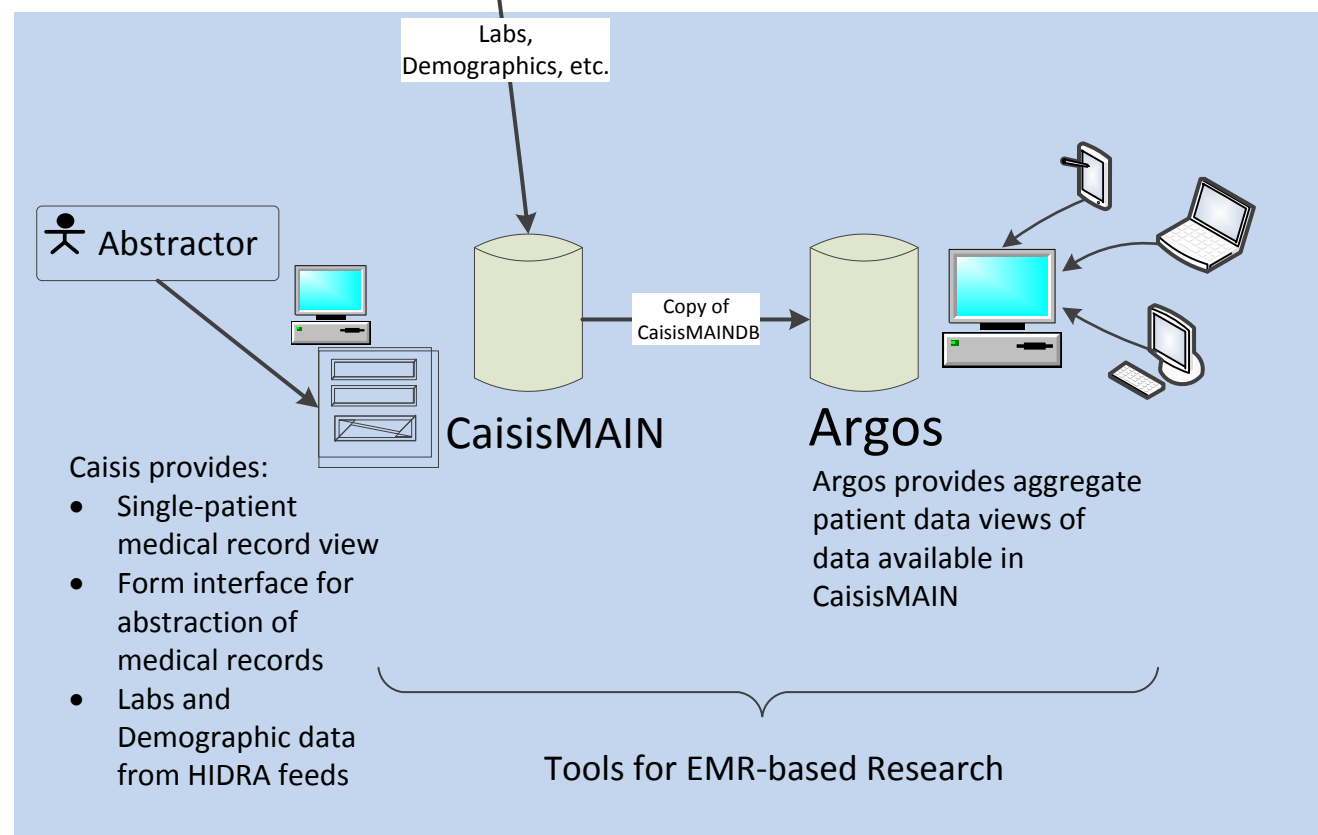Notes (in text blob)
Path #
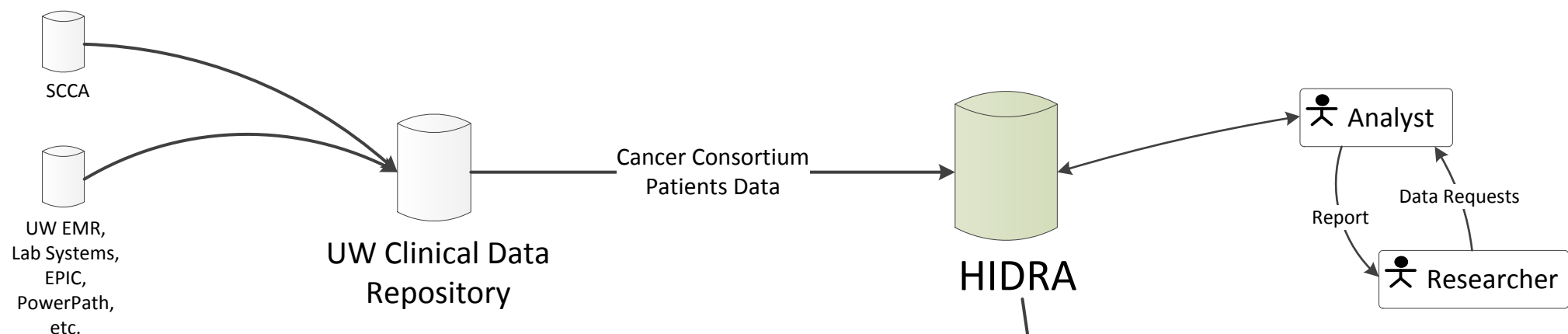Path Report Date
Specimen Type

