Data Science to Patient Value (D2V)

UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

SEPTEMBER 2017

CU Anschutz Data Science Tour: From D2V to KDD

SETH RUSSELL, MS

https://github.com/magic-lantern/biostatistics-seminar-2017

About Seth

Github:

- https://gist.github.com/magic-lantern
- https://github.com/magic-lantern/

About Seth

BS Business Administration – Central Washington University

BS Computer Science – Central Washington University

MS Biomedical Informatics – University of Utah

Capstone Project: Identification and Automation of Quality Metrics for Radiology Reporting in CT Pulmonary Angiography

About Seth

Systems Analyst/Programmer @ Central Washington University

Programmer Analyst @ University of California

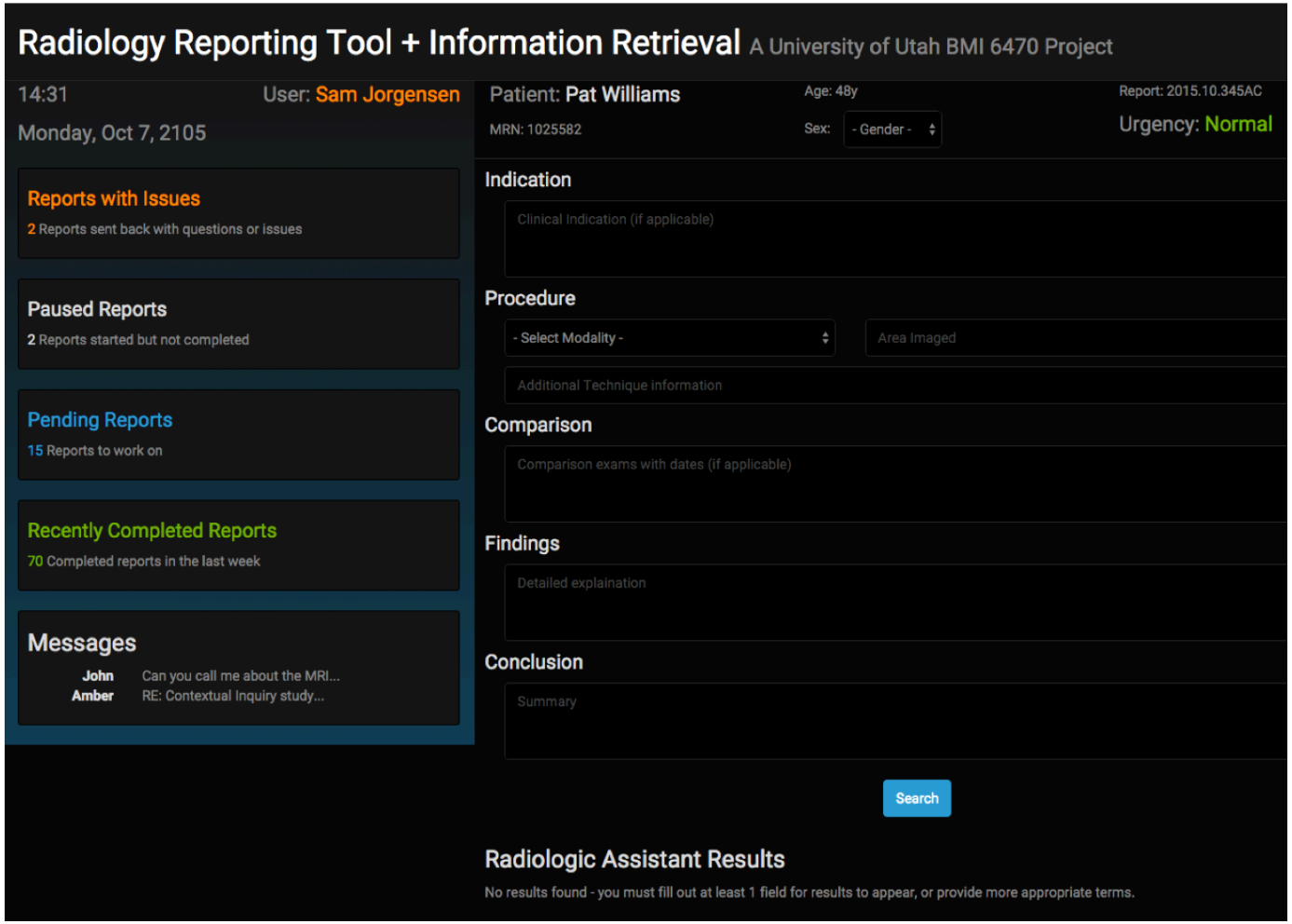
Software Engineer & Engineering Team Lead @ Backcountry.com

