PROPRIETARY

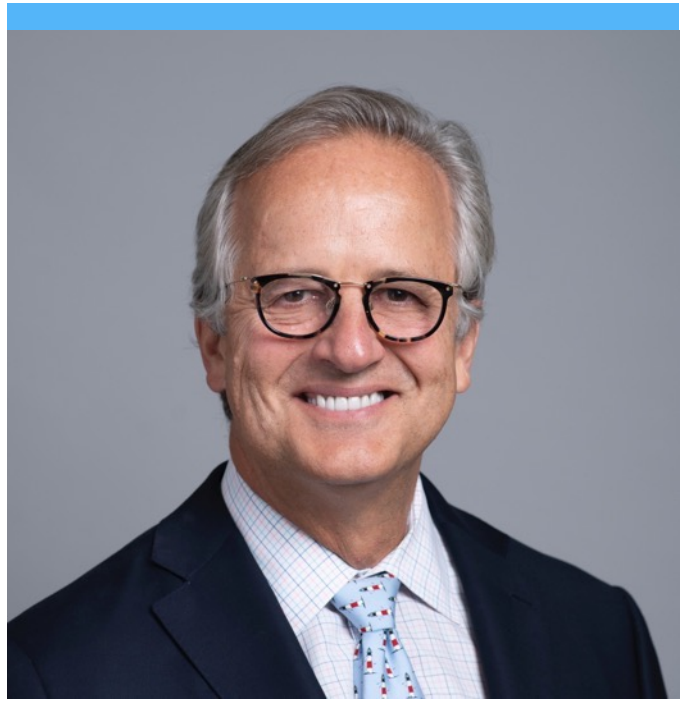
GRAY ASSOCIATES

Master Class 4

The Future of Academic Portfolio Evaluation and Management

April 25th, 2023

Today's Presenters



Bob Atkins
Founder and CEO
Gray Associates

Dr. Karen Chung
Clinical Associate Professor
Raymond A. Mason School of Business
WILLIAM & MARY

Program Evaluation: Inconsistent, time-consuming, incomplete, politicized.

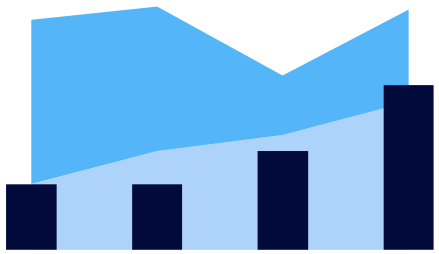
- Topics and data sources vary from one program to another
- Faculty burdened with pulling the data
  - Often unfamiliar with sources
  - Inexperienced in large scale data analysis
  - Pressed for time
  - Focused on trends in their discipline, not the market
  - Too time-consuming to do frequently
- Over-emphasis on labor market requirements and predictions
  - Student interests and employer needs often differ
  - Weak linkage between programs and occupations
  - 80% of predictions are off by 50% or more
- Absent good data, the loudest voice wins.

Death by Dashboards?

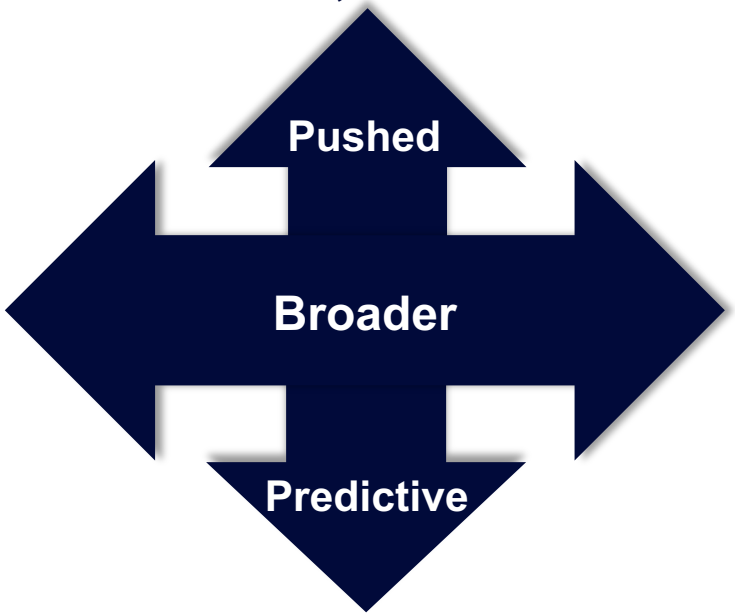
- Too easy to create
- Uncurated
- Mix exploration and decisions
- Requires familiarity with infrequently-used systems

The Future of Academic Portfolio Evaluation and Management

RAP:
Reports, Alerts, Predictions
Custom, Delivered



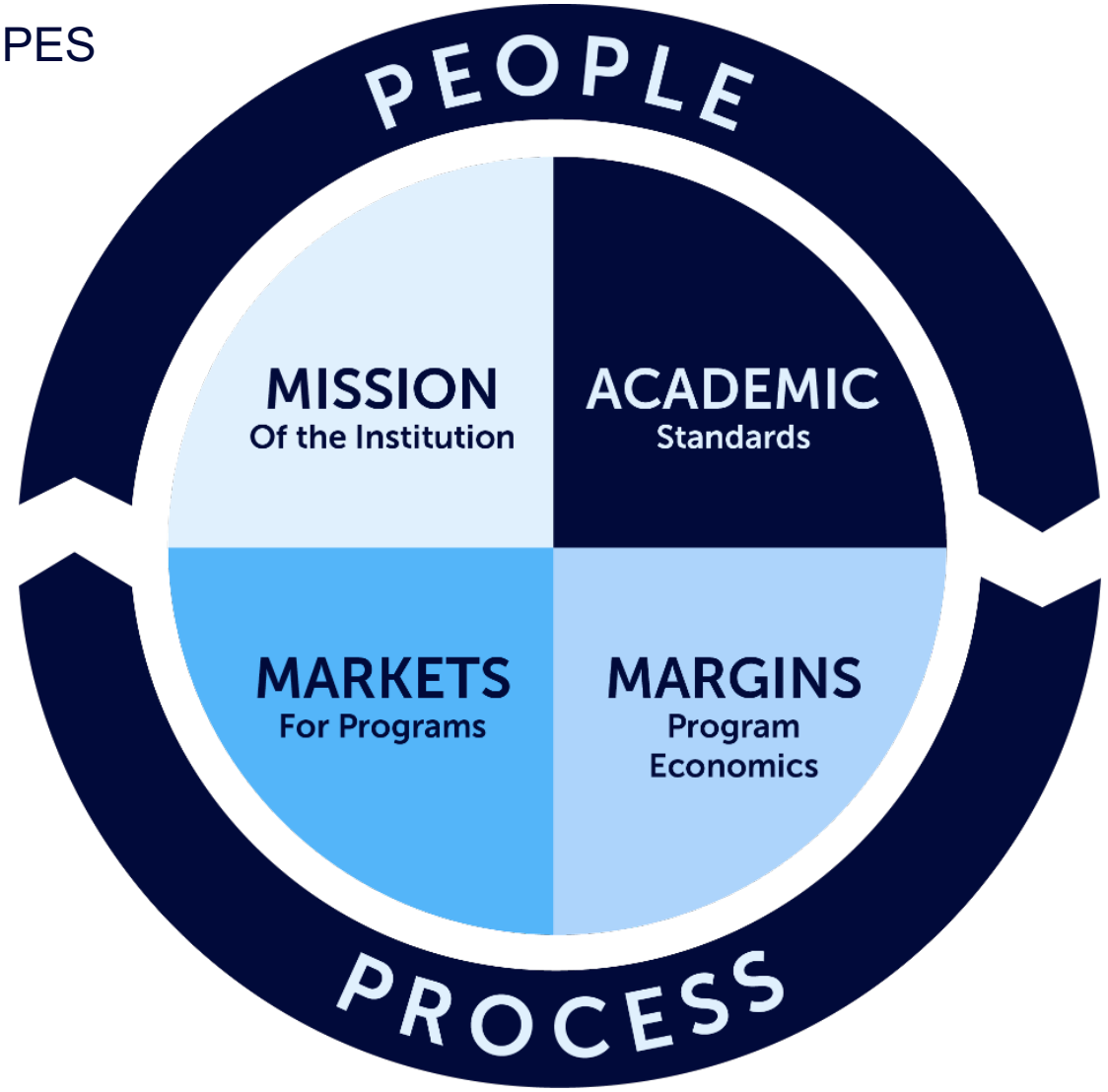
Markets, Economics, Skills, Demographics…



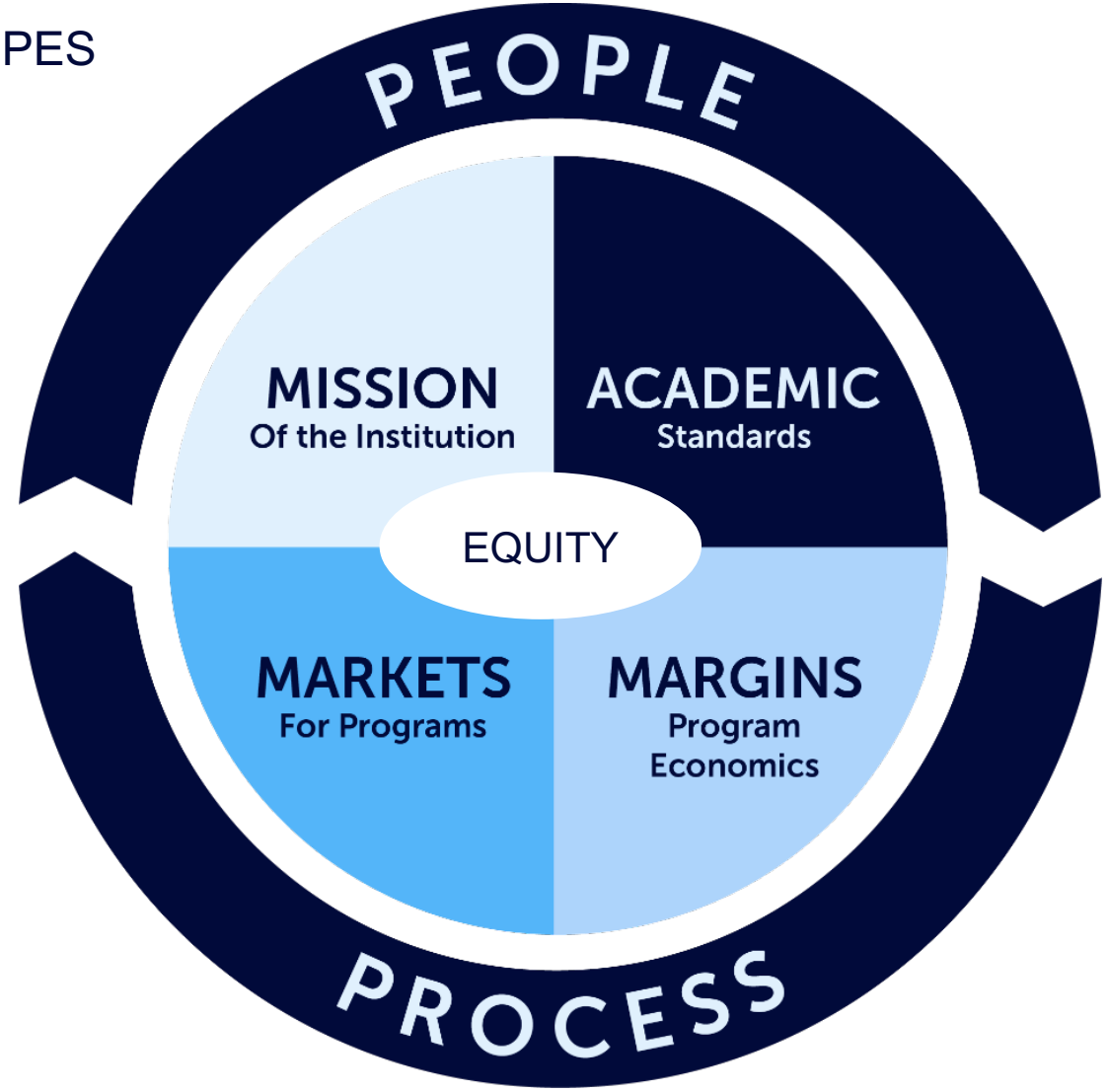
Enrollment, Economics, Retention…

Diversity, Equity, and Inclusion

Program Evaluation System: PES



Program Evaluation System: PES



Market Scorecard

CIP: 52.0904 Hotel/Motel Administration/Management | **Total Score: 13** | **Percentile: 91**

Student Demand
Score: 9 Percentile: 81

Catego...	Pctl	Criterion	Value	Score
Size	75	Google Search Volume (3 Months)*	47,34.	.
	0	Int'l Page Views (12 Months)	0	NS
	84	New Student Enrollment Volume (12 Months)	566	1
	88	On-ground Completions at In-Market Institutions	1,366	2
	79	Online Completions by In-Market Students	21	1
	87	Sum of On-ground and Online Completions	1,387	1
Growth	79	Google Search YoY Change (Units)*	6,121	1
	91	New Student Enrollment Vol. YoY Change (Units)	68	NS
	2	Completion Volume YoY Change (Units)	-190	-1
	66	Google Search YoY Change (%)*	15%	0
	72	New Student Enrollment Vol. YoY Change (%)	14%	NS
	22	Completion Volume YoY Change (%)	-12%	0

Competitive Intensity
Score: 1 Percentile: 93

Category	Pctl	Criterion	Value	Score
Volume of In-Market Competition	77	Campuses with Graduates**	29	-2
	9	Campuses with Grads YoY Change (Units)**	-3	2
	88	Institutions with Online In-Market Students**	4	NS
In-Market Program Sizes	93	Average Program Completions	47	2
	79	Median Program Completions	17	0
	82	YoY Median Prog. Compl. Change (Units)	1	0
	70	YoY Median Prog. Compl. Change (%)	3%	0
In-Market Saturation	79	Google Search * Cost per Click**	$11	-1
	31	Google Competition Index**	0.29	0
National Online Competition	81	National Online Institutions (Units)**	2	NS
	70	Nat'l Online % of Institutions	5%	NS
	63	Nat'l Online % of Completions	2%	NS

Total Percentile	0	20+	40+	70+	90+	95+	98+	100
Total Score	**-45**	**-20**	**-16**	**0**	**12**	**19**	**26**	**50**

Employment*
Score: 3 Percentile: 80

Category	Pctl	Criterion	Value	Score
Size: Direct Prep	98	Job Postings Total (12 Months)*	287,824	2
	94	BLS Current Employment*	413,775	1
	95	BLS Annual Job Openings*	52,864	NS
Size: ACS Bach. Outcomes	81	Job Postings Total (12 Months)*	6,000	NS
	81	BLS Current Employment*	26,817	NS
Growth (Direct Prep)	5	BLS 1-Year Historical Growth*	-14.3%	NS
	7	BLS 3-Year Historic Growth (CAGR)*	-4.0%	-1
	13	BLS 10-Year Future Growth (CAGR)*	0.0%	-1
Saturation (Direct Prep)	97	Job Postings per Graduate*	108.4	1
	94	BLS Job Openings per Graduate*	19.9	NS
Wages (Direct Prep)	4	BLS 10th-Percentile Wages*	$24,425	NS
	3	BLS Mean Wages*	$34,402	NS
American Community Survey Bachelor's Degree Outcomes	47	Wages (Age < 30)	$42,714	0
	31	Wages (Age 30-60)	$77,748	0
	5	% with Any Graduate Degree	13%	NS
	6	% with Masters	11%	NS
	11	% with Doct/Prof Degree	2%	NS
	19	% Unemp. (Age <30)**	2%	2
	73	% Unemp. (Age 30-60)**	2%	-1
	69	% in Direct Prep Jobs	14%	NS

CIP Description:
A program that prepares individuals to manage operations and facilities that provide lodging services to the traveling public. Includes instruction in hospitality industry principles; supplies purchasing, storage and control; hotel facilities design and planning; hospitality industry law; personnel management and labor relations; financial management; marketing and sales promotion; convention and event management; front desk operations; and applications to specific types of hotels and motel operations.

