THE
HIGHER EDUCATION
SCHEDULING INDEX

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INTRODUCTION

Change in higher education is a common denominator. Institutions are facing enrollment fluctuations, student population changes, shifts in state funding, and pressure to increase tuition. Over the past 20 years, Ad Astra Information Systems has collaborated with more than 1,000 higher education campuses, as well as many state and regional systems who are striving to respond to these changes. This collaboration is focused on the business intelligence needed to optimally allocate instructional resources and advance timely student completions.

Although the challenges are widely acknowledged, benchmarking how institutions respond to these challenges has been lacking. For this reason, Ad Astra developed the Higher Education Scheduling Index (HESI™), the industry's only peer-comparison database focused on academic resources and student success.

This 2016 Annual Report of the Higher Education Scheduling Index (HESI) includes key analytical findings that highlight opportunities for academic leaders to address enrollment fluctuations, funding shifts, and student success through a series of strategies including better allocation of finite instructional resources. This report also recommends best practices that can help leaders from campuses of any size reimagine the possibilities to improve instructional resource utilization, student-centric scheduling, and student completions.

Generally, these findings show a consistent conflict between an institution's desire to fulfill student course needs and efficiently allocate and utilize campus resources. It is not uncommon for a partner institution to excel in one of these priorities while performing below "like" institutions in the other.

Decision-support information enables institutions to strike the balance by identifying, segmenting, and managing these issues. The case studies presented in this report demonstrate practical ways that schools can succeed at meeting all of these goals: efficient resource utilization, improved student success, and the ability to respond to change.

OVER THE PAST
20 YEARS,
AD ASTRA
INFORMATION SYSTEMS
HAS COLLABORATED
WITH MORE THAN
1,000
HIGHER EDUCATION
CAMPUSES

HESI

DATABASE OF

157

COLLEGES &
UNIVERSITIES

In doing so, these example institutions help expand the industry's thinking about what is possible and, arguably, essential. Ad Astra is pleased to offer the 2016 HESI Report as a resource to assist industry leaders in this complex and rewarding process.

WHAT IS AD ASTRA'S HIGHER EDUCATION SCHEDULING INDEX (HESI)?

The HESI is a benchmarking database. The 2016 HESI Report reflects national averages derived from the HESI database of 157 colleges and universities. The performance metrics track the allocation of faculty and space resources on these campuses. These metrics:

- Allow institutions to gain clarity concerning their resource allocation and opportunities for improvement
- Provide the context for comparing institutional performance to the industry and a sub-set of "like" institutions
- Create a framework to measure and more effectively manage the highly decentralized model of scheduling employed on campuses today
- Highlight many of the best practices in higher education that can lead to improvements in balancing resource utilization and student success

The 2016 HESI Report findings serve as a starting point for institutions to take action. They answer the questions: "Where are we today?" and "What are our biggest opportunities for improvement?" Although the metrics in the HESI record an institution's initial benchmark only, most have made substantial improvements from their original findings by monitoring performance during their scheduling and registration processes and making targeted schedule changes.

METHODOLOGY

The HESI database is populated through the following process: Ad Astra consultants gather scheduling data — academic facilities, student academic history, and course sections — from partner institutions over multiple academic terms. Data analysts then review the institutional data and the metrics from the course offering and space capacity analyses. The metrics objectively describe the effectiveness of the course and room scheduling processes at each institution, and rank each finding relative to "like" institutions.

Consultants then meet with campus leadership and a strategic scheduling team to present and help interpret the metrics and create action plans. When no central scheduling team exists, the consultants advise how to formalize such a committee to collectively evaluate and take action on the recommendations.

