Predictives Bootcamp

Using Analytics to Best Assure Student Success

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Data Driven Innovation

Will Miller

Assistant Vice President,
Campus Adoption

wmiller@campuslabs.com

Learning Outcomes

- Participants in the Predictive Analytics workshop will:
  - Describe the ethical implications of predictive analytics
  - Identify potential political concerns related to predictive data on campus
  - Identify ways predictive analytics could be used on their campus
  - Conduct predictive analyses on shared datasets
  - Discuss dissemination strategies for predictive analyses on campus

What would a campus pay for a tool that could predict student course grades with 90% accuracy?

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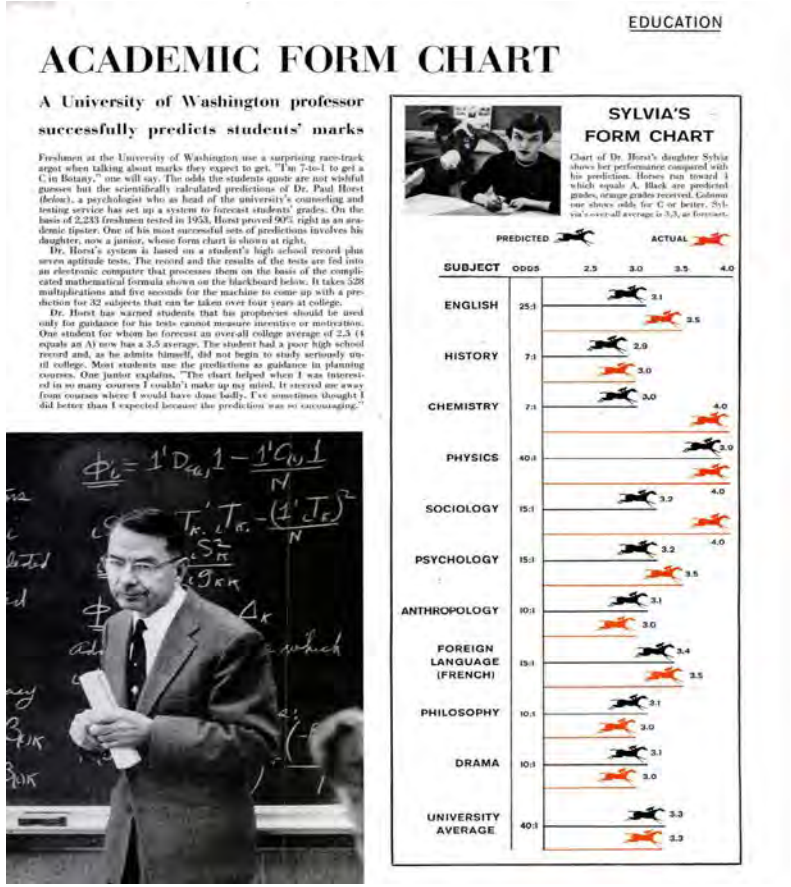
In 1953, the University of Washington paid nothing



EDUCATION

ACADEMIC FORM CHART

A University of Washington professor successfully predicts students' marks

Freshmen at the University of Washington use a surprising race-track argot when talking about marks they expect to get. "I'm 7-to-1 to get a C in Botany," one will say. The odds the students quote are not wishful guesses but the scientifically calculated predictions of Dr. Paul Horst (below), a psychologist who as head of the university's counseling and testing service has set up a system to forecast students' grades. On the basis of 2,243 freshmen tested in 1953, Horst proved 90% right as an academic tipster. One of his most successful sets of predictions involves his daughter, now a junior, whose form chart is shown at right.