2020 Completions Demographics
Male: 34%
Female: 66%
White: 45%
Hispanic: 20%
Black: 7%
Asian: 10%
International: 12%
All Others: 6%

** Color Scale in Reverse

Percentile (Reverse)	<02	02+	05+	10+	30+	60+

Degree Fit:
Score: 0 Percentile: 50

Category	Pctl	Criterion	Value	Score
NHEBI Natl 2 Year	61	Cost Index**	103%	NS
	10	Student: Faculty Index	70%	NS

National Completions by Level
Score: 0

Award Level	Completions (National)	Completions (Market)	Enrollment (Market)
Certificate	27%	27%	4%
Associates	17%	17%	26%
Bachelors	52%	52%	67%
Postbaccalaureate Certificate	0%	0%	0%
Masters	3%	3%	3%
Post-masters Certificate	0%	0%	0%
Doctoral	0%	0%	0%
Unknown	0%	0%	0%

National Workforce Ed. Attainment
Score: 0

Award Level	BLS Educational Attainment
No College	43%
Some College	29%
Associates	11%
Bachelors	15%
Masters	2%
Doctoral	1%

* - Google search, employment data and Jobs Per Grad Ratio do not filter by award level.
** - Color scale in reverse.
NA - No data available/not currently tracked.
NS - Not Scored in Rubrics (values = 0).
2-Yr - Associates & certificate programs only.
PCTL - Percentile

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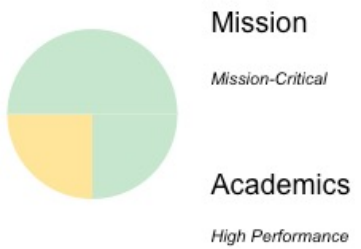
Source: Gray's PES Markets

Accounting (Bachelor's)

Program Management Dashboard

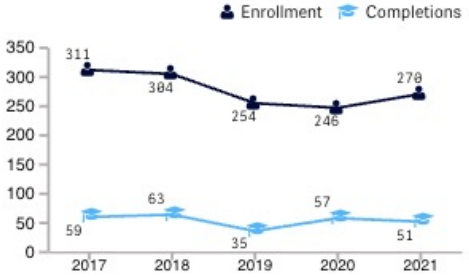
Status: Sustain



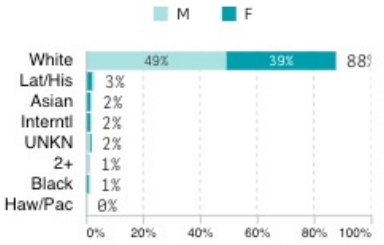
Goals

#	Goal	Status
1	Increase the number of internships	Needs Attention
2	Increase accounting student professional exam performance outcomes	On-Track
3	Increase accounting student job placement outcomes	On-Track
4	Enhance accounting students' accounting-related software skills in order to meet modern technology needs	Not Started

Size



Demographics



Markets

Overall Percentile: 100%

Rubric: Undergraduate | Market: 100-Mile Radius

	Student Demand	Employment	Competitive Intensity
Total	99%	100%	6%
Size	100%	100%	7%
Growth	7%	35%	86%

Margins

Contribution SCH Percentile: 33%

YR: 2021 | Term: All

	Total $	SCH
Gross Revenue	$2,612,945	$334
Discounts	$622,888	$80
Net Revenue	$3,069,729	$393
Costs	$1,088,810	$139
Contribution	$1,980,919	$254

Mission

Overview | Academic Focus | Students Served | Learning Outc... | Highlight

Category	Program Fit
Academic Focus	The undergraduate program in Accounting blends theory and practice in generating job-ready graduates.
Students Served	Accounting students intern at a wide variety of businesses, often holding multiple internships, leading to full-time placement. Student-practitioner day has been a hallmark for over two decades.
Learning Outcomes	The Accounting program meets regional, state, and national needs through the creation of a diverse talent pipeline for both the profit- and non-profit sectors. Additionally, the faculty, students, and staff of the department help organizations to grow as well as becoming more efficient.
Highlight	High Student Placement rates in internships and full-time employment; Professionally credentialed and award-winning faculty

Academics

Category	Metric	2018	2019	2020	2021	Change
Program Profile	# of Students	304	203	197	216	10% ↑
	# of SCH Taught	5,914	5,461	5,005	5,269	5% ↑
	% SCH in Online Courses	7%	7%	8%	60%	488% ↑
	% SCH Taught by FT Faculty	53%	59%	59%	65%	8% ↑
	PT Faculty FTE	0	0.5	0.5	0.6	5% ↑
Student Progress	# Students Enrolled 2+ Terms	170	159	139	138	-0% ↓
	# Students Return from Prior Yr	N/A	137	131	122	-5% ↓
	# Terms Students Enroll 15+ CH	200	201	188	206	9% ↑
	% Complete 15+ CH	61%	60%	64%	63%	-1% ↓
	Withdraw/D/F Rate	26%	27%	24%	27%	11% ↑
Outcomes	# of In-Year Completions	63	35	57	51	-11% ↓
	Median Years to Complete	3.7	3.7	3.7	3.7	0% –
	Benchmark Exam/Licensure Pass Rate	N/A	N/A	N/A	N/A	NA –
	Avg. End-of-Program Survey Rating	N/A	N/A	N/A	N/A	NA –
	DOE Median Earnings 2-Yrs Post-Grad.	NA	NA	NA	NA	NA –

Gender: F | M

Pell Status: Non | Pell

Race/Ethnicity: 2+ | Asian | Black | Haw/... | Interntl | Lat/His | Ntv.Am. | UNKN | White

Source: Gray's Management Dashboard

Program Portfolio Management

Market: 100-Mile Radius

Market

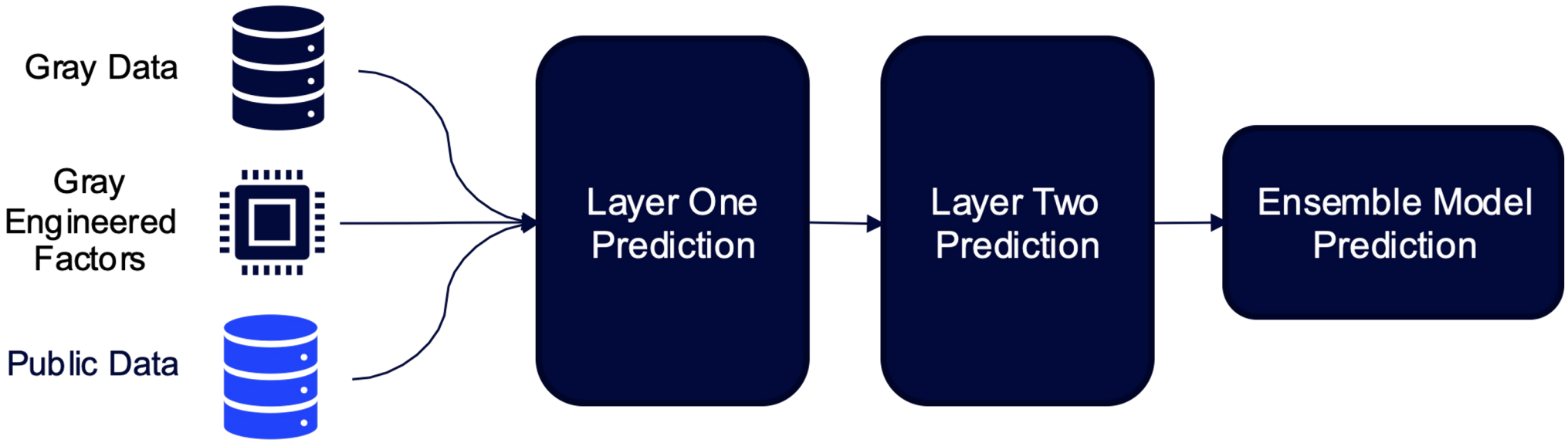
Internal Performance

Program	Google % Change	Job Posting Volume	Median Program Size % Change	Enrollment		%	Graduates		%	D/F/W Rate*	Students Return from Prior Year	Discount Rate*	Net Revenue	Cost per SCH*	Cost % Cha...	Benchmark Cost per SCH	SCH Actual Minus Benchmark
Biology	19%	516	-3%	505	11	2%	82	1	1%	27%	66	37%	$5,688,801	$155	12%	$138	$18
Business Administration	6%	21,620	-43%	22	-1	-4%	9	3	50%	27%	7	10%	$195,124	$110	-6%	$109	$1
Computer Science	18%	3,723	10%	203	17	9%	20	8	67%	32%	16	26%	$2,252,317	$162	7%	$175	-$13
Criminal Justice	41%	188	-14%	27	-6	-18%	6	1	20%	30%	5	3%	$235,183	$66	-10%	$92	-$26
English	41%	188	-14%	516	-16	-3%	78	5	7%	29%	62	14%	$5,739,672	$91	2%	$126	-$34
History	7%	132	24%	84	-7	-8%	22	12	120%	33%	18	17%	$878,480	$170	0%	$200	-$30
Mathematics	21%	29	-20%	64	4	7%	15	7	88%	29%	12	18%	$684,118	$202	3%	$197	$5
Philosophy	14%	186	-16%	68	8	13%	7	-7	-50%	25%	6	52%	$644,163	$213	1%	$242	-$29
Physics	-7%	6	43%	17	0	0%	4	4	-	31%	3	42%	$175,797	$219	24%	$227	-$7
Political Science	-19%	44	20%	23	3	15%	0	-1	-100%	26%	0	48%	$250,313	$238	16%	$225	$13
Psychology	-	-	5%	158	-2	-1%	29	6	26%	30%	23	22%	$1,782,149	$147	9%	$174	-$27
Respiratory Care	21%	85	6%	436	36	9%	72	20	38%	30%	58	20%	$4,974,479	$126	16%	$140	-$13

