



# next generation student information services

impact report: 2012-2015

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UNIVERSITY OF  
**TORONTO**

# explore

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# foreword

We are pleased to share with you the **Next Generation Student Information Services (NGSIS) 2012-2015 Impact Report**, which provides a snapshot of the many achievements we have accomplished through a targeted investment in information technology designed to improve student services at the University of Toronto.

Inside, you will find information on a rich array of new services for students and staff that have been developed to provide real-time information about all aspects of the student experience.

The breadth of the NGSIS program is staggering. Investments have been made in nearly every corner of the University, from improving the residence selection process and online registration for varsity teams, to new tools enabling students to explore transfer credit options and plan various degree paths. To accomplish this, the University has chosen a “hybrid” approach that combines open-source solutions with best-of-breed commercial packaged solutions and in-house custom development.

The results to date have been impressive, and stakeholders have remarked on the improvements and the benefits of a richer, more interactive student experience achieved

through the program. More than 30 new service improvements have been implemented, and many more are underway. Wide consultations with users of these services have assisted the technical teams in shaping the products to meet the specific needs of our students, staff and faculty. Over 900 students have provided feedback and input into the design of our new student web service, ACORN (Accessible Campus Online Resource Network), scheduled for implementation in Spring 2015.

While much has been accomplished, we recognise this is only the beginning. Now that many of the initial technical building blocks are in place, we are entering a new and exciting phase for the project. We anticipate that the development of new cloud based services, achieved through our initial investment in the Quali Foundation’s open-source student system, will help to accelerate the implementation of future services for the University.

As co-sponsors of the project and co-chairs of the NGSIS Executive Steering Committee, we invite you to explore the many impacts of our investments to date, and we look forward to sharing the future achievements of the NGSIS program over the coming years.



Professor Scott Mabury  
Vice-President, University  
Operations



Professor Jill Matus  
Vice-Provost, Students  
& First-Entry Divisions



## transforming the student experience

Students at the University of Toronto expect to quickly and easily manage the administrative details of their university experience—from academics to residence life to social activities.

Staff and faculty expect to have the resources to help students succeed and to plan for a positive and productive student experience.

**That's a big job, but we're facing the challenge head-on.**

Since 1998, the University's student record system, ROSI, has served hundreds of thousands of students and thousands of staff and faculty. Over the past decade, the rapid rise of web and mobile technologies have created the demand and opportunity to implement a new set of information services to better serve today's University community.

We're investing \$30 million over the 2012-2017 period to build the educational tools and services of tomorrow on a leading-edge technological platform. **The Next Generation Student Information Services (NGSIS)** program will provide a suite of web-centric and mobile-optimized applications that provide real-time information to students, staff and faculty about all aspects of student experience.

**Students** will be able to manage their curricular and co-curricular activities quickly and easily. **Staff and faculty** will be able to maintain student records with the utmost accuracy, reliability and security.

The information services for students – called **ACORN** (Accessible Campus Online Resource Network) – will make it easier for U of T students to:

- Plan and select courses online
- Discover new courses and programs
- Chart progress toward a degree
- Manage the residence experience
- Verify eligibility for varsity athletics
- Connect with co-curricular opportunities
- Purchase textbooks, and more.

Over the next few years, the expanding volume and breadth of ACORN services will replace ROSI.

# our approach

How can we best help students achieve academic success and provide them access to timely and accurate information about their university experience? By extension, how can we offer similar access to staff and faculty that they may plan for a rewarding student experience and help students achieve success?

These questions are at the heart of the NGSIS program and they motivate our ongoing efforts to deliver the best possible solutions for our students, faculty and staff. After an exhaustive needs assessment and market analysis, we found no single commercial product that could meet the University of Toronto's many requirements. Instead, we've taken a hybrid approach that combines packaged commercial products, custom solutions developed by our in-house team, and collaborative open-source platforms like Quali Student, which we're developing in partnership with several other leading universities around the world.

As we develop our short- and long-term projects over the NGSIS program's multi-year lifespan, we will continue to improve and maintain student information services while moving toward large-scale changes to student accounts, enrolment, curriculum management, online student information services, and technical infrastructure.

## key principles

- Implement a **hybrid technology platform** that provides best-of-breed functionality with the flexibility to meet unanticipated future needs and the ability to scale in volume and technology.
- Re-engineer existing processes as we introduce new technologies.
- Utilize **Rapid Application Development** methodology to build, test and deliver applications faster and with reduced risk and cost.
- Encourage **models for cooperative development** among central units, academic divisions and students.
- Develop applications where feasible using **open-source standards and services** that enable flexible development, modification and integration.
- Adopt an **intuitive and user-centric approach** to data access, services and information.

## user-centred design

A central feature of NGSIS is User-Centred Design. Products are shaped to complement the needs and characteristics of users, rather than forcing users to adapt their behavior to the product. Consulting users during the early stages of development allows developers to put user needs first and discover how and why they would use a tool. This user-centred approach has prompted a strategic shift in how information technologies are designed and developed at U of T.

More than 900 student volunteers have participated in usability testing. Their participation has provided the NGSIS team with a representative cross-section of students from different backgrounds, at various points in their academic lives, and across academic divisions on all three campuses. In many cases, user feedback has influenced key aspects of a project. For instance, student users were consulted during the development of Transfer Explorer, a tool designed to help incoming students understand how credits from another university would transfer to the University of Toronto. Early consultations with students revealed that many users want to know how credits transfer between U of T campuses. Transfer Explorer now meets both needs.

## project portfolio management

The NGSIS program is a portfolio of discrete but related projects. Recognizing that a single methodology cannot govern all projects, the NGSIS Project Management Office adopts a flexible Project Portfolio Management approach that uses standardized project assets, tools and templates to increase efficiency and productivity. This tailored approach to implementation reduces risks and costs while improving product quality, control and predictability and the client's level of satisfaction, ownership and collaboration.

## quali student: a collaborative platform

Quali Student is a community-source information system designed to meet the needs of students, faculty and higher education institutions. It is designed collaboratively by a consortium of college and university partners around the world and its components cover major aspects of the student life cycle. Quali Student comprises several loosely coupled modules for activities such as enrolment and curriculum management, enabling participating institutions to select and implement the modules they require.

The University of Toronto has actively participated on the Quali Student development team over the past three years in order to contribute to and benefit from this exciting collaboration with some of the world's leading higher education institutions. Recently, the University has renewed its partnership with QualiCo, a new commercial arm of the Quali Foundation, in order to evaluate the options for a cloud-based, open source student system for the University of Toronto.



## the ngsis plan 2012–2015

In March 2012, senior administrators at the University of Toronto approved a multi-year plan to transition to the new services and applications proposed under NGSIS.

