**A REPORT TO THE DEAN ON THE QUALITY OF INFORMATION SHARED
BY THE REGISTRAR AND OFFICE OF UNDERGRADUATE ADMISSIONS**

Jim Purtilo
Associate Dean for Undergraduate Education
College of Computer, Mathematical and Physical Sciences
University of Maryland, College Park

August 2009   *(Updated October 2009)*

The campus and college strategic plans both place high priority on tasks that demand access to good quality information. Careful study of data about students and their performance can help us raise the quality of advising, align high school programs with ours (the P-20 mission), broaden prospective students' access to this campus, expose opportunities to improve courses and curricula, and remove critical bottlenecks in the STEM degree pipeline.

Unfortunately some offices on campus go to great lengths to stonewall access to information that would serve the above goals. The problem has been manifest broadly and long enough so as to inspire this recordation of issues experienced and consequent costs paid, as measured in reduced graduation and retention rates, missed opportunities for program improvements and increased staff time to perform even simple administrative tasks.

As will be shown, some data we seek are available albeit partially or in the least computationally useful form possible, so obviously the issue is not that we *may not* know certain content, just that the campus *doesn't want us to know* content in a form that would allow us to tease more utility from it. Other data are unavailable to us in any form, yet are explicitly not restricted by FERPA, the federal restriction on release of student information. (In fact, data we seek are not unlike what campus gives to commercial firms. This shows there is a process for approving data access, just not one that treats all campus stakeholders equally.) It is a campus choice that we must live in willful ignorance of opportunities to improve.

The purpose of this report (a compilation of study and experiences up through most of the of summer 2009) is to make clear what it is we have been trying to learn and why it is in scope for our college's mission to know it. A full log of our requests, and their outcomes, will be available presently for inspection.

We have found in this study that the campus employs many people who are responsible for telling leadership what can't be done, and few who are tasked with telling what *can* be done. It will be up to the reader to consider what factors would motivate a university to keep its stakeholders in the dark.

————————————————————

Campus stakeholders are the primary audience for this report, hence our writing often presumes context or uses jargon typical of on-campus dialog. In case it might be useful to readers from the larger community, we include at the end a short field guide to some of the main terminology.

Values at the University of Maryland as articulated in our strategic plan:

"**[O]penness and accountability.** Shared governance ensures that all members of the University family have an opportunity to participate in its course. A continued commitment to openness and accountability is critical to the University's success. *[PAGE 8]*

"**[E]mbrace the power of technology** • to ensure the highest quality instruction, research and scholarship, and outreach to our alumni and the larger community, and indeed to change the way the world works. Whether in responding quickly to changing student demand for courses, pioneering the application of technology in the creation and study of literature, … , or exploiting the power of technology to alter the ways in which communities interact and function, Maryland will be at the forefront of technological innovation. *[PAGE 8]*

"The University will develop tools, including state-of-the-art information technology tools, to help predict the demand for, and to manage the availability of, courses needed for students to progress in their programs. *[PAGE 16]*

"We will use state-of-the-art information technology to ensure that institutional data are accurate and available for effective decision making . We will review all academic and administrative approval processes and change them as necessary to ensure that decisions can be made expeditiously and responsibly." *[PAGE 37]*

From **Transforming Maryland: Higher Expectations**, University of Maryland Strategic Plan as amended and endorsed by the University Senate on May 6, 2008, and adopted by President Mote on May 21, 2008.   http://www.sp07.umd.edu/StrategicPlanFinalCompact.pdf

EXECUTIVE SUMMARY AND HISTORY OF DATA REQUESTS

Campus leadership denies this college access to student information, some in its entirety and other in any computationally useful form.

- o The data sought are student summary information with history of courses taken and outcomes, and applicant summary information with available records.

- o While computationally useless for our purposes (because each record must be selected manually and is unavailable for aggregation and searches) any individual student record is available to us via SIS, an on-line computing system available to academic advisors and administrators. This confirms the issue is not one of federal restrictions on what we may know about a given student (i.e. it is not a "FERPA issue".)

- o A computationally useful form of student data (i.e., a form that allows us to aggregate and search it) is available to us through access to a campus Data Warehouse, however the campus limits our access to severely redacted tables. Our summer 2008 request for a full history of student performance in CMPS courses was denied – we were given only anonymized data. This creates the absurd situation of the college not even being able to reliably determine an accurate roster for courses we ourselves taught even a semester ago.

- o IRPA – the Office of Institutional Research, Planning and Assessment – provides highly distilled summaries of some student data that answer questions predetermined by IRPA. These data are not presented in a form suitable for subsequent computation or analysis. IRPA lacks either capacity or permission to help us further.

- o Unavailable to us at all is application information about students applying to this college. These data are stored in a campus database called Optix. This creates the absurd situation of our being responsible for attracting and yielding top students without actually being allowed to know anything useful about them – or in some cases even who they are.

- o All of these data sought are routinely provided to other colleges. We are left in an absurd situation, in which our counterparts in other colleges are allowed to know more about our college's students than we may know about our students.

- o In spite of the above points' tenor, we have enjoyed good relations with staff and mid-level administrators in both IRPA and the Registrar's office, all of whom are sympathetic and well-intentioned. We appreciate their help and service, and look forward to continued interaction as colleagues, even if their hands have been tied.

- o Our quest for data led to a meeting on November 11, 2008, with both the Associate VP for Academic Services, and the Director of Admissions. Both indicated they understood and would get back with us. We are still waiting.

As detailed in the body of this report, the cost of our being denied this information is felt in a broad spectrum of our mission goals. It impacts our ability to assess, plan and report; to audit the quality of data upon which decisions are based; to advise students; to inform high schools on best practices for preparing students for College Park; to recruit the best students; and remove systemic barriers to students advancing in a science career.

I. PLANNING, REPORTING AND ENROLLMENT MANAGEMENT

We are denied the ability to perform basic assessments of our present course staffing, much less forecast demand and plan for the most cost effective ways to meet obligations to either our major programs or the campus.

Departments make staffing decisions far in advance of a given semester (up to a year in some cases) so projecting seat demand for courses in a major sequence is challenging enough, even when we have a known number of majors already in the pipeline. The task is far harder when non-majors populate seats, as we have no access to data that might help us project demand in such courses. The task is further compounded by incomplete, late, and often simply inaccurate data from Admissions as to the rate of majors entering the pipeline at the front end. However the biggest problem is that fundamental trends cannot be studied at all based on what we're given to work with.

A classic example to illustrate this problem derives from fluctuation in the number of computer science majors over the last decade. Intake of new CS students peaked after the turn of the millennium, declined, bottomed out about three years ago and now is gently rising. This not solely a CS issue, however. The Physics and Mathematics Departments saw second order effects of this trend, which is not a surprise: CS and CE rely on math and physics to meet major requirements. Yet CMPS is not authorized the data necessary to retrospectively study this in detail, much less suggest what might be next year's need.

To continue the example, Physics in particular is in a hard bind for want of insights on enrollment trends. The second order effect of CS demand is also blended with change in demand from Engineering. The Physics Department has expanded its offerings year-to-year in order to meet demand, and also spent soft money upgrading student labs, without campus recognition of any fundamental trends at work that would have warranted funds from Access to serve as a buffer.[1] The department is now in a deep financial deficit, yet doesn't know – because the college is not given tools to predict – whether it is stuck with expensive over-capacity in lab space or is behind the curve in preparing to meet greater campus demand for service courses. From which departments did recent new demand come? We'd love to know what to tell them.

