Is Data Science a Paradigm Shift?

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Yes!

Evidence – in 45+ Years in Academia I Have Never Seen Anything Like It*

- It is a response to the digital transformation of society
- It is touching every discipline (aka vertical)
- We can't keep the students out of our classes

- Cause – large amounts of digital data
- Effect – interdisciplinarity, openness, translation, search for responsibility and more

In summary, it is disruptive and higher ed. better pay attention

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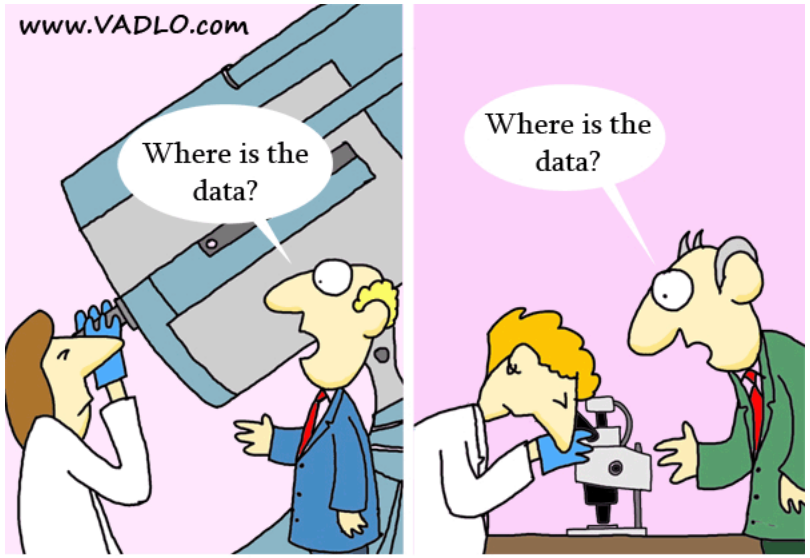
* This statement predates ChatGPT!

Big data and data science are like the Internet…

If I asked you to define them you would all say something different, yet you use them every day…



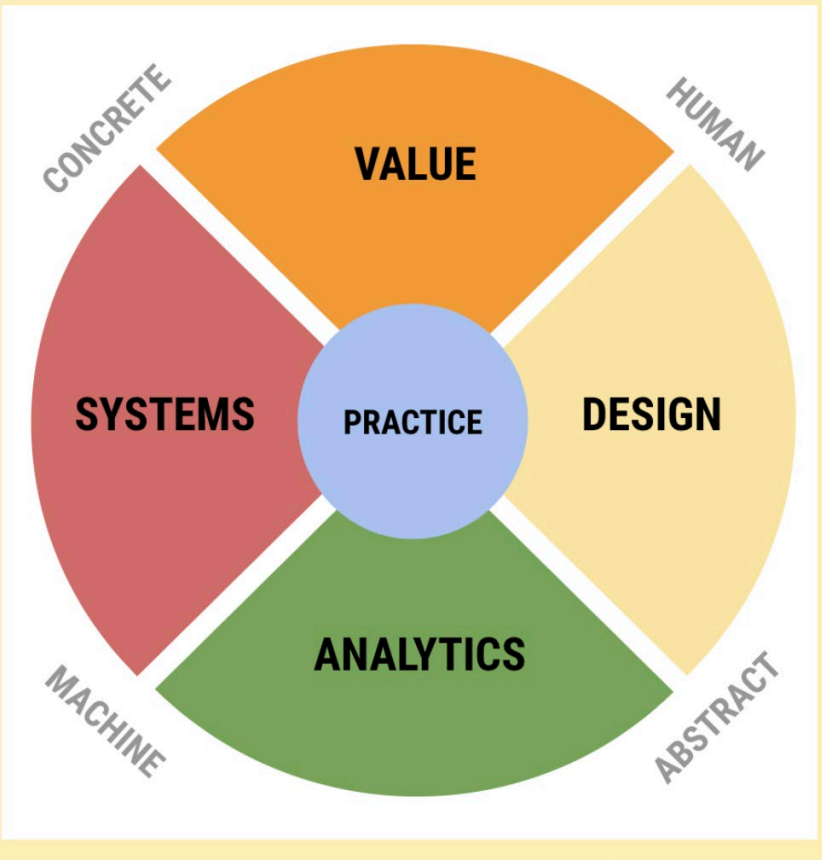
Grand Unification of Sciences

http://vadlo.com/cartoons.php?id=357

Given these precedents about data science we should start with a definition/framework

