

EDUCAUSE annual conference 2017
Visits to SUNY Stony Brook, Princeton &
University of Pennsylvania
French Delegation Report

| | |
|---|-----------|
| Forewords | 3 |
| French delegation 2017 | 3 |
| Introduction & Trends of Higher Education and Research in USA | 4 |
| The federal political context | 4 |
| The persistence of the problem of financing studies | 5 |
| How do the universities react ? | 6 |
| Freedom of expression in universities | 6 |
| Visit to SUNY Stony Brook | 8 |
| Open SUNY | 8 |
| Campus Tour | 9 |
| SUNY: common campus services | 10 |
| Visit to Princeton | 11 |
| Digital Services | 12 |
| Support service for pedagogy | 12 |
| Visit to the University of Pennsylvania | 14 |
| Digital Services | 14 |
| IT Security | 15 |
| Pedagogical Services | 15 |
| EDUCAUSE top10 IT issues 2018 | 17 |
| IT Gouvernance | 18 |
| Introduction: why IT governance ? | 18 |
| Aims of the conference | 18 |
| What is IT governance? Room feedback and survey | 19 |
| IT Governance : missions and membership | 22 |
| IT Gouvernance at UIC (University of Illinois at Chicago) – feedback from experiences | 24 |
| Fresco State IT governance – feedback from experiences | 25 |
| Higher education IT governance check list | 25 |
| Conclusion | 26 |
| Références | 26 |
| Cloud: presence at EDUCAUSE & trends | 27 |
| The context of the EDUCAUSE Top-10 IT issue | 27 |
| The conference (the reflections) | 28 |
| The Exhibit Hall (the offers) | 28 |
| The vocabulary, or what is meant by Cloud | 29 |
| The visited universities | 31 |
| Some key presentations | 32 |
| Learning Analytics | 33 |
| Learning Analytics models | 33 |
| Students follow-up | 34 |
| Adaptive teaching | 34 |
| The generalization of learning analytics | 35 |
| e-Learning | 36 |
| e-Learning: a year of consolidation | 36 |
| Deconstruction of classical courses | 36 |
| The generalization of video | 37 |
| Learning Spaces | 38 |
| Trends | 38 |
| Active Learning Classrooms: beyond the experimental phase ? | 38 |
| Learning Spaces international situation and the rise of the informal spaces | 39 |
| Design, management and assessment tools | 41 |
| Teaching with Virtual Reality | 42 |
| Overview and trends | 42 |
| Sessions & posters | 42 |
| Artificial Intelligence & Machine Learning | 45 |
| Artificial Intelligence | 45 |
| Machine Learning | 45 |
| The conference | 46 |
| ALEKS today | 49 |
| Results | 50 |
| References | 50 |
| Blockchain | 51 |
| A proof of concept, ChainScript to certify badges and diplomas... | 51 |
| A new possibility for ChainScript: following the careers of the academic staff and more | 52 |
| Conclusion: what experiments in France ? | 52 |
| Additional bibliography | 52 |
| Exhibit Hall | 53 |
| Trends | 53 |
| Startup alley | 55 |
| Spotted in the Exhibit Hall | 57 |

Forewords

For the fifth running year, a French delegation was officially assembled to participate in the annual EDUCAUSE conference. Like the previous four years, it was decided to take advantage of the trip to the United States to visit three universities: SUNY Stony Brook (Long Island), Princeton (New Jersey), and University of Pennsylvania (Philadelphia). This report follows the feedback meeting held in Paris on January 25th, 2017, and covers the three daylong university visits, and the various workshops attended at the EDUCAUSE conference.

French delegation 2017



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Introduction & Trends of Higher Education and Research in USA

Yves Epellboin, Laurent Flory & Dominique Verez

The federal political context

EDUCAUSE 2017 was held at a time when the Trump administration failed to establish itself. At the cabinet level, two weeks after taking office (following a so-called transitional phase of almost 3 months), Trump had fewer confirmed cabinet members¹ than any other president in US history. His team was not completed until May 11 2017, 4 months after he took office and 6 months after his election. Of the 350 senior administrative positions that the Senate must approve, only 172 were confirmed. Of the 606 key positions in federal agencies, 267 were still to be filled in October 2017. This vacuum at the head of the state translates into a lack of management of certain matters.

In addition to this administrative non-completeness, the Trump administration has prioritized key campaign promises such as immigration (and the construction of the Mexico wall), the abolition of the Obama care reform and the end of decrees on limiting polluting energies, lowering taxes and abolishing the tax on inheritances of less than \$10 million, mobilizing the administration (incomplete) on subjects quite remote from Higher Education (HE).

The change of presidency has been translated into a quite significant change in the HE political environment.

- The suspension of the Higher Education Act Reauthorization, the founding legislation of the U. S. education system, the latest version of which dates from 2008 and was due to be revised by the Chambers, has been suspended². Eventually it was partially revised during the parliamentary session of December but in the end to favor private and for-profit universities, to the disadvantage of students, transparency... and their debt. By lifting numerous rules and obligations aimed at regulating credit hours and information to students. Despite the simplification of the scholarship application process, the law ends the debt waiver rule for those with 10 or more years of service in the public service;
- Expected funding, particularly in an attempt to limit the impact of the debt and therefore the cost of studies, has not been approved, as budgets have been redirected to other priorities, cf. the specific point below;
- The end of net neutrality, with the cancellation of the FCC title II of 2015. This is a major step backwards for the FCC, which no longer has the task of imposing service providers to be neutral, thus opening the door to the creation of an Internet at different speeds depending on the services and operators, further distancing the actual legislation Title I from the technical evolution of the market and the offer.
- The postponement to 2018 or even 2019 of the Federal Single Audit process under the Gram Leach Bliley Act, which regulates student scholarships and which, despite the preparation of universities, does not (yet) require the security audit and risk assessment of sensitive information about the students-clients³.
- Reducing federal pressure on the obligation to guarantee accessibility to HE (and Information Systems) for disabled students corresponding to the 2010 ADA standards⁴. In 2016, 360 complaints were filed against institutions whose IS did not comply with the DOJ's accessibility rules, 40 resulted

¹ on equal terms with George Washington

² <https://www.usnews.com/news/education-news/articles/2017-12-13/house-republicans-finalize-overhaul-of-higher-education-act>

³ Fortunately, the RGPD, a major concern for American CIOs, is there to force them to do so.

⁴ 227 pages from DOJ

in trials. On this aspect the reduction of the federal pressure remains, for the time being, strongly counterbalanced by the pressure from the States and the Department of Justice.

In conclusion, many of our colleagues finally considered that, with President Trump, the status quo of HE was not the worst thing that could happen in the end... The anti Trump sentiment was not hidden in many conferences.

The persistence of the problem of financing studies

EDUCAUSE 2017 was held at a time when the cost of education remains a major concern for Americans and universities do not know how to contain ever-increasing tuition fees. Forgotten the idea of free education at the college level, the introduction of a new tax law proved to be very unfavorable⁵ for higher education. Tax cuts will have a major impact on state and city revenues; state universities and community colleges fear that the support they are receiving, which has already melted in recent years, will fall even further. As far as private institutions are concerned, several measures favor for profit institutions. The other private universities, even if only the highest donations are taxed, fear a reduction of this threshold for the years to come and therefore a decrease in the generosity of their donors.

Ted Mitchel, president of the American Council on Education declared⁶: "...At a time when postsecondary degrees and credentials have never been more important to individuals and the nation, this tax reform legislation would make higher education more expensive and less accessible. This is a big step in the wrong direction ».

American universities do not see how to reduce tuition fees, especially since students demand quality campuses, considering the value of their social dimension to be as important as the proposed studies. We saw this at SUNY, a State university where the sports facilities would be the dream of the students of our most endowed college campuses. This is also true at Princeton where they do not hide the fact that students come first to build connections for the life.

The number of students is even decreasing⁷ in the community colleges that had managed well after the 2008 crisis. This can be explained by three factors. The first is demographic, with the decrease in the number of young people of HE-accessible age⁸. The second is the decrease in the number of foreign students who come to study in the United States, following the restrictions that the Trump administration placed on their entry into the United States. The third factor is the fact that Americans wonder about the profitability of long studies: 4 out of 10 see no point in comparing salary gains and career opportunities when you start your working life with the burden of an unbearable debt. 89% of Americans see interest only in short studies and not beyond⁹ and the financial aspect is the first explanation of this answer. This attitude is encouraged by Republican political leaders who are looking at the most prestigious institutions - those where tuition fees exceed \$60,000 and who receive huge donations - on which they have doubts about the value of liberal arts and research, and who are criticized for their political correctness and liberal prejudices.

⁵ A. Kreighbaum, Inside Higher Ed, December 4 2017, https://www.insidehighered.com/news/2017/12/04/tax-bill-key-implications-colleges-clears-senate?utm_source=Inside+Higher+Ed&utm_campaign=889e97e9d8-DNU20171204&utm_medium=email&utm_term=0_1fcbc04421-889e97e9d8-233777661

⁶ <http://www.acenet.edu/news-room/Pages/Statement-by-ACE-President-Ted-Mitchell-on-the-House-Senate-Conference-Committee-Tax-Bill.aspx>

⁷ P. Fain, Inside Higher Ed, December 20 2017, https://www.insidehighered.com/news/2017/12/20/national-enrollments-decline-sixth-straight-year-slower-rate?utm_source=Inside+Higher+Ed&utm_campaign=e69b9d8a17-DNU20171220&utm_medium=email&utm_term=0_1fcbc04421-e69b9d8a17-233777661&mc_cid=e69b9d8a17&mc_eid=b23e50e8c1

⁸ The 20-24-year age group has decreased from 23,288,826 in 2015 to 22,722,067 in 2017. <https://www.populationpyramid.net/united-states-of-america/2016/>. The United States is one of the few countries where the birth rate has been falling since 2007 (from 14.3 to 12.4 per 1,000) while the mortality rate is rising (from 8 to 8.4 per 1,000) and the fertility rate is dropping from 2.12 to 1.82 in 9 years. This trend is expected to accelerate

⁹ D. Lederman, Inside HigherEd, December 15 2017, https://www.insidehighered.com/news/2017/12/15/public-really-losing-faith-higher-education?utm_source=Inside+Higher+Ed&utm_campaign=7a857a8230-DNU20171215&utm_medium=email&utm_term=0_1fcbc04421-7a857a8230-233777661&mc_cid=7a857a8230&mc_eid=b23e50e8c1

How do the universities react ?

They are changing their strategy to meet the demands of their students-clients and families.

- By splitting their curricula into micro units in order to offer menus that satisfy the demand¹⁰ as Jim Hundrieser, Senior Associate Managing Director for Institutional Strategy at the Association of Governing Boards¹¹, referred to "the idea of having to buy an entire album for one or two good songs"
- By massively expanding online education to reduce costs for a new audience that will not use campus life. More and more universities are developing independent departments to meet this demand. SUNY is an excellent example. Even the most prestigious institutions, such as MIT, are moving in this direction. In the past two years they have launched micro-masters, one online semester and one semester on campus, in partnership with universities of excellence around the world. This second semester can take place in one of the partner institutions.
- To attract foreign students, some universities even go so far as to create micro-campuses abroad with their partners.
- Finally, in search of new economic models, associations between public institutions and for-profit institutions are emerging, which would not have been thinkable until a few years ago: for example, Kaplan, a private company, was bought by Purdue, a public institution. The president of the latter believes that this will generate additional income¹².

