A Guide for Evaluating and Selecting an Early Warning and Student Retention System

Retainology Consortium - Resource for Retention Professionals

Introduction

University retention initiatives that seek to identify and support at-risk students span the spectrum. These initiatives include activities such as freshman experience, peer mentoring, supplemental instruction, and tutoring. Additionally, due to the development and availability of sophisticated software and analytical tools for early identification of at-risk students, universities have been able to more accurately target these vulnerable populations for early intervention. One such system developed at Indiana University [1, 2] is known as IU-RETAIN. The development of the system was initiated in 2005, and it has been successfully implemented at Indiana University South Bend since the fall of 2007. This software tool is now available to academic institutions of higher education through the Retainology Consortium.

The Retainology Early-Warning and Retention Software [2, 3] offers the following (shown in figure 1):

1) Tools for **predicting** student risk prior to the start of each semester.
2) A simple and user-friendly **faculty portal** for collecting performance and attendance data from faculty.
3) A powerful and intuitive **advisor portal** which allows the advisors to quickly and easily select and communicate with their students based on specific risk conditions.
4) A **student portal** that allows the students to become involved as stakeholders in their own success and retention.
5) An extensive **administrative portal** which provides administrators and their delegates access to actionable data and reports, bringing the information and decision making to every administrative level, especially those closest to the student.

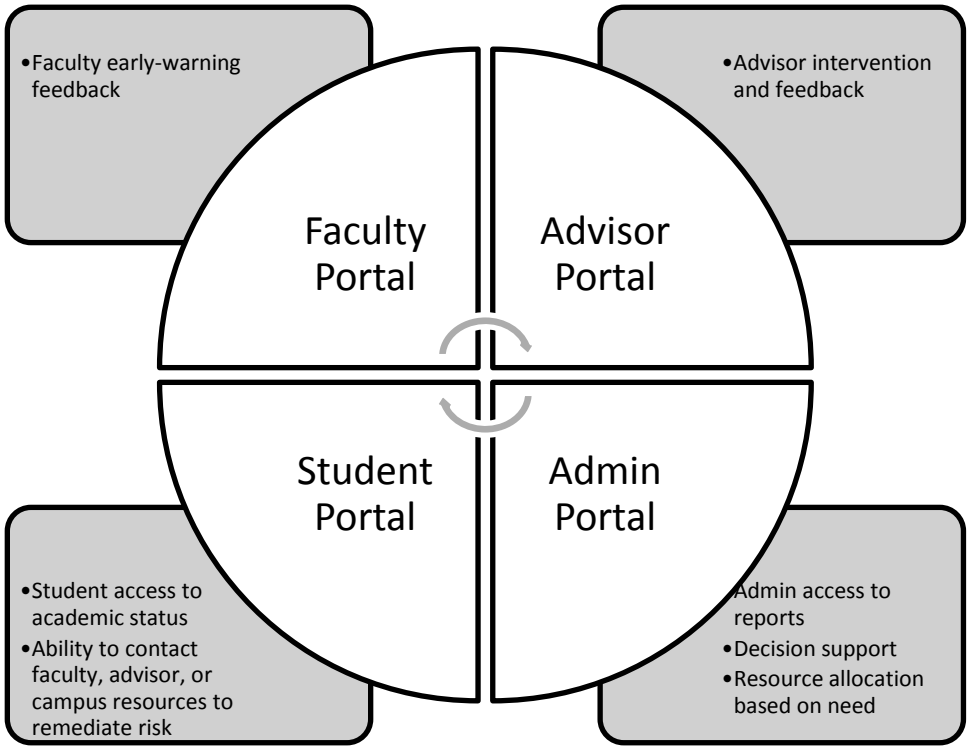

Figure 1 - Retainology Early Warning and Retention Software

Conceptual Model for Retention

The conceptual model for Retainology (shown in Figure 2) incorporates student profile data, as well as other available data (e.g., student self-assessment, or data extracted from course management systems), to develop an analytical prediction engine for risk assessment. The predictions, as well as the early-warning data reported by the faculty, are aggregated and made available to advisors and others who are charged with communication and outreach to students.

