

June 25, 2015



Decision Support for Classification and Declassification

The Center for Content Understanding
Applied Research Laboratories
The University of Texas at Austin



Presentation Goals and Outline

- **Introduce the National Action Plan efforts and the Center for Content Understanding (CCU)**
- **Answer “What is Content Understanding?”**
- **Describe CCU’s approach for Sensitive Content Identification and Marking (SCIM)**
- **Provide an overview and results of pilot projects**
 - Completed efforts
 - Status and plans for the Reagan email collection



National Action Plan



“Pilot Technological Tools to Analyze Classified Presidential Records. The Central Intelligence Agency and NARA will pilot the use of new tools to provide classification reviewers with search capability for unstructured data and automate initial document analysis, beginning with Presidential Records from the Reagan Administration’s classified e-mail system.”

The Center for Content Understanding at ARL:UT



- Applied Research Laboratories, The University of Texas at Austin (ARL:UT) is a Navy University Affiliated Research Center (UARC)
- The Center for Content Understanding (CCU) was formed at ARL:UT in 2012 to address government's need to reason over content at scales too large to achieve with manual review alone.

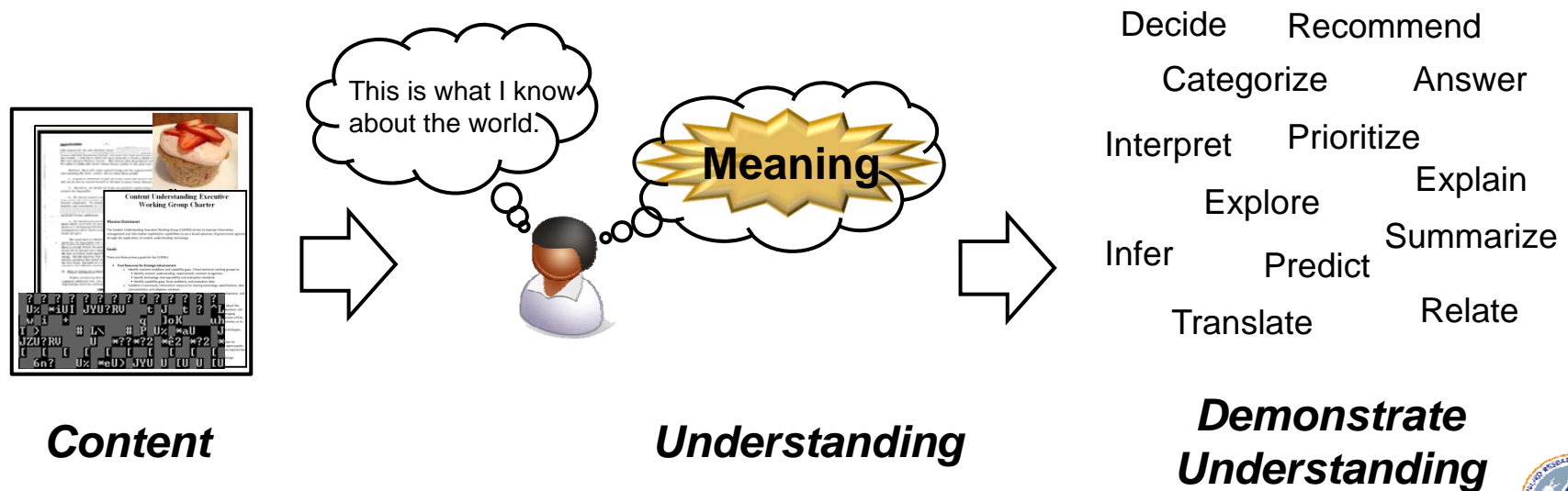


What is Content Understanding?

Understanding = comprehension

Content = something that is contained

- In the field of Content Understanding the containers of interest are the types of artifacts typically created by people to store information (such as text, recorded speech, images, etc.)
- Content Understanding is the comprehension of the information encoded in an artifact such as a text document, recorded speech, or an image.



