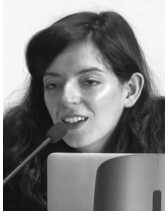
Educause annual conference 2014
Visits to MIT & University of Central Florida
French delegation report

Foreword

For the second year running, a French delegation was officially formed to participate in the annual Educause conference. Like last year, it was decided to take advantage of the trip to the United States to visit two universities, MIT in Boston and the University of Central Florida in Orlando. This report follows the feedback meeting held in Paris on November 18, and covers the two day-long university visits and the various workshops attended at the Educause conference itself.

French delegation 2014



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Visit to MIT

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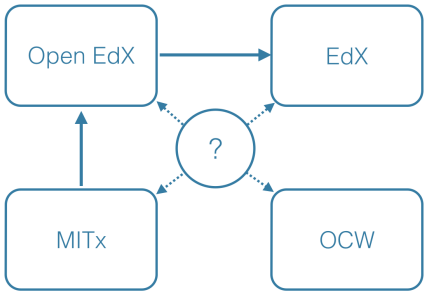
We were welcomed by John Charles, Vice-President for Information Systems & Technology. After a presentation of this prestigious institution and its resources, which are massive compared to European universities (11,380 employees including 1,030 permanent faculty members and 779 contractual faculty members, 11,301 students, and a budget of $2,908,000 for 2013), the speakers mainly focused on strategic issues.
Around 350 people in the central administration work in various ICT-related capacities (administration, research and teaching). The same number again is employed in the departments and divisions.

Digital teaching and learning (Cecilia d'Oliveira)



MIT is bringing blended learning into widespread use. Online courses are built using the MOOCs model, which entails the restructuring of curricula into shorter units, from 600 today to 850, and it's just the beginning. These units are used on the internal MITx learning platform for face-to-face classes, and placed on an internal platform, Open EDX, for online learning for MIT students; just a few courses are offered as MOOCs for the general public on EdX. The cost of building a course is high (six to twelve months of construction), raising the question of how these platforms and MIT's [1]OCW initiative are articulated. MIT computer scientists are working to built procedures for switching from one environment to another, to make the most of the vast wealth of materials already available.

The evolution of Information Technology (John Charles)

Although it already has a strong IT structure (350 employees in the central offices, a few more than that in the services and departments), MIT is constantly reflecting on agile, continuous development for maximum effectiveness.
Purchased products (registration, finance, etc.) are never adapted, but communicate through APIs available to the whole community. For instance, if a group of students or a professor produce a calendar, it will compete with the calendar produced by the central offices. All these developments can access MIT databases through standard APIs. MIT's general approach is to adapt commercial products, SAP for example, for use at MIT through APIs, rather than changing the products themselves, to avoid neverending and costly upgrades. This promotes the development of user-friendly tools defined for end-users with end-users, including students, and built with their involvement. Staff and faculty members are encouraged to design or improve functionalities for the systems offered through these APIs.
Other presentations focused on MIT's reflections on big data, particularly learning analytics and their use, and an interesting approach to the control and use of personal data.

[1] Open Course Ware

Visit to UCF

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The decision to visit the University of Central Florida was not only prompted by its location in Orlando – it is one of the most advanced universities in terms of [2]online teaching and learning. We were received by Joel Hartman, Vice Provost for Information Technology & Resources and CIO.
UCF is a public university (56,000 students, nine campuses), where 61% of students take blended learning or fully online (7%) courses. There are currently 218 online modules.
The department has a budget of $31 million. 110 people work on the systems and networks, thirty in multimedia, thirty in the libraries and 180 in support of online learning (including fifteen instructional designers with PhDs). All rooms are multimedia equipped. Half the budget is provided by tuition fees, the other half is state-funded.

The choice of online teaching and learning

Faculty are encouraged and trained to teach online, with a training course of about eighty hours divided into several modules. This training is compulsory for teaching certain courses. As an incentive, participants are paid $2,500 for their first course. Online teaching has a higher cost than traditional teaching. Tuition fees for online modules are therefore $54 higher per 3 hours of online classes, to contribute to the investment in equipment, premises and staff. They will be reduced once the initial outlay has been recouped.

This doesn't mean that face-to-face teaching is neglected. A simulator is used to train professors to manage a group and interact with students. Having tried it, we can speak for the effectiveness of this approach.

UCF works hard to provide a flexible teaching and learning environment to suit all students. In online courses, groups are formed according to level and students can work at their own pace. The impact of technology is continuously assessed. Learning analytics and information systems are used to provide students and their families and, of course, faculty with monitoring tools, and warning systems if problems arise. UCF has already reached the conclusion that blended learning is the most effective, better than all face-to-face or all online. Success rates are more or less the same, but students have to do less work to achieve the same results. Outcomes are therefore improved (at Educause 2014, the findings presented by one university showed a slightly higher success rate).

We also visited UCF's Learning Center. It caters to 600 students at a time and is soon to double its capacity. Its layout is similar to those we've seen in Britain or at Assas (only larger).

It's worth noting that, in general, at MIT and UCF, any possible space around the many cafeterias, shops, gyms and even some corridors is arranged to allow students to use their computer or tablet to work or just relax. Remember also that most students live on campus in residences under the direct responsibility of universities. You don't go to university, you live there.

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[2] programs.online.ucf.edu

Educause & trends for 2015

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Educause annual conference

Educause is the world's largest conference for professionals (faculty and support staff) involved in higher education IT. It is attended by about 6,000 people, in person and remotely. For two days, about 270 conference sessions and poster sessions are given and many topic-based group meetings are held. Educause is preceded by a day of pre-conference training seminars. The largest foreign delegations are the British and Dutch, with up to 100 people in some years.

Top 10 IT issues 2015

1. Hiring and retaining qualified staff, and updating the knowledge and skills of existing technology staff
2. Optimizing the use of technology in teaching and learning in collaboration with academic leadership including understanding the appropriate level of technology to use
3. Developing IT funding models that sustain core service, support innovation and facilitate growth
4. Improving student outcomes through an institutional approach that strategically leverages technology
5. Demonstrating the business value of IT and how IT can help the institution achieve its goal
6. Increasing the IT organization's capacity for managing change, despite differing community needs, priorities and abilities
7. Providing user support in the new normal/mobile online educational cloud and BYOD environment
8. Developing security policies for mobile cloud and digital resources that works for most of the institutional community
9. Developing an enterprise IT architecture that can respond to changing conditions and new opportunities
10. Balancing agility, openness and security

Trends

The major trends apparent at the conference sessions this year, as opposed to last year, are:

1. The United States is the only country where the number of college graduates has been decreasing over the last 30 years. 31 million students did not complete their studies. To reverse this trend would mean to increase the number of graduate students by 8 millions by 2020, which seems impossible due to the skyrocketing tuition fees. Total student debt has reach 1,200 billion dollars. Online learning is seen as the only way to increase student numbers with the same staff and faculty numbers and real estate.
2. The explosion of online courses. The term MOOC has become generally synonymous with online learning, used internally for enrolled students as well as for distance learning or blended learning.
Many universities are investing heavily in this new approach. At the same time, a minority of universities are producing courses which are actually open to the public. This issue represented about a quarter of conference and poster sessions. Many universities are setting up the physical infrastructure and technical and instructional support for a move to more online courses.

3. The improvement of outcomes through the use of technology is still controversial. If there is an improvement, it is only slight. However, the best results are achieved by students taking blended learning courses.

4. The massive growth of learning analytics, which have become indispensable for producing indicators to monitor student progress from day to day. More and more universities consider that these indicators are essential for carrying out their missions on a daily basis, and have already put monitoring solutions and warning systems in place.

5. The systematic set up of hybrid clouds: work and exchanges with students in the cloud, sensitive research data in private. Cloud applications (SaaS) are preferred to traditional software licenses, and all publishers offer them. In general, the external cloud is used for non-critical (teaching) operations, and the internal cloud for research and sensitive data.

6. The hybrid cloud is one of the main issues discussed. US universities mostly use large private providers (Google, Microsoft) for student messaging, collaborative spaces and storage. Google has announced an offer of free unlimited storage for university students and staff. No doubt Microsoft will follow. This is not the case for sensitive data (personal and research data in particular). For the first time, universities are taking into account the risks involved in exporting sensitive data while complying with federal and state laws.

7. Open source is becoming a reality in the United States. While its impact had previously been limited to educational platforms (Moodle, Sakai and Apereo), open source use by university administrations is now growing with Kuali, which offers a comprehensive suite of software, from financial management to student information systems. Many private companies offer their services for the deployment and adaptation of SaaS applications (software as a Service). For a fee, colleges and universities no longer need any local technical support services.

International Collaboration and Partnerships

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A variety of institutions and organizations

The annual Educause conference is also an opportunity to take stock of the various collaboration and partnership initiatives being implemented both within other countries and between the organizations of different countries. Examining these initiatives can help us identify perspectives that could be transposed into the French higher education landscape.

A non-exhaustive overview identifies various public organizations that promote collaboration and the pooling of resources and expertise.

Like ComUEs (*communautés d'universités et établissements*, or university communities) in France, institutions have also formed coalitions in the United States. For instance, SUNY (State University of New York) comprises 64 institutions and offers its 463,000 students 7,500 different diplomas and degrees. Meanwhile, the Tennessee Board of Regents is the sixth-largest system of public higher education in the United States, comprising 46 institutions including community colleges spread over fifteen different geographical locations, and managing over 207,000 students.