Source: Gray's Management Dashboard

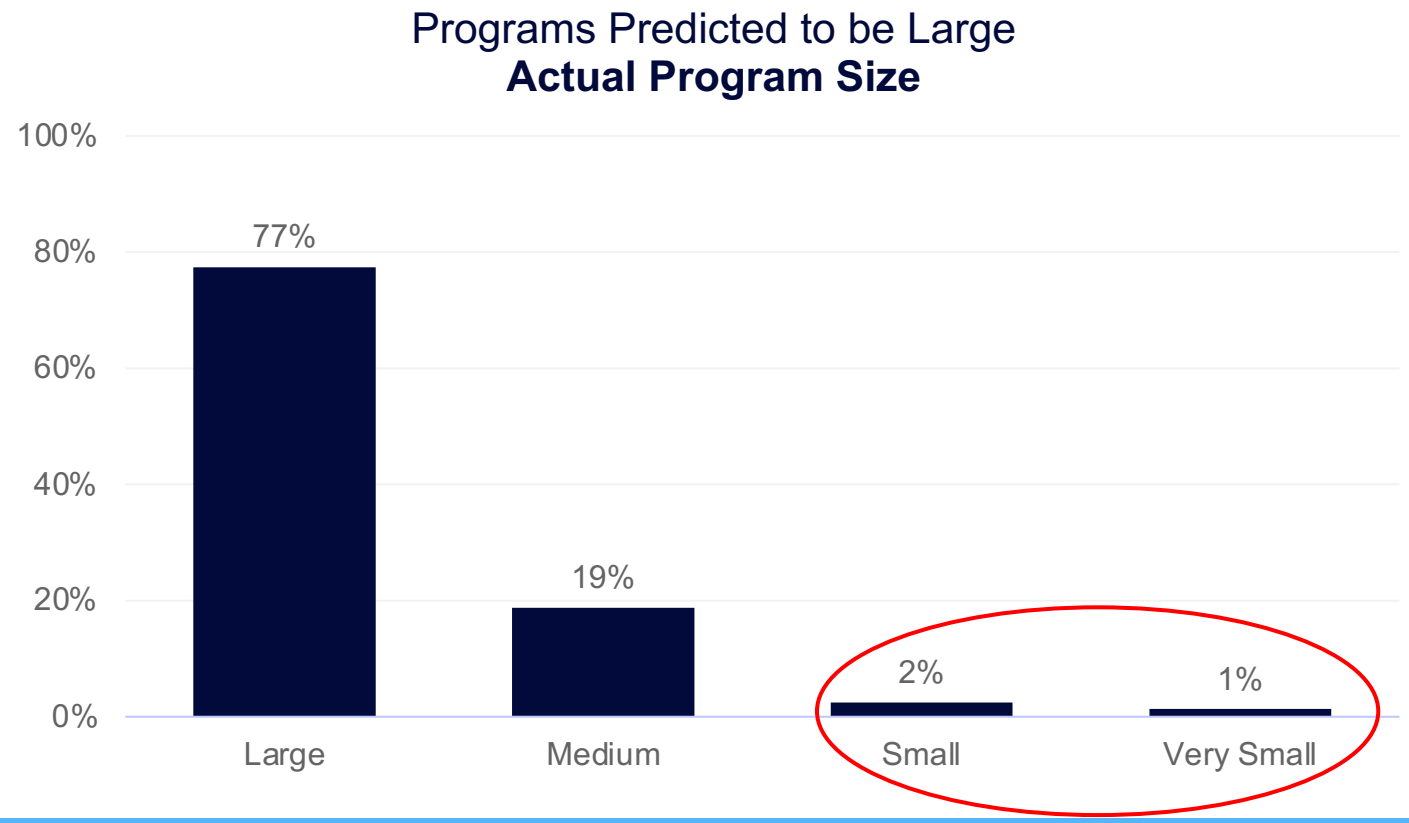
Predicting Program Size with AI

6 ML Models	50+ Metrics	500+ CIP Codes	1,300+ Institutions	3 Award Levels	75,000+ Programs



Predict Program Size Output

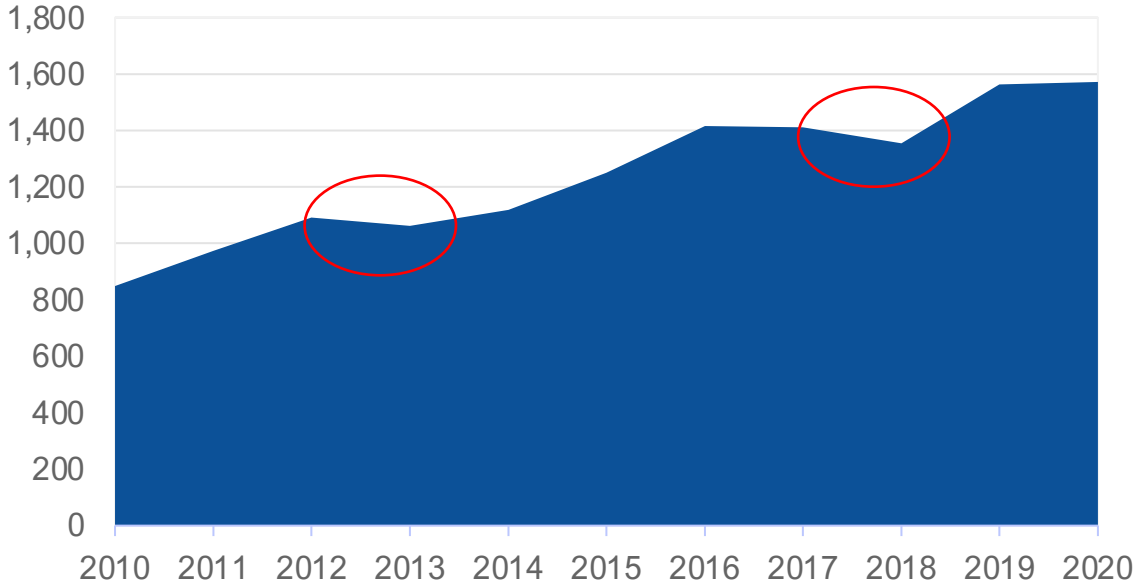
Advanced analytics predict program size with over 90% accuracy, reducing failed launches.



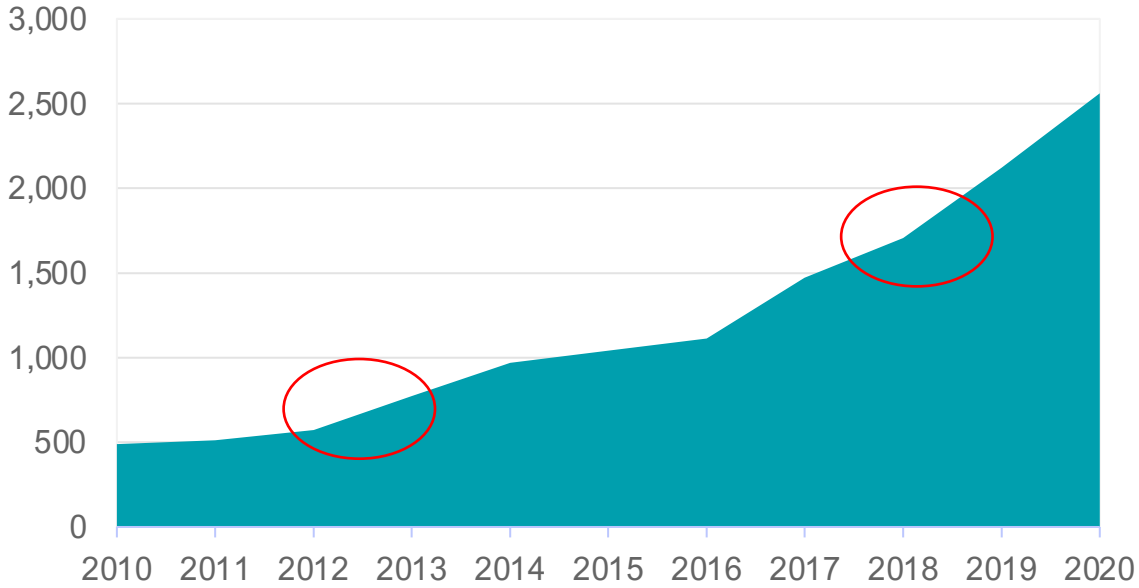
Portfolio Analysis

Even growing programs have their ups and downs—but not all have them at the same time.

Respiratory Care Therapist
Completions 2010-2020

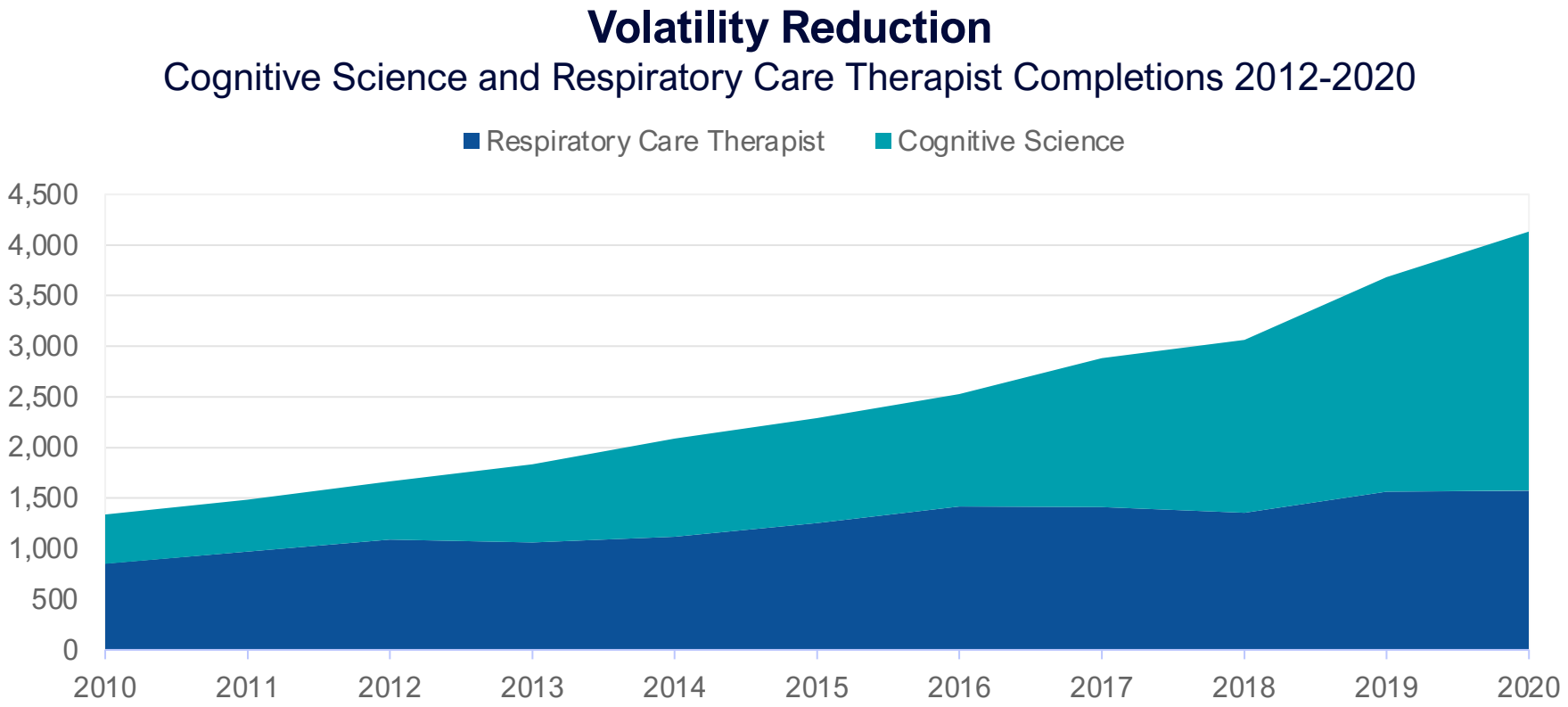


Cognitive Science
Completions 2010-2020



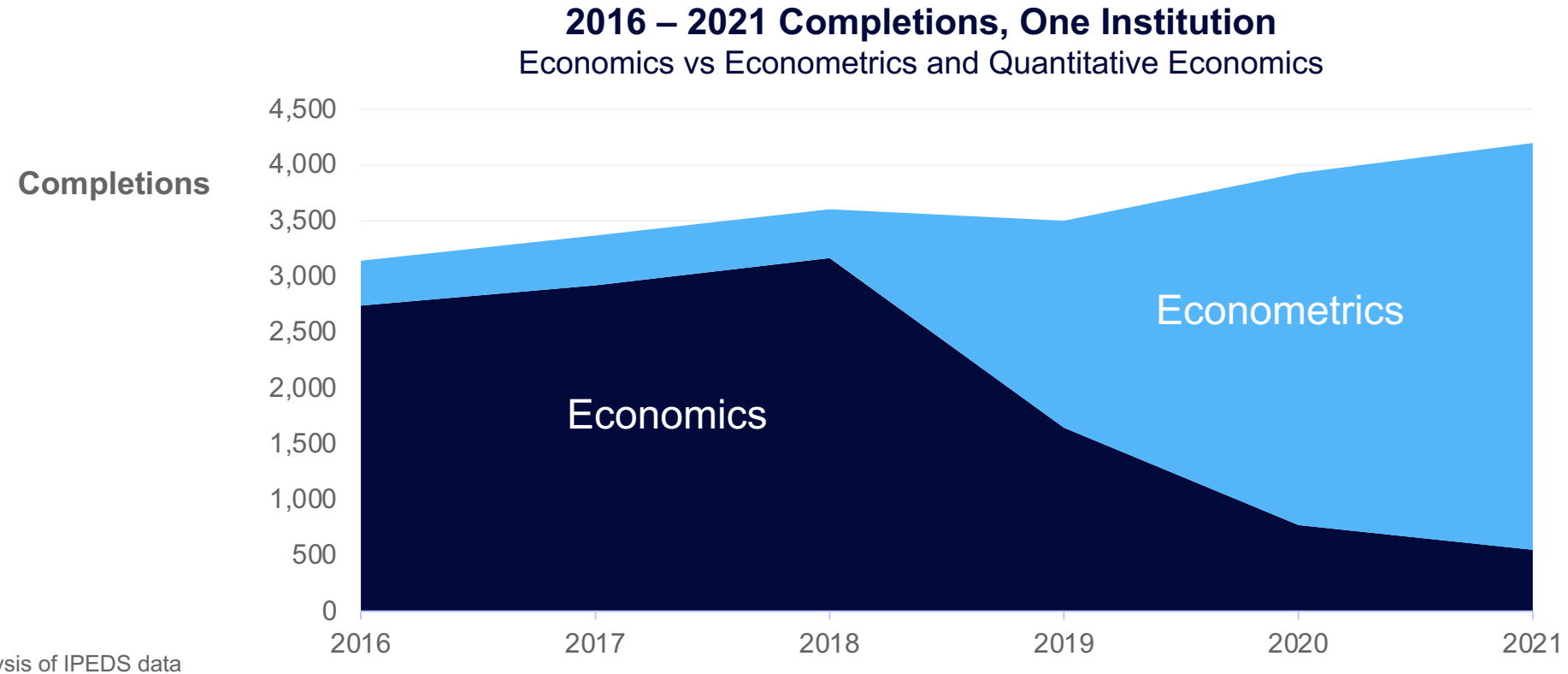
Portfolio Analysis

The right combination of programs can reduce the ups and downs in overall enrollment.



University of California: Cannibalization and Growth

Total completions rose 6% annually in five years.



Source: Gray's analysis of IPEDS data

Calculating the Gray Equity Opportunity Formula (GEOF).

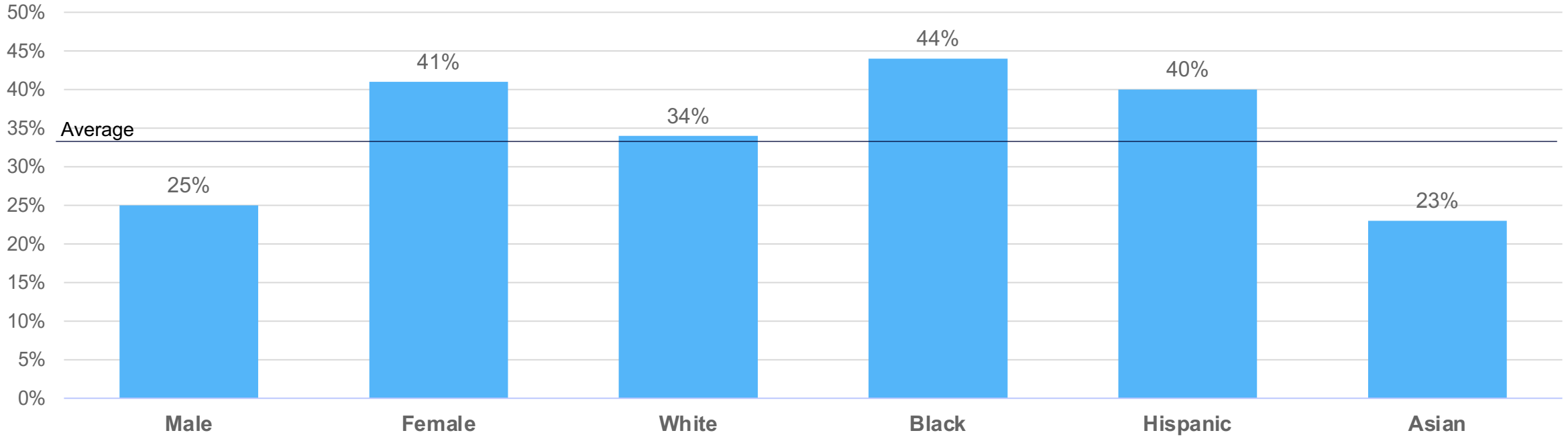
Equity gaps manifest in admissions, graduation, and program selection. GEOF calculates the dollar value of the opportunity to reduce equity gaps.

Admissions Representation	+	Program Selection	+	Graduation Rate	=	Equity Opportunity
▪ Underrepresentation ▪ Income lost to underrepresentation		▪ Programs chosen ▪ Graduate income by program ▪ Income lost to program choices		▪ Group graduation rate ▪ Institutional graduation rate ▪ Income lost by incremental non-completers		
$		$		$		

Program Mix: Building DEI into program planning

Blacks, Hispanics, and women are overrepresented in bachelor's programs that lead to low pay.

