Removing Academic Learning Silos

APPA / ACCA 2017: Annual Conference and Exhibition
July 21, 2017

FSB
Define Design Deliver

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Today's Universities are having to rethink how they provide a learning experience that prepares students for the future. It is requiring them to take a new look at how interdisciplinary learning can be achieved which is driving new academic pedagogy and redefining the ownership of education space. You will learn how the OSU CEAT Endeavor Lab tears down the traditional silos of learning and challenges how buildings are designed in response to preparing today's students to be tomorrow's professionals.

Learning Objectives

- Learn the benefits of cross discipline collaboration
- Learn how to approach designing flexible learning environments
- Learn how to engage stakeholders
- Understand today's student achievement goals

Session Description

- Current Drivers of Engineering Education
- College of Engineering, Architecture and Technology as a Case Study
- Hurdles + Vision = Design Options
- Making it Happen: The Process of Discovery
- Application to Other Areas of Study
- Benefits and Positive Outcomes
- Closing

Please take out your electronic device.

Data Gathering Exercise

Your Input

Step 1:

Enter 22333 in the 'To:'

Step 2:

Text FSBAE

Step 3:

Hit SEND

…wait for response

Polling:

What is your role or position?

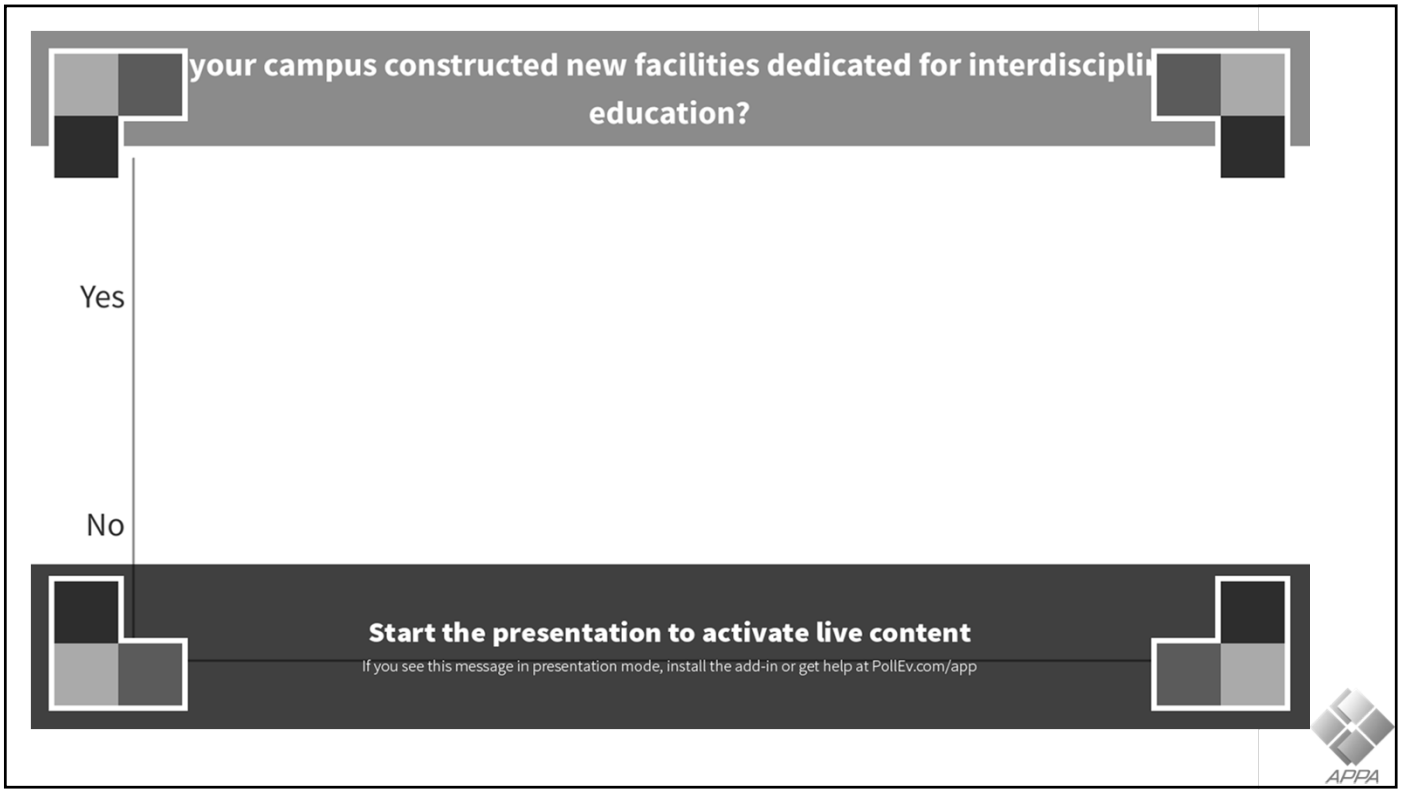
What is your role or position?

Start the presentation to activate live content

If you see this message in presentation mode, install the add-in or get help at PollEv.com/app

Polling:

Has your campus constructed new facilities dedicated for interdisciplinary education?