The impact of campus denying us opportunity to plan can be felt as increased time-to-graduation (if the students are held up for lack of critical courses), poor utilization of space, and needlessly expensive renovation of lab or teaching facilities.

Natural data sources to which we would turn are SIS, the student information system of the Registrar; IRPA, e.g. through its Profiles screens; and the campus data Warehouse, an Oracle database that is typically accessed here via a program called Brio. Unfortunately, SIS provides no capability for searching by a characteristic (it allows stakeholders to look up one name at a time), and generally the rest of the Registrar's live data is off limits. In the case of IRPA, available data are chiefly aggregated, and even the bare numbers of students served by an historical course offering remain difficult to mine. A 'student

---

[1] Access Funds, part of campus Planning Cycle assessments, are ostensibly resources made available for departments to maintain service in spite of unanticipated surges in demand for seats of interest to campus. In recent years it has largely been co-opted for other purposes, so it would not be surprising that campus would not want units able to clinically analyze trends on their own, lest they be able to document demand that is outside the favored programs any given year.

mover' panel tells only the most general of trends – for example, how many students in a given year switch from a CMPS major to a BSOS major. But how does that translate into course demand? We don't know without opening individual student records and plans, which we are denied via IRPA.

Finally, the Warehouse contains a rendering of select Regisrar data which is typically updated nightly and highly edited. The Brio tool for accessing Warehouse data might reasonably let us craft our own queries to understand seat trends, except that the campus invests great energy to remove records necessary to paint a clear picture. Only data about present CMPS majors populate tables given us. (Even records of majors' course history are removed at graduation.) The data warehouse policies defy our ability to project a trend based on even recent history within our units.

Examples of things we'd like to know – yet are not allowed:

1. *What was the source of fluctuation in demand for Math seats in the last decade?*

The Math Department recently underwent an external review, and some of the questions suggested for the initial self-assessment had to do with seats and service courses. Finding bare counts of seats for historical offerings was challenging enough: it entails using an IRPA panel probably not intended for this purpose in order to display a sequence of up to 40 different screens of lists, each of which would be saved manually into an Excel file. Those files in turn would be integrated into a single document so it could be imported to a reasonable database tool in order to count and summarize the history. What should have been a 30 second query became an exercise measured in days, and at the end, we still had no information about which students fill those seats. For that we would naturally turn to Brio. Unfortunately campus expends energy to remove data from tables visible to us. We regret not being able to provide full and insightful answers to the external reviewers.

2. *What is the source of recent fluctuation in demand for Physics service courses?*

This is the example used on the previous page. We would love to know the major and level of students populating these classes so that it might be possible to deduce a trend. Were new major tracks defined that place unanticipated demand on our content? If so, will it expand or diminish? Is there some short term phenomenon that will work out soon? (Which suggests we ought not make extensive new investments as if increase is permanent.) We'd love to know, but for the same reasons mentioned earlier, may not.

3. *What was the quality of preparation in students entering some of our living-learning communities, and how have they fared at College Park as compared with comparably equipped students who did not participate in a living-learning community?*

The recent campus report on Honors and College Park Scholars created new evaluation criteria for the programs never before shared with them, then cited a narrow range of data as basis for recommending changes. As scientists, we would have liked the capability to make observations from original record for ourselves. This would have allowed us to try other perspectives, painting a richer picture of what is really going on. It would have also allowed us to either strengthen the report – or correct it. This was no mere intellectual exercise. The future of programs that we run, and employment of present staff, was at stake. Unfortunately the history of SAT scores, high school preparation and other contributing factors concerning students in our programs is obscured to us. The campus

report hence stands as a made-as-instructed document whose assertions reasonable people may not challenge – not generally the sort of situation one expects in a university.

───────────────────────────────

Many people on campus lament that the Planning Cycle process seems broken. Of course it doesn't work. Nobody is given any basis for planning ahead in the first place!

II.   AUDITING QUALITY OF INFORMATION

We are denied the opportunity to audit or test the adequacy of basic data used by campus in fundamental policy decisions, much less correct it.

Earlier sections of this report documented how we are denied access to data that might aid us meeting campus goals, whether by improving the quality of our efforts and work product or by reducing the cost of meeting operational objectives. This limited access to data also presents a barrier to another basic quality improvement task: auditing data to find and correct errors. Without independent access to original record, no assessment of quality (as advocated by the Strategic Plan) is possible, and hidden errors may allow the campus stakeholders to make decisions based on flawed premises.

Most data provided to colleges from IRPA is not original record, but rather a processed form that has been filtered to suit the Provost's office. By its own description, IRPA is intent on limiting data access and controlling its presentation so as to minimize potential that users might draw inconsistent conclusions. Unfortunately this policy limits campus stakeholders from discovering interesting properties outside of the scope of conclusions that IRPA has chosen to provide – the data are not allowed to speak to us without IRPA translating. We doubt whether a scientist would be content to accept others' conclusions on data without having an opportunity to assess the quality of those data. In fairness to IRPA, that office at least offers generic information. The danger that stakeholders might discover an undesirable truth from either Admissions or the Registrar is solved by those offices simply stonewalling release of as much data as possible in the first place.

Sharing data among campus stakeholders who might use it to improve operations brings with it the potential for change and need for heavy lifting. We understand this moves us out of a comfort zone, so it is hence safer for some to hold a firm grip on release of data. Nevertheless, the importance of an auditing capability is suggested by the appearance of some cracks in the stone wall around the information castle. Two examples, among several, appear below.

1. Discrepancies in counting students.

One of IRPA's basic Profiles panels indicates how many students arrive in each year as either first time freshman or transfers. These figures drive projections on housing demand and enrollment management, give a starting point for measuring graduation and retention rates, and so much more.

The panels provide administrators with a capacity to drill down from each total and learn which students actually contributed to the total, presuming the user is authorized (e.g. we only have drill-down ability for CMPS units.)[2]

Unfortunately a check of these lists shows that many UIDs appear in both categories, i.e. a student is counted both a first time freshman here and a transfer (often the same year.) Students listed as transfers are later listed as first time freshmen, and vice versa.

We can think of some Byzantine situations where this might be true, but not commonly so, and suspect from analysis of the individual records that these duplications result from a misunderstanding by the IRPA Profiles programming as to the intended semantics on some of the tables from which data is drawn. (It would not surprise us. The trickier they make data models in order to stonewall information, the more likely it will be that programmers misunderstand nuances of the data model or the data's provenance.)

Nevertheless, this begs a question of whether the same counting is done in computation of graduation and retention rates, or other aggregated data on which campus leadership bases decisions. When a student whose UID indicates he is both a first time freshman and transfer student here should drop out, does the college retention rate take a double hit? Does this skew the diversity indicators? Does the Student Movers panel on which we all base decisions concerning flow of majors between colleges give us bogus information? Without access to original record to check, we simply can't know.

2. Discrepancies in CourseEvalUM reporting.

Campus course evaluations are a classic example of how raw data are distilled into a single presentation that elides much of the potential information. IRPA presumes users access results in only one way (a Web interface), so users who wish to study the data in other ways must reverse engineer the web presentation (a task that itself is unnecessary waste of campus resources) in order to acquire even that level of data in usable form.

In order to gain deeper insights into results than can be gleaned from the simplified IRPA presentation, we asked for a copy of the raw data on CMPS courses for Fall 2008. These data were provided after being anonymized, and also after having been split into two files (course versus instructor responses, respectively.) The latter preprocessing step itself kept us from answering some of the questions we might have tried to address.