Expected Earnings Under $80,000
Percentage of 2020 U.S. Bachelor's Completions
Program-Weighted ACS Earnings By Demographic Group



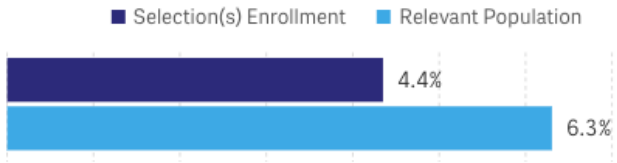
Source: Gray's PES Markets: IPEDS and ACS Data

$10B+ opportunity for Black men, primarily in enrollment.

Enrollment Opportunity

$5,730,756,560

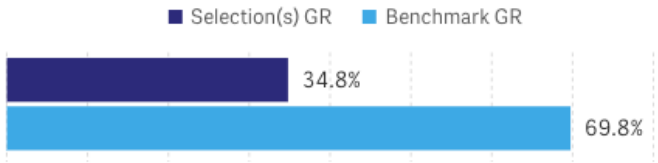
Enrollment Comparison



Graduation Rate Opportunity

$3,706,360,230

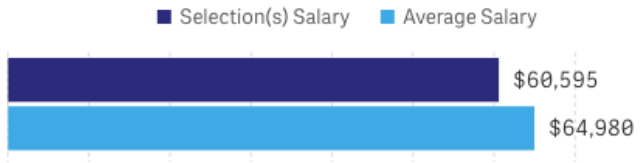
Graduation Rate Comparison



Program Mix Opportunity

$713,247,789

Weighted Salary by Program Comparison



Equity Opportunity Breakdown

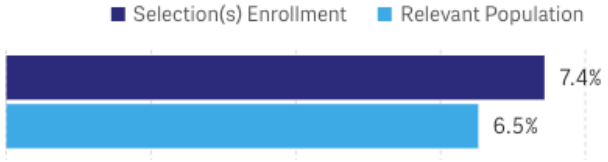
Source: Gray's DEI Dashboard

$6.0B+ opportunity for Black women: graduation rates and program choices

Enrollment Opportunity

$0

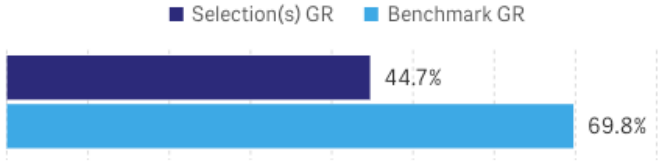
Enrollment Comparison



Graduation Rate Opportunity

$4,543,067,563

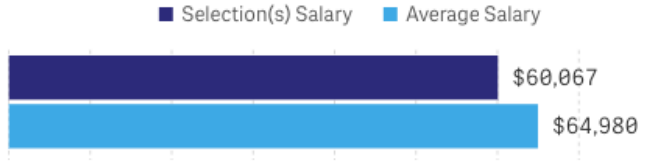
Graduation Rate Comparison

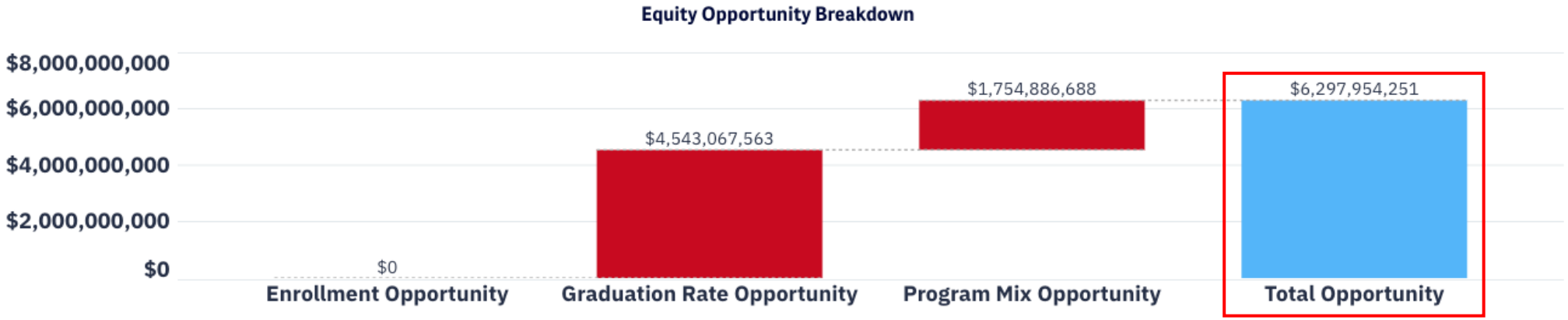


Program Mix Opportunity

$1,754,886,688

Weighted Salary by Program Comparison





Source: Gray's DEI Dashboard

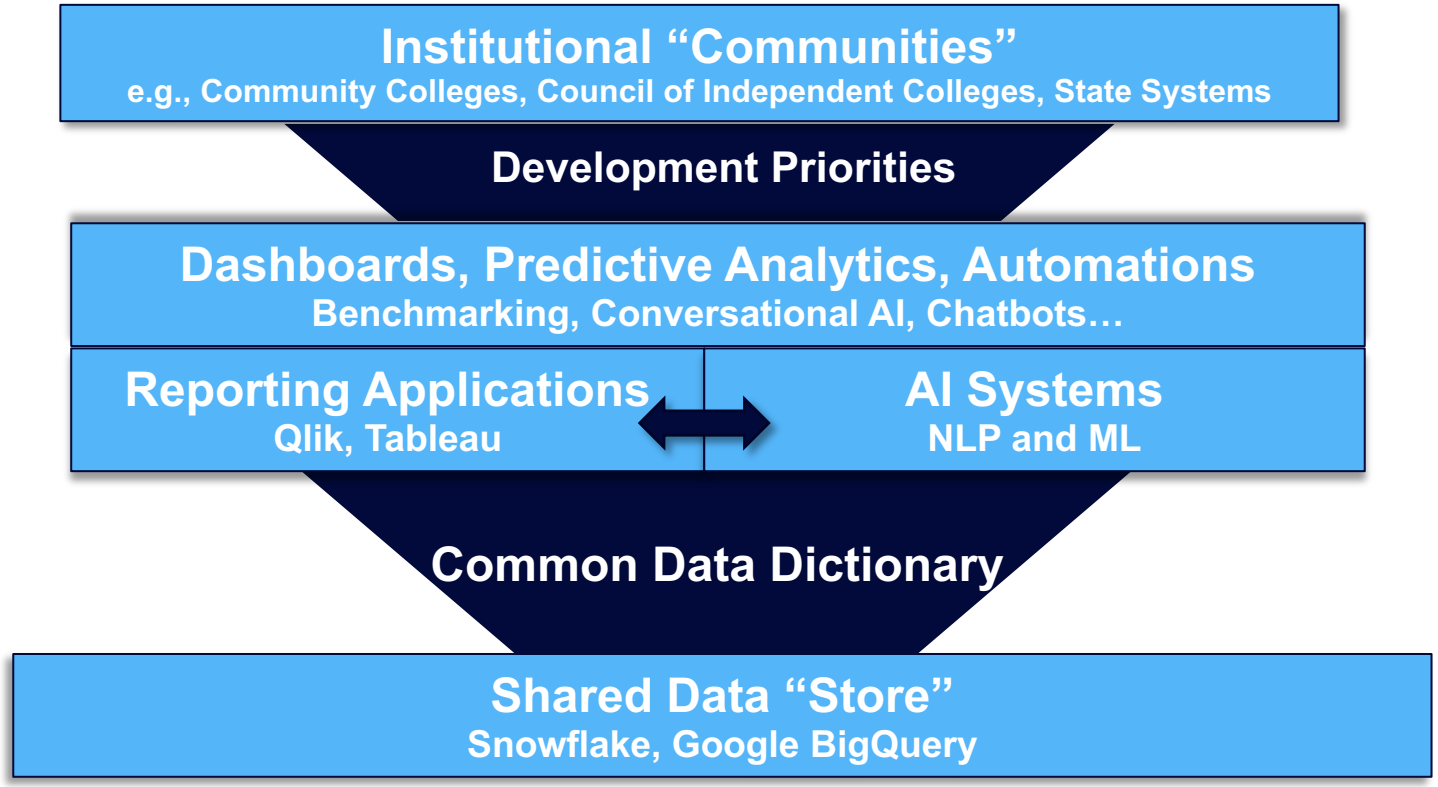
Preparing for the Future

What data should you be collecting now so you can be ready for the future?

- Enrollment Management
- Admissions
- SIS
- LMS
- Chatbots
- Financial Aid
- Accounts and Billing
- Academic Records
- Advising
- Housing
- Registrar/Scheduling
- Career Services
- Alumni Relations
- Tutoring Sessions
- Research Programs

Systems Co-ops will provide economies of scale that universities will need.

We envision massive data stores, consistent data definitions, and scalable BI and AI apps.



AI Reporting in Action

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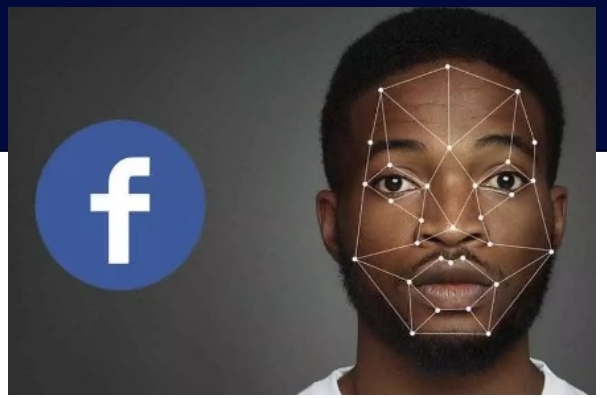
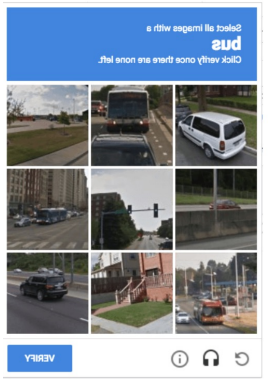


Driving Southwest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bus
Click verify once there are none left.
VERIFY

CHATGPT
OpenAI

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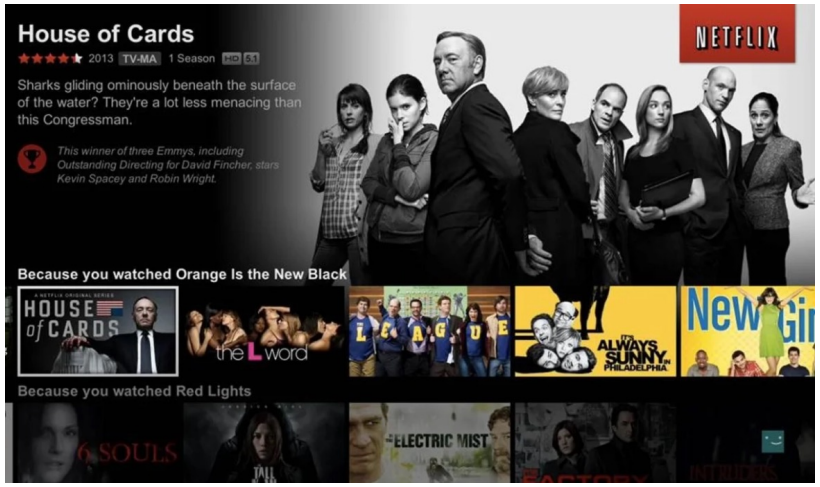
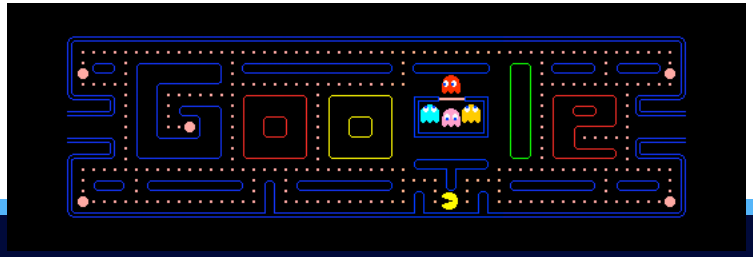
san fernando valley
san francisco state university
san francisco hotels
san francisco 49ers
san fernando
san fernando mission
san francisco zip code
Google Search
I'm Feeling Lucky


House of Cards
2013 TV-MA 1 Season HD 5.1
Sharks gliding ominously beneath the surface of the water? They're a lot less menacing than this Congressman.
This winner of three Emmys, including Outstanding Directing for David Fincher, stars Kevin Spacey and Robin Wright.
NETFLIX
Because you watched Orange Is the New Black
HOUSE of CARDS
the L word
ALWAYS SUNNY PHILADELPHIA
Because you watched Red Lights
6 SOULS
ELECTRIC MIST