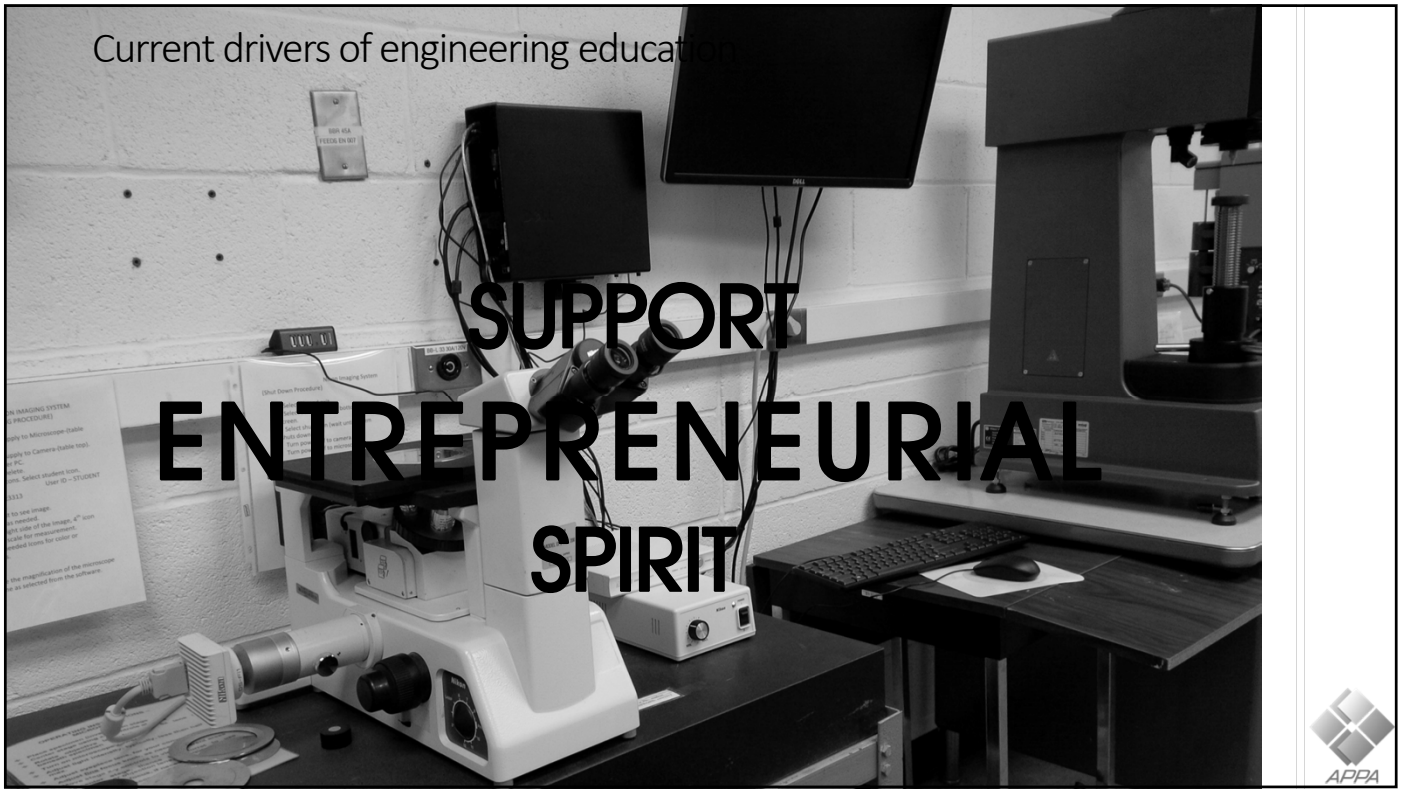


Current Drivers of Engineering Education

Current drivers of engineering education

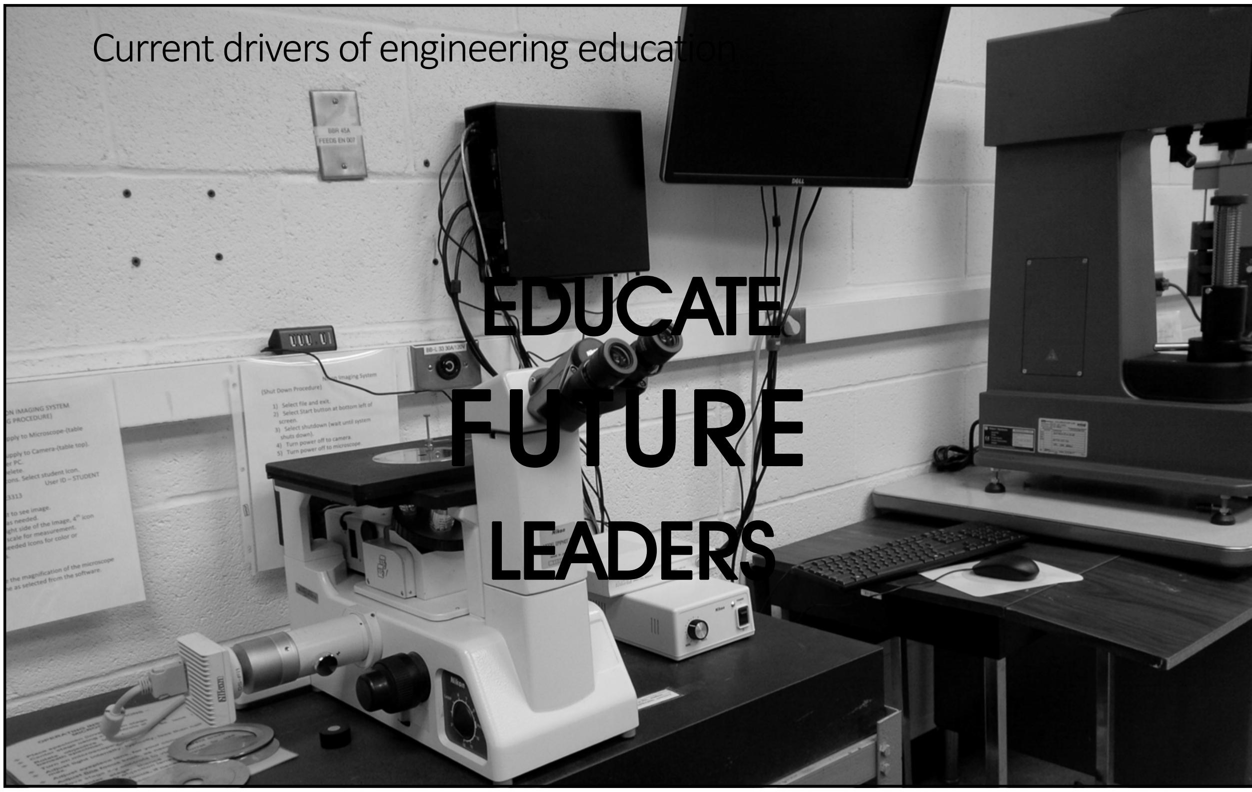
NEED TO REMAIN
COMPETITIVE

Current drivers of engineering education



SUPPORT
ENTREPRENEURIAL
SPIRIT

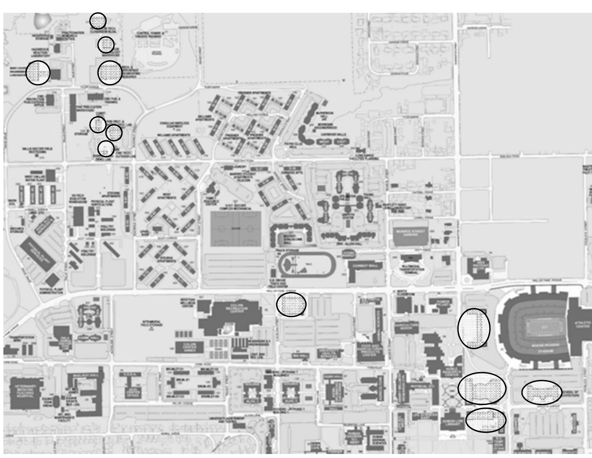
Current drivers of engineering education



