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UNIVERSIDADE DO PORTO

Self-Evaluation Report

Annex IX

ECAR case study 4, 2009

Institutional Evaluation
European University Association

ECAR
EDUCAUSE CENTER FOR APPLIED RESEARCH

Unity in Diversity at the University of Porto

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ECAR Case Study 4, 2009

Case Study from the
EDUCAUSE Center for Applied Research

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EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

The mission of the EDUCAUSE Center for Applied Research is to foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education. ECAR will systematically address many of the challenges brought more sharply into focus by information technologies.

Unity in Diversity at the University of Porto

Preface

The EDUCAUSE Center for Applied Research (ECAR) produces research to promote effective decisions regarding the selection, operation, management, socialization, and use of information technologies in higher education. ECAR research includes

- research bulletins—timely and topical analyses of key information technology (IT) issues;
- research studies—in-depth applied research on complex and consequential topics, technologies, and practices, generally relying on quantitative analysis of survey data and on interviews with key practitioners;
- roadmaps—summary reports designed to provide executive readers with easy-to-read but analytically rich guidance on essential areas of IT investment;
- case studies—designed to describe effective IT management and institutional management practices and to draw from such descriptions lessons than are transportable across higher education environments; and
- occasional papers—studies of an intermediate length on specialized topics or topics of emerging interest that often integrate lighter-weight survey techniques with ethnographic research, reviews of the literature, and other research techniques.

ECAR Internationalization Effort

In July 2007, ECAR initiated preliminary efforts to extend its research understanding of IT practices outside the United States and Canada. Among ECAR's 475 subscribers are more than 70 institutions that operate outside the United States. ECAR leadership concluded that efforts of substantial importance are under way in universities and colleges in the developed and emerging world economies, and that an opportunity exists to expand both the international relevance of ECAR work and potentially its readership and market. These conclusions led to the creation of a plan of work that includes

- a major survey-based research initiative designed to gain a deep understanding of IT security, identity management, and other practices outside North America;
- a series of planned meetings with university IT leaders in France, England, the Netherlands, Norway, Ireland, and Australasia and the creation of sector reports describing the issues and priorities facing these leaders; and

- a series of case studies highlighting effective practices at specific institutions in Europe, Australasia, and elsewhere.

Literature Review

For this case study, we conducted a broad review of literature regarding the European Union (EU), the Bologna Declaration (and Implementing) Process, and subsequent higher education communiqués. We also reviewed literature related to Portugal, as well as specific information related to Portuguese higher education, to higher education regulatory reform, and to the University of Porto.

Interviews

Richard Katz and Ted Dodds interviewed senior leaders of the European University Information Systems (EUNIS) at that organization's annual meeting in Grenoble, France, and former EUNIS President Yves Epelboin at his office at the Pierre et Marie Curie University in Paris on the impact of the Bologna process on European IT management. In addition, this study's authors conducted more than 15 interviews over a three-day period with leaders of the University of Porto, in Porto, Portugal. For their many contributions to this case study, ECAR wishes to thank

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In Varietate Concordia: European Higher Education on the Cusp of Change

The establishment and development of the European Union has coincided with a prolonged period of peace, prosperity, and growth within the continent—stability interrupted over the course of time by the current global economic dislocation.

The EU is a multinational political body comprising 27 member states. It was founded in 1993 as the successor to the six-member European Economic Commission (EEC), which was first established in 1957. The EU motto, *in varietate concordia*, translated as "unity in diversity," anticipates the central theme guiding our conclusions regarding our subject institution, the University of Porto.

The EU operates as a single market. Member nations share a common trade policy, and 16 of the 27 currently share a common currency. Their combined gross domestic product (GDP) of US$13.03 trillion in 2006 ranks a close second in the world to that of the United States, at $13.13 trillion. Passport control and customs checks

between member nations have been largely eliminated. A set of treaties and legislation known as the Four Freedoms seeks to ensure and protect the free flow of goods, services, capital, and people within the EU market.

Although there can be little doubt that the political and economic framework of the EU has positively affected the wealth and standards of living of most member nations, its future is not without challenges. First, significant changes are occurring in the international competitive landscape. Innovative, high-quality, lower-cost producers of goods and services, notably in India and Asia, are exerting pressure on Europe much as they are on North America and elsewhere. Second, the workforce is aging due to low fertility rates, increased life expectancy, and the graying of the baby boom generation. As early as 2010, deaths will begin to outnumber births, a trend that is only partially offset by net immigration. Europe's current population of 493 million is expected to decline to approximately 450 million by 2050. This will translate to a drop of 16% in the working-age population while the population aged 65-plus increases by 77%.

Finally, the global financial crisis has had a major impact on the EU economy. According to the EU Statistical Office of the European Communities (Eurostat), the EU euro area—the 16 nations that have adopted the common euro as their sole legal tender—had a seasonally adjusted unemployment rate of 8.0% in December 2008, compared with 7.2% in December 2007. The entire EU27 unemployment rate was 7.4% in December 2008, versus 6.8% in December 2007. The lowest unemployment rates were recorded in the Netherlands (2.7%) and Austria (3.9%), and the highest in Spain (14.4%) and Latvia (10.4%). Portugal's unemployment rate was 7.8% in Q4 2008, with some regions reporting as high as 10% for the last quarter of year. The EU numbers are comparable with the rapidly growing unemployment rates in the United States (8.5%) and Canada (7.8%).

While celebrating its undeniable success to date, Europe continues to build the necessary competencies to face the challenges of a new millennium and now to lead EU members out of economic recession. European political leaders, including some heads of state and most ministers of education, have begun looking to reforms in higher education as a means of sustaining and improving upon the economic and social benefits the EU has fostered.

Europe and Higher Education

Modern universities as we know them were born in Europe, dating back to the 12th century. At that time, Paris and Bologna each had major universities with a different primary focus: Paris had an orientation to theology, while Bologna's emphasis was on law. University enrollment in the Middle Ages included international students, particularly at Bologna. And even at this early stage, administrative differences were emerging between the curriculum at Bologna, which was controlled largely by students, and the system organized by instructors at Paris. England's Oxford University, also dating from the 12th century, continues to operate largely under collegiate self-governance developed at the institution's inception.

The history of continental Europe in the intervening 900 years is filled with the rise and fall of city-states, nations, and empires. Notwithstanding social and economic turbulence, great European universities have endured and prospered. Elements of modern university tradition, leadership, and governance can in fact be traced directly to roots put down in medieval Europe. In the more recent past, stable national governments on the continent have developed and continue to maintain their own unique legislative frameworks governing higher education.

Educational systems in European countries such as France, Germany, Portugal, and Hungary have tended to be highly centralized

at the ministerial level, with tight government regulation covering broad areas of academic governance and decision making. Other countries, such as England and Belgium, have maintained relatively decentralized education systems. Universities across Europe issue different credentials that reflect vastly different requirements and outcomes. A degree program might take five or six years to complete in one nation but only three years in another. These differences reflect, in part, differences in university preparation at the secondary-school level.

The practice of segmenting the academic calendar into semesters or of marking student academic progress via course credits, seat time, or other input or assessment indicators also varies widely within Europe. These differences make it difficult to compare educational outcomes, and they create barriers antithetical to the "borderless" characteristics of modern Europe, particularly as regards labor mobility.

By the late 1990s, education ministers of the EU member nations envisioned a "Europe of Knowledge" as an important factor in social and human growth. They wished to give their citizens the competencies required to face the new millennium and to foster shared values that reinforced the meaning and relevance of Europe itself. The importance of educational cooperation in strengthening peaceful democratic societies was becoming paramount.

These social, cultural, and economic values were reflected in a document known as the Sorbonne Declaration, signed in May 1998 by the ministers responsible for higher education in four EU countries. This declaration emphasized the creation of a European Higher Education Area (EHEA) as a way to promote the mobility and employability of citizens and to aid the continent's overall development.

One year later, in June 1999, a larger group of 29 countries signed the Bologna Declaration, broadly endorsing and also augmenting the Sorbonne principles. In addition, the Bologna Declaration defined a specific set of objectives with a timetable for their completion, created various working groups, and proposed a schedule of biannual ministerial meetings to facilitate progress. These meetings have each resulted in an affirming policy announcement. According to the joint communiqué, in May 2007, the EU ministers of education are "developing an EHEA based on institutional autonomy, academic freedom, equal opportunities and democratic principles that will facilitate mobility, increase employability and strengthen Europe's attractiveness and competitiveness."[1]

Overview of the Bologna Process

The joint declaration of EU ministers of education issued on June 19, 1999, aimed at establishing "a more complete and far-reaching Europe, in particular building upon and strengthening its intellectual, cultural, social and scientific and technological dimensions"[2] by implementing consistent reforms to their systems of higher education. The 29 countries that signed the declaration committed themselves to a process of voluntary reform of their own domestic higher education systems to create a greater level of pan-European convergence. The signatories also expressed the intent of having the European higher education system become attractive worldwide.

Importantly, the language and intent of the declaration stress convergence, not standardization or uniformity; the principles of autonomy and diversity remain. Although the direction is toward compatibility and comparability of academic credentials across the EHEA, Bologna does not attempt to prescribe or standardize institution-level curricula. The declaration explicitly recognizes the need for common solutions to problems shared by most EU universities. These include the employability of graduates, skill shortages in key areas, relatively

weak performance at the world level, and increasing competition from private and transnational organizations.

These accords lay out a brief but ambitious set of objectives to be achieved by 2010:

- adoption of a common framework of academic degrees;
- introduction of undergraduate and postgraduate levels in all countries, with undergraduate degrees no shorter than three years and relevant to the labor market;
- implementation of compatible credit systems also covering lifelong learning activities;
- introduction of formal quality assurance, with comparable criteria and methods; and
- elimination of remaining obstacles to the free mobility of students (as well as trainees and graduates) and teachers (as well as researchers and higher education administrators).

Although not explicitly mentioned in the text of the Bologna Declaration, over time the notion of a student-centric, rather than teacher-focused, perspective on learning has evolved. Academic credentials are to be based on learning outcomes and measures of student competencies. For many national education systems in Europe, these are new and different approaches to the means of measuring student progress and the granting of degrees.