In the context of a new school this gets everyone on the same page and helps in starting to build a culture

One Definition of Data Science – The 4+1 Model (aka domains)

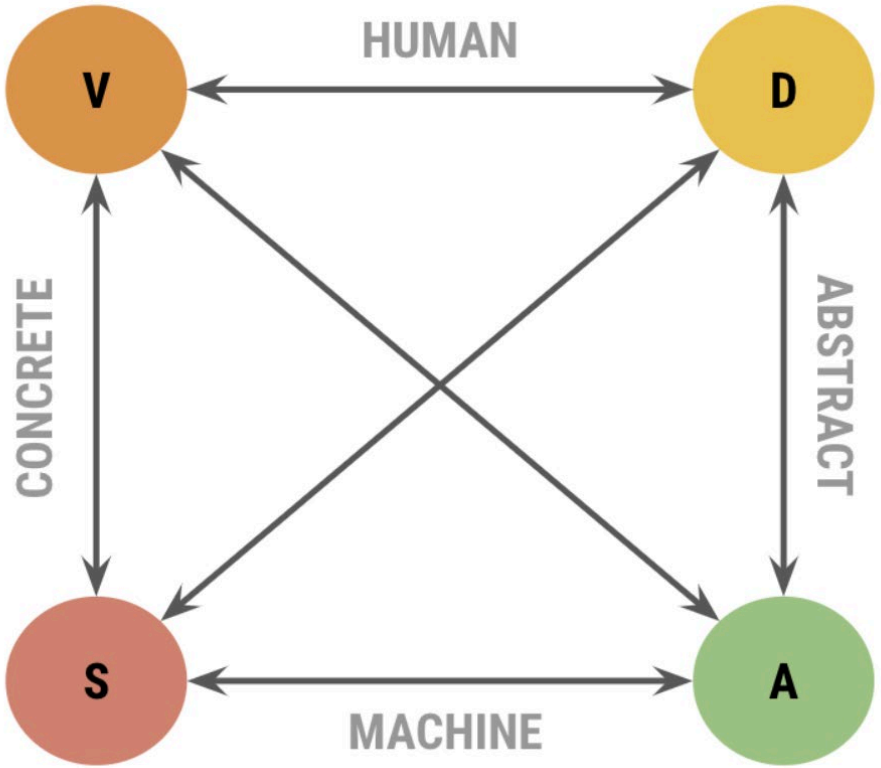


The 4+1 Model of Data Science (CC BY-SA 4.0)

- **Value** – assuring societal benefit
- **Design** - Communication of the value of data
- **Systems** – the means to communicate and convey benefit
- **Analytics** – models and methods
- **Practice** – where everything happens

[From Raf Alvarado]

The Data Science Interplay



The Science of Data

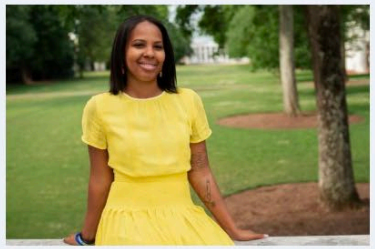
- Value + Design = Openness, responsibility
- Value + Analytics = Human centered AI, algorithmic bias
- Value + Systems = sustainability, access, environmental impact
- Design + Analytics = literate programming, visualization
- Design + Systems = dashboards, engineering design
- Analytics + Systems = ML engineering

[From Raf Alvarado]

Okay, so we have a definition to ground what we do now we need a set of principles to act as the guard rails:

- *Excellence*
- *Inclusivity*
- *Openness/ Transparency*
- *Be FAIR*

Inclusivity



NEWS

SDS Welcomes Siri Russell, Associate Dean of Diversity, Equity, and Inclusion

Siri Russell joins the School of Data Science (SDS) as the Associate Dean of Diversity, Equity, and Inclusion, a position created to be an integral part of the School's leadership team and an important advocate for equitable and responsible use of data to serve the common good.