Unfortunately there were discrepancies in the data. The number of courses and student responses for which we were given data differed from the tallies reported to the Provost (and then relayed to the Deans in a comparison of college values.) IRPA was unable to explain the discrepancy in scope of data.

We were also unable to compute the same mean values for reported responses by course or section. This is not a deep mathematical computation, so it seemed that the difference might be explained by simple differences in decisions about the scope of records used in a given computation. (For example, do the course question responses for a given section of a multi-section class contribute to the overall course's scores or not? A case could be made for either decision. Which is it?) Unfortunately IRPA was unable to say how their

---

[2] IRPA actually only provides some of these data. The programmers there arbitrarily cap the number of names that may appear in a list shown to users. So we are allowed to see the UIDs of students who are a part of our totals … but only the first 400 of them. The rest are inaccessible.

means were computed. They did supply a 25 page Word document about methodology, and later sent an additional Word document talking around the problem, but nothing that simply stated the computation, which ultimately they said was unavailable. We note that a few weeks after our exchange, IRPA sent campus a revised set of computations, under cover of an acknowledgement that their original computations omitted a number of records. IRPA has eliminated the potential for exposing a discrepancy for Spring 2009 course data by not yet providing us the data.

Except for small cracks in the armor around campus data, and the efforts of people who are starved for ways to improve quality, neither of these examples would be noticed, and we would miss opportunity to flag numbers on which leadership bases policy decisions.

III.   ADVISING AND CURRICULUM QUALITY IMPROVEMENTS

We are denied the ability to analyze patterns of student performance and outcomes that might expose opportunities to improve our curriculum, tune advice we give our students in order to succeed, and bring the state's high school curricula into alignment for a superior STEM degree pipeline.

Many factors may contribute to a successful outcome for a student. Beyond preparation, top courses and quality instructors, what makes the difference and yields graduation may be a special program, unique co-curricular activity, or informed advising policy.

Quality programs will evaluate the extent to which these factors play a role. Courses that pose a bottleneck on the way to graduation can be improved, unarticulated pre-requisites can be exposed, and activities that correlate with success more deeply studied. Problem behavior that signals a need for intervention might be recognized earlier, and a clearer picture of our expectations can be painted to high school science teachers and prospective students in the first place. In short, things that work we can do more of, and things that don't work we can stop, in order to have resources to try something else.

All that is true, except at College Park, where data necessary to improve programs is held secret from stakeholders. Little data is shared with us to begin with, what data is shared is hard to access across a suite of balkanized computing resources, and much of that in turn is preprocessed in order to elide much that might have been useful. Most perverse of all, the moment an outcome for a student is reached, the campus will begin removing from our reach any computationally useful form of that data, which defies a serious exercise in outcomes analysis. Much course data and advising history that contribute to successful outcomes become hidden from us, so we can't tell what worked, and the full record that led up to an unsuccessful outcome – a drop out or stop out – is hidden from us, so we can't analyze over time what did *not* work.

We know even simple analysis can yield insights that lead to substantial program quality improvements. To illustrate, our counterparts in College of Chemical and Life Sciences recently studied the correlation between new students' math placement scores and their course grade in the introductory biology or chemistry courses. They found good course grades linked with better math skills. As a result, the college raised its minimum pre-reqs for its intro courses, and commissioned a new calculus sequence tailored to CLFS majors. These moves are widely acclaimed and likely to raise CLFS's graduation and retention rates. What a pity CMPS is not able to perform the same sort of study on its own classes.

More generally we seek insights on student performance in order to tailor our advising policies and recognize at-risk students far earlier, giving them superior advice on how to succeed; we would like to share substantive advice with high schools in the state, so as to bridge a gap that seems to separate many schools from Maryland's flagship campus; and we would like to objectively assess the bang for bucks we spend on programs intended to help students. Do they work? We'd like to identify which policies and programs have the greatest return as measured in successful outcomes. Campus should want to know it too.

What follows is a subset of the questions on which we were stymied in the last year. In some cases we were able to derive partial or leading results at great manual cost (which again illustrates that the issue isn't that we are legally barred from knowing the data, only that some officials on campus don't *want* us to know the data.) What should be a few

seconds per query by a stakeholder studying quality in programs became days or weeks of reconstruction by hand, which is both tedious and error prone. Often we halted a line of inquiry simply by running out of time, and had to go fight other fires. In other cases the data, while available on campus, were denied to us entirely.

1. *What is the impact on outcomes from having lecturers, rather than professorial faculty, staff introductory classes?*

Lore among advisors – lore that we believe – is early contact with professors translates into better graduation rates. We wonder: how much is this true? Students in some of our majors may not take a class from a professor in our college until their third year, since so many courses in the intro sequence may be taught by lecturers. Are these students at a disadvantage with respect to graduation rates? Or do they outperform their peers, from having taken preparatory classes from talented lecturers whose specialty is teaching? In an era when staffing decisions will increasingly be based on budget constraints, it seems like we ought to be informed about both the costs and benefits of staff deployment. A relatively simple query of relevant tables would tell if retention rates vary, and if so then in what ways. If rates were largely the same, then a stakeholder investigating this point would simply move on to other questions; if different, then the stakeholder would look further, going where data draws his gaze. CMPS is denied data to profile our programs.

2. *What early indicators in major classes foretell successful outcomes – or distress?*

The sooner a student gets into a track in which he can ultimately succeed, the more likely he will be to actually complete that track. If we believe this – as we do – then the task for an advisor becomes one of recognizing as early as possible the signals of likely success or failure. We then help challenged students make an informed decision as to either a change of major or remedial actions to disrupt the failure pattern.

We know what happens in obvious cases. Allowing a distressed student unlimited tries to pass an intro sequence does nobody any favor, since it almost never leads to success. A CMPS major sequence rarely gets easier as it advances, so in this example we'd see the student at 60 credits, still at the start of a major and yet pegged at caps on repeat credits. A conversation about changing majors at that late point is as likely to result in the student just leaving campus as it is to lead to a major change. There is no question that we ought to know far earlier how to get such students onto a successful path.

In order to read signs earlier, where clues are less obvious, we would study departments extensively. These are the data denied to us. Using anecdotal evidence and expensive manual data collection, we nevertheless have strong indication of the likely value of such inquiries, warranting our further investigation.

For example, we know that almost no student in Computer Science who places into the first major course (CMSC 131) and earns less than a B is likely to go on to graduate in CS; while able to go to the next class with that grade, the odds are good that he or she will be gone by the end of CS III. The exception to this rule seems to be for students who generally got good grades as a first time freshman, yet got a C in 131. Such students who re-take 131 before proceeding (even though not required under the rules) can succeed. This insight – from studying data – yields a sound advising tip to share with students, directs faculty to consider an 'experience factor' in reformulating the intro CS course, and may help with graduation rates.

What of math placement? We have considered math reasoning skills the top predictor of success in this college, and for good reason. A manual check of CMPS students at the May 2009 graduation only about a dozen had MATH 115 on their transcripts, and half of those students had multiple instances of it (they got through by friction, and took many years to complete.) Obviously arriving at CMPS calculus ready is important to timely graduation. We are aware of students who arrive at CMPS placing into only MATH 003, a developmental math course, but not of any who then graduated in CMPS. (A geology major who placed into 003 upon arrival is the timely poster child for this. Having spent several years trying to advance, he recently left campus with high credit count but low progress towards any major. Another hit to our graduation rate.) We are unable to speak in general to how many drop-out/stop-out students have poor math or co-req skills, since once they cease being an active CMPS major the campus denies us their data for analysis.

Can we get even better insights by tuning the co-reqs, or adjusting scores which students must earn in order to advance? Our sense is yes. We'd love to know for sure, and how.