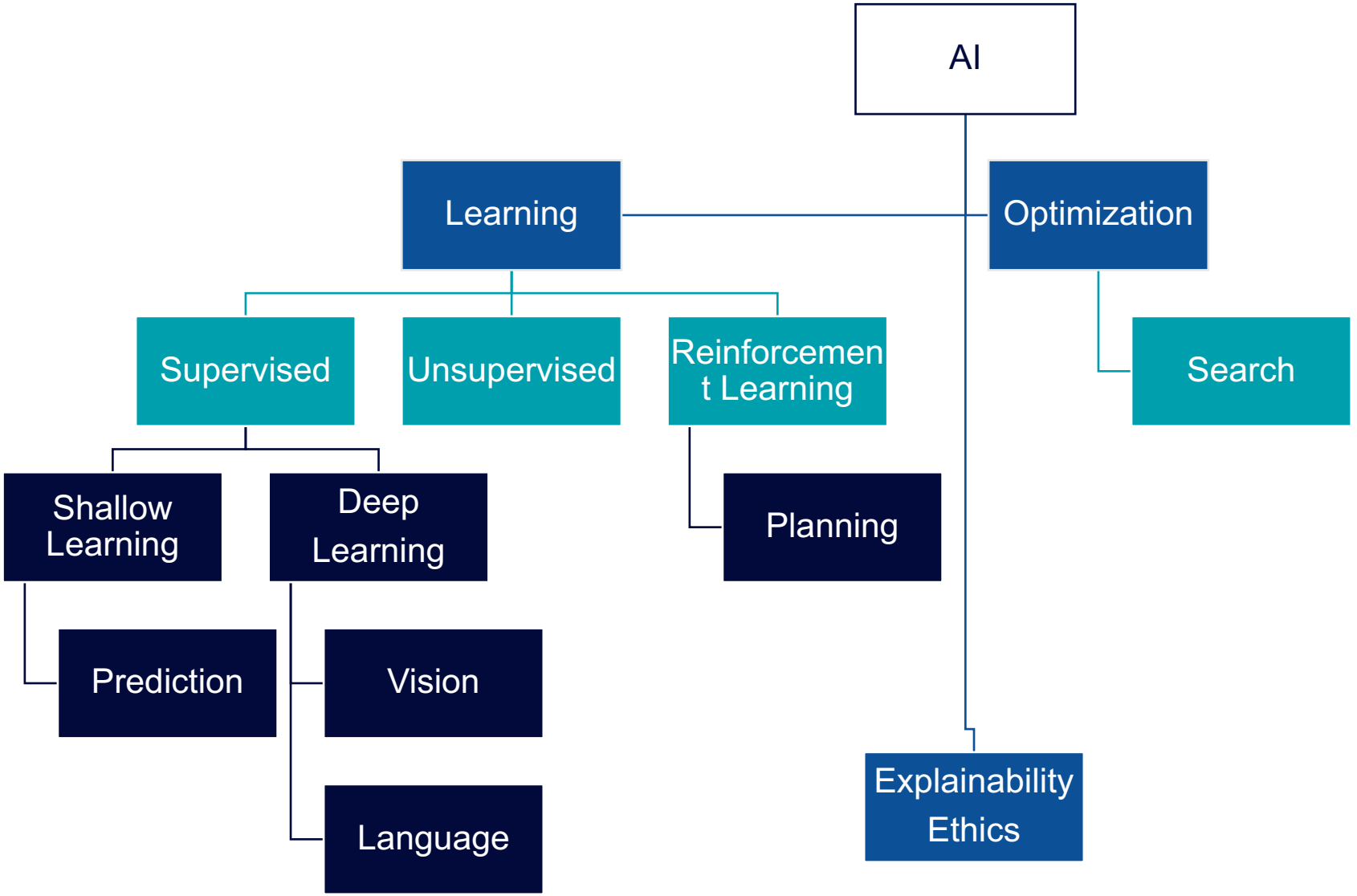


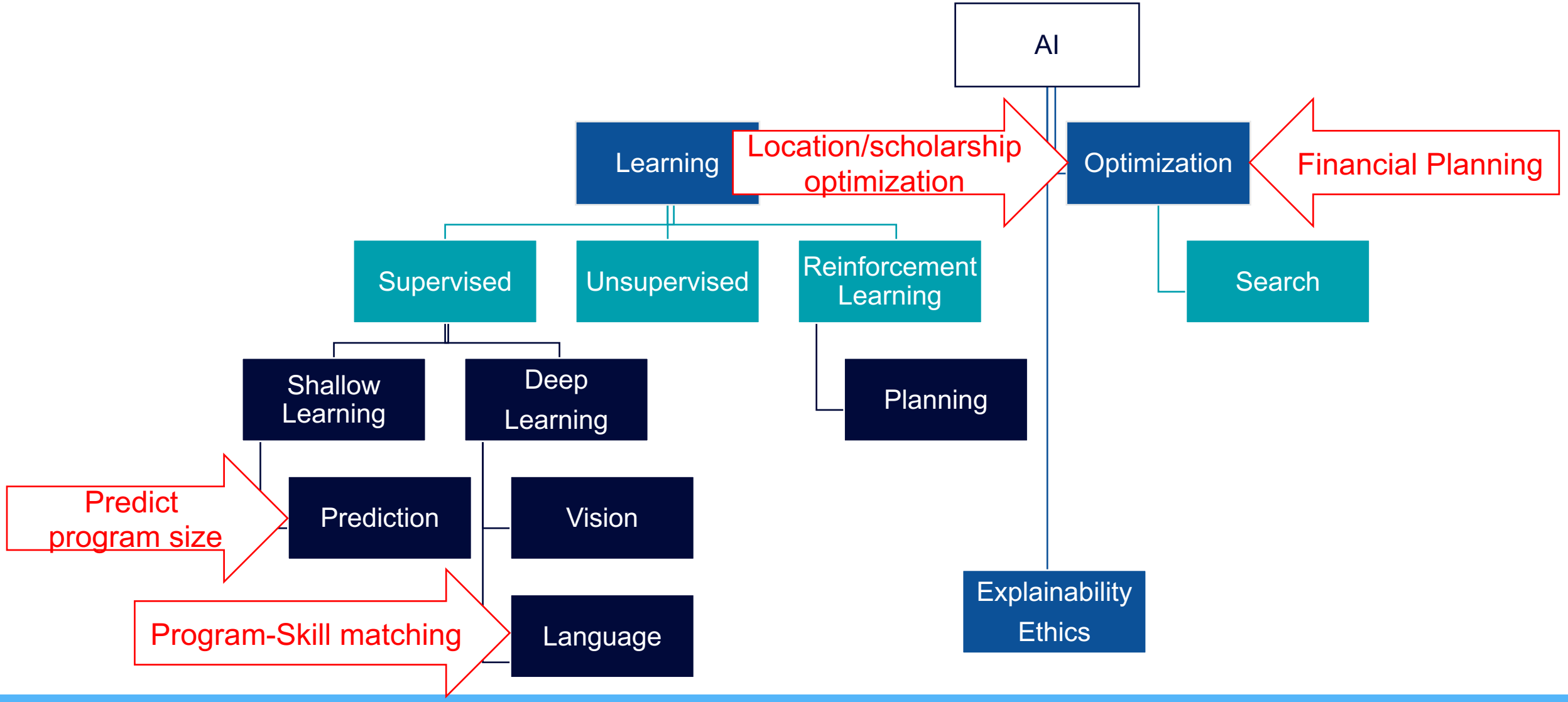
Conventional Programs

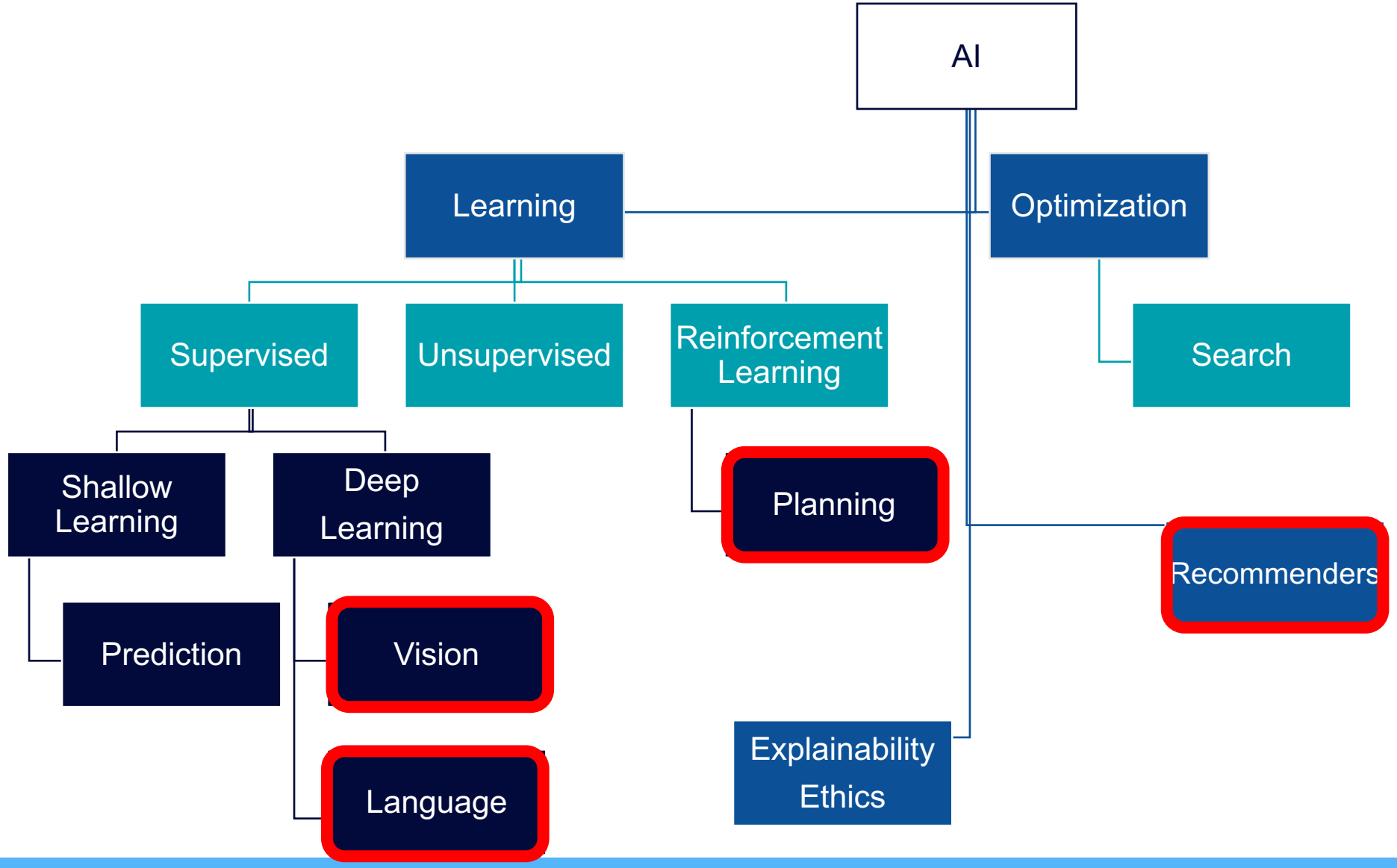
Automated Execution/Monitoring of Expert Rules

vs. AI

Automated Discovery/Learning of Patterns


AI
Learning
Optimization
Supervised
Unsupervised
Reinforcement Learning
Search
Shallow Learning
Deep Learning
Planning
Prediction
Vision
Language
Explainability
Ethics


AI
Learning
Location/scholarship optimization
Optimization
Financial Planning
Supervised
Unsupervised
Reinforcement Learning
Search
Shallow Learning
Deep Learning
Planning
Predict program size
Prediction
Vision
Program-Skill matching
Language
Explainability
Ethics


AI
Learning
Optimization
Supervised
Unsupervised
Reinforcement Learning
Search
Shallow Learning
Deep Learning
Planning
Recommenders
Prediction
Vision
Language
Explainability
Ethics

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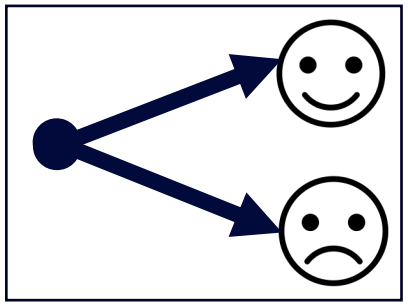
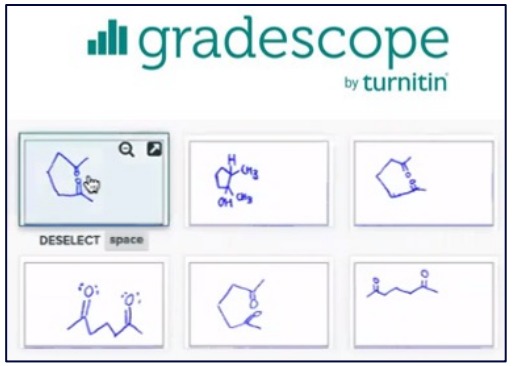
beyond predictive



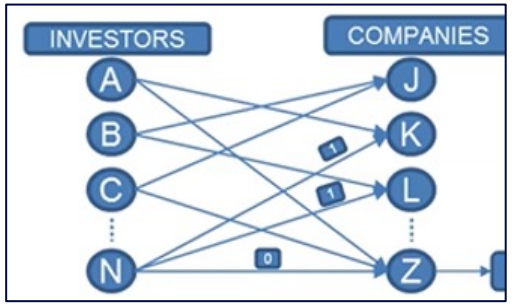
Sentiment Analysis

Chatbot

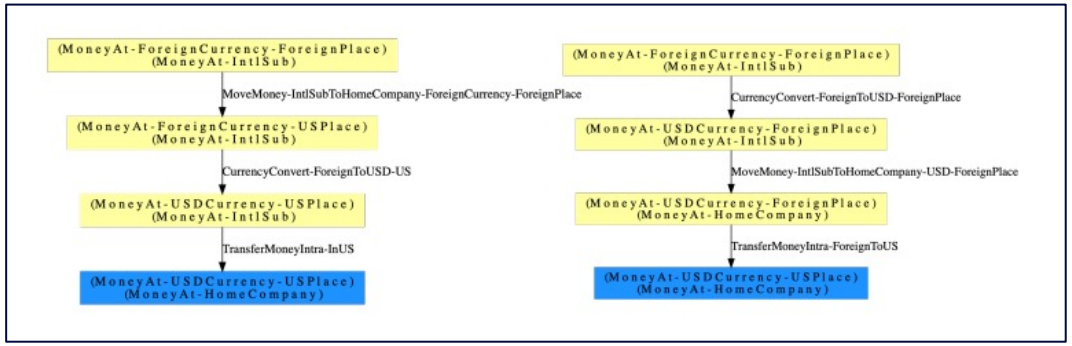
Automated Planning



Computer Vision



Recommenders



AI needs domain-specific data

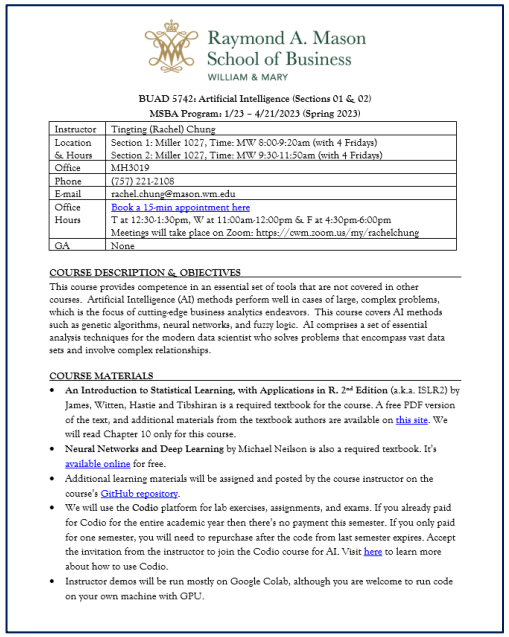
ChatGPT

BloombergGPT

AI needs domain-specific data

ChatGPT

+



Raymond A. Mason School of Business
WILLIAM & MARY

BUAD 5742: Artificial Intelligence (Sections 01 & 02)
MSBA Program: 1/23 - 4/21/2023 (Spring 2023)

Instructor	Tingting (Rachel) Chung
Location & Hours	Section 1: Miller 1027, Time: MW 8:00-9:20am (with 4 Fridays) Section 2: Miller 1027, Time: MW 9:30-11:50am (with 4 Fridays)
Office	MH3019
Phone	(757) 221-2108
E-mail	rachel.chung@mason.wm.edu
Office Hours	Book a 15-min appointment here T at 12:30-1:30pm, W at 11:00am-12:00pm & F at 4:30pm-6:00pm Meetings will take place on Zoom: https://cwm.zoom.us/my/rachelchung
GA	None

COURSE DESCRIPTION & OBJECTIVES

This course provides competence in an essential set of tools that are not covered in other courses. Artificial Intelligence (AI) methods perform well in cases of large, complex problems, which is the focus of cutting-edge business analytics endeavors. This course covers AI methods such as genetic algorithms, neural networks, and fuzzy logic. AI comprises a set of essential analysis techniques for the modern data scientist who solves problems that encompass vast data sets and involve complex relationships.

