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Nephrotex

- virtual internship, 5 schools (Iowa, KSU, Pitt, Rowan, UW), 2014-2015
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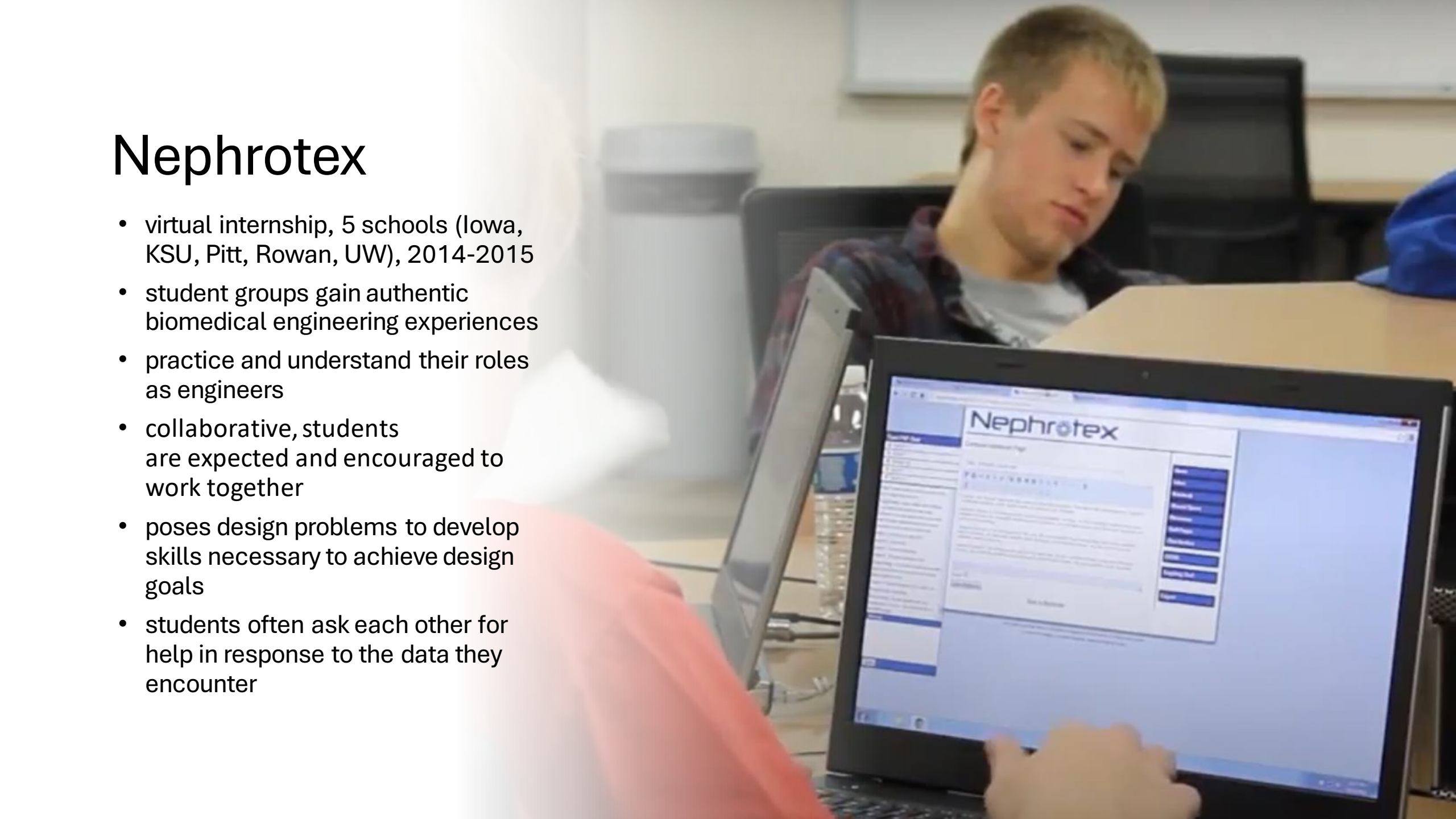
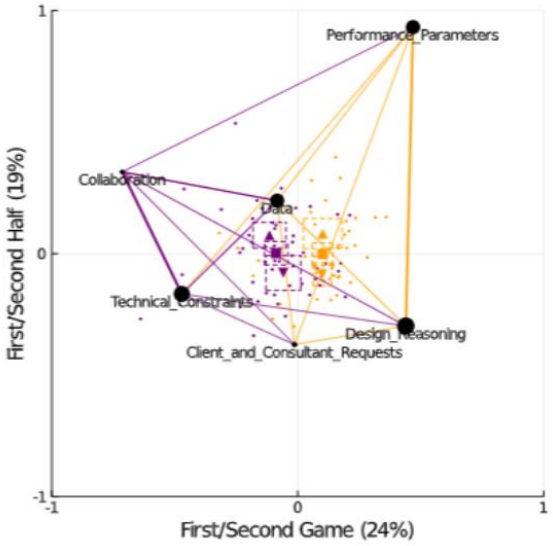


Previously…Structures of Stories

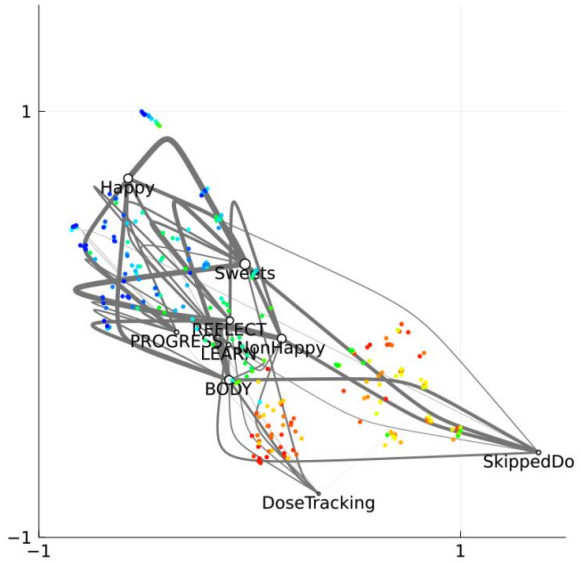
How do you tell a story…

with confounds and interactions?



Knowles, Mariah A. and David W. Shaffer. "Hierarchical Epistemic Network Analysis." *ICQE 2020*.

with ebbs and flows?



Knowles, Mariah A. "Telling Stories of Transitions." *ICQE 2021.*

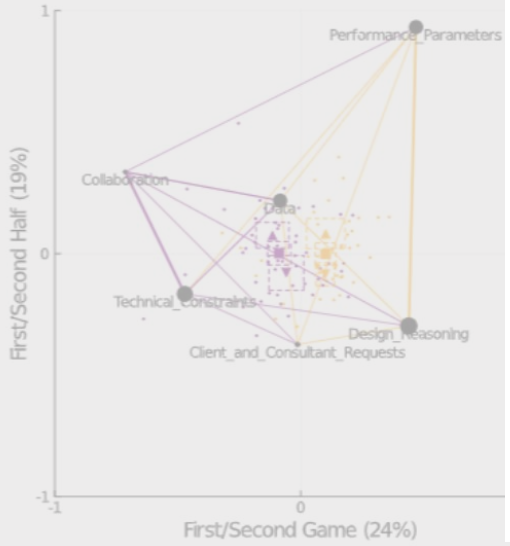
Previously…Structures of Stories

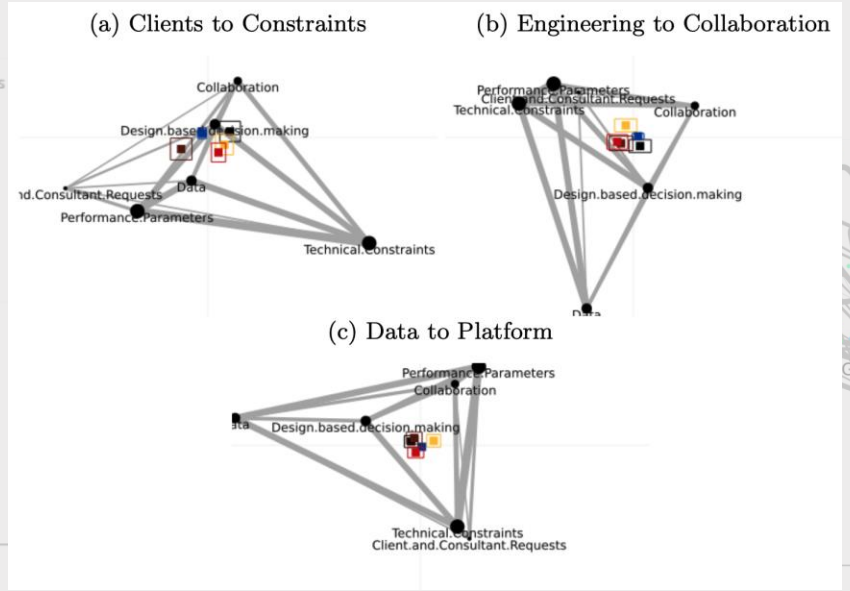
How do you tell a story…

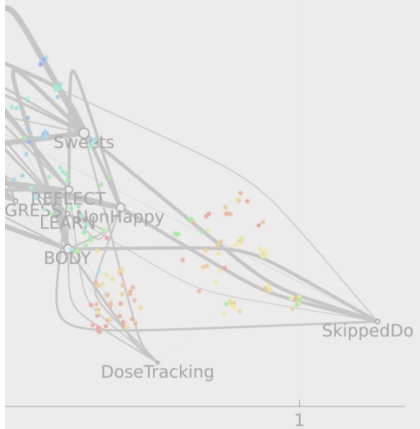
with confounds and interactions?

with many groups?

with ebbs and flows?







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Today.

