IPAS Implementation Issues: Data and Systems Integration
Introduction

In an era of scarce public resources, budget cuts, demands for accountability, and calls for more measurable outcomes, institutions of higher education are renewing their emphasis on student success initiatives. Coinciding with these pressures are IT innovations in the fields of data mining and learning analytics, resulting in the availability of entire suites of software solutions designed to track and improve student learning, progress, and completion rates. Institutions can now integrate previously siloed and seemingly disparate data into systems that empower students, faculty, and staff to take shared ownership of academic success. The integrated planning and advising services (IPAS) approach to improving student success includes advising and counseling, progress tracking and degree planning, and academic early-alert systems.

IPAS is “an institutional capability to create shared ownership for educational progress by providing students, faculty, and staff with holistic information and services that contribute to the completion of a degree or other credential.” However, an institution’s ability to deliver an effective IPAS solution or suite of solutions might be inhibited by both technical and institutional barriers. In fact, over half of the 36 institutions participating in a benchmark study indicated that IPAS effectiveness is hampered by both “a lack of coordination between different parties who support students” and “a lack of integration between different systems [and] repositories” (see figure 1).

This research report is designed, in part, to highlight these issues by looking at how four institutions have tackled IPAS implementation issues related to data and systems integration and to the coordination of key functional units.
This study is a qualitative analysis of responses collected at four institutions to five prompts regarding IPAS integration and implementation. The institutions are:

- Austin Community College
- Austin Peay State University
- Colorado State University
- Whatcom Community College

The five subject areas covered during the interviews included the following:

- The types of systems and data with which IPAS systems interact
- The costs and benefits of different levels of IPAS integration
- The integration challenges confronting institutions implementing IPAS solutions
- The solutions to those and other challenges identified by the institutions and their vendors
- The integration capabilities and skills required of successful IPAS implementation teams
Key Findings

- Using a single set of credentials for IPAS authentication makes the tools more accessible and increases the likelihood of end-user buy-in.
- Considerable effort is required to prepare existing data and to generate new data with which to populate IPAS systems.
- The costs of real-time and two-way data exchange solutions exceed their perceived benefits at this time.
- Institutions tend to have IT staff with the technical skills necessary to handle a systems and data integration project.
- Creating diverse IPAS implementation teams that include representatives from key functional units or stakeholder groups increases the effectiveness of the implementation and garners broader campus support for the project.
- In addition to hard IT skills (programming, database management), highly developed soft and cognitive skills (communication, creativity, analysis) are necessary to carry out a successful IPAS implementation project.
Case Profiles

Case selections were made in order to maximize the diversity of institutions and projects on a number of criteria. These included, but are not limited to, the following:

- Carnegie class;
- IPAS domains addressed (planning, advising, progress tracking, early alerts);
- Number and type of vendor solutions identified;
- Articulated IPAS goals;
- Progress to date; and
- Existing systems affected or replaced by IPAS solutions.

From a methodological standpoint, a comparison of only four institutions does not lend itself to generalizable claims that are applicable to all institutions. Although care was taken to select a diverse set of cases from the limited pool of institutions participating in this IPAS project, they do not constitute a representative sample of higher education institutions. A comparative case study approach such as this one affords the opportunity for a deeper dive into the institutions and their projects, a process that reveals more details about the complexity of the cases than a broader, more quantitative approach might. Even if none of the institutions included this study closely resembles your own (see table 1), we hope that some of the key findings and lessons learned will prove beneficial.

Table 1. Overview of Comparative Case Study Institutions

<table>
<thead>
<tr>
<th>Institution</th>
<th>LMS</th>
<th>SIS and/or ERP</th>
<th>IPAS Vendor(s)/Product(s)</th>
<th>Interview Dates</th>
</tr>
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<tbody>
<tr>
<td>Austin Community College</td>
<td>Blackboard</td>
<td>Ellucian</td>
<td>Civitas: Degree Map</td>
<td>April 9, 2014</td>
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<tr>
<td>Austin, Texas</td>
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<tr>
<td>Austin Peay State University</td>
<td>Desire2Learn</td>
<td>Banner</td>
<td>Starfish: Early Alert, ConnectDesire2Learn: Degree Compass</td>
<td>March 18–19, 2014</td>
</tr>
<tr>
<td>Clarksville, Tennessee</td>
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<tr>
<td>Colorado State University</td>
<td>Blackboard</td>
<td>Banner</td>
<td>CollegeSource: u.direct, u.achieve CampusLabs: Beacon Blackboard: Blackboard Analytics Ellucian: Ellucian Mobile</td>
<td>March 10–11, 2014</td>
</tr>
<tr>
<td>Fort Collins, Colorado</td>
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<tr>
<td>Whatcom Community College</td>
<td>Canvas</td>
<td>Proprietary (COBOL)</td>
<td>Hobsons: AgileGrad, Retain</td>
<td>March 27–28, 2014</td>
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<tr>
<td>Bellingham, Washington</td>
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Austin Community College

Austin Community College (ACC) is one of Texas’s largest two-year colleges, with more than 43,000 credit and 15,000 noncredit students attending 10 campuses in and around the Austin area. The impetus to implement an IPAS solution was a presidential directive taken up by leaders in Student Services to improve student success by providing advisors, counselors, and students better access to the degree-planning and advising processes. Under the previous advising system, advisors would spend approximately 80% of their time gathering and verifying student information from multiple digital and analog sources, leaving little time for more meaningful interactions.