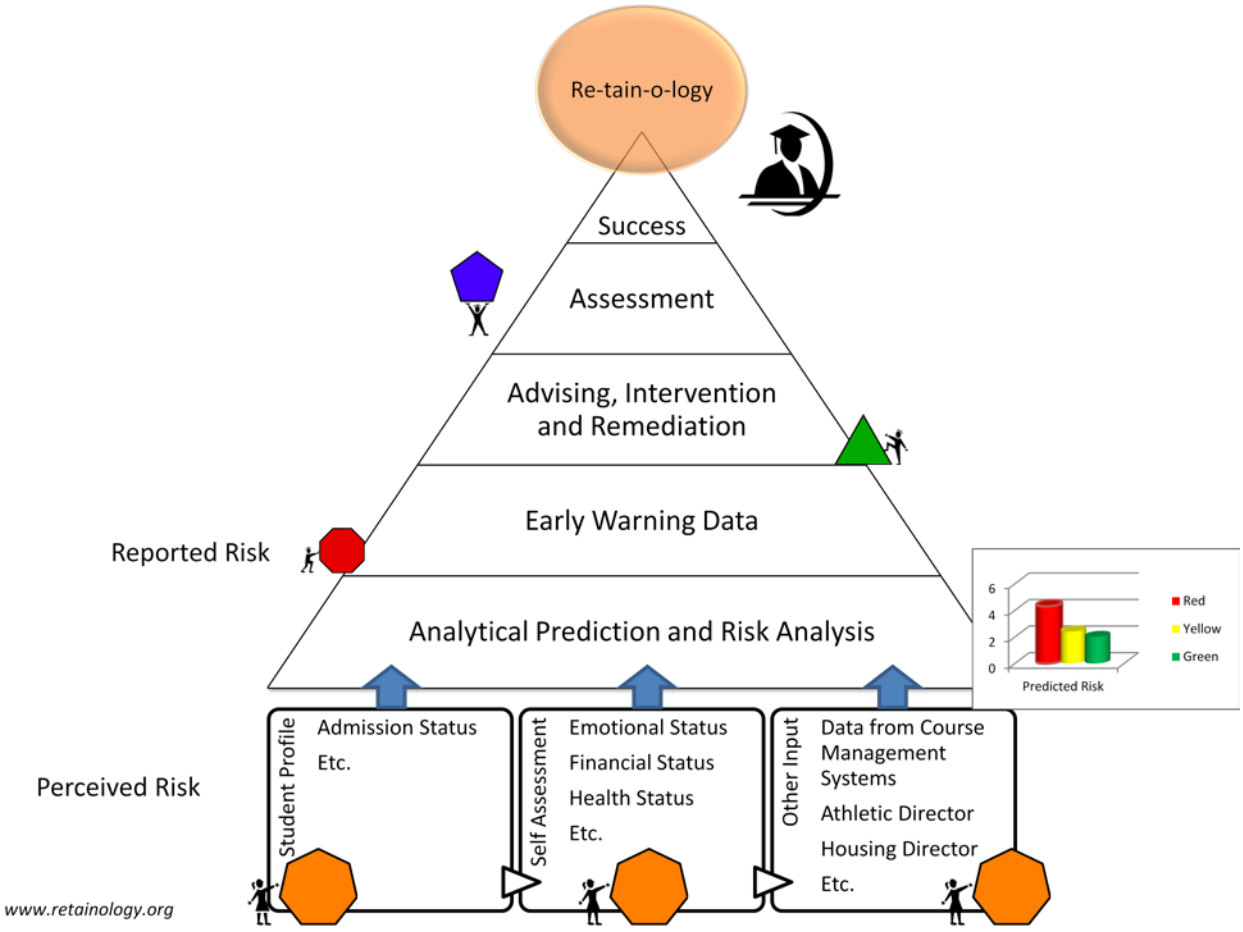

Figure 2: Conceptual Retention Model

Student themselves are part of the conceptual model. Both at-risk as well as students with no risk indicators can view their academic status at any time. Furthermore, at-risk students can complete a voluntary self assessment survey which can further aid the process of formulating proper support for students. Finally, administrators are part of the model and are able to view real-time actionable reports that helps them make decisions about staffing, budget allocation, and other day to day decision making.