The strategy included a mix of short-term improvements to existing services and long-term projects requiring significant resources to redevelop core components of ROSI. This strategy gave our team the flexibility to introduce and refine systems for both students and staff as new resources and tools became available.

The first three years of the plan will culminate in 2015 with the introduction of several large-scale changes to core components of ROSI, including the ACORN student web service and a new system to reconcile student accounts.

The plan aimed to develop strong stakeholder support for NGSIS while establishing a technical foundation that would anticipate replacing ROSI with a modern application offering superior service to students and staff.

To realize this ambitious goal, we established clear objectives for each year.

### year one (2012-13)

In year one of NGSIS, we emphasized short-term service improvements for students and staff that addressed a number of longstanding issues. More than 20 short-term projects impacting students and staff in a variety of areas including Student Life, Student Accounts, Registration and Recruitment were selected and implemented. The rapid and successful resolution of these issues generated visibility and credibility for NGSIS over the longer term. We also implemented a new project governance structure to ensure the project's long-term viability and to ensure stakeholders were appropriately engaged and consulted in all aspects of the NGSIS program.

#### Key Deliverables:

- Drafted architectural vision to replace ROSI
- Joined Kuali Student development effort
- Defined requirements for new Student Account System
- Installed Enterprise Service Bus to allow divisions to connect with online services
- Delivered 20+ short-term service improvements
- Established governance committees
- Developed communication plan and project website
- Built project teams and established sponsor support



### year two (2013-14)

In year two, our team maintained focus on short-term service improvements and began to shift resources to larger projects that would bring about significant underlying system changes. Specifically, we evaluated options to replace or enhance components of the student accounts system, and we defined the software architecture to replace the student-facing side of ROSI—the Student Web Service, or SWS. We also optimized and leveraged key NGSIS applications, including Degree Explorer, eMarks and Transfer Explorer.

#### Key Deliverables:

- Continued participation in the Quali Student community-source development effort
- Optimized Degree Explorer, eMarks and Transfer Explorer for wider distribution
- Completed requirements and scope for the first phase of the Student Accounts project
- Defined requirements and scope for ACORN student web service to replace the current SWS
- Approximately 15 short-term service improvements
- Continued to expand architectural framework to support the introduction of new services

### year three (2014-15)

In mid-2015 we will implement two large NGSIS projects: the ACORN student web service that will replace the SWS; and SAP Student Accounts to address a number of issues with the current student accounts system. Both projects are expected to significantly streamline business operations for students and staff.

Also in 2015, the University will further its investment in the Quali student system project by partnering with QualiCo, which provides cloud-based services for higher education using an open-source development model.

#### Key Deliverables:

- Implement new ACORN student web service in mid-2015
- Implement SAP Student Accounts in mid-2015
- Develop partnership with QualiCo and pilot the first deliverable, Curriculum Management
- Continue to identify short-term service improvements and leverage current applications

# IMPACTS: student life

The University of Toronto promotes the success and development of its 85,000 students by providing co-curricular opportunities and supportive services to help students reach their potential.

Over the last three years, the NGSIS team has partnered with the division of Student Life to develop and implement a number of resources for students and the staff who advise them. New online tools make it easier for incoming students to choose a residence, for recognized student groups to access room bookings for their meetings and events, for students considering international exchange opportunities to search opportunities and upload required documents, and for all students to engage in and chart their co-curricular activity at U of T. The same tools also provide the University administration with centralized data on residence demand, engagement participation, and study abroad activity.

## creating coherence from complexity

Lucy Fromowitz is a champion of the student experience. As Assistant Vice-President, Student Life, she oversees 14 departments working to meet the academic support, health and well-being, social, cultural and co-curricular needs of students. Her straightforward approach to creating coherence out of complexity has resulted in a number of online initiatives that directly benefit students.

“Technology is the backbone of anything we do at U of T because we need to reach 85,000 students,” she says. “When I first arrived here, there was no single application for residence. We expected students applying to the University to pick their residence—and we hadn’t given them any information! From a student’s perspective, that didn’t make sense. Thanks to the goodwill and work of a lot of people who care deeply about the student experience, we now have one application for all residences. MyRes provides information on all the residences, so that students can make an informed choice.”

MyRes streamlines the residence admission process by providing applicants with detailed information about U of T’s residences. Once a prospective student has applied to U of T, MyRes displays the residences for which they are eligible and points them to further information about those residences. By maintaining a link with central student data, MyRes provides real-time advice on which residences are available to a prospective student, and makes the application process clearer. Once a student is admitted to U of T, MyRes provides status updates on their housing requests.

By consolidating all on-campus housing information into one portal, U of T is now able to collect student data that helps the University track demand for residence, interest in particular residences, and U of T’s effectiveness at meeting students’ preferences. As a record of residence application, admission, acceptance and move-in, MyRes also helps the University forecast future demand for residence spaces.

## opportunities beyond the classroom

A major initiative of Student Life has been to develop the Co-Curricular Record (CCR), an official validated record that recognizes student involvement in co-curricular activities including student clubs and organizations, intercollegiate sports, leadership and mentorship opportunities, and work-study and volunteer opportunities.

“The Co-Curricular Record module accomplishes several things,” Fromowitz notes. “It puts all 8,000 opportunities into a single, searchable database so that students can find what they’re looking for. It also connects completed activities with core competencies, to help students articulate the skills they are developing through co-curricular engagement.”

The NGSIS team collaborated with Student Life to evaluate and implement a user interface for the CCR database. This involved more than 200 consultations to learn how students use the interface to search for opportunities. Students who volunteered for usability testing earned CCR credits for their participation.

## a sustainable partnership

Through its ongoing partnership with the NGSIS team, Student Life has been able to adapt emerging NGSIS technologies to support other initiatives.

For example, the Centre for International Experience offers students 130 academic exchange opportunities. Fromowitz explains that some students are reluctant to go on an exchange because there is a complex process in determining how credits earned abroad will transfer to their U of T degree. Students are frequently worried they will lose a semester or year by studying abroad.

“The NGSIS team built the Transfer Explorer module for incoming transfer students and for students transferring within the U of T system, but it also has direct application to solving this problem for our exchange students,” says





Fromowitz. “We didn’t have to reinvent the wheel. We called up the NGSIS team, they heard the problem, appreciated that the solution lay in adapting Transfer Explorer, and in no time we had a technical solution.”

By the end of 2014, Transfer Explorer will offer students information on international exchange transfer credits. This will include an estimation of how credits earned abroad might transfer to a Uof T degree, based on previous transfer credit assessments. Because a full course load at Uof T can be quite different from a full course load at another institution, Transfer Explorer does not guarantee equivalency. However, it does offer enough information to inform a more detailed consultation with the Centre for International Experience.