Progress Toward Creating an EHEA

Ministers of education from countries participating in the Bologna process meet every two years to assess developments, outline steps for improvement, and, as the deadline for 2010 nears, begin considering transnational priorities post-Bologna. Again, at the conclusion of their most recent meeting in London, the ministers issued a communiqué summarizing their assessment of the current state of progress and their vision for the future. The communiqué touches on numerous current issues arising around creation of the EHEA and notes several areas of agreement.

Mobility

Bologna seeks to increase the mobility of staff, students, and graduates in order to create opportunities for personal and professional development, boost international cooperation among individuals and institutions, enhance the quality of higher education and research, and give real substance to the European dimension. Although progress has been made, the London communiqué recognizes obstacles in areas such as immigration (which is largely outside the hands of education ministers), financial incentives, and pension arrangements. The ministers pledged to work with their own governments and with one another to address these ongoing challenges.

Degree Structure

Bologna will move institutions toward what is known as a three-cycle degree system, analogous to the undergraduate-master's-doctoral progression found in many jurisdictions elsewhere in the world. Previously, each nation maintained its own country-specific structure for degrees and academic progress. Measurable increases have been made in student enrollment at both the undergraduate and master's level, and in doctoral programs as well. However, more work is needed toward removing barriers to access and progression between degree programs.

Recognition of Qualifications

Recognition of the qualifications and formal results from other institutions and various types of informal learning is a key component of the EHEA. Detailed specifications for recognition were described on April 11, 1997, by the Council of Europe/UNESCO

Convention, known as the Lisbon Recognition Convention (LRC). Thirty-eight nations have ratified the LRC, but a need remains for greater coherence in the various national and institutional approaches.

Qualifications Frameworks

Bologna will rely upon two types of qualifications frameworks, which are viewed as central elements in promoting European higher education globally: a single overarching Framework for Qualifications of the EHEA, and nation-level structures that are evolving over time and are intended to be certified against the EHEA. The goal is to achieve comparability and transparency within the EHEA. The frameworks are also meant to assist institutions in developing academic programs based on learning outcomes and credit, as well as facilitating recognition of all forms of prior learning (formal and informal).

Much more effort is required in this area. The ministers are reaching out to other European organizations with experience in developing national qualifications frameworks. This could be a key challenge for the Bologna process as the 2010 deadline draws near.

Lifelong Learning

Recognition of prior learning, for access and credit, is not yet generally well developed. The ministers invited proposals from the Bologna Follow-up Group (BFUG) to improve prior learning assessment and develop a more systematic approach to flexible learning paths.

Other Themes in European Higher Education

The themes described above frame what has become known as the Bologna Process. They are not the only themes that are reshaping higher education in Europe. The ministers of education of European nations and the presidents and rectors of European universities have also been deeply concerned with quality assurance, doctoral education, and the role of the university and higher education in society.

Quality Assurance

Before London, the previous meeting of the education ministers, held in Bergen, Norway, in 2005, led to the adoption of Standards and Guidelines for Quality Assurance in the EHEA. These ministers endorsed the notion that responsibility for quality rests with the higher education institutions. They agreed that external quality assessment, in particular, has improved and that institutions are sharing good practice to promote continued quality improvement in the EHEA.

In addition, a register of European higher education quality assurance agencies has been established to allow stakeholders, including the general public, to have access to trustworthy information sources regarding quality. The register will itself be subject to review to evaluate its effectiveness.

Doctoral Candidates

Aligning the EHEA with the tenets of another EU initiative—the European Research Area (ERA)—has become another important objective for the Bologna ministers. The ERA is not part of the Bologna process but has goals analogous to those of the EHEA, only within the research domain. Institutions remain responsible for developing doctoral programs and appropriate career paths and opportunities for doctoral candidates and early-stage researchers. It is not clear how much leverage the Bologna process will have in this important area.

Social Dimension of Higher Education

Bologna envisions a strong role for higher education in reducing social inequalities, maximizing each individual's potential personal development and his or her ability

to contribute to a sustainable and democratic knowledge-based society. While recognizing that the diversity of the European population is both a strength and a challenge, the education ministers at their meeting in Bergen in 2005 agreed on the goal of creating "conditions for students to complete [their] studies without obstacles to their social and economic background."[3]

Student financial aid that moves across borders and the absence of additional fees or tuition for visiting students from within the EU will go far in implementing this goal. In addition, universities are expected to develop and implement action plans to improve student services, create flexible learning pathways, and ensure equal access opportunities.

Priorities for 2009

For the next scheduled ministers' meeting, the current issues of mobility and the social dimension remain key priorities. Improved data collection and broadly applicable metrics are becoming important means by which to assess progress in these two areas.

With the gradual introduction of the three-cycle degree system, improved employability is expected. Intragovernment action will be undertaken to align public sector career structures with the three-cycle system. Institutions are being requested to develop partnerships with the private sector to achieve similar alignment between degree outcomes and employment opportunities.

To attain greater recognition for the EHEA, officials will launch a Bologna Secretariat website.

A "stocktaking" process occurred at the April 2009 conference of the Ministers of Education. The goal has been to aggregate national-level reports into a comprehensive description of mobility, the social and global context of Bologna, the degree system (including recognition), and quality assurance. To address the movement toward a more student-centered and outcomes-based approach to learning, stocktaking will also address national qualifications frameworks, learning outcomes and credits, lifelong learning, and recognition of prior learning.

Finally, preparations are under way for an independent assessment of progress on Bologna, from its inception in 1999 to its implementation deadline of 2010.

National Reforms

While the EU educational community has been planning and developing major transformation within their respective systems, some national governments have been moving ahead with their own reform agendas for higher education. Broadly speaking, these national-level reforms are separate from, though complementary to, the objectives of the Bologna Declaration.

For example, when this case study visit was conducted in the summer of 2007, both France and Portugal were in the throes of new legislation that, when enacted, would alter many of the structures of university governance. These changes would significantly rework such strategic aspects as the faculty hiring, promotion, and tenure granting process, the size and composition of governing bodies, the process for selecting and evaluating the chief institutional executive, and the length of the chief executive's term in office.

In much of Europe today, these and other facets of academic governance are controlled by the state, with minimal institutional authority over decision making. As well, in many European nations, university real estate is owned by the state, and the research enterprise is often accountable through a variety of centers to a different government ministry under separate funding mechanisms and incentives. Increasingly in Europe, political leaders see a link between loosening the coupling of their universities to the government and the performance of the higher education sector. And in turn they see excellence in higher

education performance as a precondition for improved national competitiveness.

In the recent past, the performance of EU universities, with the notable exception of those in the United Kingdom, has not lived up to the caliber of their economic stature. As Table 1 shows, only four EU universities outside the United Kingdom are in the top 50 of the 2008 Academic Ranking of World Universities (ARWU) published by the Institute of Higher Education, Shanghai Jiao Tong University (IHE-SJTU).[4]

President Sarkozy and the French System of Higher Education

In late June 2007, newly elected French President Nicolas Sarkozy introduced legislation aimed at reforming that country's universities.[5] Although the Bologna process provides an external context and catalyst for change, Sarkozy's plans are specific to his national challenges and include measures that are quite outside and farther reaching than the convergence agenda of Bologna.

France has three broad groups of higher education institutions: universities, *grandes écoles*, and institutions of technological education. In 2001, 36.8% of age-eligible French citizens attended one of these institution types, ranking France seventh among 17 nations. However, only 24.6% of those of eligible age were found to have completed their first degree, well below the comparable rates in Australia (36.3%), the United Kingdom (37.5%), and the United States (33.2%). The university system is open to any recipient of the French baccalaureate—the standardized qualification taken by 18-year-old students of the French lycée—and relatively low graduation rates are often linked to the absence of tuition fees, the inability of institutions to choose students on the basis of merit, and students' lack of ability to attend a university outside their home region.

The French *grandes écoles* are smaller, more focused, and better funded than the universities. They are very selective in admissions and hence have much lower rates of attrition. Although they account for fewer than 5% of the 1.5 million university students in the country, they receive 30% of the national higher education budget. The prevailing view within France is that graduates of the *grandes écoles* will enjoy better employment prospects and opportunities for advancement than their university counterparts.

The technological institutes offer three-year diplomas with a focus on preparing students to work in technical fields upon graduation. The institutes are selective in admissions and have little attrition. Although graduates of the institutes do not have the mobility of their peers in the *grandes écoles,* they enjoy good employment prospects upon graduation.

Table 1. Nations with the Top 50 Universities, According to the 2008 ARWU

Nation	Number of Universities in ARWU Top 50
Denmark*	1
France*	2
Netherlands*	1
United Kingdom*	5
Canada	2
Japan	2
Switzerland	1
United States	36

**EU member nation*

Under the new legislation, championed by Higher Education Minister Valérie Pécresse, universities will have greater autonomy in several strategic areas, including finance, human resources, and property management:

- University presidents will be able to offer differential compensation for the recruitment and retention of top research talent.
- The faculty hiring process will be streamlined to enable job offers to occur more quickly.
- Institutions will own and manage their property and buildings (and will share in a capital fund of €5 billion over the next five years in order to do so).
- Governing boards will be reduced in size from 60 members to 20–30, with some of the reduction coming from fewer student representatives.

At this writing, even with these reforms, university tuition will continue to be free and universities will remain unable to select the undergraduate students they wish to enroll.

Portugal

Portugal, a nation about the size of the state of Indiana (91,951 square kilometers), lies at the western end of continental Europe (see Figure 1).[6] It boasts a rich heritage, with its status as a nation dating back to the Middle Ages. Portugal was a dominant world power in the 15th and 16th centuries on the strength of its seafaring abilities. Its influence extended throughout Europe, to South America and Africa. A major earthquake in the Portuguese capital of Lisbon in 1755, the erosion of Portuguese naval superiority by the Dutch and English, and Portugal's eventual occupation by Napoleon signaled a decline of Portuguese global influence. This decline hastened with the loss in 1822 of Portugal's largest colony, Brazil. Portugal remained a monarchy until revolution deposed the king in 1910. A second coup, in 1974, installed the democratic government model that remains in operation today.