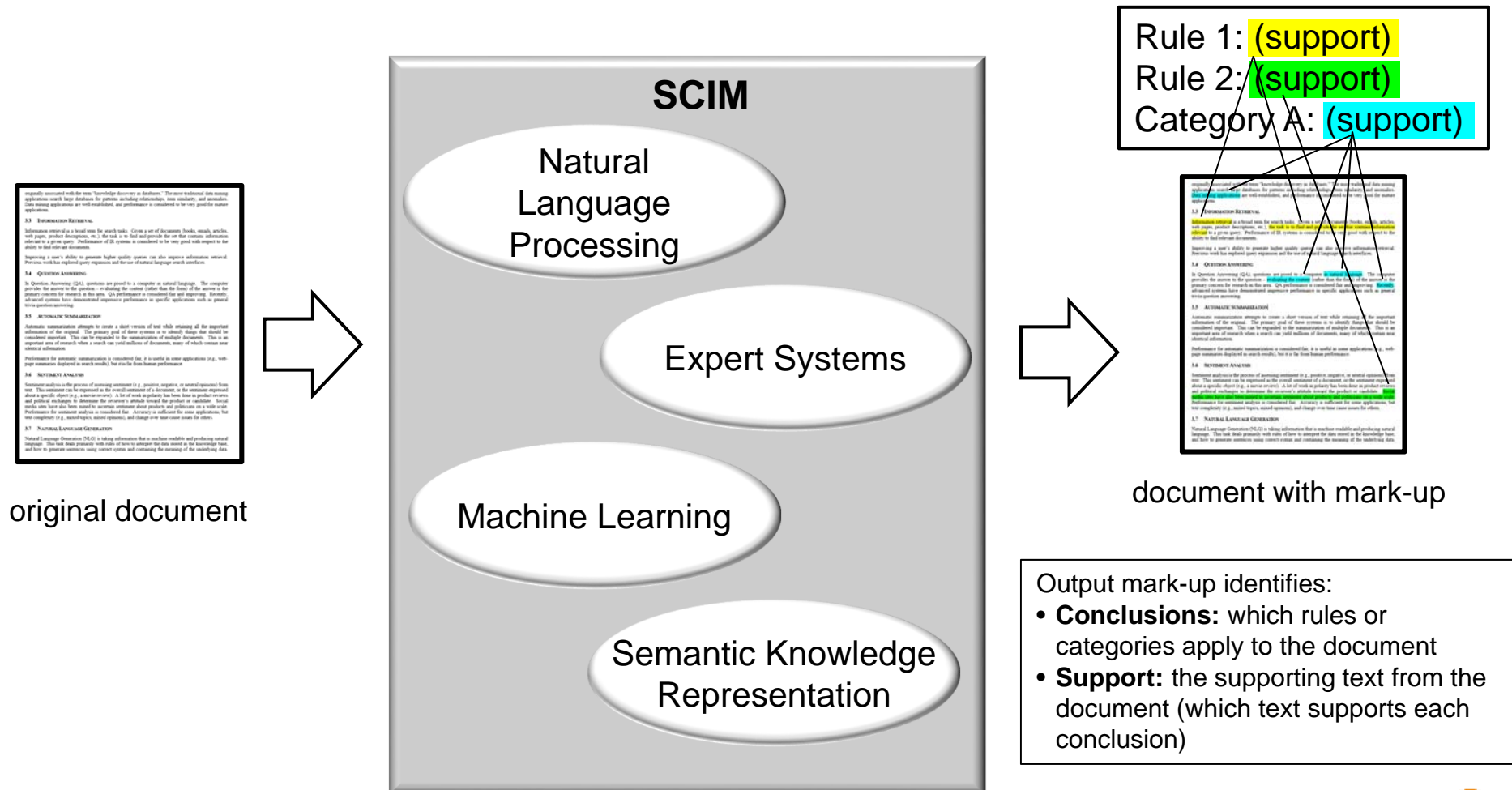
Benefits of Automation for Decision Support

- **Volume of records to review**
 - Machine processing throughput for documents is more than 3 pages per second per core
- **Limited human resources**
 - Decision support technology typically allows humans to work more efficiently (traditional roles: prioritizing, highlighting, filtering, sorting, etc.)
- **Complexity of review decisions**
 - Decision support technology typically allows humans to work more effectively (traditional roles: access to external resources such as lookup tables, skill-based routing, highlighting, etc.)
- **Plurality of equity-holders per document**
 - Decision support technology can apply multiple reasoning processes with equal effectiveness
- **Consequences of errors**
 - Machine processing is consistent, repeatable, tireless.