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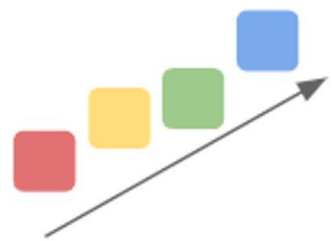
Punt the Ball

One Against the Rest

All Pairs (non-ordinal)

All Pairs (ordinal)

General Trend (non-ordinal)



General Trend (ordinal)

Justified Focus

Play the Tape

Punt the Ball

One Against the Rest

All Pairs (non-ordinal)

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General Trend (non-ordinal)

General Trend (ordinal)

Justified Focus

Play the Tape

Only Decent Option in Scenarios like this…

Situation	Example
Three or more groups, and	Five schools
Groups have many units, and	Students in schools
Groups are non-ordinal, and	Schools in different states, not months, not age groups
The differences in one pair of groups doesn't cover the whole story you want to tell.	Themes in what make schools differ

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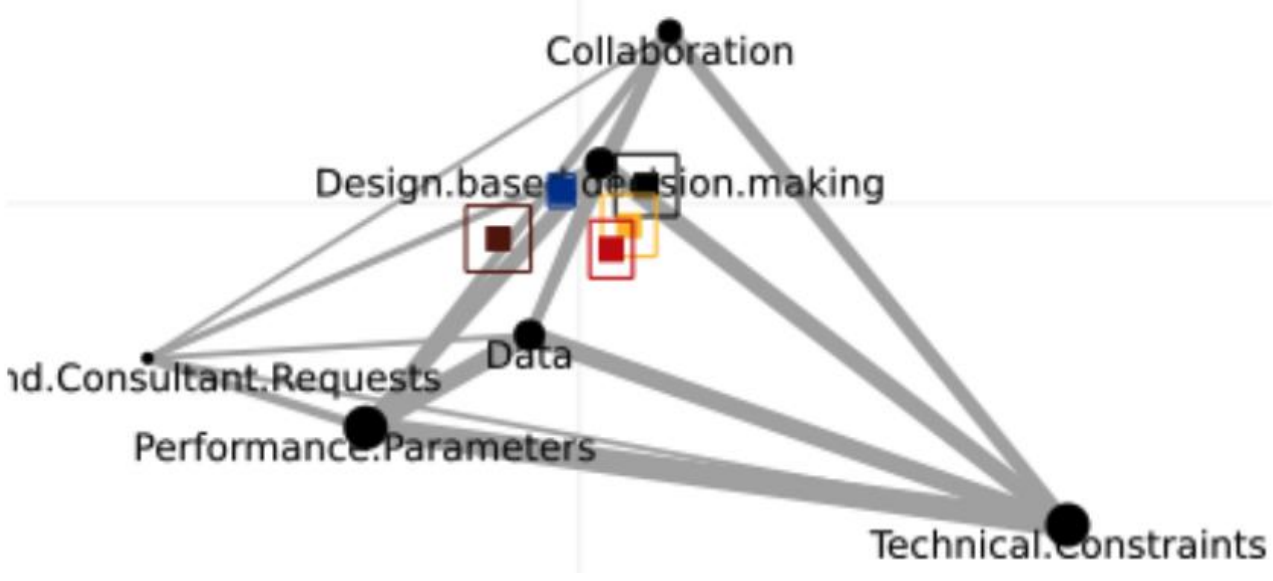

Multiclass Rotations in Epistemic Network Analysis

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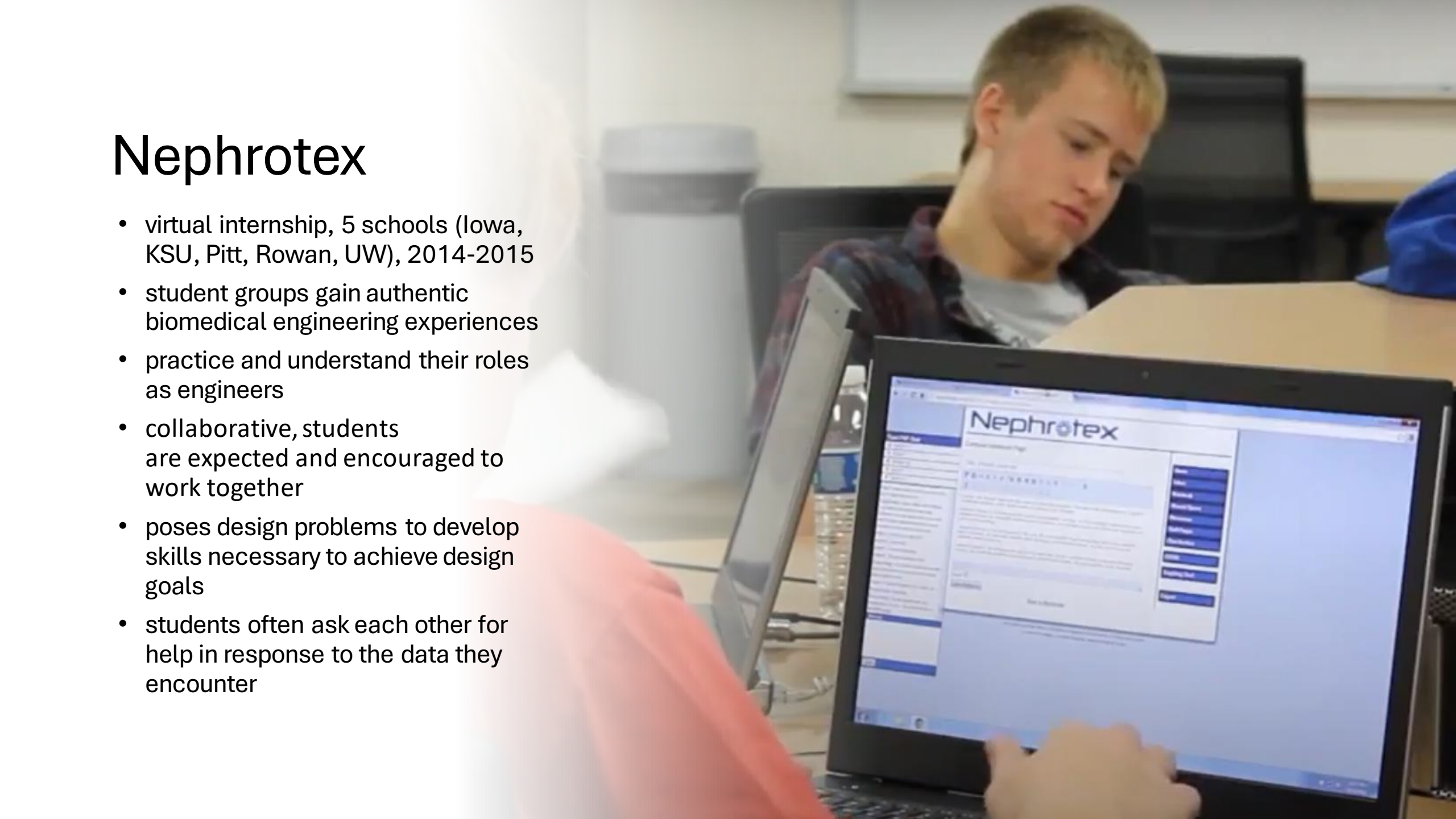

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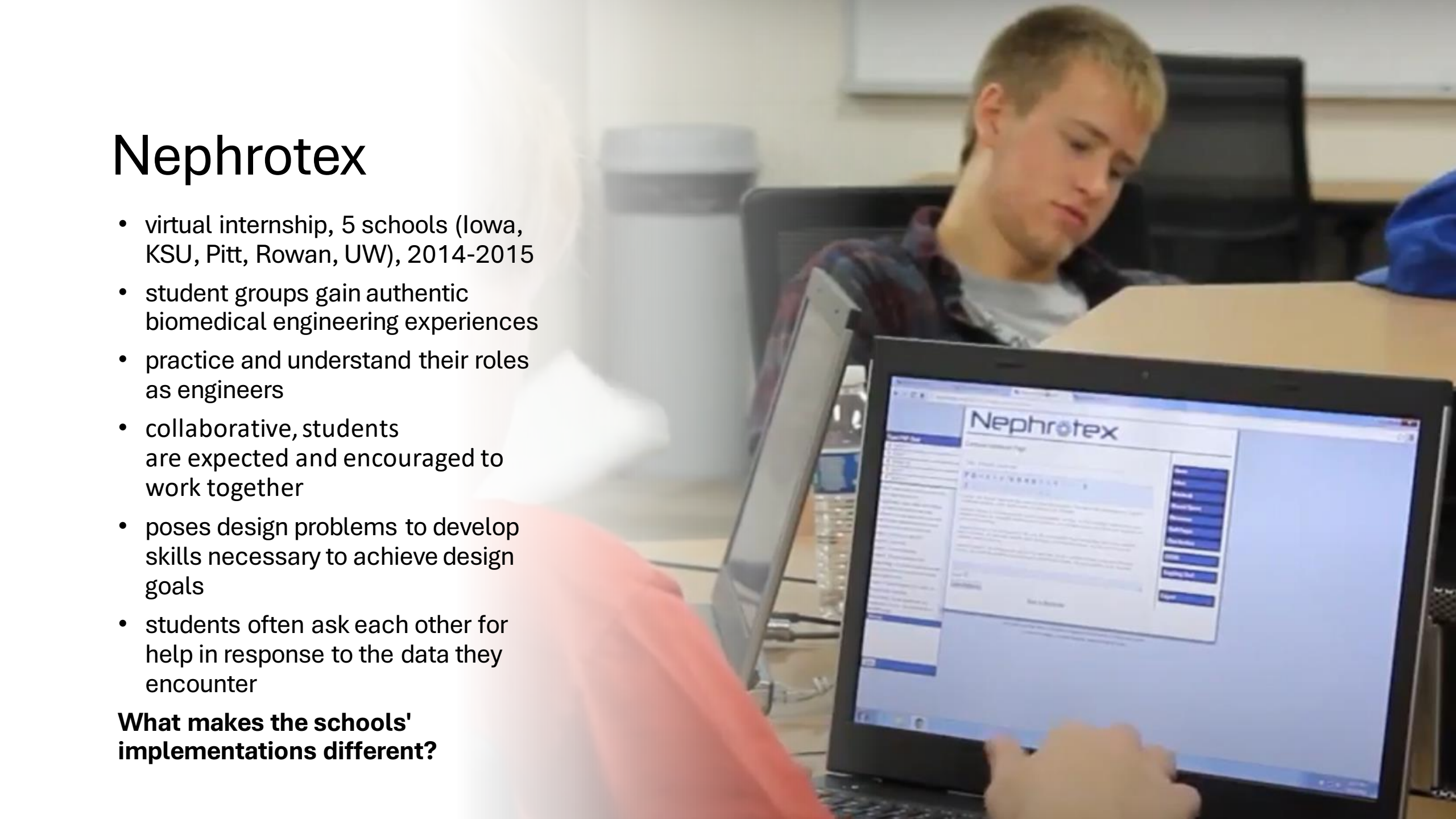
What makes the schools' implementations different?