Fromowitz is confident that the NGSIS project will continue to address the long- and short-term challenges in the Student Life division. Importantly, she notes it has helped to deconstruct institutional silos between registrarial and student life staff. She says every one of the NGSIS products that has been launched is thoughtful,

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**“Our goal is a student who is engaged with the University experience, not engaged in figuring out the administration.”**

**– Lucy Fromowitz  
Assistant Vice-President, Student Life**

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has met an urgent need, though there is much more to be done.

“ACORN is intuitive, it’s in a comfortable format compared to other products around today, and it simplifies students’ lives so that they don’t miss steps,” she says. “Missing steps at Uof T or any institution can be very harmful to your academic progress. Our goal is for students to be engaged with the University experience, not engaged in figuring out the administration.”



## IMPACTS: student finances

The University of Toronto's commitment to fiscal accountability goes beyond the obvious desire to make financial transactions easier for students, staff and vendors.

As a public institution, U of T must report on its responsible use of public funds, which in turn drives continued funding, and it must be able to account for funds it collects from students, student groups and student initiatives. NGSIS has already begun to play a key role in student accounts, from making invoices more comprehensible to providing a sustainable foundation for long-term fiscal accountability.

As the University of Toronto's Chief Financial Officer, Sheila Brown is responsible for providing the University community with efficient financial services that enable staff to pay vendors and ensure accounts are current, and students to remit fees and receive refunds. She is working with the NGSIS team to develop the new SAP-Student Accounts (SAP-SA) platform, a component of NGSIS that will serve student needs more efficiently and provide detailed student accounting information to the University's administration.

Planned for release in 2015, SAP-SA will replace components of the University's existing student accounts system, which was implemented with ROSI in 1998 and which no longer meets current business needs. SAP is an enterprise data and resource management system that is widely used at U of T to power the Financial Information System (FIS), Human Resources Information System (HRIS), and Research Information System (RIS). A particularly attractive feature of SAP-SA is its advanced reporting options.

One of Brown's core objectives is to implement a strong and auditable system of record that can substantiate both student fees and the government grant. The University

is required to file an annual enrolment audit with the Government of Ontario, she explains, which determines the level of government funding for the University. The entire student information system must serve as a very clear and auditable system of record and must be a platform that combines reliability with enough flexibility to accommodate future policy and operational changes.

### improved invoicing

"As we work toward implementing SAP-SA, it has been helpful to have a number of short-term fixes to the existing student accounts system," Brown says. One important improvement has been making the student invoices easier to read in broad strokes, so students know how much to pay; richer with comprehensible details, so students know what they are paying; and enhanced with relevant instructions on how to pay.

Audrey Cheung, Manager of Student Accounts in Financial Services, has spearheaded an effort to improve the student invoice. Her office and all registrarial offices have historically fielded a gamut of questions and urgencies about the invoice.

"Students and staff overwhelmingly recommended that

we overhaul the presentation of the student invoice generated by ROSI, to provide better guidance and make the form more understandable,” Cheung says. “Staff were challenged to explain the invoice to students, and students were challenged to understand it.”

The University was challenged to make it better. As an example of how client-side services can improve in tandem with the administrative tools, Cheung led a project with NGSIS to re-label information fields on the invoice to clarify their meaning. New labels were added to complement an improved layout, making the revised invoice clearer and better organized with useful subtotal and final total headings. Deposit payments are now labeled as “academic” or “residence”, and separate sections show incoming fee payments and outgoing awards, which had previously been combined. Payment information is now displayed in chronological order and includes the dates on which payments were processed. A guide and FAQ are now provided with the invoice as downloadable documents, providing step-by-step navigation through the invoice and anticipating common questions.

“We launched the new invoice and support materials in April 2014,” Cheung says. “We knew it was successful immediately because the phone didn’t ring and the emails didn’t come in, when we normally would have been inundated with questions.” Now that registrarial and student invoice offices across the University are less inundated with questions at peak payment times, front-line staff can allocate more time to assisting students in other ways.

### long-term vision

“Our main focus for 2015 is implementing ACORN, which will help students navigate the complex system of registering, paying fees, and getting financial aid,” Cheung says. “If we can help students to understand their current academic and financial status—the two are tied together—they can make academic and financial decisions that are more timely and informed.”

The long-term vision for future releases of ACORN is a seamless bridging of the enrolment module and the financial aid and awards module, which will allow students to view their invoice and, if needed, link directly to a financial counselor at their college or faculty. It could also allow them to view opportunities for scholarships,

awards and bursaries for which they may be eligible. This functionality will provide a critical service to approximately 35,000 U of T students who receive financial aid.

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**“Students and staff overwhelmingly recommended that we overhaul the presentation of the student invoice... to provide better guidance and make the form more understandable.”**

**– Audrey Cheung  
Manager, Student Accounts**

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“When you’re a prospective student and you decide to come to U of T, it would be nice to get an offer that includes a place in a program at a specific fee, with specific student financial supports, and a specific residence room all in one package,” Brown says. “There

are many universities that do this, and in terms of our competitive position we need to move in this direction.”

Under NGSIS, the University’s financial aid and awards systems will ultimately provide potential and current students with clear, timely information about the amount of financial assistance they can expect. For applicants, the ability to see their “net tuition” (the actual tuition they will pay after deducting assistance received) up-front can influence their choice of university.

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## related project: StarRez

Once students have applied to any of 11 residences, they are guided to StarRez, a residence management system under NGSIS that helps them to complete the next steps of the application process, including paying a deposit and detailing their living preferences.

On the administration side, the automated deposit process implemented this past year through StarRez has eliminated the duplication of effort involved in residences forwarding 10,000 deposits to Student Accounts for manual entry. Creating a nightly exchange of student data between the central database and StarRez has also eliminated 40,000 manual transactions that residence staff would have to record each year for fees, meal plans and miscellaneous charges. The entire process was time-consuming, labour intensive and created opportunities for human error and delay.

Student Accounts and residence staff used to field several hundred inquiries and complaints each year regarding residence deposits. That number has since dropped to zero. Where students once might have waited two weeks or longer to see a residence deposit reflected in their ROSI account, they now see it accurately posted within two days.



## IMPACTS: registration & curriculum management

At its core, NGSIS strives to give students the tools to manage their academic activities, from enrolment to graduation. Staff and faculty, too, must have equally efficient tools to manage courses, programs, degrees and curricula. Perhaps the best examples of the hybrid approach to NGSIS—and the tri-campus collaborations that drive it—may be found in the applications for managing registration and curriculum: Degree Explorer, eMarks and Transcript Request.

### degree explorer

Arguably the most impactful of all NGSIS applications deployed to date, Degree Explorer is described as a “Swiss Army Knife” for degree planning. Students and administrators alike have enthusiastically received this homegrown tool powered by NGSIS.