Dr. Horst's system is based on a student's high school record plus seven aptitude tests. The record and the results of the tests are fed into an electronic computer that processes them on the basis of the complicated mathematical formula shown on the blackboard below. It takes 528 multiplications and five seconds for the machine to come up with a prediction for 32 subjects that can be taken over four years at college.

Dr. Horst has warned students that his prophecies should be used only for guidance for his tests cannot measure incentive or motivation. One student for whom he forecast an over-all college average of 2.5 (4 equals an A) now has a 3.5 average. The student had a poor high school record and, as he admits himself, did not begin to study seriously until college. Most students use the predictions as guidance in planning courses. One junior explains, "The chart helped when I was interested in so many courses I couldn't make up my mind. It steered me away from courses where I would have done badly. I've sometimes thought I did better than I expected because the prediction was so encouraging."

SYLVIA'S FORM CHART

Chart of Dr. Horst's daughter Sylvia shows her performance compared with his prediction. Horses run toward A which equals A. Black are predicted grades, orange grades received. Column one shows odds for C or better. Sylvia's over-all average is 3.3, as forecast.

Takeaway

Predictive Modeling is NOT New

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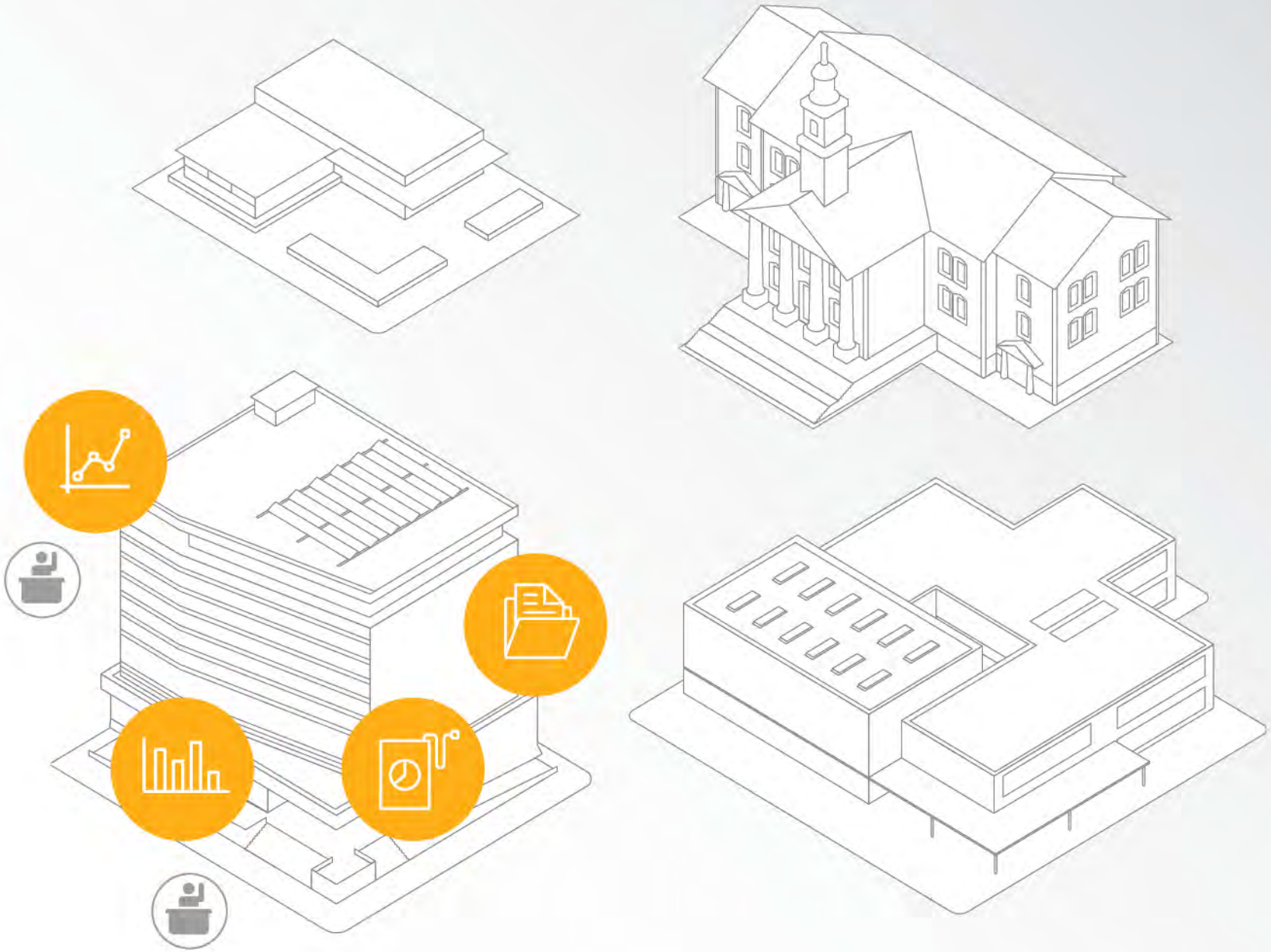
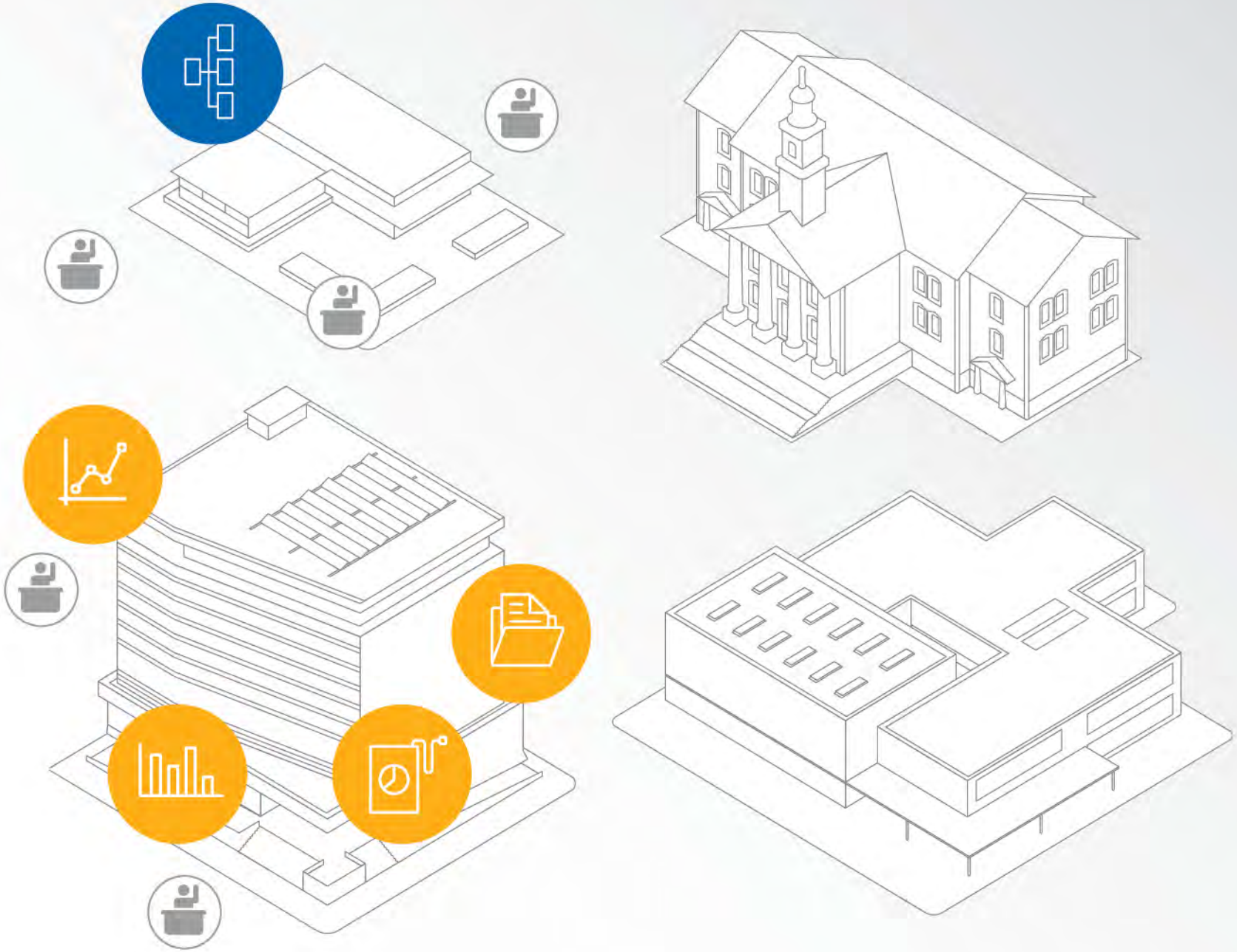
Higher Ed's Fascination with Morbidity & Mortality Conferences