An Evaluation Matrix for Selecting an Early-Warning and Retention Tool

The selection of an appropriate Early-Warning and Retention software tool is often a daunting task. Often, this responsibility is assigned to an individual (e.g., director or retention), or a group (e.g., a committee of faculty, administrators, staff, with some representation from the Information Technology department). Often these individuals or groups must try to create a mechanism for evaluating and selecting a system. Given our past experience and background in system design and integration, below we offer an instrument that may help simplify the evaluation and selection of an Early-Warning and Retention system.

Evaluation Criteria	Good (Score = 2)	Acceptable (Score = 1)	Unacceptable (Score = 0)	Candidate 1	Candidate 2	Candidate 3
Simplicity	• Users are clearly identified by their role. • Interfaces are simple, intuitive.	• Users are clearly identified by their role. • User interfaces are acceptable.	• Unnecessarily complex processes. • Cumbersome or unintuitive user interface (e.g., multiple clicks to achieve a task.)			
Speed	• Appropriate technologies are employed to speed up the user interaction. • System responsiveness should be nearly instantaneous (less than one second response-time.)	• The speed is acceptable, but response time is sometimes slow, or unpredictable.	• Slow response time. • Causes the user to be frustrated, get confused, and click multiple times to complete a function.			
Scalability	• The system should be scalable. Accommodate the natural growth of a university. • Many university systems include multiple campuses, and the system should accommodate that fact. • Scalability does not require unreasonable increase in the cost of hardware, or software.	• Scalability is available. • Scalability may require reasonable increase in the cost of hardware or software.	• System design is not scalable or requires significant increase in the cost of software or hardware.			
Hosted vs. in-house solution	• Provide both hosted as well as local in-house implementation. • Some universities have no problem placing their data in a cloud-based hosted solution. However some universities are quite sensitive to data security and privacy and would prefer to house their data on their own servers.	• Both hosted and in-house solutions could be acceptable based on the universities internal privacy and security policies. • Either solution must provide the mechanism by which the data and its access is secured and controlled.	• If the security or privacy of the data is not assured.			
Appropriate Solution for the Appropriate problem	• Software is specifically designed for early warning and retention. • Meets all the functional requirements of a retention initiative.	• Meets most of the functional requirements of retention initiatives desired by the organization.	• Minimally supports the functionality and requirements of retention initiatives desired by the organization.			

Cost of integration with existing systems	• Fixed and reasonable cost of integration or migration of data to the new Early Warning and Retention System.		• Unclear or open ended cost structure. • Unclear path for migration of data.			
Cost of supporting software tools and infrastructure.	• Some software applications include a hidden licensing cost (such as having to purchase runtime libraries, databases system, development tools, etc.)		• No hidden costs for additional software licensing. • Preferably using mature public domain tools and technologies help in this area.			
Cost of Software (License cost, per user cost, etc.)	• Fixed and reasonable.	• Per student cost with a reasonable cap that allows for proper budgeting.	• Teaser rates, followed by significant cost increases.			
Cost of Hardware and Network (servers, network traffic, etc)	• Fixed and reasonable. • Virtual host with ability to scale.	• Fixed or variable with a reasonable cap.	• Variable with no cap			
Cost of Maintenance	• Fixed and reasonable.	• Variable, but with a reasonable annual cap.	• Cost of maintenance can be up to 90% of the overall cost of the software. • Cost of maintenance is mitigated and does not become a hidden cost for the university. • If building an in-house solution, proper analysis, design and architecture can mitigate this risk. • Vended solution can mitigate this risk. • Being part of the consortium can mitigate this risk.			
Security, privacy, local, state and federal laws	• Role based access control • Secure web site and secure communication (https) • Encryption of relevant data.		• Lack of role-based access to data. • Insecure web site (http) • Lack of proper encryption.			
Maturity of Technology	• The software tools used to build the system should be mature and have reasonable support structure. This could be achieved by using reputable commercial development tools or by selecting reputable public domain development tools.		• Use of immature or obscure development tools.			
Predictive Capability	• Research based predictive model which can predict which		• No predictive modeling provided.			