Appointments
Clinic Date
Dept.
Physician
Time
Visit Type

Physicians
First (Given)
Last (Surname)
Middle

Fred Hutch Research Systems & Data - today
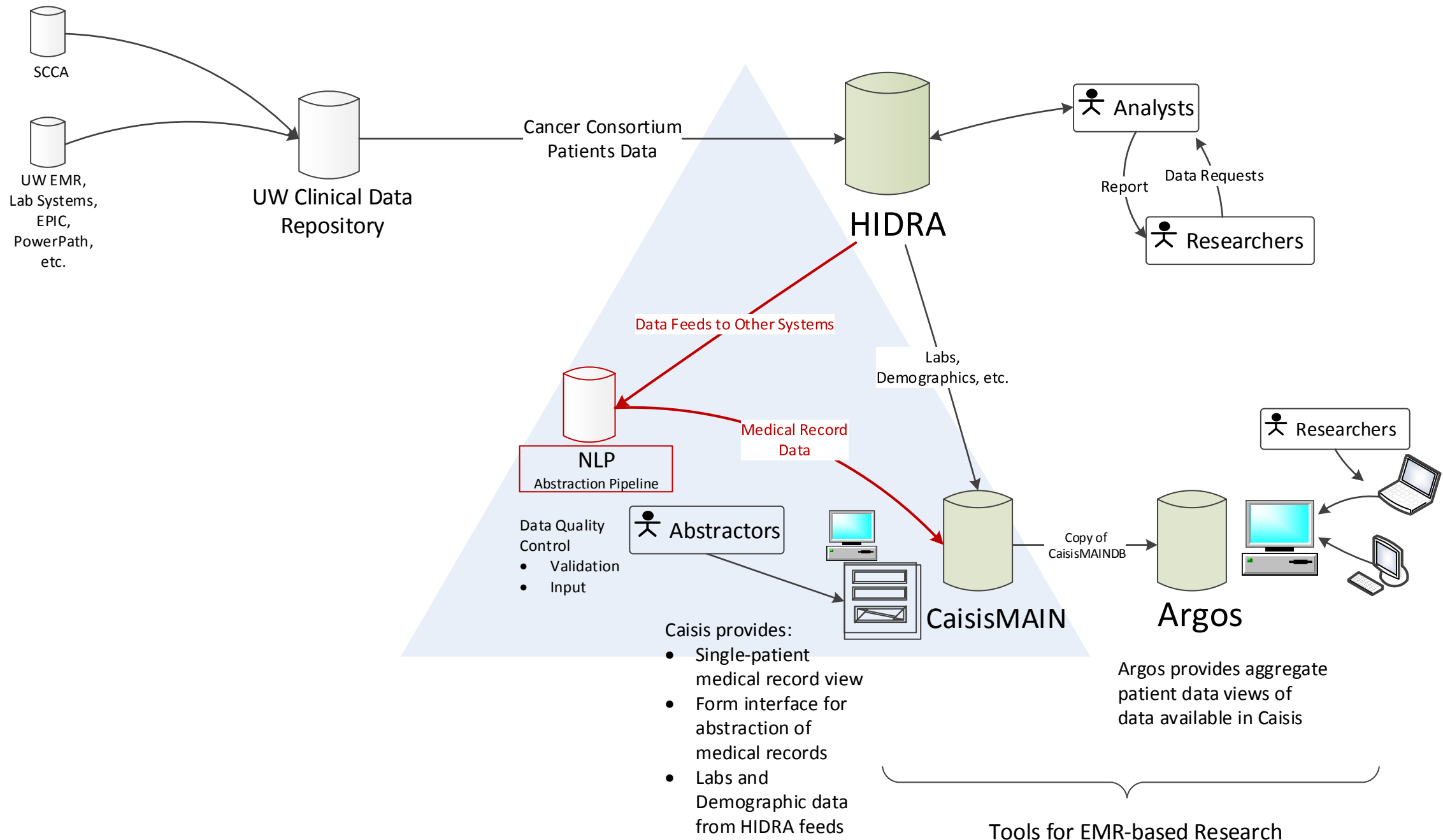
The Problem – Scaling Up

- Currently, the majority (65-80%) of the data elements needed for clinical and translational research in cancer can only be found in unstructured narrative reports.

- Manually abstracting clinical data for all historical, current, and future patients is time and resource intensive and ultimately is not scalable.

MATERIALS RECEIVED:

Label	Consult Accession No	Blocks/Slides	Description
A		0B,9S	Colon, right hemicolectomy

FINAL DIAGNOSIS:

A)

Portion of terminal ileum, cecum, and ascending colon, resection: Invasive, moderately differentiated colonic adenocarcinoma. Please see the Cancer Summary below.

SUMMARY CANCER DATA:

Specimen and Tumor Location

    Specimen type: **Right hemicolectomy**
    Tumor site: **Cecum (C18.0)**

Characteristics and Extent of Neoplasm

    Histologic type: **Adenocarcinoma (81403)**
    Histologic grade: **Low-grade (well to moderately differentiated: >50% gland formation)**
    Tumor size: **Greatest diameter: 5cm**
    Tumor perforation (macroscopic):   **Not identified**
    Microscopic tumor extent:
        Tumor invades through muscularis propria but does not penetrate any peritoneal surface
    Tumor deposits: **Not identified**
    Lymphatic [small vessel] Invasion (L):   **Not identified**
    Venous [large vessel] Invasion (V):   **Not identified**
    Perineural invasion: **Absent**

Final Surgical Resection Margins

    Grossly positive margin(s):   **None**
    Microscopically positive margin(s):   **None**

Lymph Node Status

    Node summary: Nodes with carcinoma: **0**   / Total nodes examined: **15**

Minimum Pathologic Stage (AJCC, 7th ed., 2010)

    Primary tumor (pT):   **pT3: Tumor invades through the muscularis propria into pericolorectal tissues**
    Regional lymph nodes (pN):   **pN0: No regional lymph node metastasis**

Other Findings

Medical oncology clinic note

IDENTIFICATION

[redacted] a 70-year-old gentleman with a history of a peripheral T-cell lymphoma, history of prostate cancer, a a history of a T3N0M0 colon cancer resected on [redacted] who comes in for surveillance.

INTERVAL HISTORY

[redacted] was treated by [redacted], MD, for peripheral T-cell lymphoma and had an autologous stem cell transplant followed by a nonmyeloablative allogeneic transplant in [redacted] and he has been in complete remission since that time. He has also had treatment for prostate cancer, clinical stage T1c, Gleason 3 + 3 disea in [redacted] 2008, treated with brachytherapy and since then his PSA has been minimally detectable.

[redacted] had a right partial colectomy on [redacted] with a pathologic finding of an adenocarcinoma stage pT3NM0 with a 5 cm primary tumor, 0/15 lymph nodes involved with cancer, and negative surgical margins He was not treated with adjuvant therapy as it was not indicated.

[redacted] continues to do well. He continues to play golf, feels well, has not developed any new issues. He saw [redacted] in [redacted] with no new recommendations. He had a colonoscopy in [redacted] which showed no lesions and a followup was recommended in [redacted].

MEDICATIONS
Levothyroxine 137 mcg p.o. once a day

The Problem

- Efforts to implement templated notes are underway, but changes in clinical workflow are often slow and difficult to adopt.

- Templating will provide access to many discrete data elements, but it will not provide access to historical data in narrative form and it's not reasonable to expect that all clinical data entry will be templated.

The Landscape - Barriers in Clinical NLP

- Because of the necessary protection of private data there is
    - limited cross institutional collaboration
    - very few annotated data sets for training and benchmarking
    - insufficient common conventions and standards in terminology
    - over-fitting to specific applications and institutions

- While some data sets and collaboration have been encouraged by shared tasks, the resulting systems have had limited carryover to industry

The Landscape – Current Options in Clinical NLP

- Commercial
    - Black box systems
    - Do not allow for development and improvement over time

- Open Source
    - Lack support for setup and implementation
    - Require specific knowledge and skill set to use and customize
    - Not optimized for our needs as a cancer center
    - Do not provide a single platform for automated processing, manual verification, storage, and tracking on an enterprise level

The Strategy – Join Automated and Manual Processes

- We're designing a clinical data pipeline that will serve as a platform, not only for automated information extraction using natural language processing algorithms, but also manual data abstraction and the verification of extracted elements.