ACC is partnering with Civitas Learning to implement a customized version of its new cloud-based Degree Map solution. As an IPAS solution, Degree Map provides students and advisors with a snapshot of the current degree plan, including metrics on credits completed and credits completed toward the degree. Additionally, the solution is designed to allow for comparisons of degree plan options, the impact of switching degree plans, and the identification of additional certifications for which the student may (nearly) be eligible to apply. By using the predictive analytics components of Degree Map, students and advisors will also be able to identify which combinations of courses will increase or decrease the probability of success in any given semester. Additionally, the IPAS solution should improve institutional planning by basing course offerings on projected student demand. Overall, the ACC IPAS project is designed to enable students to move beyond being passive recipients of information from their advisors and be empowered to engage with advisors in their own long-term degree plans.

Austin Peay State University

Austin Peay State University (APSU), located in Clarksville, Tennessee, is a four-year, master's level public university with more than 10,000 current students. Having created Degree Compass, a course recommendation system that draws on historical course data to identify the best classes for current students, APSU put itself on the map as an early IPAS innovator. More recently, APSU upgraded and expanded the institution’s IPAS capabilities to include other advising tools, such as academic alerts and degree planning. The existing homegrown system for advising was considered too burdensome and time consuming, especially for faculty, who were required to log into multiple systems to perform advising duties. Continued customization of the homegrown system would have been cost prohibitive. Additionally, the project moved from the Office of the Provost to a decentralized project team composed primarily of the Center for Teaching and Learning and IT.
To streamline both the process and costs associated with implementing new IPAS systems, APSU’s project employs a combination of the homegrown with third-party vendors. Specifically, APSU continues to employ Degree Compass (now part of the Desire2Learn [D2L] portfolio of predictive analytics products) to help students make informed choices about the best courses to take, given their strengths, interests, and major course of study. Additionally, the institution is using Starfish’s EARLY ALERT to provide students an academic-alert system tied to a dense network of advising and counseling resources. Finally, once populated with degree plans from its academic units, APSU’s deployment of Starfish’s CONNECT will empower students to take more control over their academic careers by giving them easier access to their advisor and allowing for the development of long-term degree plans to be formulated and tracked.

**Colorado State University**

Located in Fort Collins, Colorado, Colorado State University (CSU) is a public doctoral institution with a total enrollment of more than 26,000 undergraduate, graduate, and professional students. Unlike the other institutions included in this study, CSU’s IPAS project is nested within a formal, campus-wide Student Success Initiative (SSI). Created in 2006, the SSI is a presidentially mandated collaboration between Student Affairs and Academic Affairs. It is intended to be a long-term, comprehensive transformation of CSU that is informed by institutional data, focuses on diversity, and keeps student learning at the center of all decisions. Although there are several dimensions of student success with which the SSI is concerned, CSU’s deployment of IPAS technologies is predominantly an academic initiative, with its primary focus on improving and enhancing Academic Support.

CSU has taken a best-of-breed approach to selecting IPAS technologies to support its SSI, selecting five separate solutions from four vendors that cover each of the IPAS domains. CSU plans to use Campus Labs’ Beacon to track student alerts and participation in campus events throughout their careers. College Source’s u.direct and u.achieve are being implemented to develop and explore interactive degree plans and to track student progress towards degree completion over time, respectively. Drawing on Blackboard Analytics, CSU Academic Support coordinators will also be able to understand student experiences and proactively intervene during courses rather than reacting to outcomes after the semester has been completed. Finally, CSU has installed Ellucian Mobile to facilitate pushing important information, reminders, and alerts to students on their mobile devices.

With this comprehensive suite of IPAS technologies, CSU hopes to equip its Academic Support coordinators with the tools necessary to provide knowledgeable, proactive, and data-informed advising that treats students as “whole persons.”
Whatcom Community College

Whatcom Community College (WCC), located in Bellingham, Washington, is a two-year college serving more than 10,000 students annually, the overwhelming majority of whom seek academic transfer to other institutions, especially neighboring Western Washington University. Whatcom's foray into the IPAS realm was prompted, in part, by inefficiencies associated with two systems. First, for over 20 years WCC had been employing a time-consuming paper-based advising system that required the advising staff, many of whom are part-time employees, to navigate complicated degree checklists and course catalogues to advise a single student for a single quarter. Second, all 34 institutions in the Washington community college system use a centralized student management system (an HP COBOL SIS) that is more than 30 years old and lacks the flexibility to meet the current needs of students, advisors, and faculty.