The same manual study of data that revealed the above insights indicated that almost no CS major who arrived with a combined math/reading SAT under 1100 and without prior programming experiences actually remained a major after four semesters. After a period of struggling with either the intro sequence or math co-reqs, the students left or switched to a major outside the college. A complete study of the data might reveal more nuanced insights, and allow us to give a strong message to campus about the cost of accepting an unprepared student like this in the first place; it would guide faculty efforts to craft new courses that might be more accessible, perhaps creating a second track with a more gentle startup path; and most important it would help us flag such students earlier for stronger advising outreach from even before the student arrives here. This is blocked because we may not have the data, nor for that matter names of admitted students in a timely fashion.

A decade ago the college performed such a study limited to math prep for CS majors. It is a pity that we are not allowed to even replicate that level of investigation today.

3. *What role do key non-major classes play in successful outcomes?*

In the same spirit as above, we would like to understand the role played by courses such as UNIV 100 (freshman orientation) or EDCP 108 courses (a series of counseling and personal services courses to which advisors send students who need college credit while learning study skills, with an easy boost to the grade point average.) To what extent do these help us reach successful outcomes? If study skills courses in particular artificially stretch out the time before a student must switch out of CMPS anyway, then we should not offer false hope – earlier is better than later for the student to choose another major. If on the other hand more students reach a successful outcome after taking such classes than do comparably challenged students who do not, then we can know their value and advise accordingly. Which is it? We'd love to find out. Most likely we will find that students encounter a broad variety of issues, and one size advice won't fit all, but that ought not prevent us from trying to learn how best to tailor advice so we can help all students.

Generally our students are barred from advancing into the majors until pre- and co-reqs are satisfied (for good reason.) Students arriving unprepared to pass the gateway courses struggle to round out a schedule. We should inform our advisors about which courses are effective preparation that contribute to a successful outcome, and which are simply filler.

4. *What roles do Maryland's high school Career Technology Education programs play in preparing students for a CMPS major?*

As the state's flagship campus, College Park should play a leadership role in improving the STEM degree pipeline, which is a system priority, as is embrace of the P-20 concept of integrating the public school and university experiences. CMPS in particular should speak to the state high school system's preparation of students for entry to our college's majors, of which computer science is by far the most in demand, and for which supply falls far short.

Several factors draw our attention to potential alignment issues between high schools' curriculum and that of College Park, but the present point addresses potential negative influence of CTE, Career Technology Education, on student matriculation into computer science on this campus.

CTE is highly promoted throughout the state, and last year over 4,000 high school students participated in one of the four year programs. The CTE track in Information Technology is where students are guided when they express an interest in computers.

Unfortunately, the anecdotal evidence available to us suggests that tracking students to CTE for IT training has the effect of diminishing their transition into College Park. It seems as if we ought to find out the extent to which this is true, since it could be that a state emphasis on CTE in high school could actually be one of the factors that *drops* the output of top computer scientists at the end of the STEM degree pipeline.

Our theory is that training on specific technology at the high school level chiefly serves production of terminal degrees – employees who are workforce ready. This training is at expense of deeper educational priorities – from calculus to Shakespeare – that are critical for a student to enter and thrive in College Park. We are aware of CTE programs at each end of the spectrum – from pure training to education – but what is the effect here?

By manual techniques we have yet to find any computer science major in our program who came from one of the state's CTE IT programs. Why is that? Are students out of IT tracks too good and simply go to better schools? Do they apply and not get accepted? Are they accepted but not yielded? And if we knew of students out of those tracks, then we'd ask: how do they fare once in College Park?

These seem like important questions, that revolve around the appearance of a disconnect between high schools and the flagship. What a pity that the campus denies us the ability to investigate the gap further.

5. *Do curricular barriers in Maryland's high schools deny students access to a CMPS major?*

The need to study a broader alignment issue than just CTE preparation is suggested by leading evidence – partial to be sure, and expensive to have collected manually – that suggests not all of Maryland's high school students have equal opportunity to CMPS.

In the last four years for which we attempted to reconstruct data, little more than a dozen high schools comprised nearly a quarter of new freshmen entering CMPS. Well more than half of the state's 281 public and private high schools supplied not even one student to a CMPS major in this period, and we found no record of any student entering CMPS from three of Maryland's counties altogether.

As the state's paladin of science, CMPS should take the lead in understanding why. It seems unlikely that a majority of Maryland high schools would have no students who are either interested in sciences or capable enough to try. Are they not well prepared? Are they prepared but not applying to College Park? Are they not being accepted to College Park? Where do they matriculate if not here? If these under-represented high schools and counties have gifted students interested in College Park, then (anticipating this report's next section) why are we accepting so many ill-prepared students who run up our costs and drive down our graduation rates?

These are all questions for which answers can be found if only campus would grant us access to the data for analysis. And if in fact it turns out that ill-informed advising policy or misaligned curricula in high schools disadvantage talented students from gaining entry to a CMPS major in College Park, then it should be our responsibility to both understand the situation and make outreach to fix it.

6. *What roles do special programs play in successful outcomes, and at what cost?*

The campus, and college, run several special programs intended to help students who need remedial work or other support in order to get on track to a successful outcome. Our sense is that these programs run on auto-pilot, without assessment to understand which are cost effective and which are merely rituals. We should be allowed access to the data that might help us expand successful programs, and recognize those that are not.

One example is Freshman Connection, which is a program that allows students who did not win a regular fall admission slot to improve their record by taking selected courses in preparation for a spring semester admission. Last fall CMPS had 37 students in an FC offering of MATH 140, of which we were allowed computationally useful data on only 8. Is Math placement of FC students calibrated correctly, or should we shade placement towards a more conservative decision for these students in order to help their transition? Is there extra content we might include on the margin in order to improve successes? We would love to know.

Another example is Bridge, which is an intensive summer experience for students having serious math deficiencies who have been accepted for fall. Does it work? Bridge clearly has success stories, but anecdotally we know of cases where students participating in this program ended up taking far longer to get up on track than had they just proceeded into a remedial fall semester experience. In these cases, and based only on participation in the program, Bridge staff optimistically placed a student into far higher a Math course in fall than turns out to have been warranted. After a poor semester, the student drops back to take the course they should have in the first place, all of which delays for a year to year and a half the student's transition into a major that relies upon calculus. This observation suggests the half-life of such an intensive three week experience is relatively short, which would not be a surprise – if that worked in all cases, then we'd simply eliminate pre-calc from high schools and cram it into all students in the summer before college.

Bridge is known to front-load for success, so factoring out students who probably did not need to be there in the first place leaves a far murkier track record. We'd love to know how better to tailor the summer experience and help Bridge play a more effective role in successful outcomes. A pity that we are denied the data needed to do accomplish this.

7. *What CMPS advising policies for transfer students will improve graduation rates?*

Taken as a group, transfer students represent the single greatest drain on our measures of quality and costs. While many talented students arrive here as transfers, our operations take a huge hit from the unprepared students who drain resources out of proportion to the value they bring on quality metrics. This should be no surprise. Admissions policy vets first time freshman extensively, but apparently sets no standard for transfer admission.

We should let data draw our gaze to patterns of student failure that might be remedied by modest policy or advising improvements. We would like to inform admissions counselors in the community colleges about what preparation is particularly germane to success once a student is here; as with all our students, we would like to recognize early any signals of distress that would recommend intervention, in time to do something real about it (we do not presume the same signals invite the same intervention as for first time freshman, as the two usually have different issues); and we would like to advise all of our students on creative ways to reach successful outcomes at lower cost.