Portuguese territory includes the Azores and Madeira Islands, and the nation has an estimated population of 10,643,000. Nearly 85% of the population is Roman Catholic. Contemporary Portugal has developed a diversified and increasingly service-based economy since joining the European Community (EC) in 1986. Over the past two decades, successive governments have privatized many state-controlled firms and liberalized key areas of the economy, including the financial and telecommunications sectors. The country qualified for the European Monetary Union (EMU) in 1998 and began circulating the euro on January 1, 2002. Economic growth in Portugal was above the EU average for much of the 1990s but fell back during 2001–2006.

Figure 1. Map of Portugal

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Today, Portugal's per capita output of goods and services is about two-thirds that of the average of EU members.

Politically, Portugal is a democracy rooted in a constitution that became effective on April 25, 1976. Under the Portuguese system of civil law, the Constitutional Tribunal reviews the constitutionality of Portuguese legislation. Justices of the Tribunal are appointed for life by the Conselho Superior da Magistratura. The head of state, a president, is elected by popular vote for up to two five-year terms. The government is headed by a prime minister who, although appointed by the president, is usually the leader of the majority party or the leader of a majority coalition. The Assembly of the Republic is a unicameral body comprising 230 members elected by popular vote to serve four-year terms.

From a technology perspective, in 2006, it was estimated that 2.6 million Portuguese people were classified as Internet users. Nearly 11.5 million mobile phones were in use in Portugal in 2005.

Education in Portugal

Although more than 93% of those in Portugal over age 15 can read and write, a weak societal commitment to formal education has been an obstacle to greater productivity and growth. A high dropout rate and the age structure of the Portuguese population do not bode well for Portugal's higher education sector. Only 16.5% of the population is 15 years old or less, while 17.3% is 65 years of age or more. This structure portends political pressures that may protect funding for medical care and social programs for the elderly at the expense of funds for higher education. Today, the state accounts for approximately 60% of funding in public higher education institutions.

Against this backdrop, the Portuguese government faces tough choices in its attempts to boost the nation's economic competitiveness while keeping the national budget deficit within the debt ceiling of 3% of GDP required of EU nations that have adopted the euro (eurozone). In 2005, Portugal's budget deficit was 6%, and in 2006 it was 4.6%. Portuguese policymakers want to facilitate a shift to a knowledge-based economy while containing the costs of higher education. They hope to accomplish this through the Bologna process and the deregulation of higher education.

A total of around 389,000 students were enrolled in 162 Portuguese higher education institutions during 2003–2004. Of these, 43.9% of students were enrolled in public universities, 28.7% in public polytechnics, and 27.4% in private institutions. During 2004–2005, Portuguese public universities filled only 89% of the funded student vacancies and public polytechnics filled 73%, while the private universities filled 37% of their vacancies and the private polytechnics 56%. These enrollment dynamics/demand challenges underscore the intensity of the competitive higher education climate in Portugal.[7]

All of higher education is regulated by the minister of education. All institutions operate under a variety of laws and regulations, most notably the Comprehensive Law on the Education System (law 46/86, subsequently amended by law 115/97 in August 1997. Separate laws govern access to universities (75/97), assessment of higher education (38/94), funding of higher education (113/97), the organization of the higher education system (26/2000), and the autonomy of Portuguese universities (252/97). Though this matrix of laws grants autonomy to Portugal's public universities, it does so in a highly prescribed fashion. Universities are allocated only a specific number of assistant professorships, associate professorships, and full professorships, and they can only fill positions that either vacate or have been created through the funding process. Once available, each professorial appointment is filled through a national search conducted by outside groups convened for this purpose.

Government regulations determine salary scales, and irregular jumps between professorial ranks are not possible. Only assistant professors may apply for associate positions, and full professors can only be drawn from the ranks of associate professors. Portuguese universities are governed by senates and councils specified in law and whose membership, terms of office, and authorities are prescribed by law. Portuguese rectors must negotiate consensus with these bodies to produce the university's annual budget and to set priorities for academic investments, among other things.[8]

As this case study was being prepared, the fundamental regulation on university governance was being rewritten. Before the end of 2007, Portuguese rectors began serving at the pleasure of governing boards rather than by election. Governing boards will replace the long-standing governance by senate or scientific council. A dramatic reform to the regulations that govern the organization of Portuguese universities was scheduled for the middle of 2008. These changes amount to a sea change in Portuguese higher education, creating governance and delegations of authority that, in concert with the Bologna process, are likely to reshape Portuguese universities in dramatic and important ways. They are analogous in scope and similar in direction to those reforms being promoted in France and elsewhere in Europe, and they are designed to foster the international competitiveness of Portuguese universities by professionalizing their management and governance. These reforms also set the stage for government to extricate itself perhaps from historical financial obligations. Portuguese universities, in the future, will have a greater capacity to compete for students, research funds, world-class professors, and so forth. And they will likely need also to dedicate some of this new capacity to garner funds to operate.

Primary education lasts for eight years and concludes with the award of a diploma/certificate of basic education. Secondary education consists of an additional three years. Access to secondary education is through the attainment of the certificate of basic education. Attainment of the Certificado de Habilitações do Ensino Secundário/Diploma de Ensino Secundário is the prerequisite for access to higher education. Admission to Portuguese universities—which offer master's and doctoral education—also requires successful testing in national examinations.

Higher education in Portugal is divided into two subsystems: university education and nonuniversity higher education (polytechnic education).[9] The two systems of higher education (university and polytechnic) are linked, and it is possible to transfer from one to the other. It is also possible to transfer from a public institution to a private one, and vice versa.

In Portuguese universities, the first educational stage leads to the award of the *Bacharel* after three years. The *Licenciado* is conferred after completion of a course usually lasting four years. The *Mestre* (master's) is an advanced degree in a specific scientific field, indicating capacity for conducting practical research. The *Doutor* (doctorate) is conferred by universities on those who have passed the doctorate examinations and have defended a thesis. The *Agregação* is the highest qualification reserved to holders of the *Doutor* degree. It requires the capacity to undertake high-level research and special pedagogical competence in a specific field. It is awarded after passing specific examinations. The grading system in both secondary school and at the university level is on a scale from 0 to 20. Grades of 14 or above are considered good (or better), and a grade of 10 is necessary to pass.

University admission is based on the availability of spaces at the specific institution and on space availability in the specific academic program or faculty. Each year, the institution establishes the number of places available for

each course of study that has to be supported by the Ministry of Education. All applicants must sit for the Concouso Nacional. Higher education in Portugal is available at virtually no tuition cost to EU citizens, and financial aid for students pursuing their first degrees is administered by the institutions they wish to attend.

Finally, university research is funded in Portugal largely, but not exclusively, by the government. Public research funding for science and technology is provided through the Foundation for Science and Technology; it consists of

- direct funding for the R&D units, through multiyear funding based on periodic evaluation (every three years);
- competitive funding for R&D projects; and
- competitive grants for individual researchers.

To fund investments in new buildings and equipment, Portuguese universities, on the basis of their proposed development plans, negotiate with the ministry.

Porto, Portugal

Oporto (Porto) is Portugal's second largest city, with a population of nearly 240,000 within the city limits and more than 1.3 million in the metropolitan area. It is the capital of northern Portugal. Ribeira, the historic center of Porto, is a United Nations World Heritage site. Porto was founded on the banks of the Douro River and boasts a cathedral dating from the 12th century. Porto is perhaps most famous for its connection with the sea. It is the birthplace of Henry the Navigator in 1394 and home to the port wine industry since the 16th century. The grapes used in port wine continue to be cultivated in the nearby Alto Douro region of Portugal, and to this day the south bank of the old city is dotted with port wine cellars where white, ruby, and tawny ports are aged in barrels.

The University of Porto

The University of Porto is Portugal's largest university in terms of student enrollment. It was created through the merger of two 19th-century institutions: the Academeia Politecnica (Polytechnic Academy) and the Escola Medico-Curugica (Medical Surgical School) on March 22, 1911. The university mission is discharged in three separate areas of Porto. Because of this merged history and the university's multiple locations, the institution is imbued with a tradition of autonomy vis-à-vis its governance, organization, and operation.

The university today consists of 14 *faculdades* (colleges or schools) and a Graduate School of Management:

- School of Architecture,
- Institute of Bio-Medical Sciences,
- School of Dental Medicine,
- School of Economics,
- School of Engineering,
- School of Fine Arts,
- School of Food Science and Nutrition,
- School of Law,
- School of Letters,
- Graduate School of Management,
- School of Medicine,
- School of Pharmacy,
- School of Psychology and Education,
- School of Science, and
- School of Sports.

Each school or faculty is governed by a dean or director and its program of academic instruction is guided by a scientific board or council. The dean is elected by the scientific board of the school. The faculties that constitute the University of Porto range in size from the School of Engineering, enrolling approximately 6,000 students, to the School of Food Science and Nutrition, which enrolls about 300 students. Each faculty has considerable autonomy concerning its academic priorities and pedagogy.

University-wide, the University of Porto enrolls more than 20,000 students at the undergraduate level and nearly 10,000 at the

graduate level. International students from 62 nations make up 6% of the current student body. In addition to attracting students from Portuguese-speaking countries such as Angola, Brazil, and Mozambique, the university participates in a variety of EU and other educational exchange networks, such as Erasmus and Da Vinci.[10] The university supports 166 academic programs and a continuing education program comprising nearly 280 courses. Ninety-one programs offer master's degrees and 20 offer the PhD.

Research at the University of Porto is conducted through 71 research units, 36 of which have been designated as "very good" or "excellent" under the national rating scheme. According to the ISI citation index, the academic staff of the University of Porto has published more than 1,500 peer-reviewed research papers, more than 20% of the total published research output of Portugal. The university maintains an active and growing presence with external organizations through extensive foundation relationships and through active participation in 17% (by euro) of the total university-industry research partnerships funded by the Portuguese national agency for innovation.

At the university level, the University of Porto is led by the *Reitor* (rector), who is elected by the Assembly of the University for up to two terms of two years. The assembly is a body of 200 members of the university community comprising professors and investigators (50%), students (35%), and nonacademic staff (15%). The teaching staff of the university comprises nearly 2,300 people, and the nonteaching staff approaches 1,700 people. The current rector of the University of Porto is Jose Marques dos Santos, who was elected rector on May 17, 2006.

