

EDUCAUSE annual conference 2016

Visits to UCLA, Stanford & Berkeley

French delegation report

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## Foreword

For the fourth running year, a French delegation was officially assembled to participate in the annual EDUCAUSE conference. Like the previous three years, it was decided to take advantage of the trip to the United States to visit three universities: UCLA (Los Angeles), Stanford (Palo Alto), and Berkeley (San Francisco/Berkeley). This report follows the feedback meeting held in Paris on December 9th, 2016, and covers the three daylong university visits, and the various workshops attended at the EDUCAUSE conference.

## French delegation 2016



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# Introduction & HE Trends in USA

Laurent Flory & Stéphane Amiard

EDUCAUSE was held 15 days before the US presidential elections at the same time with the backdrop of a very strong Donald Trump's rise in the polls (but not enough to win the White House as claimed by CNN) and attacks increasingly virulent and personal on the both sides. While primaries had given rise, among other things, to questioning the model of Higher Education and Research, its sustainability and funding (see last year's report), the election's final has moved away from academic issues to focus on economy, emails and walls ...

This chapter is intended as an introduction to the EDUCAUSE annual report. It presents the main stakes of HE in the United States for the next years from a French perspective. It is divided in two parts and five points which contribute to explain the digital trends observed at EDUCAUSE and in the visited universities.

## The still very impacting "historical" stakes

### Students debt (again and again)

It remains one of the fundamental problems of HE in USA. It continues to increase in absolute value to 1.3 trillion USD ( $1.3 \times 10^{12}$  USD). The number of students struggling to repay their loan is growing with an average debt of \$37.172 per student<sup>1</sup> in 2016 (+6% compare to 2015). Although largely nationalized, which limits the exposure of banks to its possible explosion, it represents a real risk of non-payment.

The scissors effect between the cost of education and income earned in working life is transforming the access to HE into a sometimes-risky investment. Those that we describe in France as users and which the American HE considers to be customers are consequently behaving more and more as investors. Access to HE has thus become an investment in USA. Risk limitation and the search for the most positive return on investment guide the actors' choice. This has a profound impact on the training supply, the differentiation between institutions, their communication matters and, more generally, the redefinition of the existing offer on this market.

Beyond federal and regional aid or experiments of free short training (see report 2015), the good news could come from learning analytics and social networks. Indeed, digitalization and the exploitation of the data should make it possible to better guide the learners towards curricula adapted to their profile, to help them in their (re)orientation, and to enable the institutions to act as far upstream as possible to propose through personalized paths to successful professional integration.

### Security

Physical security, digital security and the issue about harassment are also topical issues for HE institutions. The problems of physical security (shootings, murders, harassment, rapes) make media headlines with echoes in Europe (see the incident at the University of Ohio on November the 28th 2016<sup>2</sup>). The federal government monitored them and increasingly "binding" laws require institutions to integrate their care and prevention into their organization. In addition, the decision to purchase (invest in) a course (by families) is increasingly becoming part of this dimension<sup>3</sup>.

Data security and data protection issues, which are less visible in the media, are high in the priorities of institutions. Both the obligation to personally inform victims of (possible or proven) leaks of personal data and the willingness to exploit the data, impact institutional policies and drive the emergence of chief data officers.

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<sup>1</sup> <https://studentloanhero.com/student-loan-debt-statistics/>

<sup>2</sup> this shooting occurred just before the publication of the EDUCAUSE annual report in France

<sup>3</sup> Karine Feyten, Chancellor and president, Texas Woman's University

Indeed, at all levels of institutions, the exploitation of data, whether for teaching or research, involves important work in their harvesting, quality and safe dissemination.

Security in HE should evolve from the concept of "security by design" (taking security into account from the design of digital tools) to "security by DNA" (Safety in DNA (actors)). A trend that must be understood as the need for each HE actor to develop security reflexes as well as a mandatory soft skill. Indeed, security rests on the weakest link. The latter is very (too) often human. Thus, beyond the growing intelligence embedded in tools and solutions for detection and behavioral analysis, widely present at the exhibit hall and in the feedbacks, the necessary appropriation by all actors of Information System security reflex is the key to a real risk decrease.

## New challenges

### The question of differentiation in a competitive market

58% of the "less selective" institutions, offering four years courses, were afraid, this year, of not meeting their enrollment targets (and therefore financial returns). In order to meet this challenge, different ways are explored: the use of technologies, the construction of a strong brand, the reduction of registration fees and the opening up to international markets to increase attractiveness and to avoid the closure of some institutions.

It should be noted that in this context, community colleges are doing well with significantly cheaper curricula<sup>4</sup>, flexible offers to enable to work and study with a focus on more professional courses. 30% of students already study part-time.

### Towards a recomposition of the actors

While the growth in the number of HE institutions has experienced a turning point in 2013 with fewer institutions than in 2012<sup>5</sup>, one may notice the acceleration in the concentration of institutions.

The reshaping of the landscape should be organized on the one hand by the managed and controlled development of the most elitist establishments led by the Ivy league<sup>6</sup>, the grouping of the 8 oldest (and most prestigious) universities founded by the British before the Independence. On the other hand, at the end of the scale, through the development of an offer through low-cost institutions (not necessarily with research), offering a high benefit / price ratio, which will increase their market share. In between the two ends, "intermediate" universities, whether research or not, could, according to the group "University Business" see their number sharply decrease and those failing to regroup, disappear at the end.

53% of institutions are developing a strategy for mobile digital services. 65% of these same institutions consider this as a priority issue. But only 17% of the CIOs of these structures consider these mobile digital services to be at the state of the art and to be "excellent".

One cannot consider a mobile strategy without a "cloud" strategy. Indeed, the figures show that the users have 2 to 3 devices connected and nowadays the data circulate among these devices. This means that BYOD is now an established fact and institutions must adapt their mobile strategy to their massive presence on campuses.

Beyond the digital strategy of institutions, it is interesting to question the capacity and the level of services that support functions of the establishment are able to provide to a full mobile portal. A maximum level of commitment may be quickly achieved if the portal or mobile applications are successful. The question of

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<sup>4</sup> Average cost per year for a public community college: \$ 10k (for state residents) versus \$ 30k for a private college and \$ 60k for prestigious colleges ...

<sup>5</sup> <https://www.statista.com/statistics/240833/higher-education-institutions-in-the-us-by-type/>

<sup>6</sup> Brown University in Providence, Rhode Island; Columbia University in New York City, New York; Cornell University in Ithaca, New York; Dartmouth College in Hanover, New Hampshire; Harvard University in Cambridge, Massachusetts; Pennsylvania University in Philadelphia, Pennsylvania; Princeton University in Princeton, New Jersey; Yale University in New Haven, Connecticut.

alliance with a private service provider with the objective of a 24/7 level of service, must be questioned in relationship with the specific environment of each institution.

### Answering to the demand of the work market and, re-calibration of the courses offer

Studies<sup>7</sup> show a lack of 300,000 graduates per year to meet the needs of the work market, a phenomenon accelerated by the growth of the US economy in recent years.

This need generates innovations and a diversification of the courses offer, the aim being to be able to adapt to an active population - in employment or seeking a job - and wishing to quickly acquire very specific skills to reach a new position. This trend is illustrated with experiments around non graduating bar camps, or very specialized micro-diplomas .

To meet the challenges of cost and duration of studies, institutions offer hyper-specialized two-years courses, close to the French BTS/IUT. However, they do not allow for further study and they put themselves outside the traditional under graduate university curriculum.

Finally, many institutions tend to develop the massification of personalization, using digital tools. They sell courses and curricula entirely *à la carte* to large cohorts, enabling every learner to succeed at his own pace, part or full-time, depending on his financial and time investment capacities.

It should be noted that companies should gradually less and less differentiate<sup>8</sup> a traditional university degree from a set of credits and certificates acquired if they pragmatically meet their needs in terms of soft and professional skills.

In conclusion, digital innovations are one of the answers to these challenges whether they concern the innovative uses of existing solutions or the appearance of new tools and services. Increasingly, they are at the core of building institutions' strategy of differentiation and not only serving this strategy. This raises the question of the durability of the solutions deployed: much-loved tools can disappear overnight, following a buy-back or a bankruptcy of a startup, etc.

In the following pages, the delegation proposes to the readers reports on the topics that we, as French Higher Education folks, have especially noticed: safety (from products to the 10 digital priorities via the blockchain), students relationship management (including families), both in its administrative aspects but also through social networks and learning analytics use. To complete the news and trends of EDUCAUSE that strike us, we also offer the readers our traditional report of our university visits. On the menu this year: UCLA, Stanford and Berkeley, three small establishments of the golden coast ;- ) that we thank again, for the welcome, the richness and the quality of the exchanges.

Good reading on behalf of the entire delegation.

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<sup>7</sup> <https://cew.georgetown.edu/wp-content/uploads/2014/12/HelpWanted.ExecutiveSummary.pdf>

<sup>8</sup> <https://www.theguardian.com/higher-education-network/blog/2013/oct/02/horizon-scanning-higher-education-2020>

# Visit to UCLA

Yves Epelboin, Cécile Dejoux & Isabelle Galy

The French delegation had already visited this university in 2013<sup>9</sup>. The organization of the university and the basic principles of its policy have not changed, namely:

- 30 000 students, 3000 teacher-researchers, a multidisciplinary university with faculties largely autonomous in the conduct of their policy, notably in Information Technology<sup>10</sup>.
- A responsibility for Information Systems shared between two departments, one in charge of administration and the network, the second of teaching.
- High autonomy of faculties. Schools may choose other service providers than the central services.

The novelties are related to two issues that have changed dramatically since our last visit: the development of online education and an important consideration to data security and privacy. The visit was also rewarding on the human accompaniment around the online courses.

UCLA is, like all American universities concerned about the solutions offered to its students so that their academic experience happens as best as possible in the most secure framework possible. In this digital era the dematerialization of the courses and of the campus, the use and protection of data has become a real challenge. The risk of a trial that would undermine the reputation of the university is a major concern, so authorities must proceed with caution in all the projects they carry out. For them big data is a big opportunity but also big risks. If this caution does not prevent them from being innovative, it has made them aware that it is necessary to put human, many human in the processes.

## Teaching

UCLA refused, from the beginning, to invest in the MOOC and does not produce any. What is denied is their open and massive aspect, UCLA considering that it is not part of its missions. This does not mean a refusal of online education which is highly developed, in the form of SPOCs for internal use only. The reflection on the approaches is even very advanced (Innovative Teaching and Learning Initiative under the responsibility of R. Crosbie). The distance learning activity allowed us to observe that, beyond the tools, a real transformation is taking place via the connected campus.

The experience shared by Professor Rachele Crosbie-Watson about how she built her course with the help of technology is particularly illustrative.

R. Crosbie-Watson is a professor of biology, an arduous subject that requires students to experience a lot. She was therefore interested in pedagogy and technologies in order to develop a course which the students could better grasp. To achieve this goal, she relied on a large team and many skills to help her and tested various pedagogical formats in order to define the transmission framework that suited them best.

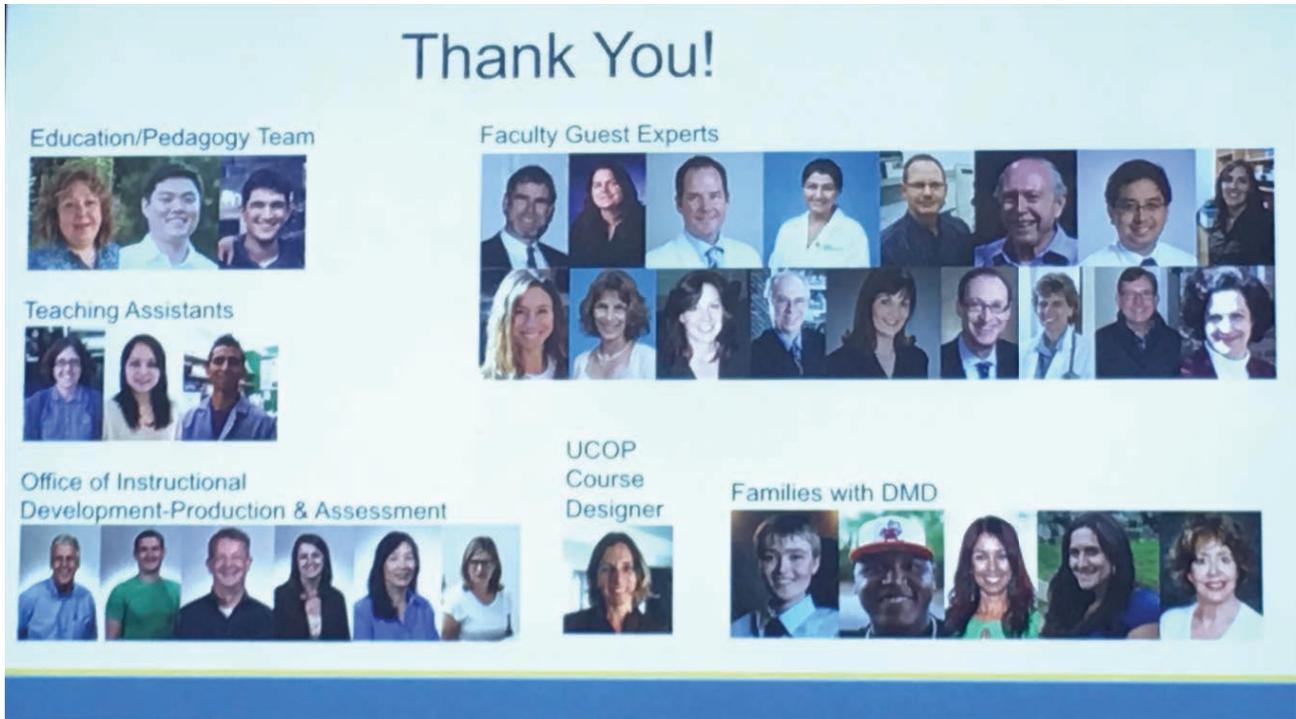
It turned out that the Learning Glass offered the best results as a medium for the transmission of its knowledge during online sessions or in class. Learning glass allows a teacher to write normally on a transparent board while remaining facing the students. So it's just a new type of blackboard. Yet he was the one which most attracted the students.

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<sup>9</sup> EDUCAUSE 2013 restitution: [https://www.canal-u.tv/video/erimes/restitution\\_educause\\_2013\\_conclusion\\_et\\_perspectives.13837](https://www.canal-u.tv/video/erimes/restitution_educause_2013_conclusion_et_perspectives.13837)

<sup>10</sup> <http://www.ucla.edu/about/facts-and-figures>

She also focused on having her course centered on the students, their own experiences and knowledge, on face-to-face activities and on a method that ensures a good follow-up of their progress. It has based on digital tools for pedagogy and on-line questions and answers and, above all, on a website which centralizes the teaching material, gives a checklist per week, allow to deliver real-time updates and gives clear instructions which facilitate the learning experience for the student. Group work is also fostered, including online discussions, peer-to-peer exchanges.



Behind this professor, more than 30 people contributed to the success of this project: teachers, assistants, experts, pedagogical engineers ... who helped her to design the most relevant course for her students. Her experience has been particularly documented, which is not always the case for all the projects implemented by UCLA, the teachers remaining free in their digital appropriation.

A major concern of American universities, which are living through the enrollment fees of their students, is to reduce the drop-out rate as much as possible (this concern is found everywhere). The university is therefore concerned with the quality and continuity of the service delivered to the learners as well as the monitoring of their pedagogical activities. UCLA doesn't hesitate to invest in projects like this one because it contributes to success and the university provides the necessary human means for this experimentation.

In the same spirit, a structure dedicated to continuing education (UNEX) has been set up to deliver its courses in the form of SPOC. UNEX employs the university's SPOC (more than 1000 today for 3000 existing courses) and develops new ones in partnership with the client companies. UNEX has the structure of a true company, very oriented towards customer satisfaction, with a strong industrial partnership. As a result, relations with the traditional components of the university are not always simple.

Learning analytics that are beginning to be implemented are still essentially research-based and involve two approaches that are considered separately:

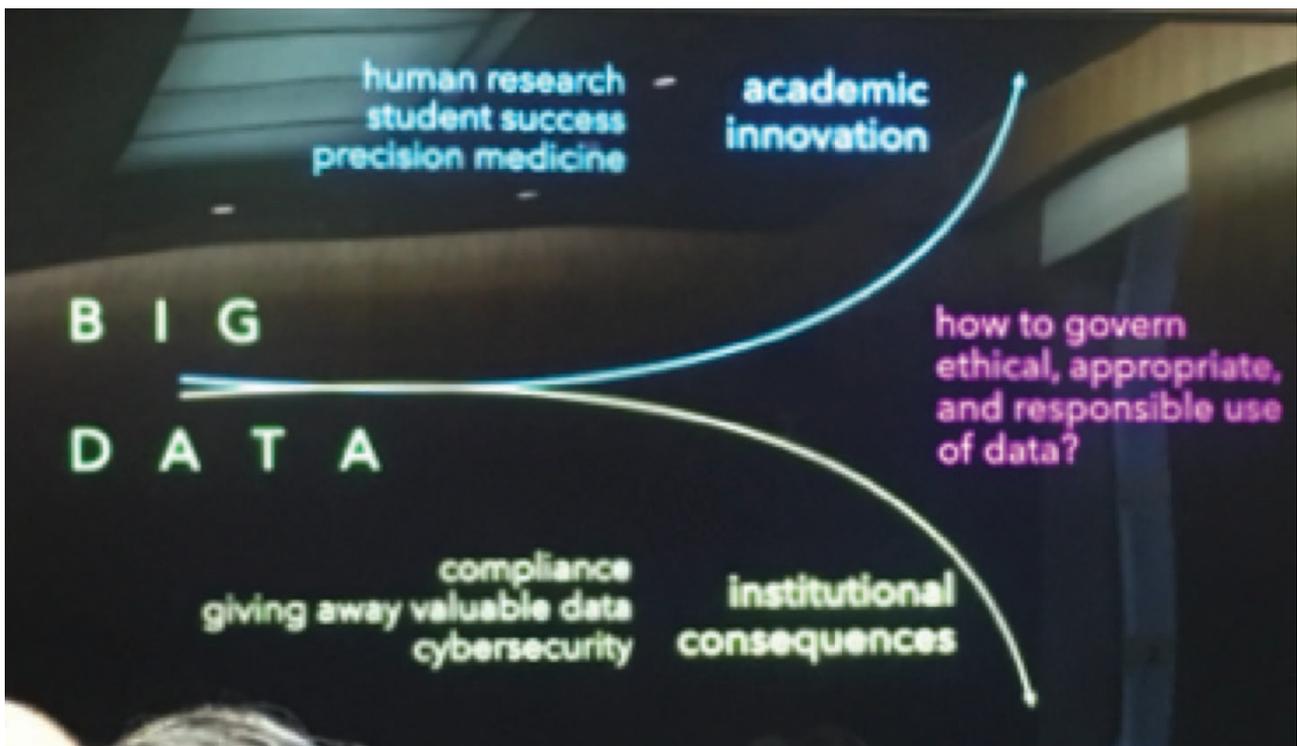
- Analysis of data about the students in the central systems and especially in the student information system (SIS)
- Data analysis of the Moodle teaching platform. However, they are not yet used to pilot the teaching in real time (adaptive learning).

## Data Security

This is the point on which UCLA's attitude has changed most strongly. Without falling into the caricature one can even say that this is a complete reversal.

In 2013 the topic was not even present on the agenda. It is today in all fields with a particular concern towards the medical data of the patients of the hospital. Blind confidence in large commercial providers has disappeared.

UCLA feels very concerned about its potential responsibility when its employees and students use external tools: what to do, for example, when researchers use an external collaborative platform on their own? The most extreme case is that of a vendor that is very popular although it was impossible to get an agreement on the data ownership and their confidentiality!



What to do again, when non-secure tools are running on a Faculty's servers? The more freedom is left to academic innovation, the more the university is at risk and the ethical and legal consequences on the institution can become serious.

We will find everywhere this concern for the confidentiality of the data and the responsibilities of the university. The state, the industrial suppliers are no longer the good guys of this world. The Snowden case went through.

# Visit to Stanford

Yves Epelboin, Cécile Dejoux & Isabelle Galy

Stanford is not a very big university: 16,000 students, only a little more than 2,000 teachers including 21 Nobel Prizes and 11,000 support staff, including 1,300 for IT. The faculties (schools) are very autonomous, 25% of the budget only belonging to the central administration. This explains why faculties develop their own Information Services. The Assembly of Faculty CIOs is therefore an important element in organizing the institution's policy. The central information Systems are managed by the Chief Financial Officer (130 people). IT services (350 people) are responsible for research, networking and teaching (to the extent that the schools want it). The responsibility is assumed by an Associate Vice-President. The budget is only partly covered by the university (\$50 million), the remainder is obtained through the sale of services (\$ 70 million) to schools.

Essential university data can be found at <http://facts.stanford.edu>.

A movement is underway to rationalize and consolidate common services while preserving the autonomy of the schools, leaving to them their specific matters. The move towards the public and private clouds is well advanced, however with a difficulty regarding the numerical computation.

The services and their engineers are immersed in the special mood of Silicon Valley and innovation, in the use of new technologies, is permanent. It is even a condition to keep attractiveness for a staff very solicited outside.

## Teaching

Online education is common at Stanford. The university encourages the use of digital services by providing training and seminars. However, the policy is very decentralized in the schools.

Stanford believes in MOOCs and works with Coursera (about 20 courses) and EdX. However the wave has passed and these are, most often, derivatives of online courses (SPOCs) developed for internal use. The university provides a technical support (5 pedagogical designers and 8 people as technical support) and possibly finance, but the teachers are volunteers. The university does not take into account this work in their time of service. The MOOCs are no longer free because the certifications issued by Coursera are no more free.

The Sakai teaching platform has been abandoned in favor of Canvas because the university feared a halt in the developments, following the leave of some American universities partners. Some schools use Moodle.

Everyone tests tools and scenarios on a small scale: mini-MOOCs on engineering, MOOCs on elections with Civitech tools so that the course (remember the visit happened during the presidential election) is made in real time. The test is done in small groups, with the Idea lab that initiated the creation of this MOOC, and, if the experimentation is conclusive, the project will be later disseminated. This is an example of real approach of design thinking. In the exchanges, there was much talk about changing the mindset, the state of mind, of students, teachers, support functions so that they are able to embrace the changes and transformations.



Part of the group visited the D School, which is the building where Stanford's design thinking is taught as a cross-discipline. More than 15,000 students participate in each of their pop-up classes. Their pedagogy is articulated around an approach that transforms them by making them live radical collaborations. At the heart of the pedagogy of the D.school, doing with your hands, the responsibility of the students about their training needs, the transversal professorial teams, modular spaces are all conceived for collaboration and creativity.

## Security

Safety is a priority. To guarantee the confidentiality of data is not only a regulatory constraint but also a necessity regarding the suffered attacks. This is particularly sensitive for patients' data from the hospital. Since 2013 the budget has grown from \$3M to \$6M and the staff has grown from 5 to 20 people! The major trend is to automatize the processes to avoid unnecessary authorization dialogues. All data must be encrypted and decrypted every time they are used. Authentication is done in two steps.

The Information Security Office is responsible for this problem in all its aspects:

- Training and awareness of users, setting standards and regulations.
- Monitoring, implementing the tools and more generally responsible for the implementation of the strategy at all level of services.
- Security research and participation in the national Cyberlink initiative.