“Degree Explorer was started three years ago, at the same time as NGSIS,” says Sinisa Markovic, Assistant University Registrar. In his previous role as Assistant Faculty Registrar in Arts & Science, he played a key role in developing its functionality and testing the application. “Degree Explorer allows students to plan by clearly identifying the courses they need to graduate. On the department side, it allows staff to manage rules for degrees and maintains an inventory of more than 400 programs and their course requirements.”

Degree Explorer is an extraordinary tool for administrators, Markovic says, serving as both a central resource to track students’ academic progression and as a relationship management tool for advising. Advisors can quickly verify whether a student meets the prerequisites for a specific class or satisfies all requirements to graduate. The tool can also track approved exceptions for individual courses and apply them to a student’s program requirements.

“Degree Explorer meets a longstanding institutional need,” says Dr. Glenn Loney, recently retired Assistant Dean, Faculty Registrar and Faculty Secretary in Arts & Science, whose responsibilities extended broadly through recruitment, admissions and registration. “I conservatively

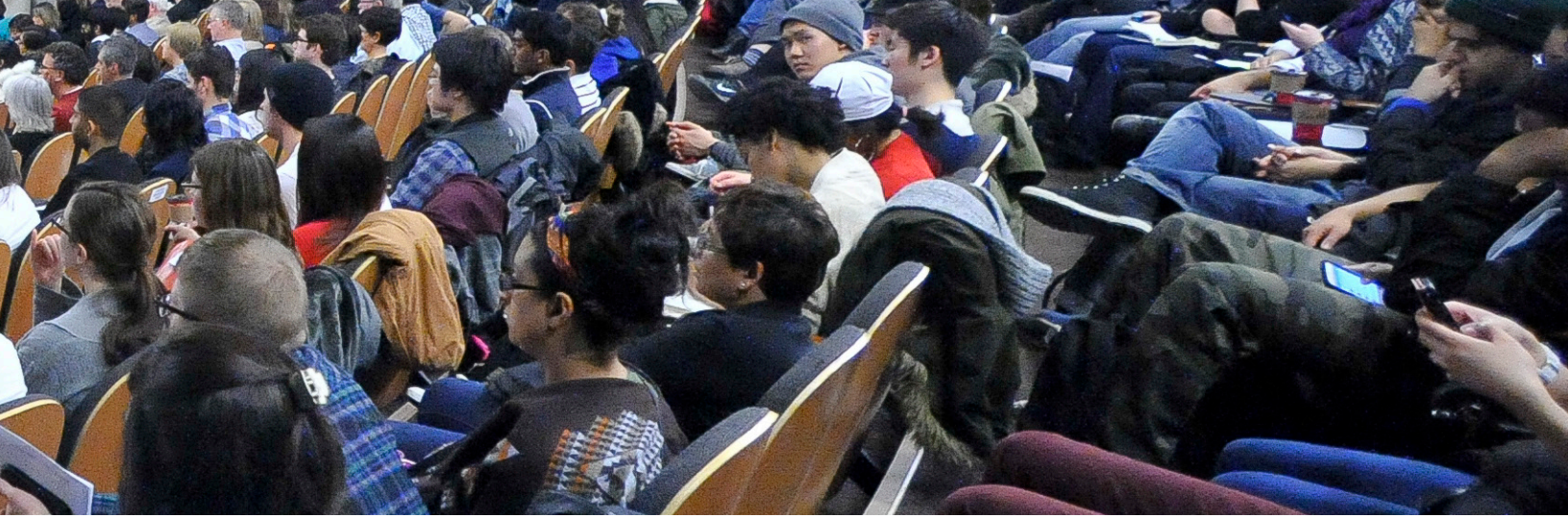
estimate we had about 100 staff who would manually assess the progress of our students throughout their degrees, using pencils and paper. We would have five to six thousand students approaching graduation who had no authoritative idea of whether or not they would make it, until the last minute.”

That changed with Degree Explorer, Loney says: “It’s intuitive and it works like a charm. All administrators use it, and students say it’s the best thing they’ve ever seen because it helps them orient to where they are and plan their direction.”

Degree Explorer’s popularity is supported by strong data. A survey of users found that over 80% believe Degree Explorer has improved their life, and replacing the administrative-facing degree assessment tool Degree Navigator with a homegrown solution is saving the University more than \$100,000 per year in software licensing fees.

### eMarks

NGSIS began developing Degree Explorer in 2011, at the same time as UTM began independently developing its own application for degree assessments. By sharing and comparing their progress, UTM staff elected to halt development and redirect their support to Degree Explorer. UTM was simultaneously developing eMarks, an application that has been widely adopted across the University. It enables instructors and faculty members to upload student grades for rapid departmental review and dissemination to students.



“We started developing eMarks at UTM a few years ago, and we decided to make it available for everybody at all three campuses through NGSIS,” says Cesar Mejia, Associate Registrar for Enrolment, Scheduling and Systems Management at UTM. “Now we’re users of something we used to support. I really like that NGSIS can take an application that was used on one campus and make it available to all three. We don’t own eMarks any more, but it feels good to know it started at UTM.”

UTM’s entrepreneurial culture has fueled its collaboration with NGSIS in a variety of ways, Mejia says. The Mississauga campus is an early adopter of new security technologies such as eToken, which provide greater data security for enterprise applications. UTM was also an influential voice in the recent decision to allow TCard photos to be used for Photo Class List, an application allowing instructors to view photos of students in their classes.

On the St. George campus, the Faculty of Arts & Science has been a key beneficiary of UTM’s eMarks application. Yvette Ali, Associate Faculty Registrar of Student Record Systems, oversees the systems of record for student grades and transcripts.

“Not long ago, marks were submitted on paper or Excel spreadsheets and uploaded into ROSI by administrative staff,” she says. “eMarks changed everything. It reduced human error and introduced an automated approval process for department chairs. Now anyone can see the history of a grade, who submitted it, what it was, and whether it was adjusted for any number of reasons.”

eMarks has dramatically reduced the time required to return marks to students, Ali says, and the system has made such dramatic changes to the operation of registrars’ offices that demand for the application has grown. Six U of T divisions are currently either using or being set up to use eMarks.

### **transcript request**

The University of Toronto Transcript Centre processes over 71,000 requests for transcripts each year from students and alumni in most faculties and divisions. Its

partnership with NGSIS to deliver a better transcript ordering experience has led to the enhancement of Transcript Request, a feature of the Student Web Service. Offering a new smart interface that recognizes a user’s ROSI information, Transcript Request now enables users to order several transcripts at once, attach tracking forms to transcript orders, and manage their orders.

“Transcript Request offers a user-friendly interface with a shopping cart,” says Ali. “Previously, students could only request one transcript per order. Now they can automatically send transcripts to several universities with a single click. We used to receive phone calls about the order form that occupied the equivalent of 2-3 staff hours per week. Now there are hardly any phone calls, and we’ve received very positive feedback on the service improvements.”