Sensitive Content Identification and Marking (SCIM)

Approach: Decision Support via Document Mark-Up



Example of “Sensitive” Content Identification

A seismic event in Asia

Chinese earthquake kills more than 150
Toll of injured tops 2,600 as buildings are destroyed and landslides are triggered

Didi Tang in Beijing
The Observer, Saturday 20 April 2013



A woman weeps outside the wreckage of her home. Photograph: AP

A powerful earthquake struck the steep hills of China's south-western Sichuan province on Saturday, leaving at least 156 people dead and more than 2,600 injured, nearly five years after a devastating quake wreaked widespread damage across the region.

The earthquake toppled buildings, triggered landslides and disrupted phone and power connections in the mountainous Lushan county. The village of Longmen was hit particularly hard, with authorities saying nearly all the buildings had been destroyed in a frightening, minute-long tremor.

The quake, which was measured by the earthquake administration at a magnitude of 7.0 and by the US Geological Survey at 6.6, struck shortly after 8am, when many people were at home, sleeping or having breakfast. People in their underwear and wrapped in blankets ran into the streets as far away as Chengdu, 115 kms east of Lushan. Chengdu's airport shut down for about an hour.

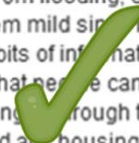


Lushan is situated where the Sichuan plain meets foothills that eventually rise to the Tibetan plateau and sits atop the Longmenshan fault. It was along that faultline that a devastating magnitude 7.9 quake struck on 12 May 2008, leaving more than 90,000 dead or missing. "It was just like 12 May," Liu Xi, a writer in Ya'an city who was jolted awake by Saturday's quake, said via a private message on his account on Sina Corporation's Twitter-like Weibo service. "All the home decorations fell at once and the old house cracked."

Not a seismic event in Asia

Get shaking and make an earthquake cake
EARTHQUAKE CAKE SEPTEMBER 7, 2011 BY: BEVERLY MUCHA

The weather outside has been frightful and it's nowhere around the Christmas holidays. So many disasters have struck many people whether from flooding, earthquakes, tornadoes or hurricanes. It sure makes that saying seem mild since it usually refers to snow accumulation. Each day the news bring more tidbits of information on how much destruction has occurred as well as all the resources that people can turn to for help. Prayers from all over the world are spoken so those living through these stressful times causing many hardships are blessed and offered aid, housing and a way to rebuild their lives once again.



View slideshow: Get shaking and make an earthquake cake
(<http://www.examiner.com/slideshow/getshakingandmakeanearthquakecake>)

There is one kind of rumble that people don't mind hearing about. That is the rumble that is heard within oneself when they get hungry or have a yen for something sweet and delicious. This is a recipe that resembles the other kind of rumble so much that it really doesn't stay together well after it is baked. This cake (<http://www.examiner.com/topic/cake>) will have you