Freedom of expression in universities

This topic may appear to be outside the context of this report. The following comments are not the result of an EDUCAUSE conference specific to this theme, but of discussions and exchanges that took place at the "CIO Lounge", the VIP area reserved for CIOs (Chief Information Officer).

While, with regard to freedom of expression, France and Europe rely essentially on the Universal Declaration of Human Rights¹³, the Americans are rather attached to the Amendments¹⁴ to the United States Constitution. Collective memory is especially familiar with the second amendment, which relates to the carrying of weapons. But the former is even more important (and this is certainly why it is the former), because it recognizes everyone's freedom of expression. It is very short: "*Congress shall make no law respecting an establishment of religion or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances*".

The current question, which was debated among CIOs, was about freedom of expression: "*Can it be restricted or is it total?*". Some private academic institutions consider that they can restrict it and the CIOs are concerned about it... The Association of Governing Boards¹⁵ (AGB) has published a report entitled "Freedom of Speech on Campus: Guidelines for Governing Boards and Institutional Leaders"¹⁶. It contains 6

¹⁰ S. Gallagher, EdSurge, November 6 2017, [https://www.edsurge.com/news/2017-11-06-as-corporate-world-moves-toward-curated-microlearning-higher-ed-must-adapt?](https://www.edsurge.com/news/2017-11-06-as-corporate-world-moves-toward-curated-microlearning-higher-ed-must-adapt?utm_source=EdSurgeTeachers&utm_medium=email&utm_campaign=11-30-17&mkt_tok=eyJpIjoiTW1JNVpqSmhPVEEzTmprNSIsInQiOiIyYk5WIBVSXU0Z01pd00rQURWVGdlbWhXR3hTekFjSlhTamEwZkRqNHhDTkoyZ3pUQmIkeUF2MmF4UXFsdzNOV2NjQzY2alk2Z1pyRUdJRjVacEhUUkhoU0E1dW1UYndBUEZldzVHM3dKWjI9)

[utm_source=EdSurgeTeachers&utm_medium=email&utm_campaign=11-30-17&mkt_tok=eyJpIjoiTW1JNVpqSmhPVEEzTmprNSIsInQiOiIyYk5WIBVSXU0Z01pd00rQURWVGdlbWhXR3hTekFjSlhTamEwZkRqNHhDTkoyZ3pUQmIkeUF2MmF4UXFsdzNOV2NjQzY2alk2Z1pyRUdJRjVacEhUUkhoU0E1dW1UYndBUEZldzVHM3dKWjI9](https://www.edsurge.com/news/2017-11-06-as-corporate-world-moves-toward-curated-microlearning-higher-ed-must-adapt?utm_source=EdSurgeTeachers&utm_medium=email&utm_campaign=11-30-17&mkt_tok=eyJpIjoiTW1JNVpqSmhPVEEzTmprNSIsInQiOiIyYk5WIBVSXU0Z01pd00rQURWVGdlbWhXR3hTekFjSlhTamEwZkRqNHhDTkoyZ3pUQmIkeUF2MmF4UXFsdzNOV2NjQzY2alk2Z1pyRUdJRjVacEhUUkhoU0E1dW1UYndBUEZldzVHM3dKWjI9)

¹¹ <https://www.educationdive.com/news/5-trends-poised-to-shake-up-higher-education-in-2018/513772/>

¹² R. Shireman, April 30 2017, <https://www.chronicle.com/article/There-s-a-Reason-the/239954>

¹³ Universal declaration of human rights <http://www.un.org/en/universal-declaration-human-rights/>

¹⁴ https://en.wikipedia.org/wiki/List_of_amendments_to_the_United_States_Constitution

¹⁵ AGB: [http:// www.agb.org](http://www.agb.org)

¹⁶ Freedom of Speech on Campus : www.agb.org/sites/default/files/u27335/report_2017_free_speech.pdf

recommendations for institutional management *"to clarify the tensions that arise as colleges and universities deal with the sometimes complex and uncertain issues of freedom of expression on campus"*. AGB distinguishes between public and private institutions on the issue of the rights guaranteed by the First Amendment. The report considers that *"... There is strong protection of the rights of the First Amendment in public institutions, where required by law, while private institutions generally retain their independence to determine the scope of the First Amendment principles and can set their own standards of freedom of expression"*.

This is where the CIOs react and debate. Is it permissible for their freedom of expression to be controlled or even restricted by the institution where they work? Some of them seemed ready to debate it warmly.

Visit to SUNY Stony Brook

Yves Epelboin & Frédéric Habert



SUNY is a decentralized structure with a strong autonomy of the different campuses that collaborate only when they wish. Example: SUNY on line.

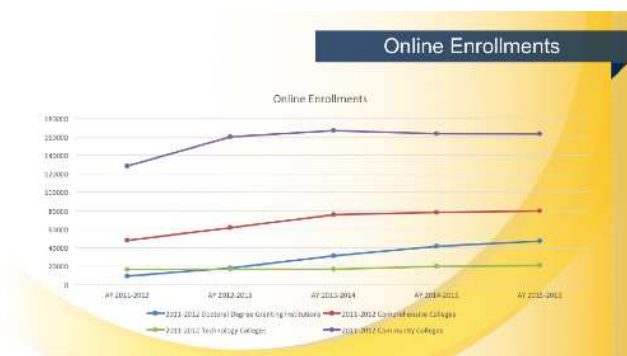
- 445 000 students
- 34 000 teachers
- 57 000 support staff
- 13 centers offering undergraduate doctoral degree studies
- 13 undergraduate campuses
- 8 institutes of technology
- 30 community colleges

SUNY, in a French vision, looks more like a federation of universities than a decentralized university. Each campus is very independent and, for example, the acceptance of credits for students who want to change locations is not automatic and depends on local decisions.

However, one should not generalize to all US: each state follows its own model. Thus, in Oregon, the various campuses have become completely independent and are universities in their own right, which SUNY is not.

SUNY, like the other universities, sees its enrollment decrease every year and hopes to change its decline by Open SUNY. It is interesting to note that students in New York State benefit from cheaper registration.

Open SUNY



Open SUNY is the result of 20 years of reflection, from the traditional approach to the most modern methods. It has been a brand for a few years now. Open SUNY is an online education system common to all campuses. It mobilizes 35 people. Open SUNY offers more than 500 courses and 21,000 are offered each year: 170,000 students take at least one online course¹⁷. More than 170,000 were taking more than 50% of their online course in 2014-2015. Institutes of technology represent the majority of participants.

The campuses are very independent on the choice of content and the courses remain the responsibility of their teachers. The funds come from the State and a subscription of the member campuses but Open SUNY also works for companies to find additional funds. Open SUNY is continuously competing with private educational companies and other universities. It must therefore constantly prove its advantages to its members. This is a principle that we already found in the State university system in California, at UCLA, a few years ago.

¹⁷ Voir <http://open.suny.edu>

The two main objectives are :

- To assist the students in the pursuit of their studies
- To promote training for a future job.

Open SUNY also has the mission to explore the specificities of online education for all campuses:

- Pedagogical research linked to practice
- The will to define quality levels

Open SUNY is built around fundamental principles:

- To offer personalized service
- A real commitment to its students
- Strong support at all times:
 - o A concierge service
 - o Not only to teach but to teach students how to work online
 - o To Build a community of practice
 - o On-line tutoring

Open SUNY provides support to teachers in all areas, including accessibility :

- Teaching teachers how to teach on line
- Funding to encourage course development: \$1,750,000 this year: 68 projects are currently being reviewed. The success rate was 42% last year.
- Full technical support. However, teachers must negotiate compensation, for the work involved in developing a course, directly with their campus. The difficulty in finding educational engineers is offset by strong ties between campus leaders.

The vision for the future is oriented towards :

- The dissemination of best practices in the community
- Improving staff and teacher competence

Financing is a recurring problem. Open SUNY must continually prove to campuses that it can bring them:

- Improved quality of service delivery
- Quality services
- Savings through negotiation of global contracts

Open SUNY delivers MOOCs with Coursera: 30 MOOCs online but no credits yet.

The three-year development plan aims to develop entirely online courses based on the Georgia Tech model: a master's degree in computer science, for example, for \$10,000 in cooperation with Coursera.

Campus Tour

The campus corresponds to what is expected of an American university: the required necessity, even for a state university, to provide quality services: dormitories, sports halls... The classrooms use Echo 360 for the automated capture.

SUNY develops, in a reflection common to all the campuses, quality learning and others spaces whose aim is to combine friendly spaces designed for pedagogy employing the most modern technologies.

(See also the Learning Spaces chapter)

SUNY: common campus services

All aspects of the digital services are managed jointly :

- Negotiation with suppliers
- Application development and sharing
- A common library technology and accessibility
- Special funds oriented towards development
- A joint strategic plan
- There is no real cloud usage policy, at least at the common level.
- Setting up a Facebook pro

Unlike private universities, there is no well-established alumni management. However, the steady decline in state funds could lead SUNY to more actively seek this source of funding and change its strategy.

Like many other universities, digital service providers face difficulties in enforcing rules at the user level. For example, teachers as well as students prefer gmail messaging.

Learning analytics are employed at two levels:

- Guided pathways: individual counselling for students to build their curriculum on the basis of their past and previous results.
- Early alerts: triggers alerts based on the analysis of LMS data in particular.

Data properties and privacy are a permanent concern of the managers. SUNY follows the legislation and recommendations in this area. The RGPD concerns them because they welcome European students. However, the reflection does not yet seem to be very advanced and remains essentially at the level of each campus.

These common services face the same problems as the universities that we have visited in previous years. They increasingly find themselves in the position of service providers competing with the private sector in terms of quality and cost. They are at a critical juncture in their evolution with a completely remodeling market.

SUNY wants to develop, through its common services, a collaborative model that serves the community beyond traditional learners, both nationally and internationally. Among other things, SUNY is interested in open resource initiatives (OER) and invests \$8,000,000 in this area jointly with CUNY (City of New York University).

Visit to Princeton

Yves Epelboin & Frédéric Habert

Princeton is not an ordinary university. It belongs to the Ivy League, that is to say to the elite of American universities, such as MIT for example, and is not very representative of the majority of universities in this country. Its model is more similar to that of the Oxford or Cambridge colleges and strongly advocates its social community aspects where students are there to participate and exchange as well as to learn.

Princeton is certainly, among the American universities, one of the closest in its essence, to the European and French model of training as well as preparation for a profession. We felt, more than anywhere else, a common vision with our ideals, whereas the importance of its financing and staff are of a completely different scale than ours.

The main philosophy is the building of a life community, as soon as the entrance in the university, based on the principle of common meetings and the construction of connections that will last for a lifetime. Everything is based on human relationships and face-to-face tutoring like in the English colleges.