NEWS

Dean's Blog: Addressing Inequality One Year On

NEWS

School of Data Science Awards First Inclusive Excellence Graduate Fellowship

School of Data Science Awards First Inclusive Excellence Graduate Fellowship

NEWS

School of Data Science Strengthens Relationship with Spelman College

NEWS

Deloitte AI Institute for Government and Oracle for Research Sponsor UVA HBCU Bridge to Data Science Summer Research Program

Deloitte AI Institute for Government and Oracle for Research sponsors 2021 UVA-HBCU Summer Research Bridge to Data Science Program

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Openness/FAIR

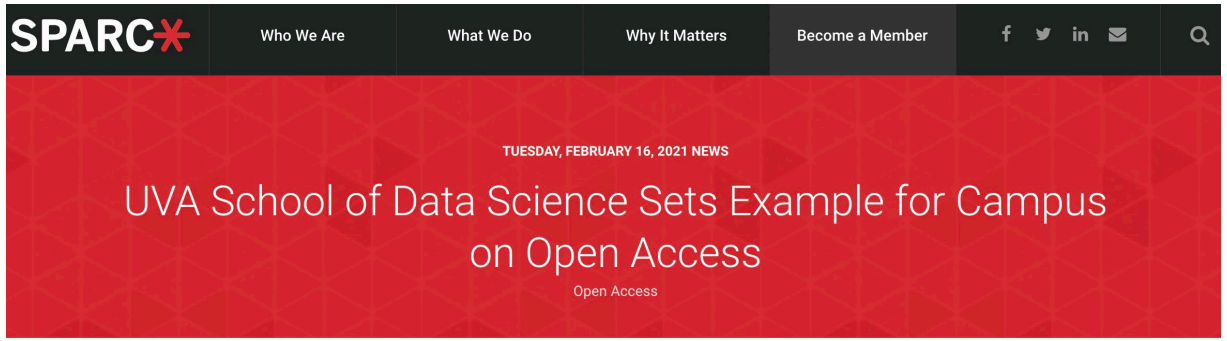
Data Science would not exist if it were not for open data and methods. It would be wrong for us to take and not give back

ANNOUNCEMENT

School of Data Science Open Access Guidelines and Recommendations

February 3, 2021

https://datascience.virginia.edu/policies



https://sparcopen.org/

Openness/FAIR

https://doi.org/10.1038/sdata.2016.18

HELIOS

https://www.heliosopen.org/

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So we have a definition of data science and we have a set of guiding principles, what else?