SCIM takes advantage of the

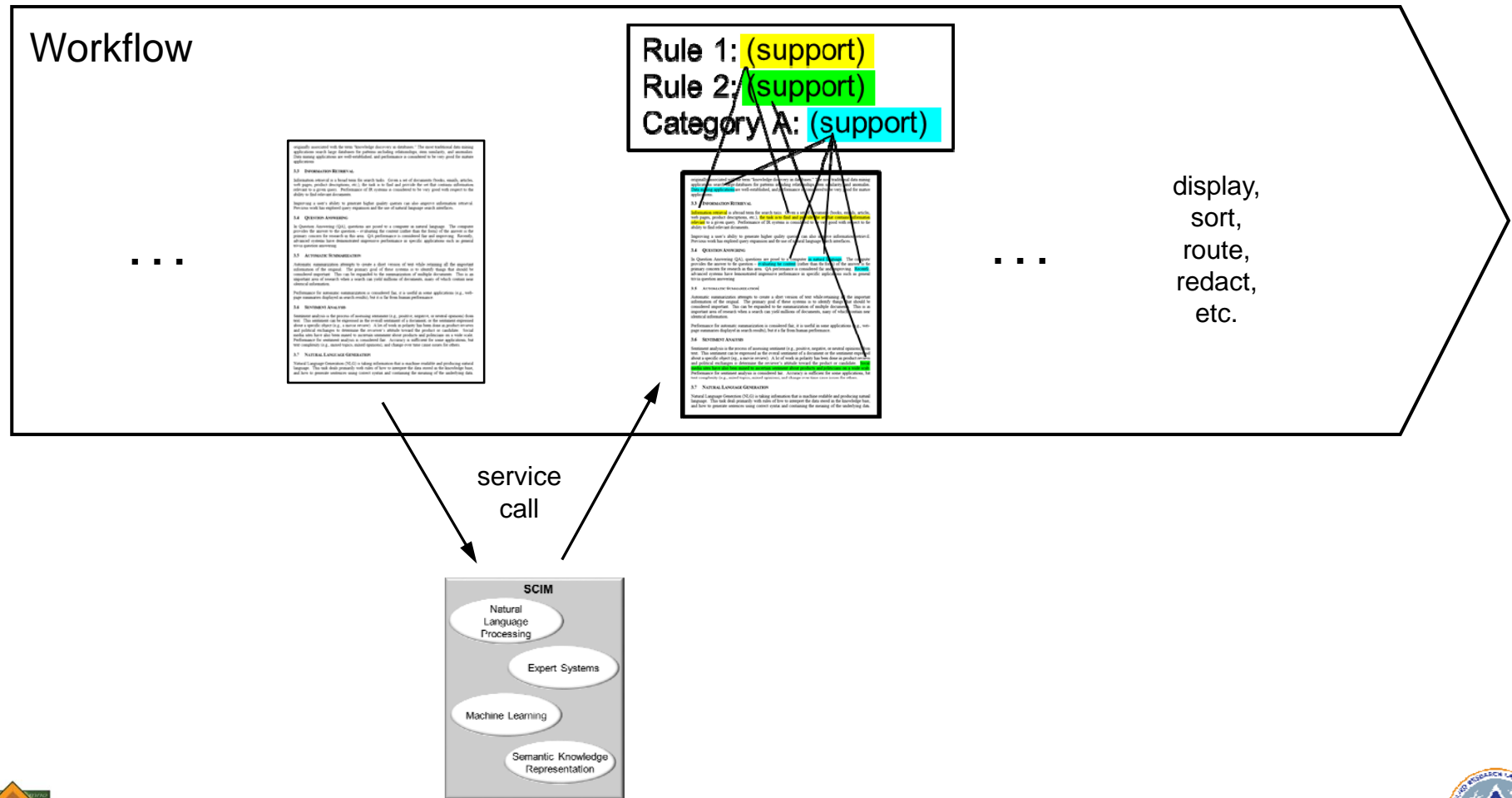
- importance of *concepts* vs dirty words
- importance of the *context* in which concepts occur

Pilot Efforts in Content Understanding

- **Decision Support for Classification Portion Marking**
 - Proof-of-Concept (December 2010)
- **Decision Support for Quality Assurance (QA) Review in Document Declassification Review and Release**
 - Deployed Application (June 2012)
- **Decision Support for Equity Identification for Presidential Email Records**
 - Initial Proof-of-Concept (September 2014)
 - Enhancements and Performance Validation (underway)