An example that addresses the latter point has to do with the CMPS policy which requires all of our major course pre-reqs to be satisfied from within the college. (So for example, once a student declares as a Physics major, we would require that he take math pre-reqs to physics classes from within CMPS.) We have maintained this policy because of having observed in the past a wide diversity in levels of rigor on classes that students might bring in otherwise. While historically useful, does this continue to serve us? Do students who satisfy CMPS pre-reqs in College Park have a measurable improvement on outcomes as compared with those who transfer in credit? It seems as if we should know. If this is key to our successes then we should be in a position to defend it; if it is not, then we should be in a position to help students for which cost is an issue take their pre-reqs elsewhere (at cheaper rates) for transfer into CMPS. Can we do this without sacrificing successes? The campus denies us data to assess.

Many other questions naturally arise in the culture of quality and assessment we have tried to build. (*Does housing situation on or off campus correlate in any measurable way with successful outcomes?* Experienced advisors dealing with a distressed freshman will routinely inquire about the student's situation in Res Life, and commonly discover that a course issue is really a room-mate or study environment issue. We ought to know if this is quantifiable or just lore. *What is the measurable impact on outcomes or progress due to work situations, internships or big course loads?* Obviously we prefer least distraction from full time study, but how do we advise our students when some work becomes too much? It seems like we ought to have some perspective. And so on.) Unfortunately, most such lines of inquiry are simply dead before they start, because we know campus denies us access to data needed for insight.

IV. RECRUITING

We are denied the ability to identify Maryland's best high school sources of CMPS candidates and cultivate a relationship with its leaders; we are denied access to application data that would help us understand trends and tailor a message to each accepted student we are trying to yield; and we are denied a basic opportunity to find Admissions errors so they may be fixed in a timely manner and improve the quality of our yield.

With some of the best-ranked programs on campus, CMPS recognizes that its ability to maintain national standing depends on influx of top quality students. Having top faculty mentor the best students on research projects is one of the ways we can advance, and by the same token, we diminish our competitiveness by burdening faculty with remedial instruction of students who might have been better served elsewhere than the flagship.

While prominent in our strategic plan, this need for excellence in recruiting is unmet, in part for want of access to basic data that would let us carry our fate in our own hands.

The Office of Undergraduate Admissions (OUA) prohibits departments from making a recruiting visit to high schools except when arranged through that office and controlled by one of their representatives. Having gained this power, OUA refuses to exercise it. In the summer of 2008 we asked for the names of whomever in OUA is serves as liaison to a number of high schools of great interest to us (e.g. Montgomery Blair Science Magnet.) In spite of repeated requests and reminders we have yet to get a response, and still do not know who would arrange such visits. While OUA staff has recently given lip service to visits, we have yet to see the first one scheduled.

Even basic information from OUA that stakeholders need for our operations is commonly flawed, late or simply not provided at all.

- o Data sent to us by OUA during and after the yield season are incomplete. This spring one of the updated lists shared with us late in the yield season contained new records for students whose decision date and letter were listed as January, yet never previously shared with us on earlier lists. It is difficult for us to yield these students if we never learn their existence until the yield season is over. Last year we were not sent even partial information about who was given a spring admit or Freshman Connection offer until well after it would have been possible to include these students in yield efforts. This year we were not sent such information at all.

- o This year we were never provided with information on who was placed on the new wait list. It is professionally and personally embarrassing to be contacted by applicants who inquire about our programs, only to find we do know nothing of their ever having applied, much less having been placed on a waitlist. This does not project an image of competence on this campus.

- o When data was sent to us during the yield period it arrived in mixed formats. For some students we are told a high school whence they came. For others we might learn GPA or SAT. But not both. Sometimes gender will be shared, other times admit status. This makes for a hodgepodge of records that is expensive and time consuming to manage in coordination with our college's units. How to tell who is a new name on our radar? OUA needlessly obfusticates the task of finding out.

- Lists provided to us in May, ostensibly the end of the yield season, are incorrect and incomplete. During summer orientation this year we advised over 30 students whose name never previously appeared on any list given to us by Admissions.

- Last year – and from what we have seen to date this year is the same story – OUA continues to admit students throughout summer, no record of which has OUA given to us. We found this by trying to analyze CMPS drop-out/ stop-out cases, and were surprised to discover weak, first time freshman were admitted here at end of July (2008). Some remained a major until just after the freeze in Fall, then switched and were removed from our scope of records in the Warehouse. As a consequence, our graduation and retention rates to the end of time will be determined in part by performance of students whose names we never learned from OUA (much less were flagged to us as arriving under-prepared and at-risk, so in need of extra advising) and who never took a major course in our college. A reasonable person who cared about student performance might alert us to these at-risk students (so we could attend to them) rather than hide them from us.

- In each of 2007 and 2008 we repeatedly requested the lists of Letters & Sciences admits so we could vet the list for students whose math preparation suggested they would be eligible to take intro classes in any of our college's majors. We had hoped to send a friendly invitation to consider starting one of our STEM degrees. In 2007 the requests were met with silence. In 2008, at a time when UPAC sought ways to promote opportunities to L&S students, only the postal addresses of the students were provided to us at end of the summer – well after all orientations, the points when students will have locked in their fall plans. No data this year.

- This year we had trouble getting the gender of applicants, which disrupted one of our more successful yield activities. We are blessed that current women students are willing to write a personal letter to help new female students feel welcome – awkward to do if we guess wrong at gender based on the name. OUA does not recognize women in science as under-represented minorities.

- We are denied access to OUA's Optix database of student applications, which contains details about students. As a result, we are unable to tailor contacts with students in order to make the best pitch for yielding them. If it turned out that a CMPS faculty member had written a letter of recommendation for the student, then we would have no way to make that connection and invite the professor to make one of our yield calls. We are unable to connect faculty with applicants based on common interests or areas (e.g., we would have someone who ran one of our high school programming contests make the outreach to students whose file showed they had competed on such a team.) Instead, we are forced to make what are in effect cold calls and send messages that are only one step away from being addressed as to "OCCUPANT". In contrast, Optix information is made available to the other colleges in support of their successful recruiting and yield efforts.

- In again stonewalling our access to Optix data, OUA's Senior Associate Director offered that she would find for us such data as given in examples above among CMPS applicants. We immediately sent a request, to which we have not yet had the courtesy of a responding email. Silence in response to requests is the norm.

o   This report's author repeatedly requested from OUA's Senior Associate Director, as custodian of record, access to public records relating to OUA's handling of administrative requests for access to Optix. These requests were ignored. OUA's willingness to illegally ignore valid requests made pursuant to the Maryland Public Information Act shows hubris we have come to see as typical.

OUA is not just impervious to requests for information. It routinely ignores basic and well-intentioned suggestions for simple bug fixes or omissions in advertising. Examples:

o   Before the 2008 recruiting season we discovered that "computer science" – one of the key STEM degrees we champion on this campus – is not advertised by OUA on web sites commonly used by prospective students. For example, someone who searches collegeboard.com for a "computer science" program in Maryland can learn about Bowie State, Towson and even University College, but not College Park's premier program. (The same search for "Mathematics" or "Physics" can bring us to this campus, so it is clearly just a miss-entry on the advertising done by people who don't perhaps understand the difference between computer science and information technology, which does direct searches to this campus.) We've repeatedly noted such omissions to OUA in the last year and a half, including to senior staff. Nevertheless the omissions remain as of the date of this writing.

o   As another part of its advertising, OUA keeps links on its web site to certificates offered to undergraduates. One of the links is for CMPS's certificate in scientific computation, but unfortunately OUA's site directs inquiries to Physics, rather than to our AMSC office, in which it is perhaps not a coincidence that no students take this program. Same story as above: nobody even up through McLean acted. The problem remains as of the date of this writing.