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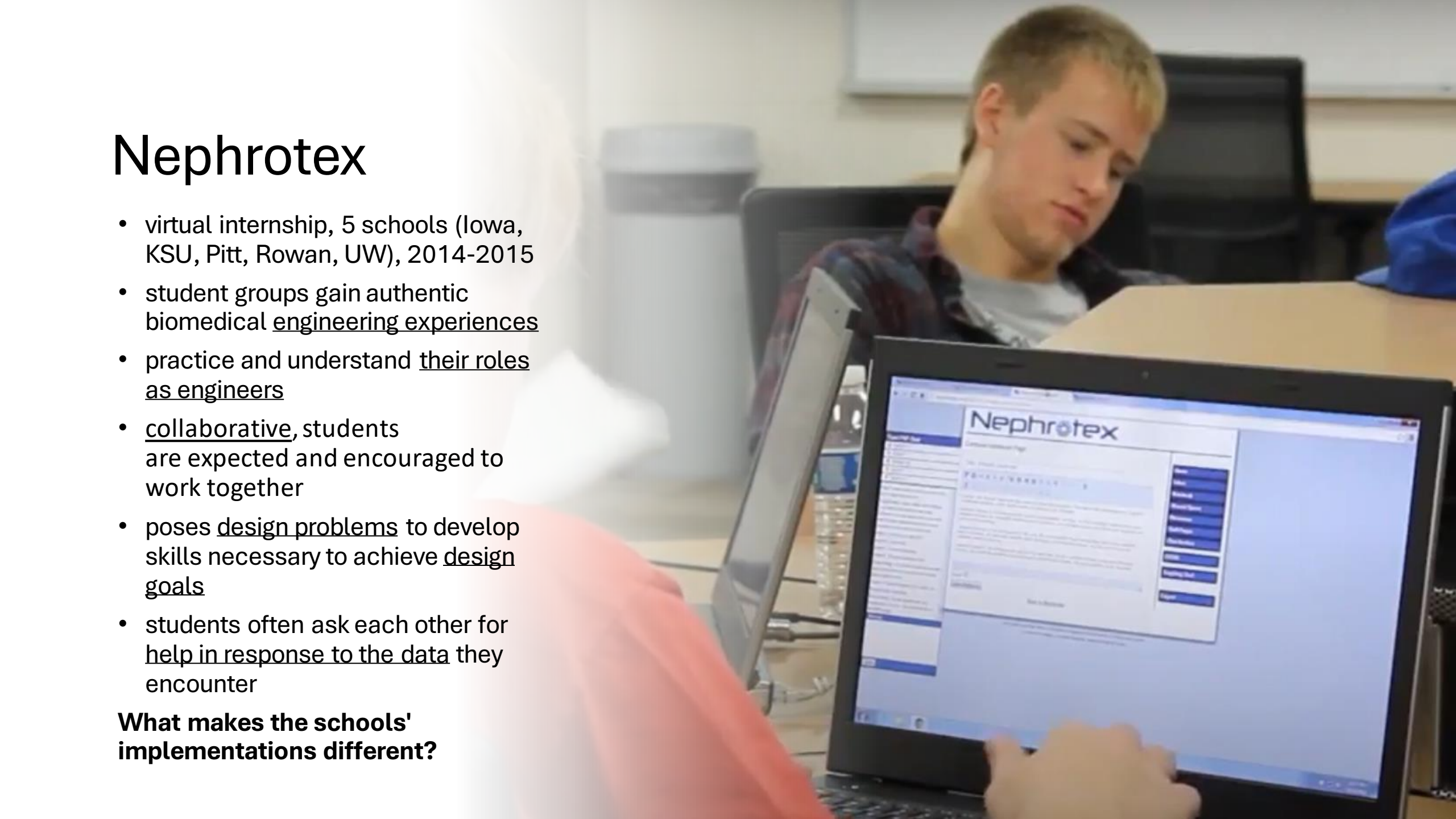

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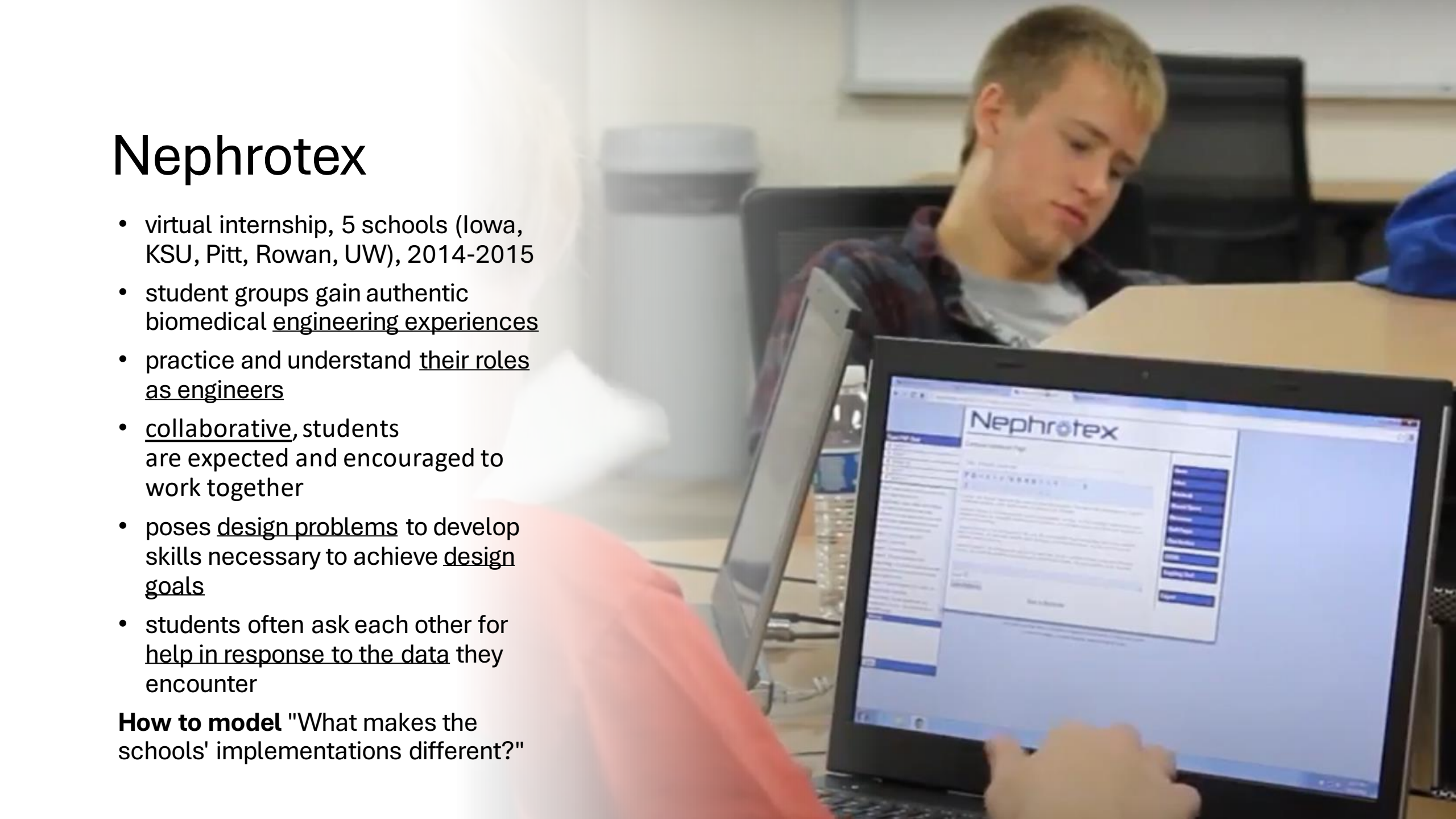
How to model "What makes the schools' implementations different?"

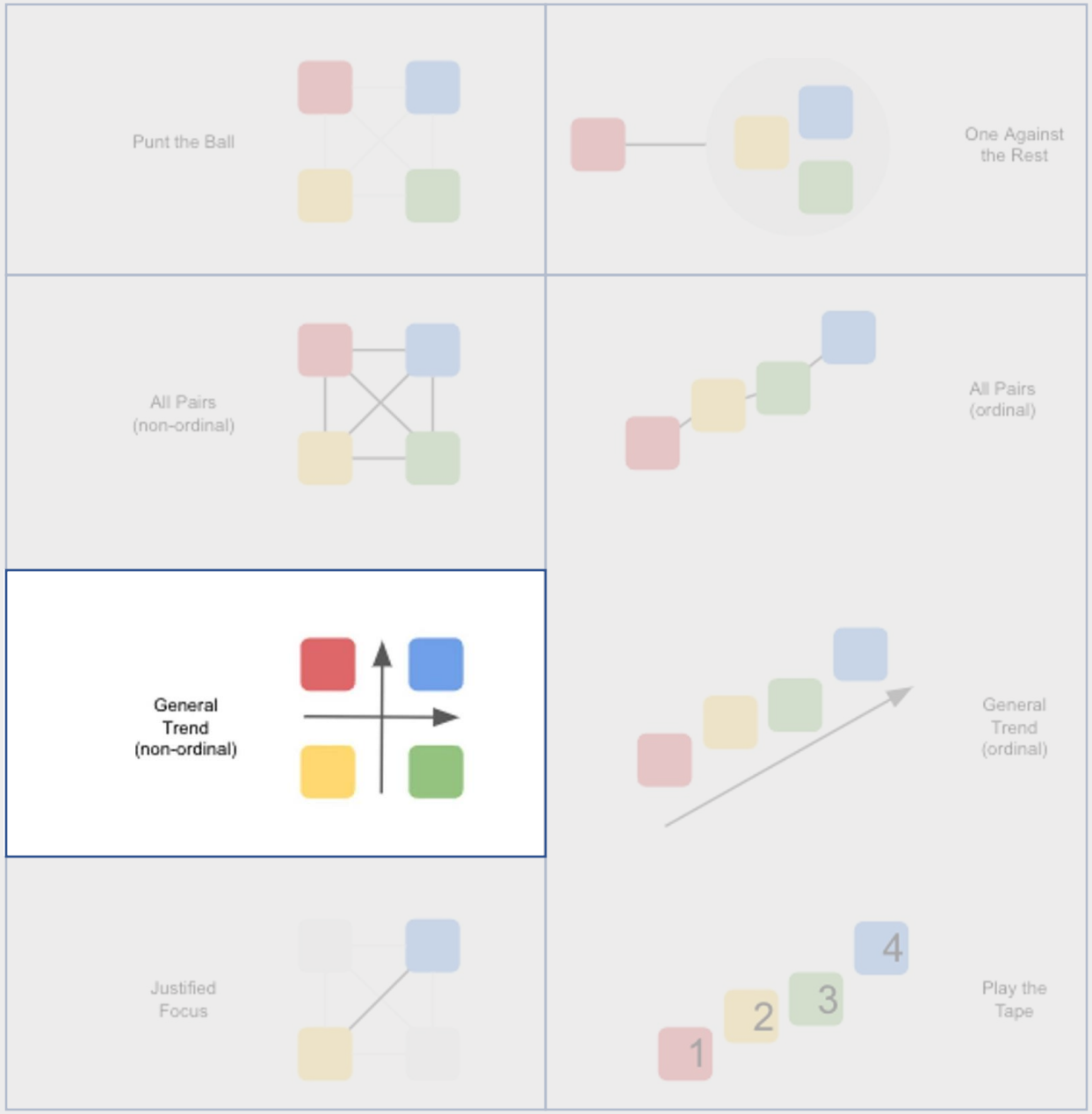


- Takes no advantage from the model

- HUGE Page Burden
- Redundant Description
- Doesn't model insights shared among multiple group differences