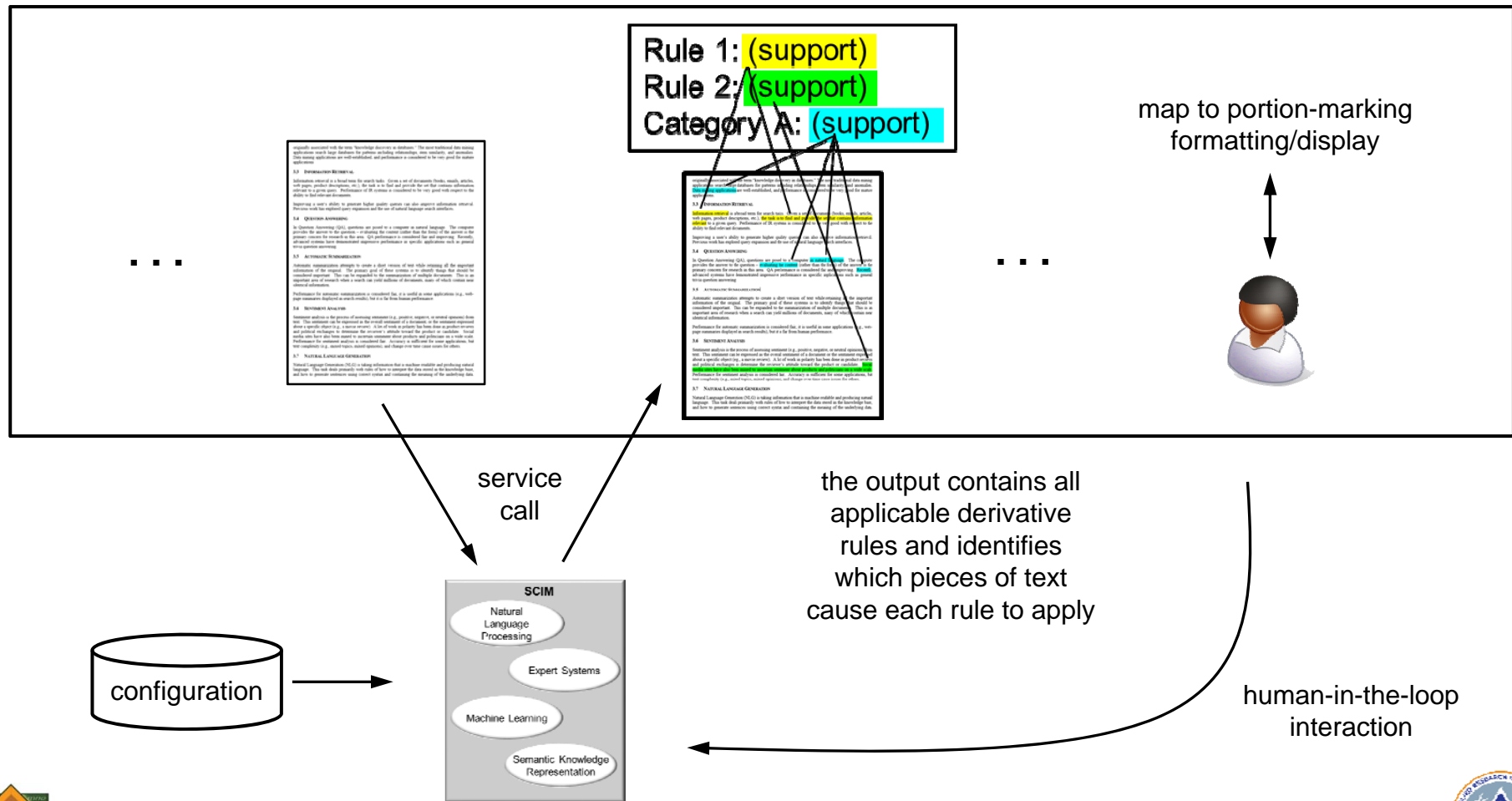


Workflow Integration for User Support



Pilot 1: Portion Classification Decision Support

SCIM identifies classification guide derivative rule suggestions

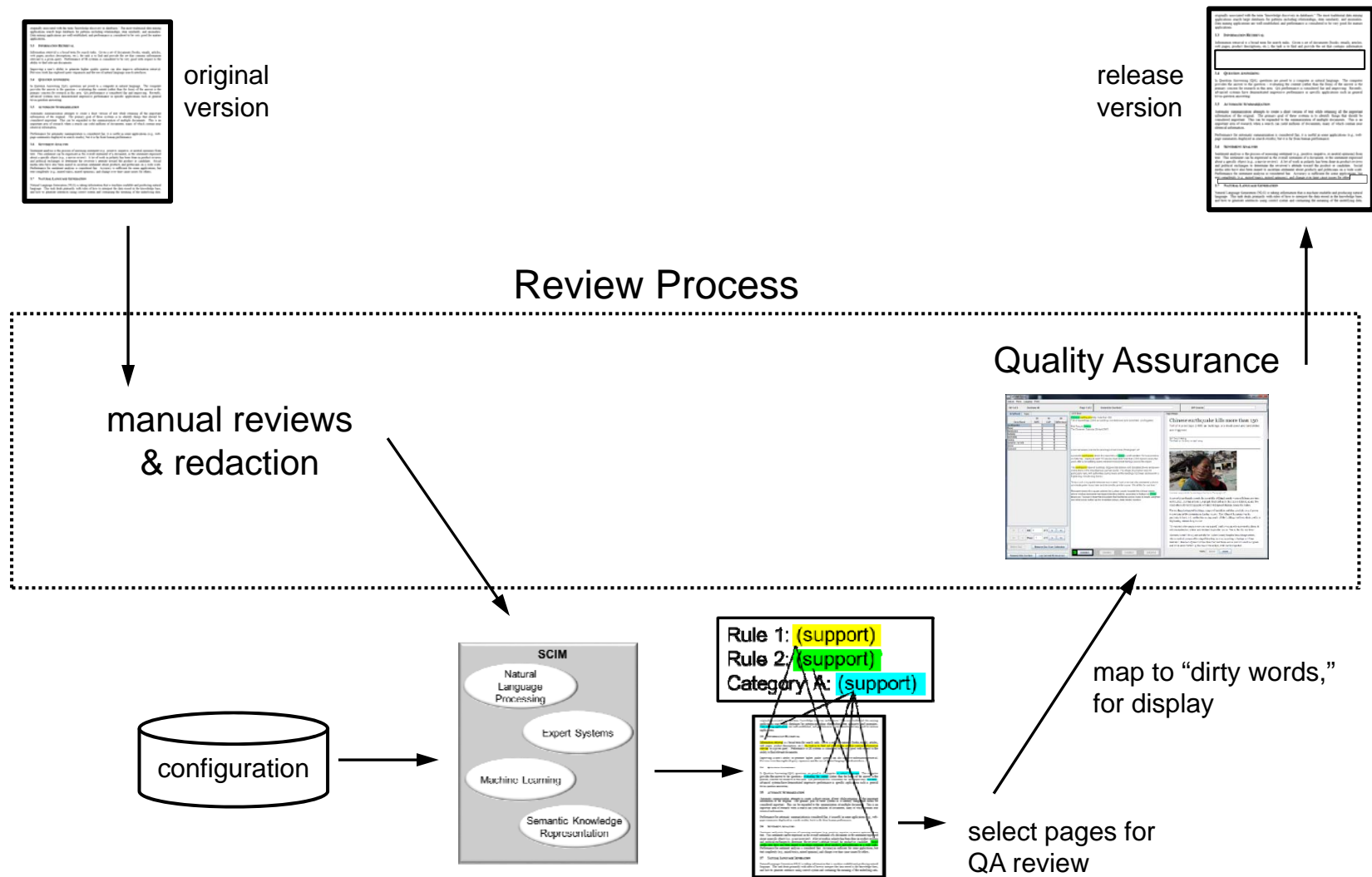


Pilot 1: Portion Classification Results

- **Lessons Learned:**
 - **SCIM produced highly accurate suggestions for portion marking**
 - 98% accuracy on small test sets (300 to 400 portions, not statistically significant)
 - **Identifying ground truth classification rationale is difficult**
 - Portion-marked documents do not identify rationale (i.e., which rules apply and which text supports those rules)
 - Subject matter experts find it difficult to express specifics for rationale
 - Disagreement is common among subject matter experts about rationale
 - **Classification guides need revision**
 - **Access to data for testing and development is difficult to justify (need to know)**