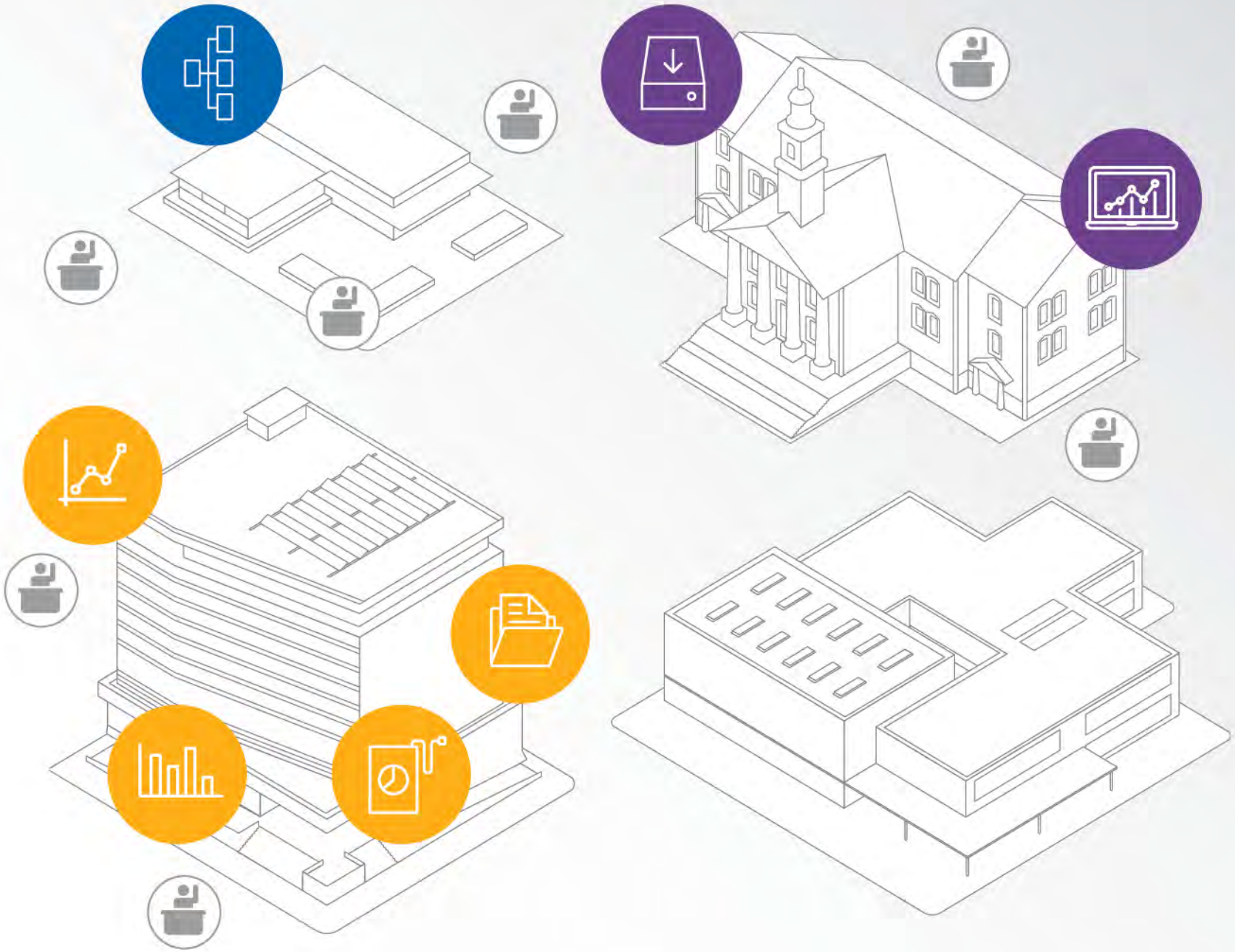
“One of the most important evolutionary changes in higher education recently has been the broad recognition that access is not enough. Most educators today understand that the goal line has moved from helping students gain entry to college to helping them succeed once they have enrolled.”

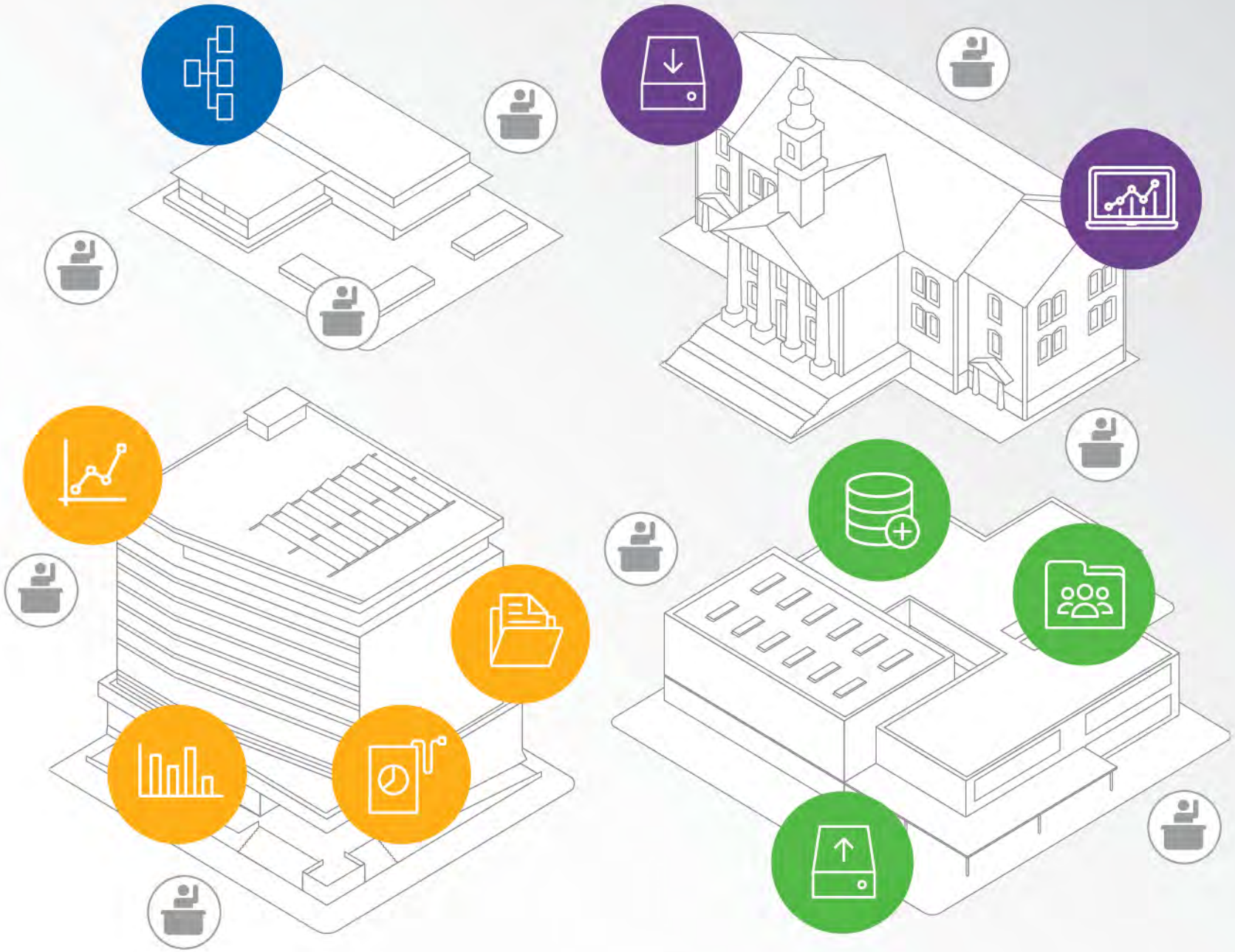
John O’Brien, President and CEO, EDUCAUSE