- By using the existing manual abstraction workflow we can
    - iteratively create a larger training corpus for NLP algorithms
    - decrease the time and effort of manual processes
    - increase the volume and variety of clinical data reaching researchers, administrators, and providers

The Solution – Clinical Data Pipeline Design
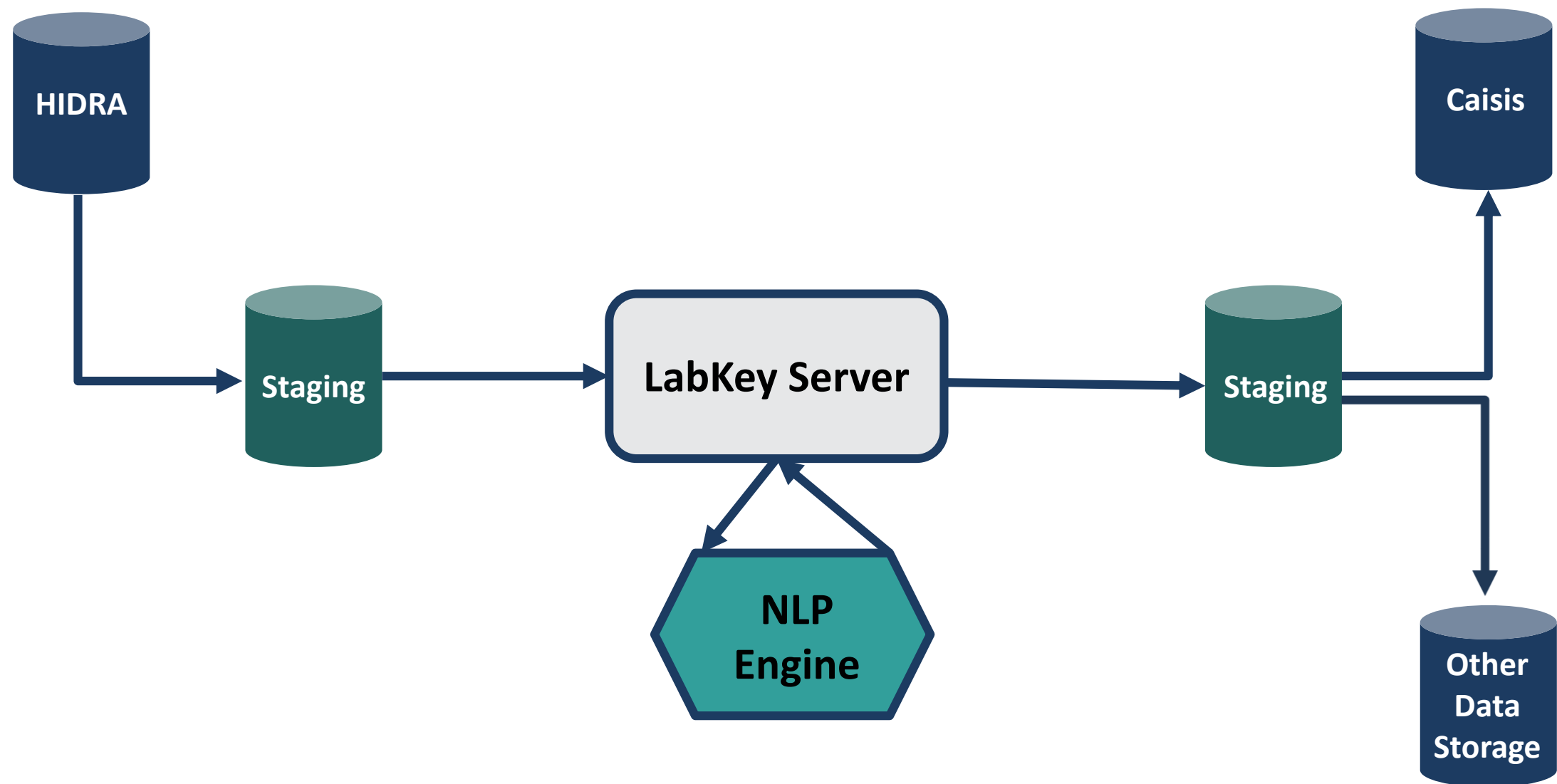
The Solution – A Single Platform for All Workflows
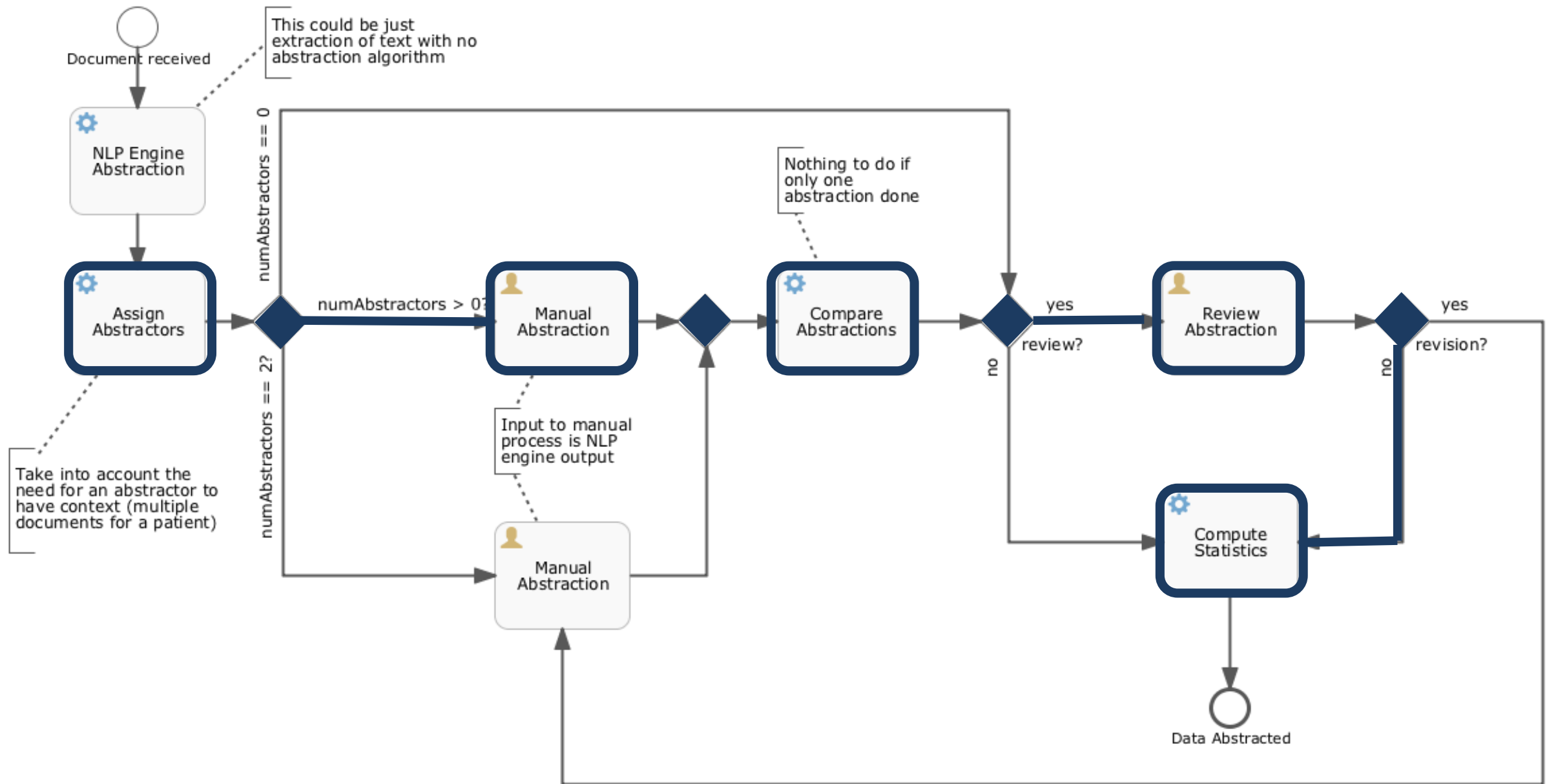
The Solution – A Single Platform for All Workflows
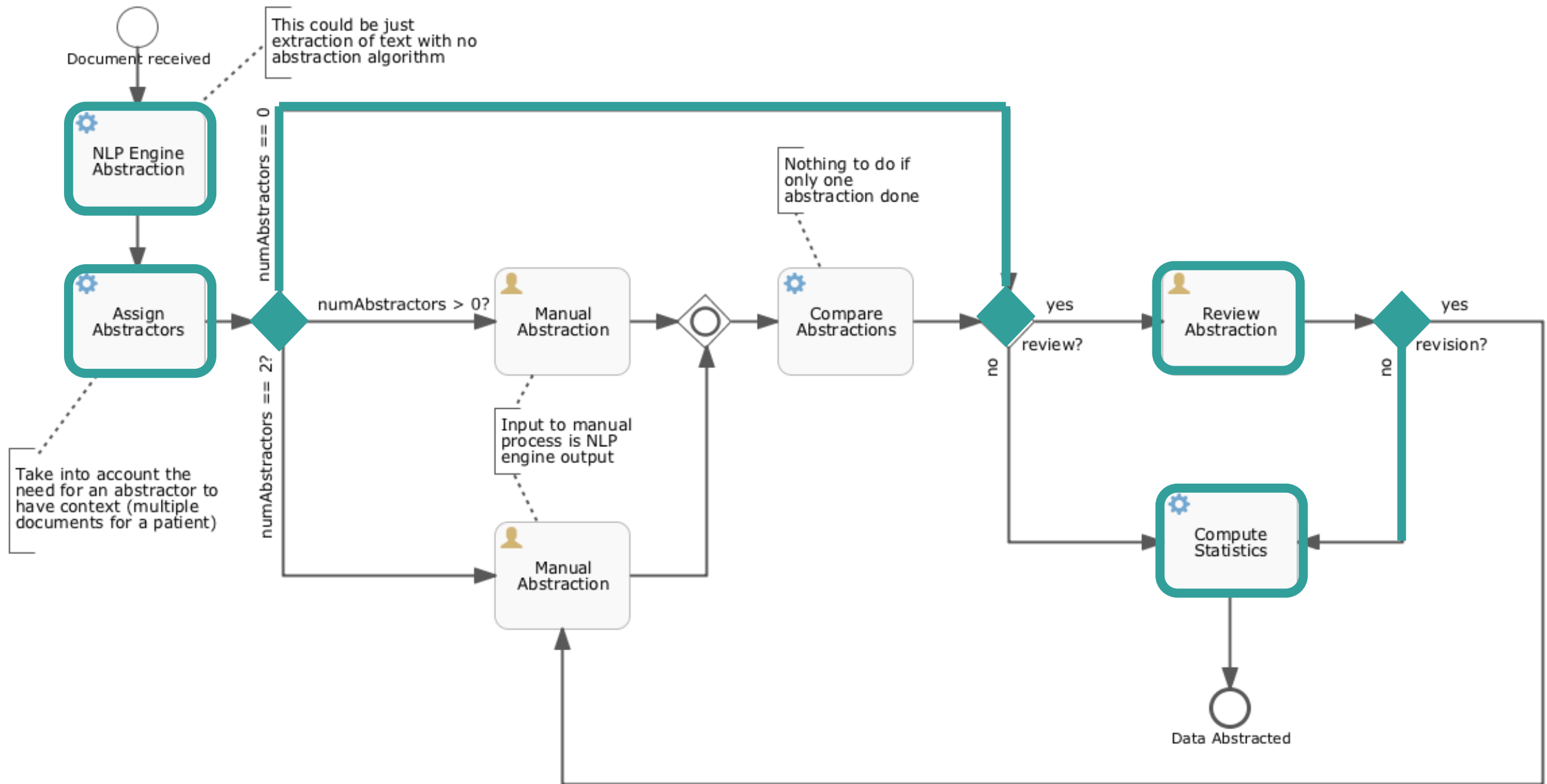
The Solution – NLP Pipeline Design