HIGHER EDUCATION SCHEDULING INDEX
157 INSTITUTIONS
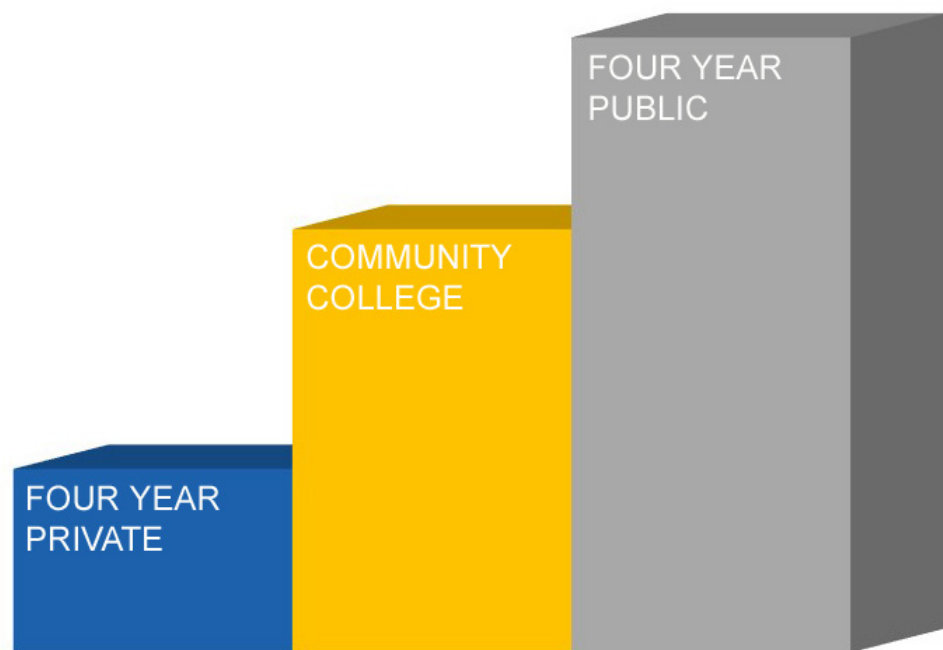
June 2016 Higher Education Scheduling Index (HESI™)

HESI TERMINOLOGY AND INDUSTRY INDEX

■ COURSE OFFERINGS

Measure	Description	Average
Average Enrollment	Average value of the enrollment (census) per section for the term	22
Average Enrollment Capacity	Average value of the maximum enrollment per section for the term	29
Enrollment Ratio	Overall average fill rate for course offerings calculated as census enrollment divided by Enrollment Capacity	77%
Balanced Course Ratio	The percentage of unique courses offered that are balanced with student need, defined as having an Enrollment Ratio between 70% and 95%	32%
Under-Utilized Course Ratio	The percentage of unique courses offered that are an inefficient use of faculty and classroom resources because they are under-enrolled, defined as having an Enrollment Ratio less than 70%	41%
Overloaded Course Ratio	The percentage of unique courses offered that are difficult for students to register for because they have an Enrollment Ratio greater than 95%	25%
Addition Candidates Offered	The percentage of total sections in a schedule that could potentially be added to the schedule based on sufficient student demand to justify one or more additional sections, limited to courses offered in the analyzed term	4%
Efficiency Candidates	The percentage of total sections/courses in a schedule that could potentially be removed based on insufficient demand. Efficiency candidates include: • Reduction Candidates: Percentage of total sections across multi-section courses that could potentially be removed from the schedule based on insufficient demand to justify these sections • Elimination Candidates: Courses with one section that could potentially be removed from the schedule as long as graduation requirements are not compromised	17%