To streamline its advising process and use data from its student management system better, WCC is implementing two IPAS systems from Hobsons. The first of these, AgileGrad, is designed to give students more agency in shaping their academic careers; with this tool, students can create, modify, change, and manage their own degree plans and graduation paths. This IPAS solution not only gives students some control over their academic plans but also removes the cumbersome paper-based advising process, freeing advisors to address other problems, issues, and goals with students during advising appointments. Furthermore, the aggregation of student degree plans affords administrators the opportunity to respond better to student demands for courses by forecasting which times, days, and quarters certain classes will be needed. The second IPAS solution, Retain, offers advisors and instructors a centralized and coordinated system with which to identify and track students who may be at risk. Furthermore, Retain is designed to open channels of communication in such a way as to avoid redundancies, allow for follow-ups, and engage in targeted interventions when necessary.
Systems and Data

IPAS solutions require some form of integration with existing college and university IT systems and need to be populated with data from those systems to perform the functions necessary to facilitate student success. In this section, we consider the types of systems and data with which IPAS solutions integrate.

Systems

The primary systems with which IPAS solutions integrate are centralized student information systems (SIS) and additional modules within enterprise resource planning (ERP) systems. The generalized structure of the integrated system typically resembles a hub-and-spoke model with the primary data system, regardless the type, serving as the hub and the IPAS programs situated on the spokes (see figure 2). As one might expect, the types of compatibility issues each institution experienced depended on the type and age of the central system with which the institution began the project (e.g. Banner at APSU and CSU, Ellucian at ACC, a proprietary COBOL system at WCC) and the number and type of IPAS vendors and solutions integrated. On this latter point, each institution emphasized the importance of knowing one's own system and data and obtaining clear information from vendors regarding compatibility and convertibility of data at the beginning of the process.

Figure 2. IPAS integration with the student information system
Because these centralized systems house the databases of record for any given institution, considerable care is taken to preserve their integrity by pushing or fetching data from the central repository to the IPAS programs, with either no or very limited data being written back to the SIS/ERP. For institutions that are writing data back into the centralized systems, the process tends to be batched and refreshed on a 24-hour cycle. Although representatives from each institution in this study expressed the desire for real-time updates and two-way exchanges of data, they also identified a number of limitations that rendered such a move prohibitive, including efficiencies and expenses (APSU and CSU), policies related to processing and using data and the administration of the central database (WCC), and data validation (all institutions).

Each of the institutions interviewed expressed a commitment to using a single set of credentials for system(s) authentication. Though the primary impetus behind this move was technical, it was grounded in a desire to maximize the ease of use—and, therefore, the buy-in—for end users, whether they are students, advisors, faculty, or other staff. Regardless of the method of authentication, some institutions indicated that federated logins still might be used to verify user identity and guard the integrity of student data.

Each institution also acknowledged the potential benefits of having the option to link its learning management system (LMS) to the SIS/ERP, but they tended not to elaborate on this point. Only CSU had an explicit plan to boost its IPAS capabilities by marshaling its LMS’s analytics program (Blackboard Analytics) to enable advisors and counselors to act on student early warnings and flags generated therein. While APSU’s course recommendation software, Degree Compass, is now technically part of its D2L LMS package, D2L is not fully integrated into its SIS (and there are no current plans to do so).

Three other systems were also identified as possible points of IPAS interaction. First, CSU is pursuing a mobile IPAS point solution to push out hard interventions (requests for face-to-face meetings with advisors), soft interventions (suggestions for modifying behavior), or general information to students via mobile devices. APSU’s Starfish IPAS system is designed to interface with MS Outlook’s calendaring function so that students have easy access to their faculty advisors’ schedules to make advising appointments. And, in an effort to measure and track students’ campus engagement, both CSU and APSU articulated plans to tie their IPAS systems to student ID cards and campus swipe-card systems.
Data

Two types of data were identified as being critical to the effectiveness of IPAS systems. The first and most important data to be integrated into IPAS solutions are basic forms of student data. The second major type of data used by IPAS systems is related to institutional curricula and programs.

In terms of student data, demographic variables (age, sex, ethnicity, socioeconomic status, etc.) and academic factors (GPA, grades, test scores, course history, major, etc.) are the primary data points used by most IPAS systems. Additionally, other data related to factors that predict student success—such as one's veteran or marital status, whether or not one has children, one's employment status, whether or not one is currently a high school student, one's Greek-life status, or one's financial aid status—might also be included, depending on the particular IPAS solution employed. Furthermore, students' registration status, holds, warnings, flags, or advising notes might also be included in an IPAS system. Although LMS data can be integrated into IPAS systems, most institutions in this study are not pursuing this option presently. Finally, for those institutions that link swipe-cards to IPAS systems, data on attendance or participation in campus events, convocations, lectures, art openings, and so forth might be collected and added to IPAS systems.