The difficulty is to maintain a balance between risk and security for a population highly attached to its individual freedoms. A reflection was initiated, about a pedagogical approach, with the publication of a classification of risks and minimal standards to respect, a consideration of the mobility and, more generally, a whole of awareness and training.

The main challenges are:

- The management of personal data.
- Ability to track changes.
- Risk taking at the local level, such as unencrypted personal computers and management of connected objects.

Unlike many universities, Stanford manages its mail entirely internally.

Stanford has a established service in charge of the security. A long history in this field leads to a pragmatic policy in an environment where constraints are badly supported.

## Calculation

Since 2015 Stanford has been implementing an initiative to meet the needs of all schools. The computing servers of the university are grouped in a data center and laboratories are encouraged to place their own machines with, in return, a guaranteed maintenance, while maintaining priority in their use. It is also possible to buy hours of calculation. 2000 users use this service. The success is undeniable since the center moved from 100 servers to 850 in three years.

Stanford gives the feeling of a very decentralized and very loose structure where the decision mostly belongs to the schools. This independence does not necessarily mean optimizing resources, but in a very rich financial context (Stanford's annual budget exceeds \$5 billions) and a very favorable local environment in the Silicon Valley; this favors the innovations. A true Darwinian process is at work and explains the dynamism of this university in all fields.

# Visit to Berkeley

Yves Epelboin, Cécile Dejoux & Isabelle Galy

The University of Berkeley is also a public university and the university mainly runs all projects even if student initiatives are observed and that a total freedom has been left to them.

Berkeley is the merging of 14 colleges and schools and welcomes more than 37,000 students and 1,500 teacher-researchers<sup>11</sup>.

This university shows a good coordination between the services in charge of the digital university while respecting the independence of the components.

The difference, in the organization of the services in charge of the digital university is amazing when visiting Berkeley after Stanford. A big effort is made to structure an Information Technology distributed in all schools. A strategic committee has been set up which relies on specialized committees<sup>12</sup>:

- Committee for Administrative Applications and Data
- Committee for Research, Teaching and Learning Technologies
- Architecture and infrastructure
- Information, risk and governance.

Computer specialists from the central services are brought together on a regular basis, enabling people who did not know each other to start working together.

However, the establishment of these structures remains difficult. Coordinating the evolution of 140 independent systems remains a real challenge. Putting it in the cloud makes it easier.

As in other universities (see the 2014 delegation report on MIT), a presentation layer has been developed for all applications to be independent from the vendor interfaces. Research and teaching contribute to this effort and a hackaton has even been organized with the students. More than 500 APIs have been developed.

## Security

Security is organized centrally and has a \$3 million budget. Like all universities, the difficulty lies in finding a balance between ease of use and protection. Berkeley is moving cautiously to the cloud by working to separate the parts that must remain private and those that can be moved out. The service works with lawyers and with the administrative departments to clearly define this data mapping. Thus Berkeley strongly struggled with CANVAS who considered that the data collected in the LMS were their possession.

A deep analysis of the risks is put in place before any choice of solution. For example Berkeley relies on Google for mail, on Google Drive for storage for the lowest levels of security and internally retains the most sensitive data. To our amazement, when learning that all mail was outsourced, answer was that a study had shown that they were not able to offer a better service internally.

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<sup>11</sup> <http://www.berkeley.edu/about/bythenumbers>

<sup>12</sup> <https://technology.berkeley.edu/governance>

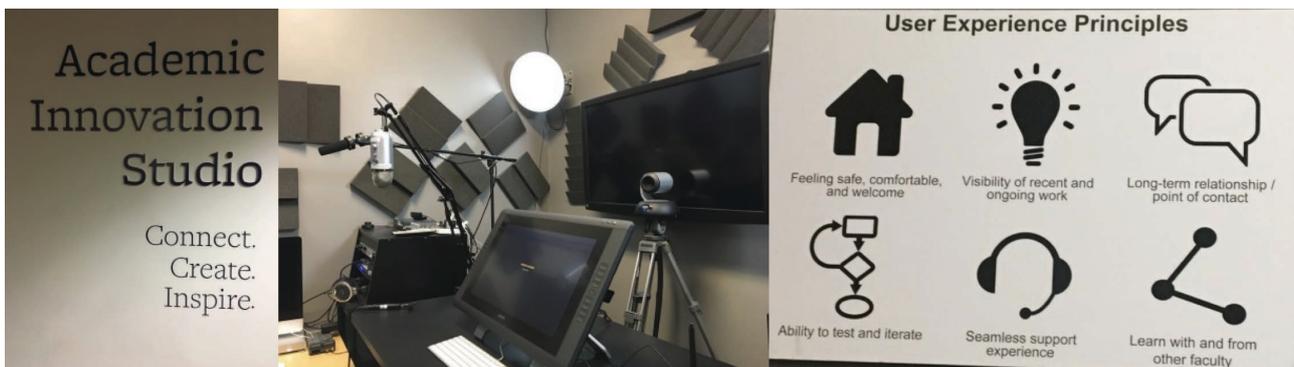
Berkeley therefore remains very pragmatic in the choice of solutions and the choice between internal developments and, quite often, of service providers must be justified in advance. A partnership policy with external platforms and startups is being developed. As at UCLA, Berkeley is concerned about the data of its students. The mastery is not easy as partnerships are difficult to negotiate with the vendors due to the volatility of important startups. Berkeley focuses on pedagogy and valuing its intellectual property rather than developing proprietary tools.

## Teaching

Berkeley, although having produced 55 MOOCs available on EdX, remains reserved on this means of teaching as well as on online education for the students present on the campus.

Teachers have access to all facilities, from the 3D printer to the video studio. Many courses are filmed (use of the Matterhorn solution) and made available to the students, in the form of raw videos without editing. The LMS, Sakai, although giving full satisfaction, was abandoned in favor of Canvas, because the university did not find commercial support meeting its needs.

Berkeley opened a courses studio very focused on the users experience: professors and students. Again, design thinking and agile methods helped to build supply and remain at the heart of the model.



It is a "Do ItYourSelf" where teachers can participate to workshops and share experiences in order to build their own course.

QJCTE (Center for Teaching and Learning) organizes the training of the teachers. Their attitude towards new technologies does not seem very different from the one we know in France.

Berkeley is very attentive to his teachers and students and observes what they are doing and what are their expectations. The BRCOE program enables them to work with teachers and identify the most suitable types of e-learning, but also to discover possible new opportunities on the world market; They think about organizing diplomas entirely online but it is rather paradoxical to note that a lively resistance exists: blended learning exists but does not seem to be the priority of all. Berkeley, one of the first suppliers of MOOCs, remains quite reserved in their internal use. For instance, teachers refused to set up a computer micromaster.

Students put a lot of pressure on teachers to make their classroom experience the best possible. They feel that coming to Berkeley must be worth it, but they continue to focus on campus life rather than on distance education. They want to have a real learning experience. Berkeley focuses on the student experience and wants to develop, in empathy with their needs, solutions that include gamification (making the campus a huge playstation). However, the operational teams are not yet ready.

Experimentation is at the heart of the campus: Students develop their own "online classes". YouTuber students come to explain the course to their classmates, becoming, for some of them, real stars.

Vocational training (Unex) is tackled in terms of the income it brings to the university. The 55 MOOCs led to 91,000 certifications and attracted 1,500,000 students. Schools must finance the MOOCs production and teachers are not remunerated, as it is the case at Stanford.

Berkeley is a humanist university. It wonders what happens next, about work experience and how these new generations will be integrated into working life.

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# EDUCAUSE top 10 IT issues 2017

Brigitte Contois, Laurent Flory & Khadija Dib

Each year a working group of experts in the field of digital studies the main issues of technology and strategic trends in Higher Education. This study covers not only digital infrastructures and services, the information system, pedagogy, libraries, analytics, but also physical learning spaces, governance, human resources, security which remains important issues, particularly in the current international context.

The work carried out in 2016 makes it possible to prioritize points in 2017.

The presentation of the top 10 points is usually published in January 2017 but the EDUCAUSE congress of October presents them, in a teasing logic, in preview. The objective being to give the key trends that will guide the participants in their strategic choices for the year 2017.

## Presentation of the 10 IT key topics 2017

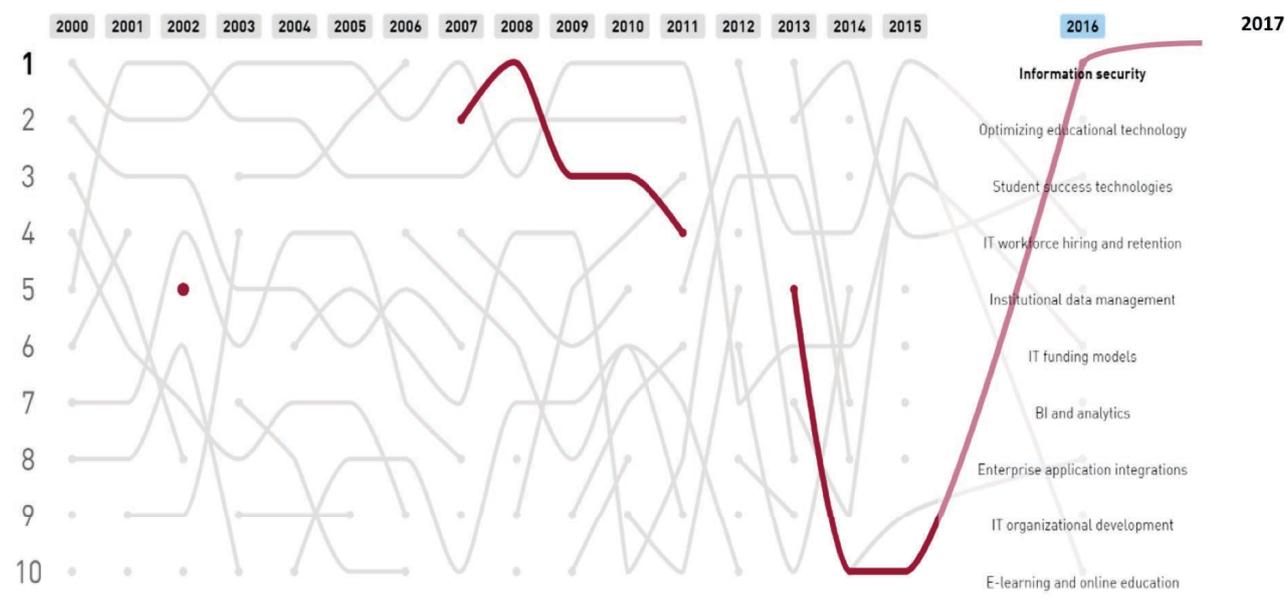
### 1 Information security: Developing a holistic, agile approach reduce institutional exposure to information security threats.

Since 2000, information security is moving back and forward in the EDUCAUSE top 10 IT issues. In 2016, information security was back in first position and keeps it for 2017. Significant increases in attacks, the existence of many data leaks (including medical data) and changes in regulations require institutions, which had been stolen sensitive personal data, to inform personally and individually the "victims" explains in large part this first position in the Top IT.

To better respond to the different aspects of information security in Higher Education, the Higher Education Information Security Council (HEISC, an EDUCAUSE group since 2000) strongly recommends:

- 1 Ensure that members of the institutional community (students, faculty, staff), beyond mere awareness, receive training and education in information security
- 2 Develop an effective security strategy that addresses institutional concerns and culture
- 3 Plan for the implementation of next-generation security technologies to address evolving threats

For example, the security system set up at Stanford University is interesting.

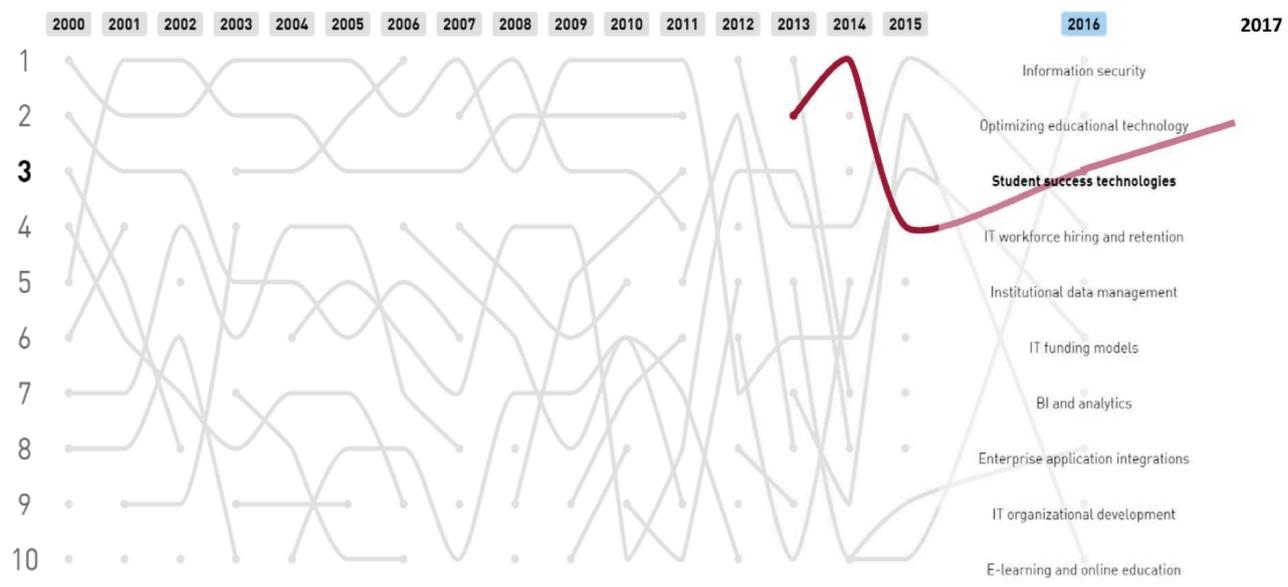


History of the information security rating in the top 10 since 2000.

## 2 Student Success and Completion: Effectively applying data and predictive analytics to improve student success and completion.

With the rising cost of education and the problem of student debt, higher education is more than ever an investment. As such, success is one of the key factors in differentiating institutions in their search for new student clients.

This priority stay on the top 4 of the ranking since 2013.



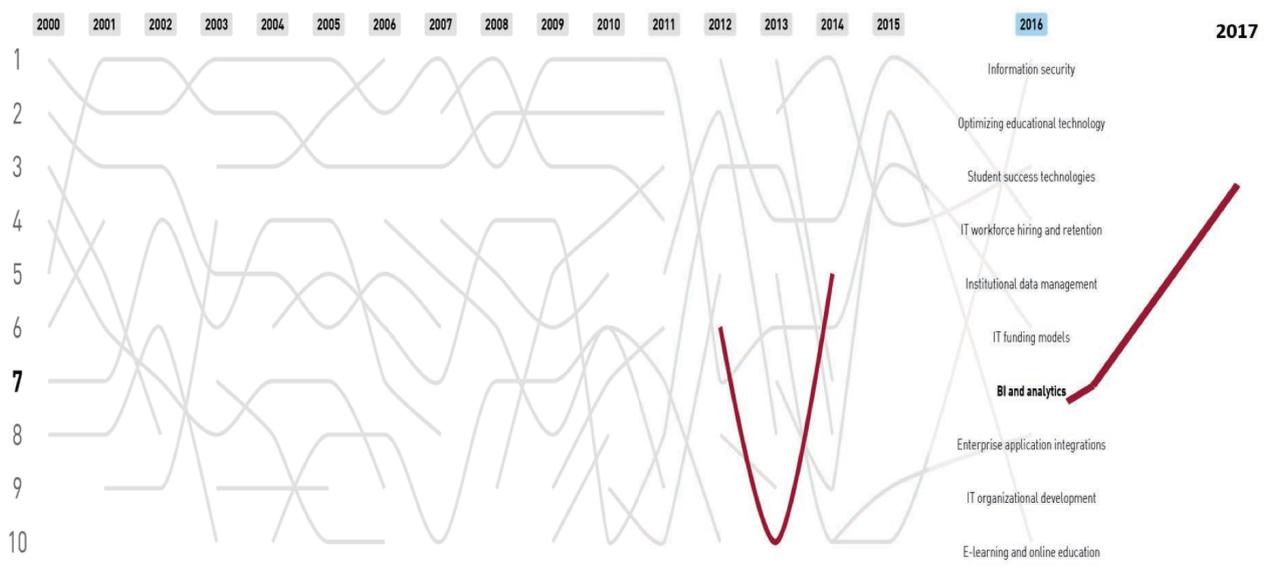
In particular, the use of learning analytics is gaining momentum in this issue. The emphasis is on analyzes and benchmarking to prioritize actions to improve student success and graduation.

### 3 Data-informed Decision Making: Ensuring that business intelligence, reporting, and analytics are relevant, convenient, and used by administrators, faculty, and students.

Within higher education institutions, the study and analysis of all the collected data help to better understand complex problems in order to make the right decisions and develop effective action plans. Different fields are covered: academic analysis, Business Intelligence and learning analysis.

Several tools are used to create powerful dashboards allowing the development of frameworks for the collection, analysis and visualization of data on learner performance. These tools also allow the development of specific actions to be taken. It is also recommended to promote and develop a culture of partnership and collaboration with other institutions. The example of the University of Perdue was presented.

The decline in resources and the need for increased management and monitoring partly explain the skyrocketing of this priority for 2017.



### 4 Strategic leadership: Repositioning or reinforcing the role of IT leadership as a strategic partner with institutional leadership.

Technological developments are forcing institutions to constantly think about their priorities. They must guide the IT strategy. However, discussions and exchanges between stakeholders are often difficult and may not lead to an effective strategy. IT leadership must have a hierarchical positioning that allows it to be a full partner with the institution's governance.

To achieve Goals 9 and 10 of a new digital approach, digital governance must pass:

- a position of IT alignment on the strategy of the institution
- a position where digital becomes one of the initiators of the institution's strategy.

Digital must be at the heart of these inflections and must be the source of an alignment of the organization and its processes with a target of providing digital services differentiating and high added value.

## 5 Sustainable Funding: Developing IT funding models that sustain core services, support innovation, and facilitate growth.

Cost reduction requires an overall cost analysis and a return on investment approach to ensure an effective strategy. In addition, a good organization of the IT will be able to meet the needs of the various services while respecting the security and attracting new talents.

With a change in purchasing strategy (rental of cloud services vs local deployments, broker behavior of outsourced solutions vs. in-house tool supplier), the structure of the needs between operation and investments evolves. The decline of state and regional financing and the lower return on equity investments impose constraints on digital budgets. Their perpetuation depends on new revenue.

## 6 Data Management and Governance: Improving the management of institutional data through data standards, integration, protection, and governance.

There is a strong trend elsewhere in USA to see data as the oil of the 21st century. Their collection, their exploitation and their security is at the heart of the priorities. Computer systems produce masses of data that should enable universities to meet strategic challenges. The combination of powerful technologies, masses of data, analytical tools and exploration will trigger a revolution within institutions in the fields of education, governance, finance, security and human resources.

Data quality and Master Data Management are at the heart of the concerns behind this priority. A quick survey at EDUCAUSE showed that no institution was expecting to have 100% reliable data in its Information System ...

The challenge for North American universities, with strong and autonomous components, is to maintain, with the development of local services and databases, central databases with quality data. The creation of a new job (and a new group EDUCAUSE) of Chief Data Officer is the perfect illustration of this trend.

## 7 Higher Education Affordability: Prioritizing IT investments and resources in the context of increasing demand and limited resources.

Information Technology can help to increase affordability in different ways. First of all, by increasing efficiency (through the use of (existing) application) decreasing the human resources needed for dedicated tasks. By a rationalization of the development and the maintenance of local tools vs. central IT tool to decrease the cost of IT with the same level of service offered. By optimizing IT investments in accordance to its strategic plans. By using IT to stem student attrition with increases the revenues and decreases the cost of graduation.

## 8 Sustainable Staffing: Ensuring adequate staffing capacity and staff retention as budgets shrink or remain flat and as the external competition grows.

This priority that was in the top 3 last year remains for 2017 in the concerns of digital superiors in the US. The need for new skills such as contractual or legal expertise (see the Berkeley model) within CIOs becomes a key factor in the success and sustainability of projects (outsourced) over time. Beyond technical skills, new soft skills such as project management, support for change and communication become increasingly essential in addition to proven technical expertise for IT teams.

The last two points should be placed in a context where the notion of providing online service through the homemade tools, social networks and cloud services should no longer serve a few (pioneers) but become tools and processes for all and therefore used by all. This implies strong reorganizations: at all levels the mode of operation and communication must evolve to align with this objective. This is naturally to be compared with the need to massify the personalization of services.

## 9 Next-Gen Enterprise IT: Developing and implementing enterprise IT applications, architectures, and sourcing strategies to achieve agility, scalability, cost effectiveness, and effective analytics.

Universities must respond to the many users who require high availability, reliability, security, and performance. The market for higher education is flooded with solutions. Students can choose the institution that best meets their expectations for their education. This situation forces universities to use technology for an attractive training and research offer.

In an increasingly competitive world, institutions need to be competitive and adopt strategies that ensure:

- Student Success: Effective Data Enforcement and Predictive Analysis to Improve Success Through Graduation
- Decision-making based on data: ensuring that BI, reports and analyzes are relevant, practical and used by all relevant stakeholders (administrators, professors and students).

A mini live survey to find out what participants wanted to address in the Top Ten points showed that Point 9 (A Next Generation IT View) was in 1st place.

## 10 Digital Transformation of Learning: Collaborating with faculty and academic leadership to apply technology to teaching and learning in ways that reflect innovations in pedagogy and the institutional mission

Digital transformation affects the entire institution: the different components and the culture of the campus. It involves changes in:

- The roles of the various university staff: teachers, students, administrators, stakeholders ...
- Teaching processes using technology
- The commitment of the actors of learning
- Collaborative work between teachers and students.

The objective is to create a true collaboration between all the components of the institution to make the best use of the technologies and achieve an innovative pedagogy.

The live survey placed this point in 2nd place.

## 2015 to 2016 evolutions

This table shows the distribution of last year and the new one with the prioritizations explained above.

Top 10 2016	Top 10 2017
1. Information security	1. Information security
2. Optimizing educational technologies	10. Digital Transformation of Learning
3. Student success technology	2. Student Success and Completion
4. IT workforce hiring and retention	8. Sustainable Staffing
5. Institutional data management	6. Data Management and Governance
6. IT funding	5. Sustainable Funding 7. Higher Education Affordability
7. BI and analytics	3. Data-Informed Decision Making
8. Enterprise application integration	9. Next-Gen Enterprise IT
9. IT organizational development	4. Strategic Leadership
10. E-learning and online education	10. Digital Transformation of Learning

The security of information remains issue number 1 guided by the notion of, and the needs for, protection of personal data. This year's originality comes with the notion of "new generation", called "next-gen", we move from an enterprise

view to a User eXperience vision (user feedback, user experience) with success on applications, Mobility, new uses that meet the needs both students and teachers.

As much as the development of pedagogical tools in face-to-face or distance education were preponderant and in second position, this year the tools are seen in a more comprehensive digital transformation of methods and tools, based on innovation and a displacement of vectors on the uses . The 2 points (2 and 10) of last year are synthesized in point 10 of this year with a vision of transformation.

Over three years, the role of a CIO becoming more organizational, and collaboration with central departments and agencies was advocated. This year the notion of transversality emerges with that of leadership as much on the IT side as on the institutional side. Already mentioned last year, decision statistics have become a priority, moving from rank 7 to rank 3.