HESI TERMINOLOGY AND INDUSTRY INDEX

■ SPACE MANAGEMENT

Measure	Description	Average
Standard Week Hours	The number of hours in all the days/times that are available for scheduling academic sections	64
Primetime Hours	The most popular days/times for scheduling academic sections, where room utilization is often disproportionately high. The prime week is a subset of the Standard Week Hours	25
Classroom Utilization Standard Week	The percentage of hours in a standard week (as defined by each institution's usage patterns) that a typical classroom is in use	46%
Classroom Utilization Primetime	The percentage of hours in the primetime subset of a standard week (as defined by each institution's usage patterns) that a typical classroom is in use	67%
Prime Ratio	Percentage of hours scheduled during Primetime Hours (Prime Hours divided by Total Hours)	59%
Seat Fill Utilization - Enrollment	The percentage of seats in use (*based on enrollment*) in a classroom when it is scheduled (Average Enrollment divided by room capacity)	62%
Seat Fill Utilization - Enrollment Cap	The percentage of seats in use (*based on section enrollment caps*) in a classroom when it is scheduled (Average Enrollment Capacity divided by room capacity)	81%
Off-Grid Utilization	The percentage of scheduling using non-standard meeting patterns during Primetime Hours	42%
Off-Grid Waste	The percentage of capacity wasted by scheduling non-standard meeting patterns during Primetime Hours	14%

HESI INDUSTRY OBSERVATIONS

■ **COURSE OFFERINGS METRICS HIGHLIGHTS**

Ad Astra has discussed course and resource scheduling with leaders from many of the colleges and universities in North America. Only a few institutions comprehensively manage the course schedule or track related performance metrics. As a result, it's not surprising that the course offering findings in the HESI database show significant opportunities for improvement.

The general pattern in the data reflects an imbalance between seats offered and seats needed for most courses. Specifically, fewer than a third of the courses taught in a major term at a typical institution have a "balanced" seat supply and demand. The highlights of the 2016 course offering findings are listed below:

1. While overall course fill rates (Enrollment Ratios) are at a respectable level of 77% for the industry, this masks the fact that only 32% of the courses offered are "Balanced."

2. The largest group of courses are Under-Utilized (41%), leading to 17% of the course sections in a typical schedule being unneeded relative to student course demand.

3. Addition Candidates are less than one-fourth the number of Efficiency Candidates in a typical schedule, meaning that most institutions currently have the capacity to meet students' course needs without additional faculty resources.

4. Given that significant capacity is consumed by unneeded course sections, more efficient schedules would greatly increase effective classroom capacity for most institutions.