A pitch – hey it's a business

https://pebourne.wordpress.com/

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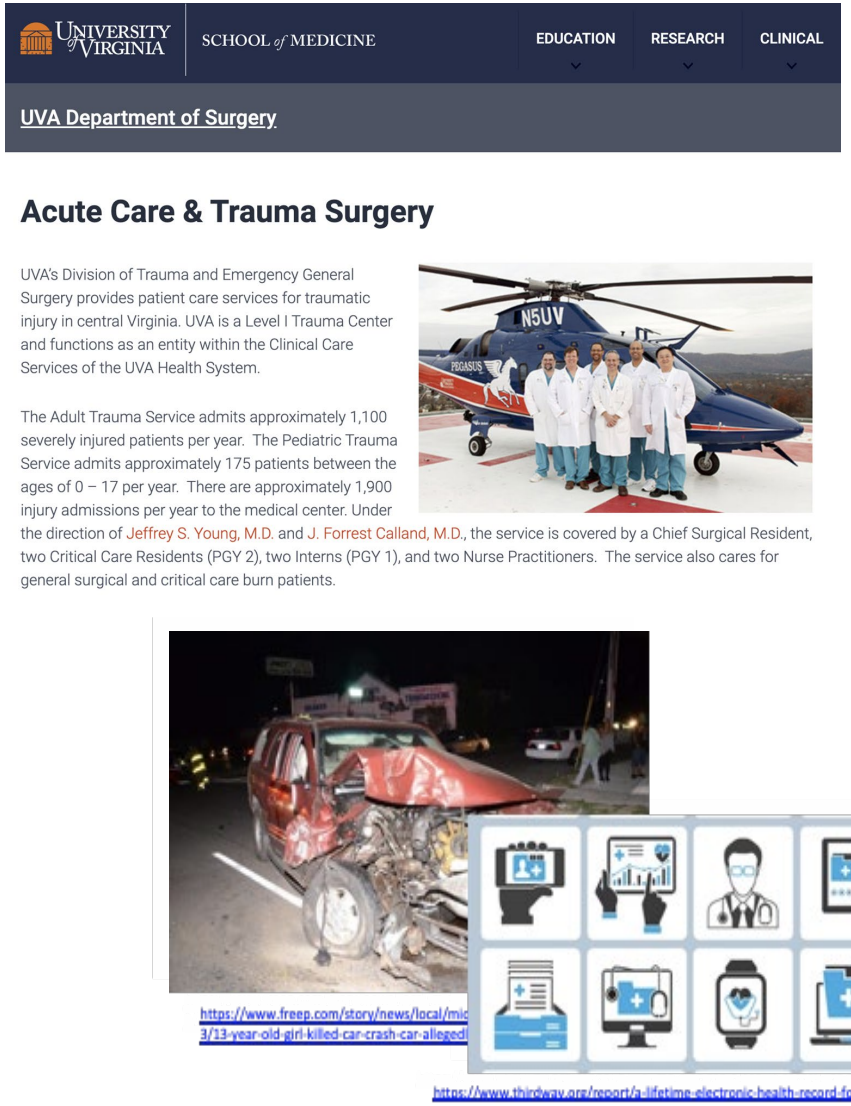
So we have a definition of data science, a set of guiding principles, and a pitch where does this take us?

Stated another way, what do we want to be recognized for in 10 years?

https://pebourne.wordpress.com/

Here is one existing exemplar



Researcher and Assistant Professor of Medicine Dr. Thomas Hartka, also a current online Masters in Data Science student, is combining two disparate data sets—electronic health records and DMV crash data—to save lives after motor vehicle crashes.

"I enrolled in the MSDS program to expand my research on automotive safety. I have already used techniques from classes in my work. I hope to expand my research to real-time analytics to improve emergency room care."