Pilot 2: QA for Declassification Review

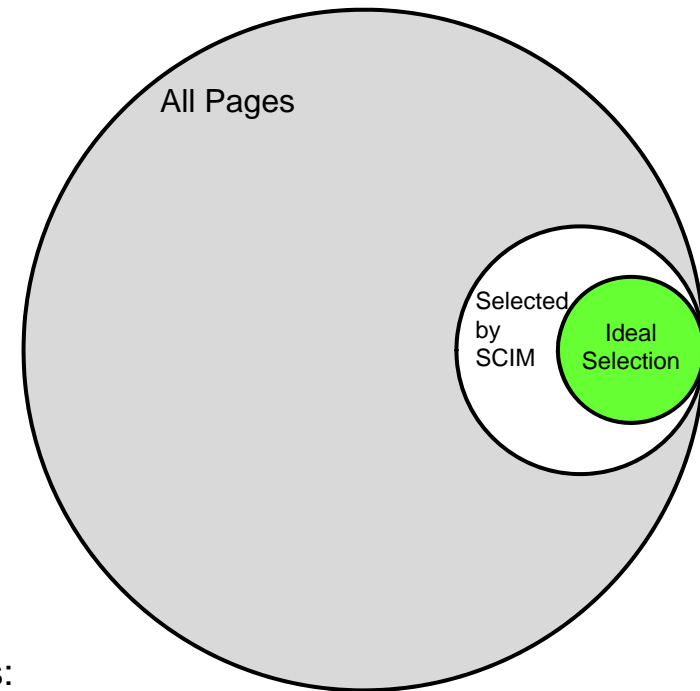
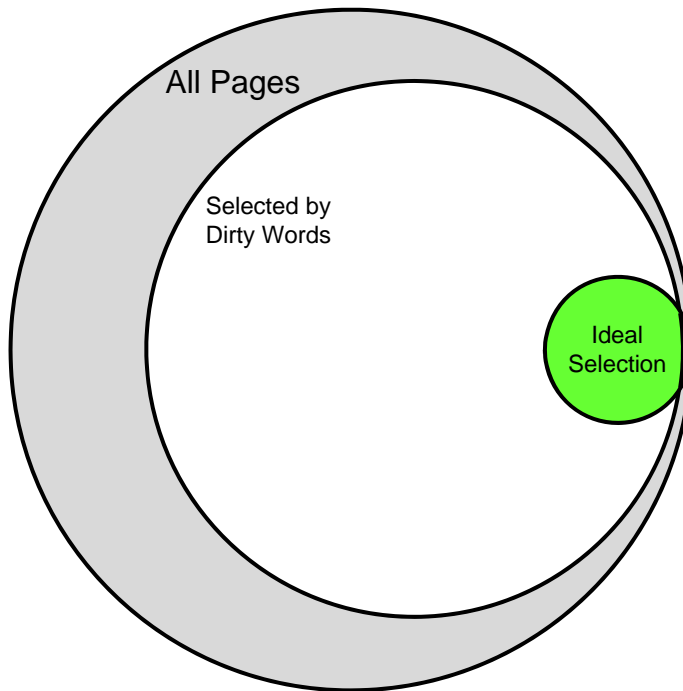


Pilot 2: QA Decision Support Results

BEFORE

~160,000 pages

AFTER



Improvements:

Reduced pages-selected from 66% to 14%
(over 82,000 less false positives)