Marques dos Santos is a longtime member of the University of Porto community, having earned his undergraduate degree in electric engineering there in 1971. After completing his PhD at the University of Manchester, the rector became director (dean) of the Faculty of Engineering from 1990 to 2001. In 2001 he became vice rector of the university, creating and presiding over the Institute for Common Resources and Initiatives. His vision is clear and straightforward—to place the University of Porto among the top 100 European institutions of higher education by 2011, the 100th anniversary of the university's creation.

University faculties are spread throughout the city of Porto but are concentrated in three main campuses. One campus is

located in the city center and marks the site of the university's oldest building—the Rector House—the administrative headquarters designed by well-known architect Carlos Amarante. A second campus—Asprela—is located in the northern part of the city, and the third campus—Campo Alegre—is located on the other side of the Douro River, not far from the city center campus. The University of Porto works actively to mitigate the effects of geographic dispersal in a variety of ways. The Science and Development Foundation links the university with the Porto municipality in ways that include the operation and management of the Porto Planetarium and the Campo Alegre Theater as public cultural resources. The university also places a priority on continuing education through teacher education, the provision of online courses, and public access to the university's library resources.

The University of Porto on a Burning Platform

Members of the European higher education community are mindful and proud of their unique place in higher education's history.

Governance forms, professorial rank and duty, and autonomy of the faculties are among a myriad of traditions that can be traced nearly always to medieval roots. These forms, traditions, and practices have served European universities well in fostering quality, intellectual independence, and stability amidst centuries of war, social and economic upheaval, and other changes. With few exceptions, European universities have been linked closely with the aspirations and destinies of their host nations or often with regions within those nations. Most European university students live with their parents while attending university, reinforcing or reflecting the local nature of the European university teaching enterprise. The Bologna Accord and process changed all of this. Increasing student mobility combined with relatively flat or declining population growth suggests unprecedented competition ahead for all European universities. No longer can any European university assume that gifted students will attend their local university when these students will be sought by leading universities from Europe, Asia, and North America. Reputation and rank, long-standing matters of national pride, are increasingly matters of institutional well-being, if not outright survival.

In this changing environment, many of those structures, traditions, and practices that have sustained European higher education institutions for a millennium are ill-suited for global competition and must now undergo change.

Few institutions of higher learning ever find themselves standing on the metaphorical "burning platform" that management consultants often describe as an important precondition for change. In Portugal, the implementation of the Bologna process is well defined, paced by an ambitious and clear timeline, embraced by the nation's minister of education, and underscored by the fact that the EU president is Portuguese. Indeed, as we spoke to the University of Porto leaders we imagined them not only to be standing on a burning platform but also in battle there with Hydra, the mythological beast of many heads.

In addition to adopting Bologna, the leaders of the University of Porto must align the highly autonomous faculties of the institution while respecting and leveraging the institution's decentralized legacy. At the same time, the university has had to organize to participate in a two-round external evaluation of its academic programs and the creation of a Portuguese national accreditation agency. Accreditation and program evaluation, of course, demand centralized processes, standards, data, workflow, and so forth. The university must also simultaneously energize an institutional community that suffered the effect of a 15% budget cut in 2007 and whose academic workforce continues to suffer from the efforts to massify Portuguese higher education in the 1980s. Rapid hiring of instructors, the university's failure over time to sustain enrollment growth, and government control of academic positions have conspired to stall the career progress of many academics in relatively lower-paying and lower-prestige assistant and associate professorships. This situation contributes to morale challenges in the short run and competitiveness challenges in the longer run. As Maria de Lurdes Correia Fernandes, vice rector for teaching and learning, explained, "The budget climate, changes in governance and administration, changes in the authority of the trade unions and in the legal aspects of a teacher's career, and Bologna are leaving many teachers with great apprehension."

The rapidly changing conditions and expectations constitute the leadership challenge for the University of Porto. The leadership literature is filled with models and frameworks that describe either the attributes of good leadership or the prescriptions for it. Most are variations on the seven S's popularized by McKinsey and consist of shared values, strategy, structure, skills, staff, style, and systems.[11]

Without referring to any leadership reference model, Marques dos Santos and his colleagues appear to be pressing on most or all of the levers of leadership described in the classical literature.

Shared Values

The University of Porto's efforts to create a competitive, unified European university that builds on the university's legacy of autonomous faculties are aligned via shared values. These values are in turn instantiated through a clearly and oft-articulated vision, strategic aims, and an aspirational set of institutional characteristics, values, and behaviors that will be needed to achieve the vision.

Vision

The vision of the University of Porto begins with its clear, unambiguous aspiration to be one of the top-100 universities in Europe by 2011, the institution's centenary year.

> *No ano do seu primeiro centenário, a ocorrer em 2011, a UP estará entre as 100 melhores universidades europeias, posição essa medida por bitolas definidoras dos rankings do ensino universitário, consagrados e aceites internacionalmente.*
>
> In 2011, our 100th anniversary, the University of Porto will rank among the 100 best European universities according to accepted international standards for evaluating university education.

With more than 750 institutions represented within the European University Association alone, the competition for a top ranking is stiff.

The university will evaluate its position on several international ranking lists, including the ARWU, which is compiled annually by Shanghai Jiao Tong University; the Times Higher Education Supplement World University Rankings; and Webometrics Ranking of World Universities.

Increasingly, the university is developing the confidence to view itself at an international level. As Pro-Rector Lígia Maria Ribeiro notes, "We are not competing at a national level; we are competing at a European or a global level."

Strategic Aims

To propel them toward their vision, the university's leadership has outlined four strategic aims ranging from changes to their models of teaching and learning to research innovation, increased internationalization, and streamlined administrative structures and processes.

Changing the paradigm of teaching and learning

The University of Porto intends to enhance the learning experience of its students by moving to a more student-focused model of learning. This approach is consistent with the pedagogical themes found in the Bologna Declaration. However, it also represents a longer-term and more challenging goal than Bologna's administrative changes. The university is systemically monitoring and assessing its pedagogical models on the basis of international best practices.

Pedagogical change will be accompanied by initiatives aimed at bridging the gap between teaching and research. Greater emphasis is being placed on master's and doctoral programs.

The institution is also promoting postgraduate and continuing education in multidisciplinary or professional fields.

R&D innovation

The university seeks to create a "scientific elite," placing faculty and staff in large research centers and attracting internationally known researchers to campus.

Internationalization

The institution seeks to increase the number of incoming foreign students studying at Porto. Recruiting students from the top-25 institutions in Europe to the University of Porto is a priority, ideally for an entire degree program with emphasis on the master's and doctoral programs. In addition, the university also aspires to increase the number of its own students interested in studying abroad.

Administration

A new administrative and management model is envisioned for the university, including simpler, aggregated organization structures with greater critical mass. A broader range of financial support possibilities are being pursued through external funding sources.

Characteristics That Enable the Vision

With an eye on the future, the University of Porto already has many important attributes that work together to galvanize the institutional vision and facilitate change. Several consistent themes recurred in interviews: a single yet diverse institution, an environment of trust, transparency, continuous improvement, and decision making based on integrated information access and systems that are easy to use.

Notwithstanding a tradition of faculty-level autonomy, there is clear movement toward the view of the University of Porto as a single institution. But it is a single institution that relishes in and encourages diversity, as witnessed in greater interdisciplinarity and internationalization efforts for faculty, staff, and students. The current organizational model gives the faculties most of the operational responsibilities, with the rector's office playing a coordinating and auditing function.

It would be difficult to imagine a large research-intensive university like Porto developing an institutional perspective without a high degree of trust permeating its culture. Although many factors contribute to a sense of trust, perhaps the single most important contributor is the leadership of Rector Marques dos Santos. He leads by example with his plain-speaking, persuasive, and honest style of communication. As but one small example, Rector Marques dos Santos and his senior executives share lunches regularly in an informal opportunity to break bread, share activity reports, and formulate institutional strategy. The atmosphere at these meetings is open, informal, and appears to the observer to be filled with mutual respect.

Illustrating the transparent processes and open access to information at the University of Porto is SIGARRA, an integrated information system that gathers, processes, and reports substantial amounts of detailed information. Reports outlining faculty workloads, teaching outcomes, enrollment, budgets, and other measures are routinely shared across academic units. This means that the dean of a faculty is able to view the operational metrics of other faculties. The environment of trust has reduced most fears over how this information will be used. The prevailing view seems to be that the information is made available to facilitate improvement, not to cause embarrassment or blame. SIGARRA was developed under the rector's leadership when he was dean. It is another vivid example of his beliefs in empowerment, open information, and open discourse.

The sense of trust and transparent information access are part of the foundation of a culture of continuous improvement, actively and rigorously practiced. Pro-Rector Jose Antonio Sarsfield Cabral is specifically responsible for continuous improvement and quality assurance. However, he suggests that accountability for quality is much broader. He defines his role as "building the right indicators, both qualitative and quantitative, so that quality improvement can become everyone's job."

All of the institutional leaders interviewed stated enthusiastically that SIGARRA is a strategic tool that contributes to the achievement of their vision and strategic aims. SIGARRA provides sound data on people and productivity. A culture of evidence-based decision making permeates the University of Porto, making this information system an important strategic asset.

SIGARRA's ease of use was frequently noted as one of the features that has facilitated its widespread adoption. The combination of functional value and ease of use is an important one, as Clara Vale, a teacher in the Faculty of Architecture, noted: "People grab technology when it facilitates and it is not hard to learn."

Leadership

Although Marques dos Santos was elected university rector only in May 2006, he had served as vice rector of the University of Porto since 2001 and dean of the Faculty of Engineering (FEUP) from 1990 to 2001.

It is impossible to spend time with Marques dos Santos without being influenced positively by his optimism, his determination, his plain-speaking candid manner, and his abiding commitment to the University of Porto.

Marques dos Santos has a lengthy track record as an agent of change. In 1994, while dean of FEUP, he created a faculty-level computer center and initiated the early information systems work that evolved into the present-day SIGARRA, now used campus-wide. His approach is to make decisions on the basis of current, reliable data that is captured at the faculty level. This philosophy created a strong foundation to develop the current system capabilities in reporting and metrics.

