HUDK 4050: CORE METHODS IN EDM

9/12/19 4:03 PM

Today

- Data sources
- Zotero
- Download some data

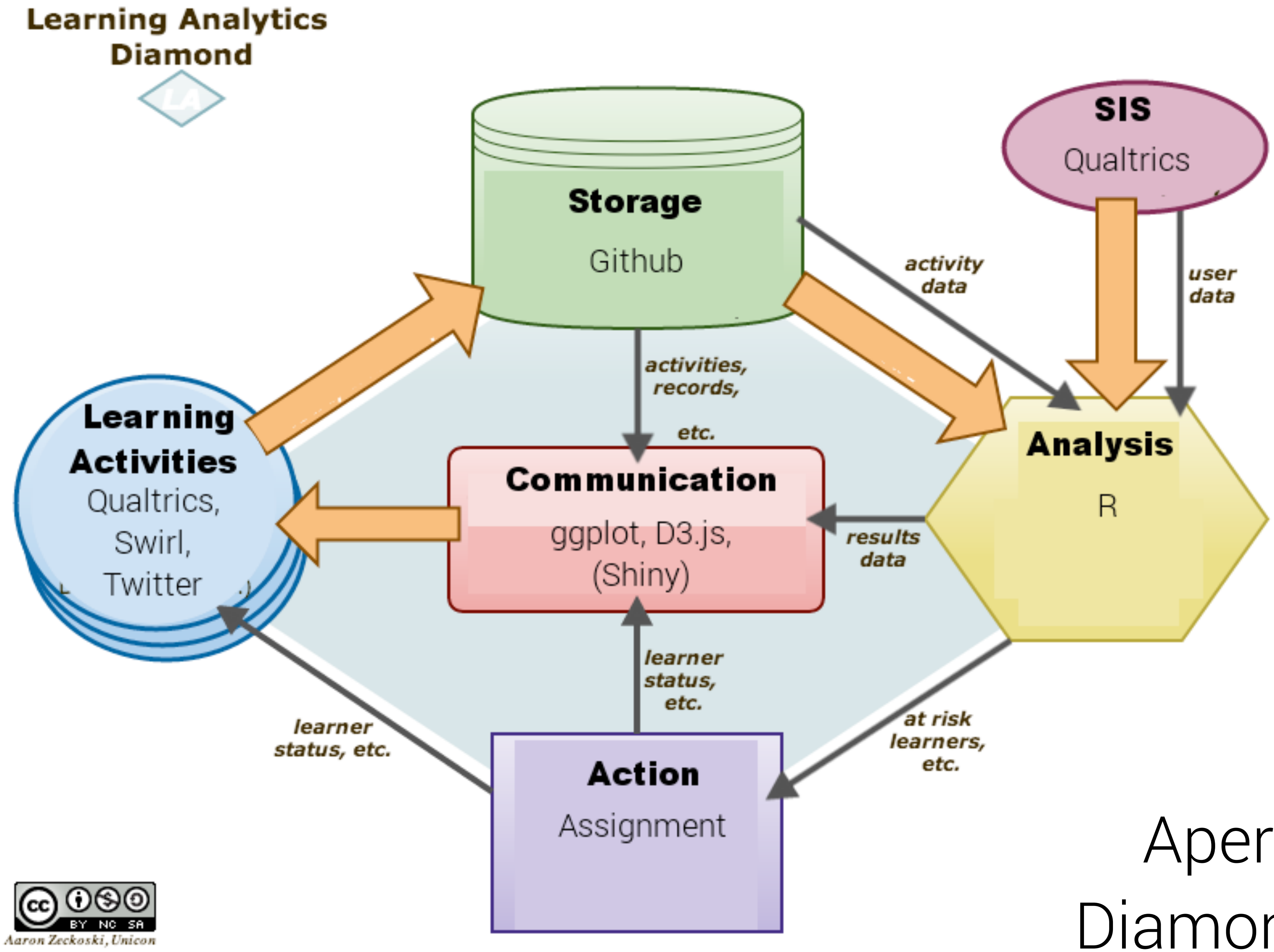
I Need Your Github Username

Yixiao	Li