Senior Software Engineer & Team Lead @ Intermountain Healthcare

Research Instructor @ Data Science for Patient Value University of Colorado Anschutz

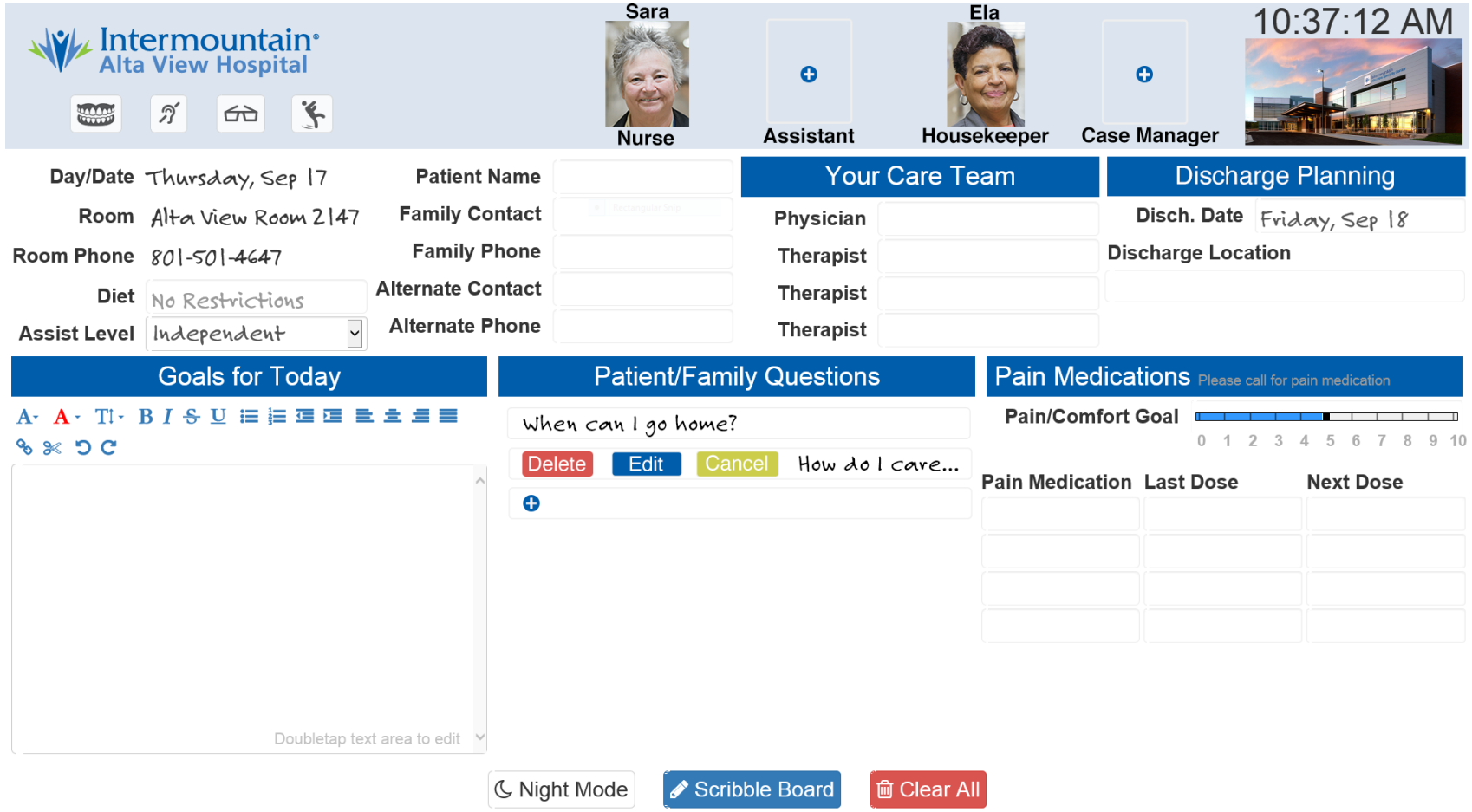
About Seth

Intermountain Care Process Models: https://goo.gl/wBE6ap



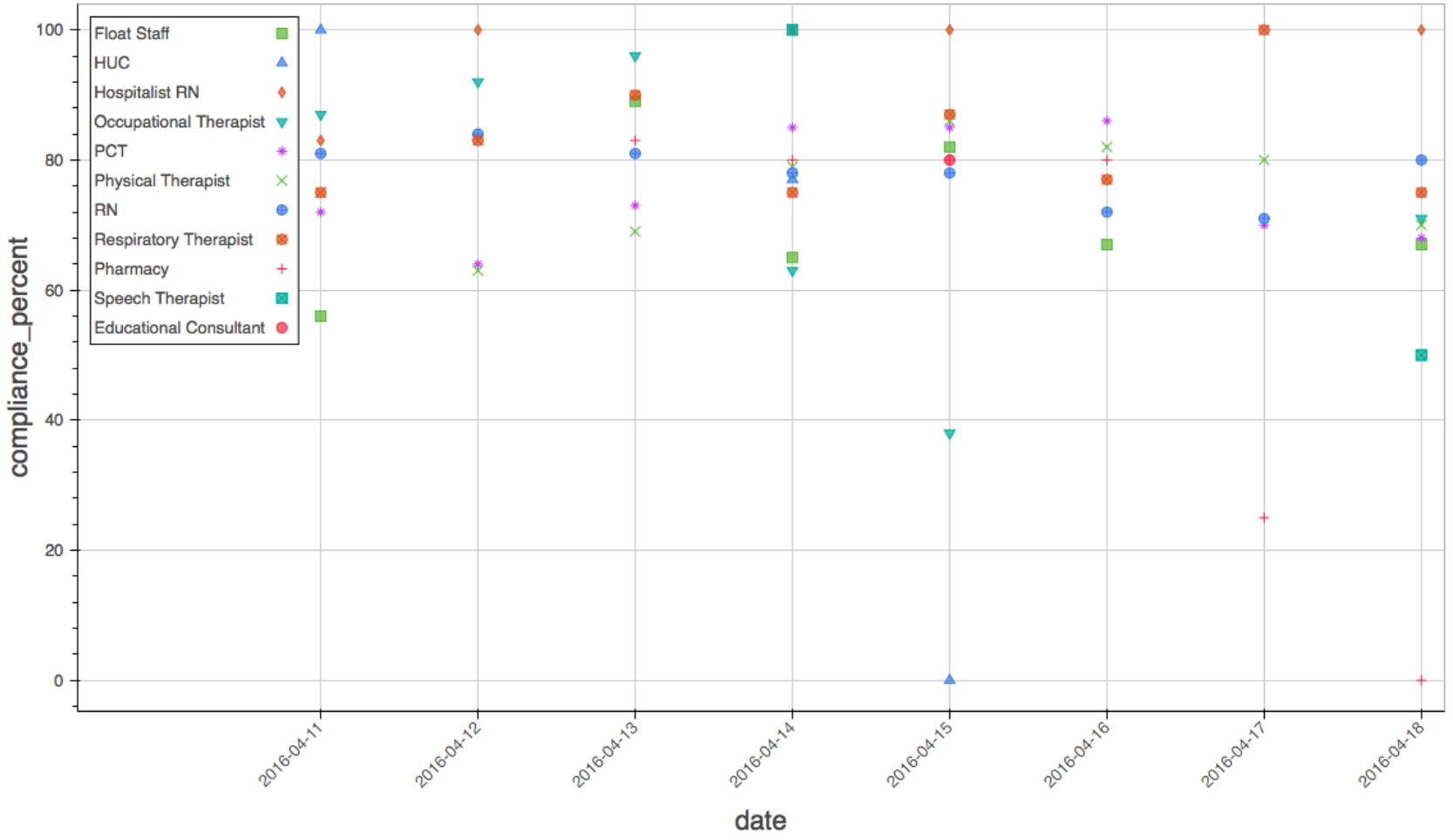
About Seth

Patient Engagement Platform



About Seth

Real-time Location Services – Hand Hygiene Compliance



Data Science to Patient Value

School of Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

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EDUCATION APPLY NOW RESEARCH PATIENT CARE DEPARTMENT|CENTER|INSTITUTE DEAN'S OFFICE FACULTY