— Dr. Thomas Hartka, UVA School of Medicine

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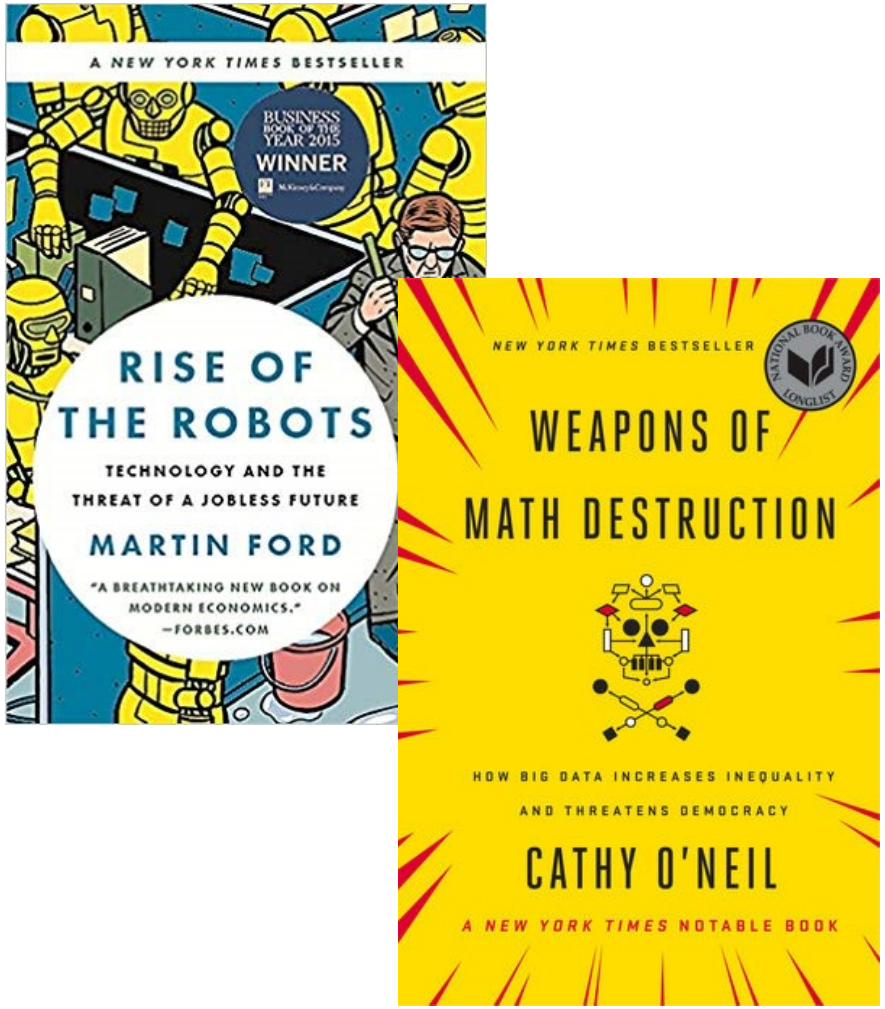
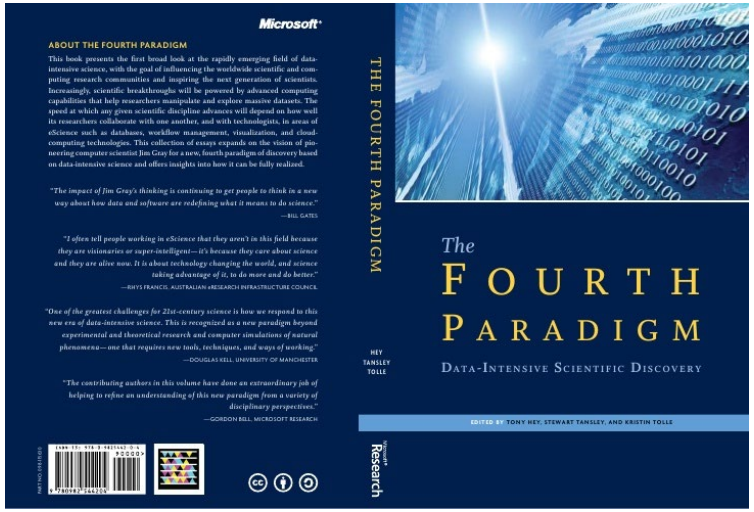
Why *Responsible* Data Science?

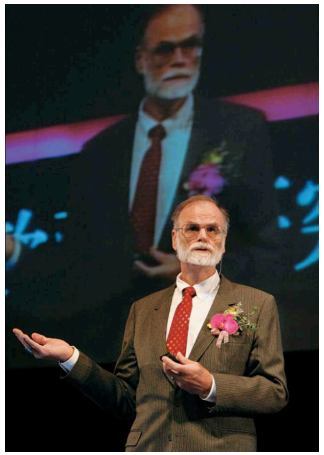


- A defining feature
- A partnership between STEM, social sciences and the humanities
- Where UVA has strength