- Hierarchical system design allows us to customize parsing for different clinical document types

- Modular algorithm design should better account for extensibility and growth over time
  - New parsers can be created when formatting or source systems change
  - New algorithms can be created when training data is available and/or new research questions arise

The Big Picture

use automation to speed up manual work

apply NLP algorithms → verify results → create training data → apply NLP algorithms
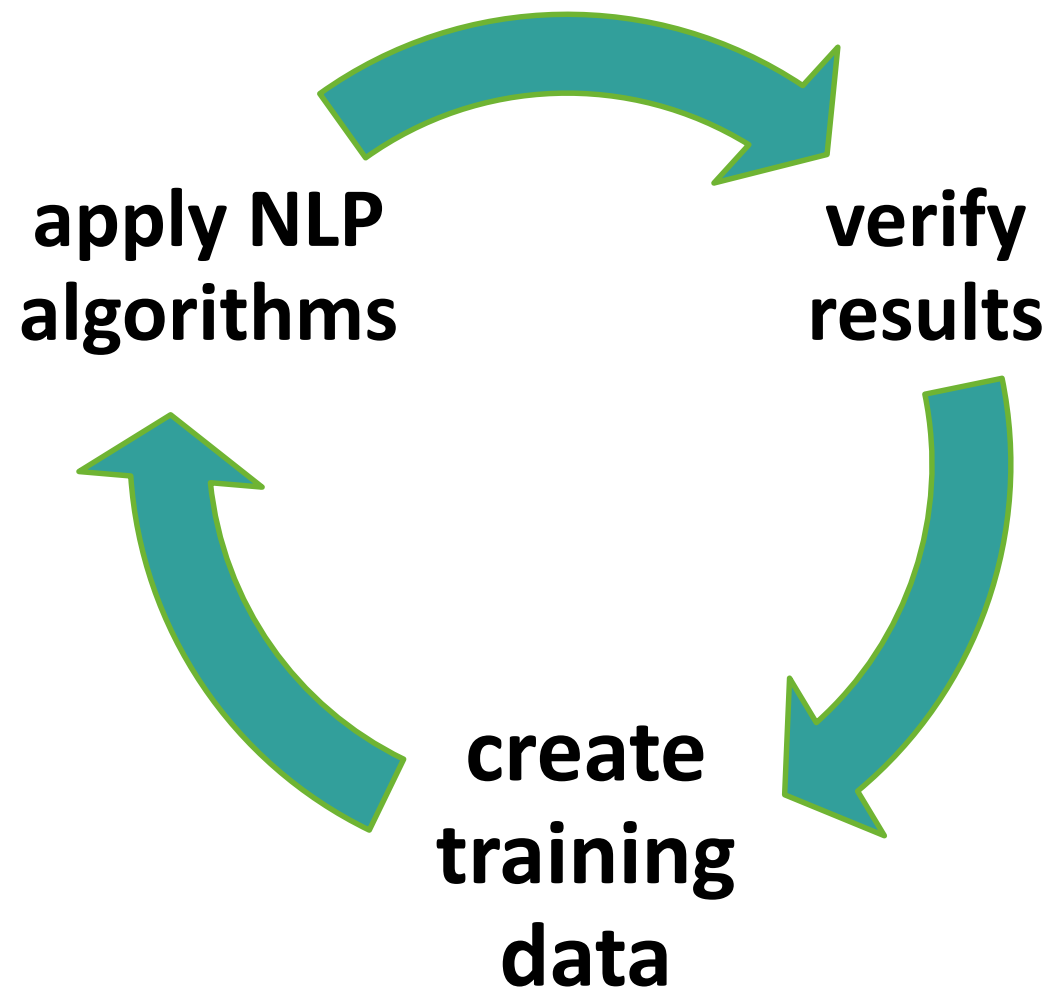
use manual workflow to improve automation
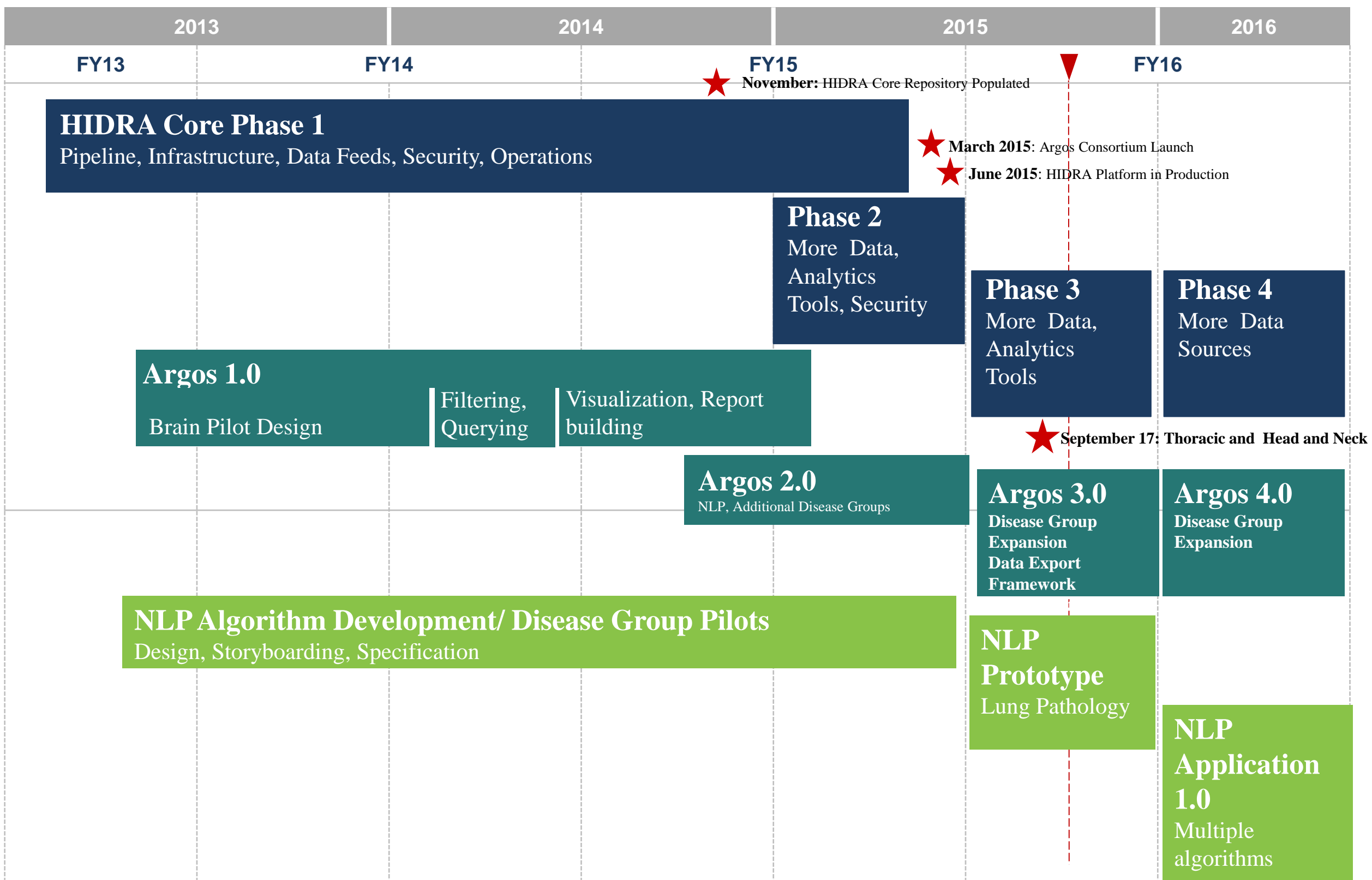
The Components - Staffing

LabKey

- Developer(s)
- Test Dev
- Admin/Management

Roughly 1.25 FTE annually

Fred Hutch

- NLP Engineer
- Abstractors
- Project Sponsors
- Project Manager
- Interns

Roughly 2.0 FTE annually

The Solution – A Demonstration in two parts

The Raw Text Pathology Reports

ObservationValue

NULL

_____

NULL

FINAL DIAGNOSIS:

A) Gallbladder, cholecystectomy: Gallbladder and one lymph node negative for carcinoma.

NULL

B) Right liver, hemihepatectomy:

1. Metastatic adenocarcinoma, 7.5 cm and 1.8 cm, 99% necrotic. Necrotic material is present at the liver resection margin (slide B5). The inked liver resection margin appears negative for viable carcinoma.

2. The background liver has mild macrosteatosis (15%), minimal non-specific portal based inflammation, likely secondary to mass effect, with no fibrosis.

NULL

C) Liver, new posterior margin, excision: Liver parenchyma is negative for carcinoma.

NULL

D) Right colon and terminal ileum, hemicolectomy: Colonic adenocarcinoma, moderately-differentiated, see Summary Cancer Data.

NULL

NULL

SUMMARY CANCER DATA:

Specimen and Tumor Location

Specimen type: Right hemicolectomy

Specimen length: 36cm

Tumor site: Right (ascending) colon (C18.2)