At national level, collaboration can be facilitated through dedicated organizations such as agencies and consortia. In Europe, this includes organizations like Amue or RENATER in France, Cineca in Italy, Sigma or OCU in Spain, Ladok in Sweden, JISC or UCISA in the UK, SURF in the Netherlands, and HIS or ZKI in Germany. These exist outside Europe as well: Axies in Japan, ASAUDIT in South Africa, or CUCCI in Canada to name a few. Some bodies, such as the National Student Clearing House, have a more specific mission, as we shall see below. Globally, collaboration and partnerships are crystallized in associations such as Educause, [3]EUNIS (European UNiversity Information Systems) and CHEITA (Coalition of Higher Education Information Technology Associations). These organizations often bring together institutions, groups of institutions, agencies, consortia, associations, and in some cases private partners.

Collaboration, how and what for ?

The essence of collaboration is exchange and sharing – sharing experiences, best practices and, in some cases, means, resources and even information systems.

Associations like Educause, EUNIS and CHEITA have established working groups for specific topics to facilitate exchanges within their member organizations.

For instance, ECAR (Educause Center for Analysis and Research) provides research and analysis on IT in higher education, and addresses technology challenges through working groups on subjects like the [4]Cloud and Big Data. [5]ELI is a community of higher education professionals committed to the advancement of learning through the innovative application of technology. Its activities include monthly [6]webinars and meetings between education professionals.

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3 www.eunis.org

4 www.educause.edu/ecar/ecar-working-groups

5 Educause Learning Initiative

6 www.educause.edu/eli/events

Meanwhile, EUNIS has four "task forces" focused on e-learning, interoperability (RS3G), benchmarking (Bencheit) and business intelligence (BI). EUNIS has also recently set up a new initiative, [7]ERAI, as a counterpart to Educause's working group ECAR.
Besides these associations, collaboration can also take the form of common projects based on a particular issue, such as international mobility ([8]Erasmus without papers) or interoperability ([9]Groningen declaration). These projects can be led by groups of organizations and institutions, and linked or not to an existing collaborative body.
In the case of dedicated organizations such as Cineca, Sigma and Ladok, various components of information systems and hosting services are offered to the entire community. Organizations may also provide a national service, as is the case of the [10]National Student Clearinghouse, which acts as a trusted third party in higher education in the US.

Some existing endeavors

This year at Educause, the chancellor of **SUNY**, Nancy Zimpher, presented a comprehensive, concerted strategy to increase access to higher education and limit dropouts and failures. One of the challenges is to lower tuition costs without lowering the quality of education.
This strategy is currently being implemented, and includes expanding the online education program to upwards of 12,000 courses and 400 degrees, diplomas and certificates, and an information system component linking businesses and students according to their needs and experiences. These projects were made feasible through the collaboration of a group of professionals (professors, administrators, students, institutions and private partners), whose collective input forms what Zimpher describes as SUNY's "Digital DNA."
In 2012 in Denver, the **Tennessee Board of Regents** presented a centralized cloud hosting service for its cost management solutions. This mode of operation has enabled a 15% to 30% reduction in infrastructure costs, and the redeployment of IS teams towards higher value-added tasks.
Within international associations such as Educause, CHEITA and EUNIS, studies by various benchmarking groups have provided highly accurate metrics so that institutions can situate themselves within the ecosystem of international higher education IT.
The **National Student Clearinghouse** manages over a billion transactions a year. The Clearinghouse performs more than 700 million electronic student record verifications annually, and nearly [11]3.5 million degrees are confirmed through DegreeVerify each year.
Among **Educause's** many initiatives, this month it published a study of [12]students' relationship to new technologies, which is freely accessible to the community.
IS-specific consortia provide their countries' higher education institutions with information system solutions, whether focused on core business (Sigma) or covering a broad spectrum of institutional management systems and services (Cineca). In the latter case, information systems are also offered internationally, in five countries outside Italy.

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7 www.educause.edu/annual-conference/2014/erai-eunis-research-and-analysis-initiative-within-european-higher-education-it

8 www.groningendeclaration.org/media/erasmus-without-papers-washington

9 www.groningendeclaration.org/

10 www.studentclearinghouse.org/

11 www.studentclearinghouse.org/about/files/NSCFactsheet-2014-Ext.pdf

12 www.educause.edu/library/resources/2014-student-and-faculty-technology-research-studies

Amue ensures that Educause's work is accessible to the French higher education community by publishing translations of [13]extracts from key publications on its website. Amue also collaborates with JISC in mapping processes in the field of higher education and student life.
Drawing inspiration from other European projects, such as Piazza dello studente led by the Andisu foundation in Italy or DeutscheStudentWerk in Germany, CNOUS has set up a working group on a **European student ID card** project, in which Amue participates.

Prospects and conclusions

Though far from exhaustive, these examples show that the will to collaborate and cooperate on various scales exists, and that there are many opportunities to do so.
It is interesting to note that each level of organization appears to suit a specific perimeter of collaboration and sharing. Unsurprisingly, it is easier to pool and share information systems among a group of institutions or at national level than on a larger scale.
Collaboration between international organizations and institutions works perfectly for sharing resources, articles, ideas and best practices, and holding seminars. However, it would be more complicated to set up concrete initiatives such as, for example, a Europe-wide information system (or part thereof).

13 www.amue.fr/presentation/articles/article/enjeux-majeurs-des-technologies-de-linformation-dans-lenseignement-superieur-en-2014-la-vision-d/

IT governance

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When developing, implementing or reviewing a blueprint for educational technology and IT use, higher education institutions often appreciate feedback from other institutions that have already integrated the technology component into their strategy, governance, teaching and management. The Educause conference, with its majority of American universities, enables thorough benchmarking at a more advanced level.
This summary focuses on the following questions:

- What strategy should universities adopt to integrate technology effectively in support of their missions?
- How can we achieve adequate governance, which integrates management, data mining and new technological tools?

The articulation between technology strategy and the various university IT projects presented at the Educause conference, visits to MIT (IT Department, Boston) and UCF (University of Central Florida, Orlando), and a review of the literature all confirm the trends seen at Educause and listed in the top 10 IT issues. UCF highlighted the three segments of a university: Education, Research, and Administration. These three areas remain the heart of the matter; it is up to technology to enrich them.

Leveraging data for strategic advantage

Campuses are increasingly turning to data to support all aspects of higher education's mission, including using it to improve student success (e.g., learning analytics), to bolster strategic decision making (e.g., business intelligence), and to run all activities (e.g., big data) from administration to research to monitoring student progress.
A critical foundation for these important uses of data is effective data management (e.g., data governance). Key issues for reflection include the challenges data presents to higher education technology leaders (IT, digital, projects, statistics), identifying best practices and strategic models, and engaging campus leaders in crafting practical solutions to these challenges.
The development of the IT profession in higher education is now also a major issue.
Every professional in an IT-related position requires a dual skill-set: technical expertise and an understanding of university activities. They must be visible to the leadership and maintain a balance between the two sides of their mission – technological and institutional.
This implies a change in their profession and not just in ideology. The objective is to drive campus and learning impact in a digitally connected world: moving from [14]Chief Information Officer to [15]Chief Digital Officer. This redefinition involves working together with leadership to align IT strategy with the university mission.
In our ever-connected, data-aware, and data-driven world, the walls of the classroom and the boundaries of the campus have been replaced with the ubiquitous network and BYOD. This phenomenon has reshaped the educational landscape in profound ways. It is no longer about if technology matters in the academy but how we can harness it to further the mission, reach, and outcomes. In this ever-changing world, it still comes down to the ability of people to understand and harness technology innovations and the ability of the campus technology practice to lead and enable innovation and change. That is why IT leadership is changing and shifting its focus towards creating value and driving impact (support, consideration of all variables - human, financial and material).

[14] CIO

[15] CDO

Hence the need to re-envision the role of the CIO and technology leaders (computing, technology, hard sciences) on campus as change agents in a digital social and learning world. Technology leadership should be viewed as an important part of the academy and administration and not simply as a provider of infrastructure, and IT leaders must see the vast ways they can impact the core mission, strategy, and operations of the campus.
Discussions went as far as listing the skills required of those in leadership roles, and technical capabilities were in the top five for some positions.

From collaborative work towards new forms of management

Implementing [16]KPIs into a service can be challenging, but it is important. During case study presentations, which included the strengths and weaknesses of existing projects, the focus was on multi-skilled teams in a collaborative framework with common goals. It was shown how statistics can serve to motivate teams, keeping them dynamic when working on long, difficult projects. The cases presented involved implementing or integrating a specific tool, always associated with performance metrics.
Another best practice associated with collaborative work is bottom-up leadership.
Universities have several objectives: finding solutions for common constraints or barriers, minimizing costs and creating value for the university. Key to achieving these objectives is understanding that change leadership does not come from senior management (top-down) but the opposite (bottom-up). Operational teams must know how to persuade the leadership and implement at least three bottom-up leadership practices that improve projects' visibility. The figures are often revealing.
The human factor remains dominant. Like the October 2014 issue of Harvard Business Review, Educause also highlighted mindfulness-based management. Mindfulness practices can help manage stress, improve clarity of mind, and mature emotional intelligence for better self-acceptance, acceptance of others and of the unexpected, especially in technology.
Technology is seen as an asset to be leveraged and a factor of success for the institution.
During SUNY's final presentation, [17]Collective Impact, the five conditions for successful collective impact were given as:
- common agenda
- shared measurement systems
- mutually reinforcing activities
- continuous communication
- backbone support organizations

Creating an IT culture

- Creating an IT culture is a springboard to gaining the support of the whole university community. Several recommendations and best practices are listed below:
- Bring in open leadership and forms of management, with staff taking responsibility for the projects they work on
- Draw up a vision: set goals and above all be proactive
- Build on the idea of IT Services: IT services are increasingly focused on the uses of the community
- Work with history: take the institution's past into account and make it a strength
- Change the everyday landscape: e.g., develop areas such as learning spaces and learning centers
- Change and define IT culture: adapt to developments and new needs

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16 Keys Indicators performance

17 a reference to the book Channeling Change

- Enrich communication on IT throughout the university, “pollinate” the staff and faculty
- Try all forms of communication and show what is being done (videos, photos of facilities, websites, flyers)
- Develop a training plan (courses, support, online) for all users
- Take account of emerging technologies
- Integrate IT risk at all levels
- Think about archiving and hardware requirements
- Develop an environment of trust, collaboration, and interpersonal relations
- Set up campus collaboration
- Develop distance learning and open learning
- Consider the “new visions, new opportunities, new buildings” triangle (new buildings create new opportunities)
- Use empathy (mindfulness)
- Know and teach how to manage failure: integrating failure is a key to success
- Keep room for innovation

Several complex data models that enable direct-assessment

As Educause showed in the top 10 IT issues 2014, student success and outcomes are a primary objective. The question of technology’s impact is how to influence the different variables, recruit successfully, promote retention and completion, and optimize outcomes through the use of technology.
Most speakers promoted a model associated with best practices. There is still a distinction between success due to the IT organization or to IT deployment. A few approaches are presented below:

[18]**CBE concept.** The CBE approach allows students to progress based on their ability to master a skill or competency at their own pace regardless of environment. This method is tailored to meet different learning abilities and can lead to more efficient student outcomes.
Functionalities include learning environments, interfaces, assessment, resume models, curriculum design, learning portfolios, transcripts, advising, and learning analytics.
New challenges include design of interfaces, interoperability of tools, and data management to meet both the goals of the institution and student expectations.