Home > Research > **Transformational Research Funding**

- Consortium for Fibrosis Research and Translation
- GI & Liver Innate Immune Program
- Human Immunology and Immunotherapy Initiative
- RNA Bioscience Initiative
- D2V

Transformational Research Funding
CU School of Medicine

(Jan. 27, 2016) At his first State of the School address on Wednesday University of Colorado School of Medicine Dean John J. Reilly, Jr., MD, named five recipients of Transformational Research Funding awards.

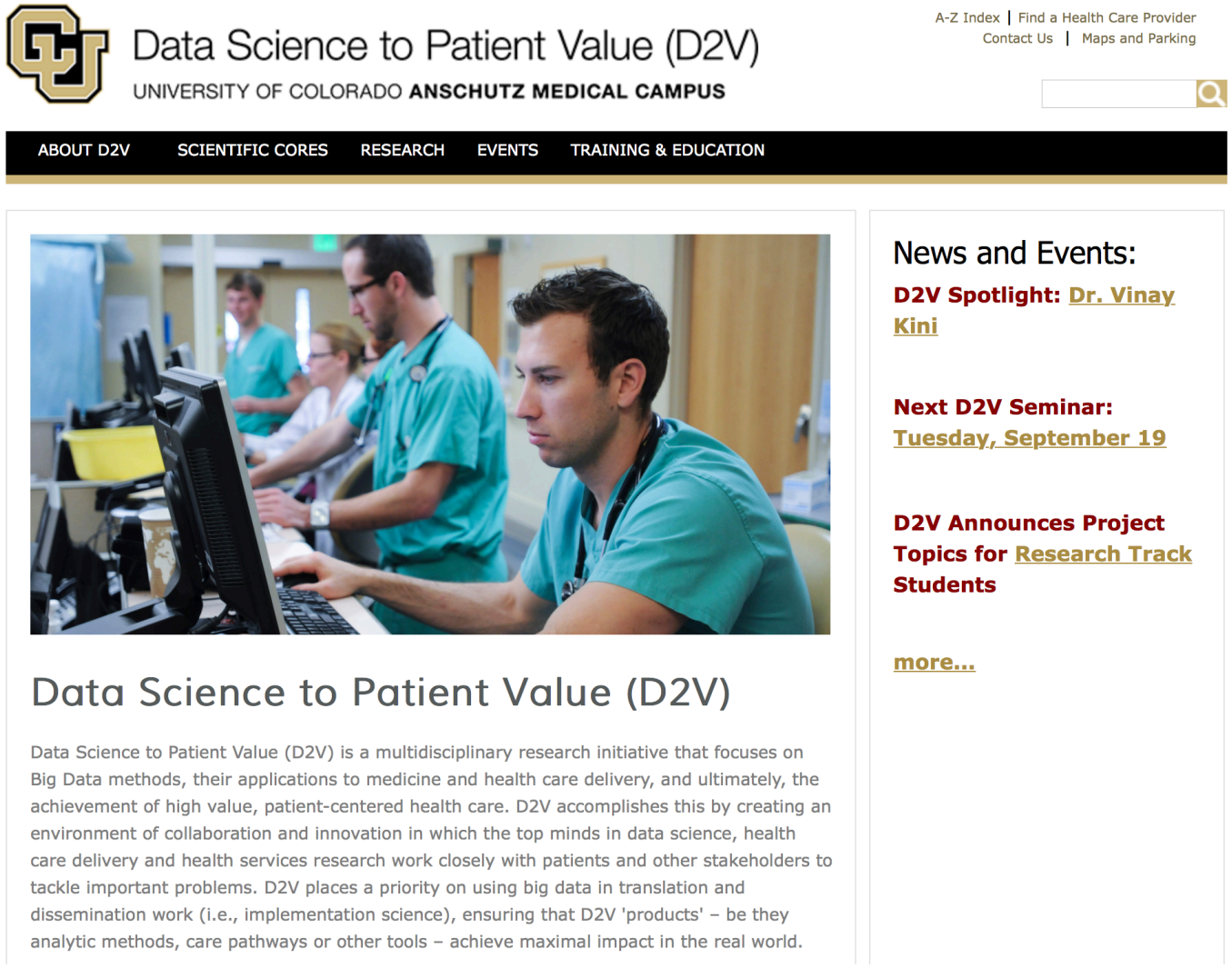
Last fall, Reilly announced a competitive process for applicants to seek funding for proposals that would position the University of Colorado School of Medicine as a leader in cutting-edge and emerging fields, attract extramural funding, help recruit and retain outstanding faculty, enhance education and training, and positively impact human lives and society in Colorado, the nation and the world.