Although the information system began within the FEUP, Marques dos Santos helped to facilitate its modification and adoption for use across the entire institution. While vice rector he created the Institute of Common Resources and Initiatives in 2003. The purpose of the institute is to coordinate and facilitate an integrated approach to technology development and adoption. He stipulated that the FEUP system be implemented in all faculties within two years, a goal that has largely been accomplished.

He has patiently and consistently fostered an institutional view of the university and its information systems. This leadership approach has been instrumental in moving a highly autonomous group of faculties, which had great difficulty establishing common directions, into a single cohesive institution that seeks to compete at high international levels.

The rector believes in and is optimistic about Europe, though he worries about the tendencies for nationalism to impede progress. These worries, of course, are heightened in periods of economic retrenchment. He sees the Bologna Declaration as an important mechanism for "improved understanding of what degrees across the EU really mean." His view is that "Bologna is a motivation for change; it should not be a template." He is working to eliminate barriers to mobility of staff and students. He wants to give students more flexibility and freedom to manage their own academic program.

His emphasis on change continues today. High on his agenda is to shift the pedagogical approach from largely lecture-based to a more interactive approach, with greater emphasis on blended learning enabled by technology. He is actively pursuing international expertise to move forward with pedagogical change, and advocates equal weighting of teaching and research in faculty evaluations.

Underlying the rector's calm demeanor and his open, respectful relationships with his staff lies a commitment to achieve results, and to achieve them quickly. The University of Porto is generally ahead of schedule in implementing the Bologna process. The Faculty of Engineering has already implemented the reforms required for 2010. A program of internal quality assessment that was initiated just this spring was reported in 2008.

The combination of personal and professional attributes observed in Marques dos Santos is consistent with the characteristics of what management consultant Jim Collins refers to as "level 5 leadership."[12] According to Collins, level 5 leaders build "enduring greatness through a paradoxical blend of personal humility and professional will." Such leaders typically demonstrate great respect for people and high ambition for the organization but not for themselves. They lead their organizations through disciplined thought and action. They build and maintain great teams. These attributes and this behavior and style characterize and typify Marques dos Santos.

Staff

At a superficial glance, one might have been tempted to entitle this case study "Revenge of the Nerds." Indeed, many on the leadership team that is closely associated with the University of Porto's current change efforts were drawn from FEUP, the Faculty of Engineering.

Not long after his appointment to rector, Marques dos Santos chose Lígia Maria Ribeiro to lead the institution's information systems initiatives in the role of pro-rector for Information and Communication Technologies (ICT). For many years, dating back to his time as dean of FEUP, he worked with and mentored Ribeiro. Ribeiro's work, as well as that of her colleague Gabriel David, professor of computer science who also serves as the CIO in FEUP, attracted widespread recognition, including the presidency of European University Information Systems (EUNIS) for Ribeiro in 2005 and 2006 and that organization's Elite Award for the University of Porto.

Jose Antonio Sarsfield Cabral, pro-rector of quality improvement, has been in his current role for eight years. He brings stability and a sense of permanence to the institutional culture of continuous improvement. His role is pivotal in minimizing or eliminating internal competition arising from the transparent data reporting for which his office is chiefly responsible. Cabral is also a key figure in the expeditious process of internal evaluation that is currently under way at the university.

Marques dos Santos continues to rely on his longtime colleague Carlos A. V. Costa. With six years in his current role as director of FEUP, Costa is another long-standing leader. Costa acknowledges that the active cooperation that exists between the faculty and the rector's office means that his faculty is not completely free to determine its priorities or allocate all of its internal resources unilaterally. However, his commitment to the institutional team is clear: under his leadership, FEUP has sustained its system development work and added several new modules to the SIGARRA system, with workflow being a current focus. Included in Costa's commitment to continuity is the continued leadership and influence of David as CIO. David has worked with Ribeiro on information systems for more than a decade. The strength and continuity of the relationship between these two key individuals is a crucial aspect to the success of the university and its information systems initiatives. More than that, FEUP often serves as a test bed for the development of new technologies and as a co-development partner with Ribeiro's central IT organization.

These leaders bring a legacy of mutual respect and trust to the leadership cadre, a respect for data, standards, method, and rigor in administration, and in many ways an overall engineering sensibility as it relates to the operation of the University of Porto. Notwithstanding this predisposition, the leadership team is tempered in its outlook with voices from other intellectual elements of the institution. In particular, Vice Rector Maria de Lurdes Correia Fernandes plays a critical role. Fernandes is the university executive responsible for teaching and learning. As such she works with a university-wide pedagogical council to develop a quantitative understanding of the university's student

body, to oversee the university's diploma supplement (record of student cocurricular and extracurricular activity), and to ensure that all academic programs conform to regulations established by the University of Porto.

Any visitor to Portugal quickly comes to realize that food holds a special place in Portuguese culture. On many working days, Marques dos Santos hosts informal team lunches at a small restaurant near the main administrative offices. Casual observation of two such lunches suggests that they are social occasions as much as business meetings. They represent an extended opportunity for the senior team to spend time together, building relationships and fostering close communication.

The rector's office works as part of a team with the faculties, particularly the Faculty of Engineering, on many facets of information systems development. The Institute of Common Resources and Initiatives maintains regular contact with the academic community and stays close to the staff within the faculties. They routinely discuss and develop consensus-based decisions and strategies with their colleagues. Although it used to be the case that most new development ideas came from the Faculty of Engineering, today other faculties are proposing their own specific ideas.

The team approach extends to governance of IT, which is handled by a small set of informal councils. These include a Council for Information Systems comprising individuals (information managers) responsible for IT within the faculties. There is also a group for e-learning and a committee for networking that is developing a common architecture and standards for the campus.

Strategy

With a mandate for change; an established and principled leader to guide them; an agreed-on set of guiding principles, values, and goals; and a team that in many cases reaches back to more than a decade of trusted interactions, the leadership of the University of Porto has turned its attention to implementation—in particular, to strategy.

The university strategy consists chiefly of two elements: first, using the Bologna process and the Portuguese legislative reforms of university governance and personnel practices as catalysts for change, and second, harnessing the university's legacy of autonomous governance by the faculties with these changes for competitive advantage. This fundamental strategy takes specific form in several ways.

Continue to respect the autonomy of the university's faculties and the hegemony of their academic and scientific boards in matters related to the curriculum.

Use faculty boards and professors in the faculties as the sources of data to fuel the information systems that are at the heart of the institution's efforts to comply with Bologna and to assimilate changes in the Portuguese higher education regulations.

Partner wherever possible with IT professionals in the faculties to institutionalize technical capabilities first developed and tested in the faculties (bottom-up development partnership).

Focus the curriculum on heath sciences; media; technology and engineering; and energy, environment, and the sea.

Consolidate the faculties in ways that respect histories of autonomy yet foster the critical mass of resources necessary to compete on a European or global scale.

Define interdisciplinary clusters of excellence, together with new relationships with regional science and technology organizations. Renew on business incubation and technology transfer.

Use existing frameworks and processes.

Wherever and whenever possible, use the Bologna process, national regulatory reform,

and even budgetary exigencies like the current recession as opportunities to drive the institution to make changes needed to compete on a European or global scale. Substantial examples include

- a self-study process under Bologna that fosters a culture and practice of continuous improvement,
- a pedagogical survey of student opinion, and
- a change to academic program requirements to align university qualifications with the Bologna 3-2-3 specification[13] while creating more flexibility for students to take courses outside their chosen faculty.

Use the Institute for Common Resources.

Created by Marques dos Santos, the institute is intended to identify, fund, and steer efforts and systems that foster university-wide integration between and among the faculties.

Promote and oversee the governance of the university's mobility efforts.

- Utilize an Erasmus working group that is appointed by the various faculty boards of the university to work with the Office of International Relations. This approach leverages relationships between scholars through EU programs such as Erasmus and Socrates to promote student and staff mobility.
- Offer some Erasmus classes in English and Portuguese and offer intensive language programs and other interventions to socialize incoming EU students to life at the university and in Portugal.
- Develop a set of strategic relationships with peer or aspirational institutions that will promote the university's international posture and standing in both teaching and research.

Other elements of the strategy.

- Create a new "employment observatory" that will follow the professional lives of graduates and strengthen bonds with alumni.
- Create university-wide resources like the Virtual Library, Digital Archive, and e-Learning Café that serve students across the faculties of the university.
- Continually communicate internally and externally the message about the unity of the university and reinforce this message by actively managing the university's brand, logos, and website.
- Use IT, standards, and information as agents of integration and cohesion.

Style

McKinsey's use of the term "style" in its seven S's in fact refers to organizational culture. The University of Porto's culture—as reflected in its key documents, website, and leadership initiatives and in our conversations with leaders and students—seems palpable, clear, and important as a competitive differentiator. It is not possible for us to determine how much of this culture emanates from values held by the university's leaders or how much of the leaders' values emanate from their common experience in the university. Still, we observed several evident and important elements of institutional culture.

Respect of faculty autonomy. As described, the history of the university and indeed of higher education in Portugal is rooted in beliefs that academic productivity, excellence, and integrity are best fostered in loose confederations of smaller political subdivisions. The faculties—or what North Americans call the schools or colleges—are historically the foci of institutional decision making about instruction. Similarly, the research centers have tended to be the steering and funding focus of the univer-

sity's research mission. The current leaders of the University of Porto remain passionate about the importance of autonomy while striving to enlarge the institution's regional and global impact by exploiting the connections between faculties.

Culture of evidence. The University of Porto's leaders are passionate about creating a culture of evidence. They are actively developing the technical infrastructure, the IT applications, the common user interface, the workflows, and the incentives to make information readily available online. The University of Porto relies on those who are closest to the information to enter data into university information systems and uses that information to plan, account to the public, allocate resources, and so forth. As a result, much of the institution is—as Fernandes puts it—"managing by the numbers." According to Fernandes, "We don't send any [doctoral] student numbers to the ministry unless they are entered into the system. The system is very important for our teachers and for the pedagogical modernization that we are going through." Deans, directors, pro-rectors, vice rectors, and the rector carefully interrogate the trusted data in the university's information systems in the normal course of decision making. It is clear too that they expect others—including teaching staff and researchers—to "do their homework" as part of shared governance. FEUP Director Carlos Costa puts it succinctly: "I cannot imagine managing a school like ours without indicators."