17%

OF THE COURSE SECTIONS IN A TYPICAL SCHEDULE ARE UNNEEDED RELATIVE TO STUDENT COURSE DEMAND

EFFICIENT SCHEDULES WOULD GREATLY INCREASE EFFECTIVE CLASSROOM CAPACITY FOR MOST INSTITUTIONS

■ SPACE MANAGEMENT METRICS HIGHLIGHTS

Statistically, many institutions understand their academic space utilization. Most public colleges and universities are required to calculate and report utilization to their governing or coordinating boards. The opportunity is to evolve from simply measuring high-level utilization to strategically planning and managing space.
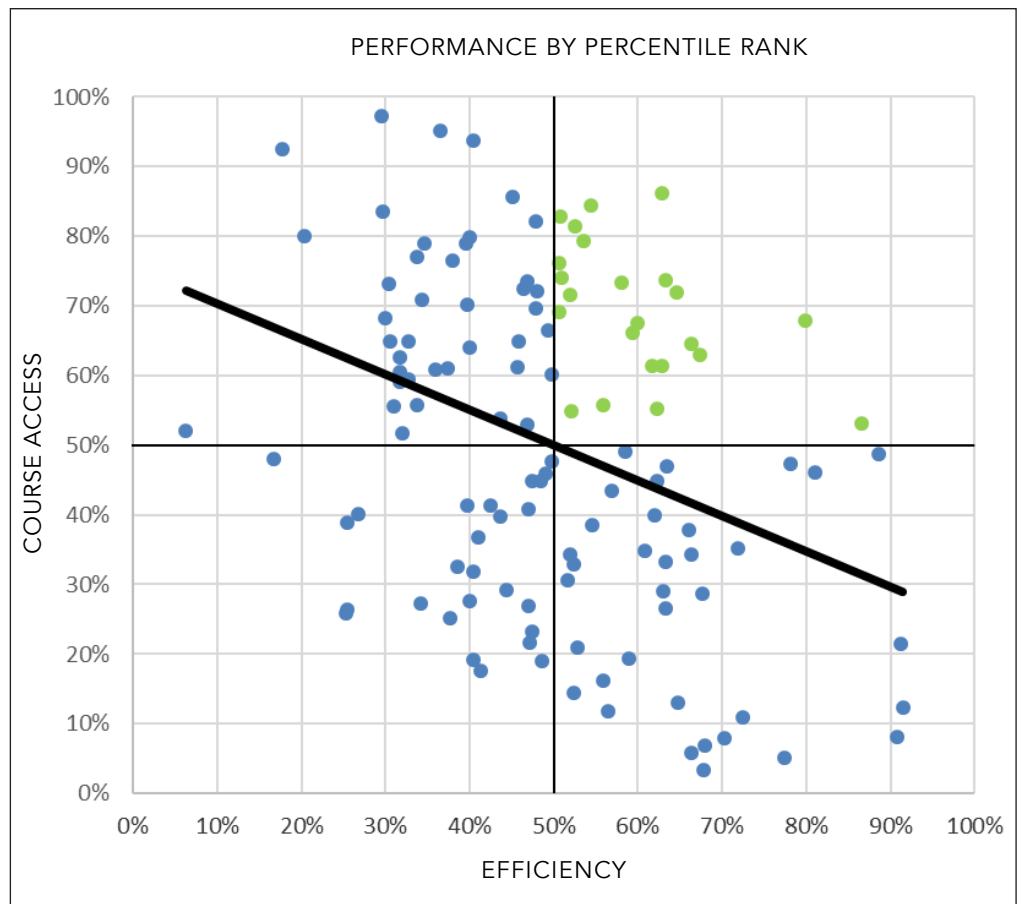
A focus on capacity, versus utilization only, is a recommended starting point. A capacity approach identifies bottlenecks and develops strategies for resolution. A campus with less than average space utilization and a perceived lack of space can benefit from this approach. The highlights of the 2016 space management findings are offered below:

1. Most institutions feel and express that they are "out of space," even though a typical classroom is in use less than half of the weekly instructional hours (Standard Week Hours) and is only 62% full when in use.

2. A typical campus loses more than 14% of its classroom capacity to Off-Grid Scheduling during Primetime. With careful management, most campuses can reduce this number to less than 10%, creating over 4% more available classroom capacity (e.g., a campus with 100 classrooms effectively loses 14 classrooms of capacity, but could reduce this to 10 or fewer).

3. While the industry widely compares classroom utilization statistics, there is a large variance in Standard Week Hours on the various campuses measured (from 32 to 96).

4. Primetime Hours, with concentrated usage, are less than half of Standard Week Hours on a typical campus reflecting the opportunity for increased capacity.

CHALLENGES AND OPPORTUNITIES FROM 2016 OBSERVATIONS

THE MAGIC QUADRANT:
ONLY **23** OF THE **157 INSTITUTIONS** EXCELLED IN BOTH CATEGORIES

Balancing Competing Priorities

The basic challenge illustrated in the scatter plot of HESI institutions below is the need to balance students' course access with campus efficiency. As previously stated, success in these areas is frequently inversely correlated (e.g. efficient institutions tend to have lower course access, and vice versa). Only 23 of the 157 institutions in the 2016 HESI excelled in both categories. They are represented in the top-right quadrant of this graph (green dots). This is the "magic quadrant" of scheduling where student course access and campus efficiency performance are both better than industry averages. Over time, an institution's performance can be tracked, with the goal of moving toward the upper-right quadrant of the scatter plot.

PERFORMANCE BY PERCENTILE RANK

"ROLLING FORWARD"

THE SCHEDULE FROM **TERM-TO-TERM** LIMITS COURSE ACCESS AND AN **INSTITUTIONS'** ABILITY TO RESPOND TO **CHANGING** ENROLLMENTS

Enrollment Trends Influence Findings

Enrollment fluctuation is a concern for all institutions regardless of whether they are public or private, two-year or four-year. Overall, enrollments have been declining nationwide since 2011, and the 18-to-24 year-old population is expected to decrease for at least another decade[1]. This trend has led to a decline in tuition revenue for many institutions as, in many cases, state support per student continues to decline.