Current drivers of engineering education

Oklahoma State University

College of Engineering, Architecture and Technology



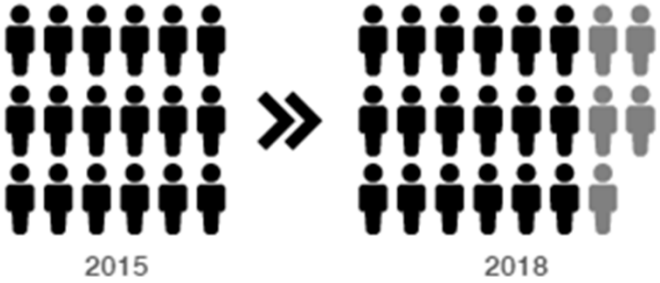
	SQUARE FEET	ARCH 0009	ANNEX 0026	ES 0027	COR 0032	ATRC 0046	EN 0059	BAE 0080	MAE 0115	BC 0211	PTW 0218	PTC 0219	FPSETL 0222	CTL#2 0223	ECDU 0227
C-1 CLASSROOM - UG	13,322	1,707	-	-	3,717	-	3,359	-	1,320	-	-	2,080	-	1,138	-
C-2 CLASSROOM - DISTANCE EDUCATION	4,257	-	-	-	1,401	-	2,855	-	-	-	-	-	-	-	-
C-3 CLASSROOM - GENERAL UNIVERSITY	15,192	-	-	11,252	623	-	3,317	-	-	-	-	-	-	-	-
L-1 LABS - UG	102,685	26,810	2,579	12,175	11,703	-	11,221	12,620	5,518	-	6,254	5,149	6,061	1,675	920
Candidates for Relocation	22,852	-	2,579	5,078	3,427		9,305	1,099	147	-	-	-	-	1,217	-
Mandatory Relocation *1	8,276	-	-	-	8,276		-	-	-	-	-	-	-	-	-
Current Location is Fixed	71,557	26,810	-	7,098	-		1,916	11,521	5,371	-	6,254	5,149	6,061	458	920
L-2 LABS - G	86,342	-	2,707	1,834	-	57,712	1,469	4,776	-	17,844	-	-	-	-	-
Candidates for Relocation	2,866	-	1,381		-	1,485			-	-	-	-	-	-	-
Mandatory Relocation *1	-	-	-		-				-	-	-	-	-	-	-
Current Location is Fixed	1,327	-	1,327		-				-	-	-	-	-	-	-
L-3 LAB SUPPORT UG	26,940	2,874	-	2,291	809	3,474	2,540	8,068	3,004	-	905	1,458	489	1,026	-
L-4 LAB SUPPORT G	7,890	-	1,281	-	-	869	-	744	961	4,034	-	-	-	-	-
L-5 UG/G SHARED - PRIMARILY UG	11,279	-	910	1,552	-	-	1,325	-	7,492	-	-	-	-	-	-
L-6 UG/G SHARED - PRIMARILY G	18,230	-	-	-	-	13,828	-	3,190	1,212	-	-	-	-	-	-
M-1 SPACE AVAILABLE	7,526	-	5,040	-	-	512	1,973	-	-	-	-	-	-	-	-
M-2 NON-ASSIGNABLE SPACE	1,336	-	754	-	582	-	-	-	-	-	-	-	-	-	-
N-1 TOILETS / CUSTODIAL	11,186	1,656	132	1,523	1,385	1,842	2,097	638	560	421	-	422	267	243	-
N-2 MECHANICAL	122,878	4,324	385	6,815	3,922	97,585	4,839	554	-	2,477	-	388	1,401	112	77
N-3 ELECTRIC / TELEPHONE	1,054	477	10	-	64	236	31	-	8	-	-	76	143	9	-
N-4 COMMUNICATION ROOM	616	10	-	-	-	417	-	-	-	160	-	-	28	-	-
N-5 CIRCULATION	117,238	13,808	1,862	18,275	10,327	44,458	18,276	2,110	2,577	1,228	-	1,717	1,313	910	378
O-1 OFFICE - FACULTY	36,126	2,760	-	12,778	7,213	825	10,605	-	688	869	-	178	-	209	-
O-2 OFFICE - GRADUATE	18,497	-	964	3,294	1,801	9,564	2,624	-	-	-	-	125	-	125	-
O-3 OFFICE - ADMINISTRATION / STAFF	17,126	161	-	401	1,399	9,637	5,269	-	-	-	-	125	135	-	-
O-4 OFFICE - ALLIED PROGRAMS	5,938	-	-	856	150	-	4,932	-	-	-	-	-	-	-	-
R-1 CONFERENCE ROOM	6,334	169	-	500	1,176	2,554	1,435	-	-	501	-	-	-	-	-
R-2 STUDY ROOM	1,104	-	-	954	150	-	-	-	-	-	-	-	-	-	-
R-3 GENERAL USE	11,326	6,235	-	77	92	4,922	-	-	-	-	-	-	-	-	-
R-4 STORAGE	10,036	2,015	343	1,220	3,051	1,409	1,037	108	231	19	-	-	143	-	460
R-5 LIBRARY	2,650	2,410	-	-	151	-	-	-	-	-	-	-	-	17	72
U-1 UNCLASSIFIED - UG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-2 UNCLASSIFIED - G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Verified Spaces *2	79,644	-	-	-	62,712	-	16,915	-	10	-	-	6	-	-	-
Net SQ Feet From Non-CEAT Buildings *4	8,920														
TOTAL NET SQ FEET *3	736,753	65,416	16,967	75,797	112,429	249,843	96,122	32,810	23,581	27,553	7,159	11,723	9,980	5,465	1,906
TOTAL GROSS SQ FEET *3	798,958	70,841	19,180	87,254	130,668	271,887	104,823	34,034	24,936	29,065	7,300	12,385	11,000	5,926	2,045

Notes:
*1 Does not include spaces counted in "Candidates for Relocation" breakdown
*2 059/EN/4th Floor - No area quantities for new floor plan; 032/CORDELL - Represents areas not occupied by CEAT
*3 Misc Rooms in non-CEAT buildings - Not Included
*4 Richmond Hill Res. Complex (Rm 185); Hazardous Reaction Lab (Rm 103, 106C, 150); Waste Water Treatment Pilot Plant (Rm 101); Electronics Lab (Rm 112A, 112AA, 112C, 112E, 112G, 114A, 150, 151)

Current drivers of engineering education

Oklahoma State University

College of Engineering, Architecture and Technology



3800 Students in 2015 expected to reach 5000 students in less than 10 years

Current drivers of engineering education

Oklahoma State University

College of Engineering, Architecture and Technology

18,285 NSF of labs were identified as being candidates for reprogramming as new labs in the CEAT Endeavor project

Current drivers of engineering education

The 8 Silos of CEAT

- Biosystems & Agricultural Engineering
- Industrial Engineering & Mechanical
- Civil & Environmental Engineering
- Electrical & Computer Engineering
- Mechanical Aerospace Engineering
- Chemical Engineering
- Engineering Technology
- Architecture

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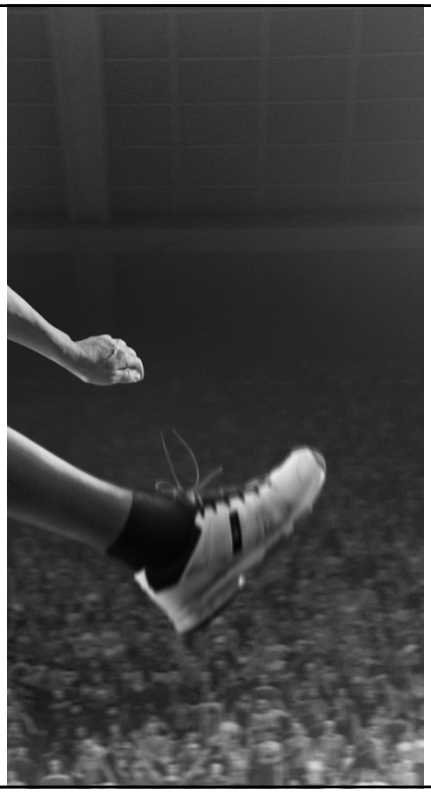


The Hurdle

Budget Challenges for Higher Education Institutions

The Vision

The facility will allow faculty to develop and implement a new pedagogy focused on how undergraduate engineering, architecture and technology students understand, apply and innovate engineering principles and operations through hands-on education, interdisciplinary and collaborative problem-solving and entrepreneurial innovation

- *Building must promote interdisciplinary collaboration*
- *Highly flexible to easily accommodate change and innovation*
- *Create an environment which is inspiring and sparks creativity and learning*
- *Highly visible labs connected by collaborative spaces*
- *Provide highly sustainable building to reflect commitment to the future*
- *Fundamental component for sophomores and juniors and an advanced, more open ended, even entrepreneurial, component for seniors*

Design
Options

Design Options

New Facilities – Old Programs

The Vision

Design Options

What does it mean to remove silos?