Although much of the student data fetched from the SIS/ERP systems is thought to be useful in IPAS systems in raw forms, registrars and representatives of institutional research expressed concerns about vendors using those data to perform secondary calculations for which institutionally specific formulae are used. That is, the methods of using data to perform secondary calculations—such as success or failure, graduation, retention rates, and full- versus part-time status—vary considerably by institution. There was considerable support for the position that in order for variables to be correctly derived from secondary or tertiary calculations, those variables need to be generated within and pushed out from the central systems rather than allowing IPAS vendors—who may not be familiar with an institution's particular data—to perform them. In a related example, interviewees from ACC indicated that its vendor, Civitas, needed to be coached with regard to what their data meant and where they were located, a process that proved mutually beneficial in that it forced ACC administrators to understand their own data better. Although it might be both reasonable and necessary for an institution to carry out calculations prior to submitting data to vendors, it is also possible that such activities may raise the costs of IPAS implementations either in the form of vendor customization fees or delays in having the most accurate data available as soon as possible. Regardless, for institutions considering IPAS solutions, the integration process might serve as an opportunity to consider revisions to current calculation methods.
For data related to curriculum and programs, degree mapping and planning programs require that an institution’s major courses of study and programs be translated from (frequently, paper-based) course catalogues into a usable digital format. For most institutions, this is a huge undertaking given that degree maps and plans must be developed from scratch. Each respective major, minor, or certificate needs to have its prerequisites, co-requisites, electives, exceptions, and variable credit courses mapped in a manner that is programmable.

For some institutions, such as CSU and ACC, the process of mapping degrees and majors mostly was completed as part of larger campus initiatives prior to the onset of their IPAS implementation and did not complicate project timelines. However, ACC has struggled with translating all of its rules and exceptions into the Degree Map software; some discrepancies remain in some student records between what students actually have completed versus what the systems say they have completed, requiring that degree audits and verification of requirements continue to be done by hand. At WCC, the need to map its curriculum presented an opportunity to identify and fix problems with major courses of study in the catalogue, such as removing dead-end paths, redundancies, or infrequently offered courses. APSU remains in the planning stages for mapping its degree programs.
Costs/Benefits

Any new integration project inherently entails trade-offs that result from or produce costs and benefits to the institution. Respondents were asked to identify both costs and benefits to decisions related to the levels of IPAS integration undertaken at their institutions. Two issue domains were dominant in the responses: one- versus two-way data exchanges, and single versus multiple sign-ons.

Data Exchanges

Although each institution expressed the desire to have system updates be as real-time as possible, when compared to the benefits, the costs were deemed to be too great at this juncture. CSU, WCC, and ACC all indicated that an application programming interface (API) would readily resolve this issue. But none of the products covered in this study include APIs, and the costs of programming them were prohibitive. In addition to the financial and technical costs of pursuing a comprehensive two-way solution, a number of exogenous factors also constrained this choice.

Two of the institutions (APSU and CSU) identified deciding what data to pull and store, even when limited data are batch-processed overnight or hourly (ACC), as a major obstacle. Some concerns were also expressed regarding the risk of corrupting or overwriting official data in the database of record during real-time exchanges (WCC and APSU). For WCC, a real-time two-way exchange of data was never really a possibility because the central data repository is a 30-year old propriety system owned by the state and used by the entire Washington community college system. The range of rule-based curriculum exceptions that would need to be manually calculated because ACC was unable to program them into its Degree Map program precluded the possibility of pursuing a real-time, two-way solution.

Each institution appeared to be acutely aware of the costs associated with maintaining a system that is predominantly unidirectional. Even the 24-hour lag time between updates, changes, and warnings could result in inefficiencies, including the need to replicate advising and counseling related conversations multiple times across units or the inability to shepherd a student facing serious pressures or deadlines through a process requiring the cooperation of several functional units (CSU). Others expressed concerns that specific advising-level data, such as flags or notes, might be lost unless manually duplicated (APSU and ACC), and there were concerns that grades will continue to need to be entered manually into two separate systems (APSU). Regardless, none of the institutions seemed to perceive the short-term costs of maintaining one-way data exchanges to exceed the benefits of simply having the IPAS solutions integrated. That is, even IPAS systems that do not update in real time were seen as superior to the complex and analog alternatives that they are replacing.
### Sign-On Types

In terms of login methods, each of the institutions included in this study was adamant that a single set of credentials was mission critical to the entire IPAS project. Requiring faculty, staff, or students to use a username, password, or both that differ from their existing credentials was viewed by each institution as a hurdle that would undermine even the strongest support for their respective IPAS initiatives. The importance of having only one set of credentials is especially compelling for institutions using more than one IPAS solution or multiple vendors (CSU and ACC), which raises the importance of single sign-on (SSO) solutions for each of those institutions. Rendering credentials portable across platforms via Shibboleth or another federated identity solution was viewed as a minor cost compared to the benefit of rendering IPAS tools readily accessible to all end users. However, in instances where SSO is not a viable option, significant efforts are being made to render the secondary login as readily accessible as possible to reduce the burden on end users.
Challenges to IPAS Integration

When asked to discuss the challenges confronting their institutions while carrying out the IPAS integration project, respondents readily offered some technological challenges. However, subjects from each of the four institutions participating in this study also seized this as an opportunity to discuss other types of challenges. In addition to the expected technological integration challenges, a number of challenges related to change management and institutional policies were also identified.