The student as central model Many data mining models exist, with new maps and outcomes to meet new needs and requirements. The conclusion is that teaching practices and pedagogical models are still focused on the institution. This model has tried to move the field to the learner and break away from the institution. It makes use of all available data, even data from students’ connected devices.
It is interesting to consider the basic premises underlying this approach. The team summarized the student’s questions as follows:
- Where should I study ?
- What behaviors can enable success ?
- How heavy is my semester workload ?
- What are the most time-consuming tasks or assignments ?
- How do my extra-curricular activities impact my success ?
- How do I compare with my peers ?
- Which weeks will I be busy ?

[18] Competency-Based Education

Feedback from university representatives referred to these concepts:
- In terms of project management: PMO, training in project management for managers, the notion of process, developing processes and models for launching new initiatives (data analytics and predictive modeling).
- References to advanced methods: ITIL, Agile, etc. or the new [19]PMBOK

Other illustrations of university projects involving technology or data were presented: accessibility, cybersecurity or data security, sustainable development projects.
This data is used in the strategic and policy decisions of university leadership.

Outcomes discussed or presented at conference sessions

The results of one of the data-supported models presented (ESAR), which is used to promote success:
- Students have full access to their personal data
- Students make better choices in programs that suit their needs and level
- Faculty can better know their students
- Students define their expectations better for major programs
- The university provides better counseling to students
- Students succeed and persist to bachelors program
- The university provides a program pipeline to better align projected programs and hiring
- A 25% increase in enrollment after one semester of implementation
- Attributed increase in persistence by + 5-10%

Outcomes in the return on investment:
- The ROI objective has risen from 80% to 90%
- Much more advanced cost models: breakdown by paradigm, monitoring system, statistical model, expected outcomes

Outcomes in organization
- Change in management roles, shifting from CIO to CDO
- Leaders' skills: management, techniques, data interpretation manager
- MIT: organization based on an inter-service digital environment model with multilayer governance on projects and applications
- UCF: Program offerings built on a mapping of courses and objectives and the quantification of outcomes

Outcomes in governance:
- Integration of IT, risk and vision in the strategic plan
- Statistics used as a tool for results and guidance
- Redefinition of investments

The limits of models and approaches presented at Educause

- About analytics, a lot depends on the data observed: the number of enrolled students and the number of graduates. Some universities are taking data governance further, but effective use of analytics is limited by a lack of methods, expertise, and strategic vision.

[19] Project Management Body of knowledge

- Organizational difficulties: separation of policy leadership and technical departments, several budgets, distinction between operating budgets and strategic budgets, difficulty of integrating IT into strategy. Consequences and risks; financial losses and job loss (for Presidents)
- 81% of institutions do not include IT risks in their strategy
- Cases and feedback; leading ERPs, large, cross-sector project teams, support from providers (firms present or mentioned: Accenture, Gartner, IBM, Cisco, Symantec), large budget, well designed project methods.
- Studies by local IT departments on the use of tablets or teaching platforms and on student expectations show they prefer paper, hence the use of adaptive, blended learning, adapted by discipline or learner.
- The effectiveness of yesterday's innovations is now being evaluated: MOOCs, for example – universities are not seeking to produce more, but rather to measure their success rate.
- Paradoxical approaches: recommending a flexible IS when talking about a large ERP system with a minimum implementation time of three years
- Failures existing, with a tendency to reassess costs, research on ROI, multi-skills, thoughtful choices
- A conclusion announced in session: analytics will not solve all problems. The need for a suitable management model, best practices and strategic definitions remains.
- The use of personal data for predictive statistics (failure rate) is allowed, whereas in France this model would have to be defended before the CNIL (authorization, limited cases for use)

The recommendations that emerged from these case studies are fairly promising in terms of value creation if transposed into the French system, although the budget for such projects across the Atlantic may seem too ambitious for an institution or consortium of institutions. The French higher education sector is addressing these issues in various ways, with several projects at different levels: budget reform based on the GBCP (*gestion budgétaire et comptable publique*, or Public Financial Management and Accounting) which emphasizes careful use of financial resources over a multiyear plan; the creation of digital campuses (new buildings, new uses), learning centers and newly equipped connected facilities; blended learning; data governance for management; and digital strategies that are clearly stated in institutional contracts. Now we need to learn from the strengths and weaknesses of the models seen here, and base our thinking and initiatives long-term on promising projects which fully integrate digital technology into the university system.

IT agility, risk management, security and protection of privacy

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IT agility was a central issue at the 2014 Educause conference. Risk management, data protection and privacy issues were also hot topics, in direct connection with agility. IT agility is one of the TOP 10 IT issues highlighted by ECAR (Educause Center for Analysis and Research), which produces surveys and statistics.

What is an agile information system?
What is IT agility? How can universities protect themselves? What policy are they adopting on cybersecurity? How do they protect their data?
How does information and communication technology disrupt universities, and how does it help them accomplish their missions?

On IT agility

Agility is originally a business term. It describes a way of thinking, building and organizing that enables organizations to respond quickly, to seize opportunities or guard against threats or attacks, to respond to market pressures and create opportunities. An agile company constantly adapts its organization to best match the changing expectations of the market and its customers.

Information and communication technology must enable universities to deliver the right service at the right time. A system's agility should enable an organization to respond to external stimuli and transform new opportunities into action and projects. It's easy to see that IT and business have to be aligned. IT agility is as much a question of strategy as of technology.

IT agility entails rethinking and transforming existing systems. One of the keys to success is to overcome functional silos and embrace a cross-cutting view (functions, practices, involvement of end-users and user-experience).

An agile information system relies on a modular infrastructure designed with sustainability in mind. Processes must be kept simple. As far as possible, overly rigid roadmaps, combining deployment schedules which are complicated in terms of integration dependencies and test cases, are to be avoided.

IT agility is directly tuned to the changing ICT market.
In the US, the 20th century was one of IT development, featuring the will to industrialize, standardize and automate.

The 21st century is that of digitization, with:
- services developed and packaged for mobile, intuitive and on-demand use.
- A service provider ecosystem that allows students and faculty to create new services and new platforms.

Massachusetts Institute of Technology is a prime example.

IT agility is central to MIT's strategy, and the issue is prioritized in its roadmap. In MIT's vision, supported by a roadmap to 2020:
The perspectives envisaged by MIT include the following objectives:
- To achieve excellence in their Information Services and Technology (IS&T) through far-reaching modernization.
- To enable the MIT community to propose and create new digital services that best meet their needs in different areas, be it research, education, student life, or administrative functions.

How do MIT's IT services work?
The IT services provide APIs to a community made up of hundreds of developers (who may be students, professors, or consultants).

In practice, this gives:
- Digital services created for intuitive, mobile and on-demand use
- A university capable of using APIs and data to create services and platforms for research and teaching
- Providing students with the opportunity to use APIs and data to create new applications and sites using institutional data made available to them
- Provide administrative staff with the possibility to create services and platforms independently that are tailored to their specific needs.
- Provide the opportunity for individuals from MIT to become members of this community and to create new data and applications
- IT services therefore have the role of supporting and guiding innovation

These modes of organization have an impact on business models, which are undergoing significant change. Today, the impact of IT on the competitiveness and attractiveness of American universities has to be measurable, and has become a highly strategic indicator.

Cloud computing: a major feature of university strategy

Cloud computing holds a prominent place in the strategy of American universities. Several conference sessions this year highlighted the fact that cloud computing requires a new approach, more strategic than technical.

Definition: according to the National Institute of Standards and Technology (NIST), cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources. This means the relocation of IT infrastructure.

At Educause 2014, no fewer than twenty conference sessions addressed the topic of cloud computing.

American universities use different types of cloud according to need, the type of data and the target audience. This might mean one or more private clouds for research and public clouds for student services (such as email). As such, on an American campus there are often a number of hybrid clouds (a mix of public/private).

The IT departments of American universities can be both cloud providers and cloud brokers.

This year the main cloud-related trends are as follows:
- The cloud as part of IT agility.
- The cloud is seen not so much as a technological innovation to move towards; reflection is more concerned with what it allows in terms of services. In fact, it is almost considered a service, and some conference sessions spoke of the "cloud as a service."