To evaluate the impact of changes in enrollments on HESI performance, the 157 institutions were grouped into three categories based on recent (since 2010) predominant enrollment trends: those with declining enrollments, those with flat enrollments, and those with growing enrollments. A clear pattern emerged. Institutions with declining enrollments often have challenges with resource efficiency, while institutions that are still experiencing growth are frequently more challenged with course access for their students. From this pattern it is logical to hypothesize that *enrollments change faster than schedules on many campuses, leading to a disconnect between students' course needs and offerings in those schedules.* While the prevalent scheduling practice of "rolling forward" from term-to-term may minimize internal and staffing disruptions, it also appears to limit course access and an institutions' ability to respond to changing enrollment climates.

The graph below correlates key Efficiency and Course Access findings to each institution's enrollment profile (Declining, Flat or Growing). Data points

EFFICIENCY AND COURSE ACCESS BY ENROLLMENT CATEGORY

41%
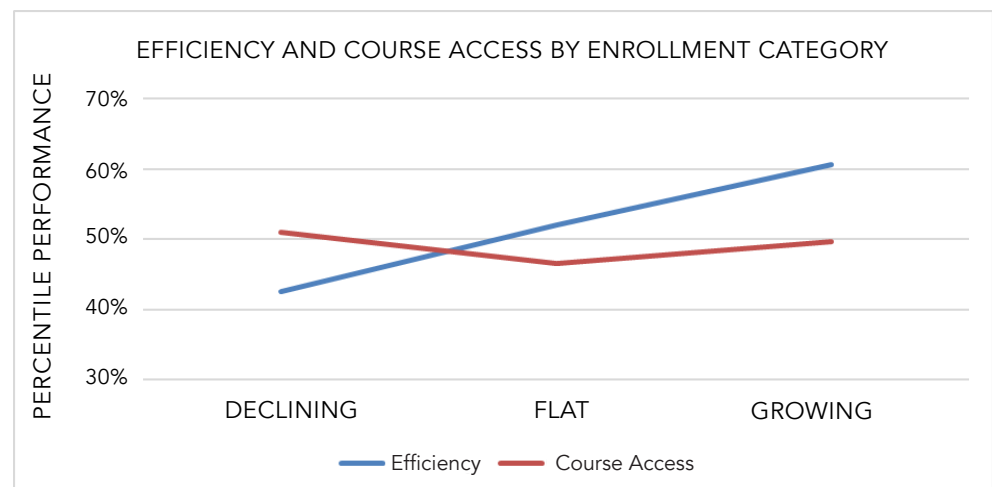
OF THE
UNDERGRADUATE
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UNDER-ENROLLED

represent the performance, on a percentile basis, of institutions in these categories, relative to the overall HESI database. Note that the average efficiency of growing institutions measures in the 61st percentile, while their course access metrics only average in the 40th percentile. Conversely, the average efficiency of institutions with declining enrollments measures in the 42nd percentile. These same schools with declining enrollments outperform "like" institutions in course access metrics, with an average in the 58th percentile. Institutions with materially flat enrollments fall in the middle of both efficiency and course access metrics.

Fiscal Considerations

In order for institutions with declining enrollments to meet students' course access needs, campus leaders should consider more effectively utilizing full-time faculty rather than relying as heavily on adjunct instruction. For example, removing unneeded sections may allow institutions to reduce adjunct spending and reallocate full-time faculty resources, enabling them to teach the courses that are in demand. In this scenario, data serve a critical role in informing decisions to optimize resource allocation and create better course schedules. More than 41% of the undergraduate courses taught on a typical campus are under-enrolled (census enrollment is < 70% of the seats offered for that course). For institutions with declining enrollments, this finding increases to 44%.