Runkun	Han
Ruin	Wang
Wanruo	Zhang
Jingze	Dai
Mengjie	Xu

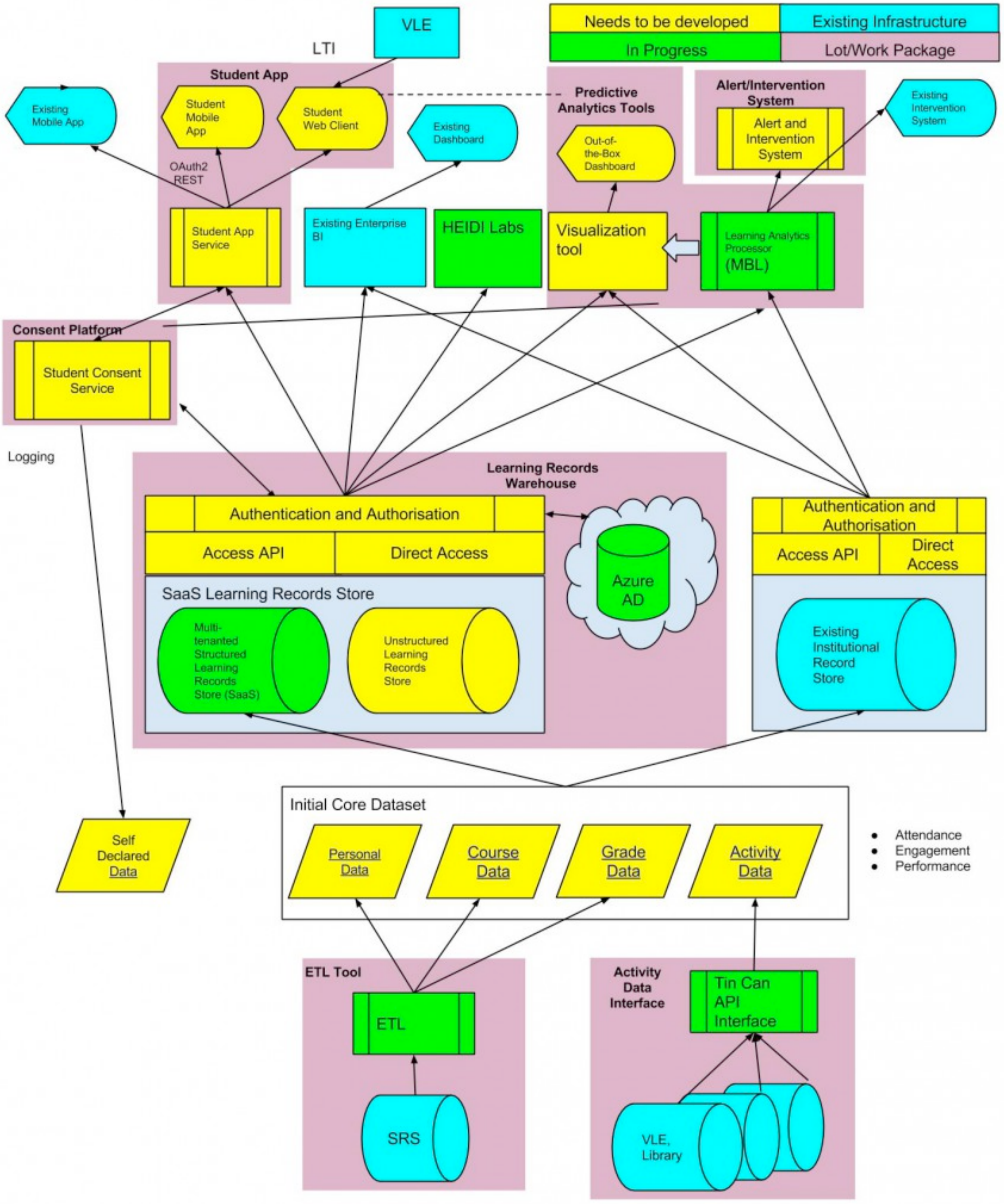
“We are what we measure.”

–Paolo Blikstein, 2013

Where does data come from?