Technology

Although respondents identified both data integration and system integration challenges associated with their respective IPAS projects, representatives from each institution emphasized that their IT units had not been confronted with any insurmountable technological challenges during the IPAS implementation. Excepting comments regarding being understaffed for the projects, each institution reported having the expertise and experience in-house to carry out or learn how to carry out IPAS integrations, a finding corroborated by the benchmark study (see figure 3).3

![Figure 3. IPAS integration](image-url)
Problems from the data-integration portion of the projects seemed to stem from disequilibrium between the supply and demand sides of the issue. That is, most of the challenges stemmed from the difficulty institutions faced in populating IPAS systems with the necessary data in useful formats so that vendors could provide meaningful data and analysis. On the supply side, some institutions suggested that part of the problem stemmed from the esoteric nature of the educational data generated, coded, and housed. Even the process of identifying which data might be useful to IPAS solutions proved difficult (APSU).

For example, conflicting definitions for what constitutes “attempted” versus “earned” credits or full- versus part-time enrollment might persist across functional units within the same institution, so converting departmental data into understandable institutional formats prior to delivery to the vendor was warranted. Even when the appropriate data could be identified, extracting and converting them into usable formats often presented challenges. In the case of WCC, getting different attributes out of a 30-year-old central database relied on external, and potentially outdated, definitions by which parameters could have been defined.

For the institutions bringing degree-planning systems online, considerable effort and time were required simply to generate the data necessary to populate the IPAS solutions. If degree maps for majors and programs of study do not exist, they need to be created; if they already exist, then they need to be digitally converted into the language of the particular IPAS solution. At WCC, it took 2–3 months to produce more than 50 degree plans with which to populate their planning solution, AgileGrad, a task that was completed on time only because the newly hired associate director of advising and career services serendipitously possessed the skills to navigate the technical aspects of the project. And even though ACC had completed a similar process before the onset of the IPAS project, they continued to find that some degree audit rules and exceptions could not be translated and programmed properly into Degree Map.

On the demand side of the data issue, representatives from three institutions identified data-integration challenges stemming from the vendors that are attributable to the embryonic state of the IPAS field. For example, although Civitas’s expertise in database management was unquestionable, ACC reported taking a more bottom-up approach in helping its vendor convert the particular data requirements and calculations unique to educational databases into a usable format. In another example, APSU had expected Starfish to receive student attributes that would allow them to raise or lower early-warning flags automatically, but the vendor instead provided a toolkit with which APSU was to produce and track flags. Finally, Hobsons developed a new algorithm with which to update IPAS data to accommodate the unique centralized database restrictions at WCC.
The fourth institution, CSU, observed that many of the challenges coming from the demand side of the curve were related to the highly volatile marketplace in which IPAS vendors find themselves competing. One individual conjectured that the database and data-exchange systems in IPAS solutions are not designed to be transparent, in part to stake out claims in the market. An approach of supplying “generic solutions for institutions they imagine,” however, proves highly problematic for institutions like CSU that take a best-of-breed approach to develop specific, flexible solutions that necessitate the use of multiple vendors. In light of these circumstances, two observations stand out:

- Overly competitive vendors may find themselves unable to earn contracts with institutions seeking to diversify IPAS solutions.
- The cooperative development of industry standards for how data is exchanged would alleviate a host of these concerns.

Not only do different IPAS solutions not integrate with one another well, but also a number of challenges exist with regard to getting IPAS solutions to integrate with institutions’ centralized systems. Again, none of these challenges proved insurmountable to the IT staff at the institutions included in this study. However, each reported that incorporating IPAS solutions into existing systems required heavy intervention by IT staff.

Although the particular problems of integrating IPAS solutions with an SIS or ERP may vary considerably based on the combinations, institutions such as ACC, APSU, and CSU that possess more contemporary systems reported that given the proper resources, these challenges could be overcome reasonably. An older, centralized, and proprietary SIS like the one on which WCC relies, however, poses even greater challenges in interpreting and translating codes. The vendor’s desire for a newer SIS is not possible in the short term. The 34 Washington community and technical colleges are finally deploying a system-wide ERP (PeopleSoft) over the next three years. However, this is a phased implementation, and WCC is not scheduled until 2017. Since this new ERP does not offer the robust functions of the current IPAS project at WCC, it is anticipated that this IPAS project will serve as a catalyst to improve the Washington system with IPAS functions in the long run.
**Change Management**

Although not technical in nature, the most frequently cited and discussed implementation challenges lie squarely within the boundaries of change management. What emerged as critical for IPAS implementation projects included 1) having centralized leadership that strongly supports and advocates for the IPAS initiative with 2) an IPAS implementation team composed of key stakeholders that facilitates 3) campus buy-in for the new IPAS system(s), especially among end users. Deviations from one or more of these parameters can produce cascading challenges to the success of the IPAS project.

In terms of leadership, the IPAS projects at two institutions had strong backing from their presidents. In the case of CSU, IPAS was one component of a larger presidially mandated student success initiative under way since 2006; as a result, it was largely unquestioned in terms of its importance to the mission of the university. At ACC, the presidential mandate to pursue IPAS solutions was considerably more targeted to resolve a narrower set of institutional problems such as fall-to-fall retention, time to completion, completion rates, and other key metrics. Following a change in academic leadership at APSU, responsibility for the IPAS project became distributed between IT and the Center for Teaching and Learning. Finally, IPAS leadership at WCC was conceived as an institutional partnership between the vice president of educational services and the IT director to improve student alert systems and to modernize the advising system.

