

NLP research trend in the last five years and VA NLP research accomplishments

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Health Services Researcher

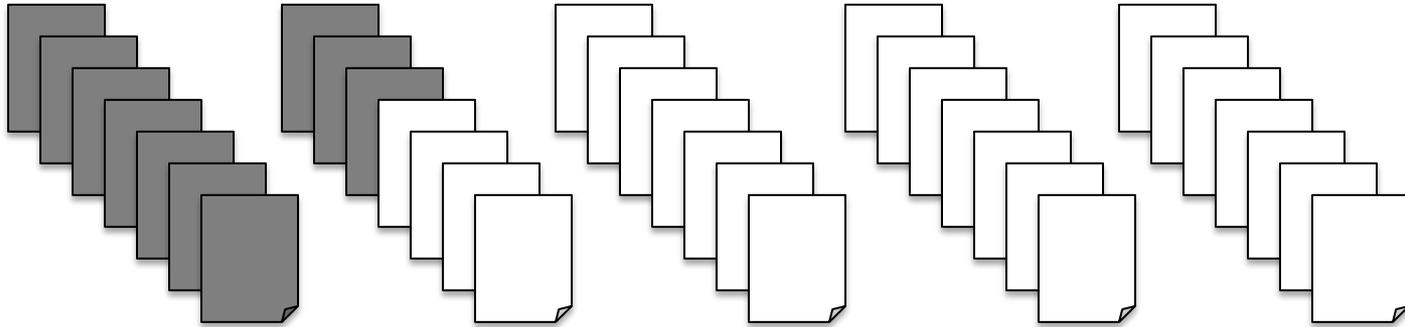
Salomeh Keyhani
San Francisco VA



Is surgery or medication better
for stroke on patients with
carotid stenosis?

2008 – unable to do
the research

How do I find reports describing carotid studies?



MRI, CT, Ultrasound, Angiograms of the NECK

- Not all describe carotid study

How do I determine if a patient had significant stenosis in right internal carotid artery?

FINDINGS: There was extensive **plaque** seen in the proximal right internal carotid artery. Only very mild atherosclerotic **plaque** was seen in the proximal left ICA. No **stenosis** in the left external carotid.

IMPRESSION:

- 1). Very severe **diameter reduction** 80-99% right proximal ICA.
- 2). Less than 20% **stenosis** in the left ICA.

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Negation

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Severity

Negation

Location

I need someone with NLP expertise!

- Where do I look?
- How long will it take until they can get access to VA data?
- Do they understand the peculiarities of VA reports?
- How will they create train and test data?
- Can we install their NLP tool in the VA firewall?

NLP with the VA

2008

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Now

- NLP expertise/partners
- Annotation processes
- NLP tools

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2015 – leveraging NLP
to make it possible

State of NLP in the VA

1. NLP has shown tremendous impact within the VA
2. NLP research within the VA contributes to the science of clinical NLP
3. Synergy within and outside of VA NLP community