Data we are able to reconstruct with the goal of improving CMPS recruiting efforts leaves the quality of OUA's admissions decisions seriously in doubt. While there is no 'sure thing' in admissions – any student, no matter how good on paper, can surprise us with a poor outcome – a sufficiently careful look at aggregated data reveals reasonable predictors of early performance. Even by obvious predictors, OUA makes questionable decisions. Of course, one complaint repeated in this report is that OUA denies us data needed to calibrate Maryland-specific models and gain deeper insights, but taking this one step further, it appears that OUA violates its own published guidelines and policies, with the effect of accepting students who needlessly diminish the college's graduation and retention rates, and bypassing students who would have predictably helped us meet our STEM degree priorities for the state.

To illustrate, we turn first to policies for admission of transfer students:

---

http://www.transferfaqs.umd.edu/transferstudent.htm

… A successful transfer applicant typically meets the following standards:
• 30 semester hours or 45 quarter hours (one full year of college.)
• Above average grades from all schools previously attended. For admission purposes, a cumulative GPA will be calculated that combines grades for all completed college-level courses.
• Good academic, judicial and financial standing at all previously attended schools.
• Completion of an English composition class that transfers as UM's ENGL 101 and a college-level math course such as College Algebra, Probability, Statistics or Pre-Calculus.

Transfer students arrive with an especially wide spread of skills and preparation, and so represent a large challenge to achieving our aspirations of quality under the strategic plan. This comes as no surprise. While there is extensive vetting and assessment of first-time freshman, admits of transfers are handled as a routine administrative process subject to almost no vetting. As has been stated by the Provost "someone's got to pay the bills around here" but even with budget in mind, the data reconstructed so far paint a picture of Admissions being asleep at the switch. As we will show, the campus turns away well prepared students who might pay bills in favor of some who are not prepared.

An oft-repeated campus folklore that Admissions incants each time stakeholders lament poorly prepared transfer students is that state law says we *must* accept advanced (greater than 55 credit) transfer students from other system schools. However that folklore seems to be only bluffery intended to defend poor practices. As seen above, the actual language of the mandate only guarantees such a student admission at *some* four-year institution, not the one of his or her choice, much less the Flagship with more demanding programs. Moreover, the law allows that higher admissions standards may be in force when demand outpaces the supply of seats, which is just what we have in College Park today.

Continuing, OUA's own web site promotes that transfers should have at least 30 credits, and have completed fundamental studies. We in particular draw attention to the case when a student seeks transfer with fewer than 56 credits. The text clearly limits any admission promise in this case to students who "would have met freshman requirements at the USM institution to which they are applying…"

Because of the above, we are surprised that OUA turns away well prepared students in favor of transfer students who have not yet satisfied fundamental studies; credit-rich

transfers who upon arrival must immediately take remedial courses in order to make up high school level skills before beginning one of our CMPS majors; and low or zero credit transfers who failed to gain entry as a first time freshman yet are accepted as transfers (in variance with the state mandate) as an administrative routine. Almost all such students end up needlessly and negatively impacting our graduation and retention rates (and as we point out later in this report, it appears we end up needlessly and negatively impacting these students' careers as well.)

Examples of Fall admits who do not meet minimum criteria …

… and, based on record, with little realistic expectation of completing a CMPS major. Note how many were transfers admitted without preparation yet after the point when we were already turning away far more prepared first-time freshman applicants.[3]

1001. Transfers in only on-line courses, as a CS major with 25 credits. No FM/ FE.. Applied in January and offered in February.

1002. Transfers in from a neighboring state as a CS major with 27 credits, but not satisfying FM. Applied in April and admitted in June.

1003. Transfers in from small southern schools after 10 year hiatus, with 76 credits. Applied in April, decision late May. No math scores on record – coming in as CS major but so far not registered for any CMPS course, and no history on record to suggest he knows math. Has no FE.

1004. Transfers in as a Physics major with 48 credits. Has not satisfied FM. Will take MATH113 in the fall. No realistic prospect of completing any CMPS major.

1005. With SAT 920, transfers in to L&S with 51 credits. Has not satisfied FM/FE. Applied in February, accepted early March.

1006. Transfers in 71 credits as CS major from several small local CC's, of which 47 are accepted. Has not satisfied FM/FE. Places into MATH113 so now in the classic holding pattern waiting to get through math in order to start a major. Taking CMSC198K and ENGL101 in fall.

1007. Transfers in as CS major with 25 credits from a CC. Has not satisfied FM/FE. Places into MATH111 but not yet seen as taking any CMPS courses in fall. SAT is repeated, from 690 to 850. Applied December, February decision.

Examples of Fall admits who meet minimum criteria but are not calculus ready

1008. Transfers from local CC as a CS major with 49 credits. Listed as having satisfied FM by transfer, but still places into MATH003, so it will be a few semesters until he can begin a CS major here. Applied in March, decided in June.

1009. Transfers from another Maryland campus as a Physics major with 15 credits. Officially has satisfied FM/FE, however placed into MATH003 here. Is a January decision, SAT 1140.

1010. Transfers from another Maryland campus as a CS major with 14 credits. Officially has satisfied FM, but places into MATH115 here and so will be in a holding pattern on starting a major here until he satisfies pre-reqs. Arrived without FE. Applied in April, accepted end of May.

1011. Transfer from local CC as a CS major with no record of any courses transferring. Nevertheless is listed as having satisfied FM/FE by transfer (suggesting that Admissions checks these off automatically.) Places into MATH015 for fall. Applied in March, was a June admit. SAT 470 verbal, 520 math.

1012. Transfers in as CS major from multiple local CC's, with 74 credits. Listed as having satisfied FM by transfer, but places into MATH115 in fall, so goes into a holding pattern before being able to begin a CMPS major. Applied in May, accepted late May.

---

[3] Note: FM = Freshman Math, FE = Freshman English. Except as otherwise indicated, all SAT scores are combined math/reading. All GPA's cited are just approximate.

Examples of Fall admits who arrive at risk

1013. First time freshman with 1100 SATs and a 2.7 weighted high school GPA. Student athlete, applied mid January, accepted into Physical Sciences early February ahead of all honors students.

1014. Transfers in 6 credits so considered "freshman with advanced standing", arrives as a CS major with sub-1100 SATs, places into MATH003. Applied October, decided January ahead of honors decisions.

1015. First time freshman arrives as a Math major with 1050 SATs and places into MATH003. Athlete from out of state with sub-3.0 unweighted GPA. A January admit.

1016. First time freshman arrives as a CS major. 1020 SATs, 3.7 GPA from a Prince George's HS. Places into MATH003. January admit decision.

We have good reason to be concerned about these students. Those who arrive unprepared struggle and, all too often, fail. To illustrate how much this is a CMPS concern, consider basic math preparation. We were able to manually reconstruct records of 60 students who entered the University from Fall 2006 through Fall 2008, and who then registered for our MATH003, the "developmental" math course for students who need remedial skills before attempting the algebra, pre-calc and then calculus courses required for graduation as a CMPS major. (We're confident there were more students, but as they have already left campus their records are removed from our access.)