Student Success is at the Heart of Institutional Effectiveness

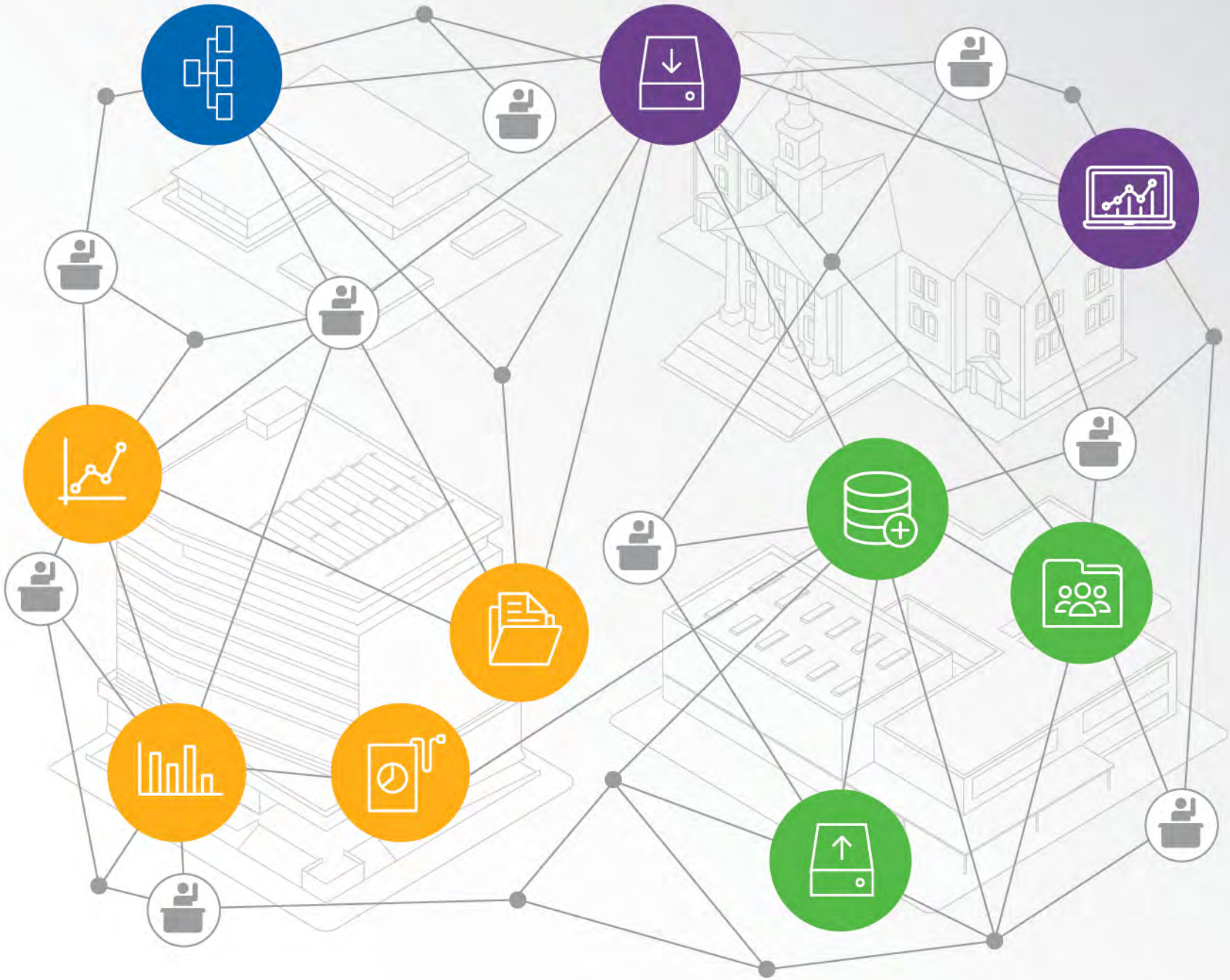









What are
we missing?



What Does it Mean for a Student to be Successful?


Student well-being
Cost of recruitment
Why we worry about retention and student success...
Institutional aid
Institutional success

One of the most important evolutionary changes in higher education recently has been the broad recognition that access is not enough. Most educators today understand that the goal line has moved from helping students gain entry to college to helping them succeed once they have enrolled.

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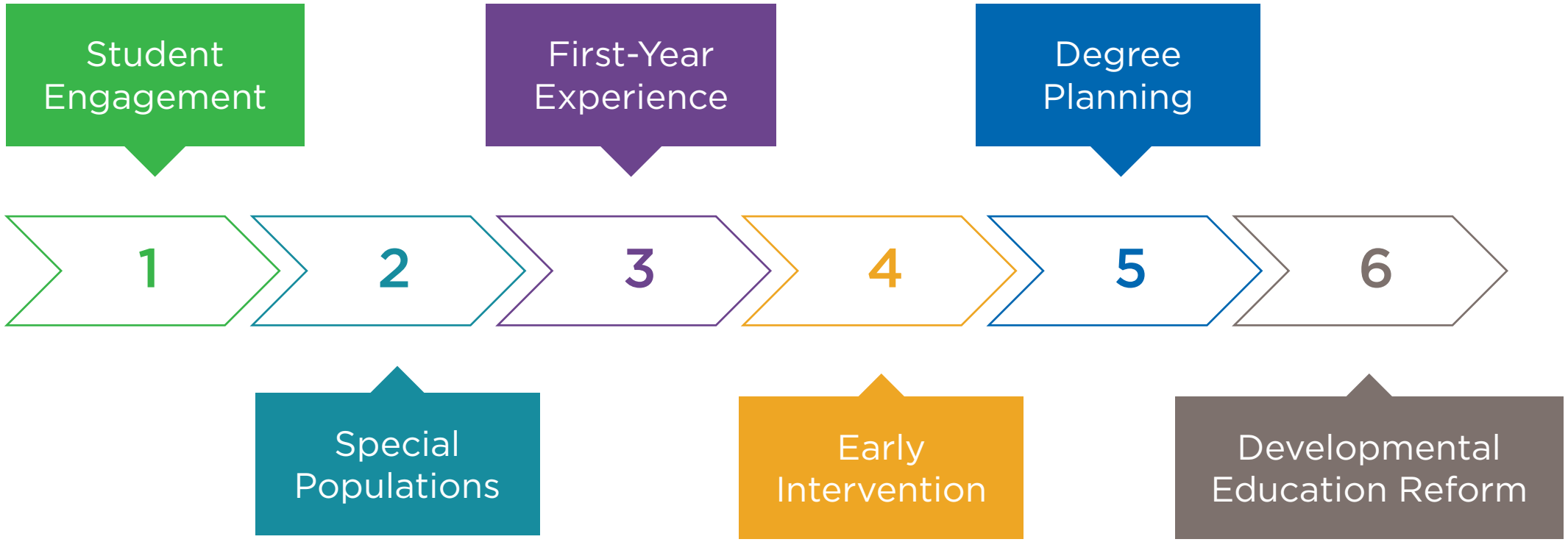
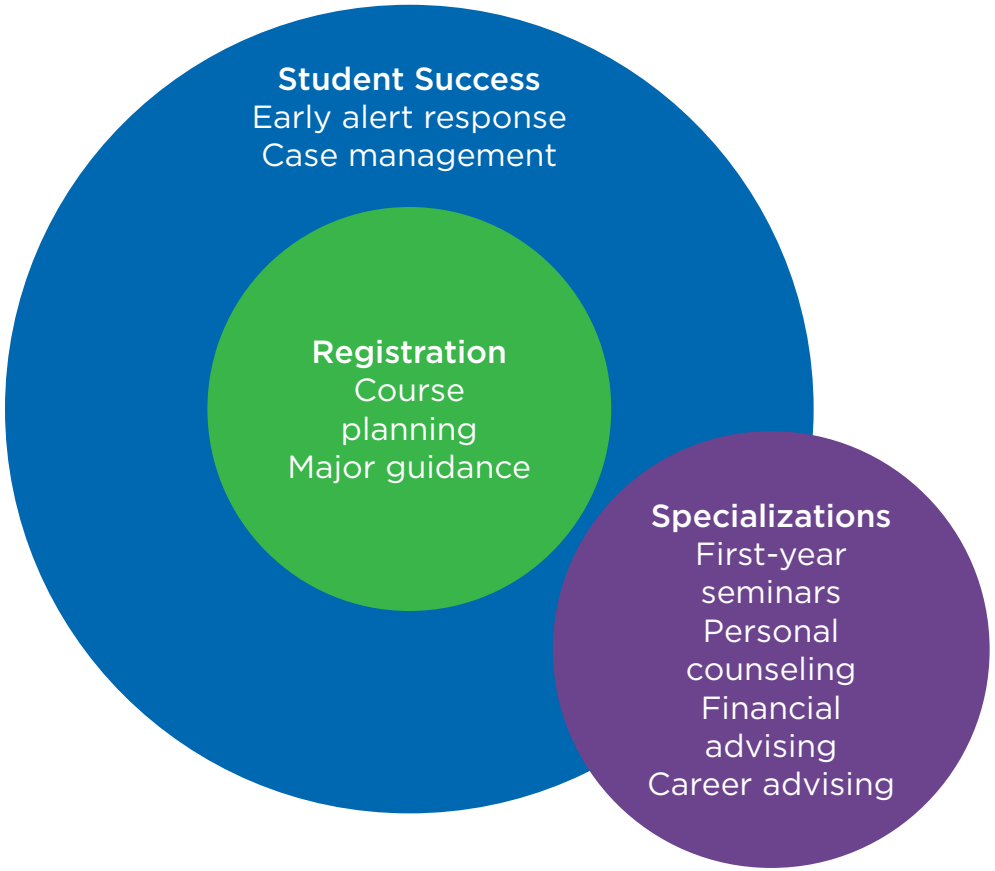
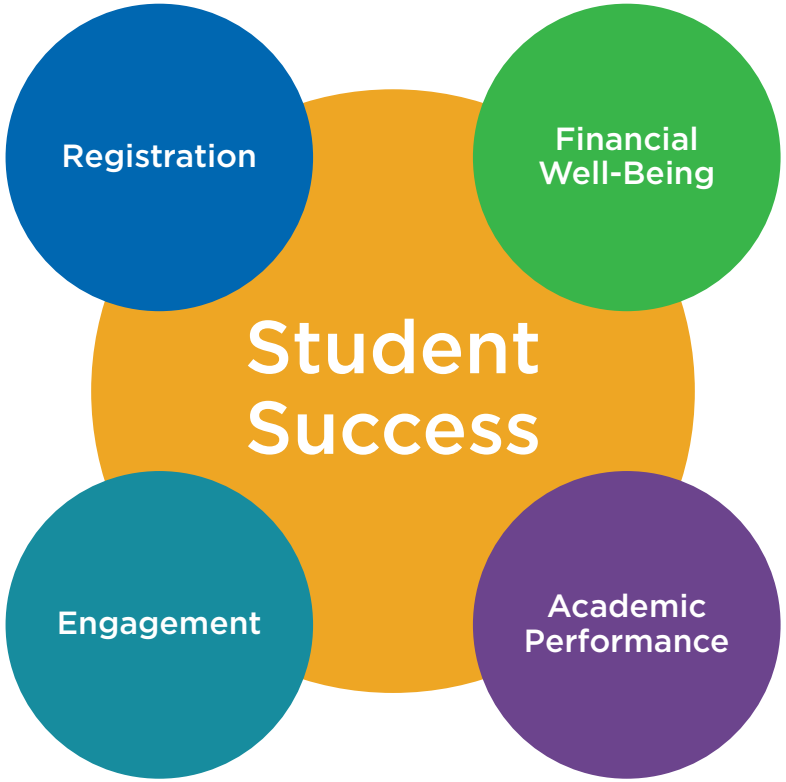
Timeline