Impact

NLP Expertise

Supporting
Research

NLP Development &
Application

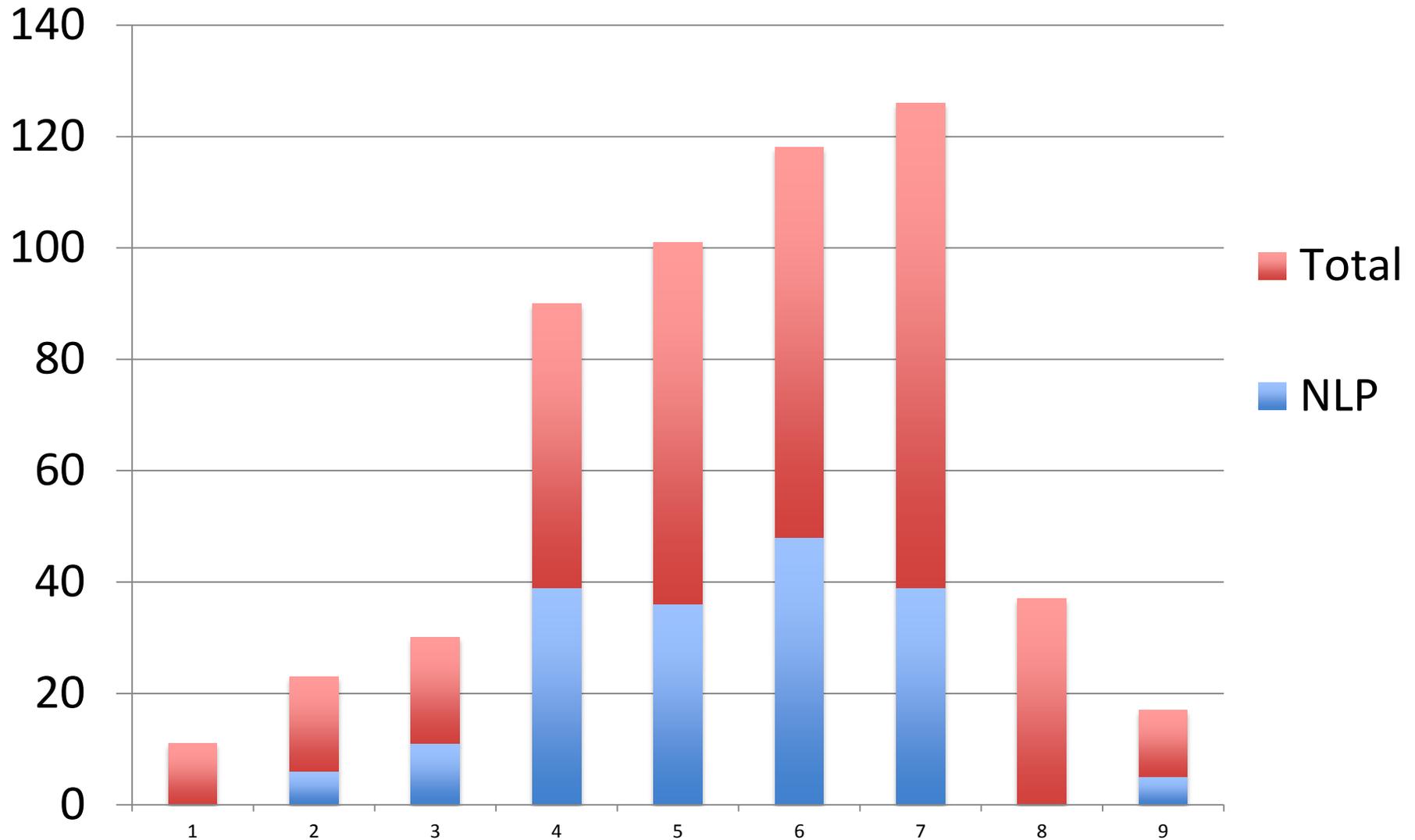
New Variables in
CDW

NLP Expertise in the VA

Developed and recruited



26-44% of VA publications use NLP



Supporting Health Services Research

VA Grants

Cognitive Support
Informatics for
Nurse Medication
Stewardship

Charlene Weir
Salt Lake City

Automated
Surveillance for
Patients with
Cirrhosis

Samuel Ho
San Diego

Michael Matheny
Nashville

Cognitive Support
Informatics for
Antimicrobial
Stewardship

Peter Glassman
Los Angeles

Supporting Health Services Research

NIH grants

NHLBI

An Evaluation of
Novel Domains
for Predicting 30-
day Admission

Salomeh Keyhani
UCSF

NIAMS

Determinants of
Achieving Target
Serum Urate in
Gout & Safety of
Gout Treatments