The proposals were selected by an external review committee.

The five selected proposals are:

- Data Science to Patient Value (D2V), which aims to build infrastructure, develop methods and establish implementation pathways to prepare for population health.
  The team leaders are Jean Kutner, MD, MPH, professor of medicine, chief medical officer for University of Colorado Hospital and associate dean for clinical affairs for the School of Medicine; Michael Ho, director of the Denver VA Center of Innovation; Lisa Schilling, MD, MSPH, professor of medicine and medical director of the Office of Value Based Performance; and Michael Kahn, MD, professor of pediatrics, director of informatics, Children's Hospital Colorado, and interim director of Health Data Compass.

Data Science to Patient Value



Leverage data to improve value in medically complex patients

http://cud2v.org/

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- Facebook: cuD2V
- LinkedIn: D2V

Data Science to Patient Value – Scientific Cores

- Patient and Systems Value
- Data and Informatics
- Analytics
- Stakeholder Engagement and Governance
- Training and Education
- Dissemination and Industry Collaboration

Data Science to Patient Value

Data Science to Patient Value Scholars Program

https://goo.gl/on8PGT

Research Track School of Medicine

https://goo.gl/hnPTFX

D2V Pilot Project Funding Opportunity

https://goo.gl/NvKopi

Data Science to Patient Value (D2V)

UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

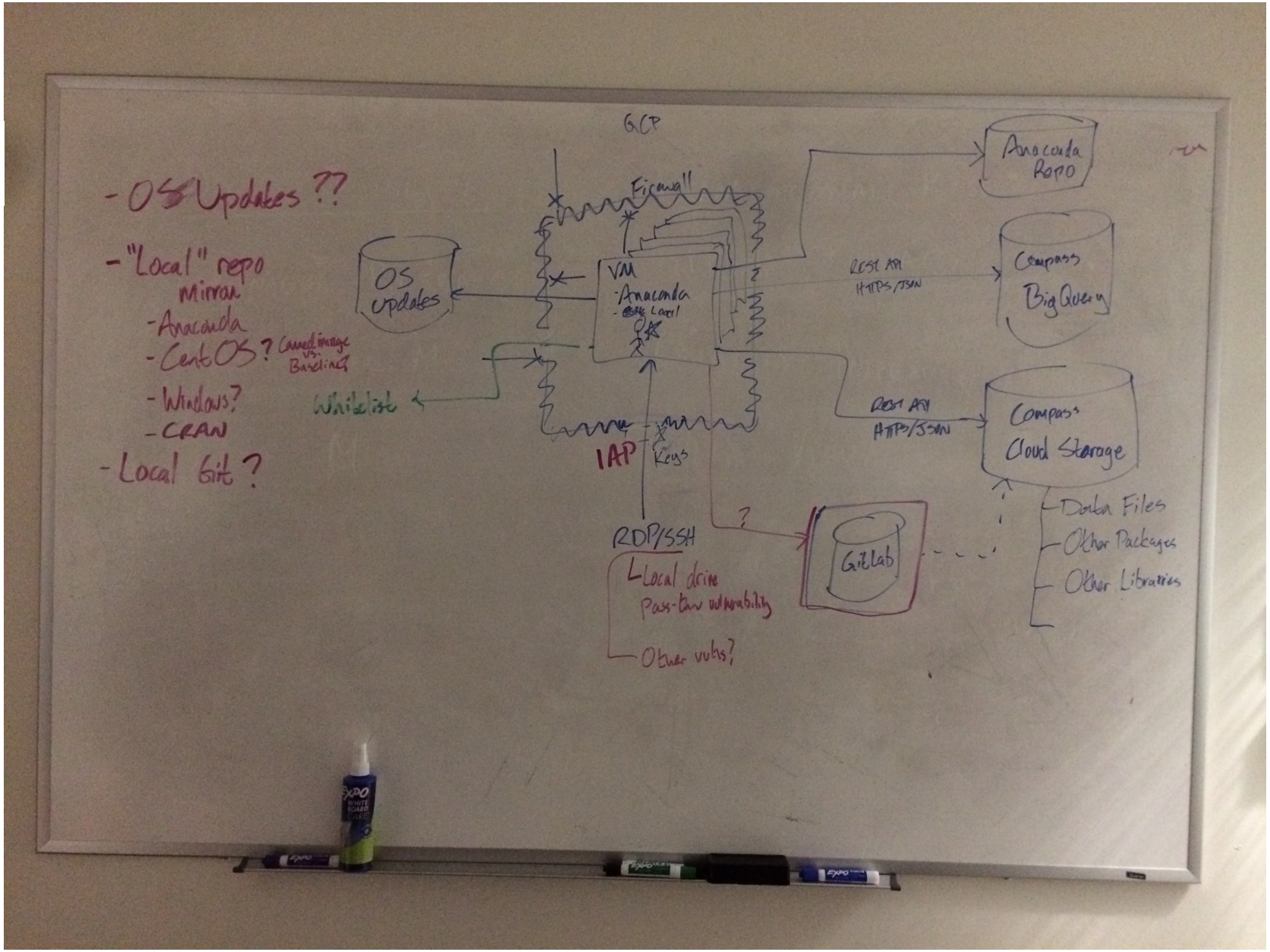
I am currently a Research Fellow in the Data Science to Patient Value (D2V) Schol Program in the School of Medicine at the University of Colorado Anschutz Medic Campus.