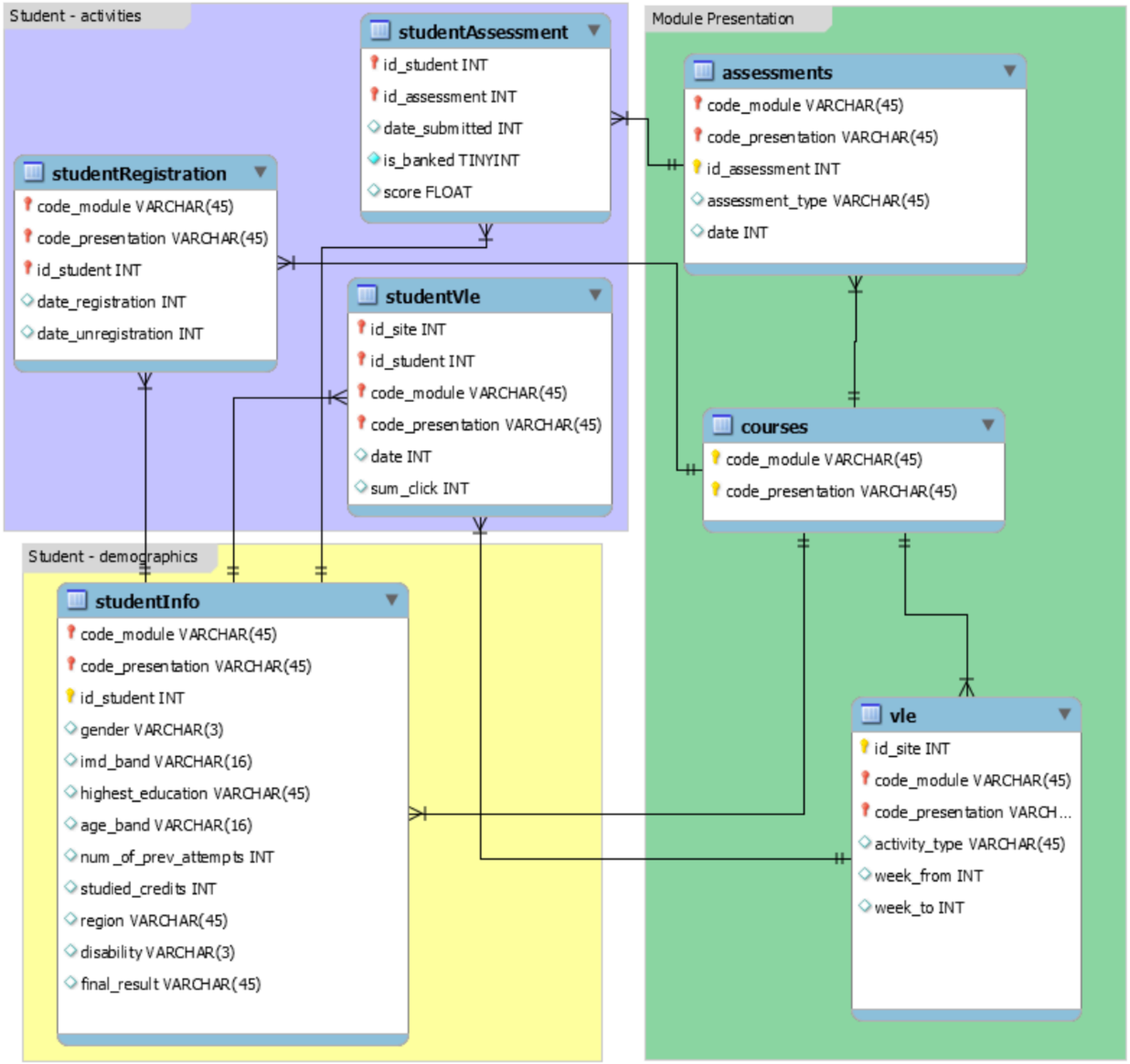


Apereo LA Diamond, 2013



JISC Learning Architecture, 2014

Real World Example



Student - activities

studentAssessment
- id_student INT
- id_assessment INT
- date_submitted INT
- is_banked TINYINT
- score FLOAT

studentRegistration
- code_module VARCHAR(45)
- code_presentation VARCHAR(45)
- id_student INT
- date_registration INT
- date_unregistration INT

studentVle
- id_site INT
- id_student INT
- code_module VARCHAR(45)
- code_presentation VARCHAR(45)
- date INT
- sum_click INT