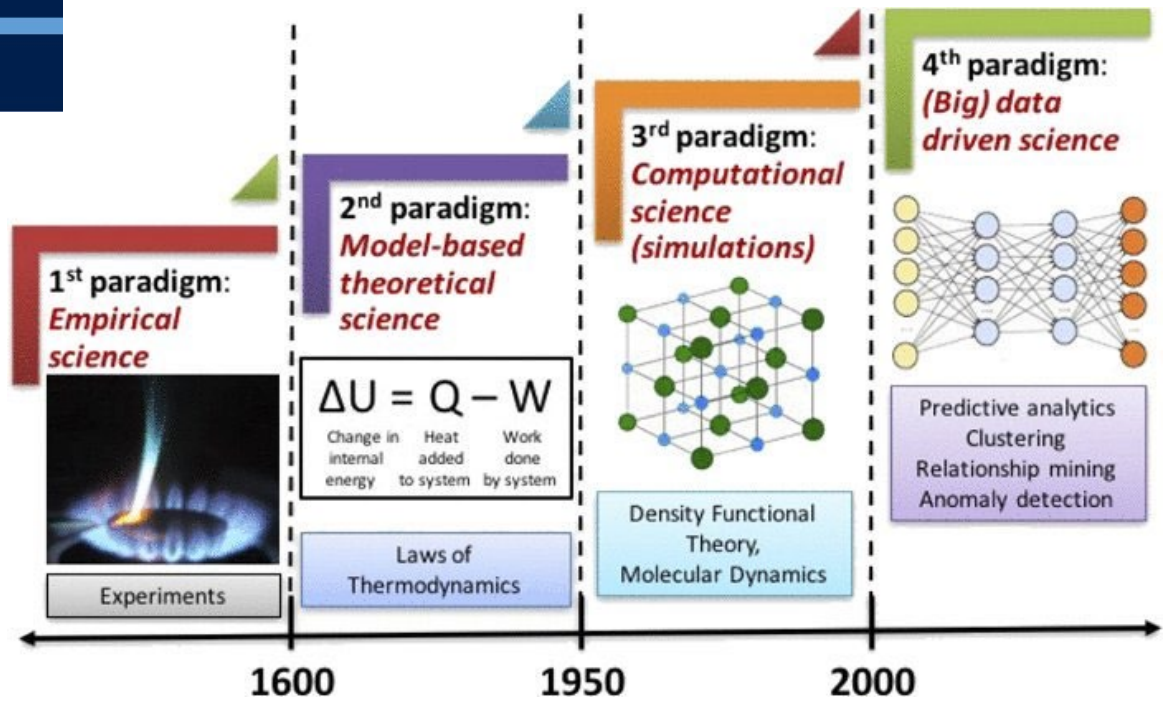
Yet another way of thinking about it – the fifth paradigm..



https://www.microsoft.com/en-us/research/wp-content/uploads/2009/10/Fourth_Paradigm.pdf



https://en.wikipedia.org/wiki/Jim_Gray_(computer_scientist)



https://twitter.com/aip_publishing/status/856825353645559808

Daily Challenges

- Deciding what not to do
- Competition for the best team members (faculty and staff)
- Establishing a diverse team
- Lack of a comprehensive enterprise-wide data infrastructure
- Its easier to conform

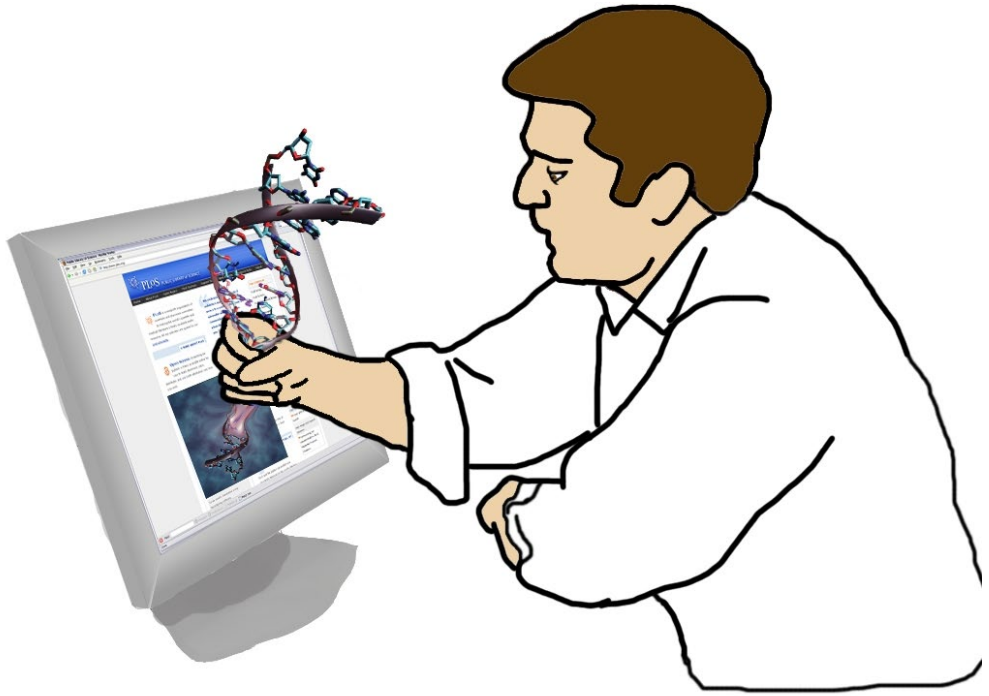
During my 5-year interview as dean I was asked,