	student may be more at-risk. • The model should explain the reasons why such risk might exist. • Risk information should be readily available to proper user groups (e.g. advisors, directors of retention and student success)					
User centered vs. Developer centered	• User centered. • The system understands and accommodates the needs of its users. Meet the functional needs of the organization.	• The basic functionality is provided, but user needs are not clearly understood.	• Some software systems are built to simplify the software developers' job! This is not acceptable.			
Proven and verifiable record of success	• Independent and published record of success.		• Claims of success with little or no evidence.			
Robustness of underlying technology	• Use of proven public domain or commercial technology tools.		• Use of propriety development tools which could jeopardize the future of the project.			
Midterm grades	• Ability to provide midterm grade information.		• No ability to provide midterm grade information.			
Ability to report: various risk information	• Ability to report attendance issues, academic issues, etc. • Ability to customize the risk indicators to fit the needs of the university.		• Rigid or inadequate list of risk indicators.			
Ability for faculty to recommend what actions should be taken	• Faculty is able to provide recommend remediation actions for at risk students.		• No recommendation is allowed.			
Ability to communicate with an individual or a group of at-risk students	• Simple, intuitive interface which allows faculty, advisors, as well as students to communicate with each other. • Ability to target and communicate with groups with similar risk indicators. • Ability to maintain log or backup of such communication.		• Limited or cumbersome communication tools. • In ability to maintain the communication private.			
Automatic notifications	• Ability to send automatic and/or on-demand notifications to various user groups. • Notification to faculty inviting them to submit their feedback (e.g., risk indicators, midterm		• No automated notifications.			

	grade, recommendations, etc) • Notification to students to let them know that they have been flagged as being at-risk. • Notification to advisors to let them know that their advisee have received new risk indicators. • Notification to administrators reminding them that they have access to actionable reports.					
Ability to follow up on at-risk students.	• Ability of the faculty to obtain follow up information about the students that they have been flagged as at-risk. • Ability for administrators to identify which at-risk students have not received an intervention.		• Information is not properly tracked. • No follow up information is available.			
Actionable and timely reports	• All users should be able to view appropriate, accurate and actionable reports.	• Reports are available but may or may not be actionable.	• Actionable reports are not available.			
Dashboard and simple real-time graphic reports	• One click access to the most frequently asked questions. • Provides the users simple graphs for frequently asked questions	•	• No dashboard or graphics reports are provided.			
Context sensitive help facility	• FAQs, Context sensitive help, tool tips, video tutorials, etc • No need for training. • Intuitive interface, online context sensitive help, video tutorials, etc are sufficient for the majority of users.	• Printed manuals • Requires faculty, advisors, and administrator to attend workshops and training sessions.	• Little or no help facility • Incomplete or inaccurate help.			

Successful Implementation of Early Warning Systems

Implementation of a successful Early Warning System is not simply a technical issue. It requires detailed attention to several important factors, many of which are non-technical. Successful implementation of an Early Warning and Retention system requires the identification of key personnel, alignment and cultivation of proper resources, the development and refinement of proper retention initiatives and programs, and finally it requires the development of proper assessment strategies so that outcome of each retention initiative can be measured and improved.