Characteristics and Extent of Neoplasm

Histologic type: Adenocarcinoma (81403)
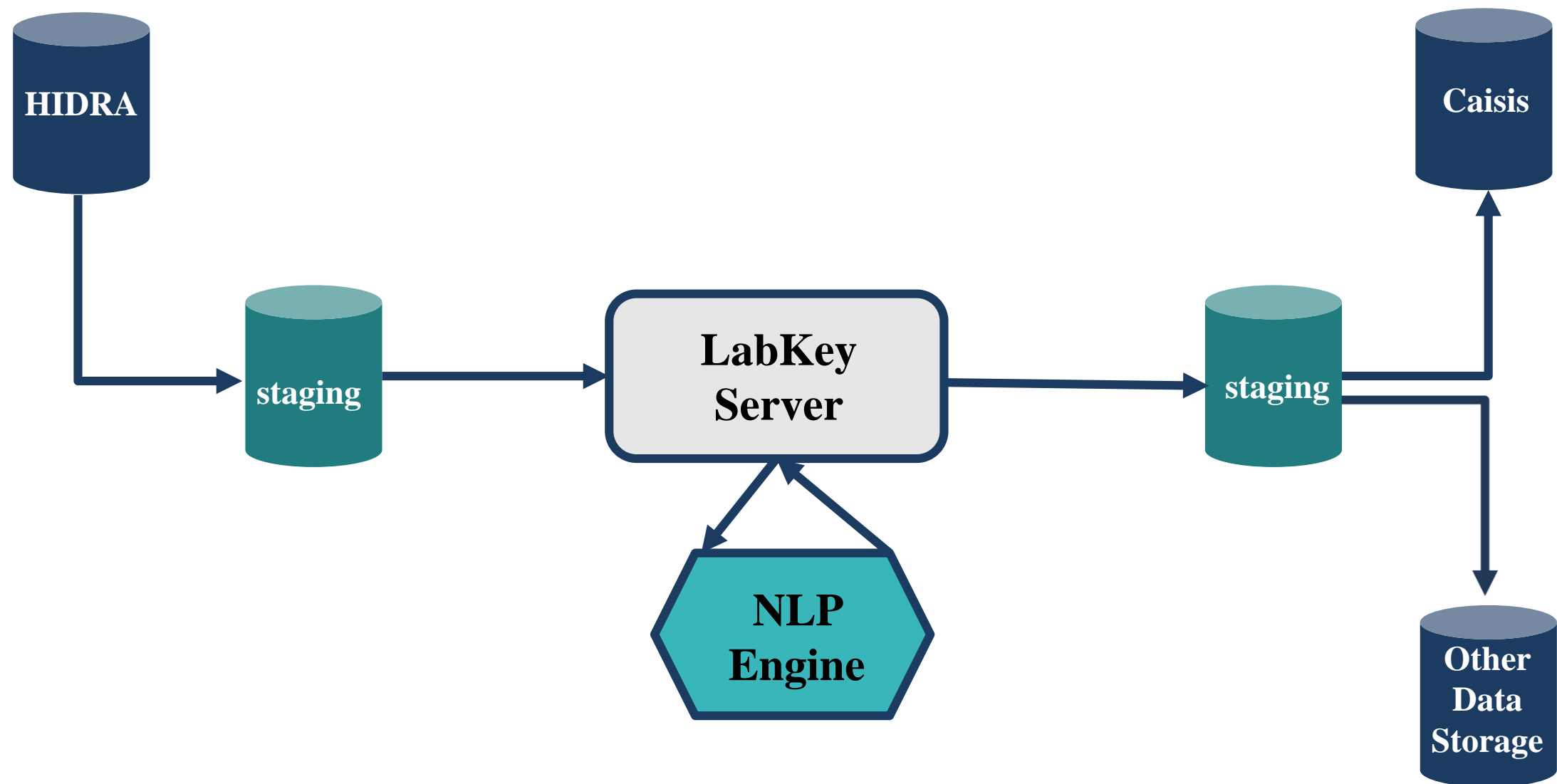
Histologic grade: Low-grade (well to moderately differentiated; >50% gland formation)

Tumor size: Greatest diameter: 5.3cm

Tumor perforation (macroscopic):   Not identified

Microscopic tumor extent:

Tumor invades through muscularis propria but does not penetrate any peritoneal surface

Tumor deposits: Not identified

Lymphatic [small vessel] Invasion (L): Not identified

Venous [large vessel] Invasion (V):   Not identified

Perineural invasion: Absent

Treatment effect: Extensive residual cancer

NLP Pipeline Demo

NLP

Admin ▾   Help (default) ▾   adam ▾

NLP

NLP Dashboard   ✏

Data Pipeline ▾

Show: Running   Errors   All

PROCESS AND IMPORT DATA   **SETUP**

Status	Created ▾	Description	Info
No data to show.			

NLP Reports ▾

VIEWS ▾   CHARTS ▾   EXPORT ▾   PRINT   PAGE SIZE ▾   1 - 6 of 6

View Results	Modify Results	Abstract Data	Report Id ▾	Job Run Id	MRN	Report No	Folder	Created	Created By	Modified	Modified By
VIEW ▸	MODIFY ▸	ABSTRACT ▸	6	6	U01F0121	SU-16-01011	NLP	2015-10-01	adam	2015-10-01	adam
VIEW ▸	MODIFY ▸	ABSTRACT ▸	5	5	U01F0121	SU-16-01011	NLP	2015-10-01	adam	2015-10-01	adam
VIEW ▸	MODIFY ▸	ABSTRACT ▸	4	4	U01F0121	SU-16-01011	NLP	2015-09-28	adam	2015-09-28	adam
VIEW ▸	MODIFY ▸	ABSTRACT ▸	3	3	U01F0121	SU-16-01011	NLP	2015-09-28	adam	2015-09-28	adam
VIEW ▸	MODIFY ▸	ABSTRACT ▸	2	2	U01F0121	SU-16-01011	NLP	2015-09-28	adam	2015-09-28	adam
VIEW ▸	MODIFY ▸	ABSTRACT ▸	1	1	U01F0121	SU-16-01011	NLP	2015-09-25	adam	2015-09-25	adam

<Select Web Part> ▾ ADD   <Select Web Part> ▾ ADD

Search LabKey Server

NLP   **NLP Dashboard**   ✎

Files

UPLOAD FILES   IMPORT DATA   ✉   👥 AUDIT HISTORY   ⚙ ADMIN

		Name	Import data from files into the database, or analyze data files	lified		Size	Created By	Description	Usages
☐	📁	argos_nlp_104							
☐	📁	configs							
☐	📁	nlpEngineInvocation							
☐	📁	single_simpson							
☑	📄	single_simpson.nlp.tsv		2015-09-25 05:51		6.3 KB	adam		nlp/single_simpson (ne...

▲ 🧪 fileset
  ▷ 📁 argos_nlp_104
  ▷ 📁 configs
  ▷ 📁 nlpEngineInvocation
  ▷ 📁 single_simpson

Name: single_simpson.nlp.tsv
Modified: 2015-09-25 05:51
Created By: adam
Size: 6.3 KB (6,442 bytes)
WebDav URL: /labkey/_webdav/NLP/%40pipeline/single_simpson.nlp.tsv

🔍 Search LabKey Server

📁 ▸ NLP   Admin ▾   Help ▾   adam ▾

NLP   NLP Dashboard   ✏️

Files

🔧 ⬆️ 🔄 📁 ⬇️ 🗑️ ✏️ ➡️ 🔧 | 📄 UPLOAD FILES 🗄️ IMPORT DATA ✉️ 👥 AUDIT HISTORY ⚙️ ADMIN

		Name	Last Modified	Size	Created By	Description	Usages
	☐	📁 argos_nlp_104					
	☐	📁 configs					
	☐	📁 nlpEngineInvocation					
	☐	📁 single_simpson					
	☑	📊 single_simpson.nlp.tsv					nlp/single_simpson (ne...