Student Engagement
First-Year Experience
Degree Planning
1
2
3
4
5
6
Special Populations
Early Intervention
Developmental Education Reform

How We Approach Student Success





Measuring Success Today

Even more students graduate

Reduce the cost of degree

Elevate post-graduation outcomes

But How Fast Can We Do This?

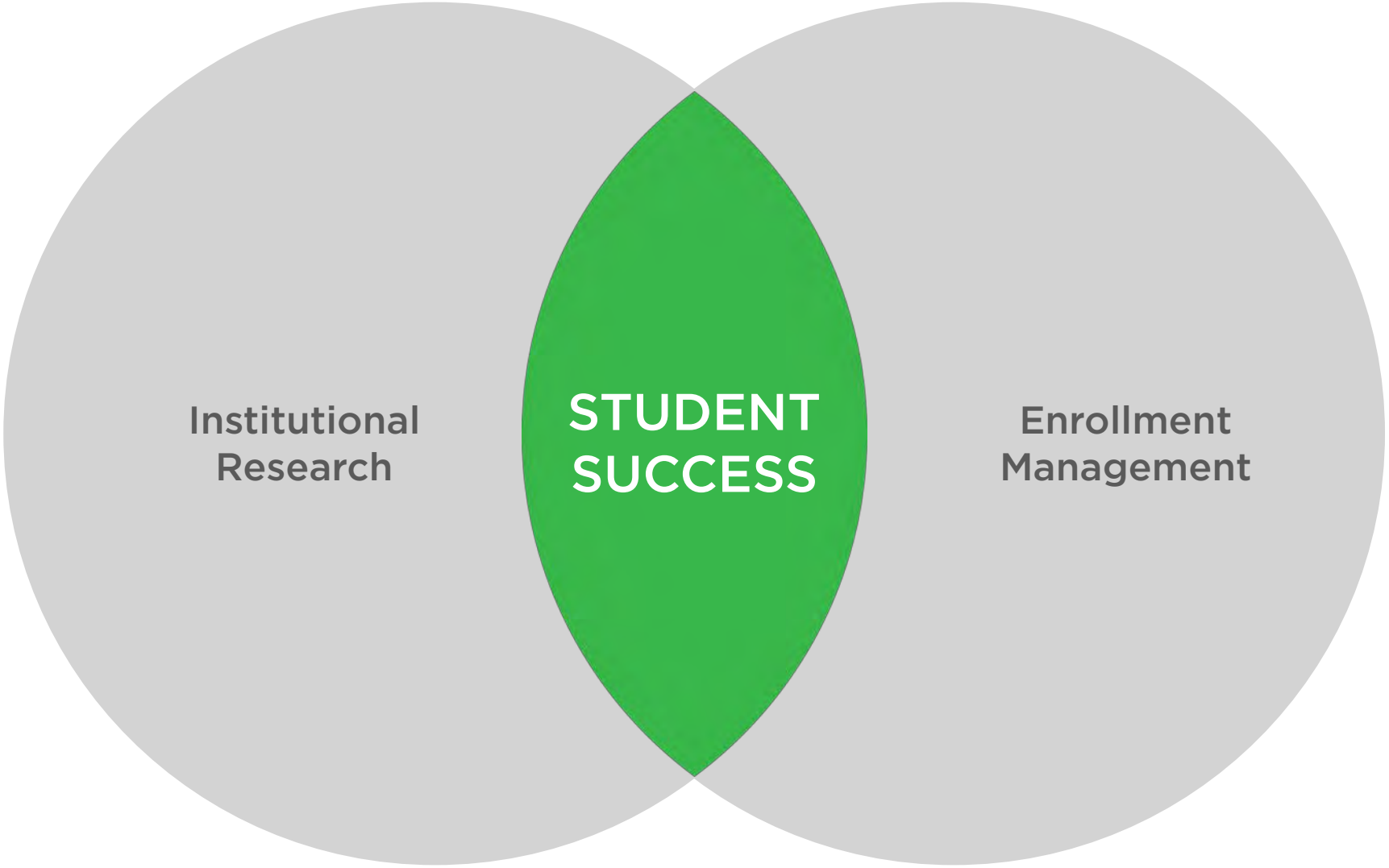
Darwin

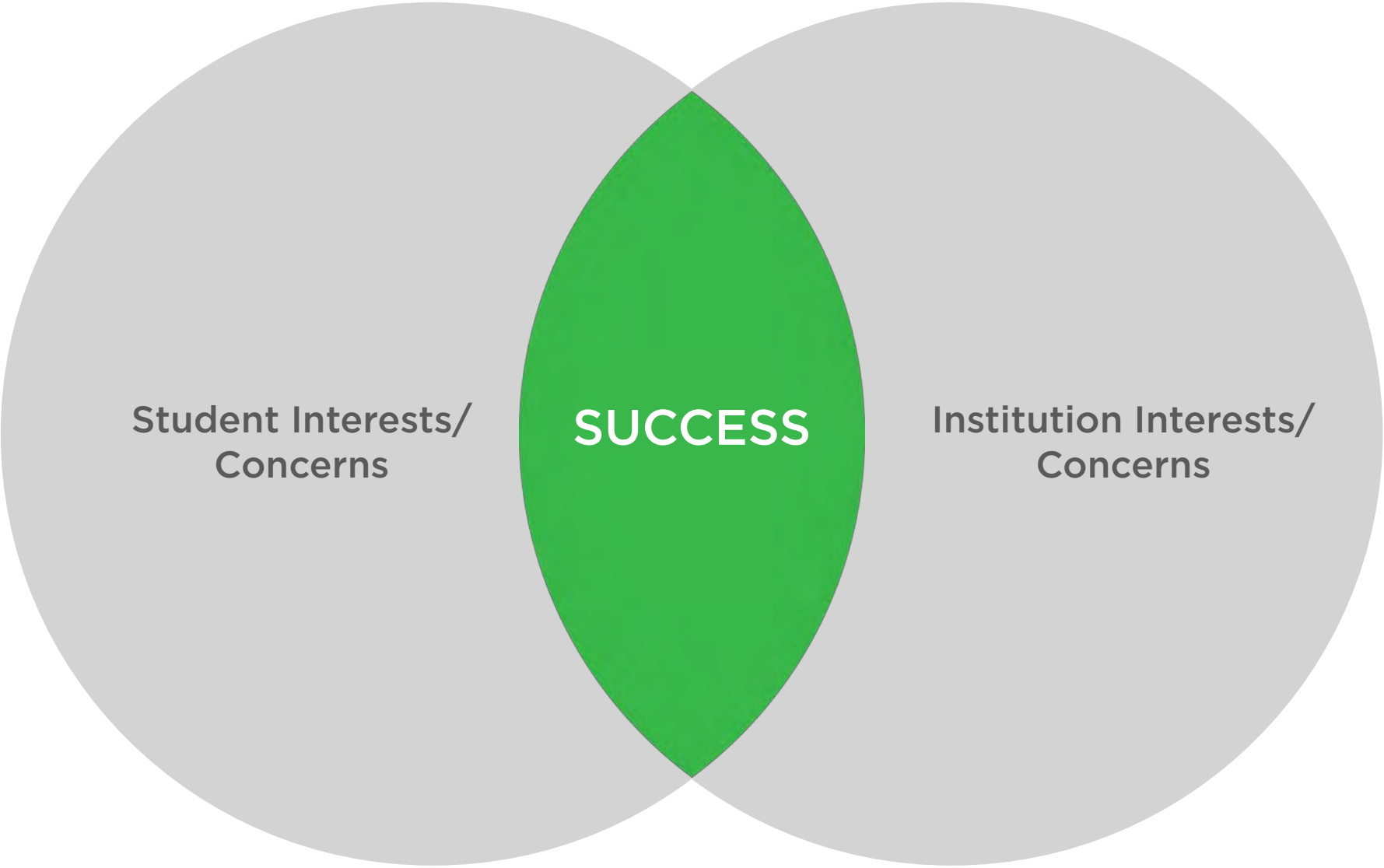
- Evolution occurs slowly as changes accumulate in response to continuous environmental pressures

Gould

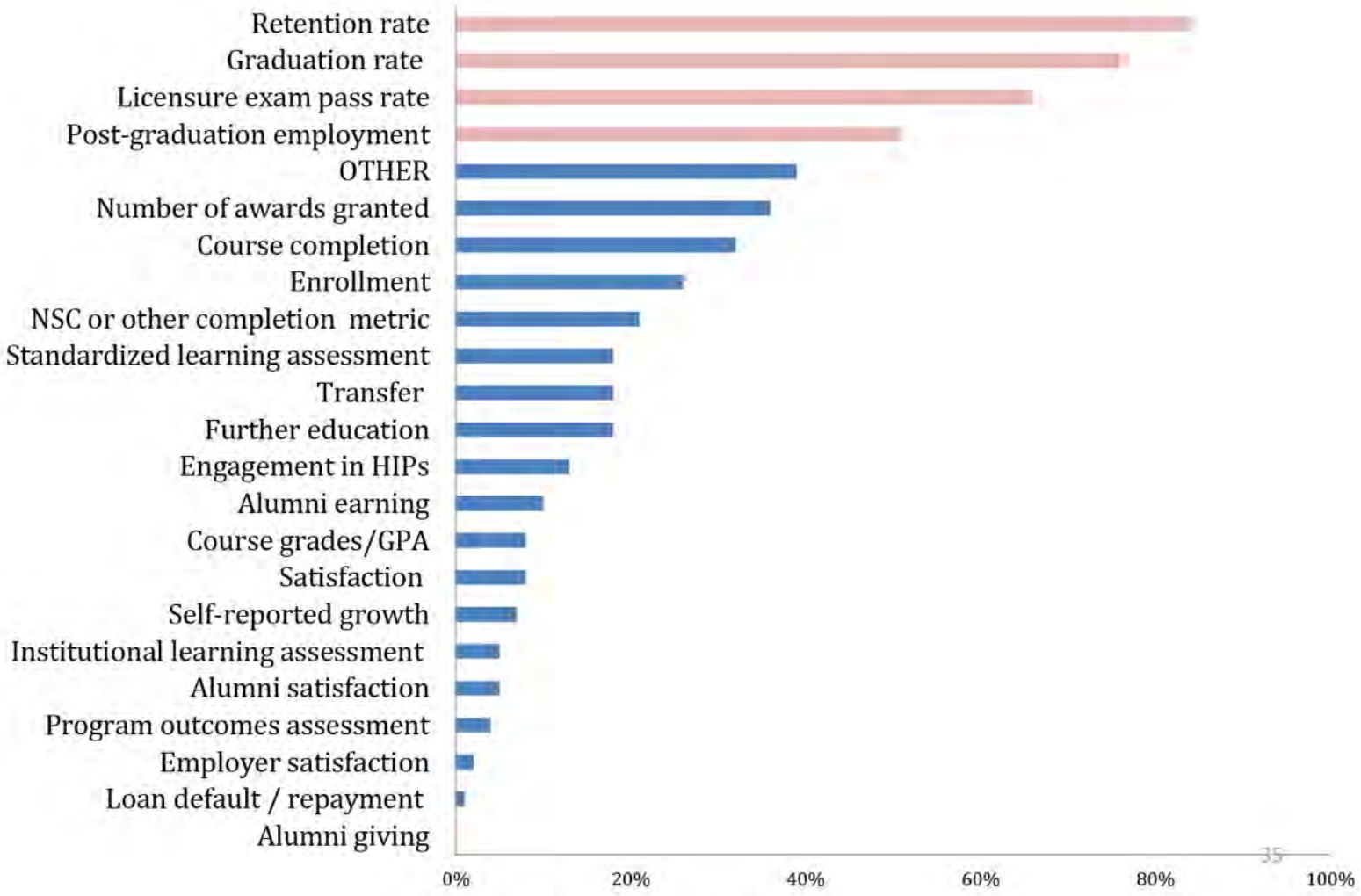
- Evolution can occur quickly when long periods of stasis are interrupted by sudden shifts in environment