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also:

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<https://events.educause.edu/annual-conference/annual-conference/agenda/advancing-a-datadriven-culture-through-collaborative-partnerships>

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# Institutional statistics & data

## governance

Brigitte Contois

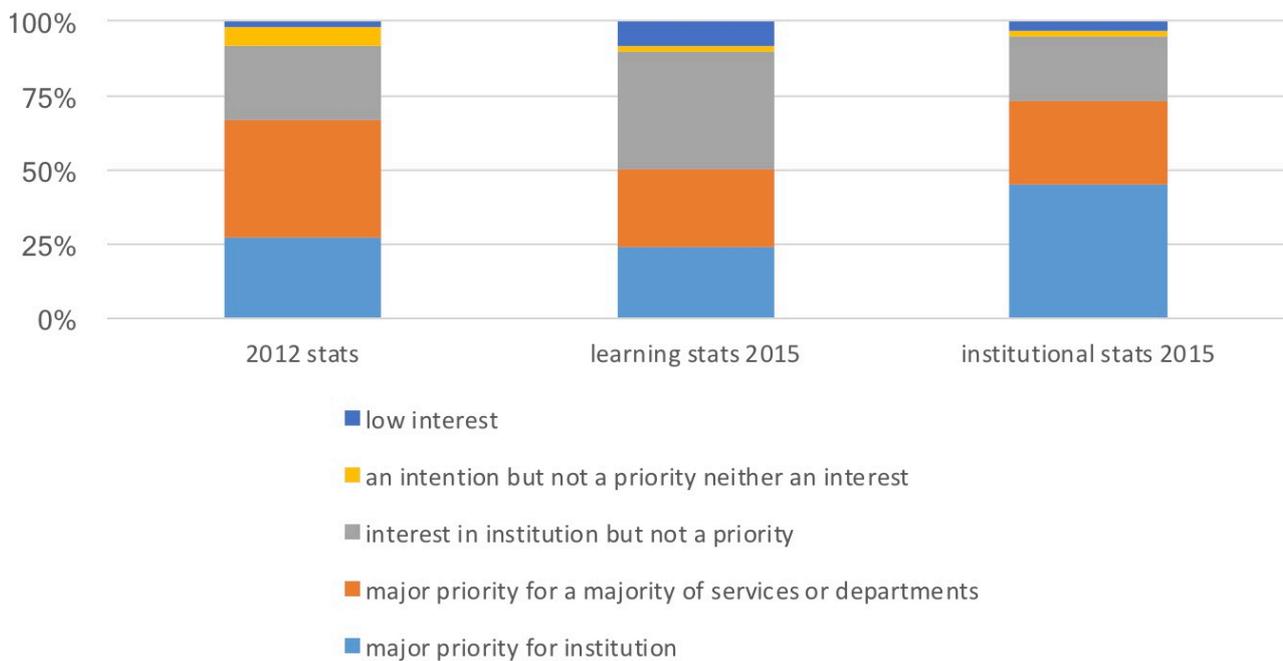
Statistics related to institutional data (governance, decision statistics etc.) are in development or evolution according to the choice of strategy of the institutions. The level of advancement depends on the priorities and strategies chosen.

### Institutional statistics' new strategies

One of the key success factors is that since 2013 a return on investment in learning analytics and institutional analytics has been observed and put forward to pursue strategies in this direction. By 2015, more than 30% of institutions decided to invest more in institutional statistics without leaving aside those of learning having matured.

The graph below shows the institutions investment strategies between 2012 and 2015.

Stats priority 2012 and 2015



In 2012, the distinction between fields and perimeters of statistics was not drawn. Between 2012 and 2015, the development of MOOCs and teaching platforms paved the way for analytics learning. Today, guidance is more resource-weighted on institutional statistics for decision-making purposes.

The other key success factor is that institutions have been able to develop teams that are competent and able to respond to requests. Last year, the lack of skills and the retention of IT staff were clearly highlighted, citing even a shortage and increased competition in the field. It remains today in the top 10 with the need for a competent team and in capacity to meet the needs expressed as the user experience for mobile applications and the predictive analytics models that have been widely implemented this year at the conference.

The ECAR Entity (Statistics and Research Unit of EDUCAUSE) listed the main recruitment requirements for IT staff. The diagram below shows the 5 main ones.

Requested skills	
Predictive models	92 %
Statistics training tools	89 %
Data visualization	88 %
UserX development	87 %
Data analysis	87 %

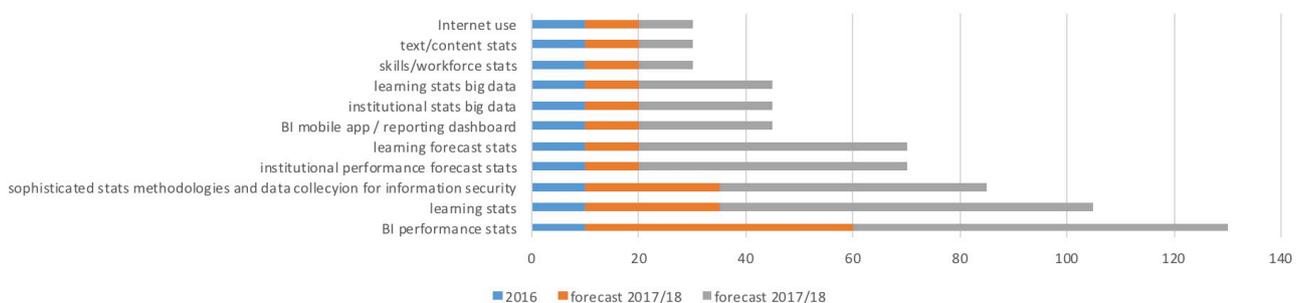


## Predictive data being successful

The models for predictive analytics have often been mentioned. Mainly at the level of teaching methods to build a training offer adapted to the level of new entrants. These models are based on the results of the students at the time of entry (competitions, tests), during the year and at the end of the year. The models evaluate the levels expected by discipline over the next three years and thus adapt the modules (capacity, opening time, credits, evaluation perimeter) in order to guarantee a success rate.

Some tools have been developed by institutions that allow users not experienced in statistics to build graphs or other representation models by selecting a menu of criteria and parameters. This tool allows decision-makers to follow the statistics in real time and thus to build models for decision-making (finance, resources, success, etc.).

Trends in prioritization of statistical technologies over the coming years



Increased use of data directories has raised the issue of risk and the need for an organizational repository for IT risk management projects.

## Awareness of data security

A demonstration around a risk weighting tool allows to judge the criticality and the vulnerability of the infrastructures submitted. The tool allows to quantify a risk, illustrated by means of a graph of subdivision and simple color code. This tool allows to prioritize the stakes in a collaborative way with a working group and to sensitize the business departments on the stakes and the responsibilities.

The tool identifies and proposes new ways of visualizing and describing risks to decision makers, taking into account local and institutional risks and achieving a common language between ISD and business services, and Than academic.

Institutional visits have shown that the security of data and their uses is a crucial issue. The means provided were consequent (dedicated service, alerts, localized data center etc.)

## A best practices repository for decision statistics

Faced with the growth of models and the preponderance of projects on institutional statistics, the need for quality data to respond to the real challenges has been realized in projects such as the creation of a reference document and a guide to good practices (IFEH Institute for Higher Education Policy)

Awareness of stakeholders is assessed on the basis of the ability to respond to this type of question:

- How many students of non-traditional age (excluding 18-24 years of age) attempt to study in higher education and obtain their credits?
- Do students who have validated their modules keep their credits if they transfer to another institution?
- How much debt is accumulated by the student and how quickly can he pay his loan
- Does the student find a job after graduation and at what level of salary?
- Under a philanthropic approach, how many students who have studied in higher education succeed in contributing to society and how?

The repository draws up a list of good practices from a global point of view to precision, taking into account the strengths and weaknesses of such projects. Recommendations can be found on these issues:

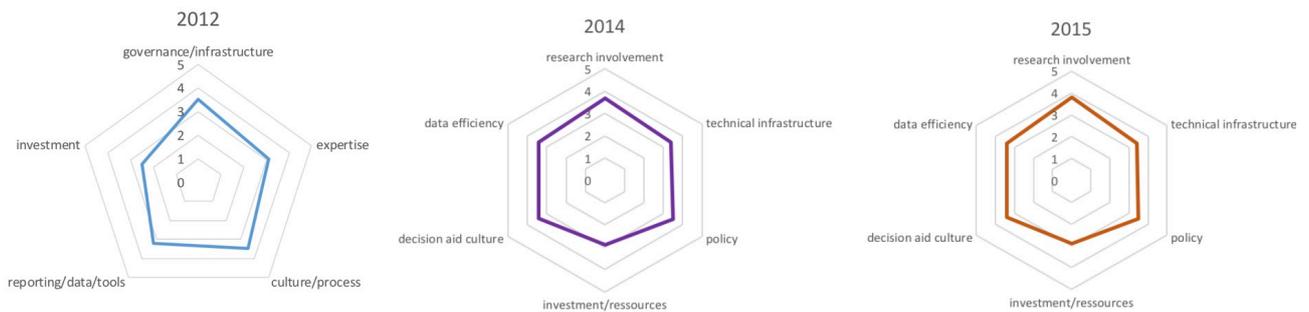
- Appropriate tools for data collection, reporting or use ensure long-term results
- An ecosystem based on an agile and flexible method allows to consider results from now to 20 years later
- Processes must take into account the respect of private data, standards and business standards as well as the legal framework
- Set the rules of data cure at an effective frequency to avoid the effusion or misuse of the predefined out-of-frame data and privilege the new data
- Working and determining correlations between the different ecosystem bases
- Building a legitimate and forward-looking framework for data governance
- ...

Numerous presentations mentioned the need for curation, even concerning data related to research. Even if the success of the institutional statistics is only a few years old, the data from the various systems are difficult to qualify. The findings showed that undiscounted data biased the constructed models and penalized the decision support methodologies. The problem of curation remains a sensitive and keen field of study.

## Conclusion

Data governance or has been experiencing real growth for two years with a paradoxical approach, both in the differentiation and the parallel on the results with learning analytics attesting the success of the students. Models for the use of data are developed, tools increasingly "user friendly" are built by teams in capacity, in short an ecosystem around the data emerges. The first limits appear on the need for repositories and the curbing of data to be able to envisage the investment in the long term.

Below, the graphs from 2012 to 2016 on the evolution of the disciplines concerned by the statistics with a clear "stagnation" from 2014 to 2015.



IT Research is more important in 2016 than 2014.

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# Learning Analytics

Yves Epelboin

The role of Learning Analytics is to collect relevant information, not only to be able to analyze the chances of success but also the risks of failure incurred by the students in order to remedy it for the best. The objective is therefore to assemble and analyze the data available to the university in order to be able to make predictions and to be able to direct the students. It can therefore be said that they are part of the forward-looking analysis.

This subject was one of the hot topics of EDUCAUSE 2016 and comes under two approaches:

1. Analyzes made from the data available in the central servers, essentially the student information system. They relate to the more general problem of management indicators, which are based on information contained in the databases of the central systems of the university, mainly the student information system (SIS)
2. Analyzes made from the use of the learning platforms (not only LMS). They are more complex to build because they come from the enormous amount of data accumulated about student activity, disparate data that should be standardized and then analyzed. They belong to the big data and can enter into the Machine Learning matter.

Ideally, these two data sources could be combined; others could be added like those of the library system, but this poses complex problems of standardization and fusion of data which are still in the field of research. In reality the existing realizations are based on the separate use of these sources.

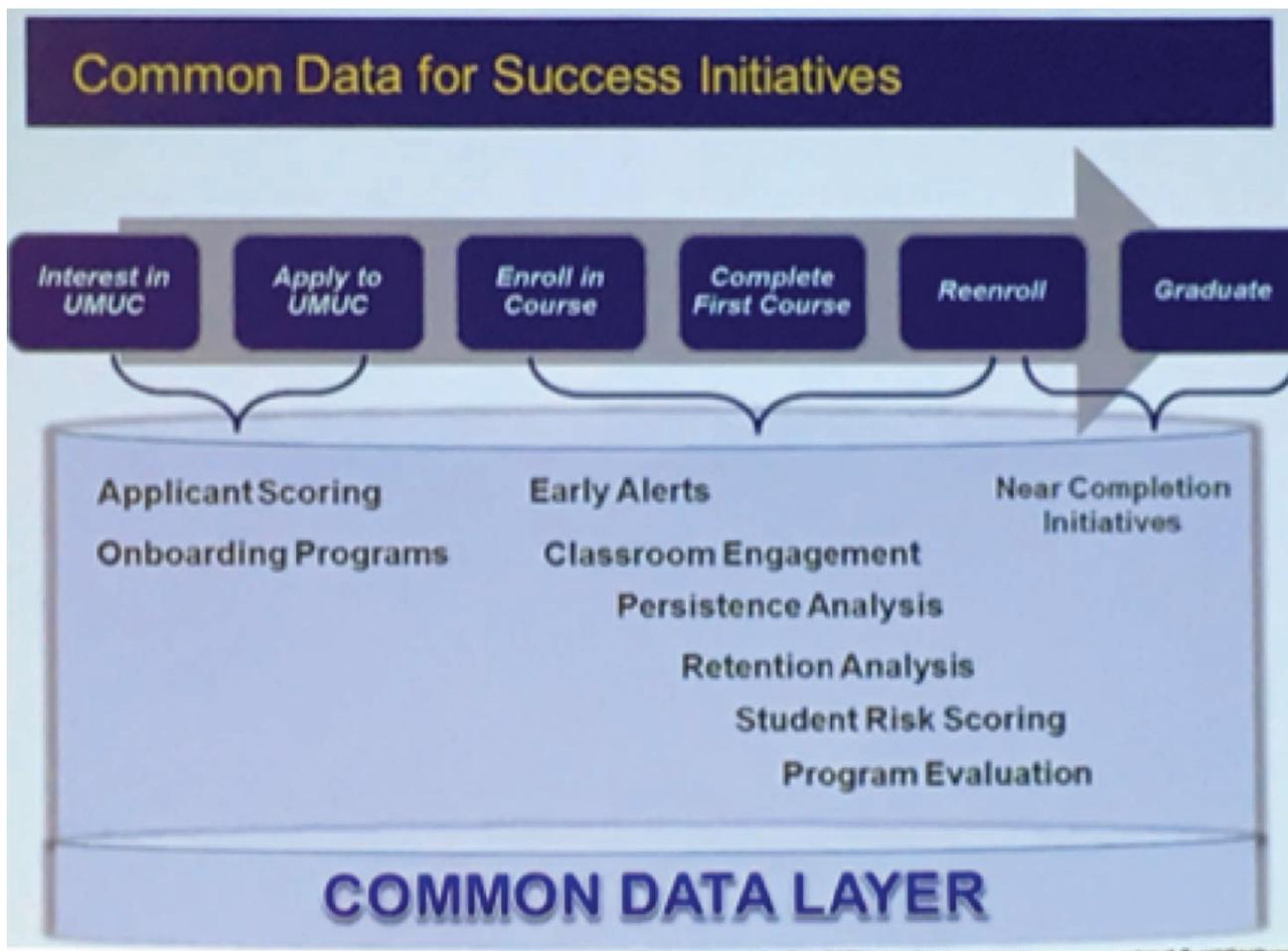
A number of industrial solutions already exist. The problem is that, most often they are black boxes that directly present dashboards, without being clear about which criteria are taken into account and how they are analyzed. MoodleRooms, for instance, very nicely organized a demonstration of the tool "X Ray analytics" by Blackboard which extracts its information from the databases of a Moodle platform (it can be adapted to other LMS). The customer does not know too much about the algorithms because the company, according to instructions, carries out the aggregation of the data. The proposed criteria and their combination are linked to the ideology of the model underlying the analysis, in this case a US vision of education. We may also wonder about the independence of the variables used in statistical analyzes. It would nevertheless be worth trying. An Open Source project, by nature more open, where one has the hand on the model, was presented. It is carried in Europe by the JISC.

D. West (West 2016) of the Charles Darwin University in Australia wonders beforehand about the teachers' view of the possible uses of Analytics. He reported results, based on interviews and a national survey, which shows that teachers expect a better knowledge of their students and of their behavior so that they can react quickly when difficulties are announced. They also expect to have access to indicators that would enable them to improve their teaching. They insist on the need not to leave the central administration alone and request to participate to all projects if relevant tools are to be produced.

Several speakers confirm, through posters or discussion sessions, that the subject is still in the research stage.

## Analytics today

The University of Maryland (UMUC) (Neill & Ford 2016) presents the state of an ambitious project to decrease the failure rate, based on the reconciliation of available information about students in all components. The sources are the information obtained during the registration, the grades, the successes and the failures. An analysis process is set up the first time a student is registered at UMUC and continues throughout the school year (see diagram below). It aims is to anticipate the risks involved and should lead to directing the students towards the most appropriate teaching modules as they go along in their studies. It is therefore not a real-time orientation but a dynamic construction of the path of studies.



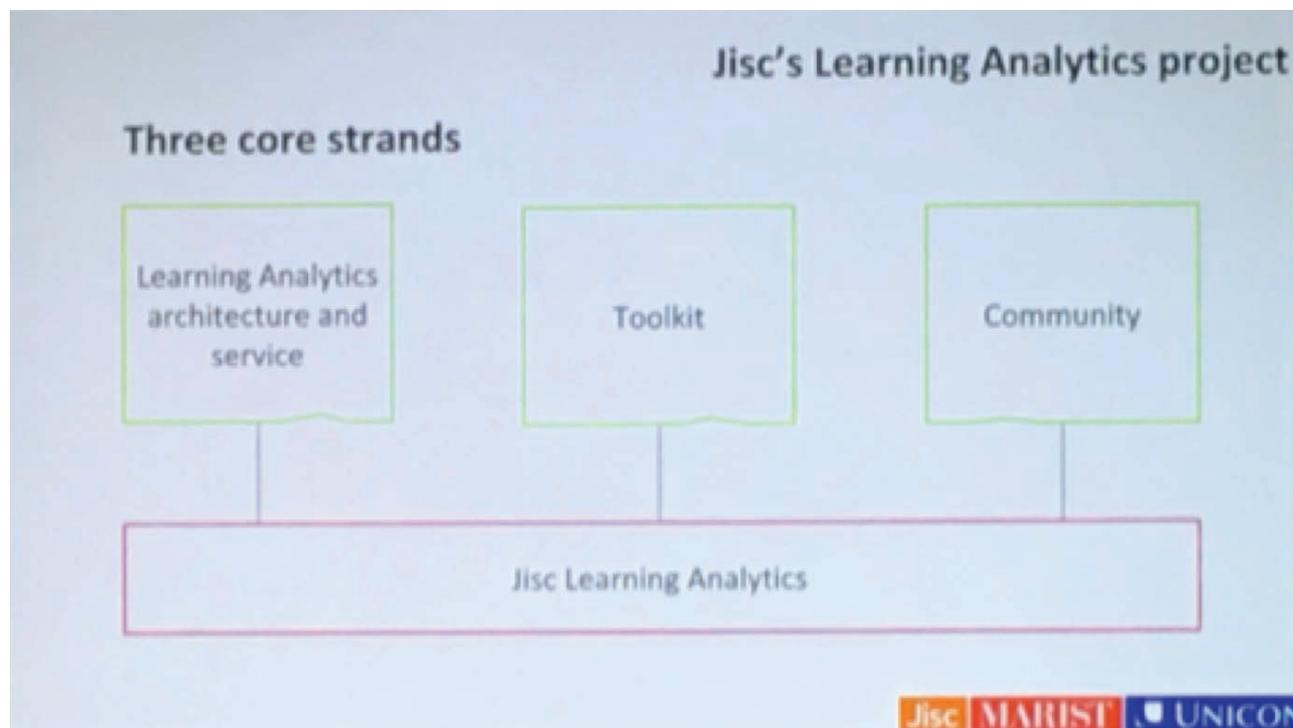
The project is still experimental and aims, for the moment, to identify problems encountered, both technical (data quality, identification of relevant sources) and related to the confidentiality of data and the dissemination of personal information to defined persons. The data belong to the students and it is necessary to obtain their agreement to disseminate them: to whom, in what form and how?

Predictive analyzes of students' chances of success can be considered as a risk analysis as it is the case of an insurance company when a contract is established. Following this idea a college (Pirius 2016) tries to determine the a priori a risk factor, and its weight for each student. The system is made of a grid of information to be filled by the students mixed with the information contained in the databases of the college. From semester to semester the system becomes more complex, going so far as to question origin of the students: secondary school, neighborhood,... weighting the risk according to sociological factors (ethnic and social origin of the student, place of life ...) maybe more, than indicators on the activity in the college. Although not devoid of meaning one can wonder about the variables selected, the weighting of the criteria and the ideological bias introduced. We can not imagine how to translate this approach into our universities!

In a somewhat equivalent approach, Valdosta U. (Dorsey & Haugabrook 2016) goes further and explains his methodology in a project that provides teachers and students with learning analytics to improve success as well as the indicators needed to manage the " University, giving everyone the information they need.

## Learning Analytics: to be continued

One of the most promising interventions (Valenti, Lauria & Webb 2016) is that developed jointly by the Americans and the Joint Information Systems Committee (JISC), an organization common to British universities around an open source tool which aims to assemble various sources and analyze their data.



All the difficulty is in researching the students' characteristics that may allow to indicate a strong probability of going to failure, in other words in the development of the analysis processor. The modularity of the concept must make it possible to develop solutions adapted to each national context.

The engine developed by Marist uses a machine learning approach and the obtained analyzes, based on past data, were found to be accurate to 86%.

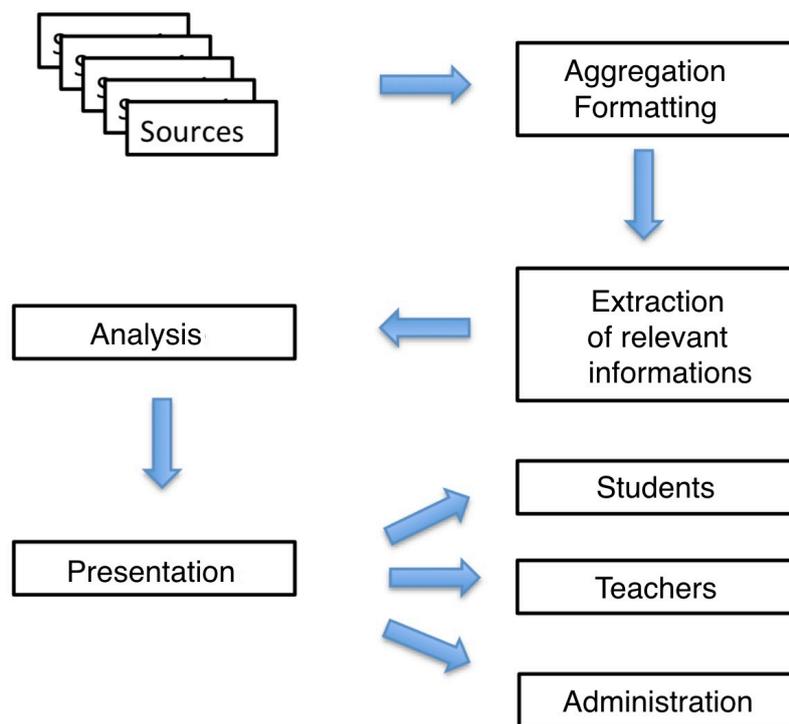
The JISC has put significant resources on this project. Not all universities have reached the maturity required to truly embark on a job of this magnitude. There is a general problem of collecting reliable quality data due to the limitations of existing information systems and the lack of staff to solve these problems. JISC also encounters difficulties in adopting standardized solutions and raises the question of acceptable limits in the customization of the engine.