Module Presentation

assessments
- code_module VARCHAR(45)
- code_presentation VARCHAR(45)
- id_assessment INT
- assessment_type VARCHAR(45)
- date INT

courses
- code_module VARCHAR(45)
- code_presentation VARCHAR(45)

vle
- id_site INT
- code_module VARCHAR(45)
- code_presentation VARCH...
- activity_type VARCHAR(45)
- week_from INT
- week_to INT

Student - demographics

studentInfo
- code_module VARCHAR(45)
- code_presentation VARCHAR(45)
- id_student INT
- gender VARCHAR(3)
- imd_band VARCHAR(16)
- highest_education VARCHAR(45)
- age_band VARCHAR(16)
- num_of_prev_attempts INT
- studied_credits INT
- region VARCHAR(45)
- disability VARCHAR(3)
- final_result VARCHAR(45)

https://analyse.kmi.open.ac.uk/open_dataset

Standardizing Data Communication

- Limited vocabulary for describing learning
- So that LMS can communicate with tools with SIS, etc
- Scorm = limit information
- Tin Can = limit syntax
- *All this comes from the US Defense Dept?*

SCORM CLOUD

TIN CAN API

I call it Tin Can I xAPI.

What is BIG Data?

- It is relative
- Process vs Study
- Depends on the domain of study: ed (MB-GB) vs ed tech (TB) vs astrophysics (PB) vs business (EB)

Common File Formats

DBF:

- Database format
- Microsoft Access, some freeware
- Table

Common File Formats

XML:

- Semantic Web
- Extensible Markup Language
- Export web page data
- Hierarchy like HTML with tags to delimit

```
<row>
  <Year>2016</Year>
  <Course>EDCTGE2550</Course>
  <Price>Priceless</Price>
</row>
```

Common File Formats

JSON:

- JavaScript Object Notation
- Similar to XML, most common server-browser format

```
{
  {10, 12, 15, 100],
  {100, 200, 150, 500],
  {9, 8, 8, 7},
};
```

Common File Formats

Fixed Width:

- Create a grid with text using spaces

```
Year............Course.................Price..............
2016............EDCTGE2550....Priceless........
```

Common File Formats

CSV (TSV):

- Comma Separated Value (Tab Separated Value)
- Most common data format
- Lightweight, easy to interpret - but you can run into trouble with text

```
Year,Course,Price
2016,HUDK4050,Priceless
```

Yeah, but where do WE get data?

Open Data Sets

- *Government*: NYC (https://nycopendata.socrata.com/), Whitehouse (https://open.whitehouse.gov/), UK (https://data.gov.uk/)
- *Research Labs*: ASSISTments (https://sites.google.com/site/assistmentsdata/), PSLC DataShop (https://pslcdatashop.web.cmu.edu/)
- *Private release*: Harvard/MIT MOOC Data (https://dataverse.harvard.edu/dataverse/mxhx)
- LearnSphere (https://learnsphere.org)

Yeah, but where do WE get data?