- SVD models differences between units, not differences between groups,
  little discrimination

- One pair is such a small part of some stories



- Redundant Description
- Doesn't model insights shared among multiple group differences

- Requires a sense of "order" between groups, not the case in many studies

- Takes no advantage from the model

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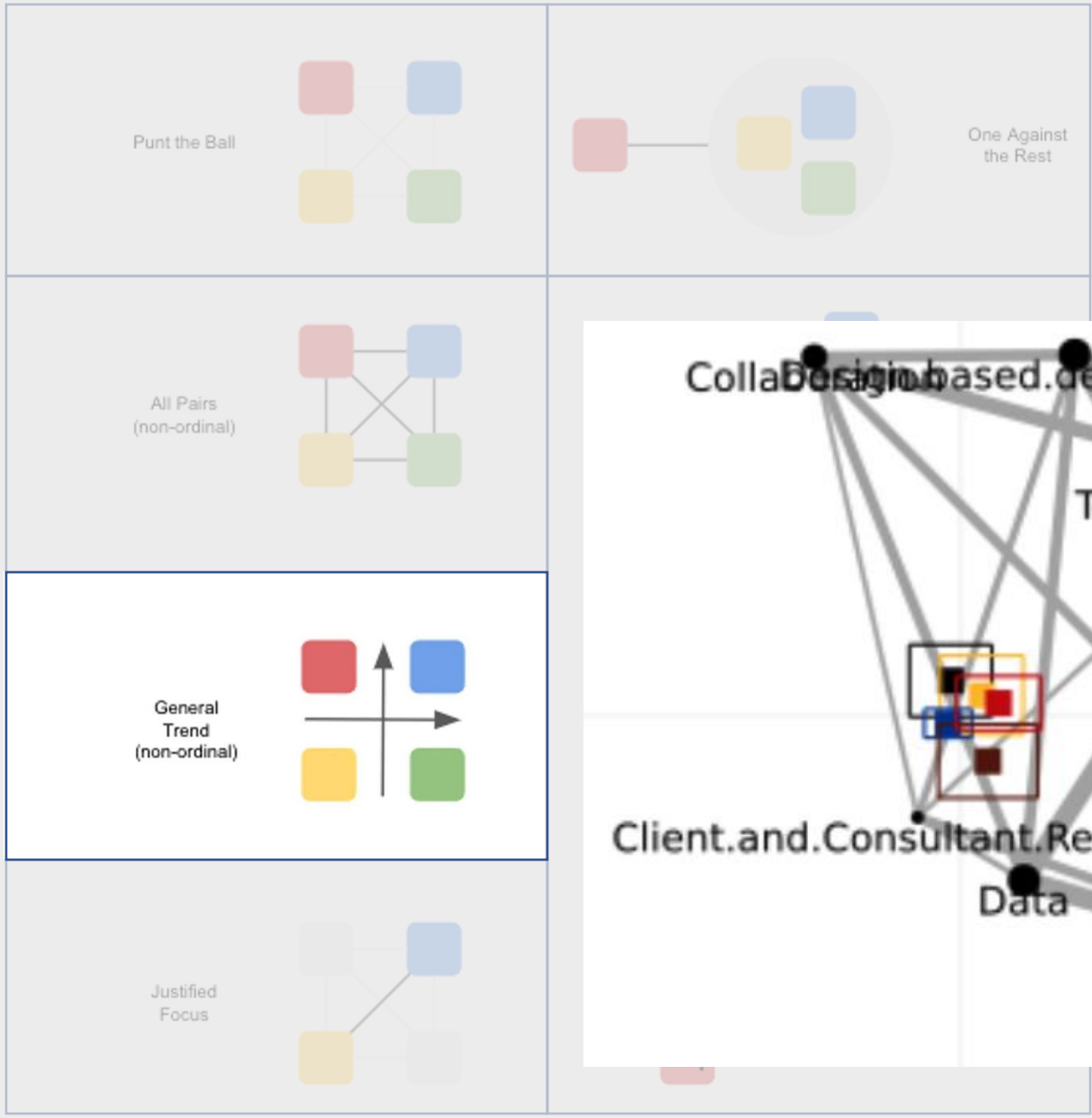

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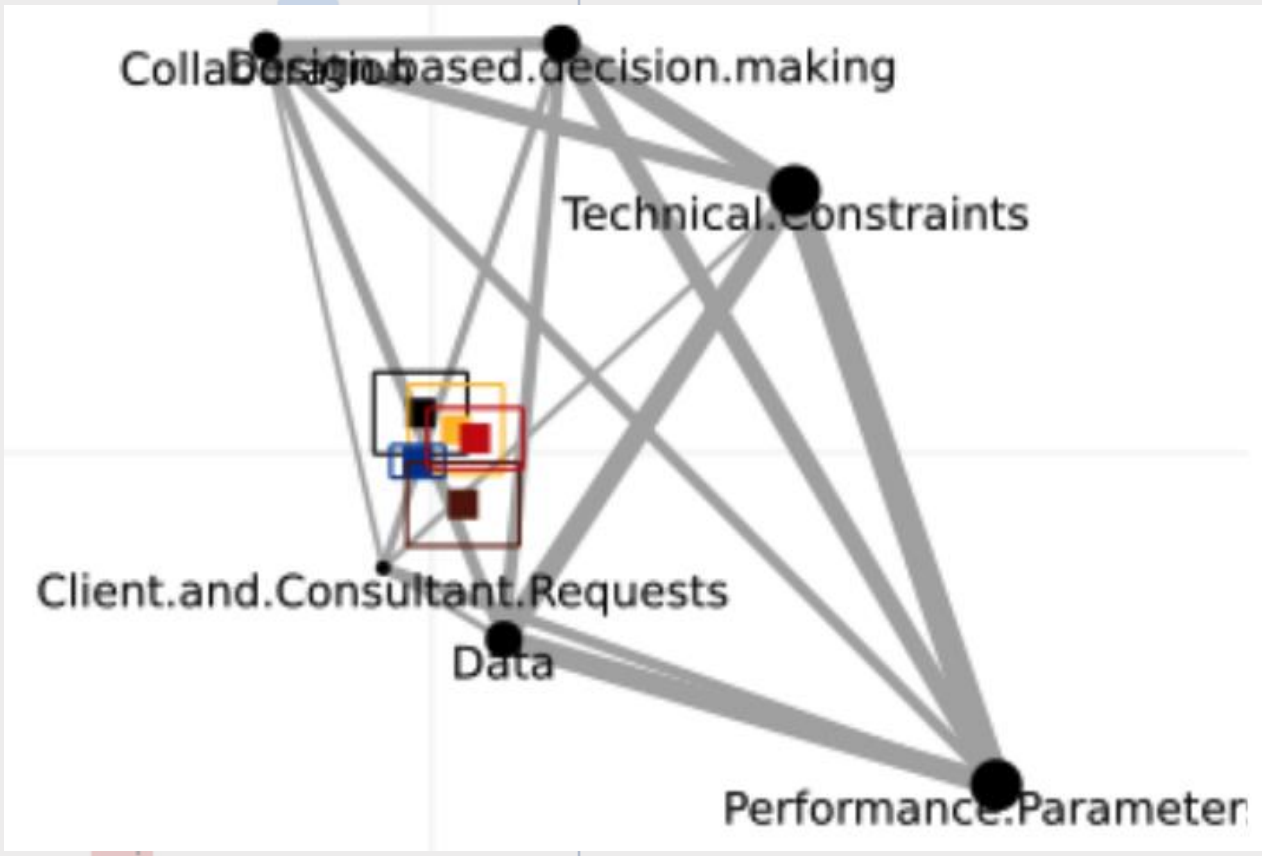

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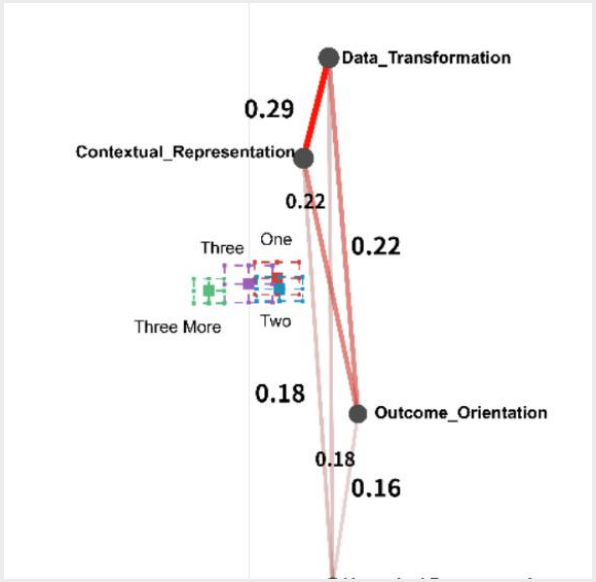