This project is conducted at the international level by Apereo, a group of Open Source projects. It is known in France and was presented (Boyer 2015) to the Higher Education and Research Ministry during a seminar on December 8, 2015<sup>13</sup>.

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<sup>13</sup> « Learning Analytics : promesses et réalités », colloque MEN 8 décembre 2015, <http://www.sup-numerique.gouv.fr/cid94948/learning-analytics-promesses-et-realites.html>

The Learning Analytics' problem can be summarized in the diagram below:



1. Define data sources. Even in the USA, few information systems, apart from the student information system (SIS) and the teaching platform (LMS), are envisaged today. They are too numerous, related to the different activities of the students, to be able to provide information of interest.
2. Aggregate sources. It is necessary to be able to qualify the information and have the connectors (API) to present them in standard formats. Unraveling spaghetti is a formula that often comes up when this problem is evoked.
3. Extract relevant information from this mass of data. The problem is not only technical but above all to define what information may be of interest for analysis.
4. Analyze the data. This problem is the most complex and the least advanced, the one on which providers of commercial solutions are the most discreet. This is the heart of the problem and the universities that have taught on it, such as Marist or Berkeley, are advancing cautiously. It is unthinkable, in our opinion, to be satisfied with black boxes, which have the disadvantage of being thought in the context of the American culture. It is essential to take account the local cultures: the behavior of an American student is not that of a French or a German one!
5. Present the results in a relevant way. It is not only a matter of considering data security and data ethics issues but also of knowing in what forms and to whom to present the results.

## Conclusion

Learning Analytics are a hot topic, the 7th on EDUCAUSE's Top 10 Issues list for this year (Grajek 2016). Many universities have embarked on them, either with ambitious projects aiming at gathering different data sources, standardizing them and analyzing them in a big data approach, or most often with a more conventional approach centered on risk analysis using the information contained in the administration databases, supplemented if necessary by additional criteria.

Little is said about the problem of the security of personal data and their availability to different categories of people (the student himself, the teachers concerned and the administration). Yet we know, through the visits we have made that this is an important concern.

Little is known on the results and improving the success rate. It is true that we are only at the beginning, that Learning Analytics is still a subject of research and it is quite surprising to see vendors presenting ready-to-use solutions. We must look at them carefully, because the models and methods of analysis remain obscure.

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# Online courses, MOOC & adaptive learning

Yves Epelboin & Eric Briantais

## Online courses & MOOC

The acronym MOOC has completely disappeared this year. Only one conference included it in its title (Finkelstein, Dulin, Goudzwaard & Marin 2016), and only to discuss the use of online courses within the university in a blended learning mode. In reality the exact word should have been SPOC and not MOOC. There is a growing confusion between both terms, with the acronym MOOC increasingly referring to any online course, without distinguishing whether it is used internally or open to everybody. The name MOOC means that this course is structured around a pedagogical path that proposes short videos, documents and controls by means of assessments and quizzes and possibly the participation in activities such as blogs and forums. The compulsory weekly rhythm of learning is disappearing, allowing the participants to choose their own rhythm. This has the disadvantage of dramatically decreasing the activity in the forums, since scattered students are no longer in sufficient numbers to discuss a common subject. It does not matter for an internal use in the university since the teacher imposes his own pace through regular meetings with students.

Our interlocutors, whether at UCLA, Stanford or Berkeley, agree on one point: MOOCs, nowadays are only a by-product derived from a course developed for internal use. UCLA, which has always refused to produce MOOCs, maintains a large internal activity, for courses in mixed education as well as for professional training which is expanding rapidly. The two other universities export some of their courses outside. This is in line with the evolution of the major players in this field, Udacity and Coursera. Udacity has turned completely towards professional training in cooperation to the industry as soon as 2013 and today goes so far as to guarantee a job if their students succeed, Coursera, without completely abandoning its initial vision, switches now to paid courses designed for professional development.

The growth of MOOCs thus continues but mainly for internal use. The "real" MOOC is out of fashion and is seen only as a by-product derived from courses created for internal use (Epelboin 2016).

## The LMS market

First, if the booth surface and the level of sponsorship of the exhibitors are markers of the economic weight of the market segment, in 2016, LMS publishers compete with IMS (Integrated Management Software) publishers.



Secondly, the competition is increasingly strong between LMS solutions with an increasing number of new entrants coming from the neighboring sectors of IMS and Cloud.

Finally, the market is driven by outsourced solutions, with "software as a service" offerings, open-core software vendors, open kernels and proprietary software extensions (licenses being often limited in time).

In this changing market context, choosing an LMS can be a tricky operation. Especially since it is a choice that impacts the institution for a long time. The duration of possession is an average of 10 years for a university. The migration costs to move data from one solution to another one can be significant. As a result, the question of application

reversibility is at the heart of the selection criteria. And with the current mobility of economic actors, the risk of choosing a non-perennial and / or inefficient solution increases.

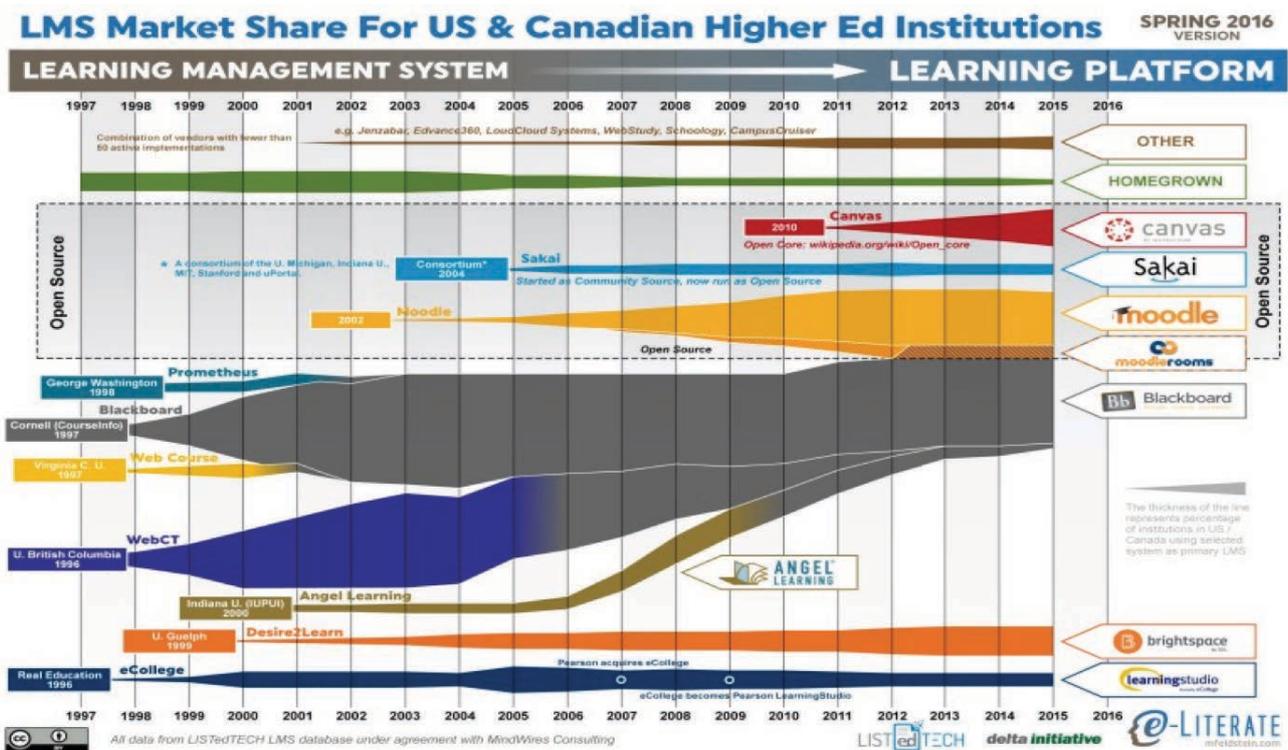
Every year, 15% of universities engage in a platform migration process and are faced with the dilemma of choosing the good LMS ...

The wise advice would be to avoid software locks. Yet, do we have to avoid the publishers?

It is in this spirit that we have followed the presentation "The Four Futures of the LMS Market" by Glenda MORGAN, Research Director of GARTNER, and specialist in the market of higher education (Morgan 2016).

The E-LITERATE site counts 6,000 instances of LMS in production in North America and a penetration rate of 99% in the universities. It is therefore a mature market. For us, Europeans, decrypting the North American market means to read in a crystal ball.

From the analysis of the following diagram about the market shares, expressed by the number of instances in production, makes it possible to draw some trends.



The size of the North American market is estimated at \$477 million and represents one fifth of the world LMS market. The economic model is that of a subscription by number of users with two pricing policies: \$18 per student for proprietary solutions and \$5 for open source solutions. The sources of income also come from additional services, with an average of \$10K, and training services with an average of \$11K.

The LMS offer is divided into three segments:

- Proprietary software produced and distributed by publishers (Blackboard Learn, D2L),
- Open-core software from the open source world distributed and maintained by publishers and software communities (MoodleRooms, Canvas),
- Open source software fully open and maintained by developer communities (Moodle, Sakai).

The US market has just undergone a phase of concentration. It is now dominated by four solutions carried by publishers or distributed by free software communities: Blackboard, Moodle, Canvas, D2L (Desire To Learn).

Four types of actor are positioned in this market:

- The dominant: Blackboard, D2L, Canvas, Moodle
- Specialists: Ellucian Brainstorm, Fidelis, Flatworld knowledge, Loudcloud, Motivis Learning
- New entrants: Teamie, Schoology, Notebowl, Valamis
- Observers (or future predators): Open EdX, Google Classroom, Microsoft Classroom

MOODLE is the most distributed LMS in the open source segment, followed by CANVAS which is growing very rapidly. At the same time, there is a slight erosion of BLACKBOARD LEARN's market share in the proprietary segment, due to new entrants. Indeed, the forces of competition are expanding with the arrival of new solutions: Jenzabar, Edvance360, LoudCloud Systems, WebStudy, Schoology, CampusCruiser. Market conditions are likely to increase the mobility of operators in the coming years.

A comparison of the penetration rates of the different platforms shows three trends:

1 - A customer preference for "software as a service" mode on the cloud rather than internally hosted solutions in "on-premise" mode so as to outsource IT constraints and better manage the scalability and versioning to improve the quality of service.

2 - A publishers' strategy towards open source software. Since the number of competitors increases, this allows to gain faster a market share, while protecting the revenues of its installed base in the national market.

3 - The entry of ERP specialists (Ellucian, Janzabar) which prefigures the new architectures of the training systems much more integrated into the information system of institutions: LMS + SIS for universities and LMS + HRS for companies.

This last trend can be complemented by the GARTNER (Morgan 2016) vision of the EDUCAUSE conference. The LMS should evolve towards an ecosystem approach with a three-layer architecture that differentiates user interaction, e-learning, and data management. The LMS becomes a brick of the training system interfaced with the ERP of the institution. EDUCAUSE recently published a paper on tomorrow's LMS (NGDLE, New Generation Digital Learning Environment) (Brown, Dehoney & Millichap 2015) where they evoke a new similar architecture. Merriman, de Wit, Santanach & Brown (2016 a-b) at two conferences present the ongoing research on the subject in the United States, the Netherlands and Spain. They mention in particular the introduction of standardized interfaces (APIs) around Caliper (2016) to allow for a dialogue and exchange of data between different LMSs and other information systems of the institution. Interconnections around EdX on the one hand, Canvas or Moodle are set up.

Let's finish with a final focus on publishers' open-core strategies:

In the schema, the two open-core LMS, CANVAS and MOODLEROOMS, are positioned on the open source segment while they contain proprietary add-ons in their plug-in matrix.

Concerning MOODLEROOMS the "flat curve" in the domestic market can be seen as an effect of the strategy of the publisher who wants to preserve his income in his home market (18 USD per student against 5 USD in the open source) and which prefers to look at new drivers of growth abroad (Europe and the Middle East).

However, should open-core offerings be favored when choosing a new LMS at the risk of not having a total reversibility of its data?

The analysis of the diagram shows that American universities respond favorably to this model despite this risk. For instance, CANVAS won in four years only. One year after its launch (2011-2012), BLACKBOARD launches a counter-offensive with MOODLEROOMS.

The stagnation of SAKAI brings a new question: could the model carried by CANVAS and MOODLEROOMS be the spare wheel of open source LMS? More and more often, American universities are buying services in the cloud and not licenses to use on their own servers. During the visits of Stanford and Berkeley, our interlocutors who have been using Sakai, have abandoned this solution, not because they were not satisfied but because they did not find an industrial interlocutor who may ensure satisfactory services. Larry Conrad, the Berkeley CIO, told us that he felt he had touched the boundaries of Open Source.

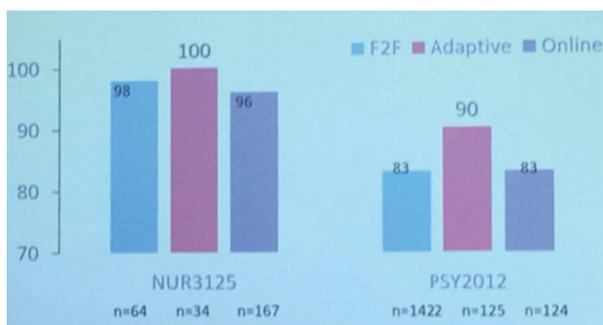
## Adaptive Learning

The term "Adaptive Learning" is ambiguous. It brings together two radically different approaches to improve students' chances of success:

1. The use of statistical analyzes of the data on students to guide them during their studies and guide them in the choice of the modules to which they could register. It is therefore an a posteriori guidance. Refer to the chapter "Learning Analytics" to discuss this point.
2. Real-time analysis of the traces that students leave in a teaching platform to construct dynamically their pedagogical path within a teaching module. This rejoins the big data and machine learning algorithms are used for this purpose. Information on projects in this area can be found in the chapter "Learning Analytics" because the ambition is broader than just driving a course. It also aims to realize performance indicators in real time.

Adaptive learning appeared at the EDUCAUSE 2015 conference and we already mentioned the first results still vague and contradictory, at UCF (University of Central Florida) (Edu15Fr 2015). This year's conferences show that building a real-time route is not easy. Cavanagh, Johnson & Ford (2016) insist on the need to completely rebuild the course because, unlike a conventional MOOC, the pedagogical path must be able to envisage various paths. Better still would be to expand the tree describing the possible paths dynamically, week by week. The authors stress the following facts:

- Learning is not a linear process.
- Skills that are relevant to the education and big data sciences are required.
- The effective participation of teachers who are constantly challenged is essential..
- Implementing this approach requires the availability of many documents. Developing them can therefore become an important job when they are not available and they do not exist in all areas.
- A reflection on the organization of the course and the pedagogical path, before the construction of the course, is important.



The variable of progress in the course is no longer the time but the pace of learning for each individual and this change of paradigm is not without difficulties. Students are supportive of this approach, they have the feeling of learning better but the results do not show a notable difference in the success rate. The slide, opposite, illustrates this finding: it compares, for three different courses, the success rate in face-to-face, adaptive learning and e-learning, i.e. with a unique pedagogical pathway.

The conclusion is noncommittal: in addition to a low improvement in success rates, speakers stress the need for universities to collaborate because the development of courses is excessively expensive. They evoke a number of 40,000 students necessary to redeem it! The second difficulty is psychological: students must know and admit that not all will progress at the same speed in an adaptive course, that some will have more work than others. Students must be prepared and accepted.

The same feeling can be found in other conferences. In the short term dynamic adaptive learning is likely to remain a niche initiative.

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# Learning Spaces

John Augeri & Frédéric Habert

## Overview

Overall, the motivation of American institutions for the settlement of innovative Learning Spaces is the desire to implement more participative teaching practices for students. There may also be for some less prestigious universities the desire to have a showcase that will attract the attention of future students. We can distinguish the formal uses (course ...) and autonomy (project mode).

Globally there is a convergence of the arrangements adopted in the classroom: shared workspaces around several tables with a flat screen at the end, moveable seats, a screen with an interactive projector with a short focal length and wall panels of creativity (writable walls). Teachers have the opportunity to project to all the displays of the tables and also to send content on these same screens (see the photograph opposite, Indiana University.) For the autonomous spaces, it is interesting to note the existence of "relaxed and user-friendly" collaborative spaces by the use of comfortable furniture (couch, armchair) and colored for example, and the division of space into different zones (isolated room for small group work, open space for personal work, IT/technological space for access to computers and 3D printers.) A particularly interesting point is the transformation of amphitheater into a hybrid space where students are grouped by tray on chairs with wheels and can aggregate around. This layout makes it possible, in particular, to alternate the transmissive phases in amphi, with the collaborative work of the students, so that there may be alternation between a classical presentation (involving a PowerPoint) of the teacher And problem-solving sessions of student groups.

In most cases, these spaces are based on the BYOD philosophy, students come with their own machine and connect to the WiFi.



## Some success factors

The various workshops, and in particular one of them, referred to various examples of achievements, in particular in terms of key factors making these spaces attractive. Were identified for three categories:



- Lecture halls: Recordable surfaces, power supply for each seat, wireless video sharing system, abandonment of the organization in rows of onions in collaborative island favors (see photo opposite, McGill University).
- Presentation focused spaces: immersive and interactive video wall (tactile) with function of taking control by the students
- PC Labs: Collaborative spaces, mid-height seating and use of interactive touch-sensitive monitors with adjustable tilt (can be positioned flat to facilitate collaboration)

Feedback for the three categories mentioned above indicates that the glass partitioning allowing to see the activities taking place in a Learning Space from the outside are particularly conducive to valuing it with the community. The users also emphasize the appreciation factor of comfortable seats, and / or a mid-height seats (bar type), as well as the presence of an assistance desk (in particular for the use of equipments such as video walls

## Pre & post-occupation evaluation tools

The Learning Spaces Rating System (LSRS)<sup>14</sup> and FLEXspace<sup>15</sup>, already widely discussed during the 2013, 2014, and 2015 EDUCAUSE conferences, have reached the end of a launching phase and now seem to have become the reference tools for their respective uses:

### Learning Spaces Rating System

The purpose of LSRS is to develop a list of criteria that allow institutions to assess how the design and operation of a Learning Space support teaching activities. Concretely, it takes the form of an evaluation form, gathering a list of 53 criteria organized in 6 thematic sections.

The feedback from institutions using LSRS confirms its relevance as a support for a common language (terminology), prioritization, and rating system, and thus capable of giving a benchmarking. It is also pointed out that while LSRS adapts well to formal Learning Spaces, this is not the case with more informal ones. This is a point that is taken into account in the current discussions regarding the publication of version 2.0. A version 2.0 which - and this has been announced very clearly - will maintain or even increase the level of difficulty currently observed for obtaining high scores.

The LSRS, version 1.0 of which was still only available in the English version at the time of the EDUCAUSE 2016 conference, has been translated into French and adapted to our national context<sup>16</sup>. The publication will take place at the beginning of 2017.

### FLEXspace

FLEXspace is an online database of Learning Spaces of all types, offering for each entry a list of high definitions photos, as well as a technical, furniture, financial, organizational and uses descriptions. At the beginning of 2016, the database had almost 700 entries and was consulted by nearly 2000 users from 1,000 institutions in 35 countries. France has had a presence there for a few months through the UNPIIdF / Université Paris 8 collaborative training room.

The number of entries and consultation is growing steadily, to which is added a version 2.0 project of the site. It will focus in particular on the improvement of the user interface, on a mobile version, and on the integration of new types of content (see below).

## Trends

The use of these two increasingly widely adopted complementary tools is part of a trend widely observed in the various workshops and other interviews held during the conference. For a few years, the Learning Spaces have been a strong topic regarding communication and visibility. If the reality of these spaces on the ground is evident, the transformation of the uses they are supposed to support - and even induce - must be checked and evaluated, especially in view of the budgetary constraints and the strategic choices necessary for their implementation. The notion of pre- and post-occupation evaluation (respectively supported by the LSRS and by FLEXspace mentioned below) appears therefore preponderant, beyond the hype.

At the same time, the various exchanges and presentations illustrated a very significant evolution in the perimeter of the projects and actions presented. If only two or three years ago, a Learning Space project was limited in most cases to an Active Learning Classroom (with its disciplinary variations starting to appear) or a collaborative work room, the reflections currently under way slip very clearly towards multifunctional and integrated projects (for example in the form of Learning Centers or Learning Commons) within which the same Active Learning Classrooms or collaborative workrooms can be found. The new generation of lecture halls also receives more and more attention. This evolution, combined with the realistic and pragmatic approach illustrated

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<sup>14</sup> <http://www.educause.edu/eli/initiatives/learning-space-rating-system>

<sup>15</sup> <http://flexspace.org>

<sup>16</sup> contact: [learningspaces@unpidf.fr](mailto:learningspaces@unpidf.fr)

above by the problem of pre- and post-occupation evaluation, reflects an appropriation of the phenomenon of Learning Spaces at the level of institutions' strategies (even regional or national), rather than local initiative (faculty, group of individual speakers) in which they had previously positioned themselves.

## Research project

Following the problem of pre- and post-employment evaluation mentioned above, the relevance of a constructive analytical and critical approach appears to be an inevitable, and above all, a necessary step. Several initiatives, mostly English-speaking, have been identified, but most of them are confined to a field of mostly local perimeter.

Thus, the discussions held during and between the various Learning Spaces workshops at the EDUCAUSE conference, as well as the discussions held during university visits, provided an opportunity to propose and present an international research project entitled "*Comparative study of innovative Learning Spaces (Learning Centers, Learning Centers, Learning Commons) policies, trends, design principles and impact on teaching / learning practices in France, Japan, USA, Australia, Canada, New Zealand, Singapore, Hong Kong and European Union*". This project, launched in October 2016 on a French initiative<sup>17</sup>, already benefits from the support and participation of 40 universities and institutions spread over four continents, an unprecedented perimeter. Following the EDUCAUSE 2016 mission, several other establishments - notably North Americans - have confirmed their willingness to join the work, which will be carried out in conjunction with the various international working groups particularly supported by EDUCAUSE, and the LSRS and FLEXspace tools. This work will consist of an inventory of the spaces, their equipment, the principles that guided their conception, their integration in the strategies of establishments (even regional and / or national) and of course the practices that they induced.

This project seeks to study the Learning Spaces phenomenon entirety, in a fundamentally international and multidisciplinary way, and in a spirit of sharing. All the types of profiles potentially involved in the design and operation of Learning Spaces, in terms of material, operational, pedagogical and political aspects, are thus associated. The data collected through a commonly accepted framework will be the object of valorization and dissemination surely through a web tool whose opening will be announced shortly through a communication, and through communications already programmed in the upcoming major conferences and symposiums.