In the American higher education arena, the most commonly cited benefits of the cloud are:
- storage capacity
- modularity of computing resources that reduces costs.
- in terms of services: mobility, learning platforms, distance learning, and data analysis.
- relieving IS&T departments of some of their “standard” activities, such as updating software, so they can focus on value-creating activities

Risk management, data protection and privacy

This year, feedback was noticeably oriented towards risk management and the location, protection and confidentiality of data.
Risk management covers several concrete dimensions:
- The critical importance of applications: qualification of heavy applications with sensitive data or which demand extensive availability.
- Qualification of the impact of an outage on university activities. Set up of communication plans directed towards end users.
- Greater demands on providers: what are their responsibilities for the product? What roadmap is envisaged? Which business process does it provide for?

There is also much more expected from contracts: reversibility, service guarantees, SLA, data center audits to make security and pricing benchmarks possible. One conference session even proposed an index with a list of keywords to search by contract.

Data protection, a priority:

This year a strong emphasis was placed on data protection, of which there was little mention little last year.
Where is data located: in the US, sure, but with a precise location in the state. The question of data ownership was also of particular interest.

Also a focus was data security and privacy policy.
A very interesting session was led by Dr Anita Lafrance Allen: cyber-security and data protection in an open learning education system. Are these ideas contradictory, where can a balance be found?

She gave some advice, such as:
- Be fully aware of the objectives of your institution’s open learning system.
- Ensure staff is qualified and competent with regard to security matters.
- Be capable of managing these central issues in a decentralized campus environment.
- Educate and train faculty and staff who do not belong to IT departments.
- Empower students to act responsibly.

Is Information and Communication Technology really used for students' benefit? In what ways does it advance the main missions of American universities?

A number of conferences highlighted the fact that the American university system is in big trouble – massive debt due to education costs, soaring tuition fees, low completion rates (many students fail to graduate and receive no qualification) – and needs to be rethought.

One of the initiatives highlighted was the Starbucks College Achievement Plan.
In partnership with the State University of Arizona, Starbucks offers to finance a large part of its employees' college studies through online learning. This initiative is commendable, as it promotes the personal and career development of Starbucks employees through access to a degree course. Nevertheless, some commentators responded by highlighting the core missions of American universities; is the university limited to training a workforce directly for the labor market, or does it have a broader role? This is an idea defended by Michael Dannenberg, director of education policy at The Education Trust, an organization that promotes high academic achievement for all students at all levels—pre-kindergarten through college. In his view, improved graduation rates and access to education are not the only determining factors of quality higher education. This position is shared by Bruce Ackerman, professor of law and political science at Yale University.

In short, new information and communication technologies may be part of the solution to improving the higher education system, but their positive impact is only one factor in a much broader, deeper reflection on what university missions should be in the United States today.

BYOD et Learning Spaces

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BYOD (Bring Your Own Device)

This year, BYOD was clearly up there with the hottest topics (n.b. the Top 10 IT issues, and the massive presence of specialist BYOD firms at the Exhibit Hall). But the angle of approach has shifted significantly since the 2013 EDUCAUSE conference, where the workshops were mainly focused on technical and organizational issues such as [20]MDM and security. The 2014 conference chiefly explored the impact of this approach and the actual benefit to users.
Some mass tablet distribution plans were presented, and their impact on the development of practices was objectively debated. It is still a little early to assess these initiatives, but Stanford, Lynn University and Michigan State University listed the key points for the successful deployment of tablets, including:

administrative processes: staff training, room preparation, procurement of hardware and applications, MDM, inventory control, maintenance, repairs and upgrades,
sustainability: intensive faculty training, integration into the educational process, taking into account the life cycle of hardware, involvement of policy makers,
evaluation: interviews with students, faculty and staff, pilot studies, focus groups, learning analytics, cost evaluation.

Design and evaluation of learning spaces

Learning spaces showed strong momentum during the 2014 conference, with certain major projects having taken form since their progress reports were presented at the 2013 edition. The topic was considered from two main angles: design and evaluation. Two tools were presented: the LSRS (Learning Spaces Rating System), which was still a work in progress in 2013, and the new FLEXspace database. A highly complementary dual approach: while the LSRS is positioned as a management tool to be used prior to the establishment of a learning space, FLEXspace is an evaluation tool for the use of such a platform after it is deployed.

LSRS (Learning Spaces Rating System)

The [21]LSRS, a beta version of which was presented at EDUCAUSE 2013 and in the French delegation's 2013 feedback report, is now available in version 1.0. The system, developed by [22]ELI, provides a set of measurable criteria in the form of a scoresheet to qualitatively assess a learning space during the design phase, before its actual implementation. The [23]scoresheet is based on 51 criteria in six subject-based sections, addressing not only the layout, furnishings and IT equipment traditionally privileged in this type of project, but also the organizational and political features, which are measures of the real impact of such a facility in an institutional context. Below is the list of sections and a few examples of criteria for each of them:

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20 Mobile Device Management

21 www.educause.edu/visuals/shared/eli/programs/LSRSv1.pdf

22 Educause Learning Initiative

23 www.educause.edu/visuals/shared/eli/programs/LSRSv1bscoresheet1012014.xlsx

Integration with Campus Context (5 criteria): alignment with campus academic strategy, integration with learning space master plan, compatibility with technology strategic plan, and innovation in integrating learning spaces with campus context
Planning Process (7 criteria): stakeholder engagement, pilots and prototypes, evaluation plan and best practices in planning and design
Support and Operations (8 criteria): training of support team, sustainability of operations, diverse patterns of use, scheduling systems
Environmental Quality (8 criteria): daylight, views to exterior, lighting control, thermal comfort and acoustic quality
Layout and Furnishings (14 criteria): seating density, movement through space, work surface, furniture comfort and durability, transparency, writable surfaces, physical storage
Technology and Tools (9 criteria): electrical power, network connectivity, visual displays, sound amplification, audio/visual interface and control, distributed interactivity

Three universities (University of California Berkeley, McGill University and Auckland University) which tested the LSRS before publication of version 1.0 presented their feedback on the redesign of several types of space: large lecture halls, medium-sized lecture halls and tutorial rooms. Overall, all three stressed the legitimacy that using the LSRS for their various projects won them in the eyes of their institutions' leadership, which for some helped obtain the budget allocation required to implement the project. For these universities, the LSRS represented a real management tool. They also appreciated the rating system's comprehensive approach, enabling evaluation from different yet complementary perspectives. Finally, they stressed the validity of the results, and the ease of use of the LSRS. With regard to possible improvements to the system, the three universities suggested that the LSRS's ability to quantify innovation remained to be proven. They added that self-assessment, which is a cornerstone of the LSRS, adds a level of subjectivity that may limit accurate comparison of results between different institutions. Finally, they stressed that certain criteria are more fundamental than others.
Overall, however, the trials conducted very clearly sanctioned the relevance of the LSRS and its fit with the reality on the ground.

FLEX (Flexible Learning Environments eXchange)

[24]FLEXspace is an open access community repository for sharing data and best practices related to the establishment of learning spaces. Available in 1.0 since spring 2014, it offers to collect information describing detailed attributes of existing learning spaces and make it available to the community.
More than 500 records are already online, including not only multiple images for each learning space, but also technical and operational data such as:
- date of establishment, and renovation where appropriate
- the type of room, its capacity and its educational purpose
- the audio/video technology installed
- the furniture installed
- costs incurred
- contacts involved

In addition to sharing data and best practices and the potential for comparison it offers, FLEXspace aims to promote the establishment of a common terminology for learning spaces for use by the various stakeholders involved in their setup: building officials, architects, administration, faculty, staff, and Higher Education IS and IT

24 flexspace.demo.artstor.org

staff. It also aims to encourage the trial and adoption of emerging models. Lastly, it provides concrete examples of business models for the establishment of learning spaces.

Resolutely focused on the post-occupancy evaluation of learning spaces once they are established, FLEXspace version 2.0 will be available in summer 2014, incorporating a new peer review functionality. A [25]tutorial video for the tool is available for users.

Adaptation to the French context and prospects

For the last six years, Paris Île-de-France Digital University has been engaged in providing digital technology [26]training to staff and faculty – and more and more students – through a network of purpose-built training centers within its member institutions. Six of these centers were opened between 2008 and 2013, fitted out as technology-equipped classrooms. After this first wave, the seventh center, opened in October 2014, is clearly designed along the lines of a learning space and strongly oriented BYOD. All new centers over the next two years will be based on these features (two other learning spaces are already scheduled), and the training sessions have been completely redesigned to leverage the hardware installed and the general layout of the room. Screen sharing, collaborative tables, and the central positioning of the facilitator are key features of this new approach.
Consequently, the decision has been made to undertake a French translation and adaptation of the LSRS v1.0 so it can be applied to these new facilities and, more generally, made available to the French education community. The French version is to be published in early 2015.
Meanwhile, these new rooms will appear in the FLEXspace database and publicized with the objective of initiating and encouraging a French presence on the repository.
Paris Île-de-France Digital University has also taken on the role of [27]French contact organization for the FLEXspace coordination team to ensure the optimal and bilateral dissemination of news and information.

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25 www.youtube.com/watch?v=yvR_R-2j_g0&feature=youtu.be

26 formation.unpidf.fr

27 contact: john.augeri@unpidf.fr

eLearning and pedagogy

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Learning technology centers and learning platforms

Teaching & Learning Technology centers. The projects presented at the conference sessions are led by the equivalent of the French ICT in Education services, alternately named Teaching and Learning Technology Centers, Centers for Learning Technologies or Centers for Teaching and Learning, and usually made up of five to eight instructional designers.
These centers are departments in their own right, independent of tech departments (IS&T) and student services (Learning Commons, Learning Center, etc.) and focused on providing services to faculty.
A few examples:

- College of Charleston, 12, 000 students, Teaching, Learning and Technology Department: six instructional designers.
- University of Central Florida, 50,000 students, Faculty Center for Teaching and Learning
- University of Kansas Medical Center, Teaching and Learning Technologies department
- Mercy College, 11,000 students, Office for Teaching Excellence & Engaged Learning

The most common learning platforms are Blackboard and Canvas.