COURSE MATERIALS

- **An Introduction to Statistical Learning, with Applications in R, 2nd Edition** (a.k.a. ISLR2) by James, Witten, Hastie and Tibshiran is a required textbook for the course. A free PDF version of the text, and additional materials from the textbook authors are available on this site. We will read Chapter 10 only for this course.
- **Neural Networks and Deep Learning** by Michael Neilson is also a required textbook. It's available online for free.
- Additional learning materials will be assigned and posted by the course instructor on the course's GitHub repository.
- We will use the Codio platform for lab exercises, assignments, and exams. If you already paid for Codio for the entire academic year then there's no payment this semester. If you only paid for one semester, you will need to repurchase after the code from last semester expires. Accept the invitation from the instructor to join the Codio course for AI. Visit here to learn more about how to use Codio.
- Instructor demos will be run mostly on Google Colab, although you are welcome to run code on your own machine with GPU.

→

AdvisingGPT

ProgramEvaluationGPT
PickYourOwnGPT

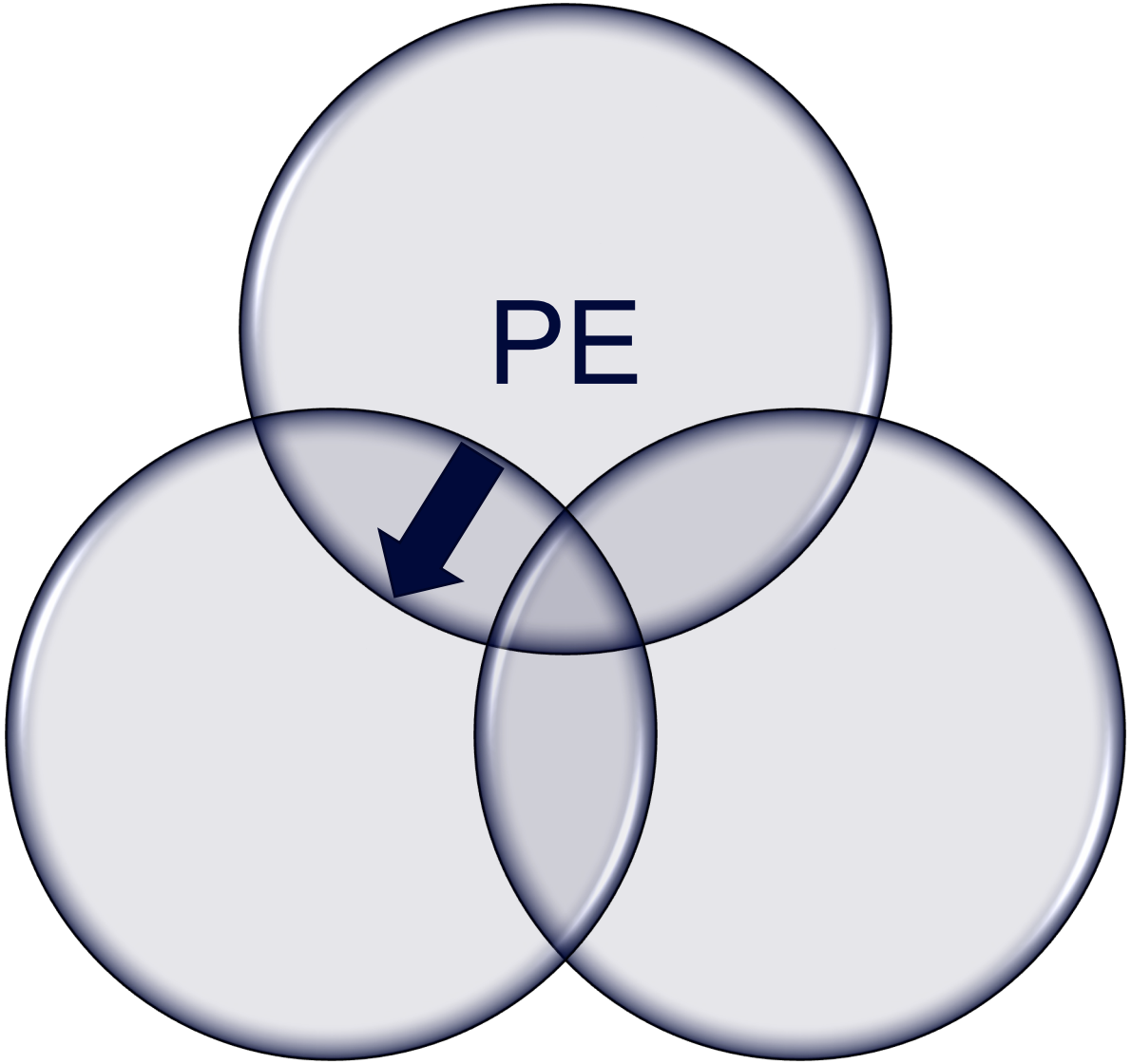
Inventory Your Own Data Assets

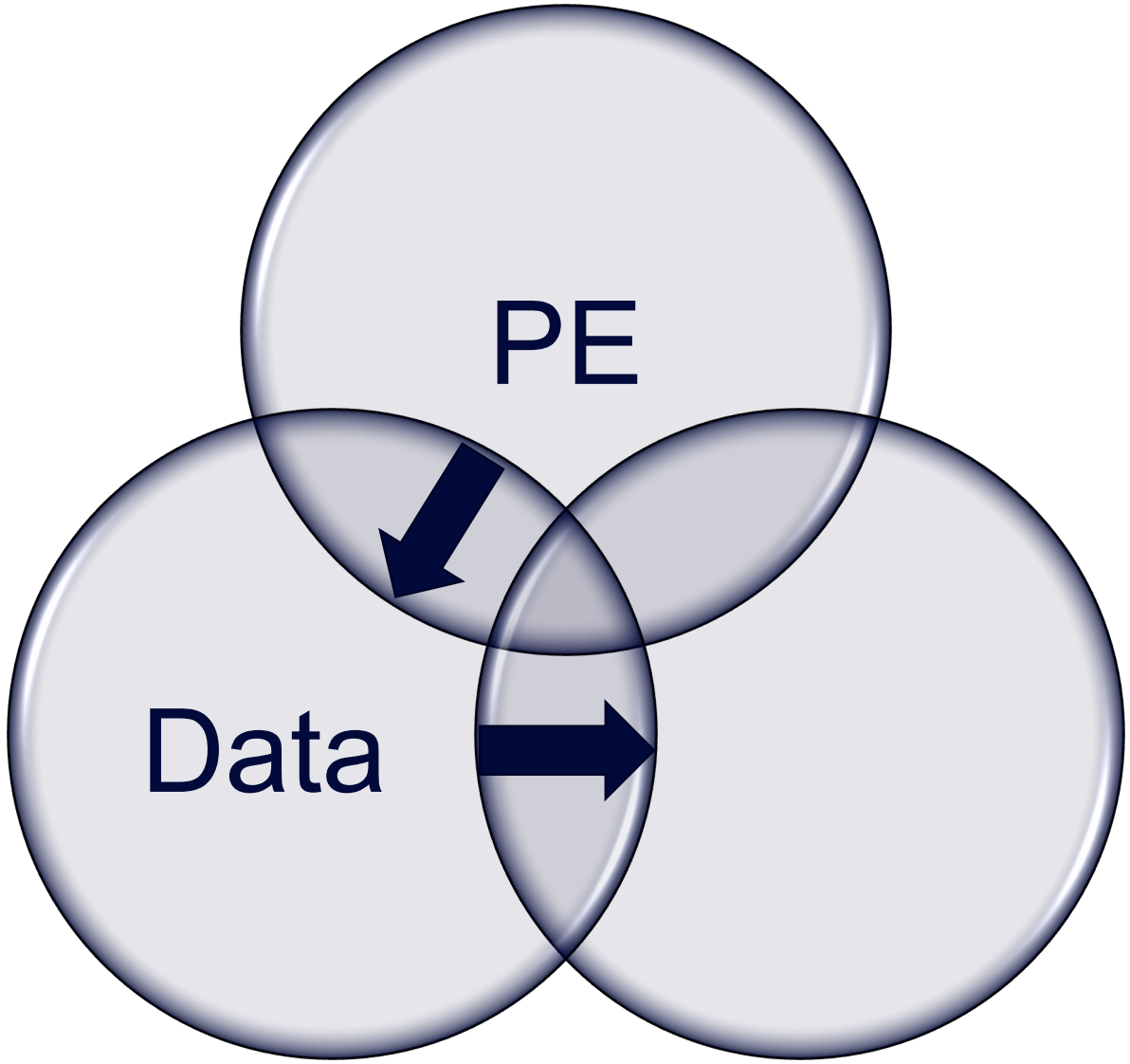
Internal assets

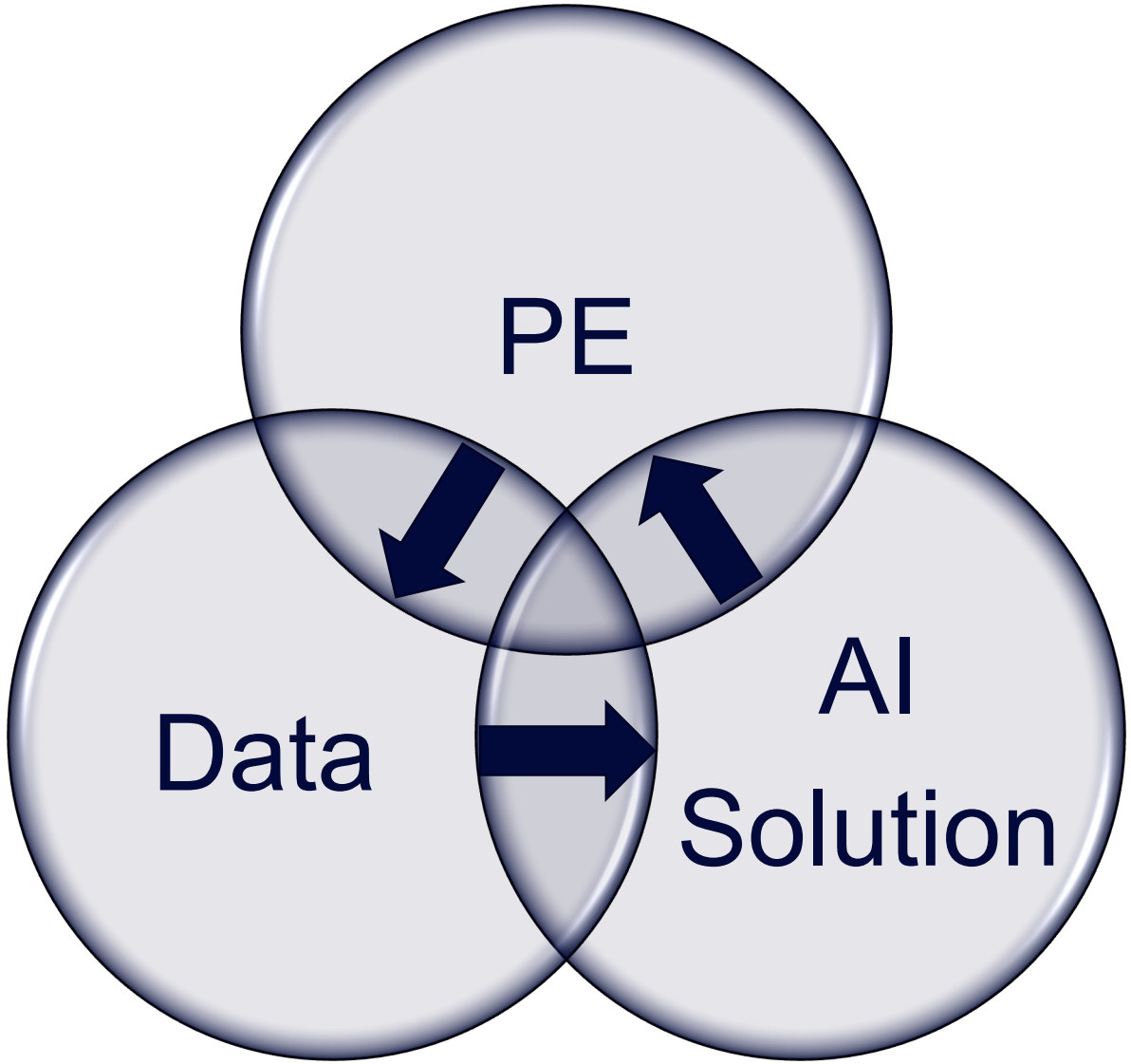
- students
- instructors
- courses (e.g. Blackboard)
- curriculum
- alumni
- placement
- user feedback
  - course evaluations
  - faculty evaluations

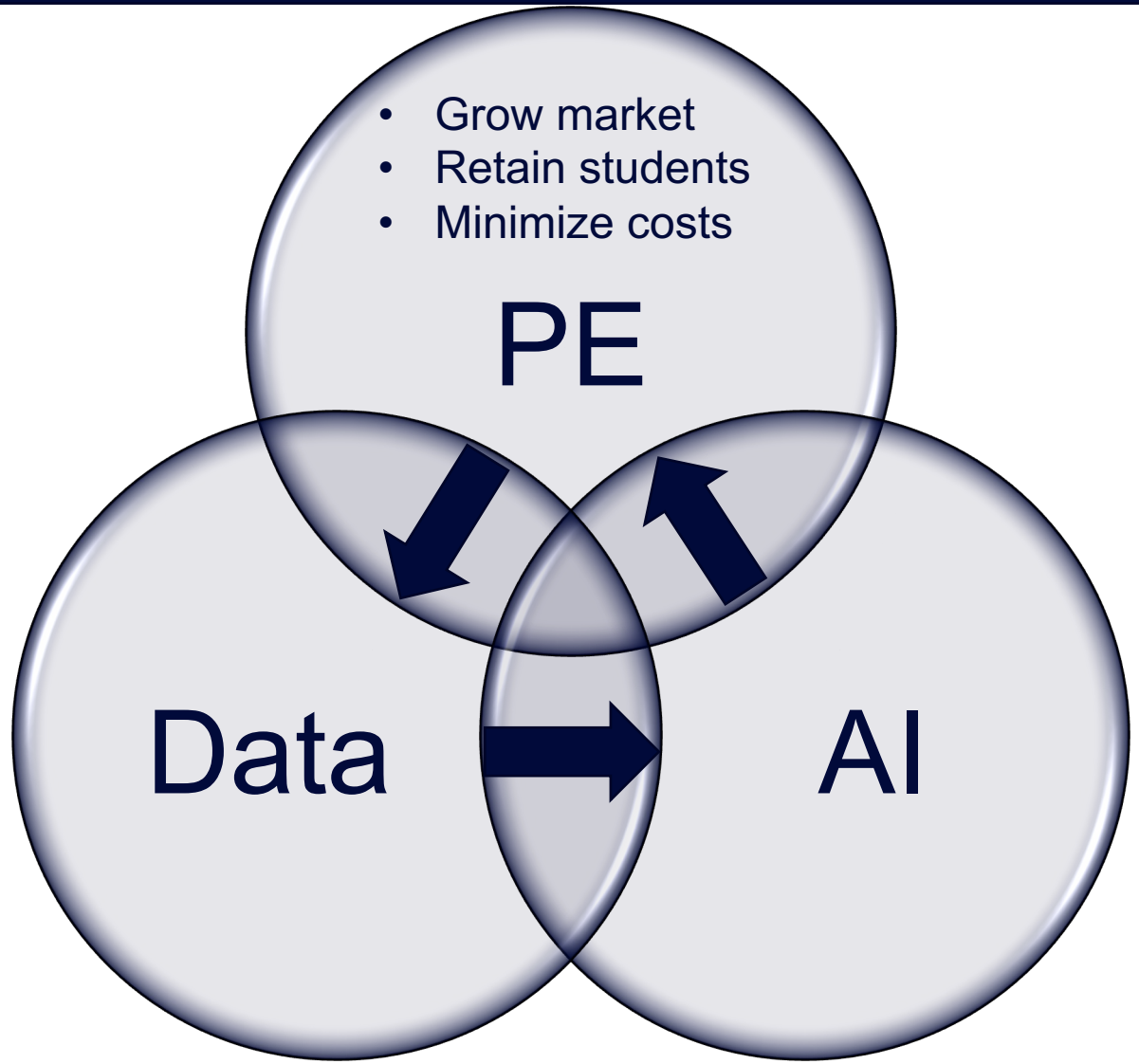
External assets

- market data
- publicly available sources
  - LinkedIn
  - RateMyProfessor
  - CollegeConfidential