The Relationship

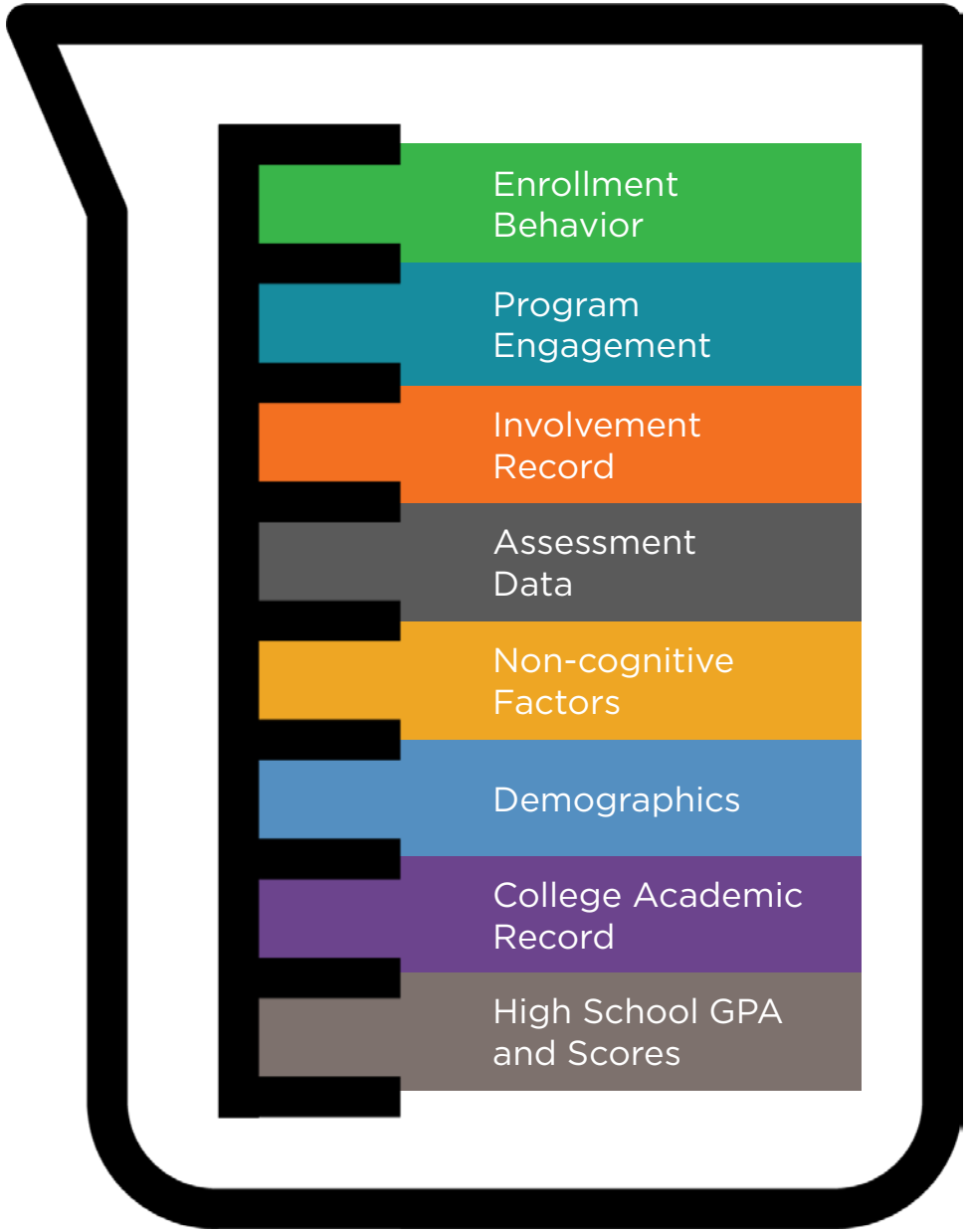



Student Interests/
Concerns
SUCCESS
Institution Interests/
Concerns

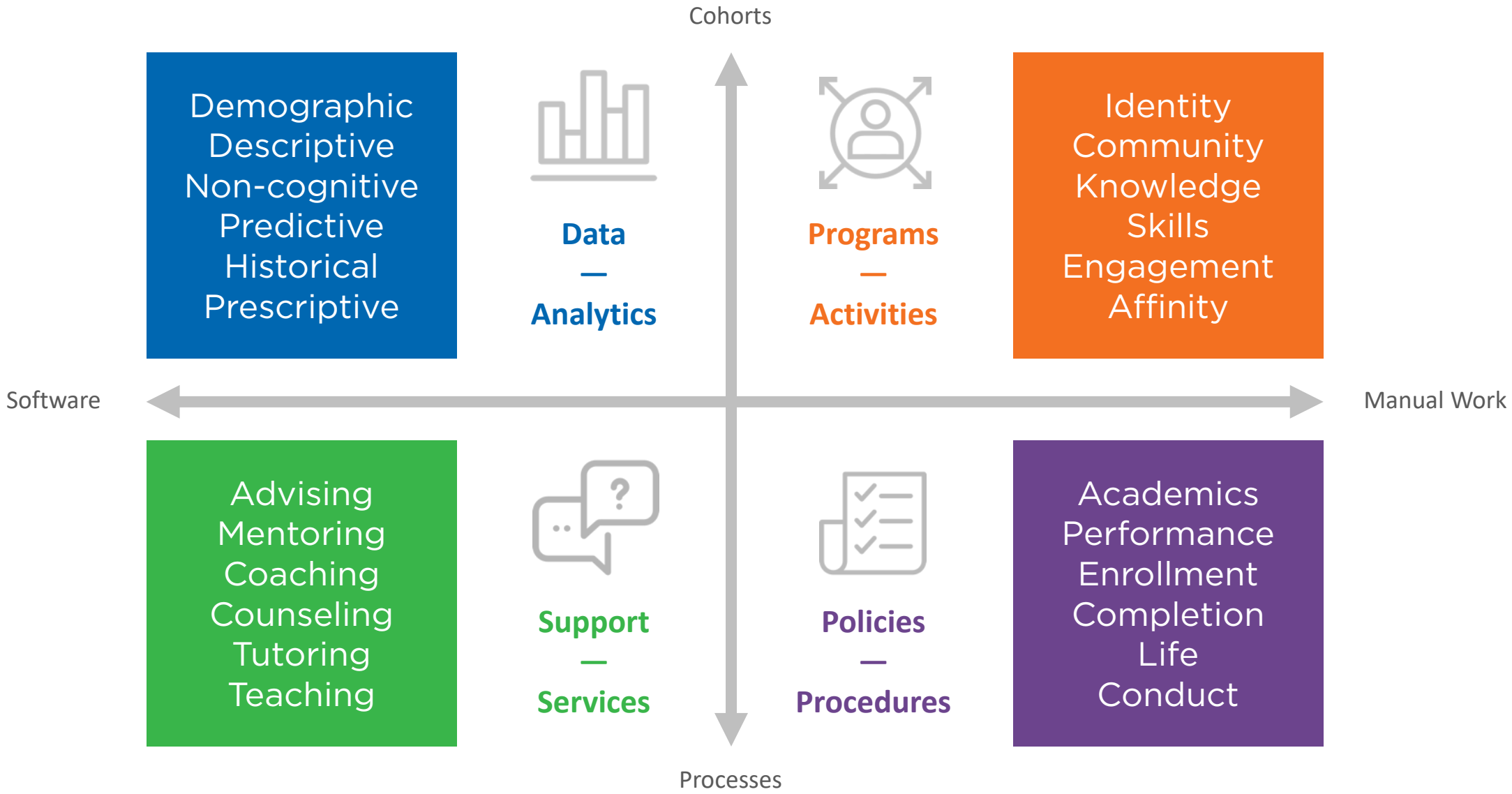
Indicators, Metrics, Criteria



A Formula for Predicting Success

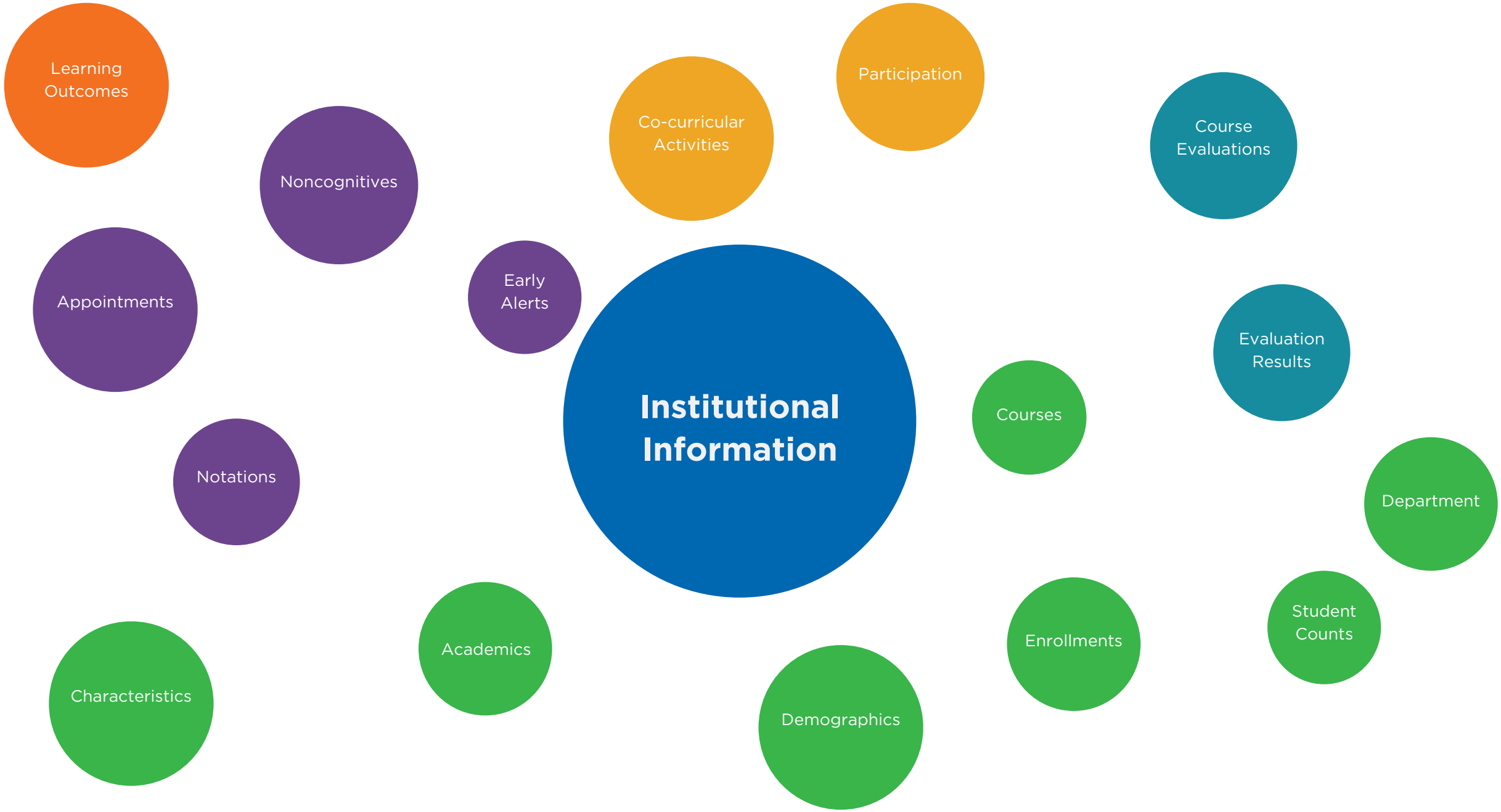


Four Points of View for Student Success



Going Beyond the Application

Non-Cognitive Data
Engagement
Academic Progress
Course Evaluation Results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Appointments
Early Alerts
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Student Counts
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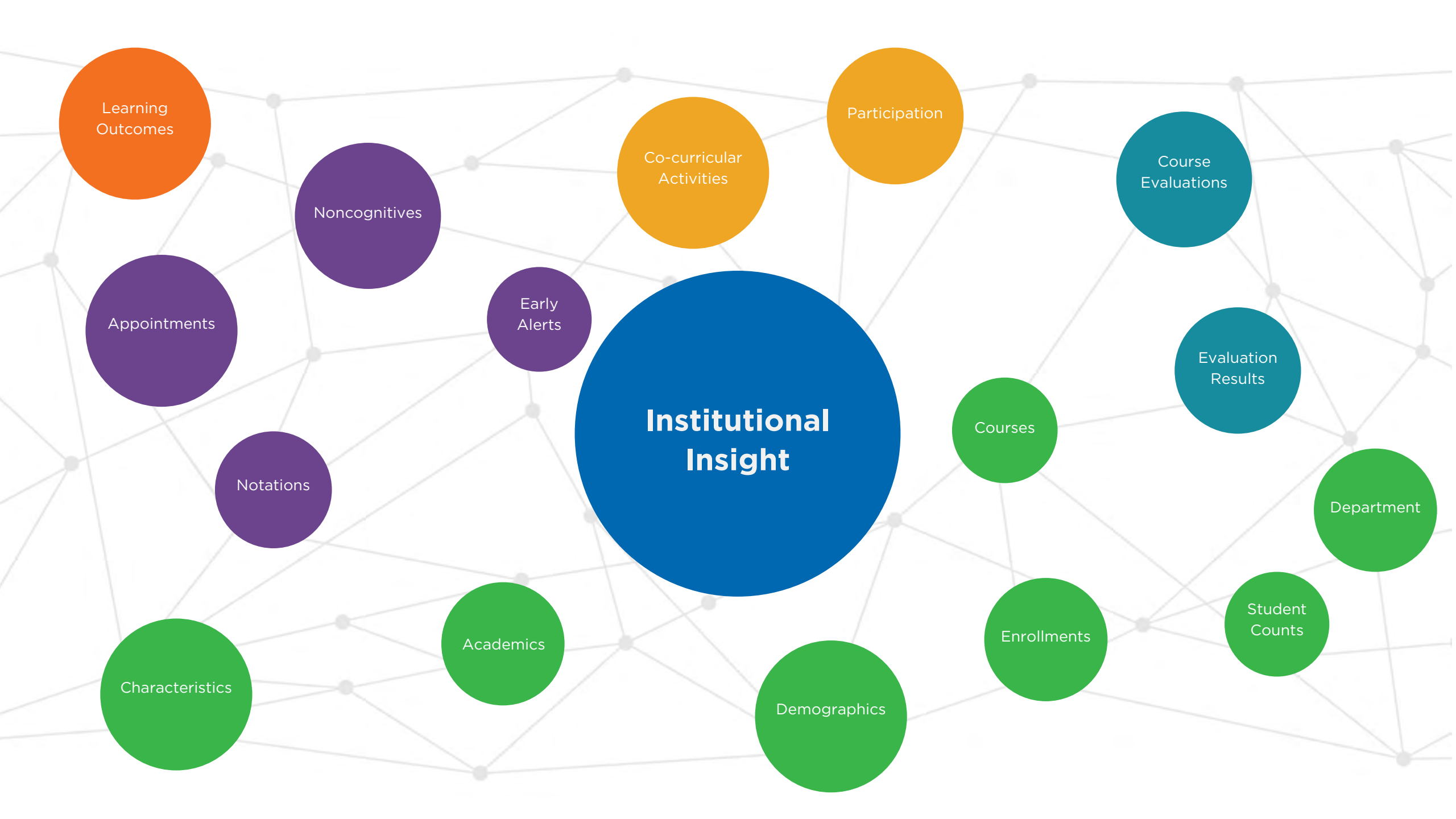
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Why Go Holistic

Targets students between pre and early enrollment (post admissions)

Inclusion of both cognitive and noncognitive factors

Alignment between assessment and institutional practices

Added value:

- Respects the whole student (examines cognitive and noncognitive factors)
- Focuses on the unique characteristics of each student
- Focuses on factors educators can control such as motivation, social connectedness, as opposed to socioeconomic, situational factors

Why Right Fit Students Matter

Cheaper to retain than replace in most instances

- Cost of recruiting
- Cost of institutional aid

Want students to succeed

- Focus on completion
- Focus on achievement

It's the RIGHT thing to do!

AVERAGE INSTITUTIONAL GRANT

$10,000

MEDIAN COST OF RECRUITING AN UNDERGRADUATE*

$2,357

In 2017 for a 4-year private institution

Costs for a Freshman Class of 600

$6,000,000 + $1,414,200

INSTITUTIONAL GRANTS ENROLLMENT

= $7,414,200

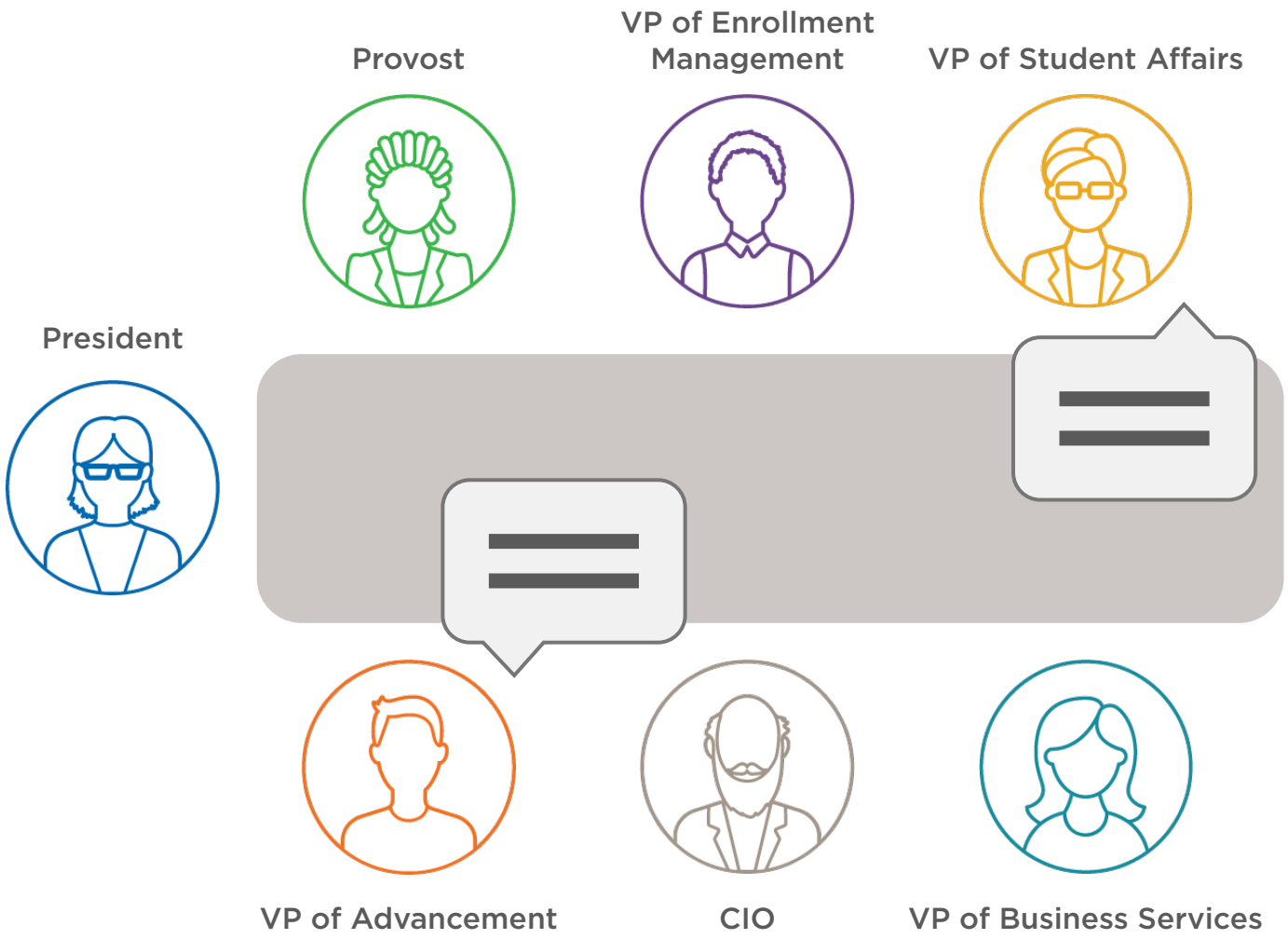
TOTAL

75% RETENTION RATE LOSES

$1,853,550

If you retain at a higher percentage, **less money** needs to go toward freshmen recruitment and the entering class size **can get smaller**