Previously I held positions as a Postdoctoral Fellow in the Computational Biosci Program at the University of Colorado Anschutz Medical Campus, and as an Ass Professor in the School of Information Systems and Applied Technologies at Sou Illinois University. Before becoming an academic, I worked in industry in various including systems analyst, software engineer, computer programmer, and syste administrator.

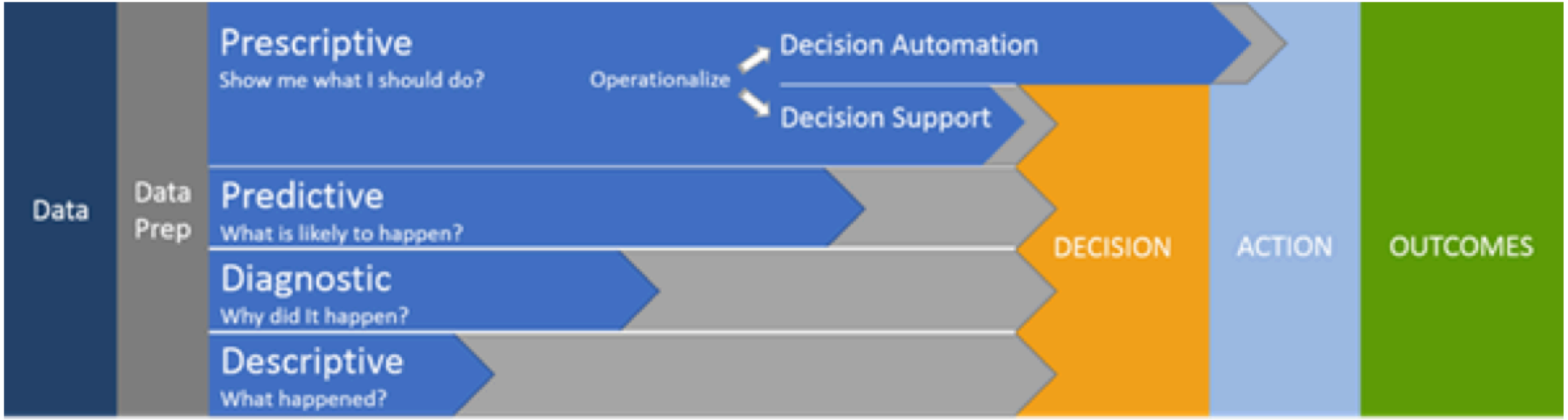
D2V Analytics Core

Analytics Environment to built on common infrastructure using open tools and to promote reproducible research