- Redefine ownership of classrooms
- Interdisciplinary learning spaces
- Redefine pedagogy (academic curriculum)
- Partnering among academic colleagues within CEAT
- Consolidation of space

Design Options

Remove the Silos

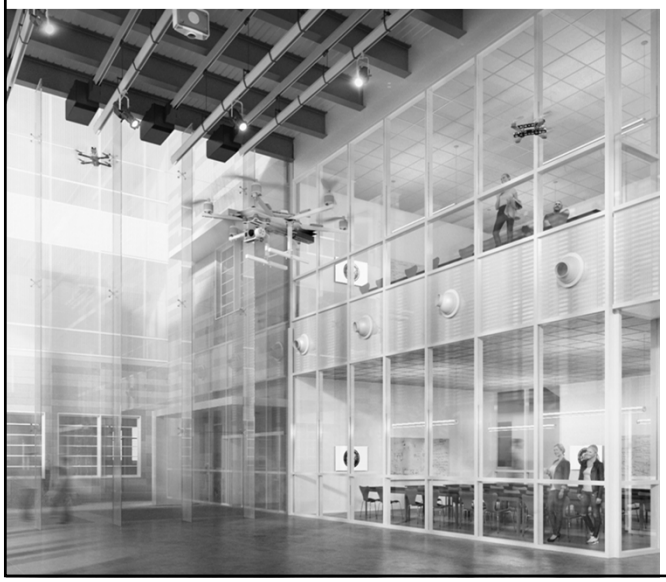
Space Consolidation

LAB TYPE	LAB SUGGESTED		PROPOSED LOCATION		LAB CLASSIFICATION			EDUCATION LEVEL		ROOM SQ FEET				LAB MODERNIZATION NEEDS...		
	I+A WORKSHOP	DEPARTMENT HEAD SPREADSHEET	UGL	EXISTING CEAT REAL ESTATE	CORE	INDUSTRY AUGNED	SIGNATURE	FRESHMAN / SOPHMORE	JUNIOR / SENIOR	CURRENT BLDG	CURRENT ROOM	CURRENT SF	STATED NEEDS	IMPROVEMENT	EXPANSION	DUPLICATION
CONTROLS	X		X		X							2,234	-			
										0080 BAE	106	723				
										0080 BAE	106A	376				
										0059 EN	212	551				
										0059 EN	213	584				
FLUIDS	X		X		X							-	-			
HYDRAULICS	X		X		X							796	-			
										0032 COR	098	796				
PNEUMATICS	X		X		X							2,631				
										0032 COR	023	2,631				
SOILS	X		X		X							394	800			
										0223 CTLaF2	102	394	800		X	
CONCRETE	X		X		X							824	-			
										0223 CTLaF2	101	824				
UNIT OPS (OR 2 LABS - FLUIDS + HEAT EXCH.)	X		X		X							2,294	-		X	
										0059 EN	006	600				
										0059 EN	006A	609				
										0059 EN	006AA	650				
										0059 EN	007	434				
MATERIAL SCIENCE	X		X		X							1,642	-		X	
										0059 EN	001	354				
										0059 EN	020	1,041				
										0059 EN	020A	122				
										0059 EN	020B	126				
ENERGY + POWER	X		X		X							691	-			
										0027 ES	101G	691				
THERMAL	X		X		X							-	-			
AEROSPACE	X		X		X							1,632	-			
										0115 MAE	120	147				
										0046 ATRC	317	289				X
										0046 ATRC	324	696				
										0046 ATRC	330	500				X
MEASUREMENTS	X		X		X							1,188	-			
										0059 EN	215	1,188			X	
INSTRUMENTATION	X		X		X							-	-			
ENVIRONMENTAL	X		X		X							1,381	1,500		X	X
										0026 EA	125	1,157	1,500			
										0026 EA	122	223				
GEOTECH	X		X		X							2,579	-			
										0026 EA	102	1,000				
										0026 EA	108	415				
										0026 EA	109	451				
										0026 EA	110	762				
TOTAL												18,385	2,300			

Design Options

Remove the Silos

Celebrate the engineering principles through interdisciplinary learning

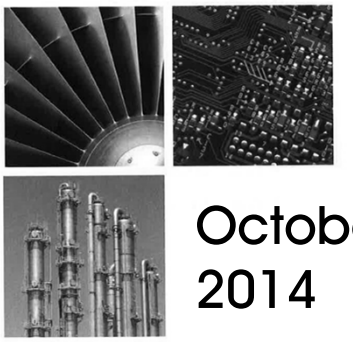


Design Options

OSU CEAT as a Trend Leader

Oklahoma State University
College of Engineering, Architecture, and Technology
Undergraduate Laboratory Master Plan

Facilities Report
College of Engineering, Architecture and Technology
Oklahoma State University
May, 2013



October
2014

Design Options

Remove the Silos

Trending: Hands on Problem Solving

FAST COMPANY

"Faced with the shifting ambitions of students and changes in institutional funding streams, colleges and universities are embracing "learning by creating," allowing them to leverage the traditional spirit of an educational community with students' growing entrepreneurial focus. In response, these institutions are adopting powerful new models to erode the boundaries of historically siloed disciplinary thinking and empower new levels of discovery."

Author: **Brad Lukanic**
Article: The Next Hot Trend On Campus: Creating Innovation
Published: 02.25.15 – Fast Company

Design Options

Remove the Silos

Trending: Maximizing Use of Classroom / Lab Space

Laboratory Design

Many research disciplines are seeking a new synergy, where collaboration and interaction between different research groups is promoted to foster technology transfer and knowledge and idea exchange. “This has a bearing on the design of the facility to seek openness within lab settings and provides zones for sharing equipment and spaces that can foster interaction both inside and outside the lab,” says Stephen Jones.

Author: **Lindsey Hock**
Article: Modern trends in lab design
Published: 06.04.15 – Lab Design News

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Design Options

Remove the Silos

Trending: Hands on Problem Solving

WBDG WHOLE BUILDING DESIGN GUIDE

Several key needs are driving the development of a new model of laboratory design:

- The need to create "social buildings" that foster interaction and team-based research
- The need to achieve an appropriate balance between "open" and "closed" labs
- The need for flexibility to accommodate change
- The need to design for technology to provide access to electronic communications systems throughout the building, which has immense implications on lab design
- The need for environmental sustainability
- The need, in some cases, to develop science parks to facilitate partnerships between government, private-sector industry and academia.

Author: **Daniel Watch**
Article: Trends In Lab Design
Published: 08.29.16 – Whole Building Design Guide

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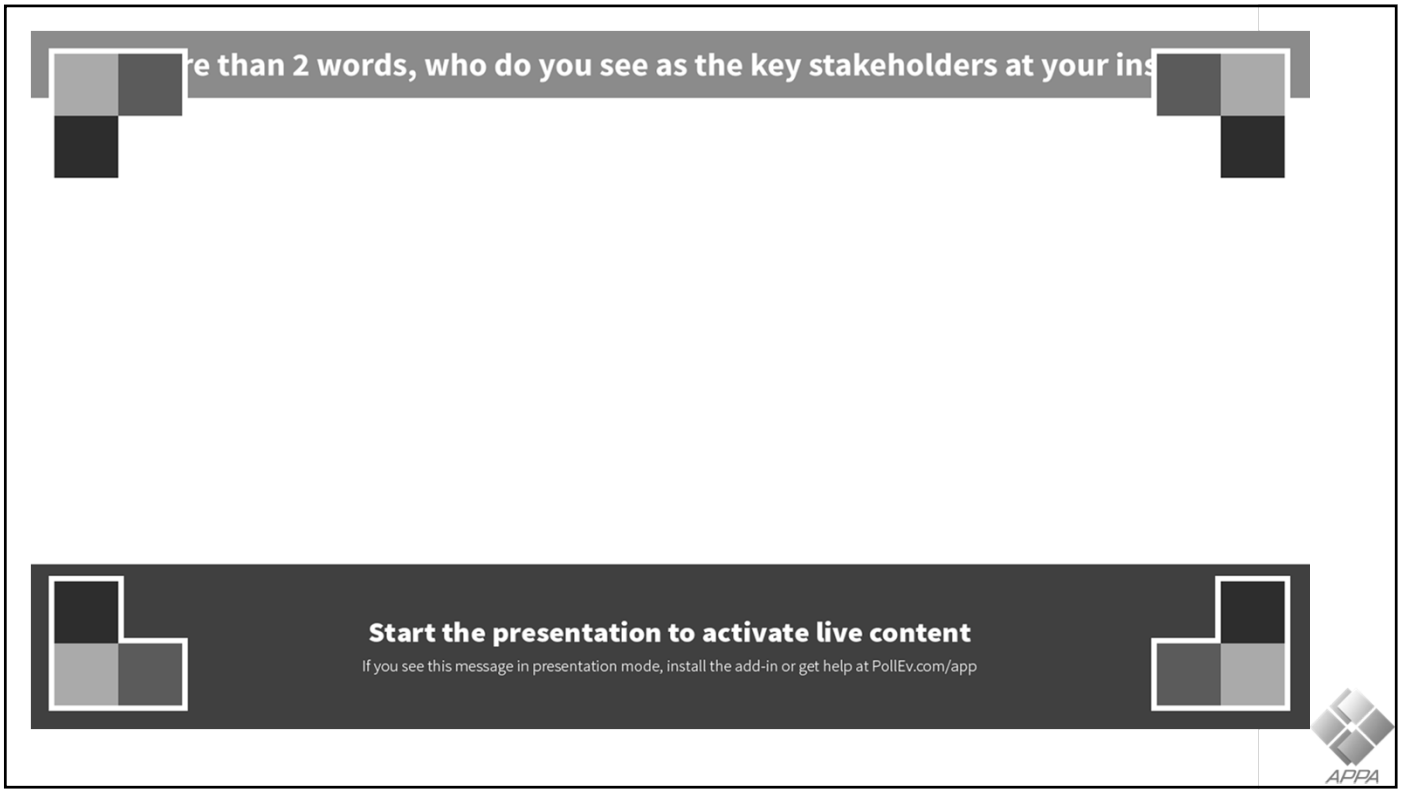
Data Gathering Exercise