Cut a Deal

- Happens often but will lose autonomy/$$$/control of results

Automated acquisition

- APIs, web scraping, beacons

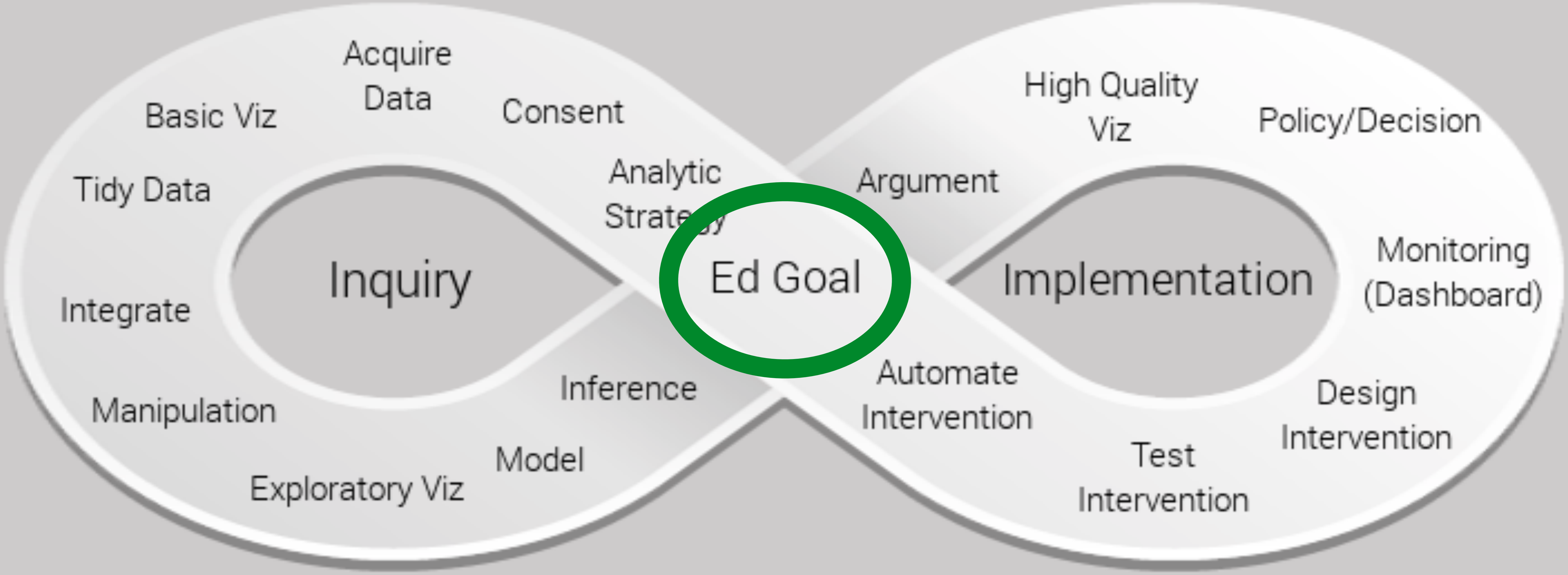
Generate

- Make your own!

Let's Practice!

- Go to: https://analyse.kmi.open.ac.uk/open_dataset
- Explore the codebook
- Download the dataset
- Open a new project in RStudio
- Uncompress the file into the new folder for the RStudio Project
- File -> New File -> RMarkdown
- Write the code to load your data into R and hit run
- How many students are there in the file?
- What is the average for all assessments
- Can you visualize one of the variables?