Identifying the key stakeholders

- Key administrators and staff in academic Affairs (VP for academic affairs, provost, associate provosts, Institutional Research, etc)
- Key administrators and staff in student affairs and enrollment management. (VP for student affairs, registrar, admissions, director of student retention, and success, director of the tutoring center, director of the counseling center, director of financial aid, etc.)
- Key administrators in Information Technology
- Professional advisor council
- Faculty Advisors in various academic units

Identifying the Early Adopters of Technology

- Faculty, advisors, and administrators who are early adaptors of technology need to be identified and trained first. This group can often serve as the focus group for the project.
- Initial usability testing and feedback from this group is crucial in the eventual success of the system.

Identifying Existing Retention Resources and Initiatives

Meet with stakeholders and identify existing retention initiatives such as:

- Freshman seminars
- Tutoring services available through the campus tutoring center as well as tutoring that may be available at various academic programs (e.g., the Mathematics, Computer Science, English, and other departments)
- Physical and mental health counseling
- Financial aid and other financial counseling.
- Peer-mentoring programs
- Supplemental instruction
- Intrusive Advising

- Proactive and advanced admission strategies which allow prediction of risk prior to admission, and allows for conditional admits that place students in to retention programs when they first apply to the university.

Assessment and Outcome Measurement

There are many ways to assess the impact of an early-warning tool and the retention initiatives that the tool may support. At the micro level, studying the impact of identifying a single at-risk student and making a difference in his or her life is rewarding. However, a more systematic and comprehensive assessment plans will allow for much better analysis and refinement of the universities retention initiatives. In general, a retention tool should provide an easy mechanism for collecting and analyzing the following data:

- semester to semester retention rate (overall and by freshman cohort);
- year to year retention rate (overall and by freshman cohort);
- overall DFW rate (overall by targeted cohorts);
- graduation rate (4 yea, 6 year, etc.);
- correlation between risk-count and semester GPA;
- the number of at-risk students identified by the system and the number of contacts initiated by their advisors;
- the number of students who were automatically notified of having risk conditions, and how many of them took the initiative to contact their faculty or their advisors;
- the average GPA among students in “tracked” vs. “untracked” sections;
- dropout rate for those with or without risk indicators;
- the average semester or overall GPA of at-risk students who were contacted by the advisors vs. those who were not;
- the number of contacts that were initiated from the student portal to campus resources and services, such as tutoring, counseling and financial aid;

Additional information that can be useful are:

- how the campus tutoring center uses the data to identify courses with the highest number of at-risk students;
- how each academic unit accesses it’s at-risk data in real-time and what programs are put in place as the result of having such data;
- how the financial aid office uses the attendance data to improve its reporting to funding agencies;
- how the registrar uses the midterm grade information to perform its mid-semester reporting and notification requirements.

References

[1] Indiana University South Bend, Retention System (2011). IU-RETAIN early-warning and student retention web site, https://retain.iusb.edu, accessed on 11-11-2012.

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[4] Hakimzadeh, H., Azarbod, C., Batzinger, R. (2011). "Re-tain-o-logy: A Comprehensive Model for the Development of Early-Warning and Student Retention Systems", 20th International Conference on Software Engineering and Data Engineering (SEDE 2011), Las Vegas, Nevada, June 20-22, 2011.

[5] Berger, J. B., Lyons, S. (2005). Past to present: A historical look at retention. Chapter I, in Seidman, A., *College student retention: Formula for student success*. Praeger Press.

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Retainology

Retainology is the cross section of sciences, methodologies, and technologies used to identify at-risk students, and help them succeed academically. The Retainology Consortium was founded in 2012 by Dr. Hossein Hakimzadeh. Dr. Hakimzadeh is an Associate Professor of Computer Science and Director of Informatics at Indiana University South Bend. His research interests include database systems, object-oriented systems, and software engineering.

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