## Community

The discussions carried out during and between the workshops on one side and also during the various university visits on other side systematically converged on the need to share data, practices and perspectives within the community. This community is positioned in an international, intercontinental logic, and illustrates a variety of very important institutions and projects, in which the common factor nevertheless remains the consideration of Learning Spaces as a potentially very important leverage for the transformation of Higher Education. Due to its intercontinental and intercultural dimension, the research project presented above thus appeared to be a strong element, to which will be added several actions were also recorded during and after the conference:

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<sup>17</sup> contact: [learningspaces@unpidf.fr](mailto:learningspaces@unpidf.fr)

### Guided tours and exchanges with stakeholders

Several members of EDUCAUSE Learning Spaces workgroup proposed the production and live and recorded commented tours of Active Learning Classrooms, Learning Centers and Learning Commons. Following a first test organized on Friday December the 2nd, regular programming is being put in place. For those who will be broadcast live, these visits will be followed by sessions of questions / answers in textual chat and videoconference with the various speakers and users the spaces presented.

### 360° & VR visits

At mid term, some of these visits will be offered in 360 ° capturing, which will allow spectators equipped (via a smartphone and its gyroscopic functions, or via a virtual reality helmet) to benefit beyond a standard broadcast .

# Alumni, and not Alumni

Pascal Vuysteker & Christian Martin

## State of play of the Californian student landscape

Nothing comparable today between our French campuses and the American campuses, mainly Californian as far as we are concerned for this restitution EDUCAUSE 2016.

You will tell us, from the next passage, that we are not referring to the smallest of these universities but to the most prestigious! We'll give it to you.

The oversized is nevertheless a reality :

- The number of campuses: for the California Community College<sup>18</sup>, 113 campuses that welcome 2.1 million students
- The campus area: Stanford 3200 ha, Berkeley 499 ha, UCLA 17ha and 163 buildings
- The number of students : Berkeley 35000 students, UCLA 28674, Stanford 17000.
- The cost of the studies: Berkeley, public university, \$ 9,500 per year, Stanford, private university \$ 47,331 per year for undergraduate studies (bachelor), which can amount to \$ 60,000 for schools or courses Individuals.
- The annual budgets: \$ 5.1 billion for Stanford, \$ 2.5 billion for Berkeley (in deficit like some of our French institutions), \$ 1 billion for UCLA
- Investments: \$ 57 million over five years to develop new technologies at California Community College.
- The wealth of student associations: the Berkeley alumni association has a membership of 500,000 to 600,000 with more than 200,000 donors raising some \$ 400 millions a year.
- Graduates of high level: Berkeley 29 Nobel Prize, Stanford 20 Nobel Prize, UCLA 7 Nobel Prize.
- Ranking at the top of the table: If one refers to the ranking of Shanghai<sup>19</sup> (ARWU), probably the most scanned and respected of the charts, one finds Stanford in second position behind Harvard, Berkeley in 3rd position and UCLA in 12th position. As a reminder, the first French universities rank respectively for UPMC and Paris Sud at the 39th and 46th ranks.

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<sup>18</sup> [www.cccco.edu](http://www.cccco.edu)

<sup>19</sup> [www.shanghairanking.com/ARWU2016.html](http://www.shanghairanking.com/ARWU2016.html)

This whole range obviously contributes to the good health of the various structures and the well-being of the students :

- Self-service rooms 24 hours a day, 7 days a week in which a food court will soon be set up for Berkeley ;
- Last generation multimedia and video solutions ;
- Modern equipments ;
- Spacious, clear and last generation furnitures equipped Learning Spaces ;
- A working environment, both in the premises and outside, that any student enrolled in our French universities would envy ;
- Security provided by a university police always present on campus.

## Alumni and Alumni associations management

Alumni associations such as the Cal Alumni Association<sup>20</sup> (CAA) in Berkeley are very present in the American academic landscape. The aim is to provide all graduates with enriching links with the university, with former alumni and students of the moment, but also and above all to be able to initiate fundraising campaigns necessary for the functioning of universities. As a reminder, while our French universities are still financed by the government, the same is not true of the US ones, where the share of states financial contribution has declined by more than 40% since the 1970s. Other sources of funding to bridge this gap through donations through appropriate alumni management (on average, it will be just over 20% of a university's budget). Today, in Berkeley, CAA brings together some 500,000 alumni across the globe. It is committed to providing programs and services in order to maintain contact between alumni, but also for each of them with their university.

These associations did not appear recently. Indeed they were created as soon as the first graduates graduated: Berkeley creation of the university in 1868, the CAA founded in 1872, Stanford University created in 1885, alumni association<sup>21</sup> founded in 1892.

These different modes of operation require a specific alumni management tool:

Why an alumni specific management tool ?

- Management of the alumni database (updating, extracting information useful for program marketing) ;
- Fundraising, funding scholarships, programs, new buildings ;
- Alumni networking (some tools allowing geolocalization) ;
- Alumni clubs animation ;
- Alumni events management ;
- Mentoring program (or how to ensure that each student receives direct advice from an Alumni).

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<sup>20</sup> alumni.berkeley.edu

<sup>21</sup> alumni.stanford.edu

## Passing through the Exhibit Hall

On the exhibition, the management of alumni appears mainly as a brick of the main ERP. In this context, modules are often limited. There are, for example, Alumni modules in the following products:

- Empower SIS<sup>22</sup> (alumni module focused on donation management) ;
- Campus Management Corporation<sup>23</sup> (donation management only) ;
- Ellucian<sup>24</sup> One of the largest SIS/Campus ERP ;
- CollegenET<sup>25</sup> (donation management) ;
- EMPOWER<sup>26</sup> Student Information System (recruitment, admissions, donation management) ;
- SALESFORCE<sup>27</sup> (CRM) ;
- JOBSPEAKER<sup>28</sup> Career service platform that can be offered to a community of alumni.

On the European side, JobTeaser<sup>29</sup> offers a similar service to Jobspeaker, but with a much more advantageous business model for schools/universities: the service is offered free of charge and it is companies that pay for the multi-posting of their offers.

However, market research reveals a pack of solution providers strictly targeting Alumni management.

The use of a Capterra search engine returns 46 companies meeting the "Alumni Networking Platform" criterion.

One can cite in particular Graduway<sup>30</sup> solution used by the alumni association of UCLA.

The French market is not left behind with at least four suppliers of advanced solutions:

- Alumnforce<sup>31</sup> (Used by Centrale and HEC) ;
- NetAnswer<sup>32</sup> ;
- HiveBrite<sup>33 34</sup>, developed in Ruby on Rail and used by EMLyon.
- RéseauPro<sup>35</sup>, professional insertion and alumni management platform developed by Paris Ile-de-France Digital University, and already used by 10 institutions in Ile-de-France area

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<sup>22</sup> [www.empowersis.com/features/alumni-donor-development](http://www.empowersis.com/features/alumni-donor-development)

<sup>23</sup> [www.campusmanagement.com](http://www.campusmanagement.com)

<sup>24</sup> [www.ellucian.com/higher-education-erp](http://www.ellucian.com/higher-education-erp)

<sup>25</sup> [www.collegenet.com/elect/app/app](http://www.collegenet.com/elect/app/app)

<sup>26</sup> [www.empowersis.com](http://www.empowersis.com)

<sup>27</sup> [salesforce.org](http://salesforce.org)

<sup>28</sup> [www.educause.edu/annual-conference/2016/exhibitor/jobspeaker](http://www.educause.edu/annual-conference/2016/exhibitor/jobspeaker)

<sup>29</sup> [www.jobteaser.com/fr](http://www.jobteaser.com/fr)

<sup>30</sup> [www.graduway.com](http://www.graduway.com)

<sup>31</sup> [www.alumnforce.com](http://www.alumnforce.com)

<sup>32</sup> <http://www.netanswer.fr>

<sup>33</sup> [hivebrite.com](http://hivebrite.com)

<sup>34</sup> [emlyon-business-school-forever.hivebrite.com](http://emlyon-business-school-forever.hivebrite.com)

<sup>35</sup> [reseaupro.unpidf.fr](http://reseaupro.unpidf.fr)

For information, CEMS, The Global Alliance in Management Education has chosen HiveBrite to launch its new Alumni community animation platform. This is one of the most promising platforms of the moment, and at a much more reasonable rate than Graduway.

## Visiting Berkeley

An interesting anecdote, in Berkeley, the alumni database belongs essentially to the university. It is updated and maintained by the internal department and used mainly in CRM (Salesforce) for the fundraising campaigns (the fundraising campaign), the results of which are astounding. The personal data retained are important (ethnic origin, studies, salary ...) without the alumni having access to it!

## Conclusion

In conclusion, the way is still long in France for the management of alumni to be generalized in our universities at the level of the visited institutions, although some experiments are attempted and if the French *Grandes Ecoles d'Ingénieurs et de Commerce* already have advanced practices in the field.

The French 2007 Universities' Autonomy Act encourages institutions to seek external funding by creating university foundations, which should lead them to develop ties with their alumni, their future donors. The difficulty lies in the fact that very often no follow-up has been carried out since the creation of the universities and that there is no memory effect.

# Learning with Virtual Reality

Thierry Koscielniak

This article is based on the "Virtual Reality (VR) in the Classroom"<sup>36</sup> session presented on October 26 at EDUCAUSE 2016 by Andrew Goodman and Kelly Egan of Brown University.

Other sessions have addressed this topic, but the difficulty at the EDUCAUSE conference is the number of sessions in parallel (about 20) and the resulting Cornelian choice. Here are the references of the other sessions for information:

«Cup of Gold: Designing and Developing a Virtual Reality Learning Space»<sup>37</sup>

«Virtual Worlds»<sup>38</sup>

«Create Virtual Learning Environments to Improve the Student Experience»<sup>39</sup>

«A Self-Managed Multilingual Virtual Classroom»<sup>40</sup>

A paid seminar Pre-Conference was also dedicated to this topic: "Virtual Reality and the Future of Learning"<sup>41</sup>

The term virtual reality covers the technological devices that allow to "simulate an environment with which the user can interact" (Wikipedia article<sup>42</sup>). The correct expression to use according to this Wikipedia article would be rather "realistic virtuality".

## An immersive VR research project

Initially, the Visualization Research Laboratory (VRL<sup>43</sup>) and the work of Professor David H. Laidlaw<sup>44</sup> on the topic were presented. The goal of the project is to provide a graphical environment for researchers to visualize their data. The project is called YURT; Acronym recursive (as GNU<sup>45</sup>) YURT Ultimate Reality Theater. It refers to the yurt form of the viewing space: conical roof and cylindrical walls on which the images in which the user is immersed are projected. The graphic resolution of the images is pushed to the maximum to give the user the most realistic impression possible.

From a technical point of view, the YURT project uses 20 computers connected to 69 3D video projectors with 145 mirrors. The total resolution is more than 100 million pixels.

The user is immersed in the middle of the three-dimensional images floating around him. The potential of this technology to teach is enormous. Students were immersed in protein structures to help them understand how they retreated.

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<sup>36</sup> <https://events.educause.edu/annual-conference/agenda/virtual-reality-in-the-classroom>

<sup>37</sup> <https://events.educause.edu/annual-conference/agenda/cup-of-gold-designing-and-developing-a-virtual-reality-learning-space>

<sup>38</sup> <https://events.educause.edu/annual-conference/agenda/virtual-worlds>

<sup>39</sup> <https://events.educause.edu/annual-conference/agenda/create-virtual-learning-environments-to-improve-the-student-experience>

<sup>40</sup> <https://events.educause.edu/annual-conference/agenda/a-selfmanaged-multilingual-virtual-classroom>

<sup>41</sup> <https://events.educause.edu/annual-conference/agenda/sem01avirtual-reality-and-the-future-of-learning-separate-registration-is-required>

<sup>42</sup> [https://fr.wikipedia.org/wiki/Réalité\\_virtuelle](https://fr.wikipedia.org/wiki/Réalité_virtuelle)

<sup>43</sup> <http://vis.cs.brown.edu>

<sup>44</sup> <http://cs.brown.edu/~dhl/>

<sup>45</sup> [https://fr.wikipedia.org/wiki/Acronymie\\_réursive](https://fr.wikipedia.org/wiki/Acronymie_réursive)

The artistic dimension is not forgotten because the laboratory opens its doors to Professor John Cayley who realizes "space poems" with his students and to Adam Blumenthal, artist in residence in the laboratory. A research work in archeology by Professor Laurel Bestock is underway.

The conclusion of Professor Laidlaw is that in 15 to 20 years the screens will have disappeared and that we will be surrounded by our friends in the form of 3D avatars for uses that still have to be imagined through the films of science fiction.

The three examples of uses of the YURT immersion space were then detailed.

## Writing in immersive VR<sup>46</sup>

John Cayley, professor of literature, uses YURT to Brown so that his students can create 3D texts as part of his teaching of "digital language in electronic poetic writing." The user is immersed in an artistic 3D representation of the texts. John Cayley thinks we are emerging from the "winter of virtual reality": a real artificial three-dimensional space of writing is born.

## Recreate an historical event<sup>47</sup>

Adam Blumenthal is an artist whose project is to describe the "Case of the Gaspé<sup>48</sup>" using virtual reality glasses (type Oculus Rift or HTC Vive) and the YURT. He appreciates the ability to move around in environments that are normally impossible to access, for example by returning to the past. The historical event studied was one of the triggers of the declaration of independence of the United States. The artistic work produced<sup>49</sup> will allow a machine effect to go back in time by reliving tragic events of boat chases, battles and explosions while presenting all the background documents, paintings, maps and objects of the boat Gaspée. Interactivity will be omnipresent to allow a non-linear path to the user.

One obstacle to be overcome is the discomfort caused by wearing large spectacles attached to a cable. The user is limited in his walk by this "connected leash". Unlike the YURT, the use of glasses is a solo experience. But using Google Cardboards<sup>50</sup> will allow hundreds of students to immerse themselves at the same time.

The creation tools used in augmented reality are the same as those that produce video games and they are "free".

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<sup>46</sup> <https://youtu.be/wqwQTzP3T0s?list=PLipxZuLedV-NdA59QiQ8d36AMfmvIPiAa>

<sup>47</sup> <https://youtu.be/2Zk85mo6NVM?list=PLipxZuLedV-NdA59QiQ8d36AMfmvIPiAa>

<sup>48</sup> [https://fr.wikipedia.org/wiki/Affaire\\_du\\_Gaspée](https://fr.wikipedia.org/wiki/Affaire_du_Gaspée)

<sup>49</sup> <http://curioussense.com/brown-university-names-adam-blumenthal-virtual-reality-artist-in-residence/>

<sup>50</sup> [https://fr.wikipedia.org/wiki/Google\\_Cardboard](https://fr.wikipedia.org/wiki/Google_Cardboard)

## Visualize curious excavations in the YURT<sup>51</sup>

Laurel Bestock, professor of Egyptology and Archeology, uses the YURT to visualize the excavation spaces with his students. Archeology is intrinsically three-dimensional because it studies the relationships between objects and their environment and their meanings within an era and a culture. Modeling a search in northern Sudan, part of ancient Nubia. On-site presence is possible from two to three weeks per year. It is essential to create numerical modeling of an immense fortress implanted over hundreds of meters and composed of more than three million bricks. Initially the modeling was not intended to be used with virtual reality but rather to create mappings. Viewing in the YURT data from a house took only five minutes. All the construction history then appeared clearly to the archaeologists as if they were moving in the field of excavations. New prospects for virtual excavations have arisen because if archeology is destructive, 3D modeling makes it possible to reconstruct virtually what has been excavated, or even to excavate the same site in different ways.

## From VR to AR

The virtual reality at Brown allows innovative scientific and artistic uses for training and research. Other institutions and companies are of course present in this field. To remind the French delegation to EDUCAUSE 2013 had visited the laboratory of the University of California at San Diego (UCSD) the Wave<sup>52</sup>, another virtual reality immersion device.

Beyond the sometimes disorienting effect for the senses of being immersed too long in a virtual world through glasses, the author has been able to experience the use of augmented reality (AR) glasses. This time it is transparent glasses with a translucent projection area that superimposes digital objects with the environment of the user. The Google Glasses<sup>53</sup> are the precursor model with a very small area located in the periphery of a single eye. They have the advantage of being wireless but their commercialization was stopped in January 2015. The MetaGlasses<sup>54</sup> were used in the challenges of the Night of Digital 2015<sup>55</sup> organized by the author at the University Paris Descartes. The use of the Software Development Kit (SDK) by computer science students allowed them to quickly produce prototypes with the support of a Meta engineer who came directly from Silicon Valley. Unfortunately the presence of the cable still limits the movements in this prototype. Finally, the long awaited Hololens<sup>56</sup> from Microsoft keep their promises as visualization in an area mapped in real time by embedded 3D technology. The absence of cable is an asset that has its reverse: a low autonomy.

3D glasses, virtual or augmented, prefigure new teaching interfaces that will be functional in the medium term. The immersive spaces are still at prices that make them difficult to generalize in teaching places.

For an interesting watch on the subject, the Twitter account @MBoisgard and the website [Googlass.fr](http://Googlass.fr)<sup>57</sup>

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<sup>51</sup> <https://youtu.be/3kMMSq4Xuc8?list=PLipxZuLedV-NdA59QiQ8d36AMfmvIPiAa>

<sup>52</sup> <http://chei.ucsd.edu/toolbox/vr/wave/>

<sup>53</sup> [https://fr.wikipedia.org/wiki/Google\\_Glass](https://fr.wikipedia.org/wiki/Google_Glass)

<sup>54</sup> <https://www.metavision.com>

<sup>55</sup> <http://jnum.parisdescartes.fr/nuit-du-numerique-2015/>

<sup>56</sup> <https://www.microsoft.com/microsoft-hololens/fr-fr>

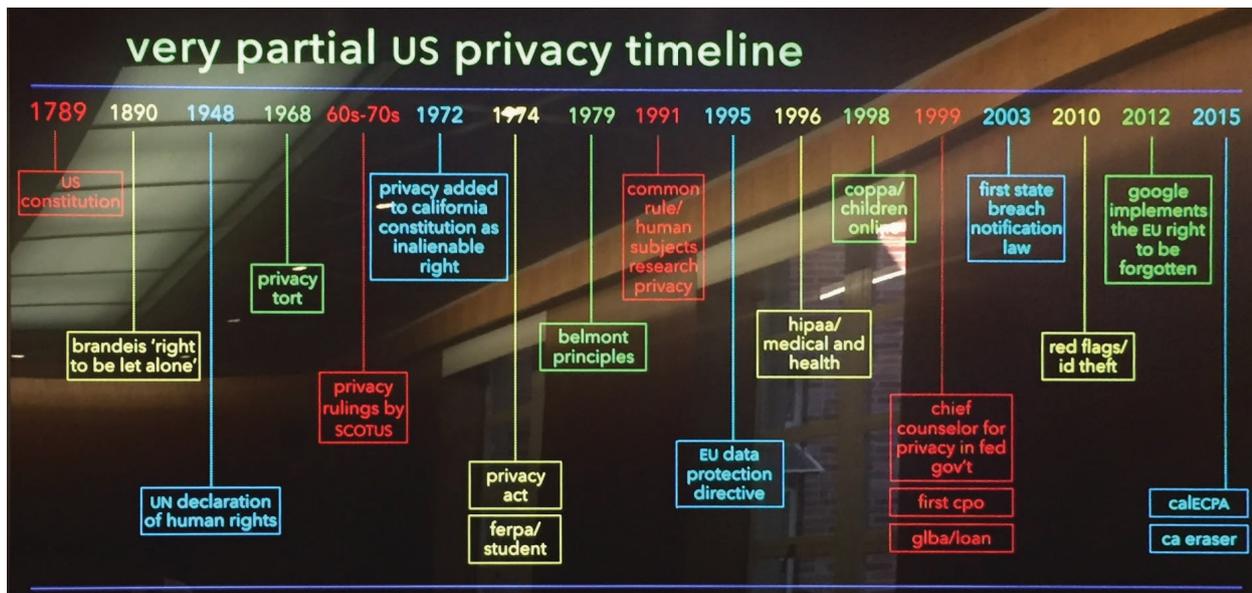
<sup>57</sup> <https://www.goglasses.fr>

# Security & Identity

Pascal Vuylstekker

In the three universities visited by the delegation, we were systematically given a detailed presentation on the importance of security, with variations on the balance between security and privacy, big data, Organization of teams.

The common points are the awareness of various incidents and the impact of these incidents on, first the communication of the university and then on the deployment of new policies.



Security is closely tied to privacy laws. The USA does not have a single main law (such as the French Computer and Freedom Act, "Loi Informatique et Liberté"), but rather a multitude of laws targeting different audiences and contexts. Among these laws, one was quoted multiple times by the three universities: HIPAA

Behind this name with a happy sounding, hides an acronym with a potentially substantial impact on the universities managing health research programs. Indeed, the "Health Insurance Portability and Accountability Act", passed by the American Congress in 1996, as well as the associated HITECH Act, imposes rules of liability in terms of data security, as well as important communication rules, whenever a databases has been hacked or in the context of simple assumptions about the existence of a hack. Therefore, as soon as traces of hacker passage are found in a system hosting a database containing private health-related data, and even if access to the data itself has not been proven, the institution hosting these data must communicate about the crisis to all patients potentially affected by the access to the data.

On the UCLA side, several milestones have marked their journey in this field:

2006: 800,000 profiles of students, and employees potentially containing the social security number.

2015: Medical data from potentially 4.5 million patients were exposed after a hacker broke into a campus computer system.

On the side of Stanford and Berkeley, similar attacks have been observed (see "References" for other examples), but also other forms of attack. This goes from the website squat (when your site starts to recommend sites selling Viagra in order to exploit your good Page Rank of your brand in a concern of good SEO related sites) to the use of computers on campus to participate in DoS, or the attack of minor and less well protected sites, to steal identifiers / passwords.

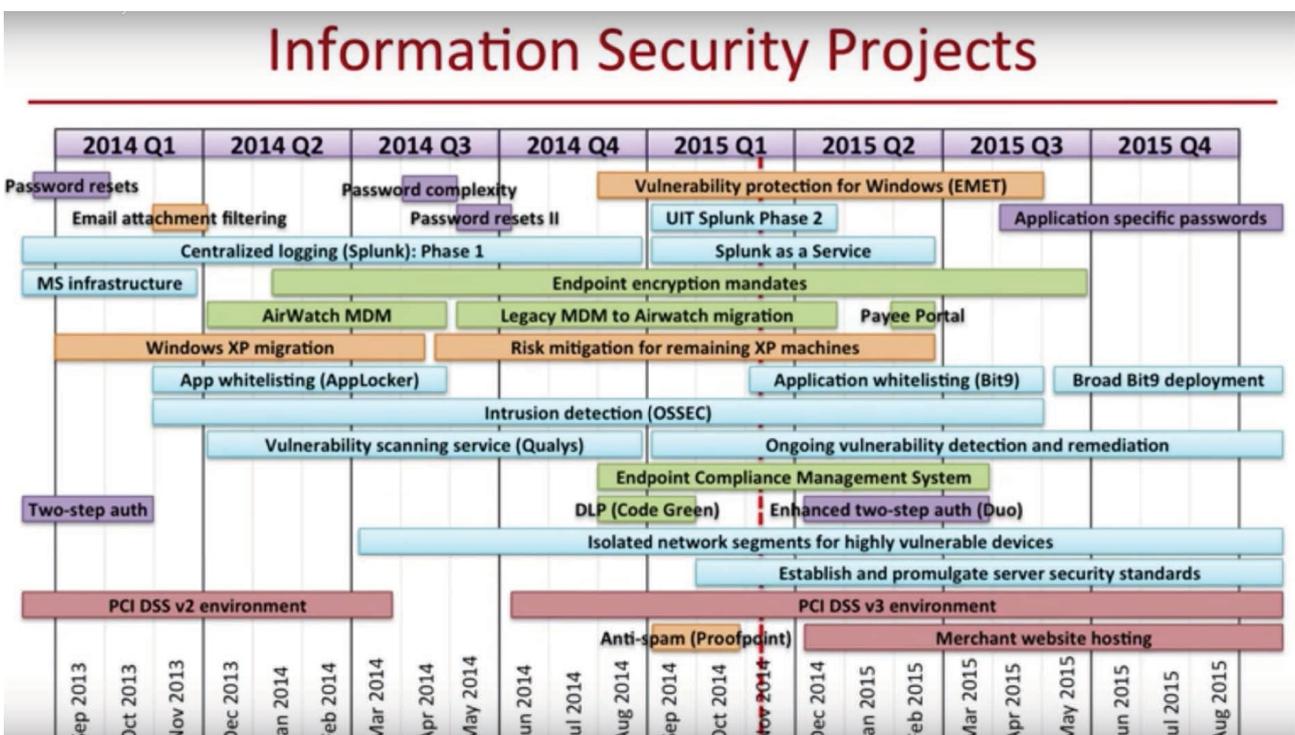
In general, the message is that we have gone from a time when the danger came from Script Kiddies and where the updating of the tools was sufficient to ensure a good level of protection to a much more aggressive world of organized brigand.