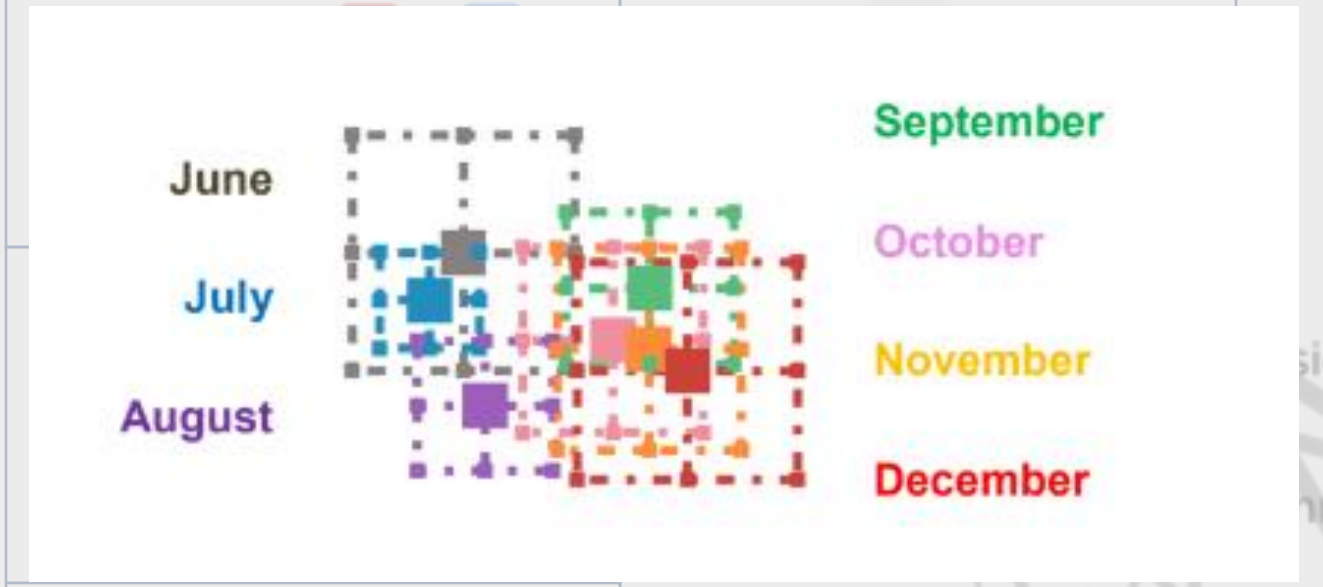

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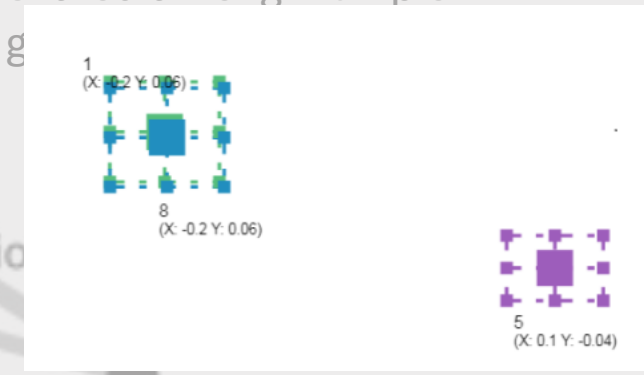

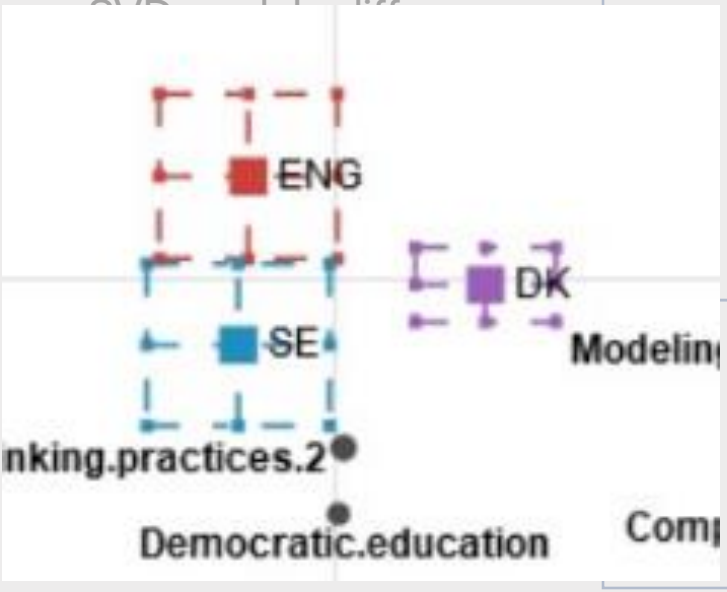

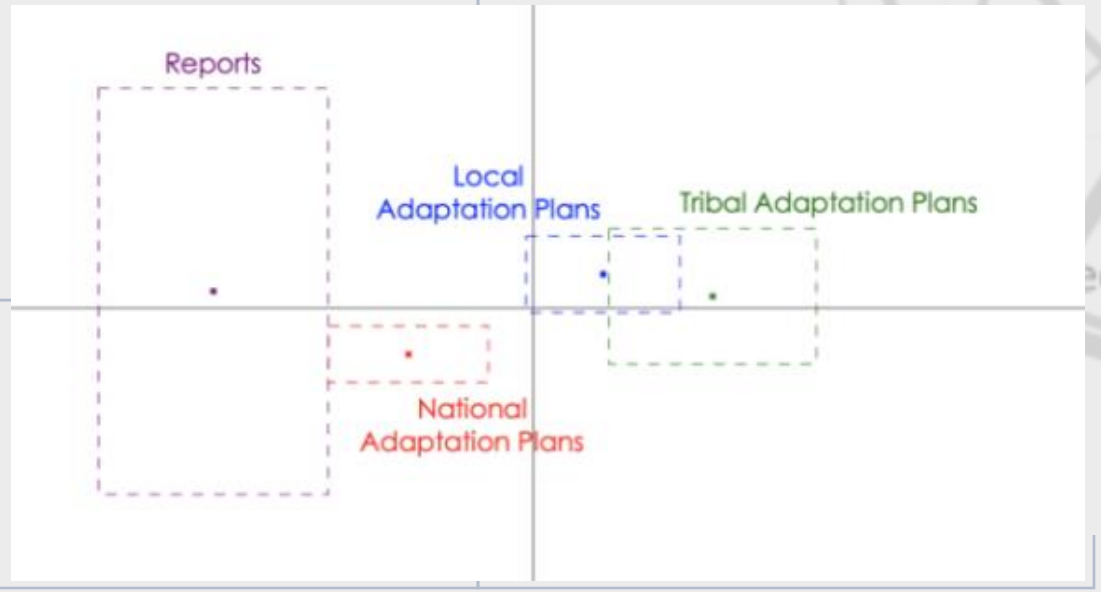

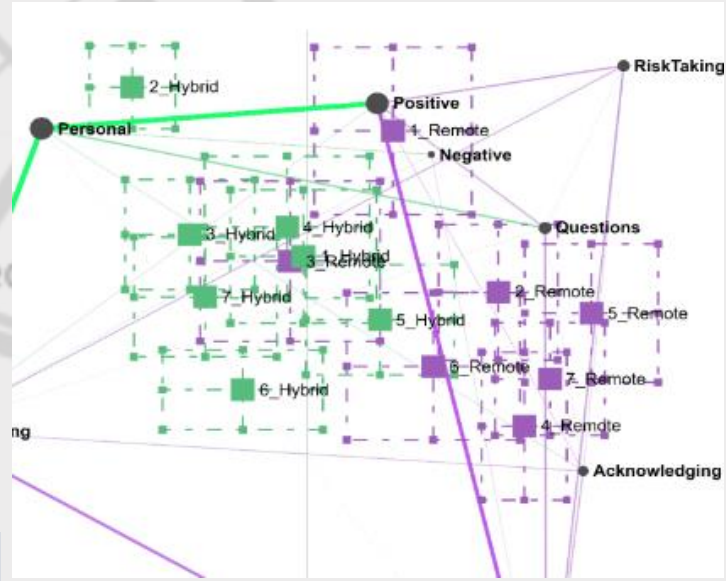

Models

Model	Use	Eigen.	R^2	r	H
Singular Value Decomposition (SVD)	Explains most variance				
Linear Discriminant Analysis (LDA)	Maximizes discrimination				
Multi-Class Means Rotation (MCMR)	Between-group variance				

Iowa
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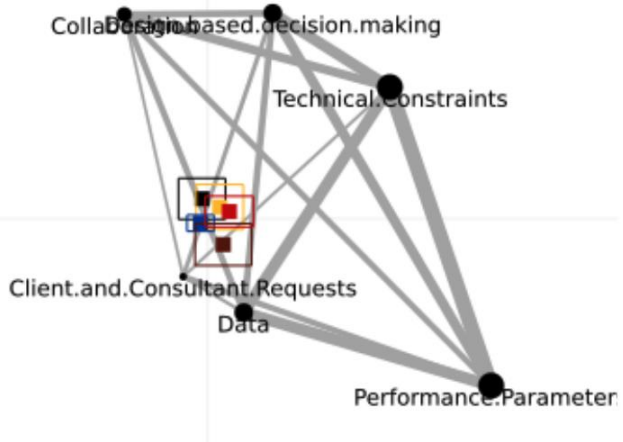
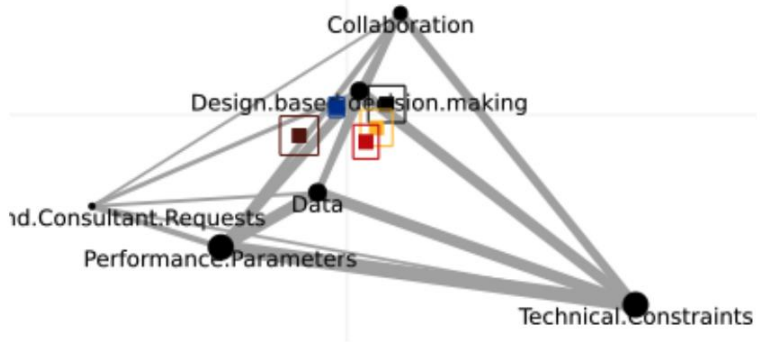


(b) LDA

(c) MCMR



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Models

Model	Use	Eigen.	R^2	r	H
Singular Value Decomposition (SVD)	Explains most variance	S_{cov}			
Linear Discriminant Analysis (LDA)	Maximizes discrimination	$S_{cov}^{-1}S_b$			
Multi-Class Means Rotation (MCMR)	Between-group variance	S_b			

