Virtual library projects should take into account not only librarians’ and readers’ requirements, but also the interests of decision makers at several levels. In the graduate school setting, a digital library should be useful not only to students and advisors, but also to managers of the knowledge development process. They are area coordinators, graduate school managers, deans, research group leaders, and others.

The Theses and Dissertations Bank (BTD) of the Graduate Program in Production Engineering (PPGEP) of the Federal University of Santa Catarina (UFSC), Brazil, was conceived taking these considerations into account. Since its first release, in 1995, nearly 4,000 theses and dissertations approved at PPGEP since 1970 have been made available, more than 1,500 in full text. A web interface was released in December of 2000. Several options of access statistics are offered in addition to access to content and catalog information.

This paper reports the development, use, and future of BTD. Public funding of university digital libraries is pondered. BTD’s starting points, features, and achievements are outlined. Current and future developments are mentioned. Information and knowledge sharing between BTD and other applications and systems is discussed.

Public funding of digital libraries
Online articles are the most cited. However, well-equipped and content-rich digital libraries reach their full potential only if they offer user-friendly access at affordable rates. Offering good digital libraries is a strategy for the improvement of graduate students’ productivity. They offer ubiquity, flexibility, and advanced search facilities in a way that traditional libraries can’t. This is an important investment of public funds. It seems advisable, therefore, to offer free access to the theses and dissertations produced. BTD, discussed next, is one such library.

BTD: history, evolution
The PPGEP strategic planning established in 1985 a ten-year goal: the organization of a distance education program. In July, 1995, PPGEP’s Distance Education Laboratory (LED) installed its videoconference infrastructure, and in the same year BTD was implemented.

The need for digital libraries and integration of academic and administrative platforms was recognized since LED’s inception. The Stela Group (a development laboratory at PPGEP) formed a team to produce HTML versions of theses and dissertations. The first digital dissertation was published in the beginning of 1996. We don’t know of any dissertation library previously online.

Some 357 works were uploaded to BTD until 1999. By that time several dissertation libraries had gone online – by the Massachusetts Institute of Technology, ProQuest, and Virginia Tech. BTD was integrated with the PPGEP academic management platform. A BTD website was designed, released by the end of November of 2000. Most BTD users are students and faculty, however, since BTD is free and available over the web, it has been useful to strengthen PPGEP’s connection with industry.
The hit counting after first six months online reached 23,000, 60,000 within a year, 100,000 in 18 months in service, and 150,000 after two years. The next section describes the features of BTD that allowed for such expressive numbers.

**BTD’s features**

The BTD website is organized in six resource areas: General Information, Recent and Coming Defenses, Access to Theses and Dissertations, BTD Statistics, Related Links, and Access Rankings.

General Information describes the objectives of BTD and presents its information sources. The main features are briefly commented, together with some historical background.

Recent and Coming Defenses reports the scheduling of defenses to occur shortly and lists defenses occurred in the last four months, with search facilities by area or graduate level and links to authors, advisors, and internal (PPGEP’s) committee members.

Access to Theses and Dissertations allows for searching theses and dissertations with filters. For each document, it is possible to see the hit counting, and to access the advisor’s curriculum and statistics of defenses with counting by year and average completion time.

Theses and dissertations are accessed mainly by academic users, but also by the community at large. A search for freight centers (“centrais de frete”), for instance, points to 6 monographs defended between 1993 and 1998. This search allowed PPGEP to demonstrate, online and in real time, its documented know-how in the subject. The demonstration was made during a visit from the president of a telecommunications company who was interested in academic works related to freight center customer service. This illustrates the role of knowledge management tool played by BTD.

The BTD Statistics link show mean completion time of graduates according to type of degree and program category (presence, distance, or out-of-campus program). It is possible to custom-fit statistics using filters for program area, advisor, entry year, and graduation year.

The generation of statistics is an important contribution to graduate education management. The detection of a tendency to reduce mean completion time and, especially, the comparison of mean completion times among the three categories of mastering programs (presence, distance, and out-of-campus) allows for an appraisal of the results of advising efforts.

Related Links leads the user to other digital libraries, as well as to articles and news. In addition, the Brazilian copyright law is linked.

Access Rankings are displayed by author, advisor, and area. It allows for the measurement of interest levels. It also links each advisor with his curriculum vitae in the Lattes (Brazilian national) Platform, and Statistics.

**Next developments**

BTD has already made an impact on how PPGEP’s candidates research, and on the visibility of graduate monographs. The hit counting suggests the vigor of the introduction of new technologies and their effect on researchers’ working style. The statistics and rankings endow the system with valuable tools for decision support.

New developments are planned for BTD, especially regarding scientific journalism and knowledge management. BTD is planned to offer interviews with graduates and their advisors and committee, and alumni track-keeping.

The next developments include also the verification of methodology of submitted theses and dissertations, advanced search features (full text), the building of informetric indexes, an
organizational knowledge management module (dealing with the building of a profile of each advisor’s areas of interest and frequent topics), artificial intelligence tools in theses and dissertations auditing (for instance, for detecting plagiarism), and the application of intelligent auditing systems for content comparison. Both methodology verification and the application of intelligent auditing systems are current research topics at PPGEP.

The university is changing, with evident impact on libraries. However, we consider that the achievements are faint if we think of the potential of technology usage in libraries. Digital libraries still stumble on inadequate integration of information and software. The integration of digital libraries depends on the building of standards that allow for the interchange of information and interoperability of applications.

**Standardization efforts in the Lattes Platform and potential benefit for BTD**

Lattes is the Brazilian platform of science and technology information systems. The most popular application, holding presently 250,000 curricula, is Curriculum Lattes, used by individual researchers to maintain their curricula. Each researcher submits his curriculum to the Brazilian National Research Council (CNPq) in order to qualify for scholarships, to be accounted for in accreditation cycles, etc.

The Stela Group is developer of both BTD and the Lattes Platform. The multilingual curriculum and the Lattes Platform Markup Language (LMPL) are development initiatives at the Stela Group that deal with systems integration, with potential impact on BTD.

LMPL is a XML-based ontology designed for the integration of science and technology information systems. A similar collaboration in the digital library arena is advisable. A recent Brazilian initiative deals with a national definition for dissertations metadata, based on Dublin Core. Such definition can be used as instrument for harvesting mechanisms.

The Lattes Platform supporting technology is now part of the SCienTI Network, an international initiative to integrate science and technology information sources. An initial difficulty for spreading application development throughout Spanish-speaking countries was the fact that the language for specification in the Lattes Platform is Portuguese. For Spanish-speaking developers to understand data models and other documents, they must be translated into Spanish, overcoming tricky problems such as false cognates.

An initial approach to this problem has been to build a translation system for XML curricular specifications, using the LMPL specification as starting point. A translation specification defines source and target languages and a detailed translation of all tags in the curriculum markup from the source to the target language. Further development initiatives should focus on the translation of content, a problem at a deeper level of difficulty.

**Concluding remarks**

The technology and the methodology for the building of BTD have been part of the continued effort for building the Lattes Platform. It was conceived and operated to support funding, planning, and evaluation of science and technology. Several agencies have worked to integrate science and technology applications into the Lattes Platform, and BTD also has this aim.

The result of these efforts will be the standardization of metadata, allowing for the establishment of links among several institutional web portals. In the future, we expect to have access to documents from within a researcher’s curriculum, and from those to the author’s curriculum, with advanced tools for search and analysis.