Your Input

Please take out your electronic device.

Polling:

In no more than 2 words, who do you see as the key stakeholders at your institution?



Polling:

Do you have experience with designing new or remodeled facilities at your Institution?

ou have experience with designing new or remodeled facilities at y Institution?

Yes

No

Start the presentation to activate live content

If you see this message in presentation mode, install the add-in or get help at PollEv.com/app

APPA

make it happen.

APPA

Making it Happen

Investigation

- Marquette University
- Michigan State
- University of Nebraska
- University of Wisconsin
- Western Michigan University





Making it Happen

Investigation

- Valuable Effort
- No “ready-made” Solution
- Valuable Lessons Learned (+/-)
- Good individual “nuggets”
- Helped establish the total vision





Making it Happen

Engaging Stakeholders

Making it Happen

Engaging Stakeholders

Making it Happen

Engaging Stakeholders

Take pride in programs and facilities

Looking for collaboration and cross-discipline opportunities to learn and grow: connectivity

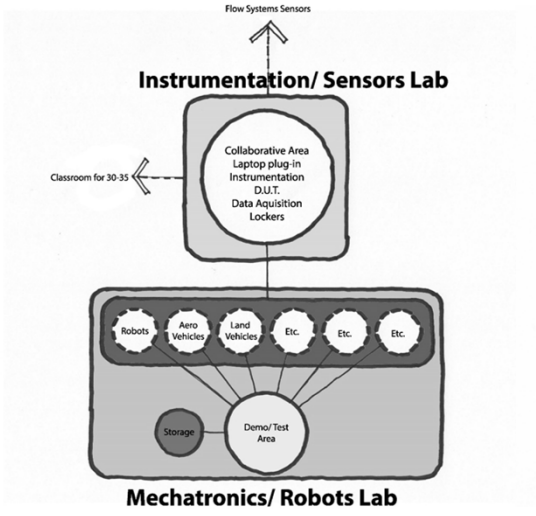
Access to great technology and equipment

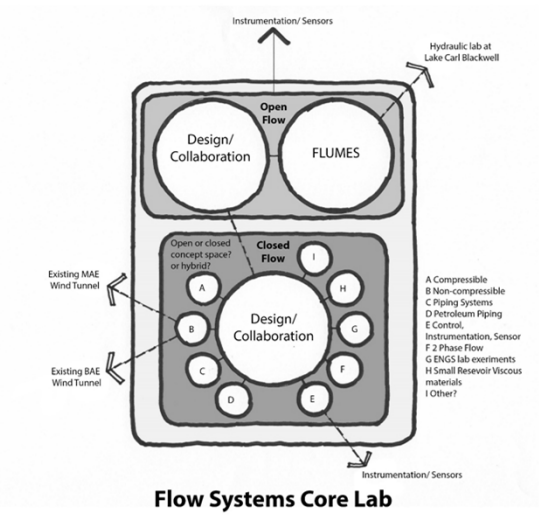
Better prepared for entering the "real world": industry partner alignment + interdisciplinary approach

Making it Happen

Engaging Stakeholders

Faculty Weekly "Coffee Talk"

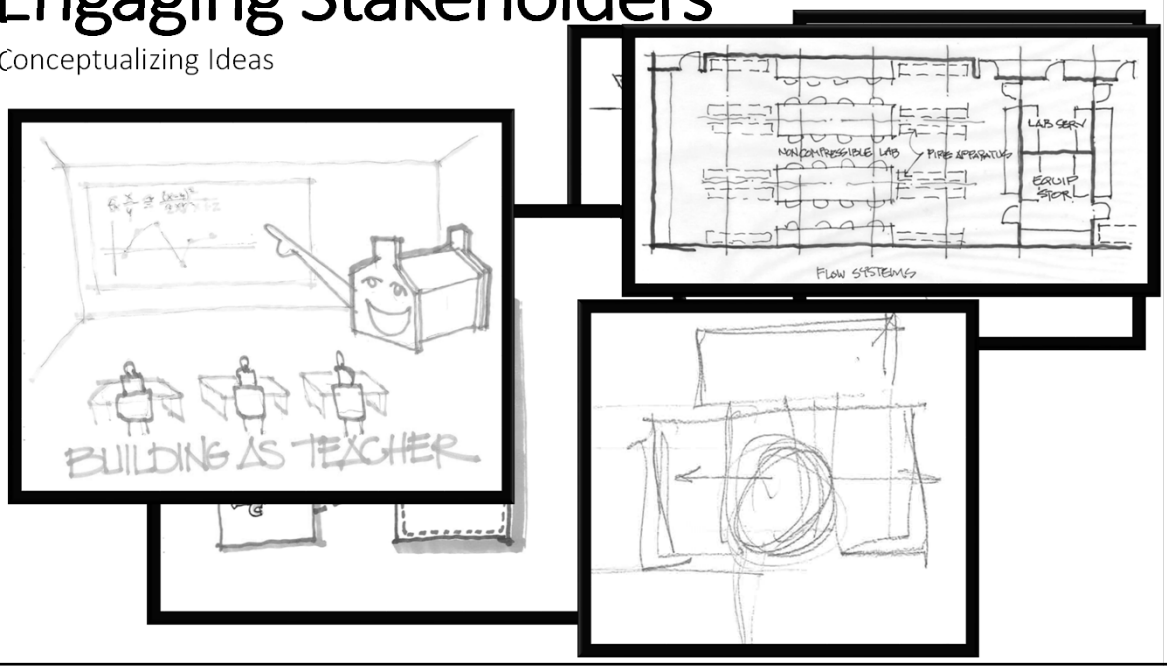




Making it Happen

Engaging Stakeholders

Conceptualizing Ideas



Making it Happen

Engaging Stakeholders

ENERGY + POWER

- ECEN - Power Electronics, Power Systems
- MET - Petroleum Operations
- BAE - Energy, Power