As a member of the NGSIS core team since its embryonic stages, Glenn Loney has witnessed rapid and impactful changes in registration and curriculum management that reach far beyond his own faculty.

“Before NGSIS, we gave students a course calendar at the beginning of their undergraduate career and gave them a degree at the end, if they came out alright,” he says. “NGSIS has provided a systematic approach and a realistic effort to recognize, prioritize and meet urgent student information needs. We are kept informed, and we have a sense of where we were and what is coming, and how far along it is. There has been a real willingness to collaborate and participate over the last three years, largely because people see good things happening in an organized way.”

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### **related project: course finder**

Course Finder is Uof T’s official public listing of undergraduate courses for the Faculty of Arts & Science, Faculty of Applied Science & Engineering, UTM and UTSC. This application allows undergraduate students to search for detailed course information by keyword, save favourites for future reference, and filter information by division, campus, term, weekday, time, credit and course level.

# IMPACTS: business intelligence

NGSIS enables students to make more informed and timely decisions about every aspect of their U of T experience, including program selection, residence life and graduation. Their decisions generate massive amounts of data which, if organized properly, can be a rich source of information for strategic planning and analysis.

That's where business intelligence comes into the picture—these tools convert large amounts of data from multiple sources into meaningful information, allowing University administrators to make better and faster business decisions. For example, U of T business intelligence currently helps staff and faculty make fact-based decisions to improve application and admission rates, improve student retention, and refine curriculum. By using business intelligence to make informed decisions in all areas of university operations, the University can respond to the changing needs of its students and better serve its communities of stakeholders.

To make sense of the data generated by its 85,000 students, the University of Toronto Business Intelligence (UTBI) unit maintains a data warehouse—a central reporting repository—to support information analysis and reporting across the U of T system. A critical element of NGSIS, the data warehouse merges, organizes and stores data extracted from the University's various enterprise information systems. Within the data warehouse, UTBI maintains content-specific “data marts” and tools for reporting on subject-specific areas such as admissions, student housing, course enrolment, program enrolment, procurement, human resources, research funding and graduate student support.

UTBI offers a self-service model that encourages individual users to help themselves without relying on an IT professional. Using this model, UTBI works with internal clients such as Enrolment Services which, under the leadership of Richard Levin, has adopted an evidence-based approach to decision-making that has driven the development of new business intelligence tools.

Among these tools are the popular data cubes, which present data from a data mart in a web format resembling an Excel pivot table. In a data cube, users can quickly and non-destructively manipulate, filter and report on data at varying levels of detail.

A key source of student data is Degree Explorer, a core NGSIS application that allows undergraduate students to view their academic history and determine which combinations of courses will fulfill their requirements for graduation. Recently implemented, UTBI now

extracts data from Degree Explorer and combines it with course and program enrolment information in the data warehouse to inform academic planning. With this information, administrators can analyze the many paths students take to complete their programs using courses both within and outside their respective divisions. For example, administrative staff can quickly determine the most common courses students are using for program completion, or see which students are over-enrolling in courses that may qualify them for program completion.

**“A task that once took two hours might now take a couple of minutes, and something that took several days might now take a couple of hours.”**

**– Prof. Suzanne Stevenson  
Vice-Dean, Teaching & Learning  
Faculty of Arts & Science**

“I'm a big user of the data cubes,” says Sinisa Markovic, Assistant University Registrar. “They provide business intelligence on admissions, course enrolment and program enrolment data.” Because course enrolment changes on a daily basis, the history of students' activity in courses, from waitlist to course completion or withdrawal, is captured and stored. This history provides a moving picture of historical trends at significant dates in the sessional calendar, Markovic explains. For example, it can provide insights into the

number of students switching from a Commerce program pre-admission to an Economics or Math program post-admission.

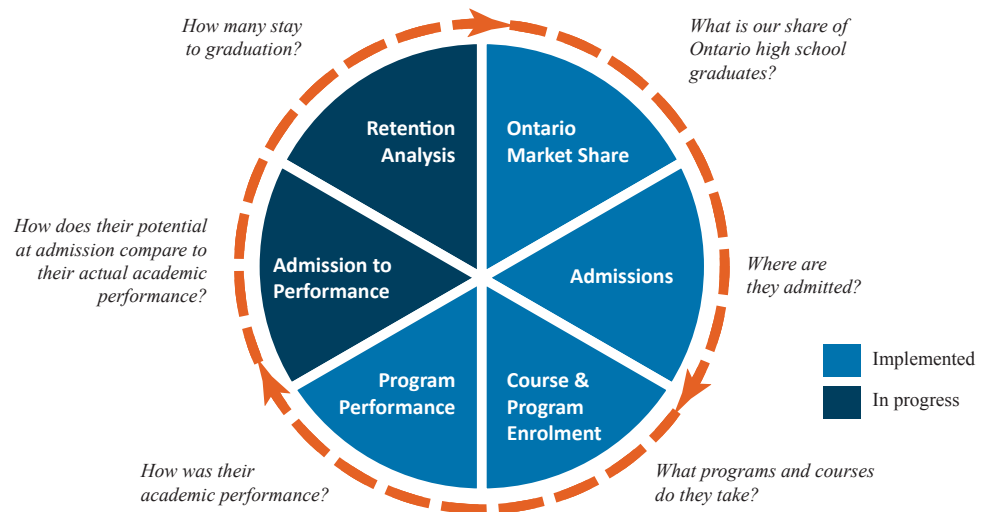
## academic planning

As Vice-Dean, Undergraduate at UTSC until July 2013, Professor John Scherk (Department of Computer and Mathematical Sciences) was an early advocate of incorporating business intelligence tools into NGSIS for long-term academic planning.

## admission to graduation: a BI lifecycle

Business intelligence tools play a critical role in answering questions about student choices and performance at key points in the academic lifecycle, from admission to graduation.

These answers help University staff and faculty to plan for a positive and rewarding student experience and to appropriately allocate resources.



“Business intelligence directly affects faculty on the ground,” Scherk says. “We’re undertaking another academic planning cycle at UTSC, and every department has to put together a plan. We can’t plan effectively without proper business intelligence. We need accurate data about students and the courses and programs they are enrolling in, and it’s vital that we have a historical picture and not just a snapshot of one point in time.”

Academic planning is by nature a long-term process that should consider both the needs of current students and the accomplishments of alumni, Scherk says.

“When we are revising programs, we need to know what our students are doing after graduation so that we can advise our current students who need to know what their career options are,” he says. “UTSC doesn’t have the technical framework to intelligently record the activities of our alumni, and there’s a clear opportunity for NGSIS to meet an important strategic need in this area.”

### student life cycle

Few faculty members across the U of T system are more engaged in this discussion than Professor Suzanne Stevenson, the NGSIS academic lead and Vice-Dean, Teaching and Learning in the Faculty of Arts & Science. A Professor of Computer Science, she oversees special initiatives for undergraduate students, as well as teaching support for undergraduates, graduate students and online learning.