An explanation for this trend is that universities have many attractions for crooks: not always well protected digital identities (ID / passwords), important computer resources (potential bases for DoS), medical data and Intellectual property (research), famous people and reputable brands.

In addition, the financial impact of these attacks is increasing, for example, \$4.1 millions due to a class action around a laptop theft that contained confidential data.

## Different ways to improve safety

As seen from a presentation by Michael Duff, Stanford Chief Security Officer, a lot of action needs to be taken in this area.



We restrict ourselves here to just a few of the tracks addressed by the universities visited and the speakers of EDUCAUSE.

### Governance's support

In each university, security teams under the responsibility of the CSO / CISO have been reinforced (from 6 to 19 people + CSOs in 2013 in Stanford) and report directly to the CIO (or Office CIO in the case of Stanford). But the problem has to be understood and taken into account even above the CIO level, up to the Board level.

## Communication & Training

Large information and training campaigns are deployed to educate all users first about the understanding of risk levels according to the types of data to be protected, then about simple actions to be taken and behavior to be followed depending on risk levels and infrastructure types (Clients / Servers / Applications). See in particular the site <http://minsec.stanford.edu> which is a reference in that matter.

## Minimum Security Standards: Endpoints

An endpoint is defined as any laptop, desktop, or mobile device.

1. Determine the risk level by reviewing the data, server and application risk classification examples and selecting the highest applicable risk designation across all. For example, an endpoint storing Low Risk data but utilized to access a High Risk application is designated as High Risk.
2. Follow the minimum security standards in the table below to safeguard your endpoints.

STANDARDS	RECURRING TASK	WHAT TO DO	LOW RISK	MODERATE RISK	HIGH RISK
Patching		Apply security patches within seven days of publish. <u>BigFix</u> is recommended. Use a supported OS version.			
Whole Disk Encryption		Enable FileVault2 for Mac, BitLocker for Windows. <u>SWDE</u> is recommended, option to use <u>VLRE</u> instead. Install <u>MDM</u> on mobile devices.			
Malware Protection		Install antivirus (SCEP recommended). Install <u>EMET</u> on Windows.			
Backups		Back up user data at least daily. University IT <u>CrashPlan PROe</u> is recommended (option to set personal password). Encrypt backup data in transit and at rest.			
Inventory		Review and update <u>NetDB</u> records quarterly. Maximum of one node per NetDB record.			

## Identity and Access Management, 2 step authentication system, Multi-Factor Authentication (MFA)

Multiple authentication systems have often been mentioned in connection with new identity management systems. Indeed, it is not sufficient to authenticate and identify yourself in a certain and secure way (MFA), it is better to have to authenticate yourself only one while obtaining different access rights according to your identity and the services that you want to get access to. And ideally the configuration of these access rights must be able to be done in a centralized way.

The reflection on the management of identification and access rights is also linked to the generalization of the use of SaaS platforms (job board, housing services, Student-Alumni Mentoring...), or acceptance of external authentication authorities (for example, a student could use a private Google ID or Twitter ID to access his private area on the University Student Information System).

OpenID, OAuth2, SAML, WS-Federation (Web Services Federation), Shibboleth or CAS + LDAP are regularly mentioned in the context of that topic. Nevertheless, the implementation of those standards is not always straightforward.

Therefore, it is not a surprise that new platform or numerous suppliers seek to position themselves for the accompaniment to the deployment of these solutions (sometimes as a simple integrator, sometimes by providing overlays to the main tools). The keywords around these tools are Single Sign-On (SSO), Unified Directory, User provisioning, Multi-Factor Authentication (MFA).

By restricting ourselves to the suppliers present in the EDUCAUSE exhibition hall, we can state that the list of those primarily interested in identity management is already relatively long for such a sharp topic.

- OneLogin<sup>58</sup>
- Okta<sup>59</sup>
- Unicon<sup>60</sup>
- AegisIdentity<sup>61</sup>
- CirrusIdentity<sup>62</sup>
- Fischer International<sup>63</sup>
- Hitachi-ID<sup>64</sup>
- The Icon Technical Group<sup>65</sup>
- Identity Automation<sup>66</sup>

## Conclusion

Information Security is listed as the number one priority of the EDUCAUSE 2016 Top 10 list (+9 in the ranking compared to the last two years). On the one hand, universities observe increasingly organized (foreign governments, organized crime, activists) and harmful (Phishing, Ransomware) attacks. On the other hand many regulations (in particular HIPAA, HITECH) as well as the related class actions and other kinds of settlement, present a considerable financial risk to universities. As a result, significant resources in HR and budget are more and more devoted to this area.

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<sup>59</sup> <https://www.okta.com>

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# Cloud Computing

Khadija Dib

Today Cloud Computing is inviting in all fields of activity in public and private institutions. In the particular case of Higher Education, the challenge is fundamental: to provide all users with quality, secure services, available H24-7/7, accessible from any equipment (BYOE: Bring Your Own Everything), at a lower cost cloud computing is unavoidable.

However, taking into account important issues such as governance, migration, integration, organizational transformation, risk management and user management is an essential prerequisite for a successful Cloud Computing solution.

In the US, the market is flooded with solutions for all levels of the cloud: IaaS, SaaS or PaaS and cloud services tend to become a standard in American Higher Education. The transition to the Cloud presents opportunities and challenges. Although most organizations use some "cloud" services, few have moved their most critical resources away from their sites: concerns about sensitive data integrity and risk management can delay or stop migration projects.

However, a higher education institution wishing to set up a service offer in the Cloud mode should develop a roadmap describing the steps needed for a successful transition.

## Develop an IT governance

A good IT governance model integrating the cloud should include the following key functions:

- Protect the institution and its interests
- Identify and manage risks
- Address privacy and security issues (regulations ...)
- Ensure that all stakeholders in the institution are fully involved in the process
- Ensure that central IT and decentralized IT units coordinate needs and opportunities

The objective of this governance is to:

- Provide agile, responsive and easy-to-use decision-making process
- Ensure that top-down and bottom-up needs are taken into account
- Meeting the expectations of executive leadership and end-users

IT governance, in a Cloud Computing context, must align IT with institutional strategies and goals.

## Transform the IT organization

In higher education, the transition to Cloud Computing mode has an impact on the evolution of IT organizations and the roles of their staff.

The adoption of solutions in the Cloud mode causes a change that affects both the IT organizations and their personnel. These organizations should act as facilitators to provide their users with value-added services and to enable universities to be more attractive and for students to succeed in their studies. To do this, an analysis must be carried out on:

- Evaluation and selection of the solution to be implemented
- Integration with internal local services within the campus
- Migration of local systems to outsource
- Project management
- Security, compliance and risk management
- Understanding the evolution of academic needs
- Raising the skills of IT staff through specific support and training

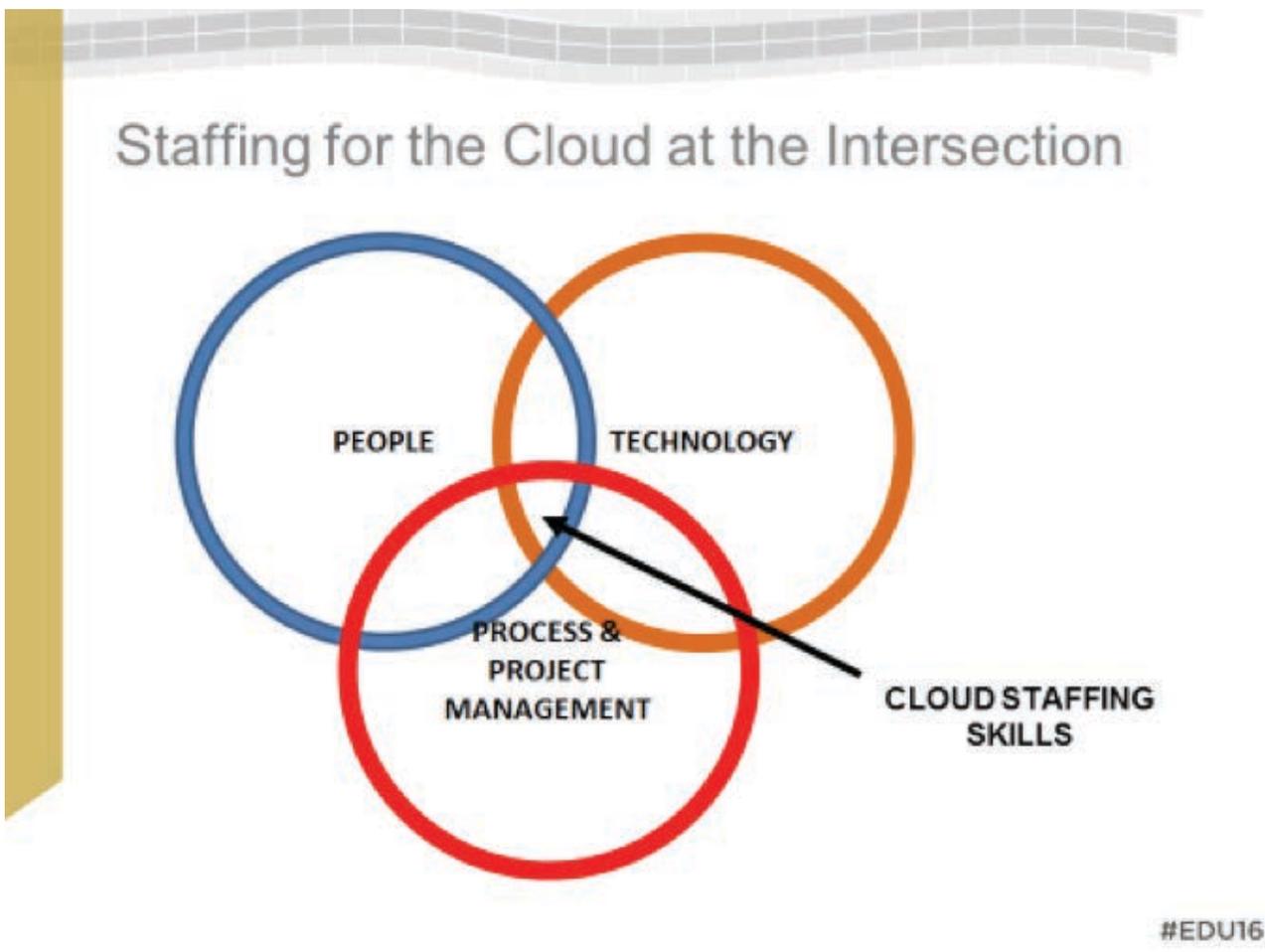
## Establish a migration strategy

As with any significant IT migration, the development of a migration plan requires, among other things, a good understanding of the objectives, a significant selection of pilot projects, an accurate review of technical details, safety and compliance, and the support of the stakeholders.

In the particular case of migration to the Cloud, there are also some technical points such as, for example, integration of local data or authentication devices.

This means that teams from different technical fields (networks, systems, databases, security, developments, etc.) must coordinate their work. Ideally, the IT organization would have an enterprise-architect function that would be able to plan this migration.

Example of identifying new roles and skills needed to integrate cloud services into the business environment.



The institution faces various issues such as:

- The need to have appropriate administrative procedures (budget, purchases, ...) to buy and use services in Cloud mode
- The difficulty of migrating internal applications to a Cloud Computing
- Choice of supplier
- Different architectures requiring different skills in design, implementation and operation
- User expectations and responses
- Prerequisites for technical architectures (eg network upgrade, security policies, etc.)
- Integration of local applications

Developing a migration strategy helps to better manage organizational changes, mitigate risks and maximize financial benefits. It takes on its importance and must be sufficiently studied upstream.

A synthetic view is schematized in the following tables:

Operational process	Key points of the Cloud migration strategy
Vendors management	Develop new methods to manage vendors, contracts, risks...
Services tests & validation	<ul style="list-style-type: none"> <li>- Know how to build test and validation plans while not mastering the environment</li> <li>- Ensure resiliency with Cloud solution</li> </ul>
Deployment management	<ul style="list-style-type: none"> <li>- Update choice: Cloud suppliers can propose automatic updates. Evaluate the impact on the institution</li> </ul>
Incidents & problems management	Support team to help users and answer their needs

Technical process	Key points of the Cloud migration strategy
Authentication & authorization	CAS, SAML, AD, etc...: which solutions from the institution do we keep, and which ones do we implement ?
Integration & interfaces	Build and manage interfaces and integrations using the institution's internal or external resources to deliver the expected services
Updates management	Identify the entity responsible for updates and patch management: the institution or vendor with operating rules that commit each of the parties
Data management	Know where the institution's data are located Establish control procedures and ensure their protection
Information Security	Define the data responsible(s): who is responsible of what ?

## Maintain the Cloud operational

This requires changes to existing practices and procedures within the institution. Particular emphasis should be placed on:

- A good understanding of the risks: the institution will need to rethink its risk assessment, mitigation and acceptance practices.
- Procurement and Supplier Management: IT professionals, procurement officers, lawyers and other contract management and supplier relationships should be vigilant.
- IT departments: who will have to adapt their practices so that they can work effectively with service providers in the Cloud mode.
- Integration with local infrastructure: Cloud implementations require application integration, network reliability, data security and compliance.
- Disaster Recovery and Business Continuity: Cloud Services offer the ability to deliver excellent disaster recovery capabilities

- The development of an exit strategy: which must be effective even if it is difficult to evaluate and will vary according to the type of cloud service (IaaS, SaaS, PaaS) used.

## Increase Cloud awareness and enhance user support

Providing support for cloud-based services presents a great challenge for support staff. Before, IT teams developed their own solutions to meet different user needs and integrate them into local systems. Cloud computing is no longer the case: the very strong competition between suppliers implies a rapid evolution of the tools.

For example, between January 4 and February 12, 2016, Amazon Web Services made 511 announcements regarding new services or improvements to existing services. Similarly, enhancements and feature additions appear frequently in Google Apps for Education and Microsoft Office 365 for Education. These innovations often induce an additional workload for the teams because it becomes necessary to accompany users by a specific training, writing new documents ... Driving the change becomes perpetual.

Moreover, cultural and social changes are difficult to achieve and sometimes even more difficult to maintain. Particular emphasis should be placed on:

- Communication on cloud computing to end users
- Promotion on the added value of the service
- Support for those involved in lifelong learning
- Support for cloud services users
- The development of a culture conducive to rapid change.

Even if users are accustomed to adapt to changes in IT tools, changing the Cloud's tools reaches another level because it happens to often. Consequently, end-user coaching becomes crucial in this new era of rapid deployments of a number of tools that come, in particular, from sources where the institution has almost no control. The use of the same program for years is over. Communication and documentation become paramount. As it is often the case for any service offered by technologies, success depends on end-user usage and satisfaction.

Example of the use of cloud services at the University of Berkeley provided by various Google Apps for Education providers, Amazon webservices .... The security device set up at the university allows the user to securely connect to access all services transparently

# UC Berkeley's Cloud Strategy: *Emergent & Opportunistic*



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# Blockchain

Dominique Verez

In a first step, this article presents the technical aspects that underlies the notion of Blockchain, and then focuses on the use that is made of it today to certify the obtaining of a diploma, or degree in American academic institutions, and ends with a reflection on a specific Education Blockchain creation.

## Where is the Blockchain coming from ?

In 2008, the financial crisis led to a lack of confidence in USA, in institutions, such as banks, and in the monetary system in general.

In order to restore confidence in the populations, the idea of a purely numerical currency, a crypto-coin: the Bitcoin, developed. This virtual currency is meant to be the "liquid" equivalent of the Dollar, the Yen or the Euro, but in digital, encoded with a powerful encryption system and a trust based on the global Internet. To be credible, the Bitcoin must exist without any state controlling it, without any Institution managing it, without any monetary system taking hold of it.

It is not known who is the true creator of Bitcoin<sup>67</sup>. Officially, it would be a certain Satoshi Nakamoto, who first published an article in 2009 describing the protocol, as well as the code. Except that this person certainly does not exist and that no one knows who actually hides behind the creator of the Bitcoin and the mechanism used to develop it, encode it and protect it: the Blockchain.

*The Bitcoin chain will be used extensively to illustrate the subject of the Blockchains. This is not a coincidence and it is even a desire, because the vast majority of the POC (Proof Of Concept) realized in the world are based on this chain.*

In all likelihood, the creator could be a group of people rather than a single individual. Indeed, many people find the source code too beautiful and too perfect to have been written by a single person. It could also be a certain Craig Steven Wright<sup>68</sup>, who has been much talked about recently and who has given up trying to prove that he is Nakamoto. Few details filter on Satoshi Nakamoto, but "he" communicates very sporadically on the forums. Some noted that his English was impeccable (he is therefore probably English-speaking), and even analyzed the distribution of the hours of his messages to try to deduce his time zone! Some say he deserves a Nobel economics for his invention<sup>69</sup>, hence his active research.

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<sup>67</sup> Who is behind the nickname Satoshi Nakamoto ? [bitcoin.fr/satoshi-nakamoto](http://bitcoin.fr/satoshi-nakamoto)

<sup>68</sup> So called Bitcoin creator : [fr.wikipedia.org/wiki/Craig\\_Steven\\_Wright](http://fr.wikipedia.org/wiki/Craig_Steven_Wright)

<sup>69</sup> Satoshi Nakamoto to be Nominated for the 2016 Nobel Prize : [news.bitcoin.com/satoshi-nakamoto-nominated-2016-nobel-prize](http://news.bitcoin.com/satoshi-nakamoto-nominated-2016-nobel-prize)

## Issue to be solved in order to have a trustworthy digital currency

For the Bitcoin to be the numerical equivalent of a currency such as the euro, we must find an answer to three problems:

1. It is necessary to create a system of direct exchange of Bitcoin, from one user to another, equivalent to the exchange of cash from hand to hand (not like the blue card system that goes through a third party bank). It will be the Peer to Peer, from computer to computer;
2. Prevent that you can give the same Bitcoin several times or create it in the back of your garage. One must know with certainty where the Bitcoin comes from. To do this, the transactions are recorded on a "ledger" and can be "traced" in this ledger until its origin. Which ensures that when I give a Bitcoin to someone, I received it from someone else and that I did not create it;
3. Guarantee currency without central authority (Bank or State). Who guarantees the Euro? It is the BCE, European Central Bank. There is no authority that umbrella the Bitcoin, it is the users between them who log the transactions and go back the history of the ledger. To do this, a number of computers, nodes, says the "miners" have a copy of the ledger. There is not only one and only one central and unique ledger, it is duplicated everywhere. The Internet as a whole is in a sense the safe.

## The Bitcoin in practice

To be able to exchange Bitcoins<sup>70</sup>, you must first create an account, you will receive a public identifier (by analogy it is your RIB) and a private key (which will be used for asymmetric encryption). You can then "buy" Bitcoins and "spend" on all (mainly US) sites that accept this currency. You can also "sell" them again in exchange for your local currency.

You encrypt a transaction with your private key (only you own it, you can not repudiate a transaction), everyone has your public key (including all network nodes), everyone can read your transaction, while being assured that it was you who made it.

A transaction contains a reference to previous transactions, which allowed you to get your Bitcoins. We know the origin of your funds.

You can even buy or sell Bitcoins in a physical store in Paris: La maison du Bitcoin, 35 rue du Caire<sup>71</sup>, and store them in a crypto-change wallet<sup>72</sup>.

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<sup>70</sup> An example of website where you can buy/sell Bitcoins : [www.coinbase.com](http://www.coinbase.com)

<sup>71</sup> La maison du Bitcoin : [lamaisondubitcoin.fr](http://lamaisondubitcoin.fr)

<sup>72</sup> Crypto-change wallet : [www.ledgerwallet.com](http://www.ledgerwallet.com)

# The Blockchain

The Bitcoin Blockchain, or more simply the Bitcoin chain, is the ledger that keeps in memory all the transactions that have taken place with this currency since the creation of the first block and the first Bitcoin in 2009. There are number of other channels than this one. Money markets include Ether, Ripple, Litecoin, Dogecoin, Monero, Factom<sup>73</sup> ...

More generally, the mechanism of the Blockchain can be seen as a ledger, as a database or as a time line. All transactions enter into blocks, they are dated, encrypted, chained and can not be modified. They are tamperproof and can not be repudiated. Trust comes from that.

## How a Blockchain works ?

Let us take again the example of the Bitcoin chain where transactions are ongoing. Each individual transaction is registered with more than 7,000 active nodes<sup>74</sup> of the network, where they are placed in a waiting list. Each node stores the globality of the string, its size is now greater than 80 GB<sup>75</sup>.

Approximately every 10 minutes, all transactions are queued for one (and only) node of the network and declared validated. All the other nodes of the network then synchronize with it. This group of transactions is called a block. We chain the blocks, hence the name Blockchain, and we put this every 10 minutes ...

## But which node do we choose to create a new block ?

It is the one winner of a simple mathematical challenge to explain (so much the better for us), but difficult to solve! It is enough (sic) to find an identifier for the new block, but it is there that it is corse. In fact, all the nodes work permanently to find this identifier so that their waiting list is proposed, because the first who has completed the calculation is the winner and he receives a reward ...

## From what do we make this identifier ?

This is a conventional hash function SHA-256<sup>76</sup> (string of any length in input, transformed by the function into a fixed-length string, of 64 hexadecimal characters). The tiniest modification of the input string gives a big difference in the output chain, which allows in some way to leave the fingerprint of the input string. Verification of the correct transmission of a block, from one node to another, is made by means of the checksum of the block in question. It is a fairly standard verification mechanism in computer science.

In order to protect the "database" from the slightest alteration, the identifier of the new block is the hash of 3 things:

1. The previous block's identifier ;
2. The list of transactions to validate ;
3. A "nonce", whose role is to secure the hash of the 2 preceding points in such a way that any attempt of decoding takes more than 10 minutes.