This exception appears in all figures:

- A very small community of only 8000 students, the majority of whom are undergraduates (5200). The university offers only 35 different master's degrees in all fields.
- Most students live on campus. 7,000 people live on campus. Distance learning is therefore not a concern.
- Outstanding supervision in terms of both quality and number: 1200 teachers and 1400 other researchers who, the university site insists on this point, live nearby. Princeton claims the best teachers for the best students.
- Princeton relies heavily on its alumni who provide 50% of its \$1.7 billion budget each year. It is interesting to note that 63% of alumni contribute.

The official cost of education is \$50,000 a year, with an average of \$30,000 a year, but its leaders strongly claim that the fees are adjusted so that no student is in debt when leaving the university: "no student debt when leaving". Financial assistance is offered to families whose annual income is less than \$50k/year.

More details on these numbers can be found on the university's website¹⁸.

It is therefore obvious that Princeton is not a university that is particularly interested in online teaching and does not promote technology, but one must interpret what is being said: its IT department gathers more than 300 people without counting 120 people in the departments.

¹⁸ <http://www.princeton.edu>

Digital Services

Princeton has been interested in building a 5-year IT strategic plan for only three years and its director is now participating in the President's office.

This led to the creation of the Office of Information Technology (OIT). OIT is responsible for academic and administrative systems.

The ambition is to migrate from a " cyber-infrastructure " to a connected community built around three projects:

- UXO : User Experience Office, oriented towards user services
- PATCO : Project and Technology Consulting Office for the development of new projects
- CeDAR : Center for Data, Analytics and Reporting. Data security is a new issue. The President pushed for the merging of computational resources, particularly to reduce energy costs.



OIT focuses on the specific services it can bring to the university and therefore turns to vendors for all standard services: Microsoft Exchange and Google for mail, Google drive and Dropbox for shared spaces, Blackboard LMS, Drupal for CMS and Peoplesoft for the student IS... while retaining control of its sensitive data that remains internally.

Support is provided to all users with priority to those using standard configurations. The goal is to provide a complete and efficient service, from the purchase of personal equipment (every four years) to the final service and network services. Projects are decided by an ad hoc committee and the services provided are all free of charge. OIT and interested departments, including research, collaborate in the search for the funds needed to conduct their projects.

Support service for pedagogy

Mac Graw center for teaching and learning is in charge of pedagogical innovation and support with technologies for all levels of education and teachers. This structure includes 22 people, including part-time students.

It organizes seminars for master students and teachers, trains and coaches them and serves as a support for the creation of online courses. Princeton also manufactures MOOCs (24 today) but this activity remains secondary. Princeton does not want to increase its business through online courses. The only clearly identified online training is provided to people in prison, which is consistent with the university's vision of an integrated community within the society.

The center is also in charge of learning spaces and learning labs, but has no responsibility for the teaching rooms or the learning platform that are part of the user support.

The center supports students who have projects that include video and, at the graduate level, multimedia projects.

The difficulties encountered are quite familiar to the French reader: professors find it difficult to shift to the use of technology and students tend to avoid classes held in amphitheatres. "Clickers" are available in the classroom to allow more interaction. This is one of the reasons why courses are recorded, but podcasting is not widely used! Overall, teachers do not like the Blackboard LMS very much, despite its reliability, and it is mainly used for storing educational resources. Consequently, a global reflection begins on the place of the LMS. In addition, there are web pages or blogs for courses where students can deposit and order resources.

Visit to the University of Pennsylvania

Yves Epelboin, Frédéric Habert & Pascal Vuylsteker

The University of Pennsylvania (Penn), a private university, is one of the most prestigious universities in the United States: 4700 teachers, 2,500 support staff and 21,000 students equally divided between undergraduate and master's degrees, a great opening to the international market with nearly 5,000 foreign students and a ratio of 6 students per teacher. Input selection is severe: 37% of applications are retained. The success rate is among the highest in the United States, about 75%. The registration fee is \$52,000 per year. Enrolment is free for students with a family income of less than \$12,000 per year.

Research plays an important role: 1100 people in addition to the above-mentioned staff and 5500 support staff. The permanent staff represents 17,500 people. The research budget exceeds \$900 million. Penn has \$12.5 billion in equity capital (half of Princeton) and alumni relations are fundamental to university funding.

Penn has the particularity of being located in Philadelphia and its campus is in complete continuity with the city. The notion of community is therefore built around schools, the most important and best known of which is the Wharton School for Economics.

Digital Services

The central service ISC (Information Systems & Computing) is in charge of providing services to all departments and schools that have their own resources, more or less developed according to their field. The central IT service includes 270 people, not to mention those scattered in departments and schools, 15 people for the smallest and much more for the most important: 900 for the medical school and its hospital, about 100 for the art and science school.

The main effort today is to switch all services to the cloud. Penn works closely with AWS where the research bill exceeds \$100,000 per month. The biggest cost is storage (5 Pbytes/year), not transfer. The contract is global for the whole university and the expenses are distributed according to usage, which allows significant savings for everyone. Penn does not want to be in the hands of a single supplier and also works with Microsoft, but his first choice is AWS. All services migrate to the cloud, including intensive computing, with a few exceptions. The size of the data center is decreasing.

Like other universities, Penn relies heavily on external service providers: Microsoft Exchange and very soon Office 365 for mail, Workday for HR, Ellucian for SIS, Canvas which replaced Blackboard for the LMS...

IT Security

Penn has completely redefined his security policy, driven in particular by his responsibilities at the Medical School, which operates a hospital. The safety and integrity of patient data is a key concern. Three levels are defined:

- High sensitivity: data from patients and their credit cards, for example
- Medium sensitivity: everything related to the business of the university
- Regulated

All media must be encrypted.

Penn follows the Stanford model (see our EDUCAUSE 2016 report).

Much depends on the goodwill of the researchers, as ISC can only make recommendations. This is a concern shared worldwide by all universities! ISC considers that the best way to prevent the risk is a contract with AWS.

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

Vocational training (Unex) is approached from the point of view of the income that this brings to the university. The 55 MOOCs led to 91,000 certifications and attracted 1.5 million students. Schools must finance the production of MOOCs and teachers are not paid, as in Stanford.

Penn is a humanist university. They wonder about what happens next, about experience at work and how the new generations will be integrated into working life.

Pedagogical Services

The service is responsible for both libraries and education.

Inverted classes and mixed-education courses are being experimented in science, but there is as yet no clear policy in this area.

Penn is interested in distance learning. Online programs already exist, from the university entrance to the doctoral level, a micromaster in robotics exists in partnership with EdX (students have to buy a construction kit), the Business School has put on line the common core of one of its MBA, and two degree programs, relatively modest, are already available online, including a doctorate in Social Sciences. In addition, Penn's goal is to be able to offer complete courses like ASU (Arizona State U) with Coursera. However, Penn remains convinced of the value of face-to-face teaching because of the possibilities of contact and exchange.

130 MOOCs have been built with the participation of 5 people in central and the support of each school for their courses, with the exception of Wharton where they are part of the business model: the Coursera series. Some MOOCs are subject to paid certification. The motivations are extremely diverse and there does not seem to be a really established policy in this area. Most of the time the motivation of teachers is the gain of notoriety.

Teachers own the copyrights of the writings, but all videos produced by the university are the property of Penn. However, in order to establish a relationship of trust, Penn systematically grants a non-exclusive license to teachers who participate in the creation of online courses, MOOCs or SPOCs. In the case they leave Penn, they may rebuild their MOOC using these videos.

Pedagogical innovation can also be rewarded in terms of both tools and practices.

Penn has no established policy for OER.

In conclusion, Penn is a university with a rather classical structure, quite similar to those we met in previous years such as Purdue or Stanford, for example. The notion of community is reflected in the quality of services offered to students but does not take on the meaning of what we found in Berkeley last year or Princeton this year.

EDUCAUSE top10 IT issues 2018

Laurent Flory

Educause top 10 IT issues is the Educause annual study on IT priorities and main issues for Higher Education. This study lead by a group of CIOs and IT leaders is a one-year work released every year in February. At Educause conference held in autumn the content of this study is presented in phase advance.

This Educause top 10 IT issues is a part of our French report published before December. Since the official report (in English) is released by the time we translate our French Delegation annual report in English, it really makes no sense to get this part of the report in English. You will find here under the link to access it.

There is no real surprise in this report, as it is not that far from the 2017 one. Just as in 2017, security and student success are the number 1 and number 2 priorities. I would like to take the liberty to underline the growing trend of data as the major issue both in its use to achieve strategic goals and as a soft skill that every HE stakeholder should master.

The URL to have access to the 2018 top 10 IT issues is here : <https://www.educause.edu/research-and-publications/research/top-10-it-issues-technologies-and-trends/2018> .

So let me just share a few word on our vision of this report. More than its yearly content, which is always illustrated by Educause with wonderful infographics (see <https://www.educause.edu/~media/files/educause/research/2018/2018-top-ten-infographic.pdf?la=en>), it's the evolution over time of some of the topics that is very interesting. You should therefore have a look at this URL : <https://www.educause.edu/~media/interactive-content/it-issues-trends/index.html?la=en>: it lets you browse the top ten IT issues over time since year 2k.

Introduction: why IT governance ?

Since a very long-time information technology has been considered as a huge expense without generating profits. It is a support service and not a support department or a business line.

The digital transformation of our universities has led to investments in infrastructure to support these new services and the cost of IT are clearly increasing and growing.

Faced to budget issues and cuts universities, including U. S. universities and especially State funded universities, saw the need to have a body to pilot these expenditures in order to measure the return on investment, ensure their success and minimize the failures of these investments.

The question of the IT budget and its management is often the main reason for the establishment of an IT governance. However, there are several other indicators or alerts that should encourage us to set up such a body:

- The institution's decision makers are surprised by an IT policy where decisions are taken, actions are made and projects are developed;
- Decision-makers are dissatisfied with the IT solutions deployed at the institutional level;
- The IT managers want to see better involvement of the governance in their policy and a greater transparency in the decision-making process;
- The IT managers have doubts (or no consensus) about how best to spend their budget to meet the needs of the governing bodies;
- Central IT and distributed IT, in the components, do not share resources, duplicating services and costs are not optimized;

Given the importance of the subject and its general interest, EDUCAUSE has set up a program called " IT GRC programs¹⁹ ". The Governance component of this program aims to define a general framework for IT governance and to help in its implementation. This framework can thus be used by IT specialists to ensure that their actions and projects are in agreement with the institution's overall strategy and consistent with it.

Aims of the conference

This conference²⁰ is part of a feedback from two universities: Chicago and Fresno in collaboration with EDUCAUSE GRC Program. The room was full.

The objectives of this conference are multiple:

- To understand the concept and the strategy of " shared " IT governance in the US higher education system;
- To understand which governance model is most effective depending on campus, university and local context;
- To understand the structures and processes needed to implement an IT governance.