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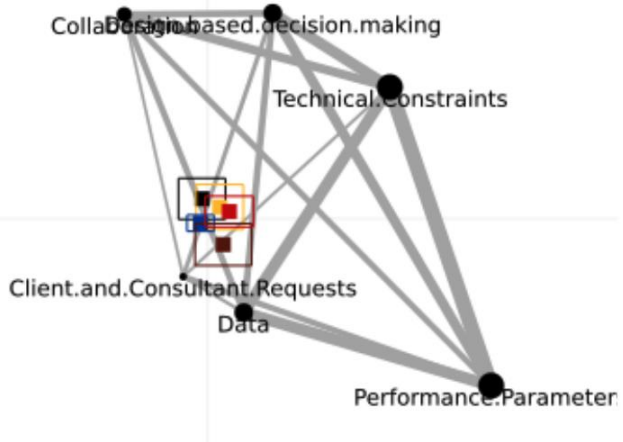

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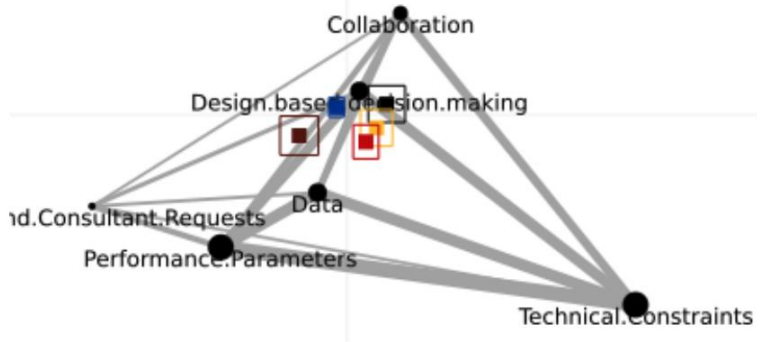

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Models

Model	Use	Eigen.	R^2	r	H
Singular Value Decomposition (SVD)	Explains most variance	S_{cov}	**.2830**		
Linear Discriminant Analysis (LDA)	Maximizes discrimination	$S_{cov}^{-1}S_b$	.0685		
Multi-Class Means Rotation (MCMR)	Between-group variance	S_b	.1178		

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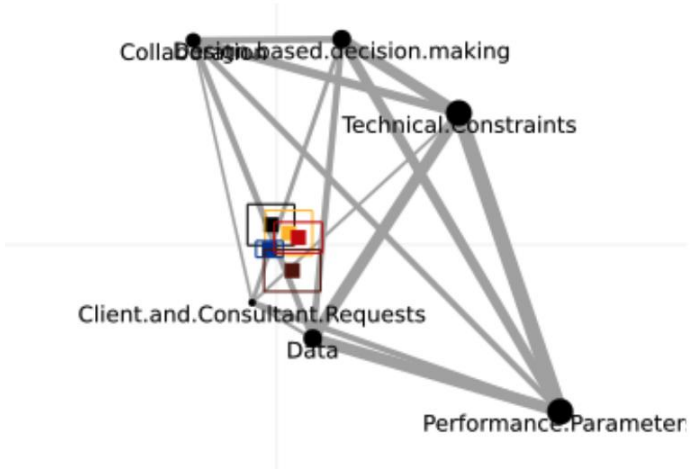

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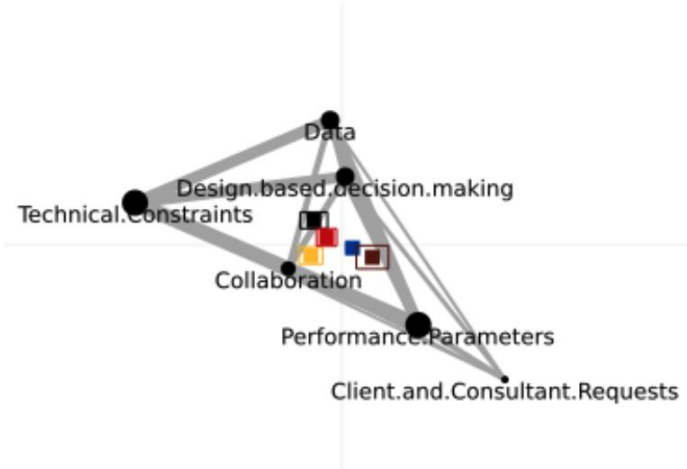
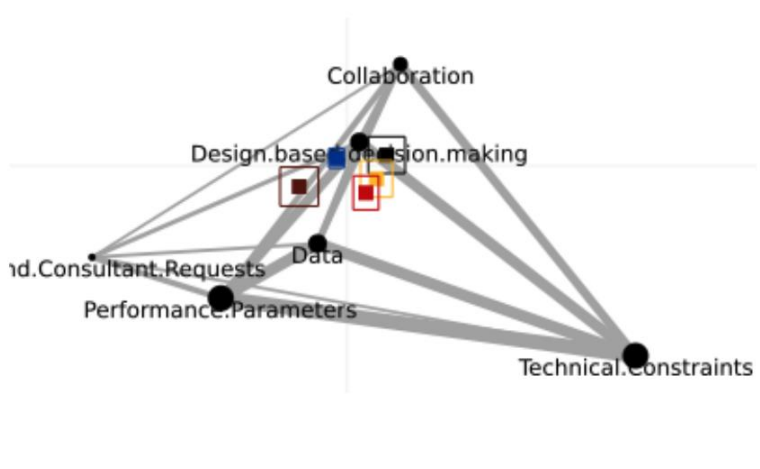


(c) MCMR



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Singular Value Decomposition (SVD)	Explains most variance	S_{cov}	**.2830**	**.9964**	
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Multi-Class Means Rotation (MCMR)	Between-group variance	S_b	.1178	**.9946**	

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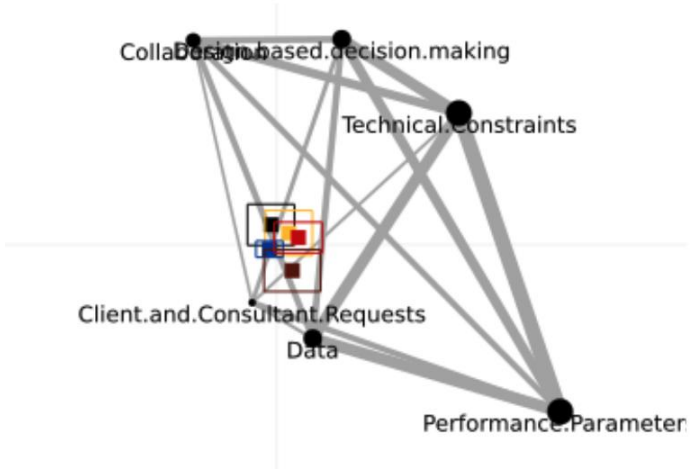

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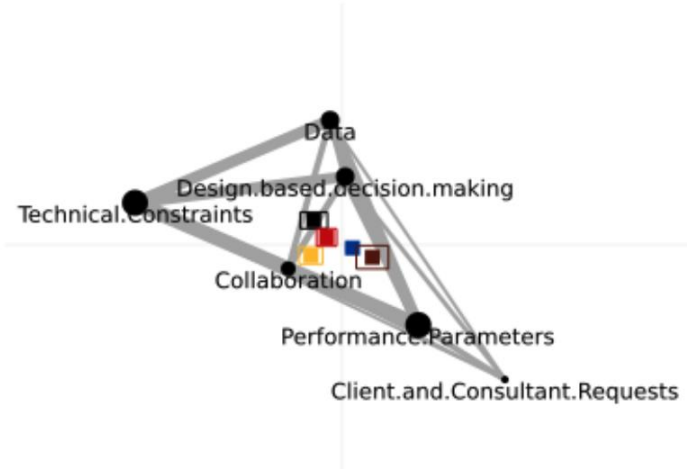

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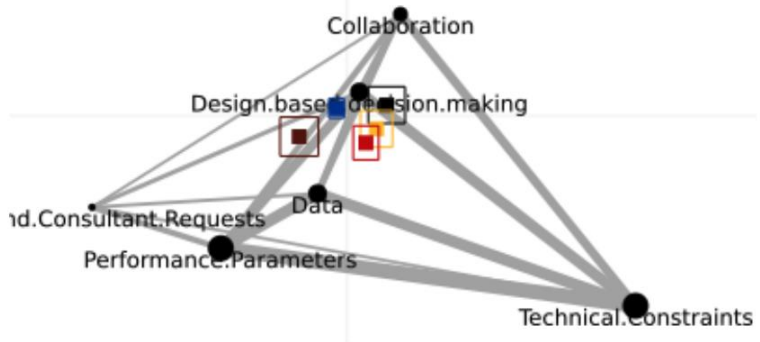

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Model	Use	Eigen.	R^2	r	H
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Linear Discriminant Analysis (LDA)	Maximizes discrimination	$S_{cov}^{-1}S_b$	.0685	.8921	**74.22**
Multi-Class Means Rotation (MCMR)	Between-group variance	S_b	.1178	**.9946**	69.76

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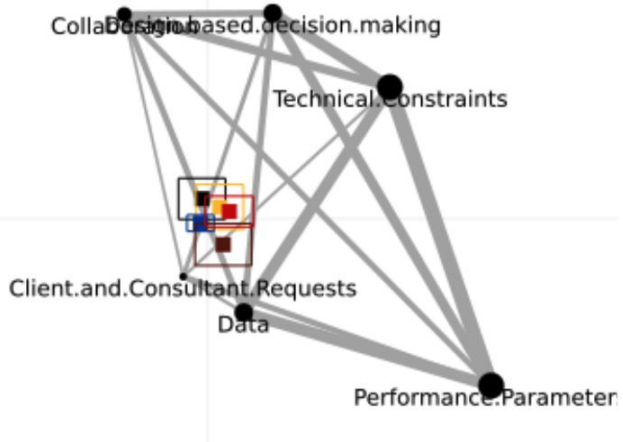