On the other hand, adding sections to Overloaded Courses (courses more than 95% filled) can accelerate completions and increase tuition revenues. Courses which are overloaded comprise 25% of a typical course schedule (23% for those institutions with declining enrollment). Rather than replicate the same "like" term schedule, using new enrollment data for each term allows strategic scheduling teams to identify and take action on Under-Utilized and Overloaded Courses, better allocating resources while advancing student completions.

THE AVERAGE **CLASSROOM** FILL RATE AMONG INSTITUTIONS IN **THE 2016 HESI REPORT**

62%

Capacity Restrictions

According to the HESI data, institutions with growing enrollment can creatively overcome constrained space and faculty resources through efficient scheduling. Since budget restrictions preclude new space and new faculty lines, these institutions must continue to focus on class fill rates and capacity strategies to maximize resource utilization. Wasted capacity, especially sections with low enrollment during Primetime, will be increasingly difficult to overcome as enrollments grow. While growing institutions are, on average, more efficient, 15% of the offerings at these institutions are not statistically needed (compared to the 17% average for all HESI institutions). Even institutions with efficient schedules that are ranked in the 80th percentile in the HESI could remove more than 9% of the sections offered to better optimize use of resources. Due to the prevalence of this phenomenon among the 157 institutions, Ad Astra believes any institution would benefit from considering removal of some of those unneeded sections, while adding sections that students require to complete their programs.

Institutions that efficiently match sections to classrooms may improve their classroom fill rates (Average Enrollment divided by room capacity). The average classroom fill rate among institutions in the 2016 HESI Report is 62% (66% for schools with growing enrollments). Utilizing these strategies, along with adherence to the most efficient non-overlapping meeting patterns in Primetime, can help a campus recapture 10-25% of additional capacity without adding resources.

CASE STUDIES, INTERVENTIONS, AND OUTCOMES

■ INSTITUTION A

Course scheduling improved completion progress and reversed financial impact of an enrollment downturn.

- 2-year college
- 3,500 headcount enrollment
- 28% decrease in enrollment since 2010

As previously acknowledged, many higher education institutions are facing declining tuition revenues and drastically reduced state funding. The future of these schools is uncertain and some are closing.

The president of this rural community college recognized this possibility, adopted a proactive approach, and partnered with Ad Astra to revise their "roll-forward" scheduling practice. High-impact changes were recommended and acted on for the Fall 2015 schedule, producing significant results:

- The college saw an 18% increase in the average student credit hour load, resulting in an increased tuition revenue yield of $167,414 in one fall term
- The college right-sized the course sections (from 511 to 442) to respond to downward trend in FTE enrollment, resulting in an estimated savings of $113,850 in one term

■ INSTITUTION B

University used course demand analytics to improve student access to required courses and degree completion.

- 4-year university
- 23,397 headcount enrollment
- Record high enrollment in 2015

In some states, a part of the funding formula is tied to space utilization. Utilization statistics must be reported to a system and governing board annually.

THE **COLLEGE** REALIZED AN **INCREASE** IN TUITION REVENUE YIELD AND ESTIMATED **SAVINGS** OF OVER **$250K**

This institution set out to optimize their space utilization by aligning course sections with student demand for courses. By using HESI performance metrics, the school was able to improve space utilization scores each year since 2012 and recently received a perfect (maximum) rating and related funding. While improving efficiency, the institution increased its Balanced Course Ratio and student access to courses significantly by decreasing Under-Utilized and Overloaded Courses Ratios by more than 10%. The impact of these changes resulted in:

- Increased average credit hour load per student by 5%
- Increased tuition receipts and related revenues by an estimated $5 million, annually
- Decreased student time-to-completion by an estimated .2 years

APPROXIMATELY

$2 MILLION
IN INSTRUCTIONAL
DOLLARS SAVED
IN ONE
ACADEMIC YEAR

■ INSTITUTION C

The course schedule is leveraged to improve degree completion, operational efficiency, and performance funding metrics.