Comparing e-textbooks and paper textbooks

Definition of an e-Textbook

- electronic textbook
- digital format that can be read online or offline
- can be highlighted, commented, bookmarked, etc.
- enables students to share notes
- search engine and browsing tools included in the text

Existing studies on the use of e-textbooks

Do e-textbooks improve learning?
It is impossible to say, as the studies are contradictory.
Some students prefer paper, others digital (studies on this question are also contradictory).
A few interesting references: many books have been published on this [28]topic.

Study on the use of e-textbooks by the University of Iowa

- on a class of 270 students
- 177 women, 88 men
- one course on one subject (advanced course)

Handouts were provided to students in both formats

- free digital format on the LMS (with integrated software to annotate, highlight, mark pages, share notes)
- paper format for purchase

Only 16% of students bought the paper version.

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[28] No difference in learning outcomes : Brunet et al. 2011 Kim et al 2010 - More difficult to learn with e-textbooks : Ackerman&Goldsmith 2011, Daniel & Woody 2013 - Preference for paper Woody Daniel & Baker 2010 - Preference for electronic textbook : Brunet et al

The study takes into account:

- Data collected automatically by the LMS on users' reading of the e-textbook and use of tools (highlighting, bookmarks, etc).
- Demographic information (gender, age, learning level).
- a weekly survey of users (they had to specify the time they thought they had spent for each reading).

The study compares:

- what the user claims to have done ("I read 15 pages, I spent 20 minutes, I found it easy")
- The data collected on the platform (download time of each page, use of tools).

Study conclusions

Ease of access: the study shows that students find the paper textbook more accessible than the digital one.

Estimated reading time (the time that students think they have spent reading)

First observation:

It is difficult to assess the time spent reading.

Studies show that some would say it takes ten minutes to read a page, others thirty seconds.

Students who use the paper textbook claim to read for longer.

Students using the e-texbook read less.

Calculated reading time (from LMS data)

There is a big difference between what students report they have read and what the data show. For example, some say they have read the book while the LMS data shows that they did not even click on the file.

Preference (student survey)

Students using the paper text were more satisfied. In a course where students have the choice, 80% still choose paper.

Three criteria studied

- ease of highlighting: preference for paper
- ease of searching: preference for paper
- did the e-textbook help you learn?: preference for paper

Tools used

- 50% used bookmarks
- the tool used the most is the highlighting tool (users highlight long passages where the important points can no longer be seen). They highlight much more than on paper, whereas studies show that highlighting does not improve learning.

Exam results

There is no correlation between the time spent reading and examination results. However, there is a correlation between use of the bookmark and results. The more pages they bookmarked, the better they did in the exam (perhaps they know how to prioritize information better?).

Advice for conducting this type of study

- It's important to take the number 0 into account when analyzing the data. For instance, how should those who do not appear in the LMS data be counted when they say they have read the text (did they use another student's username?)
- Data analysis often requires manual processing. Information often needs cross-checking (e.g., some students work in pairs or groups and are only counted once).

- Before starting any data analysis, the time factor must be taken into account. Analysis is very time-consuming and the results are under-utilized.
- If the university is working with service providers (hosted applications), they do not always want to provide all the data (negotiation is required).

Serious Game

This conference session was organized as a discussion (with counters, see "Workshop facilitation" section). A few thoughts or remarks from participants:

- There is no need to invest heavily in technology to create serious games. It is the scenario or the game itself that determines its quality (a simple quiz can suffice)
- There are many different types of games: simulations, 3D votes, badges, quizzes, construction, staging, etc.
- At this point, much research remains to be done on the topic to understand how we learn through games
- Serious games are not often combined with monitoring tools (and in general, you can not recover user data to understand how users work)
- It is difficult to assess students in serious games
- The boundaries between play and learning can be difficult to determine (especially with the new generations).
- Won't learners only focus on the form of the game (not on the substance)? This may distract from learning.

There is an annual conference on the topic of games and learning: The [29]Cuny Games Festival.

Creating interactivity in the classroom with a video tool for real-time note-taking

For a science course, a professor from University of Michigan-Ann Arbor uses the Echo 360 active learning platform to create interactivity in the classroom.

This solution makes it possible to capture lectures, recover slide shows and create richmedia to be accessed online on a collaborative platform. During class, any student can annotate the slides and ask questions on the professor's slides. The questions can be seen by everyone in the room (but remain anonymous). Links to e-textbooks can be added. The tool enables learning analytics and records student participation. The professor uses the tool during class, where students ask questions directly, and also outside class. Real-time questions encourage shy students to participate, and the professor can adapt the lecture accordingly as he/she goes.

Data analysis

Thanks to reporting and analytics tools, instructors can find out the number of notes typed by each student, the number of questions asked, the most popular slides, etc.

The data show that there is no link between exam results and the number of notes or questions posted. The data also show that this system has no effect on the motivation of unmotivated students (but it does affect the most motivated, who develop their potential better in class).

[29] gamesfest2015.commons.gc.cuny.edu/

Training professors to teach online

The College of Charleston (12,000 students, 550 faculty members) has been offering 132 fully online courses since 2009. With the demand for online courses constantly growing, the College of Charleston has set up a program to train professors how to teach online.

Program format

- eight-week course
- 100% online (professors take the students' role)
- two sessions per year

Professor participation

Admission to the course is selective. Professors who want to apply present their proposals and ideas in an interview with the head of the training program or department (what they plan to offer online). They then fill out a questionnaire (like a detailed syllabus) to assess their course: educational materials used, teaching methods, proposed forms of participation.

Content and delivery of the training course

Prerequisites: they must already be familiar with the LMS where the training takes place.

- groups are formed (based on the results of the questionnaire)
- a tutor leads each group

There are six topic-based training modules: organizing a course, writing a course, giving distance courses, online communities and communicating, online activities, evaluation

Activities

The proposed activities also help professors work on the quality of their teaching strategies.
They are asked to film one of their lectures. The video is then reviewed by their colleagues.

Educational material

- documents and articles
- online videos
- activities via Google docs
- books to read: "Teaching Online", Suzan Cap

Evaluation

Participants who pass the modules earn a certificate.
Professors who pass the course attend an online graduation ceremony.

Flipped classrooms

Confusion

A flipped classroom is not just online videos.
It doesn't mean replacing face-to-face time with online lessons either.
It is not a form of learning where everyone has to manage on their own.
Definition: a flipped classroom is

- a practical experience in the field.
- interaction between participants.

- A way for students to engage and take responsibility.

Technology is not necessarily essential for this (though it is true it can help). Studies show that 55% of what we retain, we have learned by doing.

Advice for flipping your classroom

- Start with only part of your course (not the whole thing).
- Choose a part of the course that you particularly like, or you would like to improve.
- Think about current interaction on the course. What goes on in class? And what goes on outside class?
- Look up all the different types of activity possible (Google active learning gives ideas): debates, role plays, team work, case studies, discussions, simulations, labs, activities via the LMS, etc.
- During face-to-face time: don't repeat what was done outside the classroom (otherwise students won't do the work they are asked to do at home). Favor group activities.

Importance of communicating with students

- It is important to explain to students how the course works and why it is being done that way (if not, they might think that they are not being supported and that the professor has not prepared the course).
- Throughout the course: check the reports of activity on the LMS (to understand what the students are doing, what questions they have) and do not hesitate to change the content based on the questions.
- Talk to students about any problems
- Use the tools available on the LMS to inform, have the students vote, clarify points, etc.

Digital technology training for students, with badges

Feedback from establishing a digital technology course for students with digital badges to certify skills in DTP, video, web, and images. The College of Charleston noticed that there were no training courses for students on using digital technology for education and professional purposes. Yet students have to know how to:

- use images (embed photos in a PowerPoint presentation using appropriate formats),
- make a simple video (video with their smartphones, for example, and post it on the Internet in a suitable format),
- design a poster to present a project,
- use a 3D printer, etc.

The College of Charleston set up a course to fill this gap.

Course format

- four online training modules
- non compulsory (only 87 participants)
- certification by badges (each competency corresponds to a badge)
- to encourage student participation, there are prizes to be won: an Ipad, loan of Google glass

Reflections

As this certificate has no value on a resume, how can students be encouraged to participate?

- Set up partnerships with companies. Students who have earned the certificate could be offered an internship in a partner company.
- Convince companies that the certificate has value. The content of this course must be worked on with companies.
- Participation in the course could count for credits.

Mass production of digital resources

University of Florida (50,000 students) offers a degree program where the second year takes place entirely online. This entailed the mass production of digital resources. The University of Florida works with five production teams from different departments.

Some advice for large-scale production of resources:
- Establish a model resource and define quality criteria to be respected: form, presentation of objectives, activities, type of interaction, type of navigation, evaluation, etc.
- Each resource must be based on this model and respect the quality criteria.

A project's progress is often delayed by the professor's work. It is therefore essential to establish an extremely clear relationship between the author of a resource and the producer.
- Be as specific as possible about the role: what the author must do, and by when.
- Specify the framework: the resource is produced using this model with this technology and this type of tool.
- Specify the consequences if the deadline isn't met (project deferral, cancellation, non-payment of the author, consequences for learners).
- For video recordings: require submission of the PPT at least 24 hours before the capture session.
- Establish a detailed schedule including each step.
- Clarify the role of the production team and especially where the producer's job ends (for example, is searching for articles the author's job or the producer's?)
- For copyright, make it clear what belongs to the author and what does not belong to her/him (e.g., graphic design, 3D animations, etc.)

Evaluate the resource. After the production of each resource, a team assesses whether it complies with the pre-defined quality criteria.

Using 3D printer for teaching and learning

The speaker mainly presented how a 3D printer works.