Of these 60 students, 53 are already dismissed, on probation, departed from the university or changed majors out of CMPS. Two are in their second attempt at MATH115, and one is in a second attempt at MATH140 – both signals that they will likely be out of CMPS in another semester. One was just inexplicably granted a Dean's exception for a third try at MATH140 – another danger signal. One, having gotten through MATH115 by friction, is starting MATH140 in the fall – which, because of co-reqs, means the student has been unable to start his major sequence until the beginning of his third year on campus; he will sit side by side with first time freshman who arrived prepared. Another, in his fourth year and having just squeaked through MATH140/141, is this fall in his first attempt at the second course in the CS intro sequence, CMSC132. Only one can be considered on track and a success, having registered for his first 300-level course in the CS major.

A one-out-of-sixty success ratio is obviously not where we want to be, which begs the question of why were they admitted in the first place. All had prior records that pointed to math deficiencies. Take from CMPS statistics all such students who we argued should not have been admitted in the first place due to lack of preparation, and CMPS would have exceeded the Provost's target for retention rates last year. Interestingly, 41 of these 60 were transfer admits who were brought in outside the scope of policy we listed earlier.

Considering SAT as just one example of a predictor that might foretell prospects for at least first year success, we pulled the 15 worst SAT scores (by math or overall) from the fall entering classes of 2006 through 2008. Unsurprisingly there was overlap with those cases listed above. SAT was clearly an effective predictor. Of five students who entered in Fall 2006 the only one who remains a CMPS major is the only one whose Math SAT cracked 500. Of the four who entered in Fall 2007, one never passed a course in CMPS and has switched majors out. The other three have yet to finish the intro sequence in their respective majors, but continue trying to do so by friction. Of six who entered in 2008, those having sub-400 SAT math scores or placement into MATH003 are either already switched out of the major or obviously about to do so (having never yet passed a course

in CMPS.) One CS major actually has gotten through the first intro course, though is having issues with the math co-reqs for the second; except for a liberal dose of weight training electives, AASP and EDCP108 courses, his grade point would place him on probation for all the tries at the major courses.

There are many examples of students who were denied admission as first time freshman and who were later admitted as transfers with few credits, in apparent violation of state convention. A representative is a CS major who was denied admission as a first time freshman in Fall 2003, then accepted as transfer in Fall 2006 with just under 30 credits. He began an immediate pattern of failure. All predictors indicated he was a poor risk – his original denial was the right call, so we snatched defeat from the jaws of victory.

Who was displaced by the above weak students? Among the examples are a first time freshman with 28 credits of AP, 1320 SATs, a 3.7GPA from a Bethesda area high school, and a strong letter of recommendation from a CMPS faculty member. Another was an out-of-state student who as a high school student had already passed upper level CS courses at another university you've heard of, and yet was denied admission even after we begged for reconsideration of someone who had demonstrated such depth in his field of study. Months later, one of the 370 Math SAT students mentioned above applied for admission and was given a July admit decision. The latter student that Admissions held out for is already gone. The CS star we could have yielded, had he only been admitted, had long since accepted scholarships to attend another university.

The quality of OUA's handling of talented students and scholarships is in doubt. We have many heartbreaking stories of yieldable students who we'd love to have had yet were lost for OUA's failure to properly coordinate with campus stakeholders. Records that should have been sent for Honors consideration were lost or mishandled, with predictable result.

1017. A student with 1590 SATs, 4.7 GPA, great background. Errors on admissions part pushed decision on honors with scholarship to early May, but too late by then. Another case where we could have averted disaster on a great CMPS student if only we had access to records.

1018. A student with great record and 1570 SATs, not considered for honors. Clearly a mistake was made in Admissions office, but not apparent to us for want of information shared with us, until after the student stopped looking at UMCP. Only revealed in a phone conversation during our own routine yield efforts.

1019/1020. Twins having nearly identical SAT and GPA. One was chosen for BK interview, the other not, ultimately neither was offered. Lost both students to CMU, which recruited them aggressively. Both are students whose information we'd love to have had far in advance so we could tailor a yield plan for them.

1021. A talented student who was on our radar because of participation in earlier recruiting activities and because of math faculty's involvement with him. Perfect SAT, 40 AP and college credits with perfect 4.0 GPA, and tremendous performance in math olympiad. Was not shown to Honors or given admit until after the first round of offers and we brought it to Honors attention. Ultimately given an offer but late. We had a strong yield plan and prospects for success because of an established connection with faculty in our college, all of which was subverted by mishandling by Admissions.

As suggested by the preceding text, CMPS is starved for even basic information needed to run its operations, yet beyond basics are bigger questions asked by the Associate Dean:

1. I'd like to know why, in an era of increased accountability and urgency to raise STEM degree production, applicants who present as functionally innumerate (in one case with a 370 Math SAT) and unlikely to complete a CMPS degree in any amount of time, get immediate admission months after we have turned away well prepared students, who presented as eminently likely to reach a successful outcome.

I'd like to know just what it means to be a flagship campus if resources that could have been invested in our mission to compete internationally are instead diverted to remedial studies because the Admissions office is unable or unwilling to recognize clear signs of an applicant's lack of preparation for the College Park experience. I'd like to know what to tell a parent is the measurable value to the campus and state from denying his student entry to this campus in favor of an applicant who objectively has a mere fraction of the preparation and qualification.

Montgomery County schools cite SAT scores of 1650/2400 (basically 550's in each of the three areas) as the baseline predictor for success in a generic college environment. (http://www.montgomeryschoolsmd.org/info/keys/) One might reasonably hope and expect that a "Flagship" campus would be more demanding. Maryland's OUA in contrast reaches hundreds of points below that predictor to bring in applicants based on some belief that 'other factors' adequately substitute for academic preparation. We all pay a higher cost because of the fallacy of OUA's presumption.

A Governor's commission just recommended new and expensive investments into efforts intended to boost STEM awareness and degree production in Maryland. None of these can possibly bear substantial fruit at the flagship campus because our Admissions process does not recognize, recruit and admit applicants based on STEM preparation. High school programs can boost STEM preparation and interest all they want, but if Admissions still bases decisions on 'other factors' (most of which are unmeasured and ignored) then those programs won't translate into STEM yield. Might not a cost-free way to boost production be to simply admit qualified applicants who today we turn away?

2. I'd like to know why fundamental decisions about academic programs and recruiting are made by administrators who are not a part of or answerable to professorial faculty, in contrast to the practices of our aspirational peers. Or …

3. I'd like to know why professorial faculty and colleges are accountable for the quality of academic programs having fundamental properties over which faculty and colleges have no control.

If non-faculty administrators make decisions about academic programs and recruiting, then it should not be a surprise if decisions meet the needs of non-faculty administrators.

Any organization will optimize based on how it is evaluated and rewarded. By all direct observation, non-faculty administrators making fundamental decisions about academics at College Park are not measured by the same academic yardstick by which we measure colleges, since if they were then the pattern of problematic admissions and curriculum practices as documented here would not have continued for so long. Some administrators clearly pursue very different goals than those sought by the colleges, and apparently they are rewarded accordingly.

Several questions naturally follow from this structural defect of administration, such as:

4. I'd like to know why transfer into College Park is far easier than admission as a first time freshman.

Each college is responsible for enforcing *benchmarks* – standards for assessing progress by our respective majors. In contrast, OUA seems oblivious to any sort of benchmark of the colleges to which they bring students. It routinely admits transfer students whose lack of progress, had it been as a first-time freshman here, would have been cause for ejection from that college. These students are in violation the moment they arrive.

Articles in the WSJ and Chronicle make clear that the national norm is for transfer to be far more difficult. Any state's flagship campus should collect the best and brightest so it can complete internationally. In contrast, Maryland violates its own stated policies on transfer, to the detriment of our overall potential for excellence. And similarly …

5. I'd like to know why international applicants have priority over Maryland residents on admissions opportunities and decisions.