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<sup>73</sup> [fr.wikipedia.org/wiki/Crypto-monnaie](http://fr.wikipedia.org/wiki/Crypto-monnaie)

<sup>74</sup> Source : [www.edtechstrategies.com/blog/future-blockchain-education](http://www.edtechstrategies.com/blog/future-blockchain-education)

<sup>75</sup> Bitcoin chain size: [www.edtechstrategies.com/blog/blockchain-misconceptions](http://www.edtechstrategies.com/blog/blockchain-misconceptions)

<sup>76</sup> Secure Hash Algorithm : [fr.wikipedia.org/wiki/SHA-2](http://fr.wikipedia.org/wiki/SHA-2)



These 12.5 Bitcoins granted to miners are created from nowhere, ex nihilo! This is the only way to "invent" artificially. This is why the computers involved in securing the network are called "miners", in reference to gold diggers who increased the money supply by their finds. This mechanism is known in advance and transparent. It is designed to decrease over time, with a ceiling of 21 MBitcoins created.

In fact, you have little chance of winning anything with your personal computer. Mining professionals have organized, especially in China<sup>80</sup>, with supercomputers using GPUs and ASICS (application-specific integrated circuits) specializing in hash. They reach stunning abilities of 12 Peta hash ( $10^{15}$ ) / second. Others have come together to associate their computing power.

The rate of Bitcoin varies<sup>81</sup>, as more and more people want this currency, but there are not enough available! It is rare and therefore expensive ...

### Is all this green ?

Not really, because all these computers that constantly mining consume a crazy energy, we talk about 250 to 500 Megawatts permanently<sup>82</sup> ... To compare of course with the credit cards systems, Visa for instance.

## 2014 – The Blockchain 2.0

With a little retreat on a technology that works well and produces good results, there is a legitimate question as to whether the technical solutions invented and put in place for a crypto-currency could not be used for anything else.

Let us take a step back on the concepts that are used :

1. The Peer to peer guarantees disintermediation ;
2. The Registry guarantees traceability over time ;
3. Verification and Conservation mechanisms ensure a distributed consensus without central authority.

It is these 3 notions that seduce, because once a transaction is made (whatever its nature), it is not modifiable (only a new transaction can take place). The system is carrying its own security, there is (and supposed to, remain cautious ;-)) no possible falsification ...

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<sup>80</sup> Inside the Chinese Bitcoin Mine : [motherboard.vice.com/read/chinas-biggest-secret-bitcoin-mine](http://motherboard.vice.com/read/chinas-biggest-secret-bitcoin-mine)

<sup>81</sup> Bitcoin rate : [bitcoincharts.com](http://bitcoincharts.com)

<sup>82</sup> Aberration from an ecology point of view : [motherboard.vice.com/read/bitcoin-is-unsustainable](http://motherboard.vice.com/read/bitcoin-is-unsustainable)

## Blockchain's new uses

There are many, imagination has no limit and many start-ups are launching their ideas. Let's mention only a few:

- Arcade City<sup>83</sup>, for an Uber without Uber, decentralized car sharing service between privates, without intermediate ;
- BitProof<sup>84</sup> certifies contracts. A platform that makes it possible to digitally establish legal documents that can not be forged and verified by all ;
- Moneytis<sup>85</sup>, a Western Union like, which allows to send money to the other side of the planet (almost), without transaction fees ;
- Factom<sup>86</sup> proposes various certification solutions. The company has in particular developed the property management in Honduras.

## Diploma's certification via Blockchain

The analogy with Bitcoins is simple :

X pays a sum to Y <-> Institution X issues a diploma to Y

The transaction took place, the Blockchain certifies. "Y" has proof that he has his diploma, any potential employer can easily verify it.

More and more US institutions have embarked on the delivery of certificates of diplomas, via a Blockchain, but most are still at the level of POC (Proof Of Concept).

At the EDUCAUSE conference we particularly followed the experience of the Massachusetts Institute of Technology<sup>87</sup> and the University of Texas at Austin<sup>88</sup>, but other institutions were involved: Stanford University, Yale University<sup>89</sup>, School of the Art Institute of Chicago<sup>90</sup>, Space Telescope Science Institute<sup>91</sup> ...

MIT announced at the conference the availability of a free deployment "kit" for anyone interested in the subject. This is the Digital Certificates Project<sup>92</sup>. The source code<sup>93</sup> is available on Github (web hosting and software development management service, using Git version management software).

A French institution has also embarked on the adventure, it is the Pôle Universitaire Leonard de Vinci<sup>94</sup>. To the best of our knowledge, at the time this article is drafted, it is the only one.

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<sup>83</sup> Arcade City mise sur la Blockchain pour renverser Uber : [www.frenchweb.fr/arcade-city-mise-sur-la-blockchain-pour-renverser-uber/244769](http://www.frenchweb.fr/arcade-city-mise-sur-la-blockchain-pour-renverser-uber/244769)

<sup>84</sup> BitProof certification: [bitproof.io](http://bitproof.io)

<sup>85</sup> Moneytis: [blockchainfrance.net/2015/12/03/moneytis-transferts-argent-blockchain/](http://blockchainfrance.net/2015/12/03/moneytis-transferts-argent-blockchain/)

<sup>86</sup> Factom blockchain technology can be adapted to almost any organization : [www.factom.com/solutions](http://www.factom.com/solutions)

<sup>87</sup> Massachusetts Institute of Technology : [web.mit.edu](http://web.mit.edu)

<sup>88</sup> The University of Texas at Austin : [www.utexas.edu](http://www.utexas.edu)

<sup>89</sup> Yale University : [www.yale.edu](http://www.yale.edu)

<sup>90</sup> School of the Art Institute of Chicago : [www.saic.edu/index.html](http://www.saic.edu/index.html)

<sup>91</sup> Space telescope Science Institute : [www.stsci.edu/portal](http://www.stsci.edu/portal)

<sup>92</sup> Digital Certificates Project : [certificates.media.mit.edu](http://certificates.media.mit.edu)

<sup>93</sup> Sources of the project : [github.com/blockchain-certificates](https://github.com/blockchain-certificates)

<sup>94</sup> Pôle universitaire Léonard-de-Vinci : [www.devinci.fr](http://www.devinci.fr)

## What might be the implications for education ?

One could see, in the Blockchain approach, the best and the safest technical arrangement to adapt an educational environment in which the students follow a course "à la carte". More and more of them are training in several institutions. They seek recognition not only of their basic learning, but also of their projects, the charity actions they have carried out, their associative implications, the MOOC they have followed ...

A Blockchain "transcript" can, from this point of view, go beyond a conventional recording, revealing not only what the students did, but also their interests. Their "record" could include information on the content of courses taken, past exams, projects carried out (in groups or individually), links to extracurricular activities (clubs, associations) or related internships.

By clarifying the nature of the route and the time line followed, such recordings could facilitate the transfer of "credits" from one institution to another.

Many other ways allow students to "tell" their own educational path, but only the Blockchain's traceability and certification properties enable them to "validate" their path.

## Towards an education Blockchain ?

Current initiatives are basically based on the Blockchain of Bitcoin. The reasons are simple, this chain is proven and widely distributed (more than 7,000 individual computers contribute<sup>95</sup>).

But its design is based on financial transactions and it suffers from a number of shortcomings to be truly able to meet all the challenges of education needs.

So the idea of a global chain of education germinates in large institutions, such as the Massachusetts Institute of Technology<sup>96</sup>. It is much too early for it to materialize, as the initiative must move from ethical, political and governance barriers.

Because records in "blocks" are immutable and coexist in many places, important questions arise as to whether corrections would be permitted and if so in what form. Also related to the ownership of the data and the ethical implications of maintaining records on individuals.

Issues of governance and identity management have not yet been adequately addressed. A Blockchain transcript asks basic questions about who can create or view blocks, on whom establishes and verifies identity, and on who has control over student records.

Rules need to be established to determine "who" can enter information and "what" to put it on. Because the chain's interest stems in particular from the fact that diplomas (or other titles, badges, credits, references ...) include elements from several entities.

Some content of a Blockchain Education would likely be subject to regulations such as the FERPA<sup>97</sup> (Family Educational Rights and Privacy Act) and the HIPAA<sup>98</sup> (Health Insurance Portability and Accountability Act) in the United States. In the case of higher education, some suggested that if a student agrees to participate in a chain, there should be little risk to the institution, but not all institutions are legally comfortable with this approach.

The idea of a Blockchain education is in itself interesting, but it needs to be created from an important and preliminary background reflection. We will certainly know more at the next edition of EDUCAUSE. Keep wired...

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<sup>95</sup> [www.edtechstrategies.com/blog/future-blockchain-education](http://www.edtechstrategies.com/blog/future-blockchain-education)

<sup>96</sup> Massachusetts Institute of Technology : [web.mit.edu](http://web.mit.edu)

<sup>97</sup> FERPA : [www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html](http://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html)

<sup>98</sup> HIPAA : [www.hhs.gov/hipaa](http://www.hhs.gov/hipaa)

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### EDUCAUSE sessions & resources

- The University of Texas System, Learners, and the Power of Blockchain<sup>99</sup>
  - Stephen DiFilipo, Chief Information Officer for the Institute for Transformational Learning
- Why the Blockchain Will Revolutionize Credentials<sup>100</sup>
  - Chris Jagers, CEO, Learning Machine
  - Natalie Smolenski, Cultural Anthropologist, Learning Machine
  - Kimberly Duffy, Principal Engineer, MIT Media Lab, Learning Machine
  - Dan Hughes, Founder & COO, Learning Machine
- ELI (EDUCAUSE Learning Initiative) - 7 Things you SHOULD know about Blockchain<sup>101</sup>

### MIT Blog

- What we learned from designing an academic certificates system on the Blockchain<sup>102</sup>
- Certificates, Reputation, and the Blockchain<sup>103</sup>

### EdTech Strategies

- 10 Things To Know about the Future of Blockchain in Education<sup>104</sup>
- Blockchain Misconceptions and the Future of Education<sup>105</sup>

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<sup>99</sup> [agenda/the-university-of-texas-system-learners-and-the-power-of-blockchain](#)

<sup>100</sup> [agenda/why-the-blockchain-will-revolutionize-credentials](#)

<sup>101</sup> [library.educause.edu/resources/2016/9/7-things-you-should-know-about-blockchain](#)

<sup>102</sup> [mit-media-lab/what-we-learned-from-designing-an-academic-certificates-system-on-the-blockchain](#)

<sup>103</sup> [mit-media-lab/certificates-reputation-and-the-blockchain](#)

<sup>104</sup> [blog/future-blockchain-education](#)

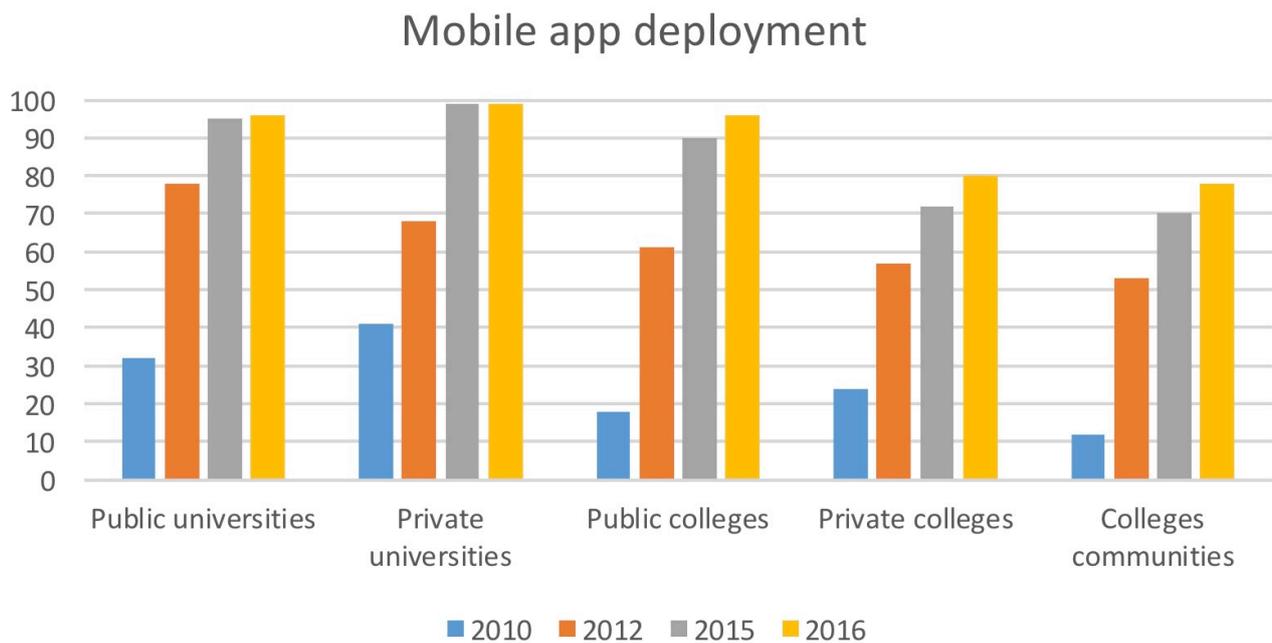
<sup>105</sup> [blog/blockchain-misconceptions](#)

# Mobile strategies

Brigitte Contois

The use of smartphones and mobile applications have been widely discussed this year in conferences at EDUCAUSE 2016. The mobile application is both seen for pedagogical use but also to affirm the presence of the institution in the student's campus life.

This graph shows the progress of mobile applications in the various higher institutions in the United States from 2010 to 2016.



EDUCAUSE and particularly its unit devoted to statistics ECAR was interested in statistics on student uses and made it possible to profile the student on 2015/2016.

## Trends, student profile and expectations

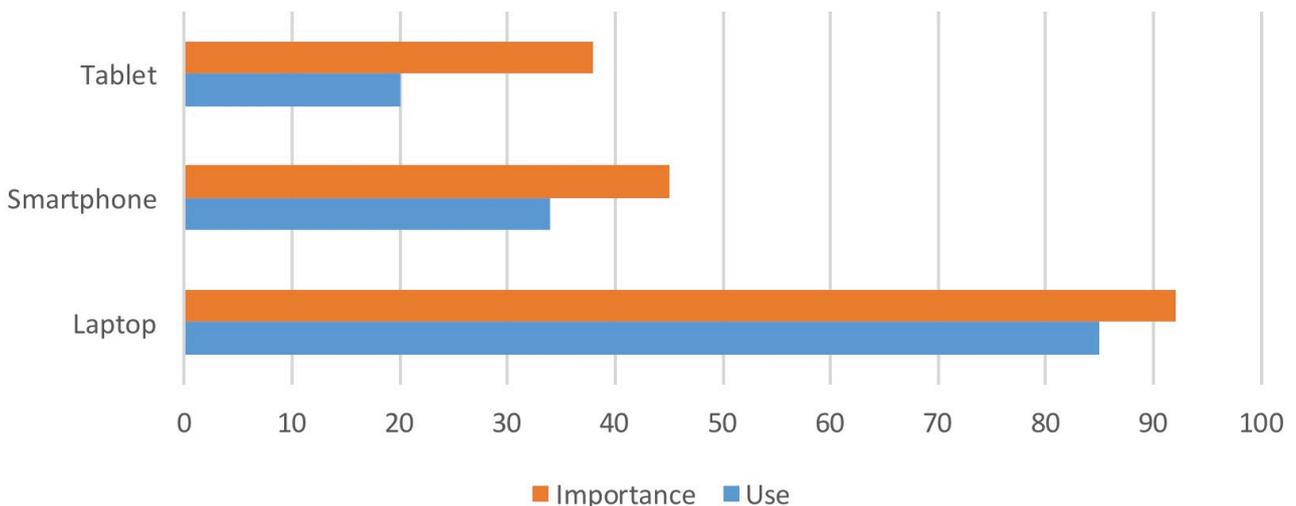
Who are the students in the United States? Here is a digital panorama from the various studies cited in reference:

- Average age is 29
- 50% of the students are in the so called traditional age bracket (18-24)
- The majority of students are the first generation to follow Higher Education cursus
- A significant number of students are single-parent
- More than the half of the students come from the middle/lower class
- 30% of the smartphone users used it to access to pedagogic contents
- Students are not or almost not dependent to their smartphone

- 96% of the students own a smartphone
- 60% of the students own a tablet
- 90% of the students say they can have pedagogic activities with their smartphone
- 78% of the students say they can have an administrative process with their smartphone
- 82% of the students prefer a mixed environment for learning (traditional teaching & use of devices)
- 40% of the students say they are distracted during classes because of SMS, emails, social networks or web surfing

The statistics also show that students consider that the use of devices involves them more in a course (71%), in particular to ask questions directly to the teacher (79%), works in a project group (69%). They also believe that the use of technology contributes to the success of their courses (see graph below).

### Percentage of students claiming to use their current materials and judging their importance to success in their training



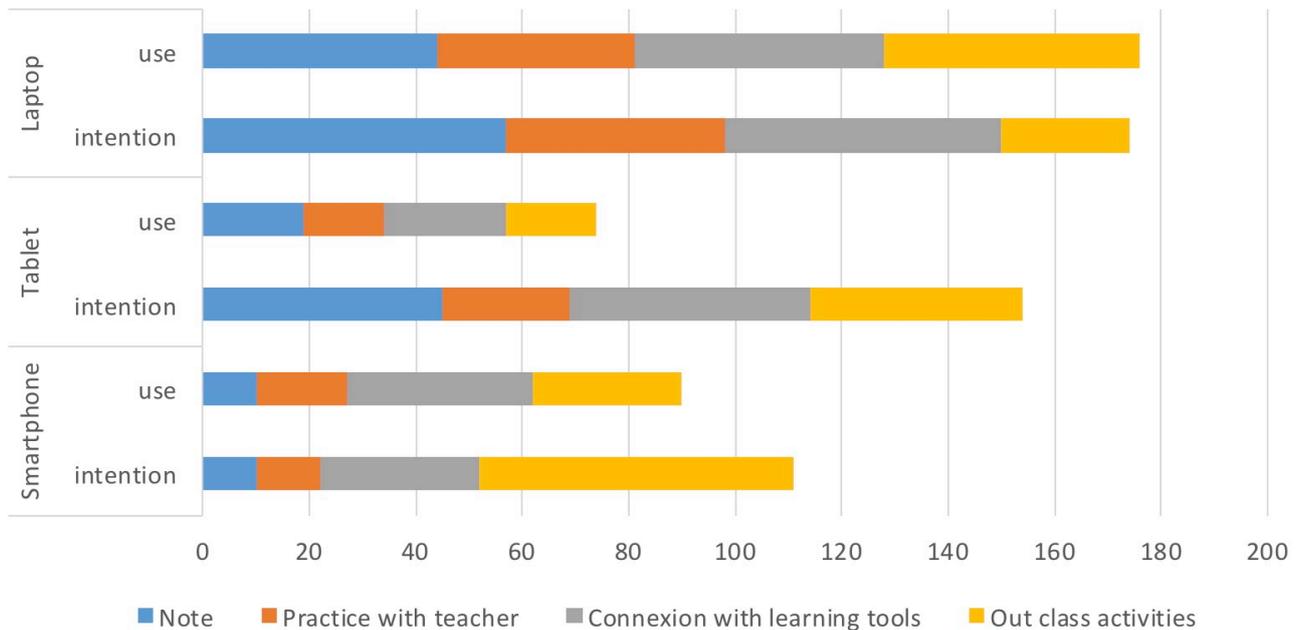
Source : the Campus computing project, autumn 2016, citrix

Studies show that these students have little income and that their only mean of access to the internet is often the smartphone. They often can not compare the different uses by mean of a smartphone to another device like tablets.

The MIT presented a mobile application project primarily on the pedestal and technical bricks for educational content on the same principle as the UserX application but called the LMX application, Learning Method Experience App. This is to provide a required environment and suitable for any user for a specific pedagogical model or teaching methodology. The aims are quite similar to those of the teaching platforms, only the APIs have a vocation of access via mobile. The user remains at the heart of the objectives of mobile application projects.

By comparing the student's intentions with the use of mobile materials and the actual use he makes of them, it is easy to distinguish how the student uses the materials. However, differences in usage make it possible to orient strategies on pedagogical uses.

## In class devices uses and use intention comparison



## Mobile applications deployment strategies

The common thread of the various strategies or feedbacks presented at the congress are all oriented towards a UserX approach, User experience or experimentation of the user on his smartphone.

Mobile applications integrate into the Next Generation Digital Learning Environment (NGDLE) strategy, or the new generation digital learning environment, a strategy for the university to meet the needs of and/or in the immediate future . This item is part of the top 10 IT EDUCAUSE this year.

The differences of strategies described in session are either on the consideration of the existing one to optimize for a mobile vision or on an innovative approach based on an approach of the life of the student

### The strategy of optimizing the existing

Most institutions want to make their system "mobile-capable", including registration tools, follow-up, tools for educational content, payment, library IS, internal portals, (examinations, specific courses, appointments with the teacher) and all the tools allowing access to forms or documents.

The example of this approach is that of the University of Wisconsin-Madison on what may be called the Digital Work Environment, with the aim of standardizing and pooling the different institutions' portals into one (ESUP Portal consortium).

The example is that of a single institution that finds itself with the problem of a multitude of portals, for various services and target populations, or that of a community of establishments using the same portal technology but with different services . It wants to homogenize its portal for a new generation use, geared towards an easy and fast handling and inspired by the navigation used on applications.

The student's needs are listed on those main actions:

- I need to check my schedule
- I need to know where my classroom is located
- I need to know the modules I have to validate this semester

- I need to know the opening hours of the library
- I need to know my credits
- ...

A reflection was based on mobile experimentation and favorite uses in order to homogenize the interfaces, drawing on the main applications (icons and visuals) used by students: Messenger, Pandora, Instagram, Youtube, Spotify and Notification system (message number bubble on the application).

The result is visible on the portal interface provides a series of icons with notifications. The home page consists of a wall of icon for the home page, the student is able to personalize them, the whole being responsive.

The portal is also decorated with a small mascot to familiarize and involve the student on an event or a new application.

The best practices on this strategy are the following ones :

- The question isn't about the chosen technology, but about a UserX oriented strategy
- It is necessary to identify, prioritize and sort the numerous shortcuts or links to obtain ergonomic results
- Find the balance between showing the right interface and avoiding congestion

The expected features for the service portal mobile application are:

- The integration in specific disciplines
- A ecosystem able to connect systems and applications
- Some means to connect and engage students on their cursus' activities
- The statistics : students progress, alerts, forecasts
- The availability and the interoperability
- The Identities Federations management
- The social network interaction and collaboration feature
- The overview of the course is clear, personalized and adapted to the level and the discipline

The obstacle to this strategy is the availability of human and financial resources to achieve the objective.

Therefore, the existence of institutional community for application development (case in California for UC Los Angeles, UC San Diego, Berkeley, UC Santa Cruz) allows the pooling of resources which is based on:

- An applications development collaborative space
- The sharing of tools through a dedicated cloud
- A workflow to validate the launch of applications between the institutions' development teams, an application reviewing by an Edtech committee .

If the application is approved, it is published on a catalog of available applications and integrates the Learning Management System. A rejection will be argued with the teams in return.

### The strategy of new uses for the student community

Settlement strategies go towards the adoption of content formats available on smartphones and create communities around activities to bring about changes in usage.

The experience feedback is quite amazing in the chosen orientations. The title of the presentation was "all together now" or how Harvard has unified its presence with the mobile with students of all cycles, which is rather revealing of the community or social network approach.

The project started in 2010 and is still evolving for 2017 with the UserX approach and responsive design technology. A study of the materials used had referenced all types of environment and screen format. Instead of adopting a "follow-up" approach (notes, exams, schedule), the application offered the following services:

- Meeting organization
- Funding and financial aid
- Step counter
- Health
- « take a sweater » : advices regarding the local weather
- Harvard news live

The community was created from the challenges or competitions offered (the one that works the most, competition of interfaces like the appathon etc.)