“Will we need a school of data science in 10 years wont it be ubiquitous throughout the university?”

My response,

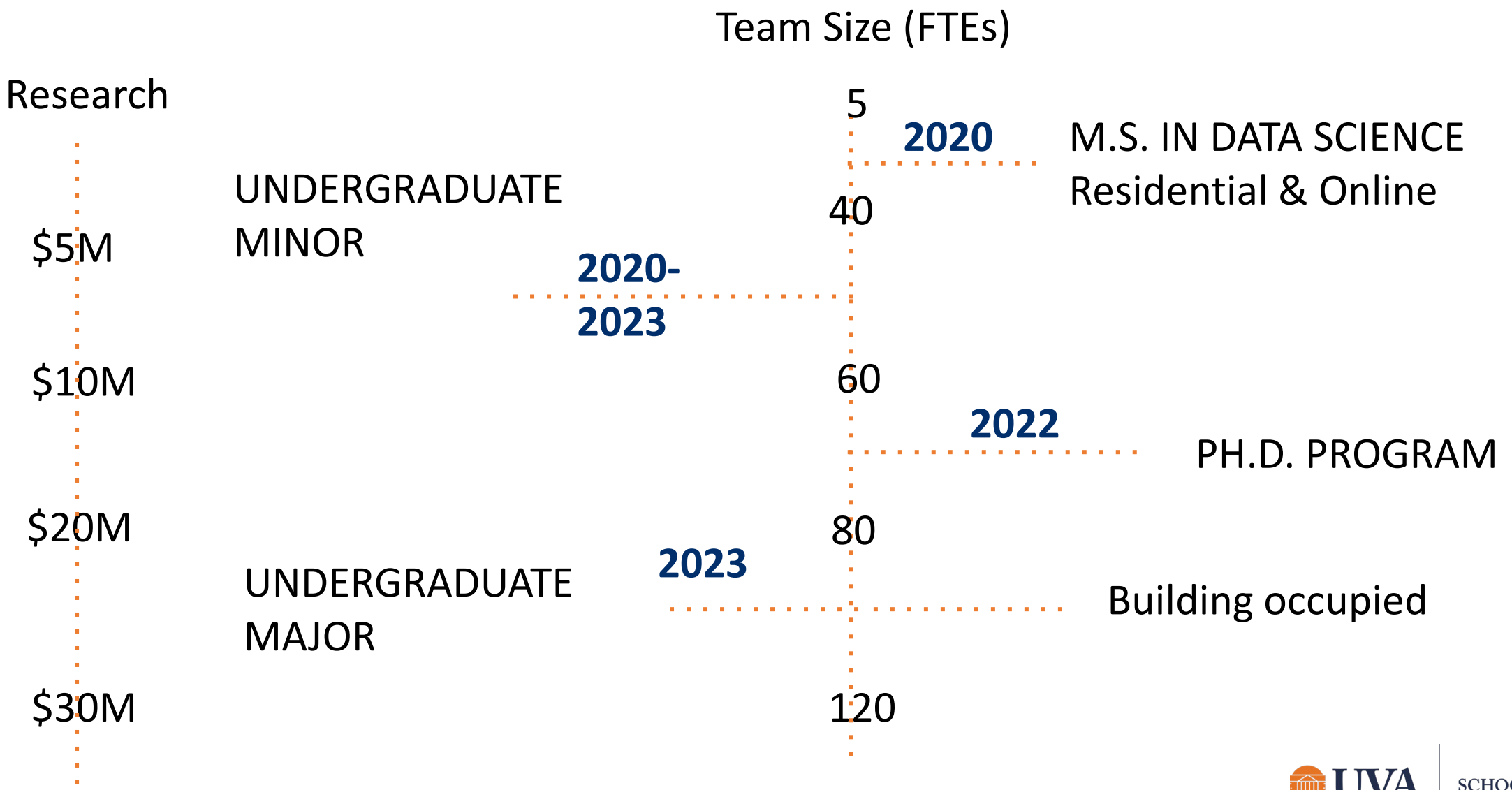
“Will we need a university in ten years? Wont it be one big school of data science?”