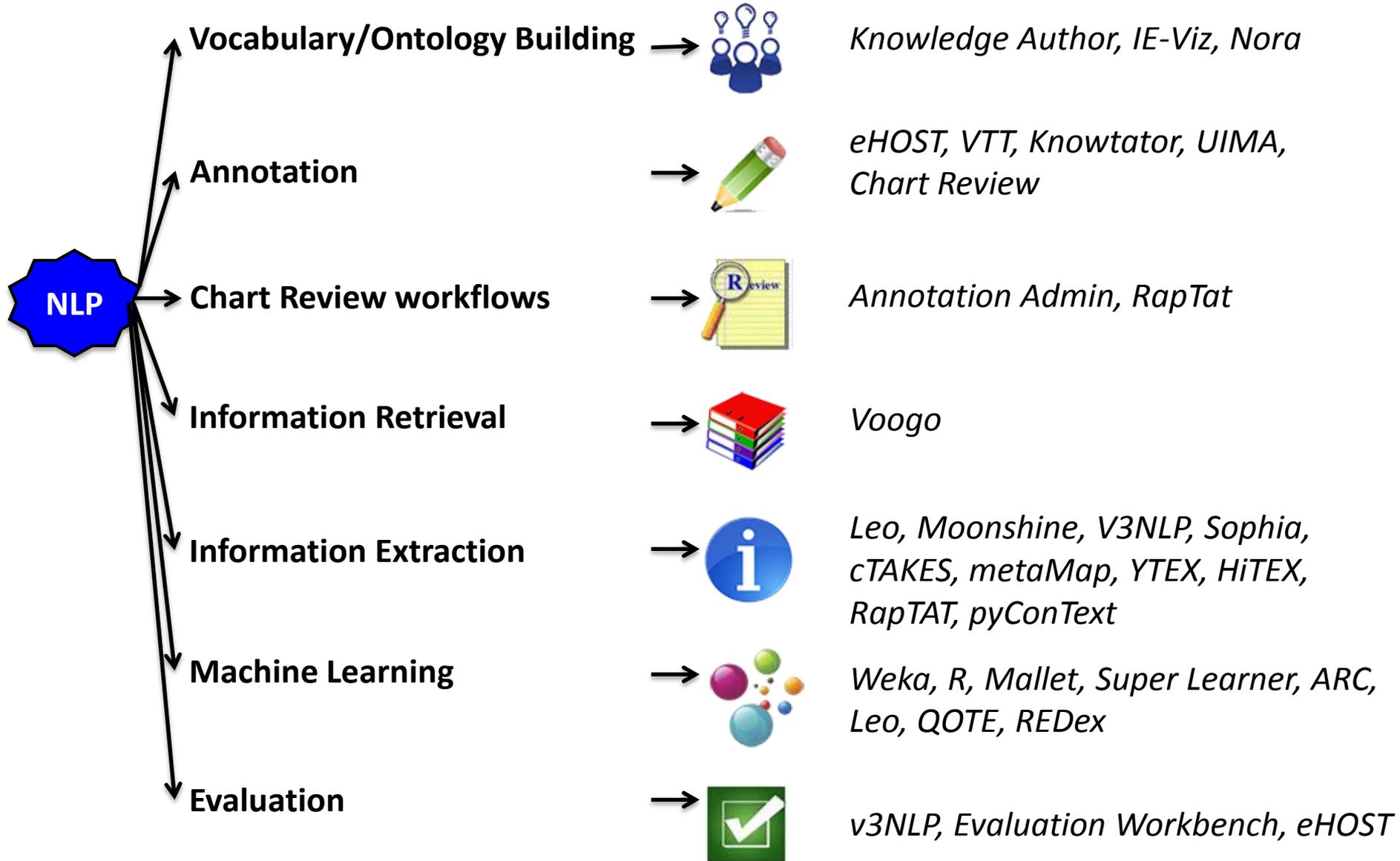
Jasvinder Singh
U of Alabama

NIGMS

Clinical
Personalized
Pragmatic
Predictions of
Outcomes

Leslie Lenert
MUSC

NLP Development & Application



New Variables in CDW

Pilot

Evaluate

Improve

Enterprise

Ejection
Fraction

Smoking

Race

Age	Dx	Labs	Ejection Fraction	Smoking	Race

New Variables in CDW

Pilot

Evaluate

Sexual trauma

CAUTI

Pneumonia

Functional status

Adenoma

Homeless

Carotid
stenosis

Substance abuse

Pain scale

Living alone

Gender

MRSA

Delirium

Symptoms

Social support

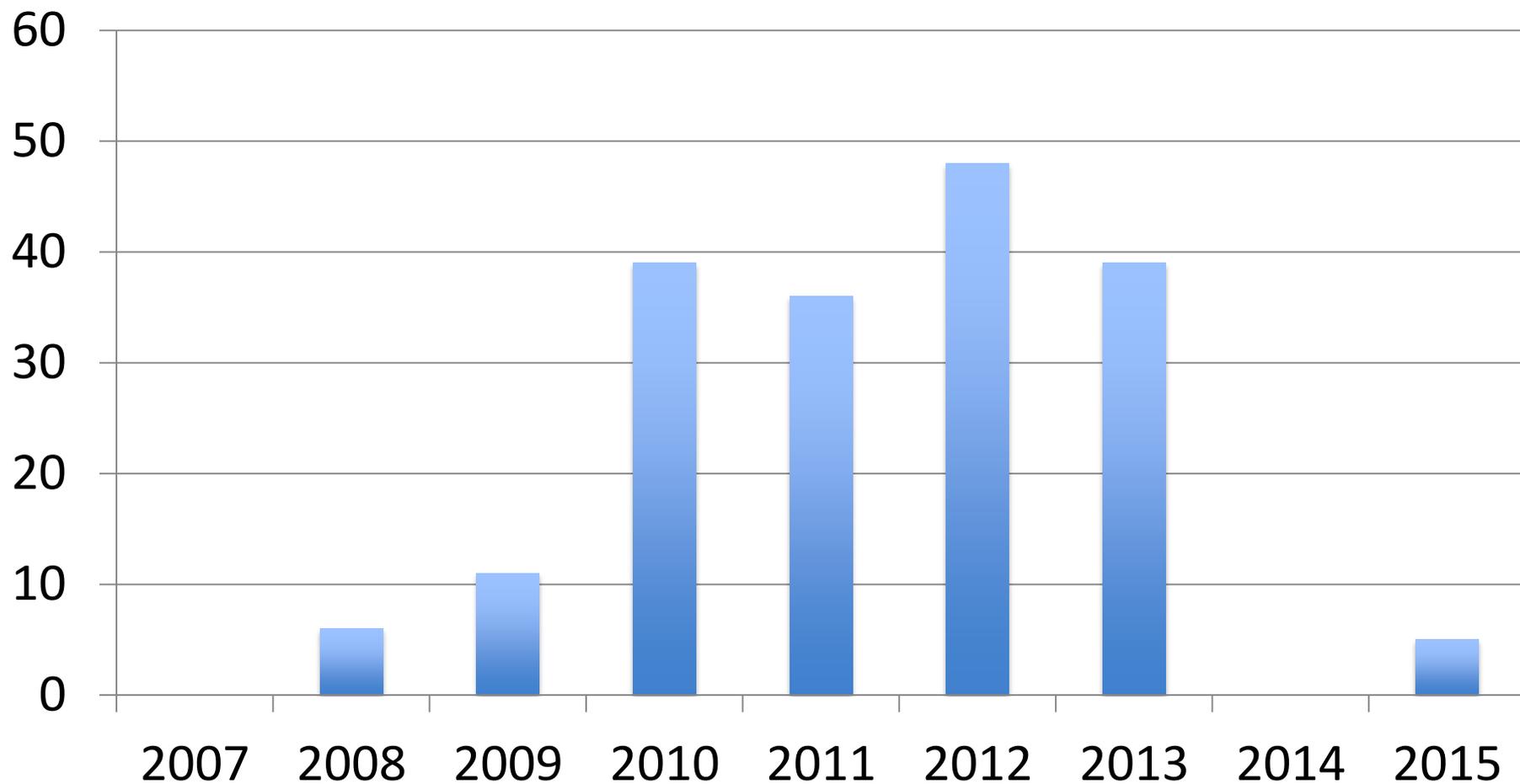
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Scientific Contribution: NLP Publications from VA Investigators

Number of VA publications with NLP has increased

Number of VA NLP Publications



Scientific Contributions

Algorithms

Knowledge
Representation

Resources

Informatics &
Health Services
Research

Algorithms

- Active learning
- De-identification
- Modifier detection
- Named entity detection
- Symptom identification
- Synonym identification
- Figure detection
- Template identification
- Uncertainty detection
- Translation to consumer language
- Temporal expression identification
- Scale up and scale out

Knowledge Representation

Common Model

- Map output of NLP modules to each other
- Enable interoperability

Knowledge Representation

“Patient denies a family history of colon cancer”



Disease: colon cancer
Experiencer: family
Negation: no
Historical: yes

Schema & Modifier Ontologies

- Represent entities and modifiers
- Provide baseline lexicon
- Support knowledge sharing