PE

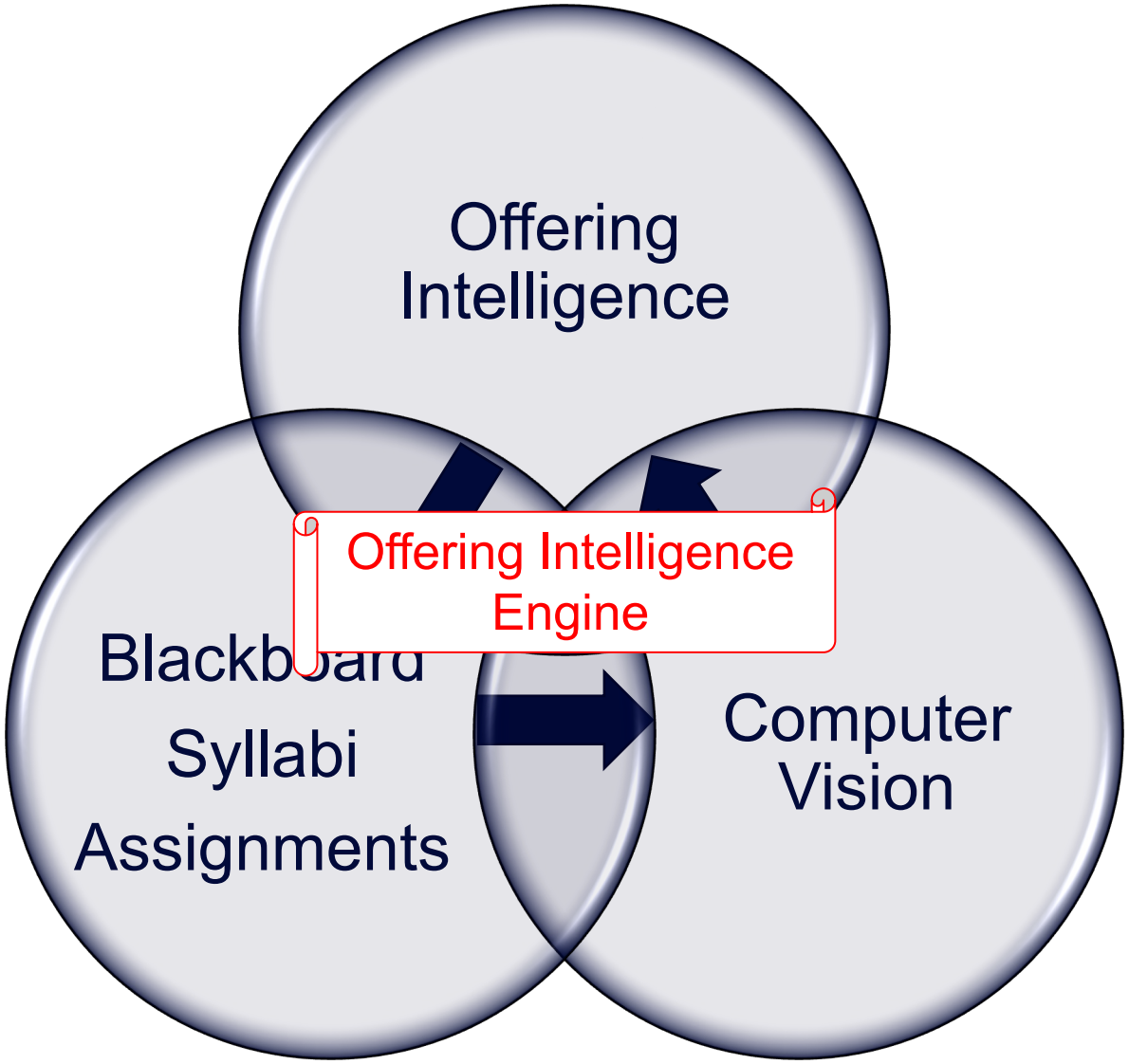

PE
Data

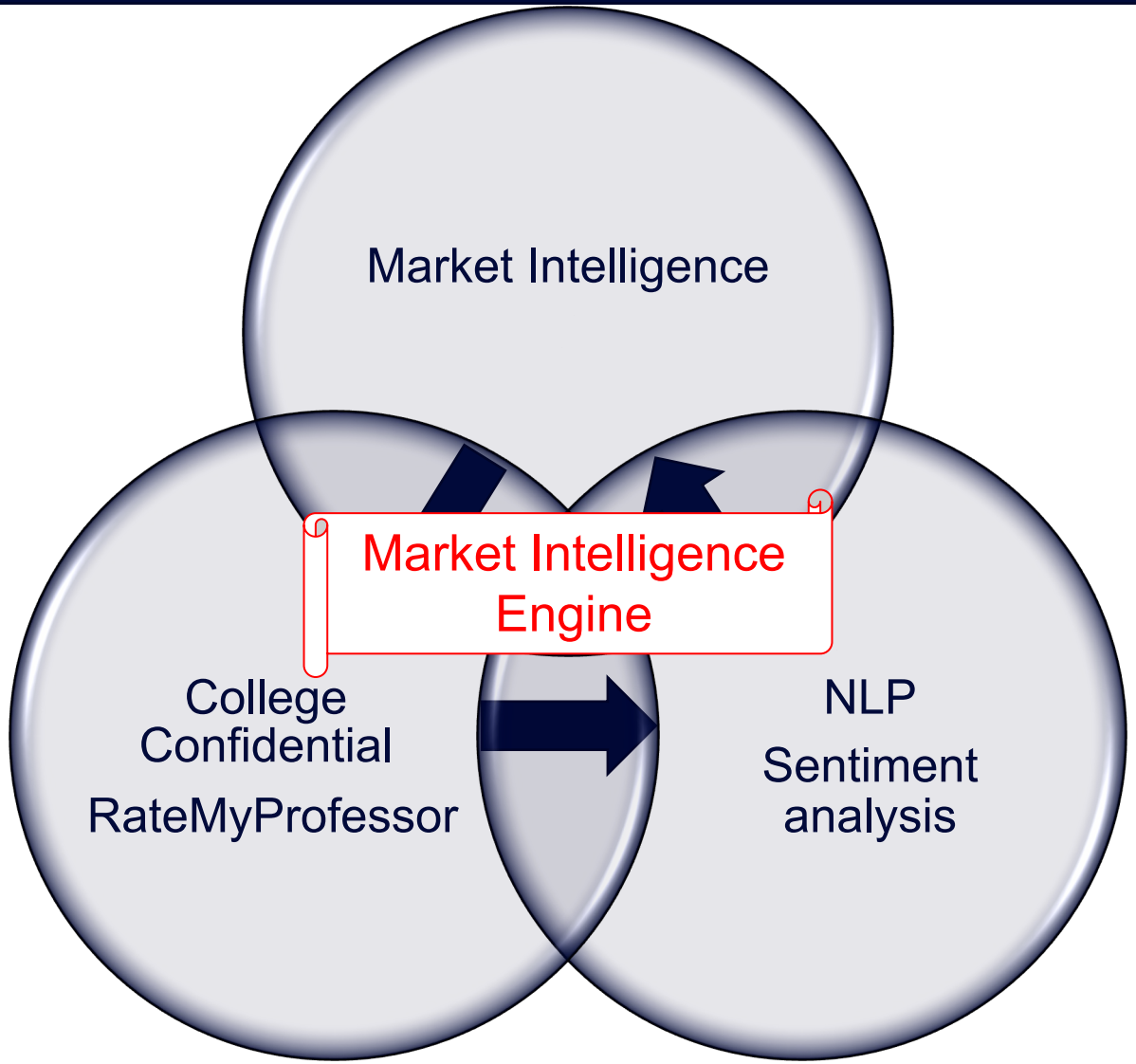

PE
Data
AI
Solution

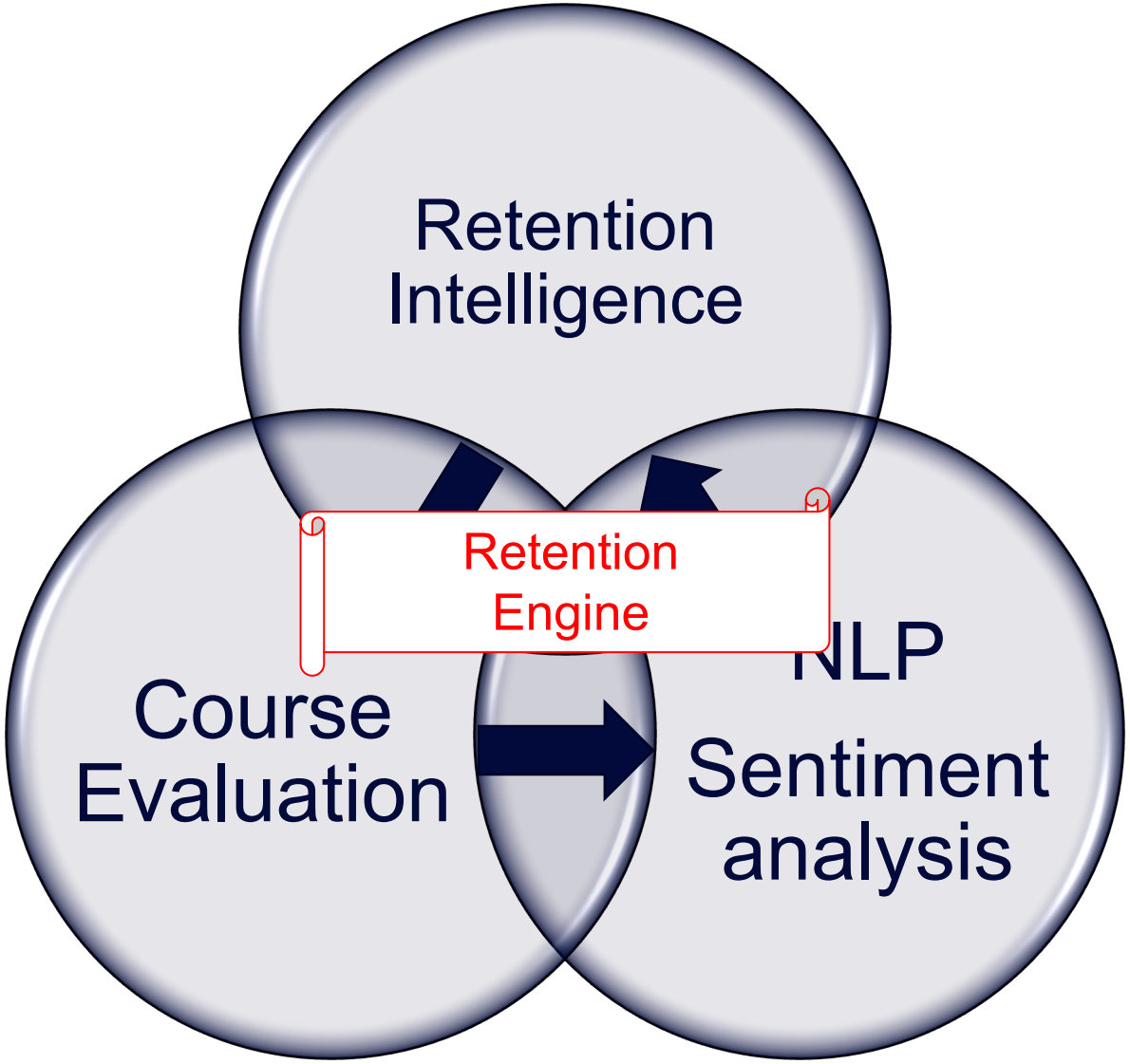


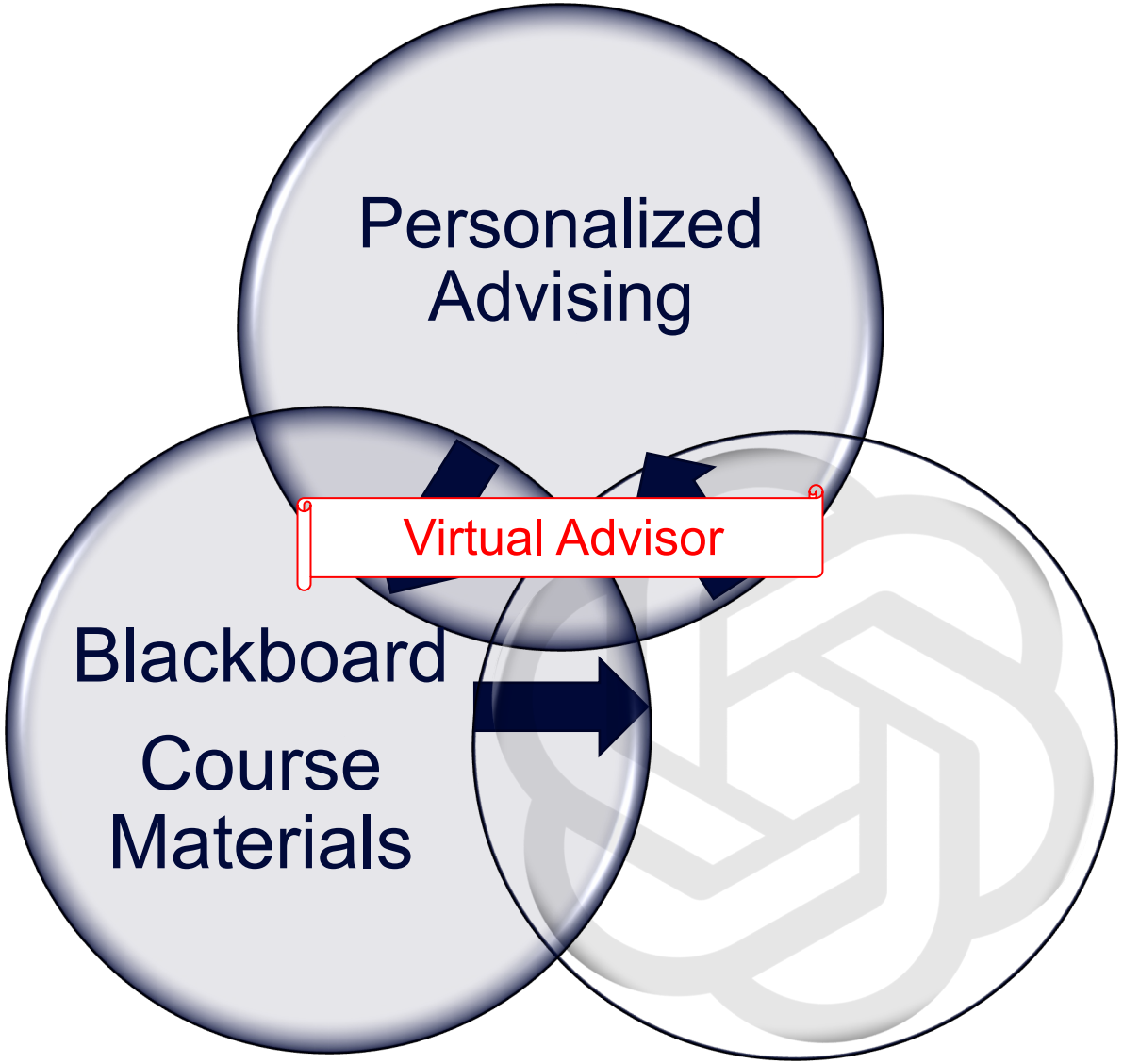
- Domain-specific documents
- Domain-specific chatter
- Interaction data
- Activity sequences