	Non-PHI	PHI
Analytics services	D2V, CBC/BERD, departmental biostatisticians	
Analytics infrastructure (HPC workloads)	Summit (CU Boulder)	TICR/ROSALIND
Analytics infrastructure (non-HPC workloads)	Personal computers, departmental servers	**Compass Eureka**
Data providers	Various sources	Compass Data Warehouse



http://healthdatacompass.org



SOURCE: MIKE HARMER, INTERMOUNTAIN HEALTHCARE, DERIVED FROM GARTNER 2013 ANALYTICS REPORT

Analytics Core: Guidance for Funded Projects

Leverage data to improve value

This Core is designed to fill gaps in current data analytic capabilities on campus. The initial focus is on applying the analytic tools of machine learning, health econometrics, and causal inference to analyses of observational data. In particular, we will develop and apply expertise in analyzing big, complex, and messy data such as those emerging from Health Data Compass and the D2V Informatics core. We envision the D2V Analytics Core as being a collaborative group that has unique expertise in these types of analyses, but which also builds strong bridges to other analytic groups on campus in support of D2V projects.

Analytics Core Leads

Tell Bennett, MD, MS
303-724-8661
tell.bennett@ucdenver.edu

Debashis Ghosh, PhD
303-724-4365
debashis.ghosh@ucdenver.edu

Services available

We offer limited engagement consultancy to all D2V funded projects. We can review each project's aims, methods, and provide high level analytical guidance.

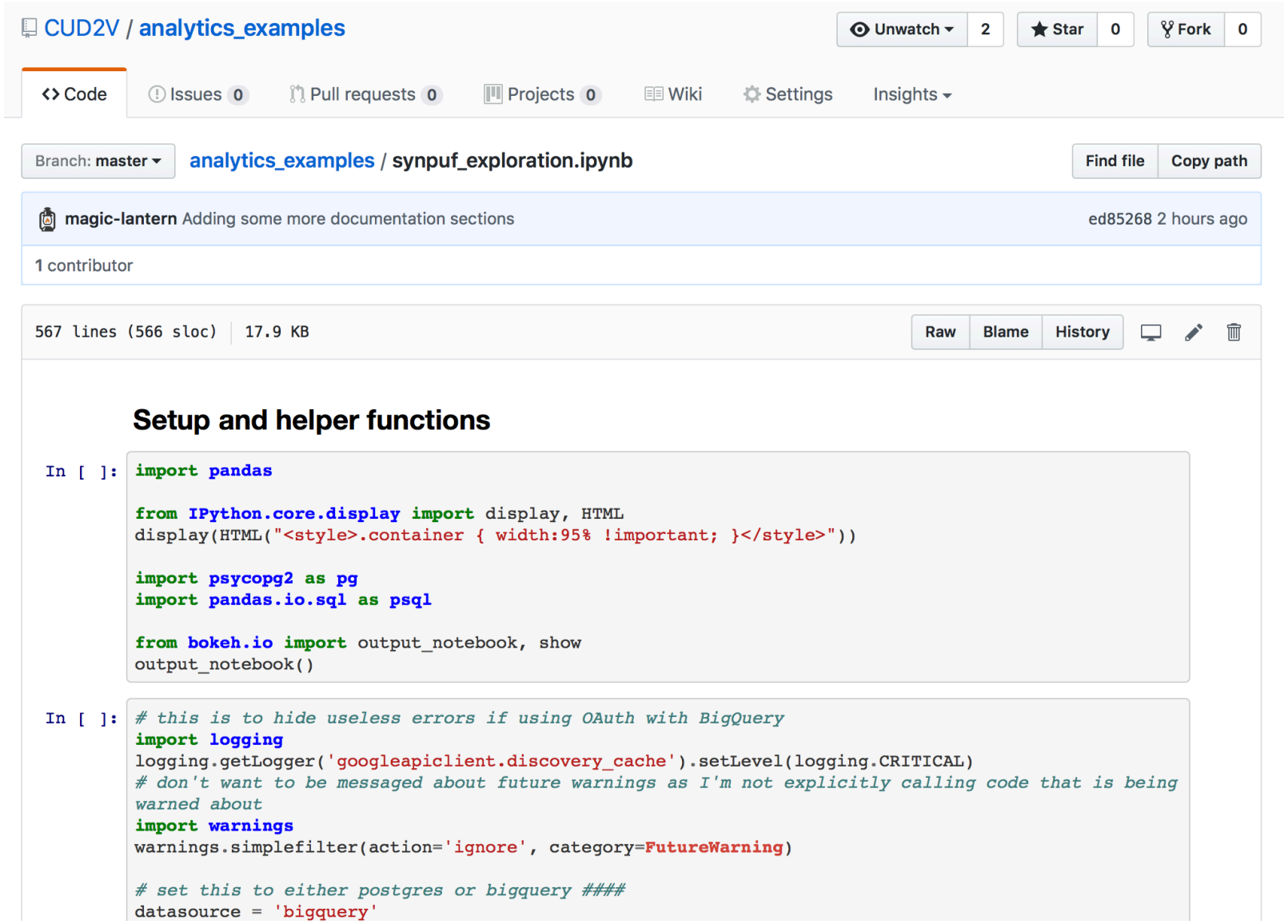
We may offer additional assistance with analytic and computing needs – or pull in other cores as appropriate - for research that will develop or extend big data methods and tooling or involve multi-organizational collaborations.