Information and services are shared and open. Sharing is a value and activity mentioned by nearly everyone we interviewed. Pro-Rector Ribeiro said it well: "At the university-wide level, our main issue is to offer our community a technologically rich environment to make it possible to share resources using the network." And sharing, of course, assumes a culture of openness. Says Rector Marques dos Santos:

> It is important to create a culture of openness. This openness extends to the manner in which the university faces the world. Openness fosters internationalism. A university that wants to be in the first rank must be global. Openness attracts students from abroad who become ambassadors who carry the reputation of the university abroad. This is a precursor to new funds and new resources. These in turn increase the breadth of knowledge about the university which, in turn, creates higher rankings, creating a virtuous cycle. So openness must be an element of our culture.

Culture of discipline. Perhaps this is where the engineering influence on the University of Porto is manifested. Whether it is the formalized program of continuous improvement led by Pro-Rector Cabral, the systematic approach to IT development, the reliance on performance indicators and evidence, or the importance placed on pacing and formal project management, the leadership of the University of Porto is leading in a structured and systematic fashion, in contrast with what many at other institutions in higher education describe as "muddling through." This leadership has a vision, mission, strategic aims, deadlines, and a toolkit. From a cultural viewpoint, this amounts to a culture of discipline and of accountability. Nearly every conversation with members of the university leadership begins or ends with a declarative statement: "By such and such a time, we expect to accomplish X. To do this, we are planning to do Y." Of course, the Bologna process, the Portuguese government, and the limited term of the rector's elected office all impose deadlines. Facing these time constraints, a real change agent must develop a disciplined culture that is rich in tools and information if he or she is to succeed.

Continuous Improvement

The University of Porto has the good fortune of implementing compliance with the Bologna process with a very strong information system, a legacy of rich and trusted data, and a leadership culture that is deeply familiar with the literature and practice of continuous improvement.

The Bergen Conference of European Ministers Responsible for Higher Education, held May 19–20, 2005, adopted a report titled "Standards and Guidelines for Quality Assurance in the European Higher Education Area." The education ministers at Bergen established that European institutions should have a policy and associated procedures for the assurance of the quality and standards of their programs and degrees. They insisted that institutions in the EHEA explicitly develop institutional cultures that recognize the importance of quality, and quality assurance, in their work. To achieve this, institutions were to "develop and implement a strategy for the continuous enhancement of quality."[14]

The Bologna process provides for the periodic review of academic programs and degrees and requires affected institutions to implement formal mechanisms for the approval, periodic review, and monitoring of these programs and degree awards. Bologna, as updated in Bergen, goes on to require that students are to be assessed using published criteria, regulations, and procedures that are applied consistently and that these be subject to external review and commentary. Institutions in the EHEA are also required to collect and analyze "up-to-date, impartial and objective information" about their programs and degrees.[15]

External reviews under Bologna will be undertaken on a regular periodic basis; they are to be rigorous and based on current, high-quality information. Institutions subject to review, of course, are expected to implement recommended actions in a timely and effective manner. European and national higher education agencies—supported by groups of experts—will conduct these reviews and will report their findings and analysis of institutional reviews in periodic summary reports.

All of this amounts to a very tall order. Not long ago, the National Council for the Evaluation of Higher Education (CNAVES) completed a two-round evaluation of university study programs, and the past several years witnessed the creation of Portugal's first accreditation agency. "Beginning September 2007, things got very real," said Fernandes. Using expert psychometricians, the university developed a survey of student opinion about their coursework and learning experience. "In 2007, the faculties were required to establish a baseline of student information at the end of each semester," Fernandes added. The pedagogical survey is only one element of a very well-elaborated complex of information, systems, and institutional processes that have been designed and deployed to promote continuous improvement. Much of the heavy lifting surrounding academic assessment and continuous improvement is shared between Fernandes and Cabral, pro-rector for continuous improvement. Cabral, also from FEUP, is working with Fernandes and others to develop a sustainable process for continuous improvement.

Cabral describes the process this way: "The accreditation process determines whether a program meets the threshold criteria and therefore certifies the existence of minimum educational standards. The assessment process evaluates the quality of specific activities, such as teaching or research. Assessment goes beyond accreditation to make graded judgments about academic quality levels." He goes on to describe a third leg of the stool—academic audit: "Unlike assessment, audit does not evaluate quality; it focuses on the processes that are believed to produce quality and the methods by which academics assure themselves that quality has been attained."

To support the continuous improvement effort, members of Marques dos Santos's team have initiated a program of rigorous self-assessment. Already terms of reference have been agreed on by members of each of the university's faculties, and each has begun the process of translating those terms into measurable performance indicators. Of course SIGARRA, the university's information system, will grow to capture and help manage this performance data so that members of the academic community can learn from and act on results. According to Cabral, "the self-evaluation process is designed to promote a perspective and fruitful reflection and debate. It identifies areas for improvement and stimulates further analysis of our quality assurance procedures." The self-evaluation process culminates in self-evaluation reports summarizing the findings of the process and highlighting internal monitoring mechanisms and institutional capacity for change. And too, evaluation visits are made during this process, designed to validate and perhaps illuminate the findings made, to ensure that self-evaluations are written with objectivity, and to help the audit report authors identify "practices worthy of commendation, suggestions for improvement, or mechanisms for consideration."

Although in the early stages of adoption, the academic audit process at the University of Porto is already demonstrating benefits:

- initiating or bolstering academic audit processes;
- placing the improvement of teaching and student learning on the institutional agendas;
- clarifying responsibility for teaching and learning at individual, academic unit, faculty, and institutional levels;
- reinforcing the university's efforts to develop university-wide quality cultures;
- facilitating discussion, cooperation, and development within academic units over means of enhancing academic activities;
- creating a university-wide repository of information on effective practices and common problems; and
- offering visible confirmation to the public that attention is being paid to academic quality assurance.

Systems

The University of Porto considers IT to be a strategic contributor in the development of the university and to attaining its far-reaching vision of being among the top-100 European universities by 2011. Indeed, as mentioned earlier, the IT environment acts as a unifying force that brings together the university's many and varied communities in ways that reflect both institutional cohesion and its rich tradition of academic diversity.

Over the past decade, the university has moved steadily toward creating an IT environment that today features

- a university-level approach to IT, implemented through distributed development and support teams;
- strong emphasis on software usability and high levels of data quality;
- a foundational infrastructure provided through a large and robust data network, augmented by a widespread wireless network available to all UP students; and
- a standardized suite of integrated products, applications, and locally developed modules that are used campus-wide—the information system known as SIGARRA.

These characteristics are by no means the norm among large research-intensive universities like Porto. They illustrate some of the specific mechanisms that collectively foster a unifying sense of community at the University of Porto.

In particular, the university's information system, SIGARRA, offers the community a simple, consistent, easy-to-use software interface within which both the local needs of academic units and the information reporting requirements of the rector's office are addressed.

Organization and Roles

IT at the University of Porto operates largely on the basis of distributed roles and responsibilities, brought together at an institutional level through a set of well-understood collegial processes of priority setting, decision making, resource allocation, and accountability. Each of the major academic units (14 faculties and the Graduate School of Management, distributed across three main campuses) has its own office to support informatics and provide local end-user support. These IT units average 10–40 staff, with the largest group in the FEUP, where 50 people develop and support information systems. Each faculty receives an overhead budget allocation to cover central costs, including central IT services such as Blackboard and Moodle for e-learning, the SIGARRA information system, and a campus license for Oracle. Beyond the overhead budget, there are no direct chargebacks for central IT services.

The faculties are required to pay for and operate their own local networking equipment and must cover the full cost of any systems they maintain locally. The central IT group manages networking standards, and it operates the campus backbone and the connection to the Portuguese national research network. Currently, there are joint developments under way to create a campus grid infrastructure to leverage the many computing clusters that exist across the various faculties.

The central IT staff of 50 is organized under the Institute of Common Resources and Initiatives of the University of Porto (IRICUP), which is led by Ribeiro, who serves as vice president of the institute. IRICUP was created in 2003 to complement and coordinate the efforts of the faculty IT units. It strives to offer the community a technology-rich environment that enables people to use IT easily in their work. They pursue this goal through ongoing development and support of the network, the e-learning applications, and SIGARRA.

Looking beyond its current e-learning environment, which consists primarily of course management systems, IRICUP seeks to provide new applications and resources that will enable teaching and learning to be influenced by IT to a greater extent. The Bologna Declaration requires that education be more student-centered. In part, this means making it easier for students to access information, possibly through a student portfolio application within SIGARRA.

IRICUP maintains close contact with the faculty CIOs and staff in the faculties to discuss and develop consensus-based decisions and strategies. For example, for a recent national initiative for WiFi at all Portuguese universities. IRICUP organized the meetings with institutional stakeholders, developed and maintained an overall project schedule, and monitored the status of the faculties responsible for deploying the infrastructure. The collaboration worked well, with the result that University of Porto students now have a campus-wide wireless network.

SIGARRA

The name SIGARRA means information system (*Sistema de Informação*) for the aggregated management of resources and academic records (*para a Gestão Agregada de Recursos e Registos Académicos*). Not surprisingly, the acronym was created to be easily remembered: the Portuguese word *cigarra*, which has the same pronunciation, is the name for the cicada insect. The system, shown in Figure 2, originated in the FEUP in 1996; in 2003, following the creation of IRICUP, work began to install the system in all faculties of

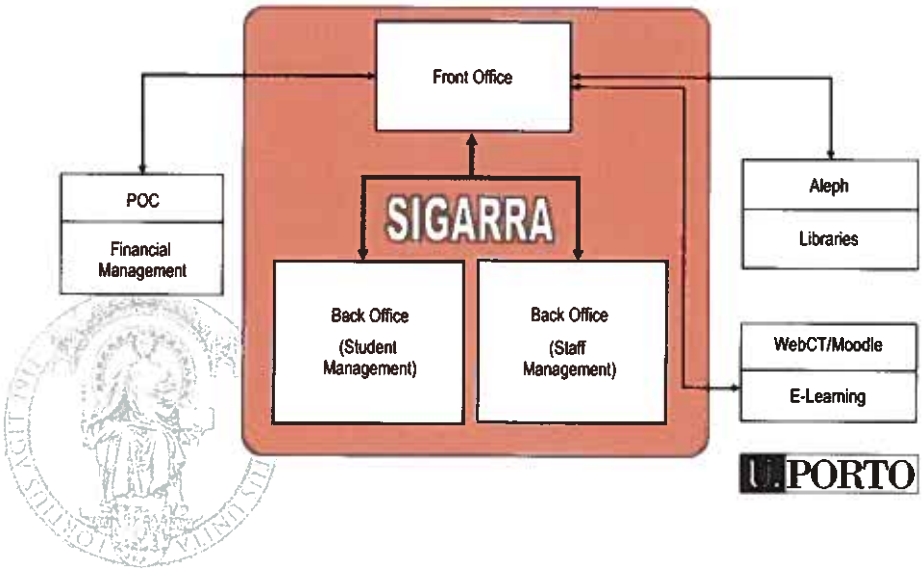


Figure 2. The SIGARRA Information System

the university. With the agreement of FEUP, the name was changed to SIGARRA to reflect the shift in scope from faculty to university-wide. As mentioned, the EUNIS organization awarded this system its Elite Award for excellence in implementing information systems for higher education.