Creating models. Software programs can be used to create 3D objects (or to model existing objects). Some of them are quite easy to use. A few examples:
- [30]Thingiverse
- Digital morphology
- Sketchup (another easy-to-use program for drawing in 3D)
- Makerbot
- 3D studio max (more complex)

Teaching application
- In science: can help a teacher explain concepts (by creating 3D objects for concepts that are difficult to understand on paper)
- In medicine: e.g. prostheses
- People with disabilities (sight impairments)
- In the military field
- Creative classes: drawing, modeling
- IT classes: using 3D programs

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30 www.thingiverse.com

Good ideas for interactivity from conference sessions and workshops

Voting by SMS. Several speakers began their session with a question or a short quiz which participants answered by SMS. The speaker received the answers in real time.
It is very simple and obviously popular.
SMS voting could be a solution on our campuses where WiFi is not the best in the lecture halls.

Simple game with counters: can be used for a debriefing. To explain the concept of a discussion thread on a forum (or how messages are prioritized on a communication tool such as email), one speaker used a set of counters. Each participant was given several yellow and red counters. The speaker began a topic. When a participant replied to the topic, she gave a yellow counter. When she launched a new topic she gave a red counter. Two objectives:

- This helped understand the difference in a discussion forum between “replying to a message” and “creating a discussion topic” and the importance of prioritizing messages on a collaborative tool
- It made the discussion more interactive.

At the end of the session, each participant counted the counters they had left.
Those who started the most topics (or responded to the most questions) were given prizes.

Adaptive Learning

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Introduction

An online course is usually linear, and follows the same breakdown as a sequence of classes.
An adaptive learning course is a graph with several paths and branches subject to conditions (quizzes, script). Adaptive learning requires content to be modeled into elementary modules, each of which corresponds to a skill to be learned. Each module contains a learning goal and the definition of the skill to be acquired. Adaptive learning solutions are based on expert systems that offer students a differentiated and personalized learning path (according to the definitions below) using feedback loops, positioning tests, and feedback tests.

Definitions

[31]e-Literate & [32]Knewton

1 Differentiated Learning describes the case where there are different pathways that students can take within a learning environment, typically organized as pre-set categories.
2 Personalized Learning describes the case where there is a different pathway for each individual student, often implemented in a rules-based method with a decision tree. Students might take a diagnostic test on the first day that will be fed into a rules engine to lay out that individual's path and content.
3 Adaptive Learning is data-driven and continually takes data from students and adapts their learning pathway to "change and improve over time for each student".

Learning path chosen by (knowledge graph): Case 1 = teacher / case 2 = student /case 3 = machine

[33]Wikipedia

Adaptive learning systems have traditionally been divided into separate components or 'models'. While different model groups have been presented, most systems include some or all of the following models (occasionally with different names):
Expert model - The model with the information which is to be taught
Student model - The model which tracks and learns about the student
Instructional model - The model which actually conveys the information

Solutions visited at EDUCAUSE 2014

We visited three Adaptive Learning exhibitors at EDUCAUSE 2014: Brightspace by D2L (ex Desire2Learn), Realize IT and Difference Engine.

[34]**Brightspace** is a LMS focused on adaptive learning and analytics. The interface is well integrated and user-friendly. Mobile use is strongly emphasized.

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31 mfeldstein.com/differentiated-personalized-adaptive-learning-clarity-educause/

32 www.knewton.com/blog/adaptive-learning/knerds-on-the-board-what-is-adaptive-learning/

33 en.wikipedia.org/wiki/Adaptive_learning

34 www.brightspace.com//products/learning-environment/

[35]**Realize IT** has a rougher interface, but lets you visualize graphs for each module. An example module was seen at the University of Central Florida (UCF). A Bachelor's course had been fully modeled by graphs made up of granular data that describe the learning objectives and skills acquired. Corresponding content and quizzes were then integrated.
[36]**Difference Engine** offers customized solutions for partners. Publisher Elsevier is to propose adaptive learning courses for preparation for medicine exams in Germany and the United Kingdom in 2015. France is to follow in 2016.

In the three solutions we saw in demo mode, importing data is simple (SCORM, XML) but no export process was apparent. This means that the academic corpus is integrated into a proprietary format, which is a big problem for sustainable use.

Adaptive learning with Moodle

Two adaptive learning solutions are available with Moodle:
- The "Lesson" activity, a simplified module
- The Topaze channel from Scenari + Moodle plugin: a sophisticated tool that can be used to produce serious games.

[37]Lesson activity in Moodle: Lesson

The lesson module presents a series of HTML pages to the student who is usually asked to make some sort of choice underneath the content area. The choice will send them to a specific page in the Lesson. In a Lesson page's simplest form, the student can select a continue button at the bottom of the page, which will send them to the next page in the Lesson. There are two basic Lesson page types that the student will see: question pages and content pages. There are also several advanced navigational pages which can meet more specialized needs of the Teacher. The Lesson module was designed to be adaptive and to use a student's choices to create a self directed lesson. The main difference between a Lesson and other activity modules available in Moodle comes from its adaptive ability. With this tool, each choice the student makes can show a different teacher response/comment and send the student to a different page in the lesson. Thus with planning, the Lesson module can customize the presentation of content and questions to each student with no further action required by the teacher.
There are plenty of lesson examples on the [38]demo website, which you can access as a guest or log in to for more interactive use.

[39]Topaze model by Scenari

Initially designed for conducting case studies with multiple pathways, Topaz has a much wider utility, making it easy to create any type of program with multiple pathways. It can be used to produce individual, personalized programs according to level, subject, etc.
How does Topaze work? With the multiple path system in Topaz, learners work in an environment that is conditioned by their choices. So, if learners start their path over again making different choices, they will not face the same situations (depending on the various paths offered in the module).

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35 www.realizeitlearning.com/product/adaptive/

36 www.difference-engine.com/solutions/

37 docs.moodle.org/25/en/Lesson_module

38 school.demo.moodle.net/

39 scenari-platform.org/projects/scenari/fr/pres/co/topaze.html , tice.mines-paristech.fr/projetopa/genDocGuide/co/GuideTopaze.html

Conclusions

Adaptive learning fuels fantasies of widespread, purely self-directed online education with no further interaction with teachers. Nobody wants to fall into this trap.

Resources for adaptive learning are very expensive to produce, even more so than the granular content for flipped classrooms or MOOCs. They entail creating a competency framework, defining objectives and the links between modules, and development or setting of the expert system.

Exhibit Hall, the other side of the conference

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The Cellule Nationale Logicielle or CNL (National Software Unit) is an office within the French Ministry of Education, Higher Education and Research (MENESR) responsible for pooling software resources and solutions for all higher education and research institutions in France. We award government contracts for the recurrent needs of institutions: Microsoft, Adobe, VMware, RedHat, etc. We have also signed protocols with around a hundred publishers. We represent nearly 300 higher education institutions (universities, research organizations, schools) in all ministries. We group together the software requirements for around 700,000 PCs and 45,000 servers. We attended EDUCAUSE for the first time this year, with the firm intention of finding innovative software solutions to add to our range. Given the mammoth proportions of the exhibit hall, we had to prepare our visit methodically based on the various domains on offer. Otherwise, we could easily have tried to do too much and ended up seeing little.

Our first surprise was discovering that nearly two thirds of these companies were unknown to us, which was both frustrating and exciting. Our second surprise was the realization that in the US, education is above all a business. From the start, at each booth we approached we were asked what kind of budget we had. We also realized fairly quickly that some companies had never looked any further than America and would be hard put to locate France on a map. So from there, explaining that we would like to negotiate a price to fit our meager budget was no easy task. It would be presumptuous of us to claim to be able to present all 267 companies with a booth at EDUCAUSE 2014 in a document of a few pages. There would be no point listing them all in random order, as you won't have heard of most of them so their company name won't mean much.
We expect what matters more to you is what they do, what their business line is, so that you can turn to them for solutions in specific areas. Consequently, we have categorized the companies into 55 sectors, with each company belonging to up to four sectors. The sector with the most stakeholders was, unsurprisingly, Cloud Computing and associated services, with 90 companies working in this sector. In the US, everything to be developed has to be "cloudable" or it just won't happen.
There is less reluctance in this regard than in Europe, even if current events have made them aware that this tidal wave has to include a minimum level of security, which is probably a good thing. BYOD came second for numbers, Online Learning third. The surprise was Analytics in fourth place with 37 companies, and Learning Analytics with 21 companies. This is a line that needs to be looked into further and developed for our institutions. We also identified 13 companies in the Governance and Compliance sector, ten in Open Source and seven focused on Social Media. We especially enjoyed "Startup Alley" with its thirty emerging companies, teeming with ideas in every imaginable field (including an umbrella that serves as a charging station for mobile devices).

We spent some time with two companies:

- [40]**Difference Engine**: a startup that offers "not just a platform – an operating system for learning".
- [41]**Vocareum:** a LMS (Learning Management System) designed specifically for computer science classes.

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40 www.difference-engine.com

41 site.vocareum.com

Now we're back, we aim to concentrate on two main avenues opened at the conference:
1. use the topic to suggest certain research areas to the Groupe Logiciel (Software Group);
2. get in touch with a few companies to give presentations in France.
Finally, for the 2015 conference, we will organize to meet the "world education directors" of a few publishers with whom we are working already. The first appointment has already been scheduled with Adobe.

In the following pages, you will find details of the 55 sectors and 267 companies with a booth at EDUCAUSE 2014.
You should have no trouble finding these companies' contact details using a good search engine.
If you do have problems, don't hesitate to contact us, we have nearly all the contact details.