Files tree:
- 🧪 fileset
  - ▸ 📁 argos_nlp_104
  - ▸ 📁 configs
  - ▸ 📁 nlpEngineInvocation
  - ▸ 📁 single_simpson

Import Data ☒

using 1 out of 1 file(s) 🛈

Import ICEMR Species-specific PCR using 1 out of 1 file(s) 🛈	⚪ Create New ICEMR Species-specific PCR Assay Design
Import IR Spectra using 1 out of 1 file(s) 🛈	⚪ Create New IR Spectra Assay Design
Import Noblis Simple using 1 out of 1 file(s) 🛈	⚪ Create New Noblis Simple Assay Design
Import Particle Size using 1 out of 1 file(s) 🛈	⚪ Create New Particle Size Assay Design
Import Protein Expression Matrix using 1 out of 1 file(s) 🛈	⚪ Create New Protein Expression Matrix Assay Design
Import Provisional HPLC using 1 out of 1 file(s) 🛈	⚪ Create New Provisional HPLC Assay Design
Import Text or Excel Assay using 1 out of 1 file(s) 🛈	⚪ Create New General Assay Design
Import Visual using 1 out of 1 file(s) 🛈	⚪ Create New Visual Assay Design
NLP engine invocation and results using 1 out of 1 file(s) 🛈	🔘 NLP engine invocation and results

IMPORT   **CANCEL**

Name: single_simpson.nlp.tsv
Modified: 2015-09-25 05:51
Created By: adam
Size: 6.3 KB (6,442 bytes)
WebDav URL: /labkey/_webdav/NLP/%40pipeline/single_simpson.nlp.tsv

LabKey Server

Search LabKey Server

NLP

Admin ▾   Help (default) ▾   adam ▾

NLP

NLP Dashboard   ✎

NLP engine invocation and results

Choose an existing protocol or define a new one.

Analysis Protocol:	`<New Protocol> ▾`
Protocol Name:	
Protocol Description:	
File(s):	single_simpson.nlp.tsv

Parameters:	`<?xml version="1.0"?>`
	`<bioml>`
	`<!-- Override default parameters here. -->`
	`</bioml>`

☑ Save protocol for future use

ANALYZE   CANCEL

Search LabKey Server

Admin ▾   Help (default) ▾   adam ▾

NLP

NLP Dashboard   ✏

NLP engine invocation and results

Choose an existing protocol or define a new one.

Analysis Protocol:	\<New Protocol\> ▾
Protocol Name:	\<New Protocol\>
	argos_nlp_092
	argos_nlp_104
Protocol Description:	Linguamatics
	OpenNLP
File(s):	single_simpson.nlp.tsv
| Parameters: | ```
<?xml version="1.0"?>
<bioml>
<!-- Override default parameters here. -->
</bioml>
``` |

☑ Save protocol for future use

ANALYZE   CANCEL

NLP engine invocation and results

Choose an existing protocol or define a new one.

Analysis Protocol:	\<New Protocol\> ▼
Protocol Name:	LKUC_Argos_NLP
Protocol Description:	Run pathology NLP pipeline
File(s):	single_simpson.nlp.tsv
Parameters:	

```xml
<?xml version="1.0"?>
<bioml>
<note label="version" type="input">argos_nlp_104</note>
<note label="diseaseGroup" type="input">lung</note>
<note label="docType" type="input">pathology</note>
<note label="allowUnknownOutputProperties" type="input">true</note>
<note label="applyAlgorithms" type="input">true</note>
</bioml>
```

☑ Save protocol for future use

ANALYZE   **CANCEL**

NLP

NLP Dashboard   ✎

Pipeline Jobs >

nlp/single_simpson (LKUC_Argos_NLP)

Job Status

Created	2015-10-01 16:08
Modified	2015-10-01 16:08
Email	adam@rauch.com
Status	COMPLETE
Info	
File Path	C:/nlp/nlpEngineInvocation/LKUC_Argos_NLP/single_simpson.log
Files	single_simpson.log

[SHOW GRID] [DATA] [RUN] [BROWSE FILES]

single_simpson.log

SHOW FULL LOG FILE ▸

```
01 Oct 2015 16:08:54,703 INFO : Starting to run task 'org.labkey.api.pipeline.cmd.CommandTask:nlpEngineCommand' at location 'webserver'
01 Oct 2015 16:08:54,740 INFO : Copying C:\nlp\nlpEngineInvocation\LKUC_Argos_NLP\nlpEngineInvocation.xml to C:\nlp\nlpEngineInvocation\LKUC_Argos_NLP\single_simpson.work\nlpEngineInvocation.xml
01 Oct 2015 16:08:54,768 INFO : python output
01 Oct 2015 16:08:54,781 INFO : =======================================
01 Oct 2015 16:08:54,786 INFO : Working directory is C:\nlp\nlpEngineInvocation\LKUC_Argos_NLP\single_simpson.work
01 Oct 2015 16:08:54,797 INFO : running: C:\Program Files (x86)\Python27\python c:\nlp\argos_nlp_104\nlp_engine.py -f ..\..\..\single_simpson.nlp.tsv -g lung -t pathology -o single_simpson.nlp.json
01 Oct 2015 16:08:56,191 INFO : Moving C:\nlp\nlpEngineInvocation\LKUC_Argos_NLP\single_simpson.work\single_simpson.nlp.json to C:\nlp\nlpEngineInvocation\LKUC_Argos_NLP\single_simpson.nlp.json
01 Oct 2015 16:08:56,195 INFO : Successfully completed task 'org.labkey.api.pipeline.cmd.CommandTask:nlpEngineCommand'
01 Oct 2015 16:08:56,247 INFO : Starting to run task 'org.labkey.api.exp.pipeline.XarGeneratorId' at location 'webserver'
01 Oct 2015 16:08:56,254 INFO : Checking files referenced by experiment run
01 Oct 2015 16:08:57,089 INFO : Experiment run 'nlp/single_simpson (LKUC_Argos_NLP)' complete
01 Oct 2015 16:08:57,313 WARN : NLP Engine reported the following errors in this run.
01 Oct 2015 16:08:57,316 WARN : Error Type: Warning Message: Output directory already existed at program runtime. It was not empty and was deleted
01 Oct 2015 16:08:57,360 INFO : Importing C:\nlp\single_simpson\SU-16-01011.txt for jobId 7
01 Oct 2015 16:08:57,438 INFO : Successfully completed task 'org.labkey.api.exp.pipeline.XarGeneratorId'
```

NLP   NLP Dashboard   ✎

NLP Report View

```
** DEMOGRAPHICS DRAWN FROM PATHOLOGY REPORT **
PATIENT:    VAN HOUTEN, MILHOUSE
MRN:        U01F0121    (Springfield Medical Center)
DOB:        Feb 30 1945
SEX:        M
.
CASE:   SU-16-01011    COLLECTED: Feb 27 2016    RECEIVED: Apr 22 2016
MATERIALS RECEIVED:

Label    Consult  Accession No     Blocks/Slides  Description
  A    OS14-1059     0B,9S          Colon, right hemicolectomy

_____

FINAL DIAGNOSIS:
A) Marvin Monroe Memorial Hospital, Springfield, ST; OS14-01059 (02/27/2016)
Portion of terminal ileum, cecum, and ascending colon, resection:  Invasive, moderately differentiated colonic adenocarcinoma.  Please see the Cancer
Summary below.