¹⁹ GRC : Governance Risk and Compliance

²⁰ <https://er.educause.edu/articles/2015/2/understanding-it-grc-in-higher-education-it-governance>

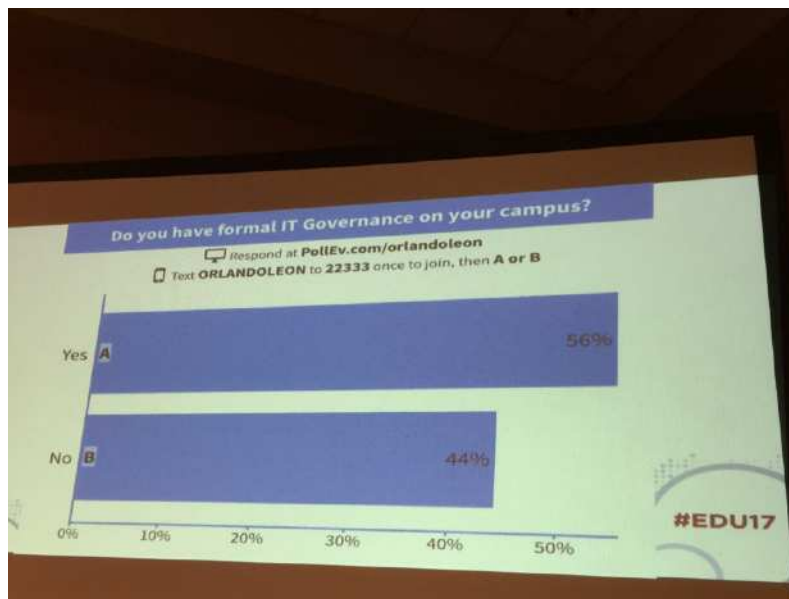
What is IT governance? Room feedback and survey

It is quite a common feature of several EDUCAUSE conferences to open a survey to better know the participants in order to get a better understanding of the audience, its maturity in relation to the topic discussed and its expectations.

Before defining what is an IT governance, the speakers ask two questions:

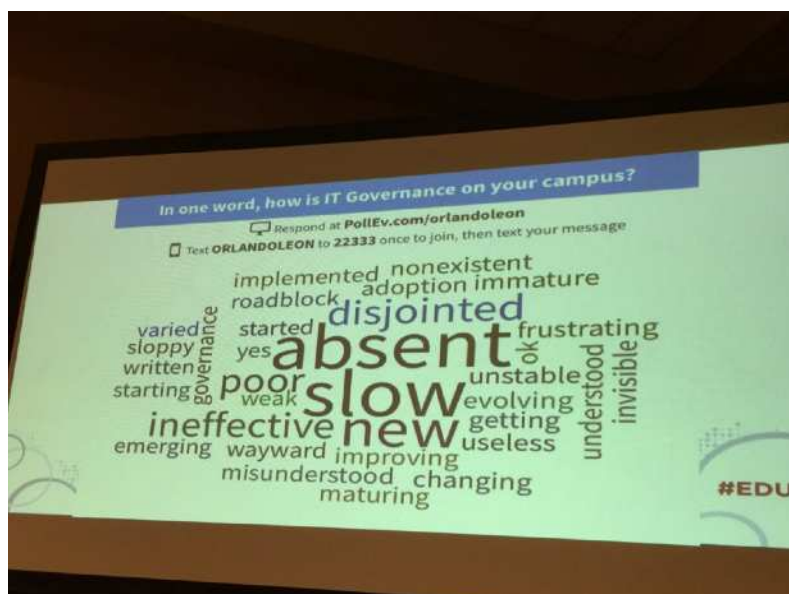
Question1 : Does your institution has a " formal " IT governance in your institution?

56% of the room answered yes. 44% of IT representatives in higher education do not have a well-identified IT governance!

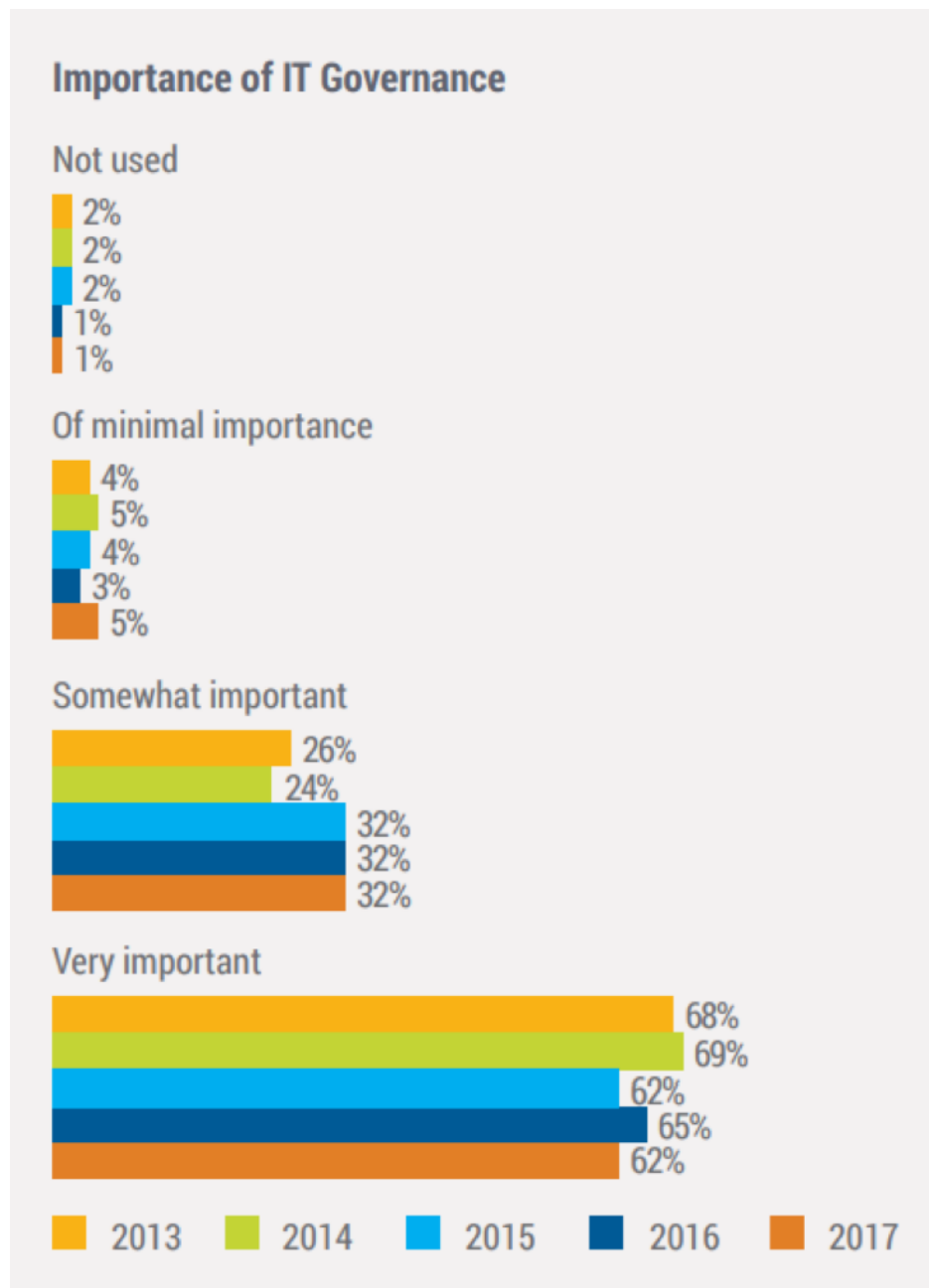


Question2 asked by the CIO of Fresno U.: " Qualify the IT governance in your establishment "?

The answers are shown in the following image;



The 4 most used words, absent, slow, inefficient, disjointed instances for central and distributed IT, are certainly the main reasons for an important and attentive audience and its interest in learning from a feedback on this important topic.



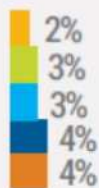
In the last 2017 report published by LBCIO²¹, 62% of the CIOs consider that IT governance is very important, although it decreases between 2013 (first report) and 2017.

²¹ LBCIO: Leadership Board for CIO - an independent higher education organization run by LBCIO members, <http://lbcio.org/>

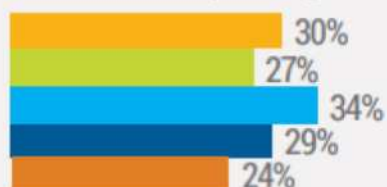
However, the majority of CIOs consider the IT governance as a consultative body but not a decision-making body. They believe that the final decision (go/no go) is theirs. Only 10% of respondents rely on decisions made by IT governance. It should be noted that in 2016, 63% of CIOs declared that they had confidence in their governance, but 55% of them declared that the final decision was up to them alone! (See diagram below)

Amount of Reliance Upon IT Governance to Aid in Decision-Making

Do not rely at all upon IT governance



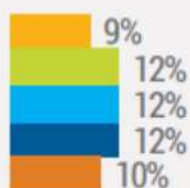
Low reliance upon IT governance model to make decisions



Relatively high reliance but ultimate decision is "mine"



Rely completely upon the IT governance model to make decisions



IT Governance : missions and membership

IT governance is a multi-purpose decision-making process:

1. To ensure that IT is used effectively and consistently with the institution's strategic objectives. The governance must ensure that any IT project, decision or initiative must be linked to the overall strategy;
2. To ensure that IT enables the achievement of strategic objectives and responds to the stakeholder needs;
3. To improve communication between computer specialists and between them and the others in the institution;

What seems obvious but very important to underline is that this governance concerns all the IT of the institution whether it is delivered by the central office or by the components or by the research laboratories.

The implementation of this decision-making process depends on the institution, its context, culture and size. In all cases, the body or bodies that constitute the IT governance must be made up of persons with authority involved in the institution's strategy.

The various IT governance bodies must therefore assemble the following:

- Individuals representing the authority of the institution at all levels (Institution Board, Component or Headquarters Branch);
- People who make decisions about technological, financial and human resources;
- The services management;
- The management of the projects portfolio;
- The Chief Information Security Officer (CISO);
- Persons whose role is to monitor compliance with regulatory and institutional policies (legal, health and hygiene department, etc.).

Experience shows that it is not enough to simply appoint an IT governance, but that it must be supported and managed. Universities, where IT governance is a success, have given a great importance to this governance allocating the required human and financial resources. For example, giving the concerned people a dedicated time to participate to the meetings (up to assigning a full-time position) and including in their job description the participation in the IT governance,

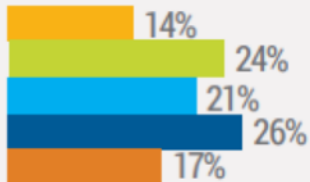
The LBCIO's latest 2017 report highlights a worrying downward trend in the involvement of corporate governance and management in these IT bodies. In 4 years, the number of committees where senior decision makers (President, deans, general managers, directors of components) participate in the IT governance has decreased from 26% to 17%.