“Business Intelligence is one of my favourite aspects of NGSIS,” says Stevenson. “We’ve made huge progress in this area. It used to take our registrarial staff up to a week to compile information to inform high-level decisions

about programs and special initiatives. Thanks to UTBI, a task that used to take two hours might now take a couple of minutes, and something that took several days might now take a couple of hours.”

Stevenson’s academic and administrative focus on teaching and learning has strongly influenced her fundamentally people-driven approach to business intelligence. While she acknowledges the strategic importance of recruitment and enrolment data, she views this as the tip of the iceberg.

“The more we know about our students, from before they enter to after they leave, the better we can guide them while they’re here,” she says. “To me, business intelligence at U of T is about understanding our students so we can better support their needs. We can’t improve the student experience if we don’t understand how what we’re doing affects students. Everything we do can be improved by smarter data.”

Beyond business intelligence, Stevenson believes NGSIS is part of a cultural shift at U of T that champions continuous innovation over stop-gap solutions. She is excited to see NGSIS expand its scope over time to include graduate education as well as alumni engagement.

“We should never again have a project that we have to call ‘next generation,’” she says. “Instead we should be continually innovating in our student information services to make sure we’re keeping up with our students. Things will become obsolete and we will have to replace them, but we should always be ahead of the curve in our technology services. We should always be innovating at some level.”

# IMPACTS: technical improvements

At the heart of the NGSIS program is a vision to offer a convenient and rewarding user experience for students, staff and faculty. Behind the scenes, achieving this vision requires a complex technical framework that is durable, cost-efficient, easy to support, and flexible enough to develop further as needs arise.

Designing a student information service for tens of thousands of users may seem a herculean task. By committing to a few foundational principles, NGSIS has laid an important foundation for long-term solutions and has already addressed a number of critical short-term needs.

Every new home begins with an architect. As NGSIS lays the foundation for a virtual home that will support students for decades, few roles are more critical than the master planner. Enter veteran solutions architect Frank Boshoff, whose designs, models and holistic vision are bringing together the diverse technical requirements of NGSIS—as well as an equally diverse community of IT professionals. As Enterprise Architect, Boshoff’s role is to map out the infrastructure components and resources that will support every aspect of NGSIS across the UofT system.

“Early in my career, I learned that if you’re not collaborating, you’re not working,” Boshoff says. “Architecture should never be done by one person, so I put processes in place that pull people together so they know where they fit in, what they’re responsible for, and how to work together to deliver a complex application.”

The catalyst for bringing together such a diverse technical team, Boshoff says, is the Accessible Campus Online Resource Network. ACORN will replace the user interface of the existing ROSI Student Web Service (SWS) with a more convenient and personalized experience. ACORN will enable students to enroll in programs, pay fees, and plan, select and register for courses. Optimized for mobile use, ACORN will integrate many of the online academic, financial and social services that students require. It will also include a read-only interface for staff in advisory or administrative roles.

“You have to build these bigger applications in groups that extend beyond the developers,” Boshoff says. “We drew together a team of experts from across the portfolio, and this has fundamentally changed how we work. Previously, one developer handled all aspects of an application, from design to deployment. This was efficient but it presented a risk—when there was a major production problem, we only had one person to call.”

A collaborative approach to development has especially influenced how user interfaces are designed, Boshoff says. Creating a convenient user experience was identified as a key priority early in the project, and collaboration has helped to ensure a consistent user interface amongst applications under development. This “common look and feel” helps visually to weave together the various services of NGSIS under the University of Toronto brand.

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**“We drew together a team of experts from across the portfolio, and this has fundamentally changed how we work.”**

**– Frank Boshoff  
Enterprise Architect**

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NGSIS has also provided an opportunity to address some important short-term needs, Boshoff says. For example, a service currently in testing to reset automatically a forgotten UTORid password will yield some important benefits.

“It may seem like an insignificant thing, but the current process requires users to walk over to Robarts Library and present photo ID just to reset a password,”

he says. “That may be fine if you are on campus, but we have teaching hospitals with interns who are in the emergency room at 2:00 a.m. and they need access to their information. One little password reset mechanism will save hours of frustration.”

## laying a foundation

NGSIS was established on the premise that the University could not realize its academic and administrative goals without making improvements to its Information Technology services and infrastructure. The project began with a high-level vision of a hybrid system that combines the best available off-the-shelf software with open-source solutions and applications developed at UofT.

In preparing to launch ACORN in 2015, one of Boshoff’s biggest challenges has been to design its technical framework to fit within the University’s current computing environment. He balances new technologies with existing ones, recognizing that applications will need to function for



decades, and he carefully selects vendors who can supply and support them.

“When we consider the criticality of some of the services we will offer in ACORN, such as student enrolment, a hybrid system makes the most sense,” he says. “We don’t want to use completely open-source software for such an important process. After a lot of market analysis, we’ve implemented IBM WebSphere to run ACORN, and we’re developing on top of that.”

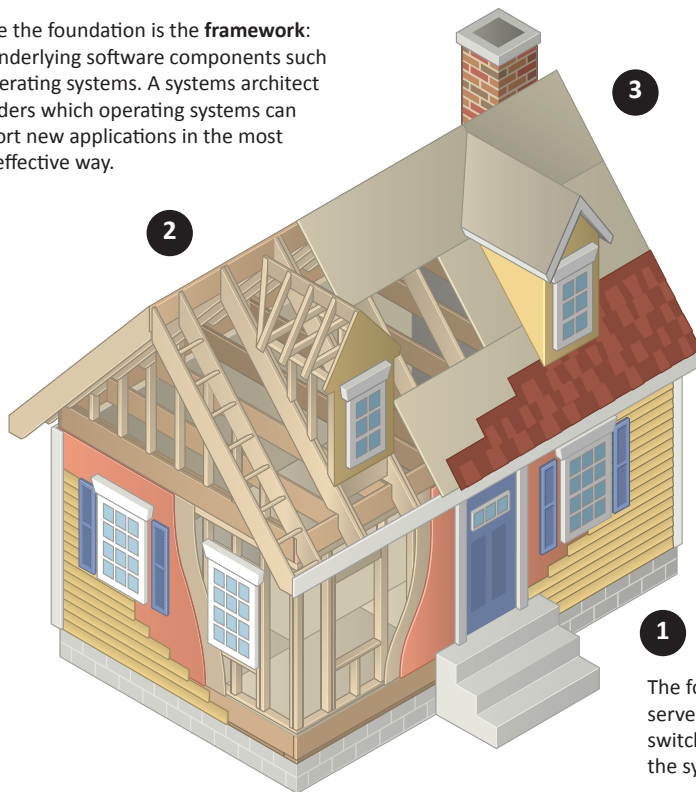
Where Boshoff might previously have had only one developer to call when something went wrong, he now has a \$100 billion technology partner in IBM with 400,000 employees. ACORN will be the first application to be deployed on the new IBM-powered foundation, but for Boshoff the acid test will be deploying the second application. “If we can build the second application without hundreds of meetings and deploy it smoothly and seamlessly, then I’ll know we accomplished what we set out to do.”