In terms of IPAS team composition, the general rule of thumb appears to be diversity and inclusion. For example, CSU strategically brought in representatives from the key functional units that would be involved with implementing the project, including IT, student affairs, institutional research, the registrar, financial aid, and others as necessary. ACC took a similarly balanced approach by making sure that the IPAS team comprised representatives from IT, student services, and admissions and records. Prior to the departure of its provost, APSU’s IPAS team was considerably broader in its representation, including faculty as well. Afterwards, the team narrowed in order to take a more efficient, procedural, and technical approach to IPAS implementation. WCC’s IPAS team was also broad in scope but did not significantly differ in composition from similar projects it had undertaken previously. Input and guidance for its project came not only from IT and educational services but also from a majority of the presidential cabinet members, advising and career services, assessment and institutional research, the registrar, and the Office of Access and First-Year Experience.

Because CSU’s project is nested within a larger SSI that revamps the advising process, has long-term and vocal presidential support, and is being led by a diverse group of stakeholders operating from a position of cooperation, CSU expects no problems with end-user acceptance or buy-in. The introduction of IPAS at ACC has been met with some skepticism, despite the obvious improvements to the advising process Degree Map provides for the 300+ staff across the 10 campuses. IPAS project leads suggest...
that the uncertainty surrounding IPAS might have been avoided with better planning in terms of timing the project roll-out, communication to staff and faculty about the benefits of the solution, and engaging the end users earlier in the process.

Since faculty and advisors did not participate fully in the implementation process at APSU, there are concerns that obtaining their buy-in might be the biggest challenge facing the IPAS team, a finding echoed in the IPAS benchmark study (see figure 4). The focus on the technological side of implementation has engendered the perspective that the IPAS project is mostly an IT one and is not related to a larger student success initiative, given that the capabilities and benefits of the solution have not been communicated as they might have been had the provost remained at the helm of the project. Faculty buy-in for the risk-identification portion of WCC’s IPAS initiative has been relatively easy, especially since some instructors were brought on board early as beta testers and are evangelizing to their colleagues. Despite some uncertainty regarding how alerts, notes, and flags work within the new system, instructors see IPAS as a long-term “win-win” with clearly defined parameters and outcomes for student success. Not unlike staff in the benchmark study, WCC’s mostly part-time advising staff are slightly more reticent about the mandated changes due to their familiarity with the decades-old, paper-based advising system, but considerable effort is being made to ensure they are well-prepared to make the transition.

![Figure 4. Concerns about the growing use of IPAS technology](image-url)

**Figure 4. Concerns about the growing use of IPAS technology**
Policy

Finally, two institutions identified policy-level challenges that, although specific to their respective experiences, are worth highlighting for future IPAS institutions as potential issues. First, representatives from CSU suggested that defining the parameters for hard interventions (requests to see an advisor or counselor) versus soft interventions (reminders and suggestions) is a particularly difficult task, especially when thinking about the need to scale them. Given the breadth of institutional expertise on the IPAS implementation team, the approach being taken is to have the rules for both types of interventions (e.g., when, why, and what) established centrally but to have faculty and advisors serve as the enforcers on the ground. Even when this particular issue is resolved, the rules surrounding how students will receive notifications remain a point of concern; identifying the most efficient and effective methods of reaching students while avoiding the perception that the institution is spamming them is paramount.

The second policy-level challenge identified is related to the definition and structure of degree plans required for IPAS solutions that allow students to map out their academic careers. Although APSU has been able to identify individual “toxic” courses and course combinations (e.g., courses with high rates of students earning Ds and Fs or withdrawing [DFW], or courses requiring considerable effort but with a high risk of failure), the structure of what actual degree plans might look like has remained unclear. To take advantage of its IPAS solution’s degree-planning features, APSU needs to define the parameters of its degree plans and majors. What is lacking is a standardized format for the manner in which degree and major plans, which are set by departments and faculty, are designed, formatted, and potentially coded. Presently, APSU’s Center for Teaching and Learning and registrar are working together to secure cooperation from academic departments and units to move forward with this portion of the project.
Solutions

In addition to identifying challenges, interview participants were asked about the solutions their institutions and vendors had taken to resolve them. Again, technological themes took a backseat to solutions grounded in the project management side of the equation. Specifically, for the institutions themselves, team composition, communication, resources, and training dominated the responses, while responsiveness was a dominant theme that emerged with regard to vendors.

A diverse team. As highlighted in the previous section, the composition of IPAS implementation teams is viewed by each institution as a critical component of project success. With support from centralized leadership, diverse implementation teams composed of representatives and stakeholders working cooperatively in partnership seem to be highly effective in carrying out the IPAS integration projects. Although the specific functional units from which IPAS team members are drawn may vary by institution and project scope, this general approach appears to have been an effective solution for the four institutions included in this study. However, it was also recommended that teams only include necessary personnel to avoid unwieldy group dynamics, project tangents, and other inefficiencies that accompany larger project committees.