SIGARRA plays several vital roles in the life of the institution, including that of a strategic tool to address the requirements of the Bologna Declaration. The university uses its information system to produce assessment reports and management indicators that provide the foundation for communication with government and other EU institutions. In this sense, SIGARRA has become an important mechanism to communicate with key stakeholders and accurately convey the "University of Porto story." For an institution with plans for increased excellence and recognition across Europe, this sort of communication is both valuable and important.

Three major applications underpin the SIGARRA system, in addition to interfaces with the e-learning, library, and financial modules. The student management and the staff management "back office" applications were developed by staff within the rector's office in 1992 and 2000, respectively. The original FEUP information system was built on the existing student management application and was augmented with other local components to form a "front office" perspective for the Faculty of Engineering. When IRICUP was created, work began in earnest to integrate these three applications as SIGARRA.

Although SIGARRA is the official institutional repository for information about the university, including the faculties, numerous local applications use information from SIGARRA, primarily for authentication and authorization. The wireless network uses information about people for the Remote Authentication Dial-In User Service (RADIUS) system.

Collaborative Priority Setting, Decision Making, and Application Development

The FEUP continues to invest in integrated information systems and still drives much of the functional development of SIGARRA. Current priorities include the implementation of workflow in several administrative domains, process automation, developing indicators for management, and leveraging the large amount of information already available in SIGARRA to build annual activity reports and CVs of the academic staff.

During the past two years, the FEUP has automated more than 95% of its procurement transactions through a standardized set of workflow tools. These complex transactions require approval at multiple levels, up to and including the dean. Travel authorizations also have been workflow-enabled with a simple online form linked to the university's financial system. The next major workflow deployment, currently being tested, will be for staff hiring.

Over time, these workflow capabilities will be implemented in all faculties. This progression of events—beginning with development in the faculty that then moves to the institution level—is a formal process within the university. At the beginning of each year, the key stakeholders meet to establish an annual plan for new joint activities across the faculties and the rector's office. The plan generally relates to the development and deployment of several SIGARRA modules each year. The plan is approved by an informal council of faculty-based information managers and subsequently by the deans and the rector's office.

Development projects are then allocated to the most appropriate mix of faculty resources and central IT resources. In addition to developers in FEUP, the Faculty of Science is beginning to contribute resources to the institutional effort. They are also bringing functionality from within their own locally developed system, InfoScience, under the SIGARRA umbrella.

IRICUP may compensate the faculties for some of this development work, with local resources allocated for much of it. IRICUP ensures that the information managers remain involved in the design process so that system specifications reflect cross-faculty requirements. The institute also operates a project management office that is available for projects undertaken by any group. Within its methodology, IRICUP provides development resources, coordination, and communication. The larger faculties allocate development staff of their own, while staff in the smaller faculties perform unit testing, system testing, and installation. The process involves a broad cross section of the academic community without overburdening any individual group. This type of collaborative approach—with functional requirements being driven by the academic units, distributed roles and responsibilities, and institution-level oversight provided by the rector's office—underscores the strong team-oriented culture described earlier in this case study.

Ease of Use

In addition to the collaborative development process and integrated technology architecture, another important factor in the success of IT at the University of Porto is the usability of software, particularly SIGARRA. Ease of use is a vital enabler in the adoption of any new system. The university's deliberate emphasis on this important but often overlooked facet of software systems has paid huge dividends. If SIGARRA had not been extremely easy to use, the institution's aggressive implementation time frame of adoption across all faculties in two years might not have been achievable. Everyone interviewed—including students—commented on the usability of the SIGARRA system. Simple point-and-click interfaces enable the end user to navigate intuitively through the various modules within the system. Architecture instructor Clara Vale summed it up well: "People grab technology when it is available and easy to use. As soon as the function is hard, it limits the spread of the technology. With SIGARRA you have information within 2 to 3 clicks."

The university's development methodology, which begins with a faculty perspective, lends itself to creating an environment that naturally follows the workflow within academic units. The presentation layer interface, or "front office," masks the complexity inherent in a large, diverse institution. Faculty-level views of information are readily available

with detailed drill-down capabilities based on roles. The emerging introduction of workflow and process automation is likely to further increase the already high level of satisfaction associated with using SIGARRA.

But usability is not limited to faculty: Students also commented on SIGARRA's simple navigation mechanism, which they assert is superior to the available e-learning applications. As Maria Daniel, dean of the Faculty of Nutrition and Food Sciences, puts it, "Technology cannot come between students and their teachers." Student use includes online access to grades, appointments with professors, announcements, course registration, and more. With an increasing proportion of student-centric information available online, SIGARRA's usability will continue to be an important factor for adoption. Its simplicity will be crucial to supporting the sweeping pedagogical changes that are anticipated through Bologna.

Communication and Change Management

Like most universities, Porto would like to commit more resources to the vital processes of communication and change management. Nevertheless, they do a lot with what they have available. The priority-setting and decision-making processes, already described, have been successful in large part due to the passionate commitment to "communicate, communicate, communicate" that is the hallmark of the IT leadership of Pro-Rector Ribeiro and FEUP's Gabriel David.

Ribeiro and David have a methodology for discussing new capabilities with senior people in the faculties and with those who are responsible for the day-to-day operations. However, with half of the IRICUP staff doing development work and the other half performing maintenance, few people are available for the important process of change management. As a result, Ribeiro and David do much of the communication themselves, as a team. When new requirements are being developed or new modules are to be implemented, they make sure to meet with representatives from each faculty, ranging from deans to end users. They explain the modules and how they work, and they field questions about problems or organizational issues.

As Ribeiro reminds us, "Implementing an information system is always an organizational issue more than a technical issue."

Data Quality

At an institution like UP, which has a senior position and an office for quality assurance, it is no surprise that the integrity of the data within the SIGARRA system is of paramount importance. And as a strategic information resource, both internally and externally, it is vital that the data contained in SIGARRA be accurate, timely, and comprehensive. Deans use SIGARRA to track a wide range of indicators of professional productivity and financial performance. The faculties are able to track individual students by name, a feature they sometimes use to intervene when a student is struggling with his or her academic performance. In such a sensitive situation, it is essential that the system's reporting capabilities be flawless. As Carlos Costa, director of FEUP, puts it, "We approach process flow from a quality point of view, not a systems point of view. It is our quality people who produce the requirements for our systems." The rector's office uses SIGARRA for government reporting, which can reflect on institutional reputation and influence potential funding opportunities. The aggregate indicators are also necessary to illustrate the university's progress according to the tenets of the Bologna Declaration.

The comprehensiveness of the university's information system is viewed as an important strategic advantage made possible by rigorous data quality standards. Virtually all of the information in SIGARRA is captured at the source of any transaction, with little or no subsequent transcription from a "shadow" system to the enterprise application. Today, students enter

most of their own information into SIGARRA. By contrast, earlier local application systems required a data entry function, an inevitable source of potential data errors. As noted earlier, deans can view the detailed information and performance indicators of their own and other faculties. This aspect of the UP culture, to make virtually all information transparently available to all stakeholders, provides an added opportunity for data errors to be identified and corrected. Further, the relatively tight coupling that exists among "back office" and "front office" modules of SIGARRA helps to minimize the redundancies and duplication often found in university IT environments that can contribute to bad data. A standardized and tightly controlled database platform provides further assurance that the base-level infrastructure promotes data integrity.

Outcomes

The University of Porto is doing a lot of things right as it faces the demands of a new millennium. The work is made all the more challenging by the ambitious change agenda found in the Bologna Declaration and the university's own vision of international excellence. Both elements—implementation of the Bologna Declaration and the quantitatively measurable vision to be among Europe's most prestigious universities—are strictly and publicly time-delimited. Both must come to fruition within roughly the same time frame, at the end of the current decade.

Our observations of the strategy, culture, plans, actions, and progress made by the University of Porto were captured during a moment in time. The agenda is complex and dynamic. The tangible outcomes remain works in progress. Institutional transformation on this scale is a journey of a thousand miles, and it will be intriguing to check in on the University of Porto over the course of years. But even at these early stages, it is possible to point to many positive signs on the road to meeting and exceeding expectations.

The University of Porto shows evidence of being an early, thoughtful, and committed institution in implementing the sweeping academic reforms of Bologna. In the European context, conformance to Bologna is nothing short of an academic revolution. Virtually all facets of the historically national higher education policies, metrics, outputs, and structure are undergoing transformative change. The shift from a locally established protocol for academic progression to the three-cycle 3-2-3 format requires teachers to overhaul curricula and think very differently about how they deliver their core product: learning. To this is added the hopes and ambitions that come with introducing new pedagogies into the curriculum via blended learning, problem-based learning, and other methods, and through new infrastructures such as Second Life (the university has purchased an island).

The FEUP is already well down the road in adopting the new structures and approaches mandated by Bologna. Indeed, they are ahead of the 2010 deadline. Other faculties appear to be making excellent progress. The Faculty of Humanities used information reports from SIGARRA to support an organizational change within the faculty and is a not-too-distant second to FEUP in implementing the Bologna changes.