Composition of IT Governance

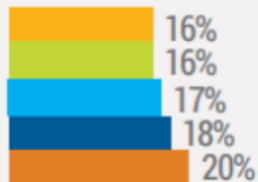
Faculty groups including Faculty Senate



Board of Trustees/Directors/Governors/Others



Outside influencers (advisory board)



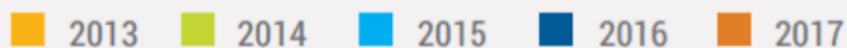
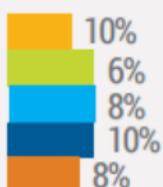
High level committee(s) to set priorities for IT



User group(s)



Other (please specify)



IT Gouvernance at UIC (University of Illinois at Chicago) – feedback from experiences

The University of Illinois at Chicago is a campus of the University of Illinois, located in Chicago. It is the only state university with 33,000 students and 15 components (colleges).

In 2011 the direction of the university conducted a lengthy consultation at all levels of the university, including the components. The final decision was the establishment of a governance²² in 2011 (7 years of existence). The governance is made of several bodies:

- An advisory body chaired by two deans, which advises the vice-presidents and the IOC;
- 4 committees: training, research, administration, infrastructure and security. These committees report to the IT Governance Board;
- And as many subcommittees per subject as needed.

These bodies are the IT voice of the entire university, including research components and laboratories. They see themselves as the link between those who work in an operational field, those who know the issues and concerns and the decision makers who know the strategic issues of the institution.

The objectives of this governance are the following:

- To define the policy in terms of IT;
- To make a decision on strategic projects and priorities according to this policy;
- To decide on the allocation of financial and HR resources for central and distributed IT;
- To define a communication plan on any IT expenditure (hardware, infrastructure, software) make transparent the use of the IT budget;
- To define IT standards and procedures for all the university in order to optimize expenses and master the technologies in use.
- To boost the collaboration between IT specialists to ensure the highest level of services at the university level.

Feedback from the UIC CIO:

- Very active and effective governance at the beginning;
- Very fluctuating and unclear process for submitting decisions: by law, via website...;
- Top-down management and decision-making process, which has not always been well understood by the execution teams;
- Many proposals and decisions made by the governance without prioritizing and without a dedicated budget;
- The communication between the various committees, which constitute the governance, is very important;
- 40% of expenditure has been spent at the components level. The politics was to extend the governance not only to the central IT but also to strengthen the presence and role of the components in the governance;
- One of the main areas of improvement was to replace a top-down IT decision making process with a distributed responsibility and collaborative management, where the various committees play their role of advice and expertise. The decisions were made locally, close to the operational level in order to guarantee understanding and agility in execution. The governance continued to ensure that local decisions are aligned with the overall strategy;

²² <http://itgc.uic.edu/>

Fresco State IT governance – feedback from experiences

Fresno State University of California at Fresno, commonly known as Fresno State University, is the 6th campus founded by California State University, with 21,000 students and 2,100 staff.

The IT governance has passed through several steps:

- 2000-2011 : IT council (comité IT) whose purpose was to share information and make some decisions.
- 2012-2015 : IT governance 1.0 which consisted of the Presidency cabinet (without the President) with the VP IT (otherwise VP CA). The CIO was not a member of this body. In addition to its mission of sharing information, the committee supervised the IT budget.
- From 2015 onwards: the IT governance had been extended to the components and includes the CIO and the Project Management Officer (PMO). It controls the entire IT function (central and distributed). It defined the priority in IT projects, follows them and works agilely in making and monitoring decisions. Decisions are made top-down.
- Currently, the IT 2.0 governance: composed of the Presidency Cabinet, Executive Directors and Component Directors. As at UIC, the governance is shifting from a central management system to a shared responsibility and collaborative management. The components are encouraged to invest, be responsible and participate more actively in achieving the institution's strategic objectives.

Higher education IT governance check list

Building an IT governance for HE should not be burdensome, but the task should not be underestimated. This section lists the important and crucial points to consider when creating such a governance, as well as during the governance process, the stakes of its effectiveness, its added value and its maintenance over time.

This list has been established by EDUCAUSE IT GRC:

- Define the objectives of governance;
- Define the decision-making process, particularly when there are several levels or governance bodies;
- Determine the scope and nature of the decisions that the governance must make;
- Identify the stakeholders involved in the decisions (people involved, concerned, those who validate and verify...);
- Know the current state of IT and the target to accurately measure the gap;
- Define the initial governance structure (e. g., governance bodies and the composition of each body)
- Distinguish between " advisory " and " decision-making " bodies;
- Review and continuously improve the IT governance process.

Conclusion

Despite a well-founded reputation of technological advance in American universities, this conference demonstrated that the questions asked by these universities are the same questions raised by the French universities. On this point, the two countries are on an equal footing and the issues are the same on both sides of the Atlantic. The governance has become indispensable due to the budget cuts in both countries with regard to State participation.

In the U. S. model, depending on the size of the university and its reputation, this governance becomes crucial for small and medium-sized universities, especially with respect to the colleges (components). Governance issues become less critical and sensitive in the context of large universities, such as Stanford, where the reputation hence the number of students, the largest part of the budget, is growing.

In conclusion, IT governance is a key issue for "governing" the budget devoted to IT expenditure when this budget represents an important part of the institution's overall budget. This IT governance must involve all departments delivering digital services, either centrally or distributed (in colleges/components) in order to have a consolidated view, at the institution level, of the budget allocated to IT as well as all achievements and priorities.

Références

<https://er.educause.edu/articles/2015/2/understanding-it-grc-in-higher-education-it-governance>

<http://lbcio.org/>

<http://itgc.uic.edu/>

Cloud: presence at EDUCAUSE & trends

Pascal Vuytstekker

The context of the EDUCAUSE Top-10 IT issue

The IT infrastructure issue has been featured in the EDUCAUSE Top 10 since 2004, appearing explicitly under the term "Cloud Strategy" in 2012 and 2013.

Whether in 2017 or 2018, the term Cloud itself is not explicitly present in EDUCAUSE's Top 10 IT Issue. It is, however, present in the responses to IS infrastructure and architecture issues. In general, the Cloud is now acquired and many universities are betting on a Cloud First policy.

In January 2017 (announced during the 2016 conference), the issue number 9 was "Next-gen enterprise IT".

In the echo, the 2017 EDUCAUSE annual conference included a session entitled "What's the Heck Is Next Generation Enterprise IT?" That session examined the changing role of enterprise IT tools in higher education. And also to explain in more detail what was behind this title²³.

Speakers described the future as one in which IT should be mission and client focused to support the goals of the institution. The next generation of enterprise IT is characterized by a movement that goes beyond sliced transactional systems to a multi-dimensional and interconnected ecosystem that contributes substantially to the mission and effectiveness of higher education. This approach is made possible by a variety of technology trends and management that include cloud computing, social networking, mobile technologies, analytics, artificial intelligence, enterprise architecture, and service management. It is motivated by the need to meet the growing expectations of greater agility, flexibility and scalability of the system, a hyper-personalization of services and a close link between IT and the mission and objectives of its establishment.

What is expected from these future systems is in order of decreasing importance:

- Transfer of IT role from technology provider to contract broker / negotiator and integrator (55%)
- Alignment of technology with the institutional mission (52%)
- Integration of data and systems for the flow of information (51%)
- Holistic approach to systems (29%)
- Consistent user experience across systems (29%)
- Personalized experience for users (25%)
- Mix of sourcing strategies (on-site, SaaS, etc.) (19%)
- Need change management (15%)
- Independence of the platform (8%)

²³ What the Heck Is Next Generation Enterprise IT? Crowdsourced Observations from the EDUCAUSE Annual Conference
<https://er.educause.edu/blogs/2017/12/what-the-heck-is-next-generation-enterprise-it>

In response to this rather general problematic, various answers are proposed, including the following:

- Foster a mission and client-centered approach
- Develop the maturity of governance
- Adapt and evolve IT organization and IT workforce
- Adopt new processes and approaches to meet changing needs
- Take into account new technologies
- Work on data analysis and integration initiatives

Moreover, we find the Cloud centrally and probably among the most pragmatic of these answers.

A cloud strategy is an important part of the next generation of enterprise computing, enabling agility, scalability, and speed that might not be possible with on-premise managed services. The consultation participants responded with 16 actions in this area, including:

- Developing a strategy around / towards the Cloud
- Moving ERP and enterprise reporting systems to the cloud (focusing on data integration).
- Implementation of a cloud-first strategy (and potentially Cloud only)
- Moving the data center to the cloud
- Moving the Virtual Desktop Infrastructure (VDI) in the Cloud

With regard to 2018 section (announced at EDUCAUSE 2017), The Cloud is no longer present directly, but always by its side effects. Deploying a cloud solution has an effect on the entire system.

First on the two points 8th tie:

- 8 Data management and governance
- 8 Digital Integration (Systems Interoperability, Scalability (2), Extensibility, Data Integrity, Standards, Formats, API and Governance)
- But also about HR in general:
- 7 IT Recruitment and Organizational Models
- 10 Change Management

Finally, the topic of Cloud is also closely related to the number one computer problems for the last 3 years: Computer Security.

The conference (the reflections)

On the conference side, 33 program elements out of a total of 543 explicitly contain the word Cloud. And if we focus on the highlights, the presentations are 27 "Break Sessions" (<11.5%) out of 234.

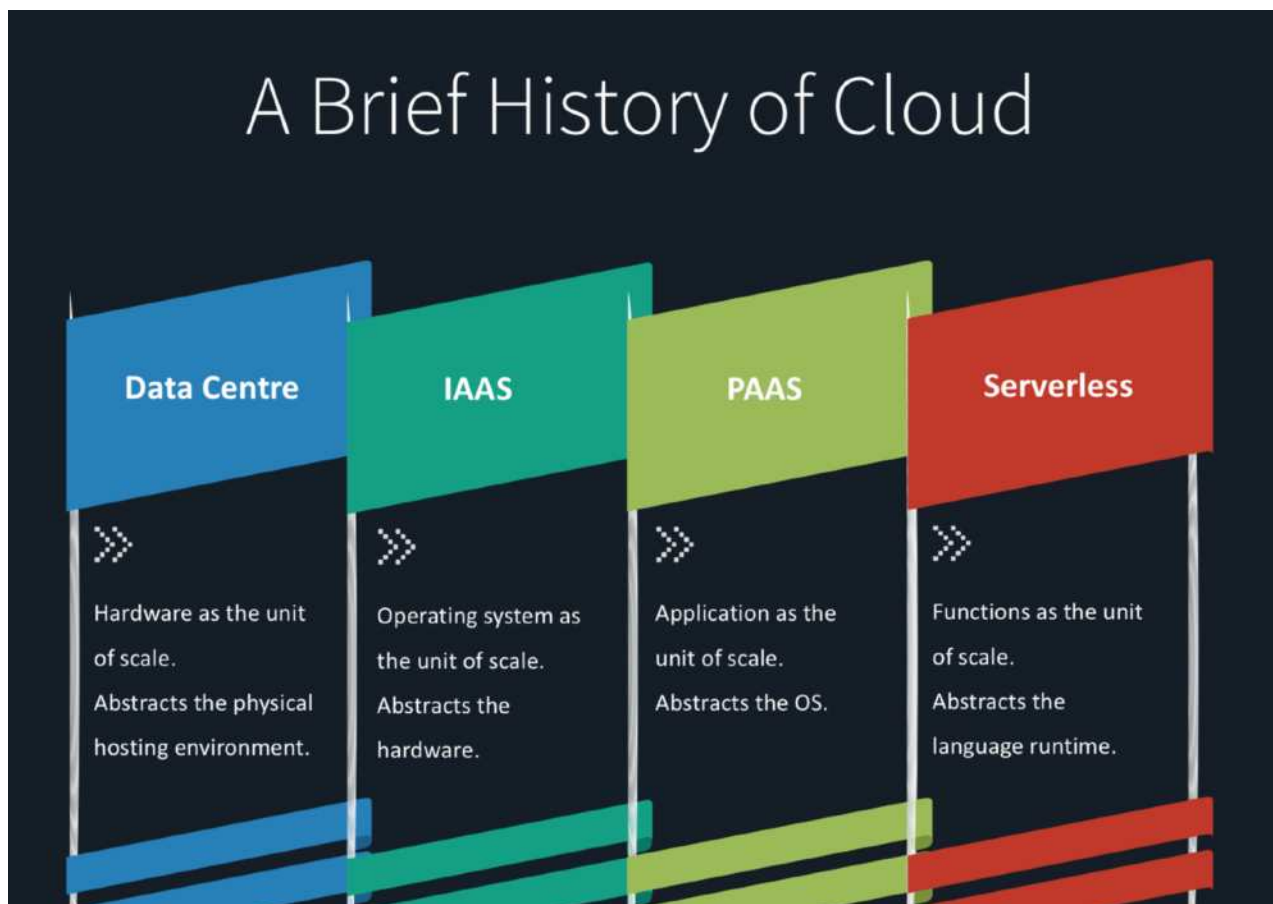
The Exhibit Hall (the offers)