Broad communication. The second most common solution proffered is the importance of communication. This includes not only the horizontal forms of communication within the IPAS team, as noted above, but also vertical lines of communication to the broader community of end users. Effective communication regarding the purpose and benefits of IPAS solutions is widely seen as critical to garnering campus support for the project. Some specific communicative solutions include

- making details available to the campus community;
- soliciting and acting on feedback about design, interface, and usability garnered from beta testers drawn from potential end users (including students); and
- identifying individuals from within the faculty or staff who are willing to serve as early adopters with an eye toward leveraging their experiences to bring others along.

Resource allocations. The third solution to resolving IPAS integration challenges is the committing of institutional resources to the project. All of the institutions involved in this study indicated that their staff possessed the technological skills necessary to carry out IPAS implementation. With the exception of CSU, however, the institutions all cited the need to be creative with how their very limited resources, especially in IT, were allocated. In most cases, this involved prioritization of projects, delaying existing projects, or saying no to new projects; on these points, having leadership support of the IPAS implementation was essential. And, in at least one case (WCC), identifying and utilizing found resources—individuals with specialized talents or knowledge with other official roles—proved effective at alleviating some of the IT resource pressures, although this had consequences for other campus units.
**End-user training.** The fourth solution identified by participating institutions is guaranteeing that quality training for all end users is provided. Making early plans to ensure that future IPAS users become familiar with the new systems, understand how data are manipulated in the systems, and interact with the tools is thought to improve the likelihood of user buy-in while reducing skepticism and discomfort with transitioning to the new system(s). Preemptive training that includes beta versions of the product or that has not fully anticipated the needs and concerns of the end user are discouraged because support for the new system can be irreparably damaged. One of the key concerns about training is breadth of institutional coverage. In a creative move, ACC is wedding Degree Map training to group advising sessions that are required of all new students and are used by a large number of other students. Other IPAS institutions expressed an intent to conduct similarly broad-based approaches to training end users.

The vendor solutions to IPAS integration challenges identified by study participants tended not to be very specific. Most institutions indicated that IPAS vendors typically work well with IT units and were responsive to concerns or issues as they arose. Altering coding schemes, authoring new algorithms, and tweaking data structures were cited as vendor responses to unique or unforeseen problems. However, at least two institutions attributed the quick turnaround and personalized attention to the relative newness of the IPAS companies and technologies.
Integration Skills and Capabilities

Representatives of all four institutions in this study identified two broad categories of skills and capabilities required of institutional IPAS implementation teams: information technology staff and skills, and the diversity of integration-team composition. The former can be broken down into hard IT skills (e.g., programming languages or database management) and soft skills (e.g., creativity, analysis, and communication).

Regardless the size of the institution or IT staff, each of the four participating institutions claimed to have had the technical IT skills and expertise in-house to carry out their respective IPAS projects, a confirmation of a finding in the benchmark study (see figure 3). As a result, it was not necessary for the institutions featured in this report to hire new staff or consultants (beyond the vendors) to carry out the projects. This does not mean, however, that the institutions had enough staff to carry out the IPAS integration project without disrupting regular services or delaying new projects. For an institution the size of CSU, the impact of dedicating resources to an IPAS project is minimal; for smaller institutions, protecting limited, allocated IT resources assigned to IPAS projects from competing interests can prove difficult for an institution and its IT organization.

One of most commonly cited requirements of the IT staff was the need for knowledge about one’s own institutional systems. Understanding one’s own data and the systems in which they are housed to facilitate the extraction, transformation, and loading processes was viewed as elemental. In general, the importance of having staff with excellent programming and database skills was articulated. The specific skills and programming languages mentioned, however, seemed to be more germane to specific projects.

For example, a programmer at APSU highlighted the importance of having Java expertise and knowledge of structured query language (SQL) to integrate Banner and Starfish. However, representatives from CSU, APSU, and WCC indicated that expertise and facility with specific programming languages was not nearly as important as having staff who possess the skills to learn specific languages quickly as necessary. Finally, some previous experience with systems and data-integration projects was also cited as particularly helpful, especially ones that involve more than one vendor solution.

Given the previously cited change management challenges, it should not be surprising that the soft skills identified as necessary for carrying out a successful IPAS implementation are valued highly. First of all, knowledge of one’s institution beyond the boundaries of the IT organization facilitates trust, cooperation, and collaboration with functional units (CSU and APSU). An exceptional example of how institutional knowledge can benefit a project includes a former registrar turned programmer who was able to foster a quicker-than-planned turnaround by bridging the gap between IT and the functional...
units at WCC. Functional-unit representatives repeatedly cited the importance of having IT involved at every level of the project to provide project updates and to listen to concerns (ACC, CSU, WCC); good and frequent communication rendered IT accessible and helped partners feel comfortable asking for help or clarification (WCC and ACC). Additionally, APSU IT representatives highlighted thinking creatively about solutions, creating processes and managing projects, and knowing which questions to ask of vendors when considering the functionality of their products.