Quality assessment, another key element of Bologna, plays to one of the University of Porto's many strengths. The leadership of the institution organized a comprehensive quality self-assessment in what most universities would consider record time. In just a few months they developed the terms of reference, structured the review, and obtained broad academic support and senate approval and will fully integrate the quality assessment information into SIGARRA. The rich information environment, where data quality and integrity are paramount and evident, adds to the university's readiness for the continuous improvement and assessment measures mandated by Bologna and by evolving national accreditation standards.

The university also has been making good progress on Bologna's international component, an aspect that is often realized through increased mobility. Over the past decade, metrics on international student mobility demonstrate ongoing improvements in this important area (see Figure 3). Mobility also ties into one of the institution's strategic aims—to become more attractive to high-quality international students. However, it remains to be seen whether officials will succeed in their ambition to double the size of this group, with a greater proportion of students being recruited from top-25 EU schools.

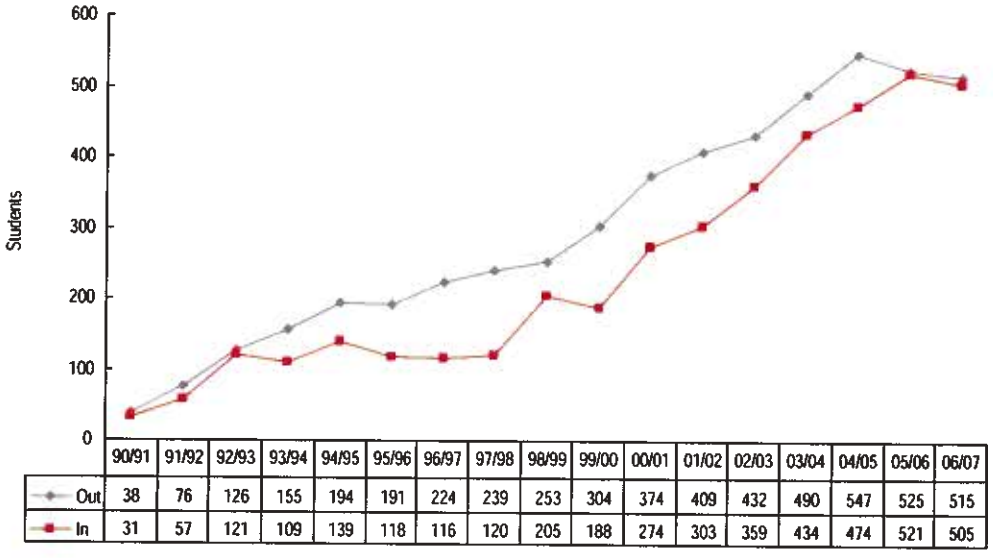
The vision of the University of Porto to be among the top-100 European universities by the time of its centenary in 2011 is strikingly quantitative and measurable: Climbing the international rankings is a visible and tangible means of demonstrating advancement and the successful realization of a strategy. This will not be easy, particularly in light of the macroeconomic climate and the possibility that recent budget cuts will be sustained.

In sum, we conclude that although the University of Porto story—from an outcomes perspective—cannot yet be told, we see both a management infrastructure that imbues confidence and intermediate indicators of success. This institution clearly faces Bologna not as a bureaucratic or political requirement but as an opportunity to bootstrap the institution into a new competitive position in higher education.

Lessons Learned

The visit to the University of Porto was rich and surprising in many ways. We came to Porto to document an award-winning information system. We left with a profound admiration for an institution in the midst of historic change. We came to deepen a relationship with a most talented CIO, and we left having had the opportunity to see a leadership team that shares a vision for change, a passion for their university's continuous improvements, and a diverse set of skills that will likely enable them to move the university to the higher competitive level of play they aspire to.

The lessons learned of ECAR case studies are always hard to write. Much is always learned. What is learned, however, must be filtered before publication, through the lens of portability. Stories of an irreplaceable leader or a propitious endowment can make great reading, but they waste the time of a practitioner-reader who is seeking approaches, strategies, and tactics that can be replicated or adapted for use at another institution.



	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07
Out	38	76	126	155	194	191	224	239	253	304	374	409	432	490	547	525	515
In	31	57	121	109	139	118	116	120	205	188	274	303	359	434	474	521	505

Figure 3. University of Porto Incoming and Outgoing International Students, Socrates and Erasmus Programs, 1990–2007

This accent on practical adaptability does not dampen our enthusiasm for all that we have learned, but it does restrain our pen.

That said, we come away from the University of Porto invigorated in the belief that transformational change at research-intensive universities is possible. Any of us with two decades or more in higher education is well aware that institution-level change in the academy is very hard. Further, because research-intensive universities are, of necessity, more decentralized in general than most, university-wide change is particularly hard. The University of Porto is undeniably a research university, and one of note. The legacy of autonomy of the university's faculties is profound by international standards. The shared governance of the scientific council, the elected nature of the rectorship, and the dominance of the federal government in matters related to academic personnel, capital development, and research add up to incredible complexity in governance. Indeed, one is tempted to use the word *feudal* to describe much of this governance.

The University of Porto story reminds us that in fact even the most established institutions can move quickly—at the institutional level—when they are faced with extraordinary incentives or pressures, when they possess extraordinary leadership, when they are guided by the right philosophies, and when they possess the right tools. This institution appears fortunate enough to possess all of these attributes.

So, the first lesson learned is that we can effect widespread change in higher education.

The second lesson is a reminder that a university is foremost a community and that successful change depends on the assent of those who are affected by the change. The story of the University of Porto is indeed one of unity and diversity, a story of respect for the autonomous history of the faculties and a reliance on those faculties for guidance, direction, systems, and tools. Partnership, collaboration, and openness were the watchwords of our interviews at the University of Porto.

We were convinced that indeed the management models that look somewhat like McKinsey's seven S's really do make sense, even in institutions of higher learning. To a very strong degree—and without ever saying so—the leaders of the University of Porto are engaged in a change management process that could have been "engineered" by the top management firms (while remaining at the same time true to the culture of higher education). A corollary lesson is that we should be slow to throw out babies with bath water; that is, although the rhetoric of management methods may offend our more sensitive academic ears, the substance of these methods has merit. Keep the substance, transform the rhetoric. The leaders of the University of Porto are reluctant to use the word *quality* to describe their continuous improvement efforts, understanding that although everyone believes that things can improve, few can agree on the attributes of quality in the context of academic endeavor.

Notwithstanding these powerful lessons in general management, in the end we did (perhaps it is our orientation) return to the information system. In SIGARRA, we were reminded of C. J. Date's fundamental principle of database design: "To the user, a distributed system should look exactly like a nondistributed system."[16] The engineers of SIGARRA and its predecessor—David, Marques dos Santos, Ribeiro, and others—appear to have established three overarching and powerful design principles for the information. First, the data in the information system must be of unimpeachable quality. If the data is not trusted or trustworthy, all the investment in technical capabilities is of little benefit. Members of the university community understand that resource allocation, accountability reporting,

priority setting, and other critical activities will be facilitated via data from SIGARRA. This knowledge creates a culture of involvement and care concerning the entry of data into SIGARRA. Second, SIGARRA is *the* enterprise information system. This belief is reinforced regularly by the rector. More than once we heard, "The rector wants this to be on SIGARRA" or "the rector has indicated there will only be one system." This kind of CEO support for institutional IT and data standards is rare. The effects of this support are important. Third, SIGARRA's developers are nearly fanatical about ease of use as a design principle. Every person interviewed commented on the system's ease of use and ascribed to that characteristic great magnetic powers. This seems perhaps an obvious lesson learned, but the reader would be mistaken to miss its profundity. It is as simple a lesson as "if it is easy to use, it will be used." But few enterprise information systems embody this advice quite so well or in quite so widespread a fashion as SIGARRA.

As we North Americans also learned, something that can be called a European system of higher education really is being born. It is a profoundly important development in the history of higher education. It seems likely that if national governments and university leaders can embrace the guidance being offered under the auspices of Bologna while retaining their historic funding commitments to the higher education sector, then European higher education is ripe for a competitive renaissance. The ability of national leaders and university leaders to join in this effort is not clear at this writing. It seems to us that the preconditions for success in Europe are

- conformance to standards through the Bologna process;
- deregulation of higher education, particularly as regards governance and academic labor mobility;
- maintenance of historical funding support for higher education for at least the near term; and
- a cadre of educational leaders who have the vision, energy, skills, and desire to realize this vision with their colleagues.

The ultimate lesson, of course, remains that the information system can be a powerful engine of institutional unity and integration. It can, through a common interface, common tools, and open access to trustworthy data, provide a cohesive and comprehensive view of an institution so geographically, financially, and politically disparate as the University of Porto.

Endnotes

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7. *Review of the Quality Assurance and Accreditation Policies and Practices in the Portuguese Higher Education: Self-Evaluation Report,* April 2006, http://www.cnaves.pt/DOCS/Ava_Int/Self-Eval.Report.doc.
8. *The Comprehensive Law on the Education System (Law 46/86,* of October 14, amended by *Law 115/97,* of September 19, and by *Law 49/2005,* of August 30) defines the scope and organizational structure of higher education and the conditions for access are defined. More than a dozen laws govern various key aspects of higher education academic conduct, the rights of students, personnel matters, governance, and other topics.
9. In addition, there is a university institution that offers courses in management, anthropology, sociology, history, economics, and psychology. The Portuguese Catholic University was instituted by decree of the

Holy See and is recognized by the State of Portugal. Private higher education institutions cannot operate if they are not recognized by the Ministry of Education. Access is regulated by the same procedures as those for state higher education institutions.

10. Erasmus and Da Vinci are international programs to foster exchange, lifelong learning, and mobility among higher education students and staff. Currently nearly 2,200 institutions in 31 EU countries participate in Erasmus. Credits earned are recognized at participants' home institutions via the European Credit Transfer System (ECTS).
11. McKinsey's 7-S Framework, 12Manage, http://www.12manage.com/methods_7S.html.
12. Level 5 Leadership (Jim Collins), 12Manage, http://www.12manage.com/methods_collins_level_5_leadership.html.
13. The Bologna Accords seek to harmonize degree expectations around a three-year undergraduate qualification, a two-year master's degree, and a three-year doctorate.
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16. C. J. (Chris) Date, *An Introduction to Database Systems* (New York: Addison-Wesley, 1995).

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