https://pebourne.wordpress.com/2022/06/29/deans-blog-data-science-ten-years-from-now/

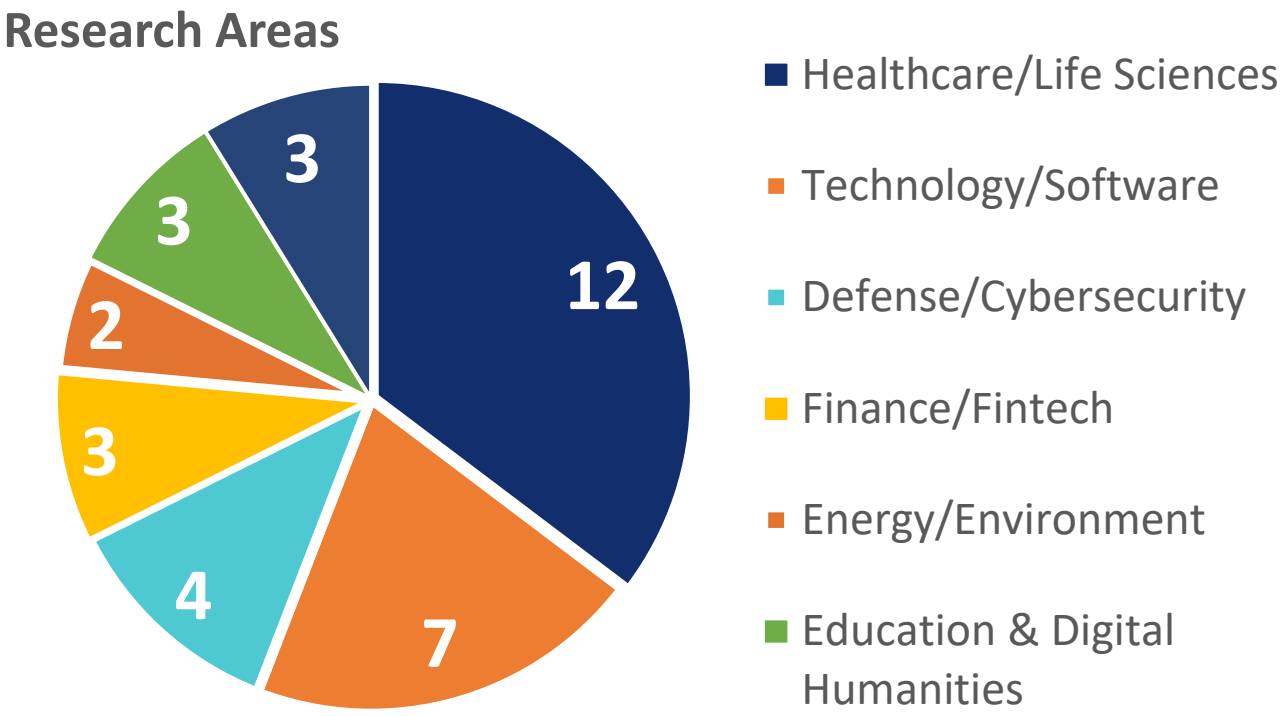


Questions?

Growing the School



SDS Current Research Portfolio



SDS strives to be a connector – a place where interdisciplinary research driven by common data, methods and expertise comes together

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