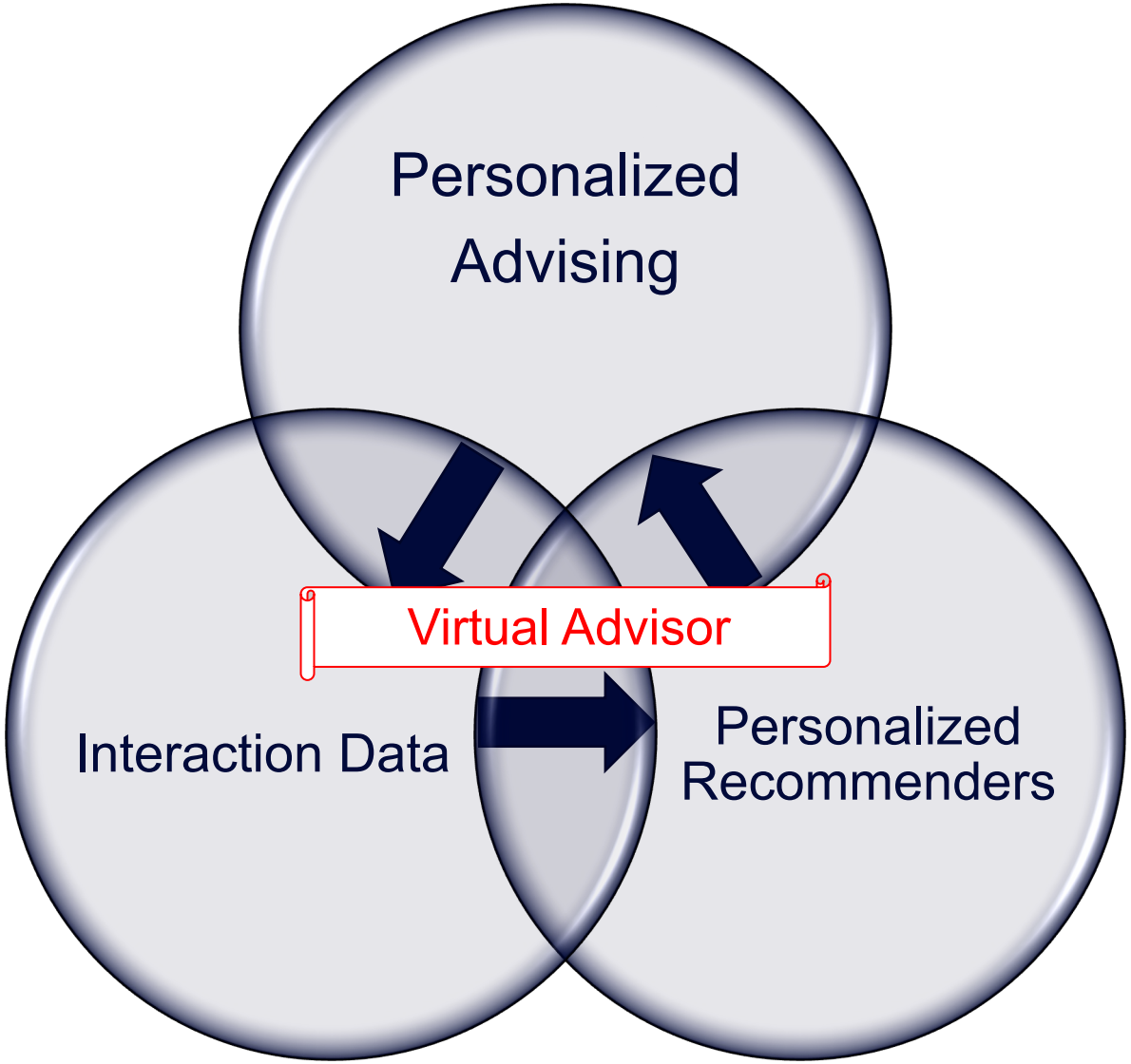
- Vision
- NLP
- Recommenders
- RL/Planning


Offering Intelligence
Offering Intelligence Engine
Blackboard
Syllabi
Assignments
Computer Vision


Market Intelligence
Market Intelligence Engine
College Confidential
RateMyProfessor
NLP
Sentiment analysis


Retention
Intelligence
Retention
Engine
Course
Evaluation
NLP
Sentiment
analysis


Personalized Advising
Virtual Advisor
Blackboard Course Materials


Personalized
Advising
Virtual Advisor
Interaction Data
Personalized
Recommenders

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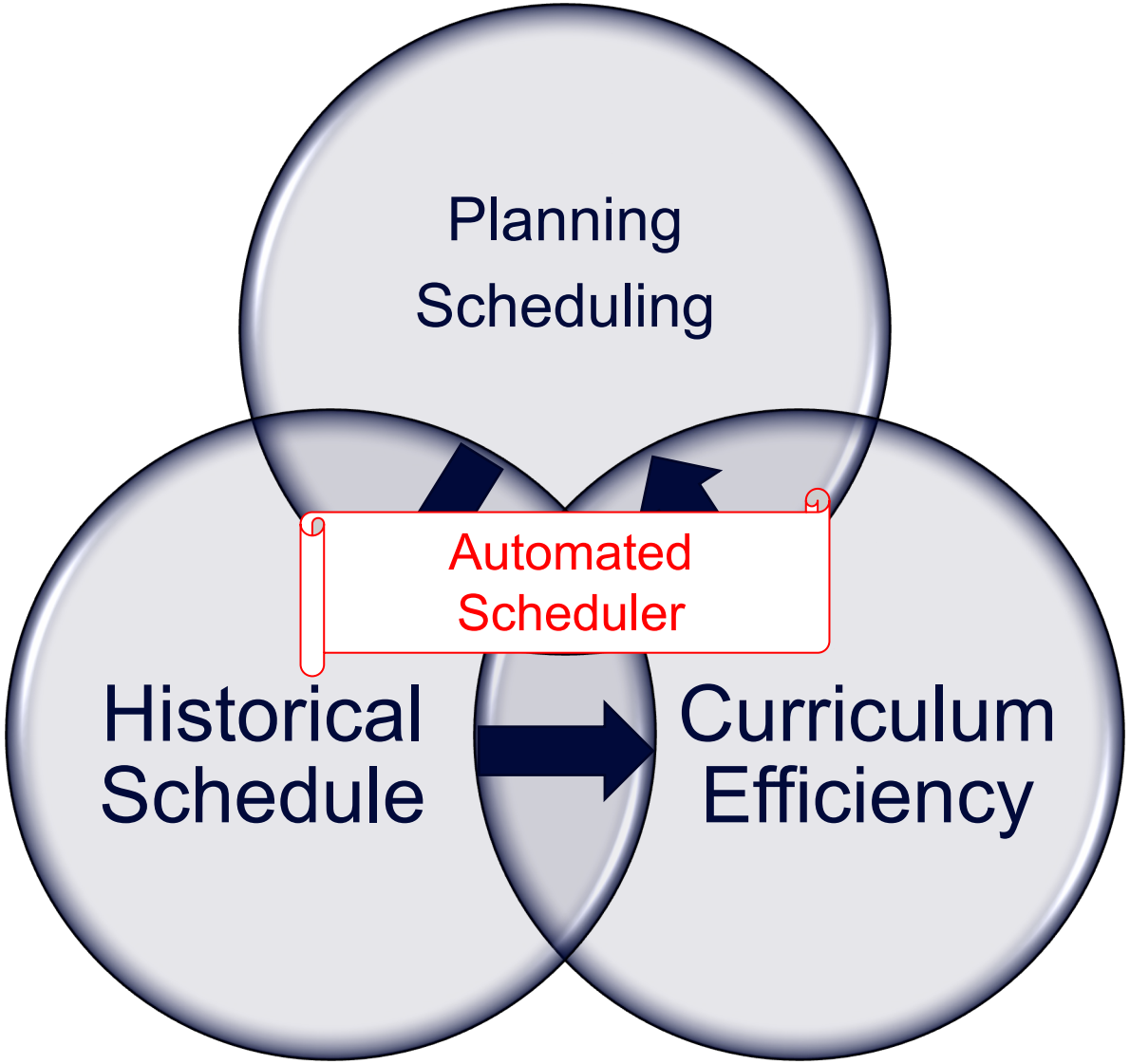
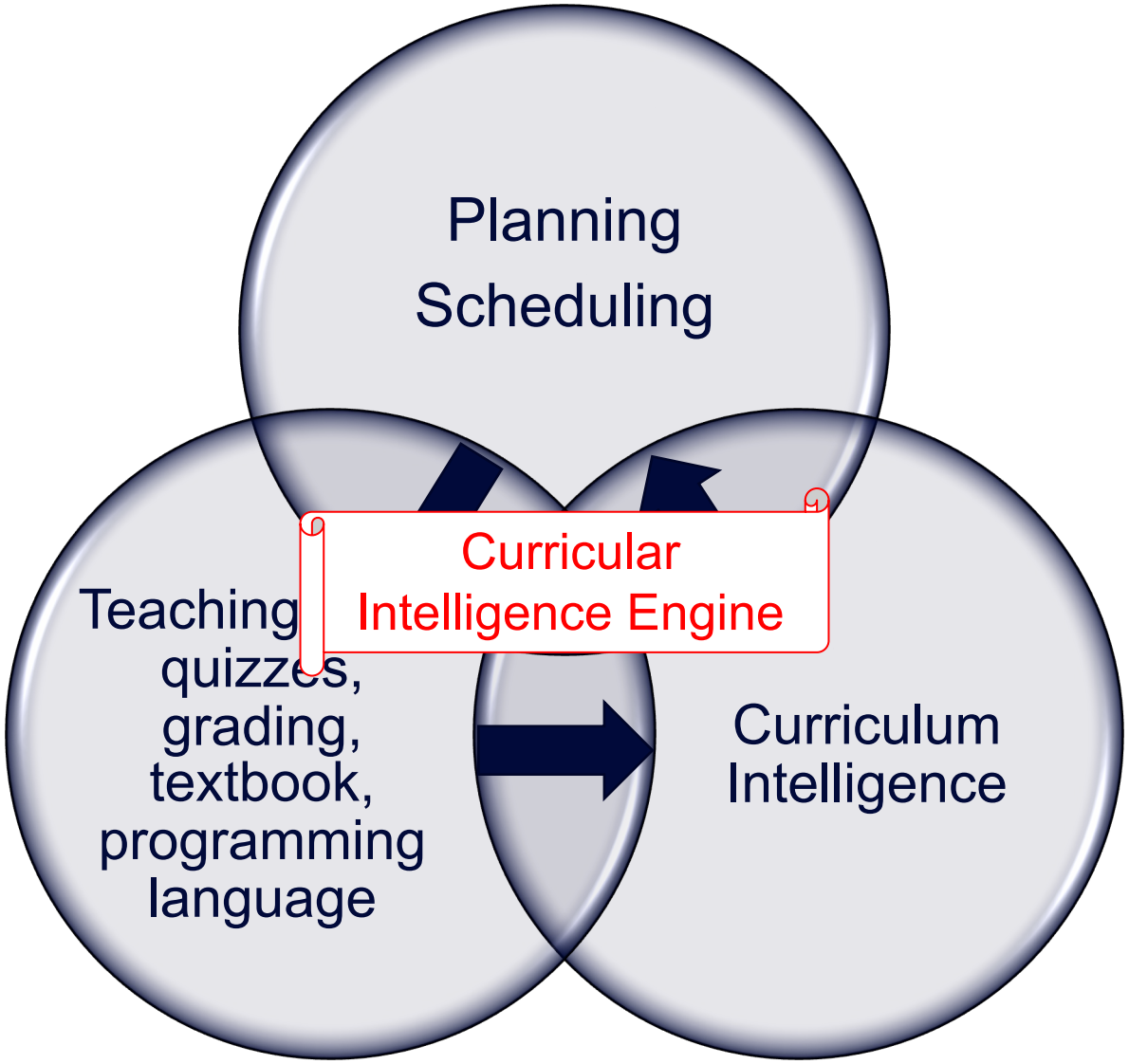

Planning
Scheduling
Automated
Scheduler
Historical
Schedule
Curriculum
Efficiency


Planning
Scheduling
Curricular
Intelligence Engine
Teaching
quizzes,
grading,
textbook,
programming
language
Curriculum
Intelligence

Questions?

Rachel Chung, Ph.D.

rachel.chung@mason.wm.edu

Learn more about the topics covered today:

The Course on PES

Academic Program Evaluation and Management Certificate

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Webinars

Demand Trends Webcast: Community Colleges	***Wednesday*** **April 26th at 2 pm ET**
Demand Trends Webcast: Bachelor's Programs	***Thursday*** **April 27th at 2 pm ET**

REGISTER HERE

Bob's Book

AVAILABLE ON AMAZON