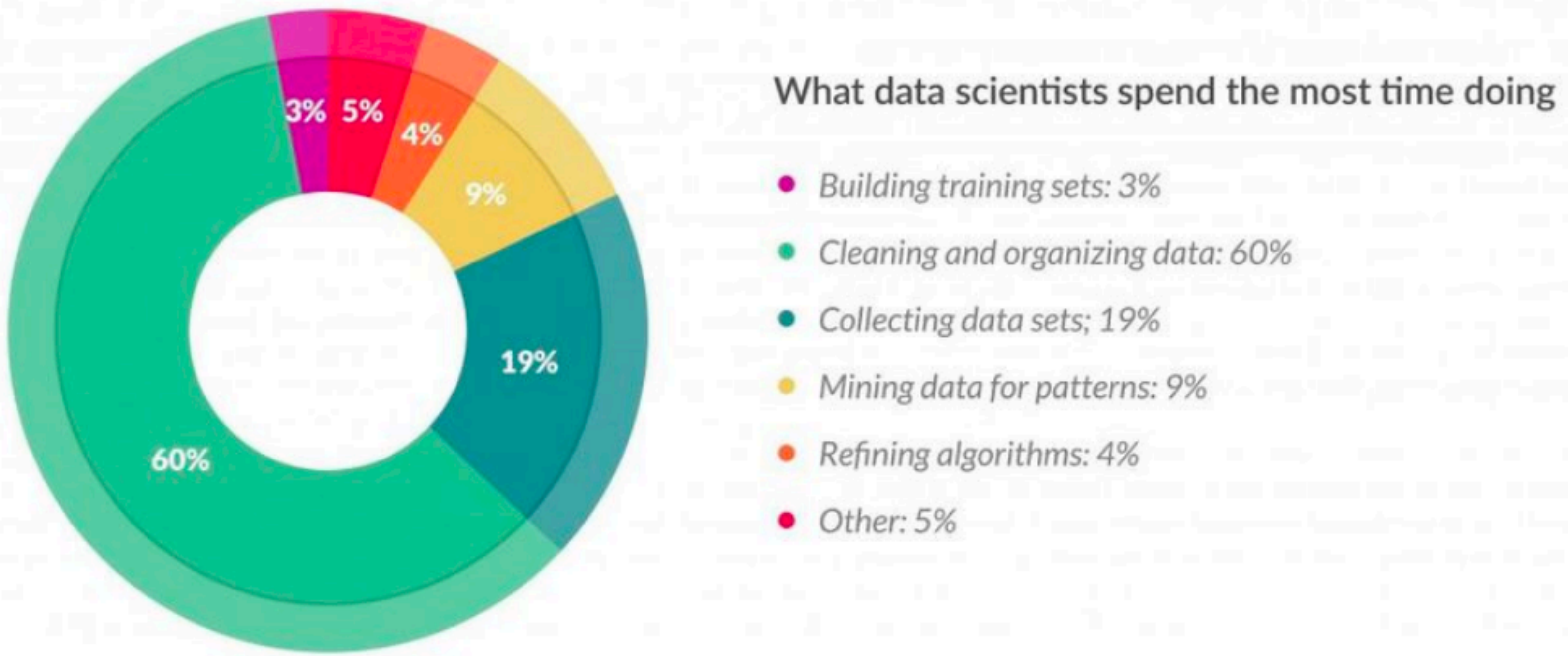
Ed Data Science Cycle

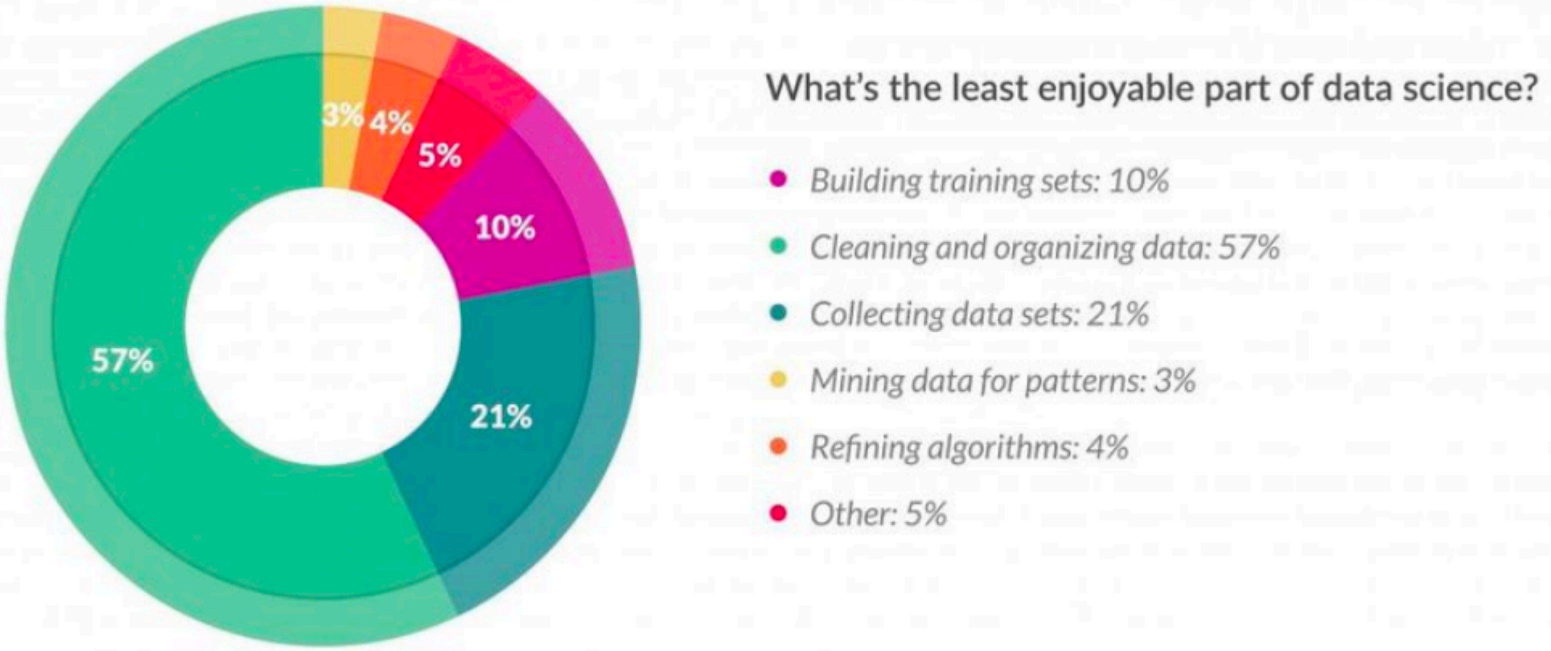


The Ideal Model

Data → Insight → Automate

Reality 1


3%
5%
4%
9%
19%
60%
What data scientists spend the most time doing
● Building training sets: 3%
● Cleaning and organizing data: 60%
● Collecting data sets; 19%
● Mining data for patterns: 9%
● Refining algorithms: 4%
● Other: 5%


3%
4%
5%
10%
57%
21%
What's the least enjoyable part of data science?
● Building training sets: 10%