Making it Happen

Engaging Stakeholders

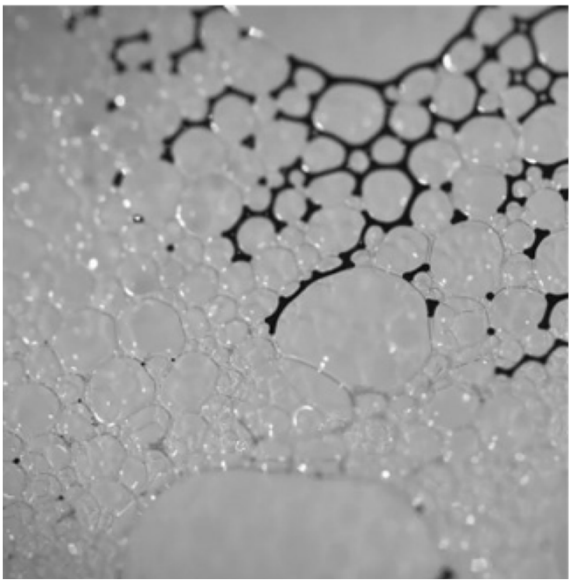
UNIT OPS + ENVIRONMENTAL

- CHE - Separations, Reactions, Heat Transfer & Fluid Mechanics
- MAE - Heat Transfer, Thermodynamics
- CIVE - Environmental Engineering
- ENSC - Thermodynamics
- BAE - Heat and Mass Transfer
- MET - Applied Thermodynamics, GSHP Systems, Fluid Thermodynamics

Making it Happen

Engaging Stakeholders

FLOW SYSTEMS



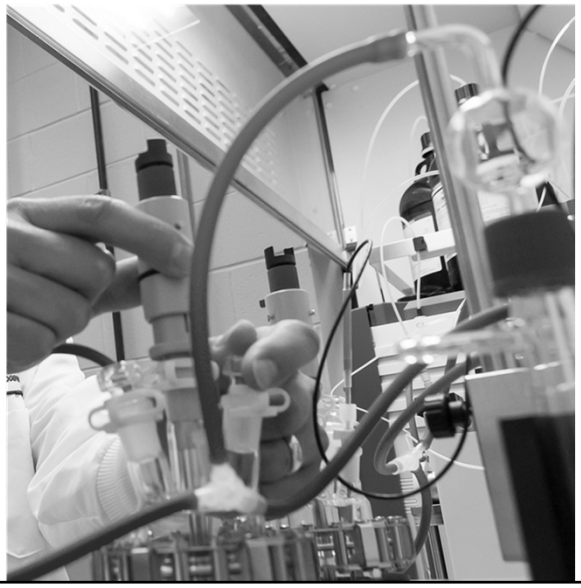
- ARCH - HVAC
- CIVE - Applied Hydraulics, Hydrology
- CHE - Rate Operations, Two Phase, Sub-sonic Compression, Process Control
- MAE - Experimental Fluids
- FPST - Fire Protection Hydraulics
- MET - Fluid Power, Pneumatics, Electro Hydraulics
- BAE - Hydrology
- ENSC - Fluid Mechanics

Making it Happen

Engaging Stakeholders

- ARCH - Steel, Concrete, Timbers
- ENSC - Statics, Strengths, Dynamics
- CMT - Concrete, Site Development, Soils
- CIVE - Soils, Geo-tech, Engineered Materials
- MAE - Composite Material, Metallurgy, Advanced Design Methods, Space Craft, Aero Structures, Mechanical Design
- MET - Physical Metallurgy, Dynamics