In addition to highlighting the IT staff requirements necessary for an IPAS data and systems integration project, each institution reiterated the importance of the composition of the IPAS implementation team. Having representative stakeholders from each of the major functional units participating in the planning, execution, and delivery of the project eases the strain on IT, distributes the burden widely, and cultivates broad institutional support for the IPAS project. Furthermore, it facilitates the identification and understanding of the kind, amount, and location of data involved with IPAS systems. Having “the right people and the right number of people at the right time” on an IPAS implementation team does not preclude the possibility of shifting memberships.

In the cases of CSU and WCC, partners were added ex post facto to address unforeseen issues; conversely, APSU reduced the size of its original team considerably to make the integration process more efficient. Institutions with distributed campuses, such as ACC, also need to take this into account as integration and implementation teams are formed. The IPAS team should consider a federalized model in which experts and principal agents from each campus are included alongside the leaders of functional units.

Participants also were asked about vendor skills and capabilities. Although these can and should vary depending on the solutions being offered and the systems with which the solutions are being integrated, a few general suggestions were made by at least two institutions each. First, vendors should make an effort to eliminate any discrepancies between what is promised and what is possible, really offered, and provided to clients. Most of the institutions in this study noted how the failure of vendors to deliver on certain aspects of the product resulted in financial costs, project delays, and expenditure of additional IT resources.

Other desirable vendor characteristics identified include the flexibility to work within higher education institutions, being sensitive and attentive to the unique aspects of institutional culture and organization. Effective and open communication with clients was also mentioned, especially in terms of listening to concerns, acknowledging needs, and being on task. Finally, vendors would be well suited to collaborate in development of some industry standards for IPAS systems, especially in the area of data interchange. Although the field is young and vendors are participating in a heavily competitive marketplace, a modicum of standards that would allow easier IPAS integration, not only with SIS and ERP systems but also each other, would reduce the costs and amount of work required to implement IPAS systems.
Conclusion

Institutions implementing IPAS solutions to advance student success clearly need to consider a host of technical and organizational issues prior to the onset of the project. Understanding one's own data and systems, the technical requirements of vendor solutions, and the costs and benefits of pursuing SSO authentication or two-way exchanges of data are among the basic requirements. We have also seen that anticipating challenges, regardless their origins, and being flexible enough to respond creatively with either homegrown or vendor-supplied solutions can improve the likelihood of a successful IPAS integration and implementation.

Finally, institutions that assemble a collaborative, inclusive IPAS implementation team—one that brings together institutional stakeholders and can place its trust in the IT department to have the knowledge and skills to carry out the systems and data integration—will likely find themselves in a good position to successfully engineer an IPAS project. Although the comparison of four institutions does not lend itself to the scientific generalizability of these patterns to all institutions, we are confident that there are valuable lessons from which institutions that seek to implement IPAS solutions on the heels of these early adopters can learn.
Recommendations

Despite the limited number of cases covered in this study, a number of important takeaways could be particularly useful to institutions undertaking future IPAS projects. Those lessons are organized by project function.

Solutions Providers

- Incorporate an API into each of the IPAS products. Although each institution expressed the desire to have system updates be as real-time as possible, when compared to the benefits, the costs were deemed to be too great at this juncture. CSU, WCC, and ACC all indicated that an API would readily resolve this issue. However, none of the products covered in this study included APIs at the time of the interviews, and the costs of programming them were prohibitive.
- Eliminate discrepancies between what is promised and what is possible, really offered, and provided to clients.
- Collaborate with competitors to establish industry standards, especially with regard to data-exchange systems.

Institutional Leaders

- Assemble IPAS implementation teams of key stakeholders, especially end users, and that are backed and championed by institutional leadership to engender campus buy-in of IPAS solutions.
- Select IPAS solutions based on a combination of specific institutional goals for student success, an understanding of existing systems and data, and available staffing, in both kind and number.

Student Success Staff

- Budget a generous amount of time to translate degree programs and majors into usable formats that account for institutional rules and exceptions to implement degree mapping and planning IPAS solutions. This is an excellent opportunity for institutions to review degree programs to identify contradictory requirements, dead or dead-end courses, and sequencing issues.
- Identify the variables that IPAS solutions require and clearly catalogue the data definitions associated with those variables in advance.

IT Staff

- Identify, extract, and convert institutional data prior to delivering data to IPAS vendors.
- Ensure that the IT staff is knowledgeable about the institution’s data and the systems in which they are stored and used; this is critical to extraction, transformation, and loading processes.
Methodology

Given that IPAS is a nascent IT field with a limited number of fully participating institutions, ECAR looked to a set of 19 colleges and universities currently implementing IPAS systems as part of a grant-funded project sponsored by the Bill & Melinda Gates Foundation. Since the number of cases from which data could be collected is too small for statistical analysis, and since our research questions lent themselves more to qualitative analysis, four institutions from these 19 were selected for a series of site visits from March 10 through April 9, 2014.

During the site visits, semi-structured individual and group interviews were conducted with project leaders and institutional stakeholders including representatives from IT, academic affairs and records, student affairs and services, institutional research, teaching and learning centers, and other administrative units. By using the same core questions during each interview, a more robust, triangulated perspective on issues related to the integration of IPAS systems for each institution was obtained.

Notes


2. Ibid., 9.

3. Ibid., 19.

4. Ibid., 10.