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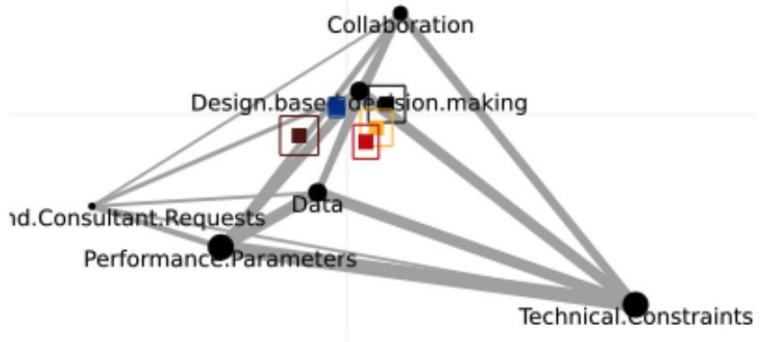

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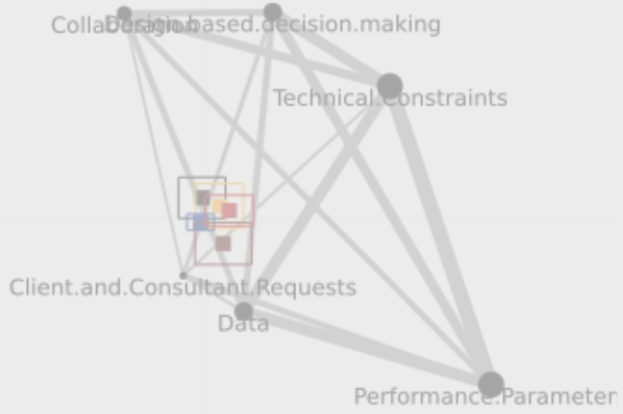

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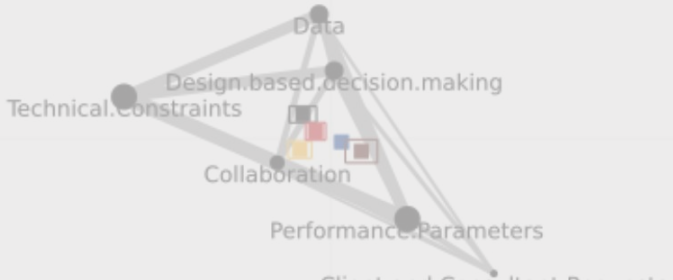
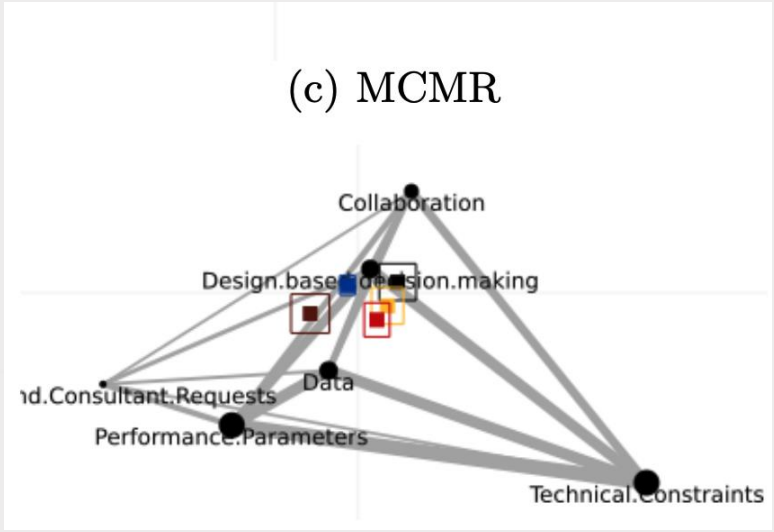
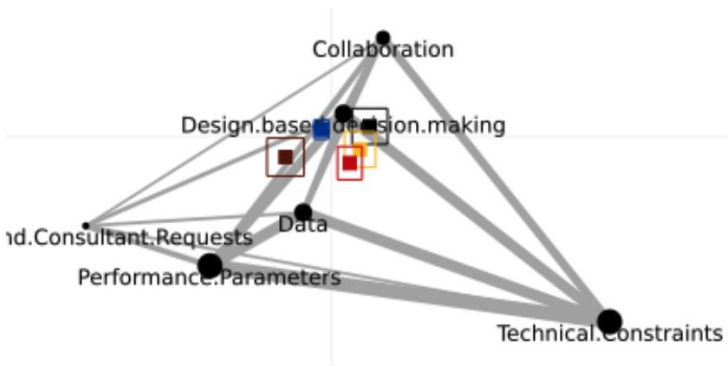
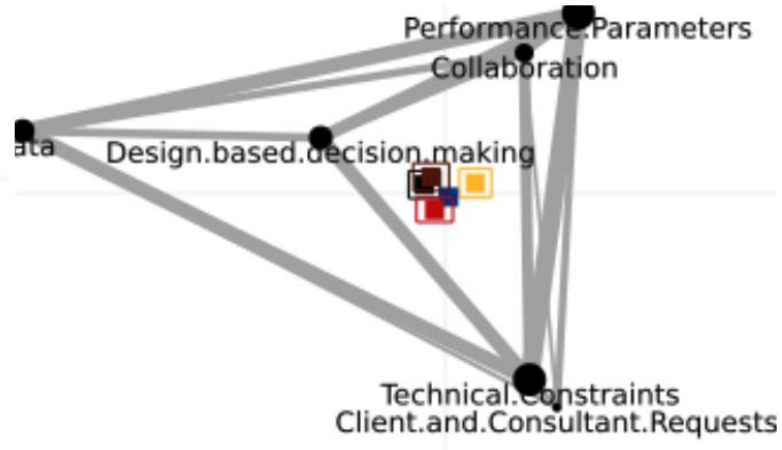


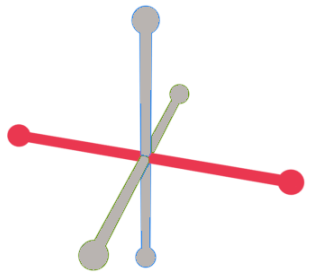
(c) MCMR

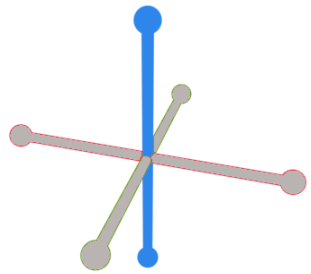


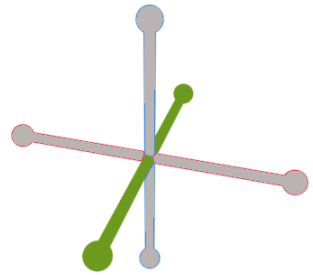

Collaboration
Design.based.decision.making
Data
Performance.Parameters
Technical.constraints


Performance.Parameters
Technical.constraints
Collaboration
Design.based.decision.making


Performance.Parameters
Collaboration
Design.based.decision.making
Technical.constraints
Client.and.Consultant.Requests







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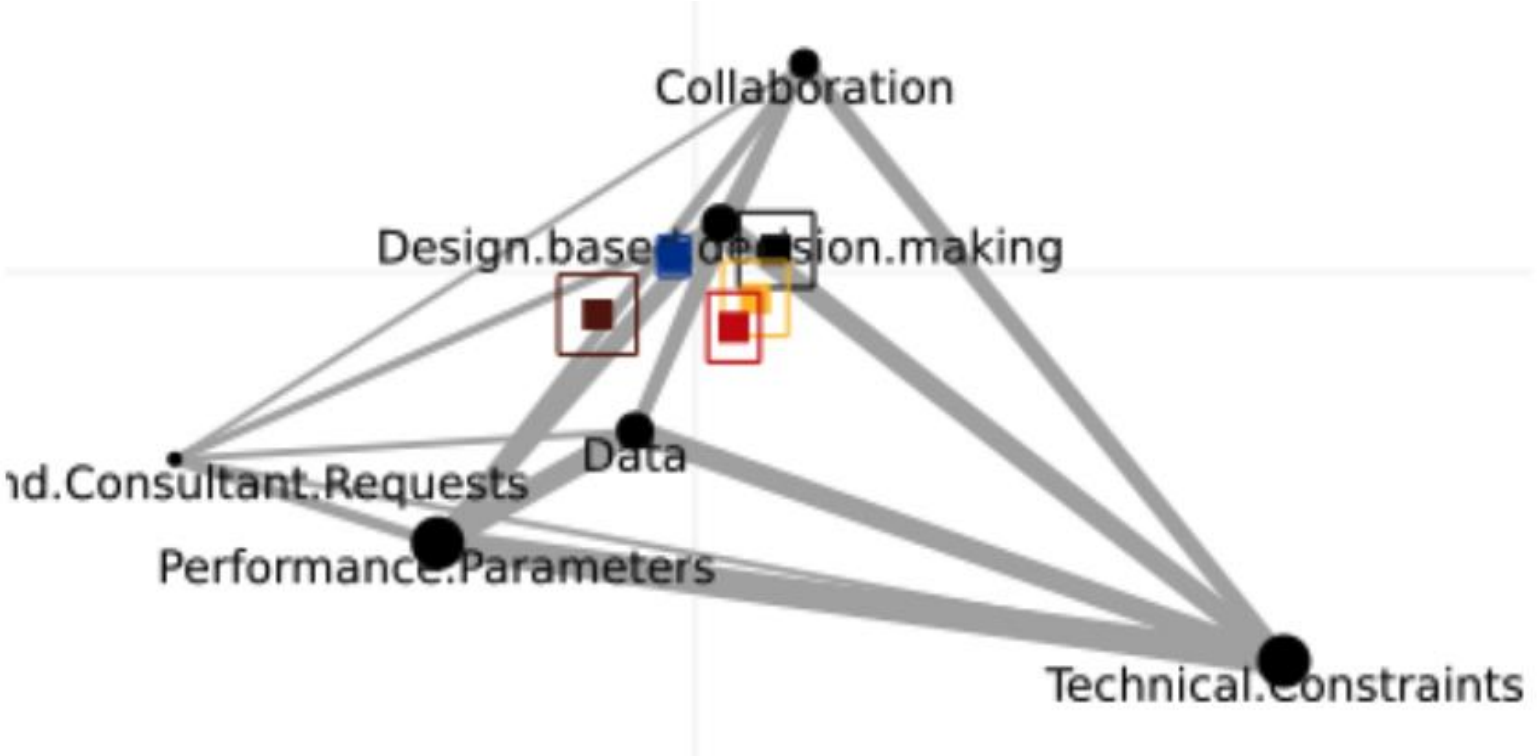
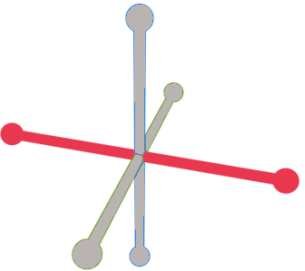
Results