The goal of healthcare analytics should be to improve an outcome in a desired area. The diagram shown at the bottom of this page depicts the process by which analytics can affect outcomes. An analysis or analytics tool can provide value at multiple time points. The closer an analytics process is to affecting outcomes, the more mature and robust it should be.

Some key analytics questions to ask regarding your research project:

- What is the specific outcome you want to

https://github.com/CUD2V/analytics_examples



CUD2V / analytics_examples

Unwatch 2 | Star 0 | Fork 0

Code | Issues 0 | Pull requests 0 | Projects 0 | Wiki | Settings | Insights

Branch: master | analytics_examples / synpuf_exploration.ipynb | Find file | Copy path

magic-lantern Adding some more documentation sections — ed85268 2 hours ago

1 contributor

567 lines (566 sloc) | 17.9 KB | Raw | Blame | History

Setup and helper functions

In [ ]:
```
import pandas

from IPython.core.display import display, HTML
display(HTML("<style>.container { width:95% !important; }</style>"))

import psycopg2 as pg
import pandas.io.sql as psql

from bokeh.io import output_notebook, show
output_notebook()
```

In [ ]:
```
# this is to hide useless errors if using OAuth with BigQuery
import logging
logging.getLogger('googleapiclient.discovery_cache').setLevel(logging.CRITICAL)
# don't want to be messaged about future warnings as I'm not explicitly calling code that is being
warned about
import warnings
warnings.simplefilter(action='ignore', category=FutureWarning)

# set this to either postgres or bigquery ####
datasource = 'bigquery'
```

https://github.com/magic-lantern/biostatistics-seminar-2017

KDD 2017 Highlights

- About 1700 attendees
- Paper acceptance rate ~9%
- Poster acceptance rate ~10%
- Workshops/Tutorials acceptance rate ~60%
- $540k in sponsorships

KDD 2017 Highlights

- User voted best video (paper summary) : https://youtu.be/G-omu_ki7YM
- Videos of all presentations not yet available. Should be available on youtube in the next few weeks- search “kdd2017”
- Accepted Papers Available at http://www.kdd.org/kdd2017/accepted-papers many have short video introduction/overview

KDD 2017 Highlights

Trends

- Machine Learning can be applied to any domain
- Hyperparameter Tuning
- How to scale to handle larger data, more CPU needs
- Working to migrate from supervised learning methods to unsupervised methods
- The real bottle neck to analysis is people
- Research problems
- Healthcare specific topics
  - Relevant Paper: http://www.kdd.org/kdd2017/papers/view/patient-subtyping-via-time-aware-lstm-networks

KDD 2017 Highlights

Sub-Conference: Big data analytics-as-a-Service: Architecture, Algorithms, and Applications in Health Informatics

Top Challenges

- Privacy & Security
- Compliance with regulations
- Mobile Computing
- Sharing of data
- Lack of Integration between clinical and administrative systems
- Operational Analytics
- Lack of analytics or people with analytics skills

Sub Conference Papers: http://bigdas.org/callforpapers/

Videos should be posted to YouTube along with rest of conference