Out of a total of 314 vendors, 119 use term cloud in their description (including three in their name). The term SaaS is present in only 8 sellers. But in practice, this is finally what many propose to the point that it becomes implicit.

The vocabulary, or what is meant by Cloud

Cloud = More than just “Someone else’s computer”

It is essential, when exploring the subject, to understand the different levels of investment in the cloud.



Source : <https://read.acloud.guru/iaas-paas-serverless-the-next-big-deal-in-cloud-computing-34b8198c98a2>

- **IaaS** – Infrastructure as a Service: virtual machines, virtual data centers, auto-scaling sites, extreme computing, etc.
At this level, we rent servers (virtual or not). This is where the "Cloud Computing" begins.
- **PaaS** – Platform as a Service: analytics, media streaming, storage, queuing services, database
Basic elementary brick
- **Serverless** – Cloud provider dynamically manages allocation of resources. Server management (yes, there is a server) and capacity planning decisions are completely hidden from the developer.
Also known as **FaaS** (Functions as a Service)
- **SaaS** – Software as a Service (Ex Box, Canvas, Qualtrics, Duo, LastPass, Wrike, GSuite). This is the most successful level of the Cloud. At this level, the most important is probably the contract with the supplier and remaining master of your data. We could, therefore, imagine that the most critical human resources to be kept internally are project managers and lawyers. But the integration of the selected platforms and the management of data consistency between these different platforms still require a lot of very technical skills. The SaaS version of the Cloud is, however, different from the previous three architectures in the sense

that the development plan and the evolution of the application (the roadmap) are, in the SaaS context, mainly in the hands of the provider.

Another way to differentiate Cloud Offers is Public / Private opposition

- **Public Cloud** – Shared tenant environment typically provided by a vendor (e.g. AWS, MS Azure, Google Cloud Platform)
- **Private Cloud** – a single-tenant environment where the hardware, storage and network are dedicated to a single client or company
- **Hybrid Cloud** – “I hear ‘Hybrid cloud’ as the polite reframing of ‘we started migrating and it was really hard and screw it, we gave up halfway.’” – Corey Quinn

As an illustration, the very first level of investment in the Cloud is to move to a private IaaS in order to simply get rid of your internally hosted data centre ("On Premise").

This is called "Lift and Shift" which consists of just moving an internally developed application and hosting it on servers from an external provider.



































This could be opposed to the "Cloud-Native" mode (if possible in FaaS) which will be to re-develop your tools by exploiting as much as possible the specific tools of the Cloud platform of your choice, with the intent of maximizing the investment in the Cloud, but with a new risk of dependence on extremely proprietary development layers.

To illustrate this choice, when selecting a relational database, you can opt for classic and robust MySQL, but without benefiting from the latest advances in database management (typically scaling and management issues). Or you can opt for "Google CLOUD SPANNER" without ever having to worry about resizing but at the risk of not being able to host its application elsewhere than at Google.

To better evaluate the importance of tool development based on cloud platforms, consult the CompareCloud²⁴ website which lists the very rich offer of these tools.

²⁴ <http://comparecloud.in>

A glimpse of it just bellow:

| Category | Service | amazon web services™ | Azure | Google Cloud Platform | IBM Cloud | ORACLE® | Alibaba Cloud |
|----------|--|--|--|---|---|--|--|
| Database | Relational Database Management Service |  Amazon Aurora  Amazon RDS |  Azure SQL Database  SQL Server Stretch Database  Azure CosmosDB  Azure Database for MySQL  Azure Database for PostgreSQL |  Cloud SQL  Cloud Spanner |  dashDB for Transactions SQL Database  IBM DB2 on Cloud  Informix on Cloud |  DBaaS  MySQL Service |  ApsaraDB for RDS MySQL  ApsaraDB for RDS SQL Server  ApsaraDB for RDS PostgreSQL |
| Database | Non Relational Database Management Service |  Amazon DynamoDB  Amazon DynamoDB Accelerator (DAX)  Amazon Neptune (Preview) |  Azure CosmosDB  Azure Time Series Insights |  Cloud Datastore  Cloud BigTable |  Cloudant NoSQL DB  IBM Graph |  NoSQL Database |  ApsaraDB for MongoDB |
| Database | In-Memory Data Store |  Amazon ElastiCache |  Azure RedisCache |  |  |  |  ApsaraDB for Redis |

The visited universities

Among the universities visited by the delegation, the Cloud is present at all levels, but with more or less advanced deployments.

At Penn University, the CIO Thomas Murphy offers a clear vision where, ultimately, everything must be in the cloud. Even if it is to start with the simple "Lift and Shift", many Information Systems bricks are already in SaaS.

Stony Brook University (SUNY), presented a (very long) cloud solution deployment list in one EDUCAUSE presentation : "Planning and Deploying Cloud Applications (Small and Large), without Causing a Storm" 24 :

Email and Collaboration (Google Apps, Office 365) • Social Networks (Yammer, etc) • Blog Platform (Wordpress) • Content Management Systems (Acquia) • Procurement (Sciquest) • Lab Services (iLab) • Travel and Expense (Concur) • Recruitment and Onboarding (Taleo) • Study Abroad (TerraDotta) • Financials for Foundation (Oracle Cloud) • Room Scheduling (25 Live) • Campus Residences Mgmt (StarRez) • Broadcast Email (Emma) • ePortfolios (Digication) • Event Management (CVENT) • Course Evaluations (CampusLabs) • IRB (IRBNet and CITI) • ITSM (Cherwell) • Survey Tools – Qualtrics • Employee Learning Management – Taleo Learn • Software Dev (Atlassian JIRA, Confluence, Bitbucket).

Berkley (visited by the delegation last year) was also present at EDUCAUSE, in the person of William Allison (CTO Berkley) animating the interactive session: "Cloud Ready: A Cloud Strategy for the Rest of Us" (4)

Finally, Princeton, although less invested in the Cloud (probably because of less financial pressure than other universities) is moving towards at least a centralisation of IT infrastructure in a private data centre, and also various SaaS (Blackboard LMS, Microsoft Office 365 ...).

Some key presentations

In addition to the few presentations mentioned above, we will consult in priority

“CLOUD 101”

As its name suggests, the indispensable introduction to the subject

<https://events.educause.edu/~media/files/events/user-uploads-folder/e17/sess002/cloud101-e2017-final.pdf>

SaaS and Cloud, the Unauthorized Biography

Learn from a university that has already deployed more than 140 cloud / SaaS systems. Slides are limited

<https://events.educause.edu/annual-conference/2017/agenda/saas-and-cloud-the-unauthorized-biography>

A Fast Pace to the Cloud: Transforming IT in Just Six Months

A “Case study”

<https://events.educause.edu/annual-conference/2017/agenda/a-fast-pace-to-the-cloud-transforming-it-in-just-six-months>

Planning and Deploying Cloud Applications (Small and Large), without Causing a Storm

<https://events.educause.edu/annual-conference/2017/agenda/planning-and-deploying-cloud-applications-small-and-large--without-causing-a-storm>

Learning Analytics

Yves Epelboin & Thierry Koscielniak

Learning Analytics models

Learning analytics is one of this year's hot topics. They are part of an emerging research in the field of big data, with or without artificial intelligence. Their objective is to give the possibility of offering individualized tuition tailored to each student. Students are not all equal in their learning, and learning analytics are one way to address this difficulty.

Their use can be considered from three perspectives:

1. To offer students a curriculum adapted to their previous studies and success in previous modules. Mainly computed from the data of the institutional databases, mainly the Student Information System, their purpose is to build curricula adapted to each student. They will be called Institutional Learning Analytics.
2. To provide alerts to draw attention to students dropping out. These analyses are based on information about students' activities (educational follow-up, use of libraries, etc.).
3. To build dynamic pathways within an online course.

There is sometimes a confusion between learning analytics and business indicators used in the daily administration of universities. As is often the case, some people try to recycle old practices under a more modern name. This can be frustrating and worrying.

This confusion appears in several projects that use indicators that are not strictly speaking traces of learning but that allow to quantify a student's quality of life on campus. For example, the Cytillife²⁵ startup has a three-part application: Smart Campus, Smart Assistant and Smart Decisions. The first uses data from the Internet of Things (IoT) to give students an indication of the availability of campus services: libraries, halls, sports facilities, car parks, etc. The second optimizes, using Machine Learning, the results obtained in terms of availability over a significant period of time to offer students choices in their activities. The third uses artificial intelligence (Deep Learning) to advise the student in his way of life to fight against demoralization and to avoid dropping out of his studies.

This mobile application is currently deployed at Georgia Tech.

Cytillife, exhibitor at the Startup Alley of the Exhibitor's Fair, was the winner of the " Under the Ed Radar Pitch Competition²⁶ " award at the conference.

Another project, which was also presented at the EUNIS 2017 conference²⁷, is the " Quantified Student²⁸ " project, which aims to collect as much data as possible on the students' actions and then treat them statistically with Big Data methods.

What is disturbing in these two examples is that the link between the student and the teacher is lost. There is no longer any question of learning or teaching, which are the two fundamental acts that determine student success.