● Cleaning and organizing data: 57%
● Collecting data sets: 21%
● Mining data for patterns: 3%
● Refining algorithms: 4%
● Other: 5%

Reality 2

The ideal model:

Data → Insight → Automate

VERY RARELY HAPPENS

Workflow

C

Workflow

Data → Process → Knowledge → Action

What am I counting?

How do I make meaning from count?

What information does the process give me?

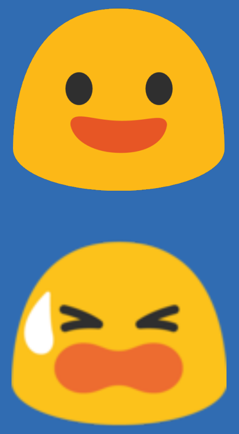
How do I respond to the information?

Count raised hands

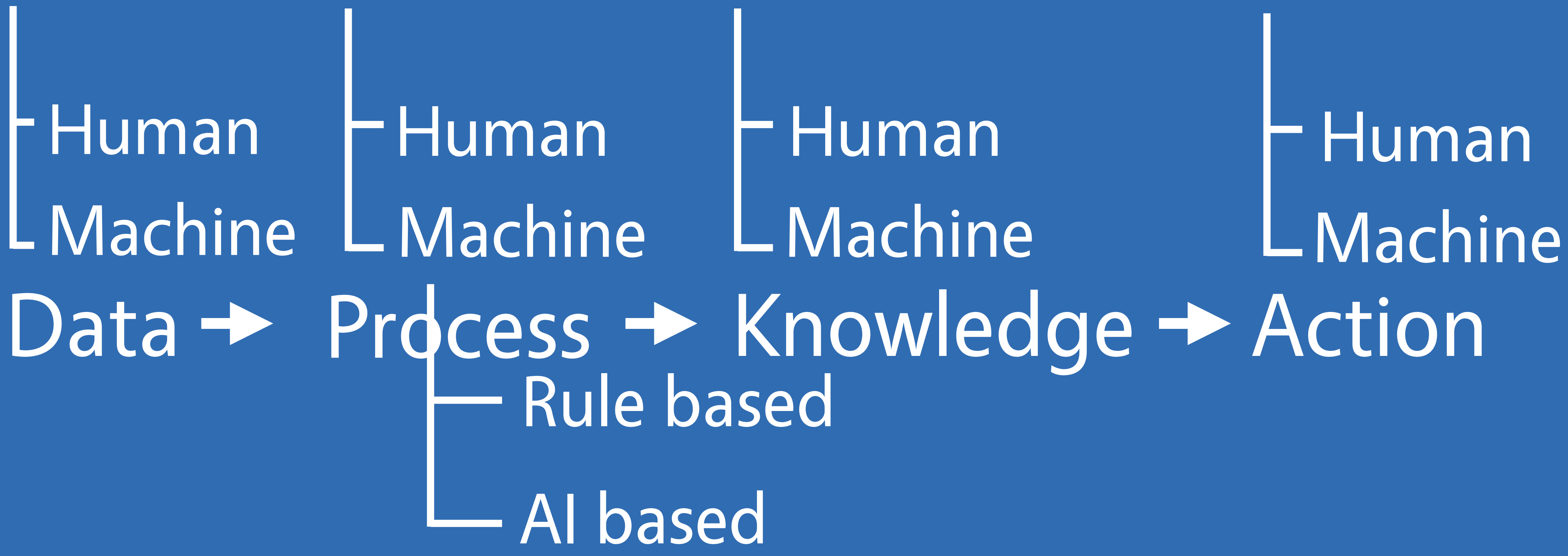
Is that enough?