The Discussion Process on Campus Today



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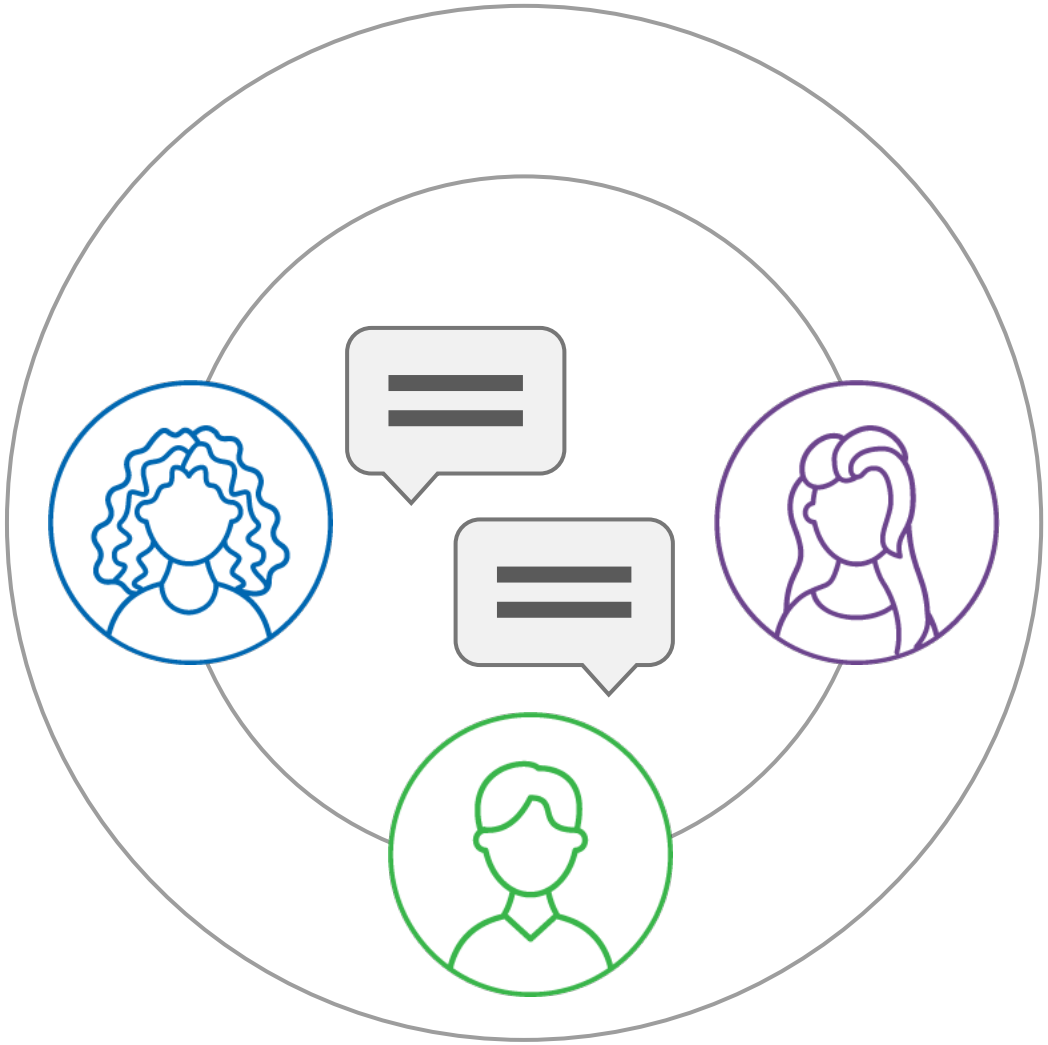
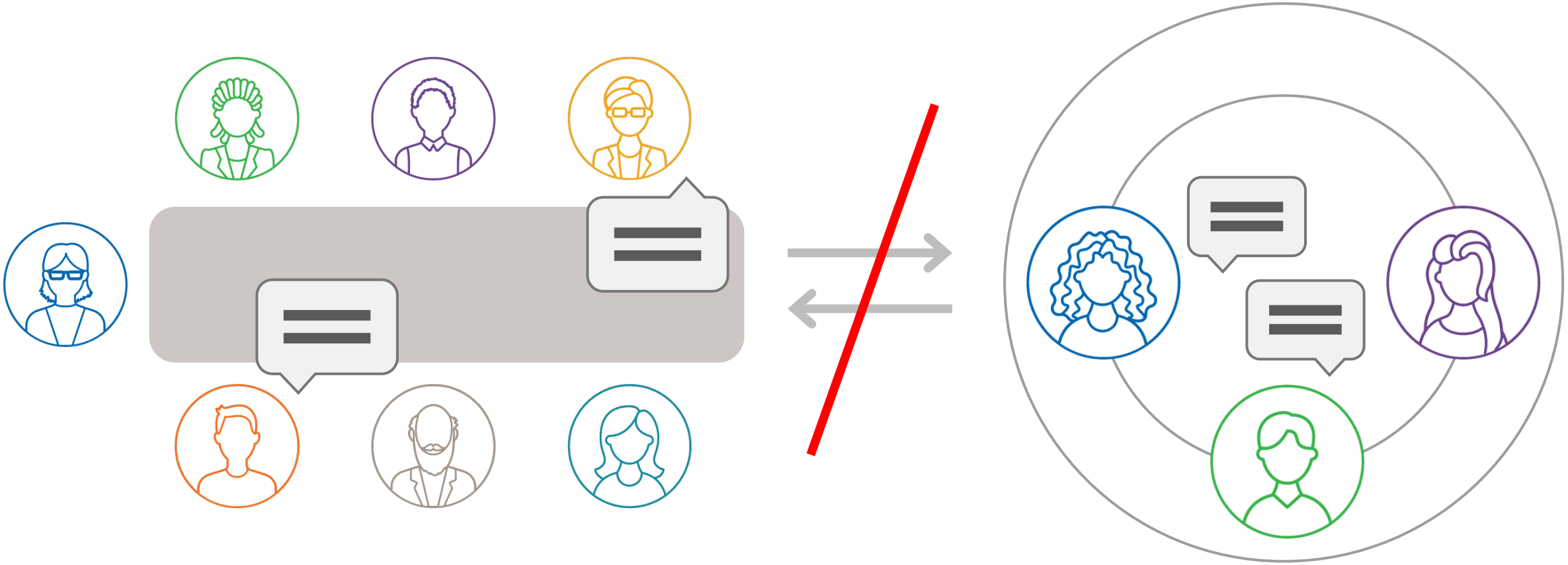


Communication is Lacking



Three Steps for More Successful Students

1. Strive for a Culture Where Silos are Discouraged
2. Track and Assess Whenever and Wherever Possible
3. Use Data to Put Anecdotal Evidence into Perspective

The Keys to a Meaningful Relationship between Institutional Research and Student Success

Four Steps

Step 1

Identify the problem

Step 2

Get data

Step 3

Build model

Step 4

Gather the right team

Predictive Modeling

What are the **STRENGTHS** of predictive modeling?

What are the **WEAKNESSES** of predictive modeling?

Use of Data and Analytics for Student Success

Finding 1 Although primary data-oriented roles and responsibilities for IR, IT, and student affairs are somewhat siloed, these units are contributing to institution-wide goals of improving student success.

Finding 2 Most institutions are investing in data and analytics projects, but few are measuring the resulting costs.

Finding 3 For most institutions, first-year students are the leading focus of multiple student success studies.

Use of Data and Analytics for Student Success

Recommendation 1	Identify and expand institutionally appropriate roles for IR, IT, and student affairs.
Recommendation 2	Transcend or remove certain organizational silos to improve communication across all position levels.
Recommendation 3	Prioritize measuring student outcomes.
Recommendation 4	Increase the use of qualitative data, especially from students.

An Educause survey in 2015 found only 47 percent of respondents said institutional analytics was a major priority and only half as many described learning analytics as a priority. Respondents identified a host of challenges in implementing analytics that could account for it not being more widely used, including cost, inadequate data quality, institutional culture, and potential over-reliance on products offered by private companies.

EDUCAUSE

Data = Students

Datasets are great, but they aren't abstract toys for researchers to utilize

This isn't a political poll

This isn't a Census

These are the lives of young adults who trust us to help guide them to a successful experience at our institutions

Conducting Predictive Analyses

Picking the dependent variable

Selecting independent variables of interest

needs to be an inclusive process

Needs to be tested and adjusted

Should be specific to your institution

Higher Education Uses

Identify students at risk of not retaining

Manage enrollment

Develop adaptive learning courseware that personalizes learning

Identify predictive courses and grades

Ethical Considerations

Early in my career, I used to think of players as assets, statistics on a spreadsheet I could use to project future performance and measure precisely how much they would impact our team on the field. I used to think of teams as portfolios, diversified collections of player assets paid to produce up to their projections to ensure the organization's success. My head had been down. That narrow approach worked for a while, but it certainly had its limits. I grew and my teambuilding philosophy grew as well. The truth—as our team proved in Cleveland—is that a player's character matters. The heartbeat matters. Fears and aspirations matter. The player's impact on others matters. The tone he sets matters. The willingness to connect matters. Breaking down cliques and overcoming stereotypes in the clubhouse matters. Who you are, how you live among others—that all matters. The youngest team in World Series history with six starters under the age of 25; they helped me get my head up.

Theo Epstein at Yale Senior Day

Ethical Use: Data

Thoughtful Decisions

Who should have access to the results?

When should people have access to the results?

What level of access should they have?

- Group summaries
- Individual level data
- Comparative data

Need to Consider/ Protect

Individual participant confidentiality

Department or school confidentiality

Sensitive subject matter

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Transparency

Does reporting accurately and truthfully reflect the assessment?

- Methods clearly described
- Results presented fairly
- Important issues not glossed over or ignored
- Outcomes clearly articulated

How easily can the audience judge the quality of the work and the results?

Are results shared or kept private?

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Things to Remember

Data Points Equate to Students

Don't Be Afraid to Data Mine

Practical Significance Trumps Statistical Significance

Data-Augmented, not Data-Driven

Speaking at EduCon 2.9, a panel of students said they "worry that the data will be used to label them before they have a chance to make their own impressions on a teacher." Students aren't inclined to trust the data partially because they aren't able to view it. Students also note that the algorithms don't have the power to take external context into consideration when evaluating specific students' records.

Student Concerns

Specifically, the students expressed concern that analytics tools:

- Will write them off as failures;
- Would let one bad grade haunt them;
- Will restrict their academic choices; and
- Make their teachers view them as numbers from an algorithm, not a person.

Things to Remember

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Hands-On Exercises

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Thank You!

Questions?

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Assistant Vice President, Campus Adoption
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