²⁵ <http://citylife.com>

²⁶ <http://www.nibletz.com/events/educause/cytillife-win>

²⁷ http://www.eunis.org/download/2017/EUNIS_2017_paper_74.pdf

²⁸ <https://quantifiedstudent.nl/>

Students follow-up

Most of the conferences also dealt with analyses based on institutional data (student information systems, activity management systems: libraries, sports halls, etc.). They make it possible to monitor students' progress and trigger alerts²⁹ before they lose their footing and drift away. Universities use more or less sophisticated systems, depending on the variety of available databases. No one explains the methods of analysis; some people talk about artificial intelligence, but we are still in the dark and the presentations are limited to showing beautiful warning signs and trying to demonstrate the success of their method. However, it must be very clear that, if this makes possible to recover students and improves the success rate, it is not a remedy for those who do not have the necessary prerequisites for the envisaged studies. Problems relating to the privacy of this information (security, rights and access conditions) are often mentioned, especially since American universities are impacted by the European RGPD legislation. As they welcome many foreigners, including European citizens, they could indeed be held accountable and may have to pay large fines if they do not comply. Several conferences have mentioned this point and this problem is not underestimated.

Often analyses are based solely on data from the student information system (SIS). Only a few include other data such as libraries³⁰. The University of Central Florida is certainly one of the most advanced in the use of learning analytics. We mentioned this during our visit to this establishment (see the report on EDUCAUSE 2015). This year UCF presents figures in this area³¹. Between 2010 and 2016 the drop-out rate fell from 14% to 10%, the annual success rate went from 51% to 70%, which means that students graduate faster, so that the cost of their studies decreases... Some even analyze the progression of students, according to their social origin. This allows Paul Dosal, Vice President Student Affairs & Student Success to state: "We believe that all students can succeed if given the opportunity".

UCF is one of the universities that has given the most thoughtful consideration to the use of learning analytics to improve student success, and we must continue to monitor it closely.

Adaptive teaching

Another possible use of learning analytics is the construction of dynamic lessons where students are offered an individual learning path inside an online course. The data come mainly from the teaching platform (LMS). The construction of such courses is extremely expensive because it requires long hours of work, the participation of many specialists (teachers, pedagogical designers...) and require a lot of documentation; very few universities have experimented the building of such dynamical courses. There has been no significant progress compared to last year. Platform providers such as Blackboard and Knewton are represented but few courses are available. This is understandable given the investment required for teachers. More interesting is Mc Graw Hill's ALEKS³² project, but it has a completely different purpose. At a time when publishers see their revenues threatened by the use of open resources (OERs) that tend to replace the paper or digital textbooks that every American student must buy, this project aims to offer a new generation of intelligent textbooks. It is still essentially a research project, since it proposes to combine artificial intelligence in the analysis of textual, audio and video content with simultaneous interpretation. E-Manuals will soon be available, that will automatically adapt to the context of their readers. They are in a sense the future substitutes for the classic PDF.

²⁹ <https://events.educause.edu/annual-conference/2017/agenda/a-researcher-advisor-and-marketer-walk-into-a-predictive-analytics-tool>

³⁰ <https://events.educause.edu/annual-conference/2017/agenda/closing-the-data-gap-integrating-library-data-into-institutional-learning-analytics>

³¹ <https://events.educause.edu/annual-conference/2017/agenda/using-analytics-to-reach-the-right-students-with-precision-to-raise-retention-and-graduation-rates-and-unlock-performancebased-funding>

³² <https://events.educause.edu/annual-conference/2017/agenda/artificial-intelligence--machine-learning-art-of-the-possible>

The generalization of learning analytics

In conclusion, the American universities consider that learning analytics are an important means to improve their efficiency and thus reduce the cost of studies for students. Their use, in terms of both curriculum development and student monitoring, is becoming more widespread and allows them to offer their clients the most suitable courses to guarantee them the maximum chances of success. It is also a way to introduce some form of online mentoring for at-risk students. On the other hand, the ambition is still limited in the construction of dynamic teaching and many publishers are on the forefront, preparing the next generation of e-books. Factors external to the act of learning are also taken into account in an attempt to "quantify" the student behavior. What will be the positive effect of such approach? The advice provided by the machines to students or the fact that they feel better supported by the institution?

e-Learning

Yves Epelboin

EDUCAUSE 2017 does not bring much new information about teaching with computers, usually referred to as e-learning.

e-Learning: a year of consolidation

The word itself is seldom used: this keyword appears only twice in the conference list. Online learning is often used and brings together all forms of teaching: MOOCs, distance learning as part of initial or vocational training, as well as the simple fact of using elements of online courses integrated in a blended learning environment. Universities are no longer asking themselves the question of the interest of online courses. They are a given fact and almost all offer blended learning as part of their normal curriculum.

Regardless of how higher education is approached, few students escape online education and virtually all of them are or will follow some. Motivation is not necessarily educational. It is also a way to attract new clients and reduce the cost of studies (see the chapter on the state of higher education in the United States) by reducing or even eliminating the presence on campuses. The social aspect of the campus is fundamental to American culture and removing the need for expensive services is the solution that universities are putting in place to contain tuition fees.

This does not mean that teachers and support staff are completely committed to this policy: some pedagogical engineers express a blues that shows that teachers, like in France, are not all converted to the new technologies!

Deconstruction of classical courses

Several conferences are intended for provos and other leaders to explain to them examples of implemented strategies and the contribution of education engineering in course construction. Several speakers stressed that e-learning courses, new generations of teaching platforms, the organization of learning spaces, teacher training and university transformation should be seen as an unbreakable whole³³. The various methodologies for implementing this policy are also emphasized³⁴.

Some universities go even further in deconstructing traditional courses by offering micro learning courses. Invented and promoted by MOOC platforms oriented towards vocational training (UDACITY for example) the idea of fragmenting the content of a degree into micro degrees is becoming popular. Classical courses are divided into smaller units and students are given a certain freedom to choose their curriculum according to their aspirations. Added to this is the simultaneous use of Snapchat, Facebook, Instagram... as a teaching environment instead of the cumbersome institutional platforms³⁵. Americans are less sensitive than Europeans to the private nature of personal data and it is surprising that they rely on GAFA so willingly. It is questionable whether institutions are the driving force behind this policy, or whether they are under pressure from their student-clients.

³³ <https://events.educause.edu/annual-conference/2017/agenda/evolution-of-learning-design-to-support-innovation-in-teaching-and-learning>

³⁴ <https://events.educause.edu/annual-conference/2017/agenda/evaluating-digital-learning-implementation-with-the-cwic-framework>

³⁵ <https://events.educause.edu/~media/files/events/user-uploads-folder/e17/sess029/educause17-presentation-of-microlearning-northeastern.pdf>

The generalization of video

Video has taken an important role in the American education. Recording and broadcasting courses becomes commonplace not only to allow students to review their courses but also as a raw material for distance learning. The students also use it in the preparation of their dissertations and several conferences present implemented technical solutions, to make this means accessible to everyone, students as teachers, with a minimum of assistance.

Learning Spaces

John Augeri

The innovative physical Learning Spaces continue to figure prominently in the hot and future topics listed by EDUCAUSE. Two sessions mainly dealt with them: the first focused on the future of Active Learning Classrooms, presented by members of the EDUCAUSE team and some practitioners, the second giving an international overview of the Learning Spaces, presented by a member of the French delegation.

Trends

For a few years now, the Learning Spaces have been a strong topic, often used as a vector of communication and visibility for the institutions. If the reality of these spaces on the ground is obvious, the transformation of the uses that they are supposed to support - even to induce - must however be verified and evaluated.

Active Learning Classrooms: beyond the experimental phase ?

During the previous EDUCAUSE annual conferences, the Learning spaces were evoked in particular through Active Learning Classrooms and their variations. Quite logically, as since they are the point of entry for institutions when they engage in thinking about innovative spaces in most cases. The session "2017: the year of Active Learning Classrooms" has not departed from this rule, however, bringing a relatively new angle of approach. Indeed, if the discussions of previous years had mainly focused on the design of Active Learning Classrooms (especially in the furnishing and technology sense), and more rarely on their integration in the institution strategy, this session adopted a line much more focused on a logic of questioning around the transition from an experimental status to a generalization.

Field studies³⁶ tend to show that the majority of Active Learning Classrooms remain confined to an experimental role, or even communication and institutional visibility one for some. The cases of generalization - if only partial - appear to be relatively rare. Contextually speaking, when they are in place within an institution, the Active Learning Classrooms are generally limited to a few units or even a single iteration. The capacity they offer in a weekly or monthly schedule is thus also very limited, and often too much to allow them to be included in a program of regular courses.

This overtaking of the experimental status is certainly the main challenge ahead for this type of Learning Spaces, if only to validate their real relevance in the transformation of practices and uses. The prediction of the following sequence was thus evoked: 2017: experimental phase, 2018-2019: growing phase, 2020-2022: mainstream phase.

This perspective was, however, conditioned by two aspects that were also discussed at the same session: the reality of a transformation of teaching and learning practices, and the implementation of an evaluation.

With regard to the renovation of teaching practices, while Active Learning Classrooms undoubtedly have a significant attraction capacity among the teaching public, this does not translate systematically into a real change in their practices when they use them. Several testimonies³⁷ have thus emphasized the fundamental aspect of the Faculty Development. In addition, the need for an objective evaluation³⁸ of the results of the Active

³⁶ see the research project "Comparative study of innovative Learning Spaces (Active Learning Classrooms, Learning Centers, Learning Commons) policies, trends, design principles and impact on the teaching / learning practices" mentioned below

³⁷ <http://academicaffairs.arizona.edu/sites/academicaffairs/files/collaborative-learning-spaces-project-pilot-report-february-2015.pdf>

³⁸ for instance by using the Learning Space Rating System (LSRS)

Learning Classrooms was widely emphasized, going as far as to mention a "return on investment" to be validated.

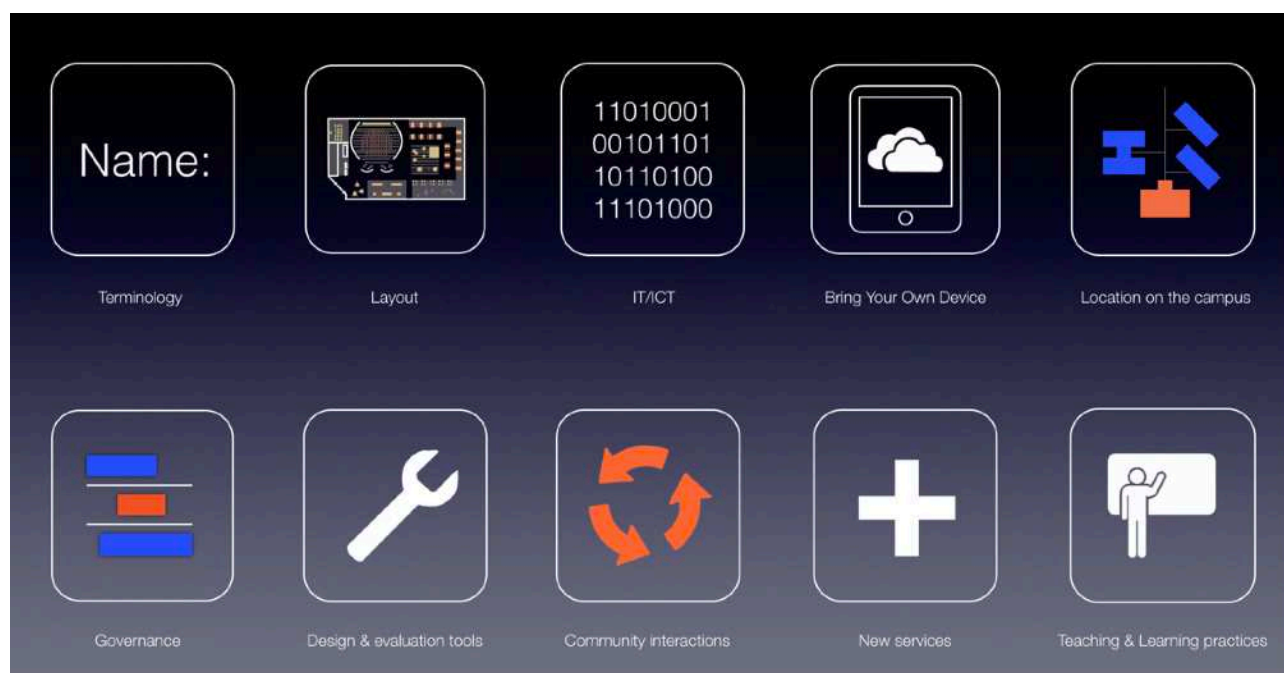
Learning Spaces international situation and the rise of the informal spaces

The previous edition of this report mentioned a year ago the launch of an international research project entitled "International Comparative Study of Innovative Learning Spaces (Active Learning Classrooms, Learning Centers, Learning Commons) policies, trends, design principles and impact. on the teaching / learning practices ".