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## understanding the IT environment

Like a house, an IT environment is built from the bottom up, from the foundational infrastructure to the public face. Frank Boshoff’s architectural schemas consider all stages of NGSIS, from foundation to presentation, in order to select technologies with an appropriate life span and capability.

Above the foundation is the **framework**: the underlying software components such as operating systems. A systems architect considers which operating systems can support new applications in the most cost-effective way.



The **applications** sit overtop the framework. They can be monolithic (in the case of ROSI) or made up of a number of different components (in the case of ACORN). They typically include a database that stores data, a layer of code that accesses the database, and a layer of business logic that translates the University’s academic and administrative processes into code.

Like a building façade, the **user interface** conceals the structural elements behind a visually appealing surface. Its design primarily considers how users will behave when interacting with it. It is built for usability and aesthetic appeal.

The foundation is the **physical infrastructure**: servers, network cables, racks, and network switches. An architect considers how much power the system will need and plans accordingly.

# ngsis projects 2012–2015

## Year 1: 2012–13

### student life

**MyRes:** Implemented new gateway to streamline residence selection process.

**StarRez:** Implemented residence management system for 11 of 13 residences.

**co-curricular record:** Completed vendor selection and began implementation.

**mobile apps:** Released Mega App for students and began work on ROSI secure apps.

**Varsity Blues Registration System:** Provided online registration system for student athletes.

**University Health Insurance Policy:** Streamlined UHIP insurance processes for international students.

### registration, degree planning & curricular activities

**enrolment planning tools:** Linked courses to textbooks for Bookstore. Introduced Course Finder tool for UTM, UTSC, Arts & Science, Applied Science & Engineering.

**degree explorer:** Implemented degree planning and verification tool in Arts & Science and UTSC.

**transfer credit:** Provided prospective students with online access to application.

**online calendar system:** Provided improvements for administrators.

### student accounts

**one stop:** Implemented registration/account status page for students; improved invoice and payment screens and online registration cancellation process.

**administration & reporting:** Developed fast entry screens for residence fee/deposit payments by students and month-end reconciliation reports for divisions.

### business intelligence

**ontario market share:** Showed U of T's share of applicants.

**divisional admissions dashboard:** Provided executive view of U of T admissions statistics.

**divisional admissions reporting:** Provided detailed view of U of T admissions statistics.

**course enrolment planning:** Provided divisional view of course enrolment statistics.

## Year 2: 2013–14

**transcript request:** Made it easier for students to navigate and submit their transcript request.

**StarRez:** Built automated financial interface for residence fees from StarRez to ROSI.

**safety abroad database:** Built live ROSI interface to capture changes in student contact information.

**mobile apps:** Developed secure apps using ROSI information to view timetable, grades, etc.

**campus maps:** Extended online map to UTM and UTSC.

**personalized exam schedule:** Built a facility to provide students with a personalized view of enrolled courses and exam schedules.

**course finder:** Enhanced application to provide timetable information and build foundation for full online calendar.

**degree explorer:** Extended application to UTM and Applied Science & Engineering. Added features for Arts & Science, UTSC, UTM and Applied Science & Engineering.

**one stop:** Improved registration cancellation process and posted additional information on status page. Improved invoice and payment screens and integrated into a new SWS design.

**awards & scholarships:** Added an Awards and Scholarships tab on SWS. Implemented several reports to assist students with viewing financial award information.

**program enrolment data cube:** Developed analytical cubes and reports on multi-year Program of Study enrolment information.

**student performance data cube:** Developed analytical cubes and reports on student academic performance, trends and patterns.

## Year 3: 2014–15

## large-scale projects

### student life

**transfer explorer:** Add International Course opportunities to Transfer Explorer (Transfer Credit) application for students.

**varsity blues registration system:** Extend online registration system for Varsity Blues Athletics to UTM.

**StarRez:** Negotiate university-wide bulk buying agreement with StarRez for additional modules (e.g., room maintenance, key management, etc.).

**ACORN:** Replace the ROSI Student Web Service website in spring 2015 with ACORN, which will deliver a more convenient, personalized and guided online experience to students. New security features will allow single sign-on to many applications. Enhanced registration services will include a shopping cart to plan course enrolments, pre-emptive warnings for course prerequisites and timetable conflicts, and improved notification services for upcoming deadlines. Subsequent versions in 2015–16 will provide more information on student finances, such as awards disbursement, and a staff view.

### registration, degree planning & curricular activities

**degree explorer:** Allow Engineering students to indicate future course preferences to enable faculty enrolment planning. Add a report allowing academic advisors to identify students registered in a program of study who are not enrolled in complementary courses.

**eMarks:** Expand and enable for use by SGS and graduate units.

**kuali student:** Through a new agreement with KualiCo, a Kuali Foundation commercial affiliate, develop a cloud-based version of Curriculum Management (CM) that will become the single source of course and program information in the student system. The solution will be piloted in 2015 as part of an ecosystem of products to better support course and program management. Several complementary applications will be developed concurrently to leverage the content of KualiCo CM, including an online calendar allowing divisions to publish and manage calendar content, and a new reporting tool enabling course and program impact analysis. The design of all aspects of the CM ecosystem will be refined with stakeholders over 2015.

### student accounts

**Student Awards:** Enhance SAP Student Award report for administrators to allow for improved readability, additional selection criteria and drill down to award details.

**Tuition Fees:** Enhance Tuition Fee report for administrators to improve readability and provide capability to receive by email.

**student accounts:** Implement SAP Student Accounts in summer 2015 to provide detailed and timely student accounting information for financial administrators. The new solution will provide a complete, detailed record of all ROSI financial transactions within the University's financial system. New tools and reports will be delivered as part of this project, enabling Financial Services staff to fully reconcile individual student accounts. A number of large business processes will be moved from ROSI into the new SAP financial system, including payment and refund processes. This project will be the first step in implementing a more robust student accounts system that will streamline many cumbersome manual administrative processes.

### business intelligence

**financial data cube:** Develop a rolling five-year cube on fees charged to students, awards received, and employment money received.

**student awards data cube:** Develop multi-year cube on awards inventory to support analysis on awards processed through student system.