Based on admit decisions forwarded to us from OUA, it appears that on 12/17/2008 a few dozen international applicants were notified of admission, almost exclusively students from PRC. This date places them about six to eight weeks ahead of domestic student decisions, and because of the sliding window of offers this gives them top priority over Maryland residents. The dominance of PRC in this mix is clearly more than a statistical fluke, but is otherwise unexplained by campus. It would be interesting for us to know why we have no international applicants from South America, Africa, Europe or for that matter most other Asian countries. (Of course, we might have applicants from those sources, just no admits, but we can't know it since OUA won't share that data.)

6. I'd like to know why students having serious math or other preparation issues are admitted mid-summer (often long after a notice of 'full' goes out) but then aren't flagged to the people who are responsible for advising them to successful outcomes.

There is no sharper example of differing faculty and administrator evaluation criteria. If we all shared faculty objectives – successful outcomes for our students after a rigorous course of study – then administators in charge would alert colleges to weakly prepared arrivals so we might immediately advise on best practices to reach graduation. The fact that administrators instead keep us in the dark on such information means they achieve a successful outcome just by getting a student in our front door – nothing after that point factors into their performance measures. Once they throw a student over the wall to us, any subsequent outcome becomes part of our evaluation – not theirs. They optimize for their measures at expense of our measures.

7. I'd like to know why no we have no specific description of academics and graduation requirements at the Admissions web site.

This seems like the sort of data that serious scholars might look for in sizing up a campus, so if we're fishing for them then shouldn't we use the right bait? In contrast, we can find out about athletics and campus life with ease. Absence of a description of academics and what it means to get a Maryland degree doesn't seem to telegraph a focus on scholarship. We help prospectives visualize athletic opportunities. Can't we help them visualize the interesting classes they might take? If we were optimizing for academics, then we might.

Of course, perhaps we missed such information on the OUA site, but either way this is an interesting exercise for the reader: Starting from the Admissions main web page, find out how many clicks it takes for a prospective student to learn that there is something called CORE in his or her future here, and then learn that how many credits are associated with something called fundamental studies. (Hint: technically you can find the first in about 3 clicks, but knowing to follow it is problematic, since there is no description. As one test subject said, "why would I click on general education when I want to major in math?")

8. I'd like to know why Freshman Connection is apparently a whites-only program.

Enrollment management needs dictate that the campus spread out intake of new students in order to maximize throughput. Freshman Connection is an opportunity for students in a spring entering class to get an early start by taking select classes available to them in fall.

> **Freshmen Connection** provides spring admitted freshmen with the opportunity to start their Maryland education in the fall. You'll get on track to graduate in four years, earn up to 16 University of Maryland credits, and be a part of all that Maryland has to offer.
>
> In **Freshmen Connection**, you'll enroll in Maryland courses and connect to the University's resources that help you succeed. You'll take classes with other students in the program, form study groups, and develop social networks that will last throughout your time at Maryland.

It was troubling that while checking preparation of the 76 Freshman Connection students having a CMPS connection in recent years, I noticed none are listed as African American. (Two appear in records as Hispanic. Also the overwhelming majority of participants are men.) One might wonder what admissions policy would allow an imbalance such that no student of color (or at least one who is interested in computers, mathematics, physics, astronomy, geology or earth sciences, the majors of this college, which seems to cover a broad set of areas) has an opportunity to get a head start at College Park by participating in a program like Freshman Connection. This property remained true of the students who entered in Fall 2009, based on our reconstruction of partial data from the recent recruiting season.

V. STUDYING DEEPER STRATEGIC QUESTIONS FOR THE STATE

We are denied the opportunity to study the state's STEM degree pathways in order to expose bottlenecks and suggest remedies, with the potential of raising the overall USM production of STEM degrees.

The National Clearinghouse is a service in which our campus is a first class player, and it provides a wealth of information about where prospective students attend if not here, and also where our students continue education after leaving here (whether due to a good or poor outcome at College Park.) More precisely, the Clearinghouse would be a wealth of information if only we were allowed to use it.

Previous reports document our role in helping process Clearinghouse data to benefit all colleges, and of the unexpected mandate from IRPA that we destroy these data right at the point the first pilot started to become useful.

Given the extent to which even basic data is not shared with us, per earlier parts of this report, it would be overkill for us to lament much further of lost potential due to lack of Clearinghouse access too, but one example, that is very pressing, warrants mention, and that has to do with raising STEM degree production in the UM system.

We have documented the number of unprepared students accepted into CMPS majors, and watched in frustration as many of them struggle for several semesters trying to get past even the intro sequence or mathematics pre-reqs. At the point when all in-college options have been exhausted, they may be 60 or more credits in to campus, and are as likely to simply leave as to start another major.

Our speculation is that many of these students would have been far better off by going to another of the schools in the system, at least for the start, where they would be presented with a far gentler introduction to a STEM major than they get here at the flagship, where everything is maximally challenging by design. Would these students then be more likely to complete a STEM degree, rather than leave altogether after we burned them out here?

Our hypothesis is yes, and this can be evaluated by observations made, in part, through the Clearinghouse. We could observe, from afar, the performance of students who arrived at College Park with preparation issues, and compare outcomes with those of comparably prepared applicants (whose records we have) who matriculated elsewhere.

By addressing questions such as these we could surely get a far richer and fuller picture of STEM pathways in the state – and improve them.

TERMINOLOGY

CLFS – College of Chemical and Life Sciences

CMPS – College of Computer, Mathematical and Physical Sciences

CTE – Career and Technology Education (formerly called vocational education) are integrated four-year programs offered through some Maryland high schools and are intended to help students acquire skills and industry certifications in one of ten different "career clusters", from *Consumer Service, Hospitality and Tourism* though *Construction and Development*. One of these areas of interest to us here is *Information Technology*, where the hope is students will be workforce ready at time of graduation by virtue of having Cisco networking certification or Oracle (a database company) credentials.

FERPA – Family Educational Rights and Privacy Act, the body of federal laws that govern how anyone having access to student records may handle that data.

IRPA – The UM Office of Institutional Research, Planning and Assessment. Per the office's web site, these are the people who provide "essential information about the University of Maryland for the purposes of decision-making, policy analysis, strategic planning, mandated reporting, and academic program review." One of the common ways that users access IRPA's work product is through a web interface called Profiles, which gives a highly processed distillation of data for a fixed set of predetermined questions about campus.

OUA – The UM Office of Undergraduate Admissions, which is run by Barbara Gill, Assistant Vice President for Undergraduate Admissions and Enrollment Planning. Ms Gill's supervisor is Bill McLean, Associate Vice President for Academic Services.

P-20 mission – A priority of the University System of Maryland, which is to align and integrate educational opportunities from "pre-K through college"

Planning Cycle – is the annual evaluation done with each college to review how well it meets its campus obligations, to report back what are its needs in order to meet upcoming obligations and to alert campus to fluctuations in demand that require rapid adjustments in offerings.

STEM – Science, Technology, Engineering, Mathematics. STEM education is a priority in Maryland, especially in the context of meeting workforce needs due to the federal government's Base Relocation and Closing plans, which may bring a large number of labs and businesses into the state.

Warehouse – The Data Warehouse is an information resource provided to the campus decision makers. It contains a broad spectrum of types of data, and is intended to house preened and checked data for purposes of analysis. One of the common ways that users access these data is via a program called BRIO, which serves as a front end tool for making queries to warehouse databases.