Dimension: Themes of Difference	H	Discriminates Between…
Clients vs. Constraints "I found our reliability at least meets the required and preferred standard of both consultants" vs. "Cost was also a factor in my previous decision, otherwise the steric hindering surfactant would have been my top choice"	69*** *** p < .0001	Rowan vs. Pitt vs. others

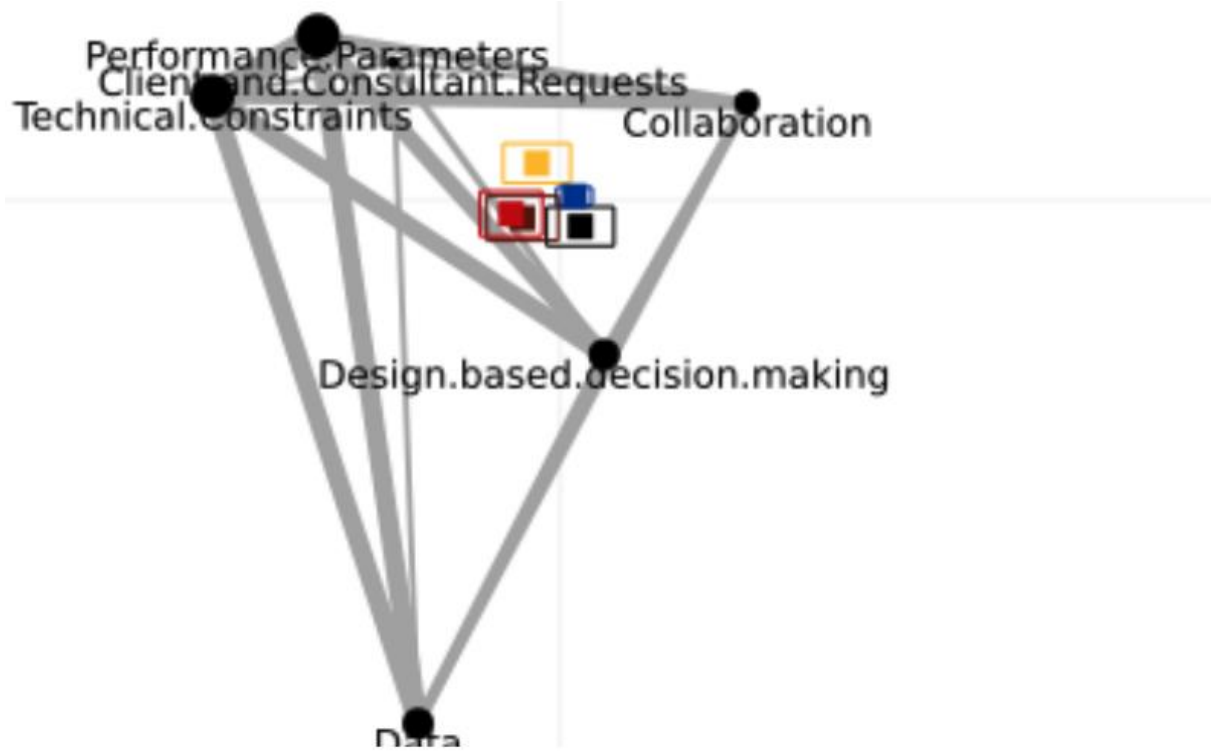


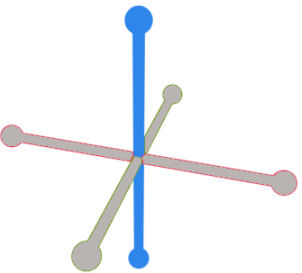


Iowa
KSU
Pitt
Rowan
UW-Madison

Results

Dimension: Themes of Difference	H	Discriminates Between…
Engineering vs. Collaboration "I have submitted my surfactant data to Alex twice and both times he has told me that some of my data is incorrect" vs. "I agree with [student] in saying that steric hindering was the best option. It provided the most categories scoring in the higher ranges."	26*** *** p < .0001	UW-Madison vs. Pitt and Iowa





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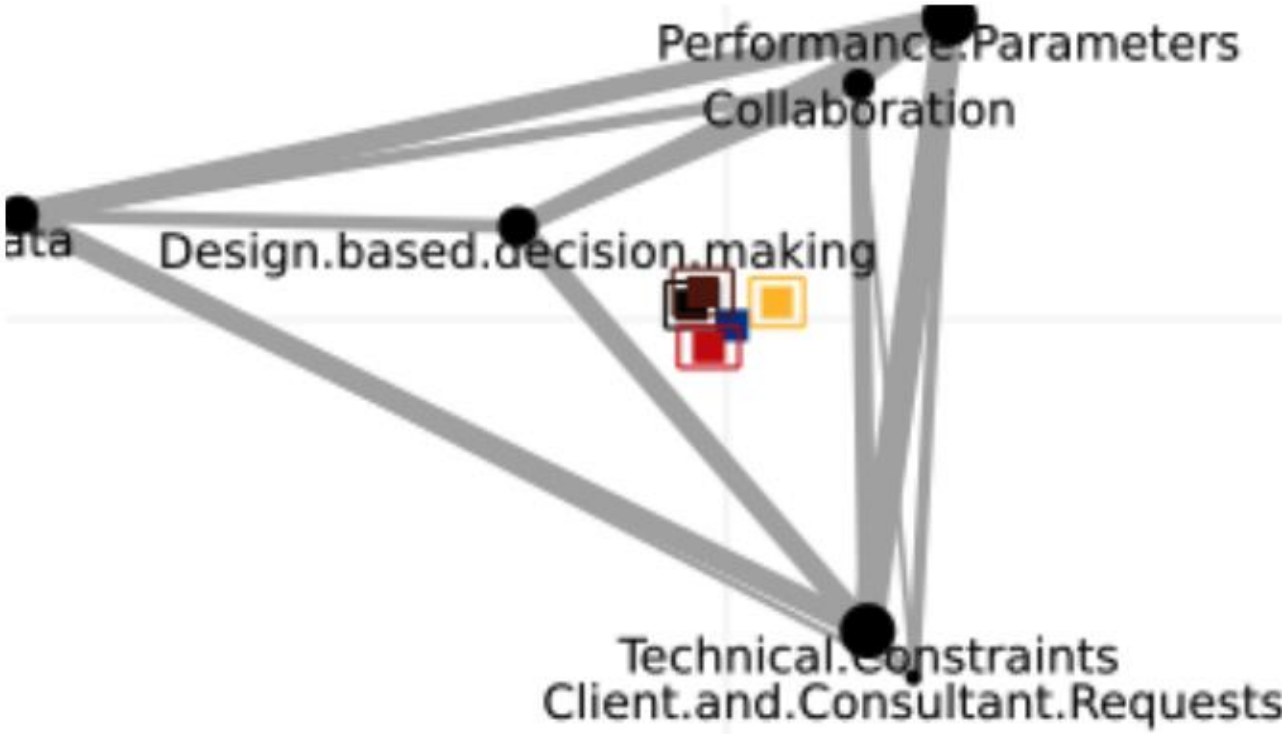
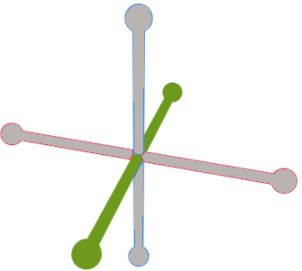
Results

Dimension: Themes of Difference	H	Discriminates Between…
Data vs. Platform "The biological surfactant could be a good option if we could lower its cost or improve its reliability" vs. General discussion of affordances of the platform	24*** *** p < .0001	Others vs. KSU

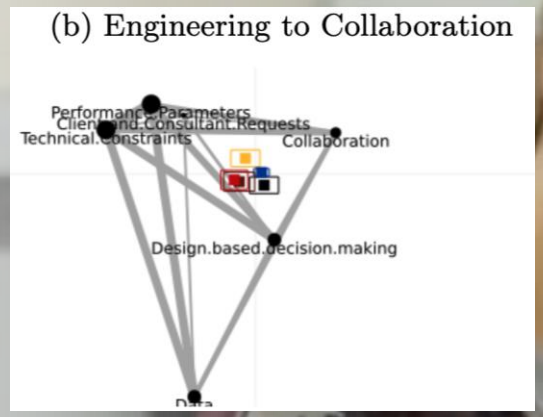


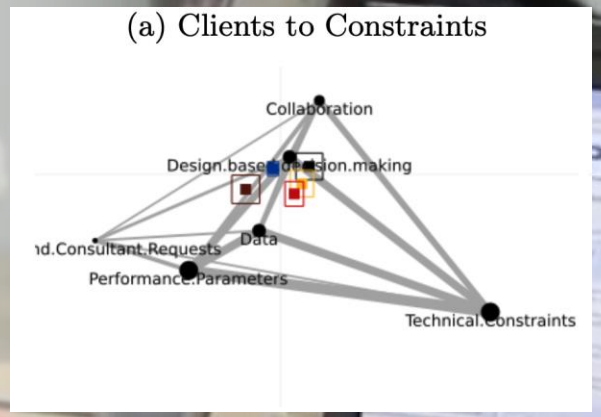


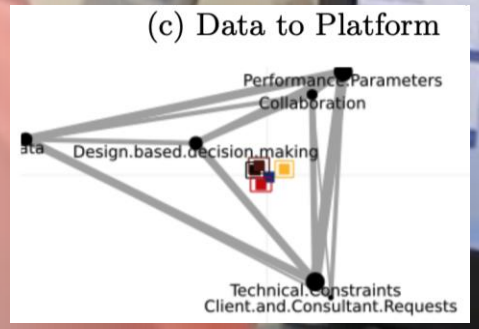
Nephrotex

- virtual internship, 5 schools (Iowa, KSU, Pitt, Rowan, UW), 2014-2015
- student groups gain authentic biomedical engineering experiences
- practice and understand their roles as engineers
- collaborative, students are expected and encouraged to work together
- poses design problems to develop skills necessary to achieve design goals
- students often ask each other for help in response to the data they encounter

How to model "What makes the schools' implementations different?"







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