Shared Resources

Annotation Tools

eHOST

RapTat

Chart Review

Shared Resources

Information
Extraction Tools

yTex

Rad-Ex

v3NLP

Sophia

Moonstone

Leo

ConText

RapTat

Shared Resources

Knowledge
Building Tools

Knowledge Author

Nora

Shared Resources

Machine Learning
Tools

ARC

QOTE

REDex

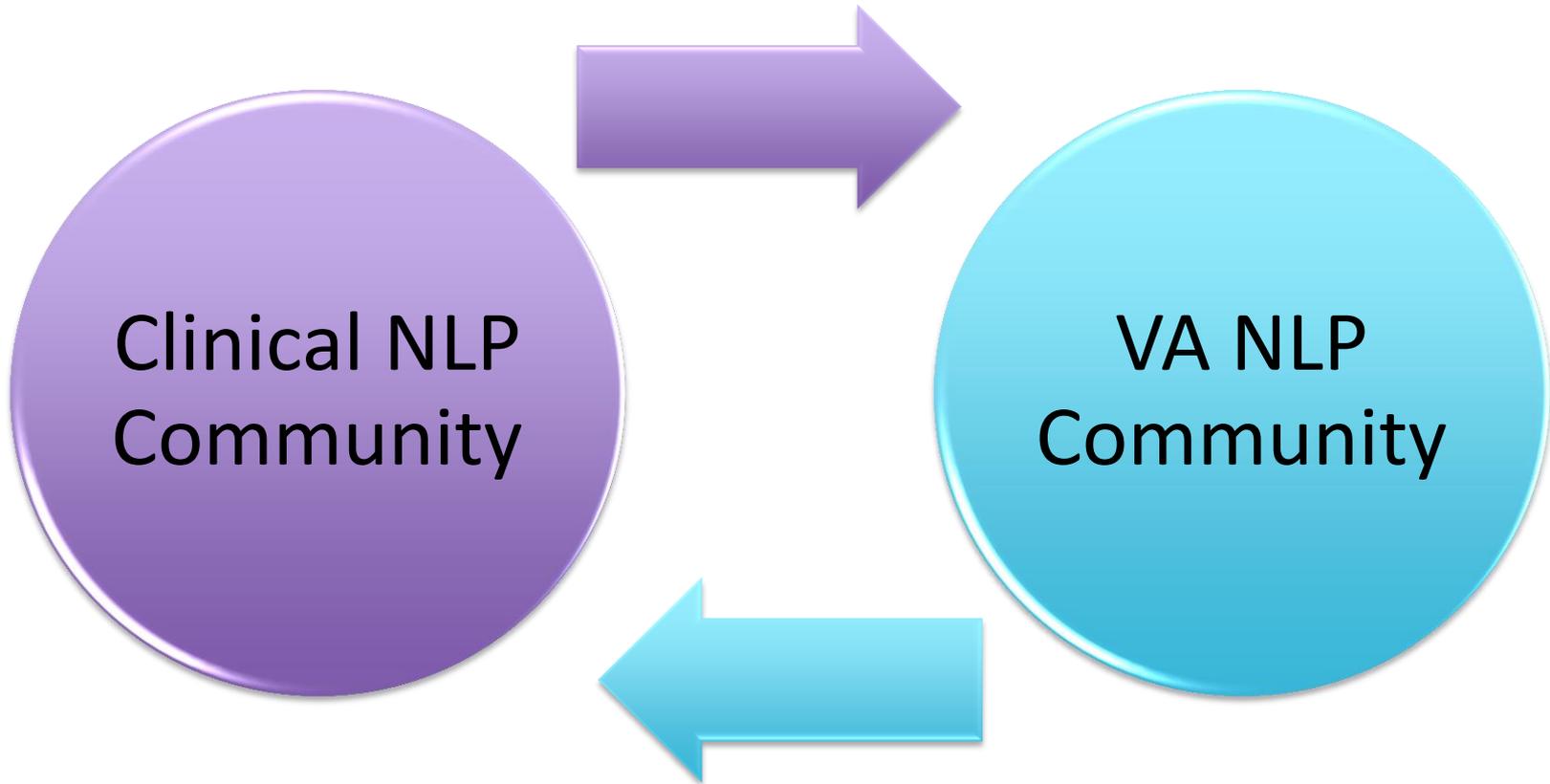
Informatics & Health Services Research

- Surveillance of Acute Kidney Injury following Cardiac Catheterization
- Automated Surveillance for Patients with Cirrhosis
- Actionable Knowledge to Guide Antimicrobial Stewardship
- Evaluation of Multistage Antimicrobial Treatment Strategies in Pneumonia
- Preventing MRSA Infections: a virtual comparative effectiveness model
- Comparative effectiveness for stroke treatment

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Synergistic Relationship





Orbit Registry



NLP Toolfinder

ShaRE & i2b2
annotations



Training Data

NLP tools



VA tools

NLP development



NLP Ecosystem



Schema &
annotations



I2b2 challenge

Common model



Integrate modules

Shared meetings



Collaboration

NLP ecosystem



Support develop

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NLP Within the VA

Health
Services
Researchers

- Can ask questions they couldn't ask before

NLP Within the VA

Health
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Researchers

- Can ask questions they couldn't ask before

Informatics
Researchers

- Can provide more comprehensive and intuitive cognitive support

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- Can ask questions they couldn't ask before

Informatics
Researchers

- Can provide more comprehensive and intuitive cognitive support

Patients

- Can better participate in shared decision making

Steps on a path to cognitive computing

What is your long-term vision?

What We Are Missing

- Question answering
- Text summarization
- Visualization of data
- Speech recognition and synthesis

Recruit &
Partner

Collaborative
Funding

Infrastructure

Thank you!