SUMMARY CANCER DATA:
Specimen and Tumor Location
Specimen type: Right hemicolectomy
Tumor site:    Cecum (C18.0)
Characteristics and Extent of Neoplasm
Histologic type:    Adenocarcinoma (81403)
Histologic grade:   Low-grade (well to moderately differentiated; >50% gland formation)
Tumor size:    Greatest diameter: 5cm
Tumor perforation (macroscopic):   Not identified
Microscopic tumor extent:
Tumor invades through muscularis propria but does not penetrate any peritoneal surface
Tumor deposits:    Not identified
Lymphatic [small vessel] Invasion  (L): Not identified
Venous [large vessel] Invasion (V):     Not identified
Perineural invasion:    Absent
Final Surgical Resection Margins
Grossly positive margin(s):   None
Microscopically positive margin(s):    None
Lymph Node Status
Node summary:  Nodes with carcinoma: 0    / Total nodes examined: 15
Minimum Pathologic Stage (AJCC, 7th ed., 2010)
Primary tumor (pT): pT3: Tumor invades through the muscularis propria into pericolorectal tissues
Regional lymph nodes (pN):     pN0: No regional lymph node metastasis
Other Findings
Tumor-Infiltrating Lymphocytes per high-power field:   1
Peri-tumoral lymphocytic response: Mild/Moderate (up to 2 aggregates/section)
Additional pathological findings:  Adenoma(s)

SY/pwt
```

Field Results

Field ▲	Value	Confidence
⊟ **TargetTable: Pathology**		
PathDate	2016-04-22T00:00:00	1
PathHistology	Adenocarcinoma	0.9
PathHistologyGrade	moderately differentiated	0.9
PathQuality	REV	0.98
PathSite	Colorectal	0.7
PathSpecimenType	Resection	0.7
Pathologist	Ned M Fland~~ Start: 639, Stop: 644~~ Start: 694, Stop: 701	1
⊟ **TargetTable: PathologyFinding**		
PathFindGrade	moderately differentiated	0.9
PathFindHistology	Adenocarcinoma	0.9
PathFindSite	Colorectal	0.85
PathSpecimenType	Resection	0.7
⊟ **TargetTable: PathologyStageGrade**		
PathGrade	moderately differentiated	0.9
PathStageN	pN0	0.92
PathStageSystem	AJCC 7	0.95
PathStageT	pT3	0.98

🔍 Search LabKey Server

📁 ▸ NLP   Admin ▾   Help (default) ▾   adam ▾

NLP   NLP Dashboard ✏️

NLP Report View

```
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Tumor deposits:      Not identified
Lymphatic [small vessel] Invasion  (L): Not identified
Venous [large vessel] Invasion (V):     Not identified
Perineural invasion:     Absent
Final Surgical Resection Margins
Grossly positive margin(s):   None
Microscopically positive margin(s):     None
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Node summary:  Nodes with carcinoma: 0    / Total nodes examined: 15
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Peri-tumoral lymphocytic response: Mild/Moderate (up to 2 aggregates/section)
Additional pathological findings:  Adenoma(s)



SY/pwt

_____


CLINICAL DATA:
Malignant neoplasm of rectosigmoid junction.  The case is for review.  The patient will be seen by Dr. Nick Riviera at Springfield GI Clinic.




Selma Bouvier MBBS
GI Path Fellow
04/21/2016
Ned M Flanders MD, PhD
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Field Results

Field ▲	Value	Confidence
⊟ **TargetTable: Pathology**		
PathDate	2016-04-22T00:00:00	1
PathHistology	Adenocarcinoma	0.9
PathHistologyGrade	moderately differentiated	0.9
PathQuality	REV	0.98
PathSite	Colorectal	0.7
PathSpecimenType	Resection	0.7
Pathologist	Ned M Flanders	1
⊟ **TargetTable: PathologyFinding**		Start: 2355, Stop:
PathFindGrade	moderately differentiated	0.9
PathFindHistology	Adenocarcinoma	0.9
PathFindSite	Colorectal	0.85
PathSpecimenType	Resection	0.7
⊟ **TargetTable: PathologyStageGrade**		
PathGrade	moderately differentiated	0.9
PathStageN	pN0	0.92
PathStageSystem	AJCC 7	0.95
PathStageT	pT3	0.98

NLP Dashboard ✎

NLP Report View

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** DEMOGRAPHICS DRAWN FROM PATHOLOGY REPORT **
PATIENT:   VAN HOUTEN, MILHOUSE
MRN:       U01F0121    (Springfield Medical Center)
DOB:       Feb 30 1945
SEX:       M
.
CASE:   SU-16-01011    COLLECTED: Feb 27 2016    RECEIVED: Apr 22 2016
MATERIALS RECEIVED:

Label   Consult  Accession No    Blocks/Slides  Description
 A    OS14-1059     0B,9S         Colon, right hemicolectomy

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FINAL DIAGNOSIS:
A) Marvin Monroe Memorial Hospital, Springfield, ST; OS14-01059 (02/27/2016)
Portion of terminal ileum, cecum, and ascending colon, resection:  Invasive, moderately differentiated colonic adenocarcinoma.  Please see the Cancer
Summary below.

SUMMARY CANCER DATA:
Specimen and Tumor Location
Specimen type: Right hemicolectomy
Tumor site:    Cecum (C18.0)
Characteristics and Extent of Neoplasm
Histologic type:   Adenocarcinoma (81403)
Histologic grade:  Low-grade (well to moderately differentiated; >50% gland formation)
Tumor size:    Greatest diameter: 5cm
Tumor perforation (macroscopic):   Not identified
Microscopic tumor extent:
Tumor invades through muscularis propria but does not penetrate any peritoneal surface
Tumor deposits:    Not identified
Lymphatic [small vessel] Invasion  (L): Not identified
Venous [large vessel] Invasion (V):    Not identified
Perineural invasion:   Absent
Final Surgical Resection Margins
Grossly positive margin(s):  None
Microscopically positive margin(s):    None
Lymph Node Status
Node summary:  Nodes with carcinoma: 0   / Total nodes examined: 15
Minimum Pathologic Stage (AJCC, 7th ed., 2010)
Primary tumor (pT): pT3: Tumor invades through the muscularis propria into pericolorectal tissues
Regional lymph nodes (pN):    pN0: No regional lymph node metastasis
Other Findings
Tumor-Infiltrating Lymphocytes per high-power field:   1
Peri-tumoral lymphocytic response: Mild/Moderate (up to 2 aggregates/section)
Additional pathological findings:  Adenoma(s)
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Field Results

Field ▲	Value
⊟ TargetTable: NodePathFinding	
PathFindExtension	
PathFindHistology	
PathFindMaxDim	
PathFindNumNodes	15
PathFindPosNodes	0
PathFindSide	
PathFindSite	
⊟ TargetTable: PathTest	
PathDate	
PathNotes	
PathQuality	
PathResult	
PathTest	
⊟ TargetTable: Pathology	
PathDate	2016-04-22T00:00:00
PathHistology	Adenocarcinoma
PathHistology2	
PathHistologyGrade	moderately differentiated
PathQuality	REV
PathSide	
PathSite	Colorectal
PathSpecimenType	Resection
PathSubsite	
Pathologist	Ned M Flanders
⊟ TargetTable: PathologyFinding	

CANCEL   SAVE

NLP Pipeline Demo

The Pathology Results in Caisis

The Pathology Results in Argos