The choice of these tools was mainly for the following purposes:

- Provide students with easy access to critical health and wellness information, as well as resources available at the institution or on campus
- In addition to this health and wellness information, provide advice and recommendations on youth prevention campaigns
- Create personalized experiences for all types of student target population (disability, gender, single-parent family ...)

To ensure the success of the project, the following elements were required:

- The support of the Presidency to ensure the sustainability of the project (currently over 6 years)
- Leave the initiative to the departments (the various Harvard schools) on the needs, the specificities related to the specific disciplines and tools
- Adopt an approach of accompaniment with each department to have their adhesion and to arrive at a common application of the institution
- Consider the different profiles (students, alumni, visitors, etc.)
- Capitalize on feedback from users ("all comments can bring a big idea"), maintain a group focus for monitoring and motivate users
- Conduct a marketing campaign to maintain the attractiveness of the application
- Consider new versions: creation of good practices, new uses, improvement of identification / authentication ...

The application's home page includes by default the following items:

- A background image (of the photo type with students around a table or the self)
- Health and wellness: access to resources on campus and advice
- A standard menu of items on the right side and bottom: food items (with menu, access, food truck), events, sport, library, network, map, transport ...

The navigation is intuitive about the needs of the student based on questions such as: "you are not feeling well at the moment" / "you are looking for information about your career" / "you want to have information about student life" / "You have been the victim of harassment or a discriminatory act" ... Navigation results in a telephone number and the service or contact person for an aspect of providing information in real time.

## Conclusion

It can be noted that mobile application projects are long-term and choose a deployment angle according to the means or initiatives of the institution. Key success factors are based on continuous evolution and improvement based on experience and feedback from users. The community or the social network, the collaborative aspect or the innovation makes it possible to guarantee loyalty of the users, the students until the future old ones

The applications presented remain mainly for students and little for other audiences such as teachers or staff. The constraints remain the availability of resources and skills to complete these projects and ensure their long-term success.

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# Communicate on IT projects at the digital era

Christine Marle

This article is mainly based on the Conference Communications Toolkit - Creating meaningful messages that support your IT changes from the University of Michigan<sup>106</sup>, as well as on the IT communications group's discussion session..

## The problematic

IT services often carry out complex projects, spread over time, that have or will have a strong impact on the life of an institution. The users (students, teachers, researchers and the various services of the institution) are asking for information on their progress, the changes they will bring, the problems they will solve. This information is necessary for them to prepare for change, or even to participate by embedding it in their practices. Communication is therefore a key step in the success of an IT project.

When it comes to communication, IT staff have an important advantage: As professional "geek", they master communication channels (Skype, social networks, etc.) better than others. On the other hand, they have to overcome an obstacle: Communication is not a priori their strong point, even if, like the University of Michigan, specialists in the field are sometimes part of the IT teams of the big universities. How can we effectively send a message in the ocean of information that overwhelms us every day, when the initiators of the project are not communicators?

## The context : a revolution in the communication world

### An uninterrupted flow of messages and information

Since the emergence of social networks, the situation has changed completely. The figures give the vertigo: 1.6 billion Facebook accounts in the world, of which 1 billion active every day (20 million in France), connections that take on average 30 minutes a day to the user. The communication of higher education has followed this general trend. Social networks have become unavoidable. Almost all institutions (98%) are on Facebook, often multiple times, 9 out of 10 are on Twitter, three-quarters are also present on YouTube and LinkedIn. A few years ago, the presence of the French grandes écoles on the social networks was supplied by students "digital natives", eager to invest in this project. Today, almost all schools and universities have a community manager.

Messages can easily drown in the uninterrupted flow of information and exchanges. At the meeting of IT communications group EDUCAUSE, the first question the group is asking is: In the middle of this overdose of news of all kinds, how to stand out?

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<sup>106</sup> ITS Communication team – University of Michigan Create a communication toolkit  
<http://its.umich.edu/about/methodology/communication-methodology>

## A communication everywhere, and by everybody

This mutation is not only the emergence of new media used everywhere and by all. The very nature of communication has changed. Social networks give the floor to all those who want to take it. The institutions had to accept the end of vertical communication, from top to bottom, and totally under control. From now on, every student, every teacher, can express themselves via his Facebook, Twitter, Snapchat or LinkedIn accounts. The reflections of the IT communications group focus on the best ways to get students to twitter, because if the talkers were not very well seen at school, the twittos university is, on the contrary, a student who twitts is a student involved. Far from dreading the bad buzz, some teachers encourage their students to tweet at least once a week (Thursday's tweet) their personal reflections, readings, and help them build their Facebook or LinkedIn pages, using software to embellish a page, like Spark Post, a free Adobe product that makes it easy to create web designs. The use of Snapchat is integrated into the curriculum of some courses of law Social networks are considered today as the mark-up that can make the difference in the course of a student.

The IT communications group of EDUCAUSE<sup>107</sup> emphasizes, however, that it is essential to educate the public (students, staff) about the dangers of social networks. UCLA, recently victim of hackers who have managed to access medical data, has designed a humorous video for this purpose: When shopping in a store, the cashier asks questions such as "what are the last 5 SMS that you have sent?" "Where were you last night?" "With whom did you have lunch?". Obviously people quickly answer that it is not his business. What we do not accept in real life, we allow Twitter, Facebook to do it. To meditate ... and to bring closer to a reality that a member of the IT communications group emphasizes: a part of what is communicated in the real life experience dissolves when it is done by an interposed screen and the unconscious antennas that warn us a danger appear to be disabled.

Besides giving his opinion, an actor on the social networks becomes a relay for the information that seem interesting to him to share. This essential dimension must be taken into account in the design and implementation of the communication plan.

## The example of the University of Michigan: a rigorous methodology to keep the direction

Located in Ann Harbor, with two other sites in Dearborn and Flint, the University of Michigan is made up of 19 schools and colleges, has 44,000 students and employs 14,000 people, including 7,000 teachers and 1,400 IT staff.

The University of Michigan's IT department is leading three major projects, including the replacement and / or upgrading of the wifi network throughout the campus. Wifi on the campus was highly anticipated by users, to quote the communications officer of the University of Michigan's ITS, "Wireless is no longer a must, it's a need." This project lasted three years. Requests for information on the progress of the work were strong. It is from this example that the University of Michigan's Information and Technology Services (ITS) department presents its approach at the communications toolkit conference at EDUCAUSE 2016.

To avoid getting lost by using all possible chains, ITS has built a methodology to create and implement a communication plan. True roadmap for the communicator, it can be applied whatever the size of the project. The full version of this methodology is described on their website. For the presentation at EDUCAUSE, the team simplified its approach by identifying the 5 major steps. This methodology is accompanied by a toolkit of matrices and tools to guide the communicator, a toolbox that can be adapted to any communication campaign.

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<sup>107</sup> #EDUSOCMEDIA

## Step 1: Define as precise as possible the project's range, and gather the maximum informations

- What's the project ?
- How can communication help its realization? ?
- Who are the project's sponsors ?
- What's the context (environnemental, historical, political ...) ?

For this step, the ITS makes available a form<sup>108</sup>, communication intake form, which could be translated word for word by means of a record of contributions to the communication.

It is a question of "nourishing" communication by going to the collection of everything that can be gathered: concrete elements, technical specificities, the timeline of the project. The pros and cons are examined, the problems that this project solves and the possible brakes that could delay the adhesion of the stakeholders are listed.

## Step 2 : analysis of the public concerned (audience)

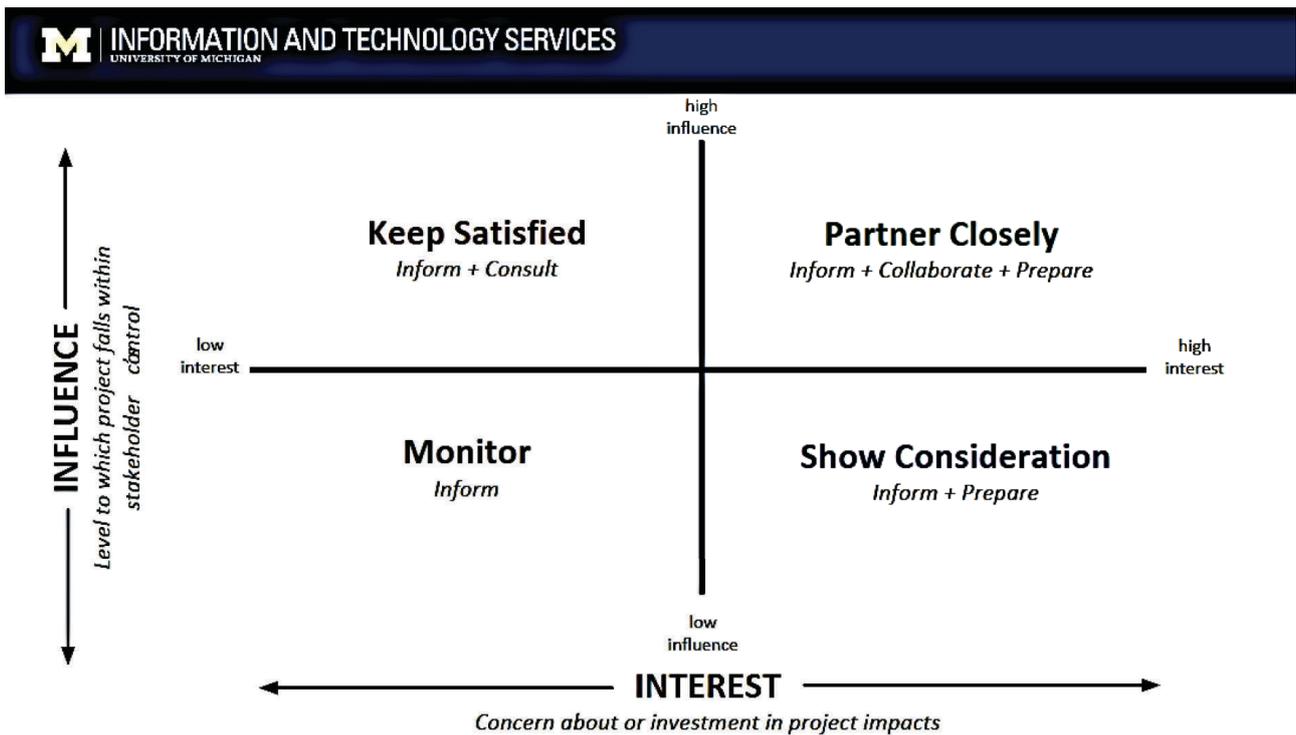
It is at this stage that we will identify groups, which will not necessarily have the same information, and not necessarily at the same time. The ITS proposes to place the different publics concerned on a diagram, according to their interest in the project and their influence (does the project depend on them?).

Once the different groups are identified and placed on the chart, it is necessary to determine what information they need and how often. The needs of the various groups identified for the Wifi project are also mentioned in the graph below. At the top right are the general services of institution, closely linked to the IT department for this project, with which a number of meetings will be scheduled throughout the lifetime of the Wifi project. The management of the establishment must be informed at all stages, it decides to invest in this project, but has no action to take to prepare itself. The help desk should be able to solve any problems. There is therefore a technical preparation to consider for them, but on the other hand, they do not intervene in the impulse to give to the site. The average users, on their side, will have to be informed especially when the wifi will work everywhere, and possibly before to make them wait.

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<sup>108</sup> <https://docs.google.com/document/d/1ysgubolhQtJLKBVNeUXIstH9dwzPWRnaq3qpO6ihmTM/edit>

On this chart the WiFi project audience:



This diagram should be used for all communication actions.

### Step 3 : Designing the key message

This message must go straight to the point, express itself as simply as possible, without unnecessary frills.

For the example of wifi, the message to be passed is very simple: Now, there is Wifi that runs all over the campus. A small visual is more effective than a big speech:



The message will be stronger if it carries the branding. In this case, this image is in the colors of the University of Michigan, here is the logo:



#### Step 4 : Choose the medias & create materials

First, the media available on campus (digital signage, radios, student newsletters, staff, existing newsletters, webinar solutions, customizable emails (Wifi announcement at the bottom of All the messages), the meetings, the events on the campus ...). There is no need to create another Facebook page if you can post information on pages that already exist and whose audience is already established.

The choice of using a media is closely tied to the audience to be contacted. For the management of the establishment, a series of meetings, webinars, emails are planned. Similarly to inform the technical actors of the project, for whom these tools will be complemented by the use of a collaborative portal, shared documents.

To reach students who, for almost all of them, are present on one or more social networks (Facebook, Twitter, Snapchat ...), communication will rely mainly on these media: a post to like and share, a festive event to relay, all expressed in a language of proximity, appreciated by students. This message encourages them to give their opinion via Twitter:



For everyone, when Wifi is actually available everywhere on campus, we program a festive event, with distribution of goodies, tee-shirts for example, taking up the key message. An event is much better memorized when one does not return empty handed.

It is then enough to messages for the selected media by declining the key message (digital display, paper (table-tents small cards to put on a table, website, videos, posts, objects ...) Over the life of the project:

- Wifi in progress
- Wifi cutover
- Pardon our progress
- Wifi upgrade is complete



### Step 5 : Find partners on the campus

At this stage, it is necessary to find the key contacts, those who have the possibility and the legitimacy to become your relays in the institution. For Wifi, information can be relayed by students, verbally or on social networks. Those who like your publications, who share them, and more who are sending you a message are at the top of your key-contacts list. Do not they deserve a goodies? For a technology, it is the early adopters who become advocates of change and set an example to others.

It is necessary to ensure that the potential relays of the project have easy access to the tools that have been designed (posts to be shared, messages to be resumed, etc.), and can appropriate them by personalizing them.

## Conclusion

The methodology suggested by the University of Michigan is based on the fundamentals of communication: What do I have to say? Whose? Why? When and how?

In a situation completely redistributed by social networks, reaching its target has become a real challenge. True, everyone has easy access to information, being connected to many media, but on the other hand, we are all overwhelmed with information of all kinds, we just have to look at his own thread, Facebook news to measure the extent of this unceasing flow. Consequently, the item "to whom", inseparable from the "when" and the "how", deserves to be the one on which to give priority to its energy. The use of the influence / interest diagram should be recommended in order to identify the groups that should not be overlooked and can be generalized with advantage to any communication action. Upstream reflection, design and follow-up of a rigorous methodology avoid the cacophony and lead to the optimal equation:

*right material – right hands – right time*

## References

EDUCAUSE 2016

- Conference

Communications Toolkits Workshop – Creating Meaningfull messages to support your IT changes

Leslie Williamson - Sr Project Manager – University of Michigan

Patricia Giorgio - Marketing and communications specialist – University of Michigan

Jessica Rohr - Marketing and communications specialist - University of Michigan

Heather Kipp - Marketing and communications specialist - University of Michigan

- Sessions

IT communications meeting

Cathy McVey - Sr Director for IT communications and Customer ad - Miami University

Alison Cruess - Director for Communications and Training - University of North Florida

# Exhibit Hall

Dominique Verez, Christian Martin, Christine Marie & Stéphane Amiard

In 2016, 322 companies were present in the very impressive Exhibit Hall. To simplify the journey, the organizers had the good idea to describe each by 1 to 4 areas of activity, in a total list of 57 topics, as follows:

Academic Information Systems - Accessibility - Analytics - Assistive Technology - Audio and Video Conferencing - Business Continuity, Disaster Recovery, Emergency Planning - Business Intelligence (BI) - BYOD - Captioning - Classroom Control Systems - Clickers - Cloud Computing and Services - Compliance - Consulting - Content Management Systems - CRM - Data Security - Data Warehousing - Digital Publishing - Digital Signage - Document Management - E-Commerce - E-Mail Management - Enterprise Information Systems - Enterprise Resource Planning (ERP) - E-Portfolios - Financing - Furniture - Hardware - Help Desk - Identity and Access Management - Intrusion Detection and Prevention - IT Governance - Learning Analytics - Learning Management Systems (LMS) - Learning Space - Lecture Capture - Media Production, Preservation, and Storage - Mobile Apps - Mobile Learning - Network Architecture and Infrastructure - Network Security - Online Learning - Open Source - Portfolio and Project Management - Privacy - Productivity Applications and Systems - Risk Management - Security Management - Social Media - Storage - Student Information Systems - Student Retention - Training - Virtualization - Webcasting - Wireless

Compared to the previous editions of 2014 and 2015, the 2016 edition shows very clear trends, all linked to current events. We thus find in the living room answers very reactive to the immediate concerns of the Universities and Colleges. This is mainly the case of security and risk management :

Topic	2014	2015	2016	%
Risk Management	8	8	22	175
Identity & Access Management	16	15	24	60
Intrusion Detection & Prevention	2	5	8	60

All the tables in this article indicate the number of companies working on the themes indicated. For example, in 2016, 24 out of 322 companies have solutions on Identity and Access Management.

Regarding the problem of Student Retention, or how to keep in his institution, throughout their course, those who return in the first year. The phenomenon has exploded over the last two years, to the point that genuine loyalty programs are now being created.

Topic	2014	2015	2016	%
Student Retention	2	43	48	12

Analytics in general, and Learning Analytics in particular, are in full swing. Big Data and its statistical and analytical processing, increasingly through artificial intelligence and machine learning, are now confirmed stars of the different editions of EDUCAUSE.

Topic	2014	2015	2016	%
Analytics	37	47	49	4
Learning Analytics	21	21	26	24

The Top 2 of the most represented sectors does not change. The biggest increase was in Learning Analytics, which earned 12 ranks. The biggest decrease is that of the BYOD which loses 8 ranks, indicating that this problem is already well resolved.

Topic	2014	2015	2016	2016 /2015
Cloud Computing & Services	90	115	96	→
Online Learning	45	55	51	→
Analytics	37	47	49	↑ +1
Student Retention	2	43	48	↑ +2
Mobile Apps	23	46	41	→
Enterprise Information Systems	31	29	37	↑ +6
Student Information Systems	23	35	36	↑ +1
Security Management	26	30	35	↑ +3
ERP	15	38	30	↓ -2
CMS	24	32	29	↓ -1
BYOD	54	50	28	↓ -8
Mobile Learning	32	28	26	↑ +2
Learning Analytics	21	21	26	↑ +12
Data Security	20	29	25	↓ -1

Top 14 of the most popular themes in the exhibition

Some sectors are in full development :

Topic	2014	2015	2016	%
Captioning	2	1	5	400
Risk Management	8	8	22	175
Assistive Technology		5	10	100
Identity & Access Management	16	15	24	60
Intrusion Detection & Prevention	2	5	8	60

Top 5 of the sectors in development

If you want to know the companies that work on this or that theme, please log on to the EDUCAUSE website: [events.educause.edu](http://events.educause.edu). In case of necessity, do not hesitate to come back to us, we have almost all contacts available.

## Spotted in Exhibit Hall

### Canvas<sup>109</sup>

Canvas is originally an Open Source Learning Management System (LMS), which is used to host online courses. Canvas has had a paid version since 2008, but in contrast to other platforms (Coursera, or Edx) reserved for the most affluent institutions, Canvas's strategy is to make MOOCs accessible to everyone, allowing the best courses to get out Of the lot by their own merit. This positioning explains their success, and the company in Salt Lake City quickly weaves its web and currently has 800 employees.

### Salesforce<sup>110</sup>

The market-leading Salesforce CRM (Customer Relationship Management), used in many sectors (banking, insurance, industry, media, etc.), also offers a CRM for higher education, as well as Not-for-profit on campuses.

### ZOOM Videos Communications<sup>111</sup>

ZOOM offers an easy-to-use cloud platform to organize videoconferences, online meetings, chat, screen sharing, video integration ... ZOOM was nominated by Gartner's new Magic Quadrant for the 2016 videoconference. ZOOM is used in Stanford.

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<sup>109</sup> [canvaslms.com](http://canvaslms.com)

<sup>110</sup> [salesforce.org](http://salesforce.org)

<sup>111</sup> [zoom.us](http://zoom.us)

## Stop Theth<sup>112</sup>

Stop Theft est une société créée par Yves Berliet, un français expatrié dans la Silicon Valley, qui propose plusieurs solutions pour lutter contre le vol de machines :

- Bar code labels, safety cables,
- A tracking software that allows a very precise geolocation,
- Software that allows an administrator to remotely encrypt data, and block access.

Stop Theft offers a special price for schools and universities and already has almost fifty establishments among its clients.

## Spotted in the Start-up Alley : Acadly<sup>113</sup>

Acadly was founded in 2013 by two students from the University of New York. The young company is part of the interactive pedagogy and offers a wide range of applications to animate a course: instant messaging, quizzes, the possibility to vote students, check their presence ... Solution also produces statistical analyzes on knowledge, but also on student behavior (number of questions asked, participation in discussions, etc.). What distinguishes them from other solutions: the solution is free for teachers and students, and it is designed for mobile phones (Android, iOS).

## ED TECH

EDUCAUSE allows start-ups to present themselves in the trade show through an exhibition, the "Learning Theater Session" and a competition entitled "Under the Ed Radar".

Emphasis should be placed on the easy access of US startups / scaleup to campuses to test and experiment with their products or services. Access to a panel of a dozen universities seems easy to reach for companies. The presence of many doctoral students from universities in the start-up teams strengthens the university-business link and the knowledge of the needs of campus students.

The table below summarizes the most innovative solutions we have noticed.

Presentation	Position	Company	Strengths	User's interest	Univ. interest
Dedra Chamberlin	CEO	Cirrus Identity	SAML bridge: allow multiple authentication between social networks' CAS/LDAP/Identity	●●●	●●
Katy Kappler	Président	Crafted Education	Inscribe: teacher/student support: database + connexionSaas + mobile app/ website inscribeapp.com	●●●	●●

<sup>112</sup> stoptheth.com

<sup>113</sup> acadly.com

Presentation	Position	Company	Strengths	User's interest	Univ. interest
Kevin Hesler	COO	Education Technology Associates	Teacher/student support: connexion with physical spaces on the campus where support is available. Private online community aiming to increase students engagement	•••	••
Jeremy Dean	Managing Director	hypothes.is	Collaborative annotation tool (public/private/group). Available in white brand, and on site licensing. Possible to integrate in the most popular LMS	•••	•••
Sean Higgins	Founder	Ilos Videos	Automatic video caption. Ilos is a video platform for universities to record, edit, host and share video content. Mobile app/ website app.ilosvideo.com	•	•
Anatoliy Kochnev	CEO	IntelliBoard	Integration in Moodle. Dashboard capable of analyzing the student's engagement	••	•
Karl Rectanus	CEO	Lea(R)n	Valorisation platform containing advanced tools for research, analysis and automation of educational technologies for schools	•	••
Norbert Morawetz	CEO	potential.ly	A platform that highlights the skills of users throughout life (DPC). A degree is not enough to fit into the professional world. SAAS technology, tested at the University of Birmingham / Westminster Contact: <a href="mailto:norbert@potential.ly">norbert@potential.ly</a>	••	•
Ramji Raghavan	CEO	Pragya Systems	SAAS/SSO platform. Management of harvested IS content in cloud computing and data to provide data optimized by algorithmic curation	••	•
Ethan Keiser	CEO	Study Tree	Mobile app for learning support and personalized follow-up of student engagement by dashboard	••	•



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The 2016 French delegation with John O'Brien, President & CEO of EDUCAUSE

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