MATERIALS + DESIGN



Making it Happen

Engaging Stakeholders

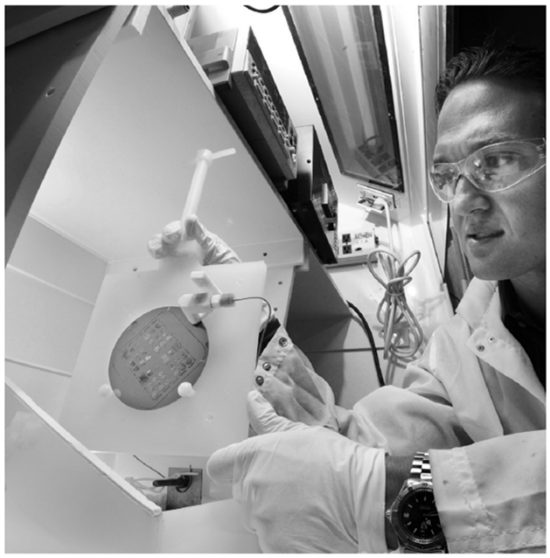
INDUSTRY ALIGNED LABS

- Building Systems
- Petroleum and Energy
- Manufacturing Processes

Making it Happen

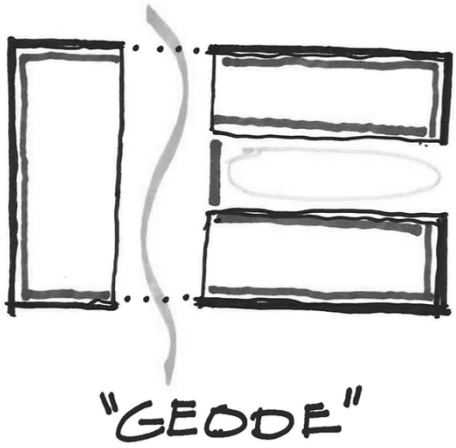
Engaging Stakeholders

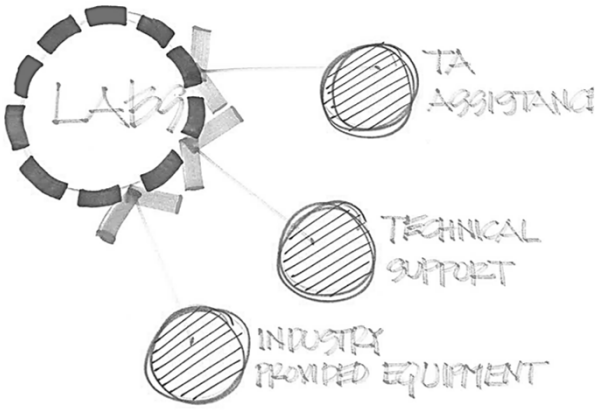
FABRICATION LABORATORY + SHOP SPACES



Making it Happen

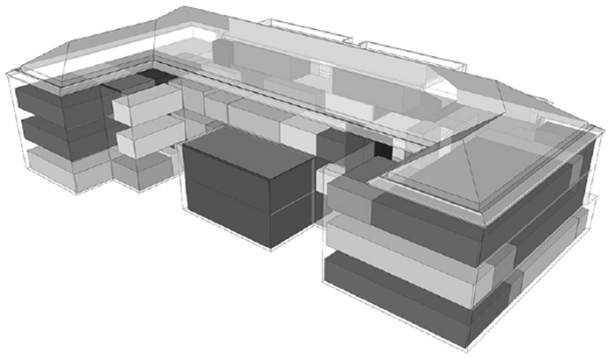
Design Process

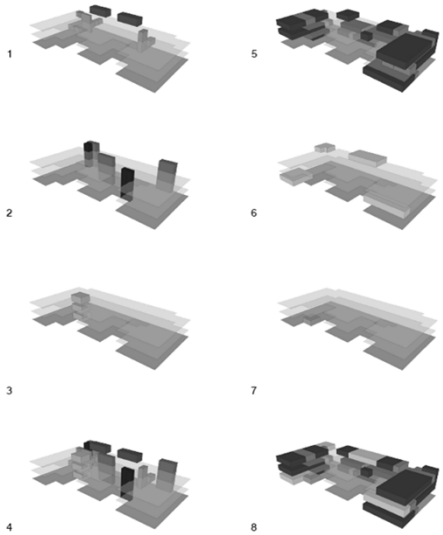




Making it Happen

Design Process





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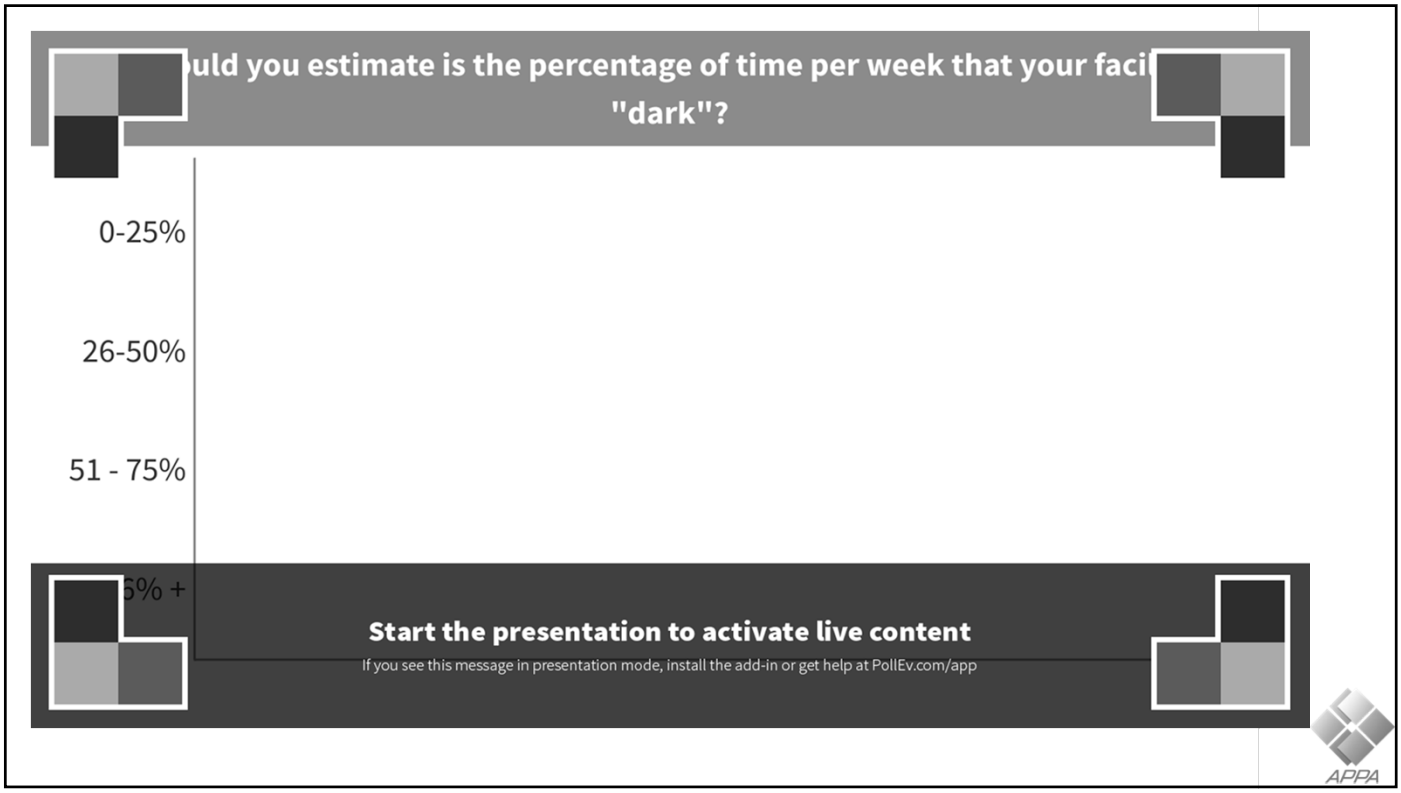
Please take out your electronic device.

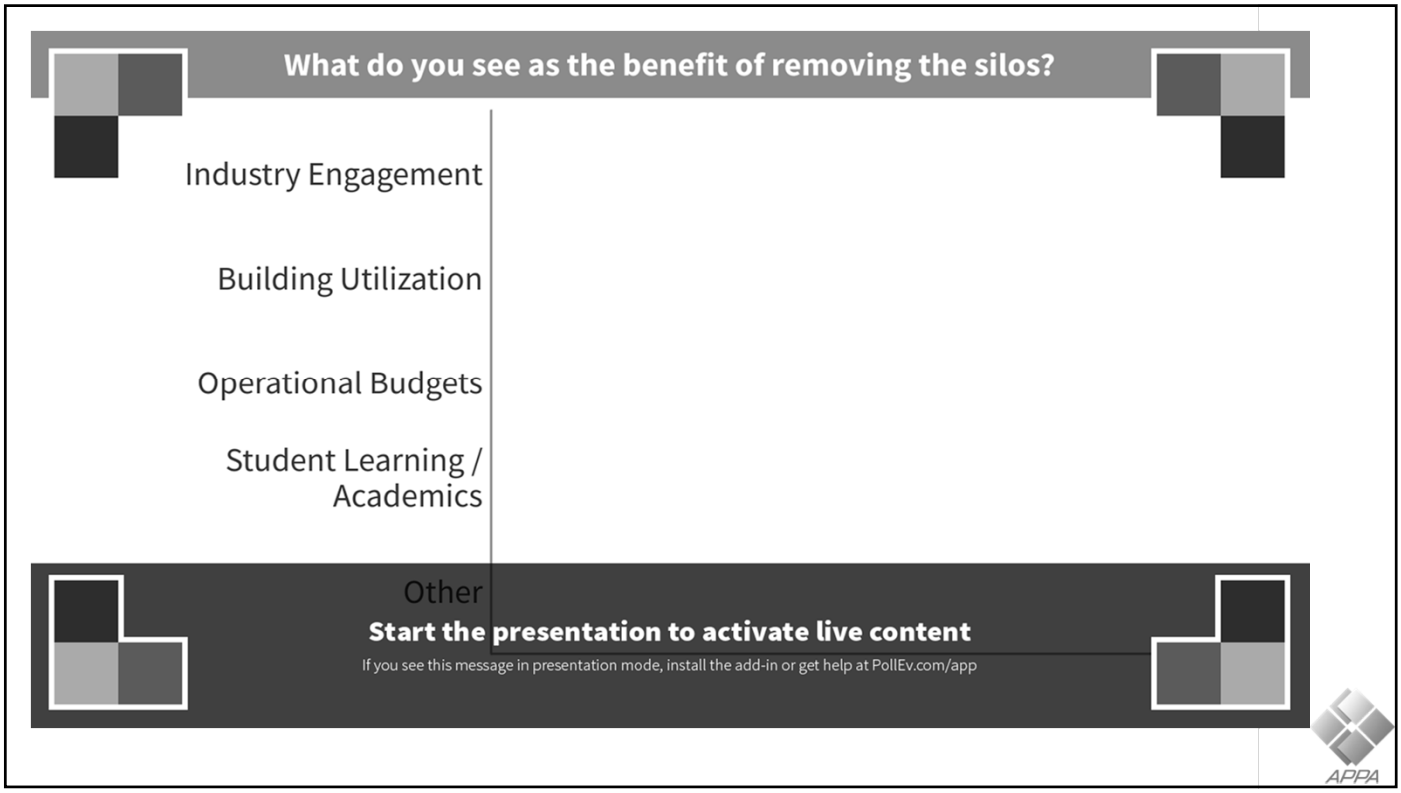
Polling:

What would you estimate is the percentage of time per week that your facilities are “dark”?