Companies present at Educause 2014, listed by activity

We listed 55 major activity fields, and for each of them the attending companies:
Academic Information Systems / Adaptive Technologies / Analytics / Audio and Video Conferencing / Business Continuity, Disaster recovery, Emergency planning / Business Intelligence / BYOD / Captioning / Classroom Control Systems / Clickers / Cloud Computing and Services / Consulting / Content Capture / Content Management Services / Content Management Systems / CRM / Data Administration and Warehousing / Data Security / Digital Publishing / Digital Signage / Document Imaging and Management / E-Commerce / E-mail and Productivity Systems / E-Portfolios / Enterprise Information Systems / ERP / Financing / Furniture / Governance and Compliance / Hardware / Help Desk / Identity and Access Management / Intrusion Detection and Prevention / Learning Analytics / Learning Space Design and Outfitting / LMS / Media Production, Preservation, and Storage / Mobile Apps / Mobile Learning / Network Infrastructure / Network Security and Applications / Online Learning / Open Source / Portfolio and Project Management / Privacy / Risk Management / Security Management / Social Media / Storage / Student Information Systems / Student Retention / Training / Virtualization / Webcasting / Wireless

1. Academic Information Systems : WebCheckout, UNIT4 Business Software, Tk20, Taskstream, Sierra-Cedar, Schoology, Scantron Corporation, Lumens Integration, Internet2, Higher Technology Solutions, Higher One, Follett Higher Education Group, EMS Software by DEA, CollegeSource, Campus Televideo, Campus Management Corporation, Burning Glass Technologies, BOSS SOFTWARE, Ad Astra Information Systems, Academic Management Systems
2. Adaptive Technologies : W.W. Norton & Company, Wiley, WEPA, Panther Learning Systems, McGraw-Hill Education, Flat World Education, eXplorance, Educate Online, Difference Engine, Cengage Learning, CCKF, Alertus Emergency Notification
3. Analytics : Utelogy Corporation, Tribal Group, TRACSYSTEMS, Three Rivers Systems, TERMINALFOUR, Taskstream, Starfish Retention Solutions, SAP Institute, SAP Public Services, Rapid Insight, Qualtrics, Pharos Systems, Pearson, OrgSync, Oracle Corporation, OmniUpdate, Ntrepid Corporation, NEC, Minitab, LANDESK Software, Infor, Higher One, Helix Education, GradesFirst, Gartner, eXplorance, Entrinsik, EcoprintQ, Deloitte, Dell, D2L, Cognizant Technology Solutions, Cengage Learning, CCKF, CampusM, Burning Glass Technologies, Ad Astra Information Systems
4. Audio and Video Conferencing : WolfVision, Vaddio, Utelogy Corporation, Unify, Teq AVIT, PowerCreator, Polycom, Panasonic, Mitel, Lumens Integration, Level 3 Communications, Jive Communications, Huawei Enterprise USA, Extron Electronics, Exact Furniture, Epson, CHRISTIE, CDW-G, Blue Jeans Network, Blackboard, Avaya
5. Business Continuity, Disaster recovery, Emergency planning : Spanning Cloud Apps, SEP Software Corporation, Regroup, Rave Mobile Safety, Pure Storage, Nimble Storage, Mitel, MessageSolution, e2Campus by Omnilert, Code 42 Software, BRUNS-PAK, BridgeWave Communications, AVST

6. Business Intelligence : University Business, Starfish Retention Solutions, Sierra-Cedar, SAP Institute, Rapid Insight, Microsoft Corporation, Macmillan Science and Education, iDashboards, Gartner, Entrinsik, Entigence Corporation, EMS Software by DEA, Burning Glass Technologies

7. BYOD : Xirrus, WolfVision, Wisegate IT, Vmware, Vaddio, Turning Technologies, Trustwave, TRACSYSTEMS, Tidebreak, ThreatTrack Security, Teq AVIT, Symantec Corporation, Stoneware, Poll Everywhere, Pink Elephant, Pharos Systems, Nimble Storage, NetApp, Moofwd, Mitel, Meru Networks, LocknCharge, LaptopsAnytime, LANDESK Software, Kaltura, JAMF Software, Impulse Point, GovConnection, GoPrint Systems, Ginkgotree, Gartner, Fujitsu America, Extron Electronics, Extreme Networks, ExamSoft Worldwide, ESET North America, EcoprintQ, Crestron Electronics, Cognizant Technology Solutions, Code 42 Software, Cloudpath Networks, CHRISTIE, CDW-G, Canon U.S.A., CampusM, Bradford Networks, Blue Jeans Network, Blue Coat Systems, Avaya, Autodesk, Apogee, Alcatel-Lucent Enterprise, Airwatch, Aerohive Networks

8. Captioning : Automatic Sync Technologies, 3Play Media

9. Classroom Control Systems : Wacom Technology Services, Vaddio, Utelogy Corporation, Tidebreak, Teq AVIT, Stoneware, JAMF Software, Horizon DataSys, Extron Electronics, Epson, Crestron Electronics

10. Clickers : Turning Technologies, Poll Everywhere, Macmillan Science and Education, Echo360

11. Cloud Computing and Services : Zones, Workday, Wolfram Research, WEPA, Vocareum, Vocado, Vmware, UNIT4 Business Software, Unify, TimeClock Plus, Three Rivers Systems, TeamDynamix, Taskstream, TargetX, Symplicity Corporation, Stoneware, Spanning Cloud Apps, SoftChalk, Silicon Mechanics, Sierra-Cedar, SHI International Corporation, SAP Public Services, Salesforce.com Foundation, Regroup, Regent Education, Qualtrics, Pure Storage, PrinterOn Corporation, Polycom, Pharos Systems, Parature, from Microsoft, Panther Learning Systems, Palo Alto Networks, Oracle Corporation, NetApp, NEC, Mitel, Microsoft Corporation, Lucid Software, LONGSIGHT, Level 3 Communications, Lenovo, LaptopsAnytime, LabArchives, Kuali Foundation, KEMP Technologies, JourneyEd.com, Jive Communications, Jenzabar, Internet2, inLighten, Howard Technology Solutions, Google, Gigamon, Fujitsu America, Fischer International Identity, ExamSoft Worldwide, Evisions, Entigence Corporation, Ensemble Video, Ellucian, EduServe, Eclipse PPM, e2Campus by Omnilert, DLT Solutions, Difference Engine, Destiny Solutions, Deloitte, CollegeNET, Collaborative Solutions, Cognizant Technology Solutions, Code 42 Software, Citrix Systems, Cisco Systems, Ciber, CDW-G, Canvas by Instructure, CampusEAI Consortium, CampusCruiser, Campus Management Corporation, Cambridge Computer, Blue Jeans Network, Blue Coat Systems, Blackboard, AVST, Autodesk, AT&T, Aerohive Networks, Adobe Systems, Acquia

12. Consulting : WTC Consulting, Unicon, Tribal Group, TRACSYSTEMS, TeachPrivacy, Strata Information Group, Sierra-Cedar, Pink Elephant, Moran Technology Consulting, iData, Higher Technology Solutions, Helix Education, Entigence Corporation, Ellucian, EduServe, Deloitte, Collaborative Solutions, Cognizant Technology Solutions, Ciber, Campus Technology, Burning Glass Technologies, BRUNS-PAK, BerryDunn, Ad Astra Information Systems, Accuvant

13. Content Capture : Sonic Foundry, PowerCreator, Polycom, Perceptive Software from Lexmark, Panopto, OnBase by Hyland, McGraw-Hill Education, Laserfiche, Kaltura, Echo360, DocFinity, Canon U.S.A.

14. Content Management Services : Acquia

15. Content Management Systems : Vital Source Technologies, TERMINALFOUR, Sonic Foundry, Softdocs, ShareStream, PowerCreator, Polycom, Perceptive Software from Lexmark, Pearson, Panopto, OrgSync, OnBase by Hyland, OmniUpdate, NEC, Moofwd, Jadu, inLighten, Ginkgotree, Four Winds Interactive, Follett Higher Education Group, DocFinity, Courseload, CollegeSource, Asahi Net International

16. CRM : Wiley, Three Rivers Systems, TargetX, Symplicity Corporation, Starfish Retention Solutions, Salesforce.com Foundation, Parature, from Microsoft, Jenzabar, Higher Technology Solutions, GradesFirst, Enrollment Rx, CollegeNET

17. Data Administration and Warehousing : WebCheckout, Tegile Systems, SAP Institute, Ntrepid Corporation, Nimble Storage, LiveText, LabArchives, iData, Google, Evisions, CollegeSource, Cambridge Computer

18. Data Security : Wisegate IT, Trustwave, ThreatTrack Security, Symantec Corporation, STOP Security Tracking of Office Property, Spanning Cloud Apps, SHI International Corporation, SEP Software Corporation,

Proofpoint, Palo Alto Networks, Novell, Hitachi ID Systems, Guidance Software, Gigamon, FireEye, ESET North America, EcoprintQ, Code 42 Software, Bomgar Corporation, Aegis Identity Software

19. Digital Publishing : W.W. Norton & Company, Wolfram Research, Vital Source Technologies, University Business, SoftChalk, ShareStream, Pearson, Modo Labs, McGraw-Hill Education, Macmillan Science and Education, Lucid Software, Kanopy Streaming, JourneyEd.com, Follett Higher Education Group, Extensis, Ensemble Video, The Chronicle of Higher Education, Adobe Systems

20. Digital Signage : Visix, inLighten, Four Winds Interactive, Exact Furniture, EMS Software by DEA, CHRISTIE, Alcatel-Lucent Enterprise

21. Document Imaging and Management : WolfVision, Wacom Technology Services, TRACSYSTEMS, Softdocs, Perceptive Software from Lexmark, OnBase by Hyland, Ntrepid Corporation, Laserfiche, Jadu, Howard Technology Solutions, GoPrint Systems, DocFinity, Canon U.S.A.