Yes

No



C



Human
Machine

Data → Process → Knowledge → Action

Human
Machine

Human
Machine

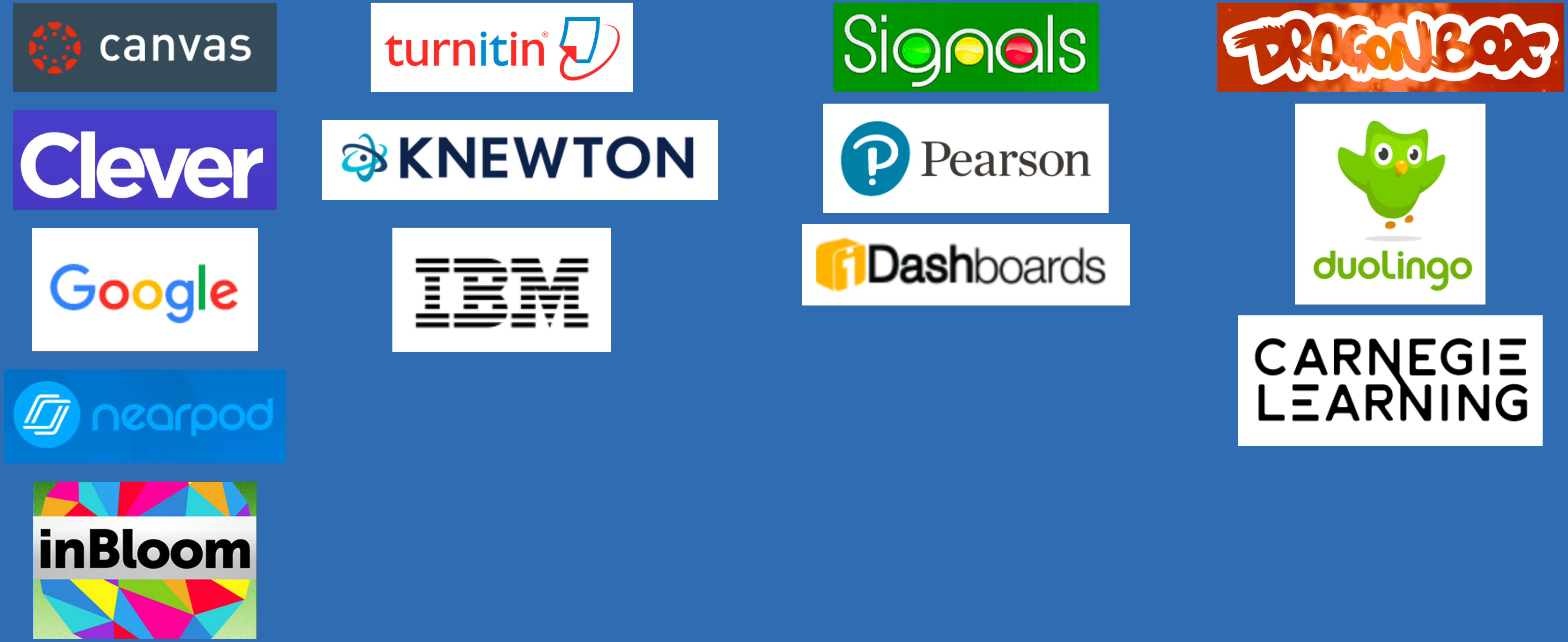
Human
Machine

Rule based
AI based

What does this look like in education?

Workflow

Data → Process → Knowledge → Action



Zotero

- Install Firefox & Zotero (Assignment 1)
- Clone the assignment1 repository to a new project in RStudio
- Open Zotero
- File -> Import -> Navigate to your assignment1 project folder and import the hudk4050-references.rdf file
- Click on “Siemens & Baker” in the list of refs
- Add a note within under the notes tab on the top right
- Right (cmd) click on the folder
- Choose “Export Collection…”
- Choose CSV from the drop down menu and choose your assignment1 project as the location
- Open R and type the code:

```
DF <- read.csv(“hudk4050-references.csv”, header = TRUE)
```

- Behold! Your bibliography including your notes (under the “notes" column)