**co-curricular record data cube:** Develop multi-year cube/reports to support strategic reporting needs.



## moving forward

Today, NGSIS project teams are a blend of information technology staff, user experience designers, and functional experts in central and divisional units. The synergies and collective accomplishments of these groups have produced a responsive and flexible model for delivering new online services at the University of Toronto. NGSIS has also responded to the emerging requirements of the University and the higher education sector by re-engineering some of its business processes.

We are now working on a roadmap to leverage the investments to date and accelerate the delivery of applications that will serve the University's long-term goals for IT support. We will redesign and streamline relevant core business processes in preparation for introducing these new applications. ROSI will continue to serve the needs of the University until it is fully replaced by new NGSIS modules and applications. Broad strategic initiatives to support these efforts include:



**Participate in Quali Student.** We will continue to participate in the development of Quali Student through QualiCo, the commercial affiliate of the Quali Foundation, in order to leverage cloud-based, open-source student services for our new student system. Curriculum Management will be the first module considered under this new model, in 2015.



**Build out successful NGSIS products.** We will capitalize on the success of our business process reengineering efforts and current product streams by: expanding the Student Accounts module to provide for additional information on awards; enhancing ACORN to include service improvements for students in financial management and registration; and expanding and integrating successful point solutions such as Degree Explorer, Course Finder, Transfer Explorer, eMarks, and MyRes into the ACORN interface.



**Provide reporting & analytics.** We will provide new web-based reporting tools and extend our current business intelligence solutions, enabling University administrators to access relevant information for academic planning.



**Launch web interface for staff.** We will convert the current ROSI student information system from a mainframe software platform to a web-based interface for staff, allowing urgent services to be more easily integrated.

In early 2015, the NGSIS team will continue to consult with key users, divisional IT groups and senior management to ensure these strategic initiatives and proposed solutions meet the aspirational goals and progressive standards of stakeholders. We welcome an exciting new phase of the NGSIS program.

# services & modules

## tools for students



The **Co-Curricular Record** allows students to search opportunities to build their experience through participation in campus activities, and to record their participation and skills.



**MyRes** enables students to apply for on-campus housing, whether they are first-year or returning student, undergraduate or graduate, single or with a family, and at any U of T campus.



**Transfer Explorer** allows students to check the eligibility of course credits from other institutions (or other U of T divisions) for transfer to, or within, the University of Toronto.



**Course Finder** is the official public list of undergraduate courses for the Faculty of Arts & Science (St. George), Faculty of Applied Science & Engineering, UTM and UTSC.



**Degree Explorer** allows U of T students to review their academic history and degree requirements, and to determine how future course choices might meet program requirements.



**StarRez** is the management software used by Student Housing in 11 residences across the three University of Toronto campuses.



The **Cognos Business Intelligence Tools** software suite allows staff and business users without technical knowledge to extract institutional data, analyze it and assemble reports.



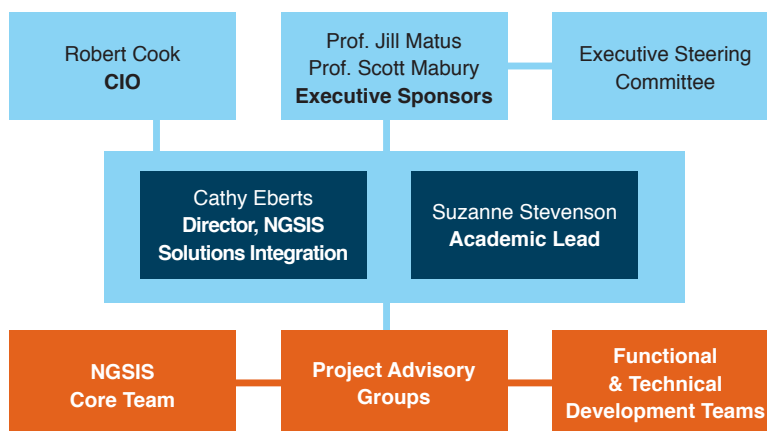
**eMarks** is a convenient and user-friendly web application for faculty members submitting grades at the University of Toronto.



The **Varsity Blues Registration System** tool ensures athletes and teams meet eligibility requirements for competition. Staff members can quickly check a student's academic standing and track athletic honours and awards.

## tools for staff & faculty

# ngsis governance structure



## executive steering committee

**Prof. Cristina Amon**  
Dean, Faculty of Applied Science  
& Engineering

**Robert Cook**  
Chief Information Officer

**Prof. Luc de Nil**  
Vice-Dean, Students, School of  
Graduate Studies

**Prof. Rick Halpern**  
Dean & Vice-Principal  
(Academic), UTSC

**Prof. Scott Mabury**  
Vice-President, University  
Operations (Co-Chair)

**Prof. Jill Matus**  
Vice-Provost, Students & First-  
Entry Divisions (Co-Chair)

**Prof. Amy Mullin**  
Dean & Vice-Principal  
(Academic), UTM

**Prof. Seamus Ross**  
Dean, iSchool

**Prof. Trevor Young**  
Dean, Faculty of Medicine

## ngsis core team

**Donald Boere**  
Registrar, Innis College

**Frank Boshoff**  
Enterprise Architect

**Sheila Brown**  
Chief Financial Officer

**Robert Cook**  
Chief Information Officer

**Cathy Eberts**  
NGSIS Program Director

**Lucy Fromowitz**  
Assistant Vice-President,  
Student Life

**Prof. Kelly Hannah-Moffat**  
Vice-Dean, Undergraduate, UTM

**Graham Kemp**  
Director, Enterprise Applications &  
Solutions Integration

**Richard Levin**  
Executive Director, Enrolment  
Services and University Registrar

**Glenn Loney**  
Assistant Dean, Registrar &  
Secretary, Faculty of Arts & Science

**Don MacMillan**  
Director, Student Services, School  
of Graduate Studies

**Tom Nault**  
Registrar, Faculty of Applied  
Science & Engineering

**Daniel Ottini**  
Manager, Internal Audit

**Marden Paul**  
Director, Planning, Governance,  
Assessment & Communications

**Wes Robertson**  
Director of Information Technology,  
Faculty of Medicine

**Deborah Robinson**  
Registrar & Director of  
Undergraduate Academic Services,  
Faculty of Arts & Science

**Trevor Rodgers**  
Senior Manager, Planning & Budget

**Prof. Mark Schmuckler**  
Vice-Dean, Undergraduate, UTSC

**Prof. Suzanne Stevenson**  
Vice-Dean, Teaching & Learning,  
Faculty of Arts & Science

Past members: **Mark Johnston** (Academic Services Architect); **Rajiv Kaushik** (Director, Quali Student Development); **Prof. John Scherk** (former Vice-Dean, Undergraduate, UTSC); **Prof. Elizabeth Smyth** (Vice-Dean, Programs, School of Graduate Studies); **Karel Swift** (Assistant Provost Registrarial); **Prof. Catharine Whiteside** (Dean Emerita, Faculty of Medicine)





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