22. E-Commerce : Zones, Tuiton Management Systems, TouchNet Information Systems, Follett Higher Education Group, Entrinsik, CollegeNET, Acquia

23. E-mail and Productivity Systems : University Business, TargetX, Salesforce.com Foundation, Microsoft Corporation, Google, EMS Software by DEA, AVST

24. E-Portfolios : Tk20, Taskstream, OrgSync, LiveText, LabArchives, D2L

25. Enterprise Information Systems : Vocado, TargetX, Symplicity Corporation, Scantron Corporation, SAP Institute, Salesforce.com Foundation, Qualtrics, Perceptive Software from Lexmark, OnBase by Hyland, Nimble Storage, MessageSolution, Lenovo, Laserfiche, Jadu, Infor, Higher One, Gigamon, Evisions, EcoprintQ, Eclipse PPM, CollegeNET, Collaborative Solutions, CampusM, CampusEAI Consortium, Campus Management Corporation, Cambridge Computer, BOSS SOFTWARE, BerryDunn, Alcatel-Lucent Enterprise, Accuvant, Academic Management Systems

26. ERP : Workday, UniversityLease, UNIT4 Business Software, Three Rivers Systems, Strata Information Group, SAP Public Services, Moran Technology Consulting, Kuali Foundation, Jenzabar, Entigence Corporation, Ellucian, EduServe, Destiny Solutions, Deloitte, Ciber

27. Financing : U.S. Bank Equipment Finance, UniversityLease, Higher One

28. Furniture : Virco, Steelcase, Spectrum Industries, Marshall Furniture, LocknCharge, ISE, Extron Electronics, Exact Furniture, Computer Comforts, Bretford Manufacturing, AvinED Technical Furnishings

29. Governance and Compliance : Vocado, Proofpoint, Pink Elephant, Novell, Laserfiche, Guidance Software, Fischer International Identity, ESET North America, Eclipse PPM, DocFinity, BerryDunn, Automatic Sync Technologies, Accuvant

30. Hardware : Xirrus, Vaddio, UniversityLease, TimeClock Plus, Tegile Systems, Silicon Mechanics, Panasonic, Oracle Corporation, NEC Display Solutions, MakerBot, Lenovo, LaptopsAnytime, Howard Technology Solutions, Fujitsu America, Four Winds Interactive, Epson, Cambridge Computer

31. Help Desk : WebCheckout, Utelogy Corporation, TeamDynamix, Pink Elephant, Parature, from Microsoft, LaptopsAnytime, LANDESK Software, Hitachi ID Systems, EduServe, CampusEAI Consortium, Bomgar Corporation, Atomic Learning, Apogee

32. Identity and Access Management : Wisegate IT, Unicon, TimeClock Plus, Symantec Corporation, Software Secure, Respondus, ProctorU, NEC, Moran Technology Consulting, Microsoft Corporation, Meru Networks, Impulse Point, Hitachi ID Systems, Fischer International Identity, Cloudpath Networks, Aegis Identity Software

33. Intrusion Detection and Prevention : Trustwave, Alertus Emergency Notification

34. Learning Analytics : Vocareum, Vital Source Technologies, Unicon, Turning Technologies, Tk20, Poll Everywhere, Panther Learning Systems, McGraw-Hill Education, LiveText, Ginkgotree, Flat World Education, eXplorance, Excelsoft Technologies, ExamSoft Worldwide, Educate Online, Echo360, Difference Engine, Courseload, Canvas by Instructure, Blackboard, Academic Management Systems

35. Learning Space Design and Outfitting : WebCheckout, Virco, Tidebreak, Panasonic, LocknCharge, ISE, Exact Furniture, Bretford Manufacturing

36. LMS : Vocareum, Vital Source Technologies, Tk20, Software Secure, Skillsoft Corporation, Schoology, Respondus, ProctorU, Pearson, Modo Labs, Maplesoft, LONGSIGHT, LiveText, LabArchives, Helix Education,

Excelsoft Technologies, D2L, Cengage Learning, CCKF, Canvas by Instructure, CampusCruiser, Atomic Learning, Asahi Net International

37. Media Production, Preservation, and Storage : Wacom Technology Services, University Business, ShareStream, Panopto, Panasonic, Lumens Integration, Extensis, Ensemble Video, 3Play Media

38. Mobile Apps : Workday, Unify, TimeClock Plus, Rave Mobile Safety, PrinterOn Corporation, Pharos Systems, OrgSync, OmniUpdate, Novell, Moofwd, Modo Labs, Maplesoft, Jive Communications, Jadu, Citrix Systems, CampusM, CampusEAI Consortium, Bomgar Corporation, AVST, AT&T, Aruba Networks, Airwatch, Academic Management Systems

39. Mobile Learning : W.W. Norton & Company, Wolfram Research, Turning Technologies, Tidebreak, TechSmith Corporation, Steelcase, SoftChalk, Skillsoft Corporation, SHI International Corporation, Schoology, San Jose State University, Poll Everywhere, Maplesoft, lynda.com, LocknCharge, Lenovo, JAMF Software, Howard Technology Solutions, GovConnection, Google, Four Winds Interactive, Flat World Education, Excelsoft Technologies, Educate Online, Edmentum, Dell, D2L, Courseload, CampusCruiser, Brainfuse, Atomic Learning, Airwatch

40. Network Infrastructure : Xirrus, WTC Consulting, UniversityLease, SEP Software Corporation, Meru Networks, Level 3 Communications, KEMP Technologies, Internet2, Huawei Enterprise USA, GovConnection, Extreme Networks, Dell, Cisco Systems, BridgeWave Communications, Avaya, Aruba Networks, Apogee, Aerohive Networks, 7signal Solutions

41. Network Security and Applications : Zones, Trustwave, ThreatTrack Security, Palo Alto Networks, Level 3 Communications, KEMP Technologies, Internet2, Impulse Point, Guidance Software, Gigamon, Fischer International Identity, FireEye, Extreme Networks, Cloudpath Networks, Citrix Systems, CDW-G, Bradford Networks, Bomgar Corporation, Blue Coat Systems, Aruba Networks

42. Online Learning : W.W. Norton & Company, Wolfram Research, Wiley, Vocareum, TechSmith Corporation, TeachPrivacy, Stoneware, Steelcase, Sonic Foundry, Software Secure, SoftChalk, Skillsoft Corporation, ShareStream, Schoology, San Jose State University, Respondus, ProctorU, Panther Learning Systems, Panopto, Maplesoft, Macmillan Science and Education, lynda.com, Lucid Software, LONGSIGHT, Kanopy Streaming, Kaltura, Ginkgotree, Flat World Education, Excelsoft Technologies, Ensemble Video, Educate Online, Edmentum, Echo360, Difference Engine, Courseload, Cengage Learning, CCKF, Canon U.S.A., CampusCruiser, Brainfuse, Blindside Networks, Blackboard, Automatic Sync Technologies, Atomic Learning, Asahi Net International

43. Open Source : Unicon, LONGSIGHT, Kuali Foundation, Kaltura, DLT Solutions, Canvas by Instructure, Blindside Networks, Asahi Net International, Aegis Identity Software, Acquia

44. Portfolio and Project Management : WTC Consulting, Unanet, TeamDynamix, Ntrepid Corporation, lynda.com, Extensis, Eclipse PPM

45. Privacy : TeachPrivacy

46. Risk Management : STOP Security Tracking of Office Property, Spanning Cloud Apps, Regroup, MessageSolution, Horizon DataSys, FireEye, Accuvant, 7signal Solutions

47. Security Management : Zones, Wisegate IT, ThreatTrack Security, STOP Security Tracking of Office Property, Software Secure, Regroup, Rave Mobile Safety, Proofpoint, ProctorU, Novell, LANDESK Software, Impulse Point, Hitachi ID Systems, Guidance Software, Gartner, FireEye, ExamSoft Worldwide, ESET North America, e2Campus by Omnilert, Dell, Bradford Networks, Blue Coat Systems, BerryDunn, Alertus Emergency Notification, Alcatel-Lucent Enterprise, Airwatch

48. Social Media : TERMINALFOUR, Rave Mobile Safety, Proofpoint, Parature, from Microsoft, OmniUpdate, Extensis, Campus Technology

49. Storage : Tegile Systems, Silicon Mechanics, Pure Storage, NetApp, MessageSolution, Huawei Enterprise USA, DLT Solutions

50. Student Information Systems : Workday, Vocado, UNIT4 Business Software, Tribal Group, Strata Information Group, SAP Public Services, Regent Education, Oracle Corporation, Moran Technology Consulting, Modo Labs, Kuali Foundation, Jenzabar, Higher Technology Solutions, eXplorance, Evisions, EMPOWER

Student Information System, Ellucian, Destiny Solutions, Collaborative Solutions, Campus Televideo, Campus Management Corporation, BOSS SOFTWARE, Aegis Identity Software

51. Student Retention : Starfish Retention Solutions, Helix Education

52. Training : Workday, TechSmith Corporation, TeachPrivacy, Strata Information Group, Skillsoft Corporation, San Jose State University, lynda.com, ISE, Infor, iData, Horizon DataSys, Edmentum

53. Virtualization : Vmware, Symantec Corporation, Silicon Mechanics, SHI International Corporation, Pure Storage, NetApp, KEMP Technologies, JourneyEd.com, Horizon DataSys, GovConnection, Edmentum, DLT Solutions, Citrix Systems, Cisco Systems, CHRISTIE, AT&T

54. Webcasting : Sonic Foundry, Blue Jeans Network, Blindside Networks, Automatic Sync Technologies

55. Wireless : Xirrus, Teq AVIT, Meru Networks, Lumens Integration, JourneyEd.com, Huawei Enterprise USA, Extreme Networks, Epson, Cloudpath Networks, Cisco Systems, BridgeWave Communications, Avaya, AT&T, Aruba Networks, Apogee, Aerohive Networks, 7signal Solutions

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