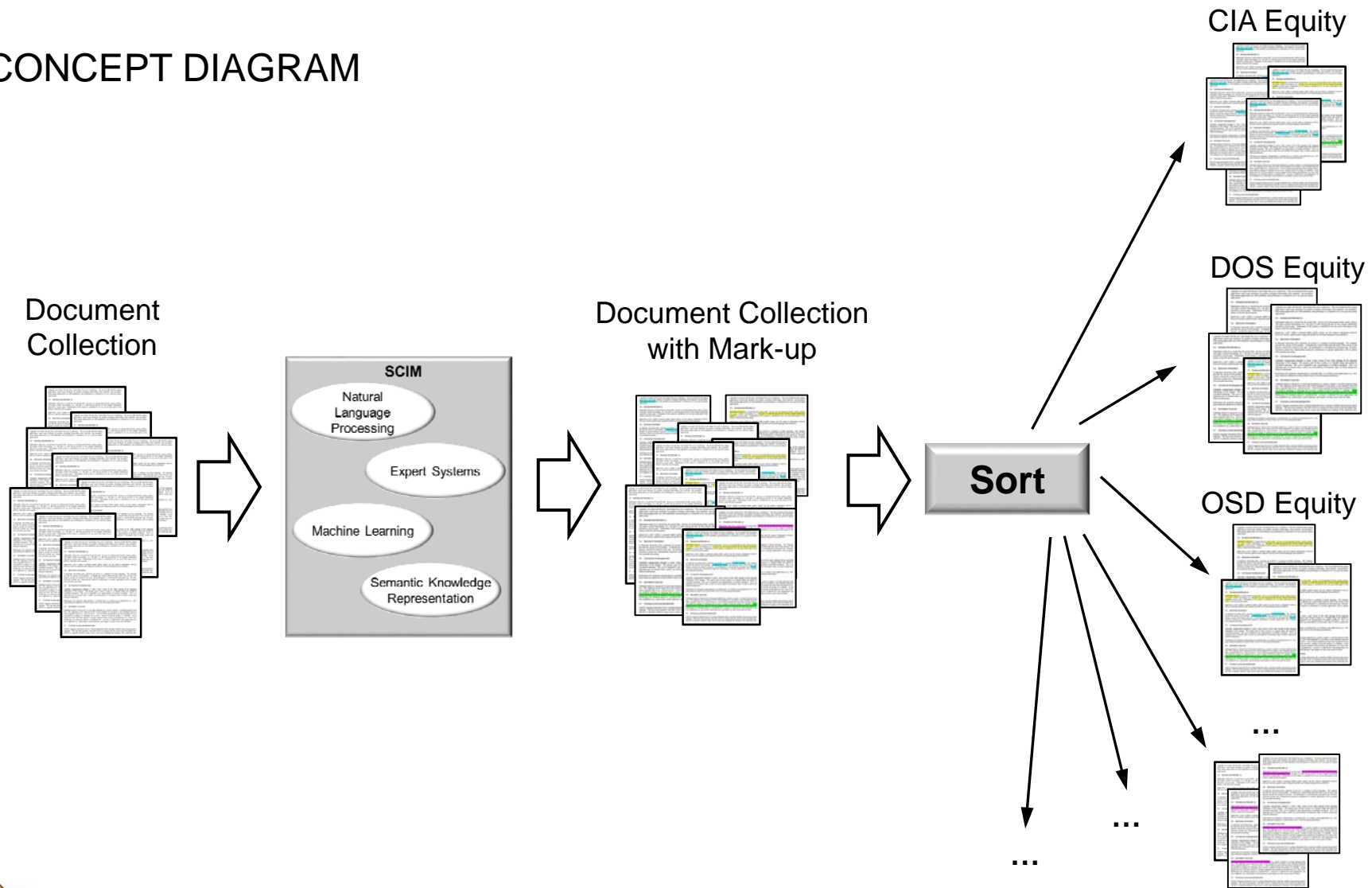
Correctly selected all the same desired pages

Found 96% of previously missed pages



Pilot 3: Equity Id for Presidential Email Records

CONCEPT DIAGRAM



Pilot 3: Reagan Presidential Emails

- The emails were collected at the end of the Reagan Administration and stored as electronic records
- The collection contained ~80,000 email records from the PROFS email system, ranging over all years of the Reagan Administration.
- The format of the emails was extremely difficult for humans to read
- Initial processing tasks:
 - Parse into individual email records
 - Normalize usernames using email meta-data
 - Identify thread groupings
 - Create TIFF representations for formal review process



Pilot 3: Results for Presidential Email Records

- **Status:**
 - **Completed all parsing, normalization, thread identification and basic processing**
 - Delivered processed emails back to NARA
 - **Initial proof-of-concept for equity id demonstrated September 2014**
- **Plan Forward:**
 - **Formal process for review and release of emails is underway**
 - **CCU is enhancing the SCIM configuration to extend equity id capabilities**
 - CCU developers are consulting with Subject Matter Experts (SMEs) to identify/encode rationale for additional equity referral decisions
 - The formal review process is identifying ground truth for equities in emails, CCU will use this ground truth for validation
 - Effort ends late 2015 when current funding is exhausted