Polling:

What do you see as the benefit of removing the silos?



Wait! There's More!

Exportable approach to other academic programs

Wait! There's More!

Exportable approach to other academic programs

Journalism
TV
Radio
Print Media

w

Wait! There's More!

Benefits of designing architecture that supports:

Wait! There's More!

Benefits of designing architecture that supports:

Wait! There's More!

Benefits of designing architecture that supports:

Wait! There's More!

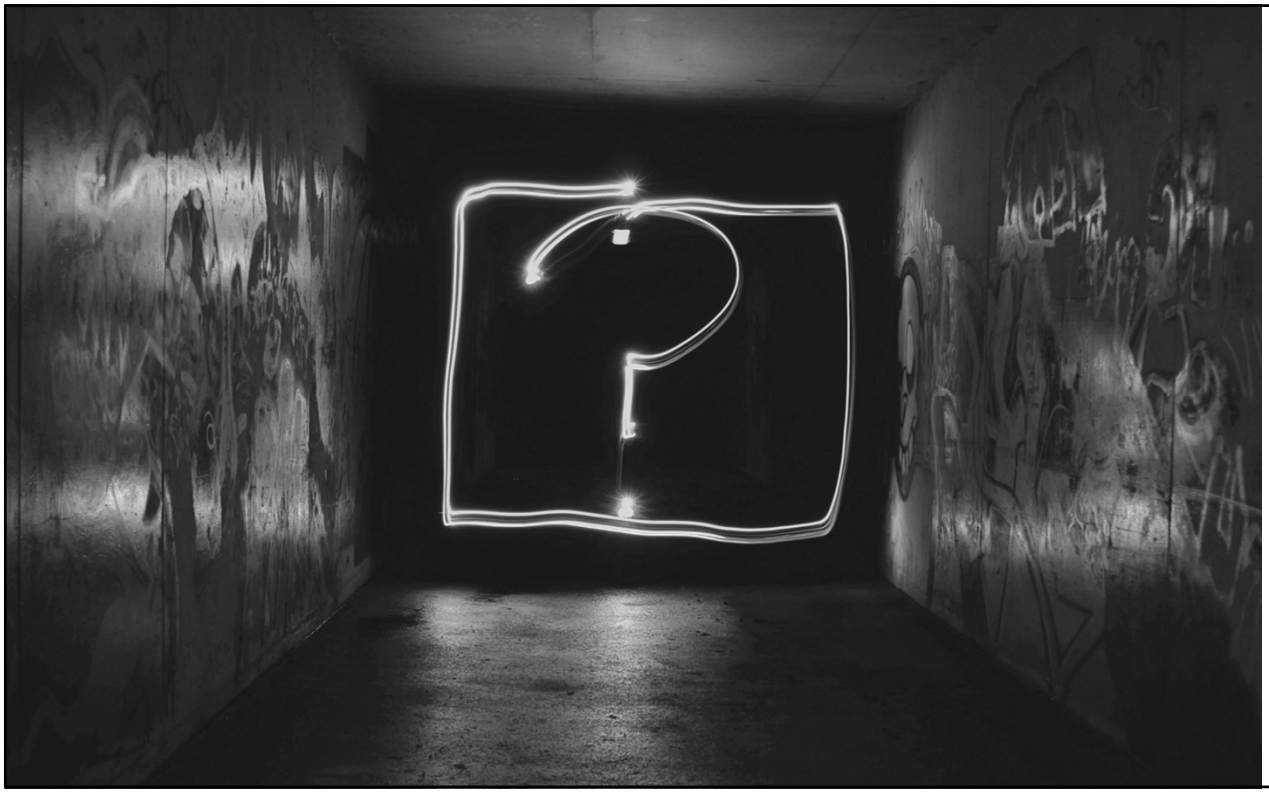
Summary

Learning Objective 1:
Learn the benefits of cross discipline collaboration

Learning Objective 2:
Learn how to approach designing flexible learning environments

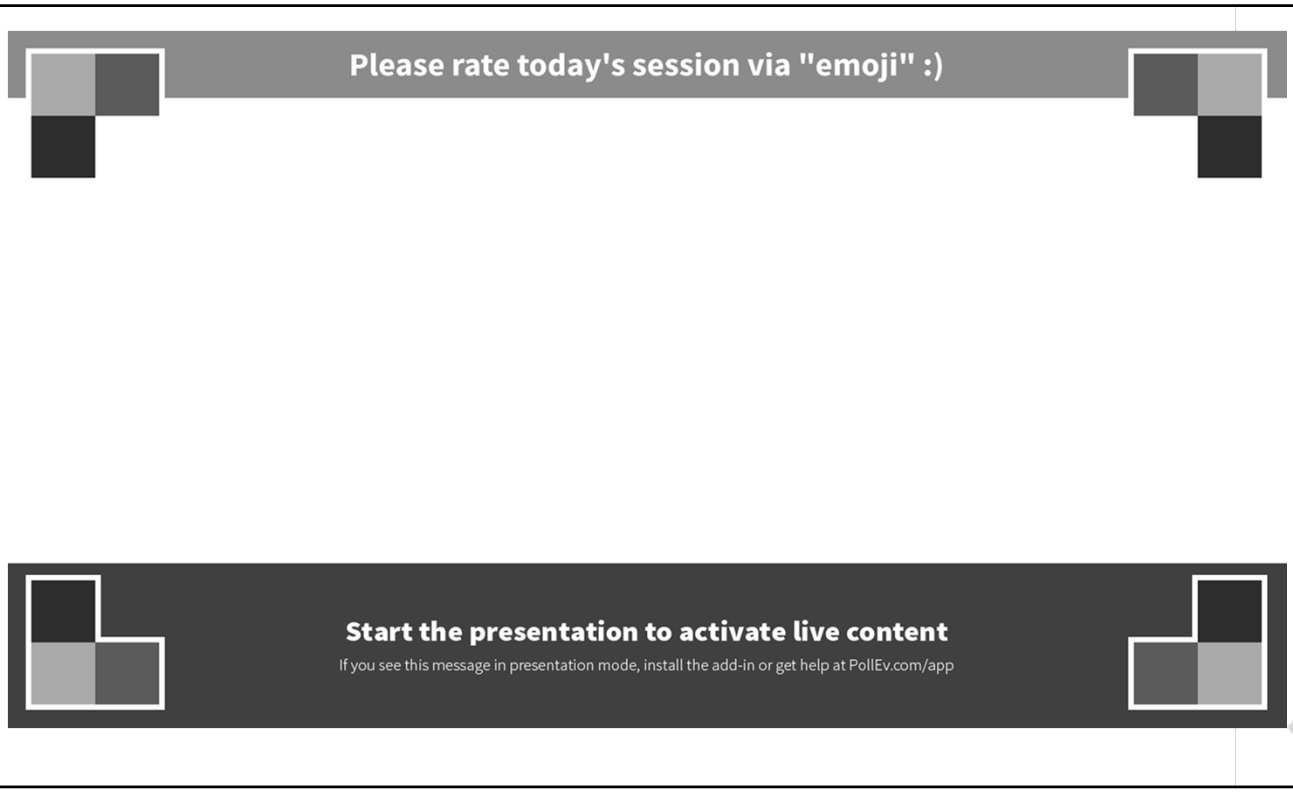
Learning Objective 3:
Learn how to engage stakeholders

Learning Objective 4:
Understand today's student achievement goals



Polling:

Please rate today's session via "emoji" ☺



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Today's presentation and polling results will be available on the Education Design Studio blog by July 31st, https://educationdesignstudio.wordpress.com/

Polling:

What do you see as the greatest negative to maintaining the “Silos”?