- 2-year college
- 15,000 + headcount enrollment
- Enrollment doubled between 2006 and 2010; has been declining since 2010

Course scheduling is an important part of an overall strategy to increase completions. Working with Ad Astra, this institution implemented a system of metrics and course demand analytics to align academic resources to their students' needs. Optimization and targeted changes made to the fall and spring schedules resulted in:

- Saved approximately $2 million in instructional cost in one academic year
- Increased the annual average student credit hour load by 6% (7.71 to 8.18), despite a declining enrollment
- Increased the average velocity to completion by .2 years

- Increased the number of degrees awarded by 22% in a three-year period, while unduplicated degree-seeking enrollment decreased by 31%
- Realized an additional tuition yield of $72.19 per student, resulting in an increase of $1.5 million in aggregate revenue

■ INSTITUTION D

Public university aligned course offerings with student course needs and classroom capacity to save $249,000 in one academic term.

- 4-year university
- 5,200 headcount enrollment
- Enrollment trended up from 2004 - 2011, then began trending down (9% decrease since 2011)

The previous five years of historical enrollment data were gathered and analyzed for this institution. The findings then informed schedule changes for Fall 2016, which were quickly acted upon by academic leadership. The recommendations included removing 86 sections with historically low enrollment and adding three sections that had been bottlenecked for student access. These actions resulted in:

- Recaptured $249,000 in instructional costs
- Adjusted course capacity to more realistic levels, allowing better classroom assignment based on projected enrollment levels
- Reallocated funds for additional full-time faculty to teach historically overloaded courses

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THE INSTRUCTIONAL COST SAVINGS FUNDED ADDITIONAL FULL-TIME FACULTY TO TEACH HISTORICALLY OVERLOADED COURSES

WHAT'S NEXT FOR THE HESI IN 2017?

As the number of partner institutions benchmarked in the HESI continues to grow, Ad Astra plans to augment the database with new metrics. Many of the new metrics will result from a "snapshot" process, a series of recurring captures of section data during various phases of the registration process and the academic term. These snapshots allow for tracking of a number of important metrics such as section cancellations and late additions to the term schedules, as well as attrition from peak enrollment to census date and beyond.

Additionally, existing integration of Ad Astra software with industry-leading degree audit systems will be leveraged to track students' progress to degree completion through the lens of productive versus non-productive credits. This *"Velocity to Completion"* metric will be the first leading indicator of graduation rates in the industry. Because it tracks current students rather than collecting data from recent graduates, this metric will be actionable.

Finally, as referenced in the 2015 HESI Report, Ad Astra's new Simulated Registration algorithm now allows tracking of important metrics regarding students' registration conflicts. These metrics will provide insight into the critical question: "is completion delayed because students are not taking the courses they are advised to take, or because they can't get seats in those courses at registration?"

Ad Astra is enthusiastic about researching and uncovering opportunities for the industry to improve student and institutional success. Continued development of new HESI findings will allow this report, and Ad Astra's services, to better address those opportunities.

Notes
[1] Source: U.S. Department of Education, National Center for Education Statistics. (2015)

ADDENDUM

WHO IS AD ASTRA INFORMATION SYSTEMS?

Ad Astra's interest in academic space began in the 1950's when the founder's father, John Shaver, was introduced to a Ford Foundation project at Stanford University that cemented the firm's future. Shaver decided to morph his architectural firm from a general design practice to one specializing in higher education facilities. He enthusiastically joined the project and helped shape its contribution to the industry: a framework that quickly became and remains the standard by which space utilization is assessed and facilities' master plans are developed.

When Founder and CEO Tom Shaver launched Ad Astra in 1996, it was known that space management was both critically important and incredibly complex. Measuring space utilization wasn't enough. First, and most obvious, was that measurement didn't improve utilization; it simply confirmed the need to improve. Second, space was only part of the equation. Scheduling must be embraced as a way to allocate not only space, but also faculty; to deliver instruction, and to enable students to graduate on time.

Ad Astra has collaborated with more than 1,000 higher education campuses and many state systems that prioritize the stewardship of instructional resources and improved student outcomes.

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