This French initiative, as well as an international panorama of trends related to Learning Spaces, was presented during the "Learning Spaces around the World" session led by John Augeri of the French delegation, who is also leading this very research project³⁹.

The latter now brings together nearly 100 institutions spread over 4 continents, with whom contacts, visits, observations, data collection and interviews are regularly conducted. The objective is to highlight in an intercultural approach the internal and external dynamics that govern the implementation of these Learning Spaces, their conditions of success, and the potential for their transposition from one territory to another . By early 2017, more than 130 Learning Spaces of all kinds had been visited.

This research project is based on a framework of 10 criteria that were presented during the "Learning Spaces around the World" session, and which aims to take into account all the aspects related to the implementation and the exploitation of such spaces: political, strategic, operational, technological, organizational, technical, educational ...



The first conclusions of this research project were then presented and discussed with the participants.

Learning Spaces design

It appears that beyond to local culture related trends, there is no commonly accepted recipe for the flexibility of the furnishing and the level of technology integrated into the spaces. Thus, there is still a significant number of Active Learning Classrooms based on fixed furniture embodying technological components useful in the

³⁹ <http://learningspaces.unpidf.fr>

redesign of teaching practice (including sharing screens), as well as very flexible spaces. A design based on a philosophy of "voluntary low tech", supposed to catalyze human collaboration, tends to be observed in some examples.

This reinforces the relevance of zoning (physical and functional subdivision) in the design of integrated spaces. A video time-lapse resulting from this research program and diffused during the session however demonstrated a rather marked heterogeneity in the use of the different zones of the same Learning Commons, seeming to translate practices and therefore different needs according to the users. Note also in the case of integrated informal spaces mentioned below the establishment of a wide range of new services: technical assistance counter (echoing BYOD⁴⁰ almost systematically integrated in the plans), technology sandboxes, printing centers, video capture studios, video wall, group working spaces, presentation spaces ...

Informal and integrated spaces, location on the campuses

The study shows a strong focus on all territories towards informal and integrated spaces as Learning Centers and Learning Commons. These seem to get essential in the strategic projects of the institutions compare to Active Learning Classrooms, which consist often to local initiatives and remain at the experimental stage (see above) for most of them. Nesting can however exist, since some Learning Centers, also designed in a logic of emblematic place carrying an innovative image for the institution, integrate within them Active Learning Classrooms. The centralized model that aims to integrate all the innovative physical spaces of a campus in one place seems to be a strong trend, especially in highly competitive higher education systems.



Photo credit : John Augeri

⁴⁰ Bring Your Own Device

Competitive context

The setting up of informal spaces such as Learning Centers or Learning Commons can face different levels of competition, particularly inherent in the dynamics of students daily life. The typology of American universities is, for example, very favorable to informal spaces with a large opening hours, since most students live on campus, making access to these places particularly convenient. The Japanese context is radically different in the sense that a third place comes between campus and home in the typical daily journey of students, in the form of coffees shops that also meet the demands of users in the context the setting up of informal spaces: access to WiFi and power supplies, possibility of drinking and eating, cozy place.

Design, management and assessment tools

The Learning Spaces Rating System (LSRS) and FLEXspace, which have already been widely discussed at the EDUCAUSE conferences since 2013, were once again presented.

Learning Spaces Rating System⁴¹

The LSRS seeks to establish a list of criteria that allow institutions to assess how the design and operation of a Learning Space (especially formal) support teaching activities. Specifically, it is based on an evaluation sheet, bringing together a list of 44 credits organized into 6 thematic sections.

Version 2.0 of the LSRS, published in English in February 2017, was translated and adapted in French by the Paris Ile-de-France Digital University in December of the same year⁴².

FLEXspace⁴³

FLEXspace is an online repository of Learning Spaces of all types, offering for each entry a list of photos in high definition, as well as a description of technical/technological, furniture, financial, features organization and uses. By the end of 2017 the database had nearly 1,000 entries, and was viewed by more than 2,000 users from 40 countries.

The 2.0 version of the site which focuses in particular on the improvement of the user interface and on a mobile declination, is available at the beginning of 2018.

Learning Space ToolKit⁴⁴

The Learning Space ToolKit is a tool particularly focused on the design of informal spaces, and which was also mentioned during the sessions. Published prior to the LSRS and FLEXspace, this well-known guide in its original version will benefit from an update and a French translation / adaptation provided by the Paris Ile-de-France Digital University by the summer 2018⁴⁵.

⁴¹ <https://www.educause.edu/eli/initiatives/learning-space-rating-system>

⁴² <http://learningspaces.unpidf.fr/outils/lrsr/>

⁴³ <http://flexspace.org>

⁴⁴ <http://learningspacetoolkit.org>

⁴⁵ <http://learningspaces.unpidf.fr/outils/>

Teaching with Virtual Reality

Thierry Koscielniak

Overview and trends

This article follows the one published in 2016 report, entitled "Learning with Virtual Reality".

Surprisingly, virtual reality has not been tackled in a massive way in the 2017 edition of the EDUCAUSE conference, unlike artificial intelligence (machine learning, deep learning, see article page 49 in this report)

Attendees were greeted at the entrance of the show with a Microsoft booth to test Hololens augmented reality glasses on general purpose demos.

The opening plenary lecture by Michio Kaku dealt in part with the subject. According to him the virtual and augmented realities will mainly change the way we communicate with each other⁴⁶.

A pre-conference workshop was focused on "Designing Immersive Experiences and Stories in VR / AR That Will Transform Learning"⁴⁷, but it was taking place at the time of the campus visits by the delegation.

A meeting of informal "Meet and Mingle" type meetings was organized on the theme "VR, AR, MR: Immersive Tech" but the author was unfortunately on appointment at the same time.

General questions regarding the use of VR / AR were discussed at the Virtual Worlds Constituent Group meeting. But the group was created exactly ten years ago (January 2008) to discuss the virtual worlds.

In the Exhibit Hall some stands were demonstrating helmets: Google, Microsoft, Lenovo. Only the xpereal⁴⁸ startup presented on its stand a consultant offer in VR / AR / MR (mixed reality) / 360° videos for education.

During the conference, two sessions of the type "introducing innovation in teaching and learning" treated the subject as well as three posters. It is not much if one considers the number of articles in the specialized press which predict the revolution that will bring the virtual and augmented realities in Education.

Sessions & posters

These five events (two sessions and three posters) are detailed below.

Session 1 « When Virtual Reality Meets the Classroom: What Happens Next? »⁴⁹

The VR initiative is part of a global one called MOSAIC from Indiana University on Active Learning. Many innovative Learning Spaces are presented and linked to an Advanced Visualization Lab that integrates all 3D imaging technologies is simulation.

This led to the need to create Reality Labs to test AR and VR.

Reality Labs rooms are comprised of powerful computers for VR, high-definition displays and Oculus-style headsets.

Many VR applications are tested in various fields: art, interior decoration, architectural archeology, anatomy, astronomy, music, etc.

⁴⁶ https://twitter.com/drchris_davis/status/925706541700993025

⁴⁷ <https://events.educause.edu/annual-conference/2017/agenda/sem02adesigning-immersive-experiences-and-stories-in-vrar-that-will-transform-learning-separate-registration-is-required>

⁴⁸ www.xpereal.com

⁴⁹ <https://events.educause.edu/annual-conference/2017/agenda/when-virtual-reality-meets-the-classroom--what-happens-next> diaporama de la présentation inclus



Photo credits: Indiana University

The next step of Reality Labs is the settlement in spring 2018 of a Creative Lab named Idea Garden. There will be tested in portable devices (iBackpack), augmented reality glasses and 360° cameras associated with 3D scanners and 3D printers.

Session 2 : « Making Virtual Reality a Reality: Applications of Augmented/Virtual Reality »⁵⁰

The presentation took place in three steps:

- Description of the steps for creating a VR Lab; types of equipment and costs.
- The Kinber Network of the State of Pennsylvania to Fund 360° Camera Uses
- Presentation of many experiences of VR uses.

This session was extremely useful for someone wanting to discover what VR is and its applications. The three slide shows are available (see link in the note) and exhaustive.

Poster 1: « Immersive Learning with 360 Video »⁵¹

This poster shows the use of 360-degree videos (video-spheres) to show how machine tools work for engineering students at Penn State University⁵².

The videos are taken over with Adobe Premiere Pro which is provided free to all Penn State students. But only editing functions are used⁵³.

The next step will be to use a video-spheres editing tool to make them interactive. For example the Uptale⁵⁴ and Sphere⁵⁵ applications, from FrenchTech companies.

The upcoming opening of an Immersive Experiences Lab at PennState is announced; resources are already online.

⁵⁰ <https://events.educause.edu/annual-conference/2017/agenda/making-virtual-reality-a-reality-applications-of-augmentedvirtual-reality>
diaporamas de la présentation inclus

⁵¹ <https://events.educause.edu/annual-conference/2017/agenda/immersive-learning-with-360-video>

⁵² <http://tlt.psu.edu/2017/10/13/immersive-technologies-provide-hand-on-training-options-for-engineering-students-at-berks/>

⁵³ <https://mediacommons.psu.edu/support/tutorials/premiere/>

⁵⁴ <https://uptale.io/>

⁵⁵ <https://www.sphereapp.fr/>

Poster 2 : « The Use of Virtual Reality Technologies in Architecture Instruction and Critiques »⁵⁶

The authors propose to provide architecture students with simulation platforms to perform critical reports and tests.

Poster 3 : « Virtual/Mixed/Augmented Reality Overview Fall 2017 »⁵⁷

Poster author Susan Molnar described the different techniques and materials for using VR / AR. His core business is to be an artist and educator⁵⁸.

To complete your discovery of virtual reality, you can read the five volumes of the reference book "Treaty of virtual reality⁵⁹" coordinated by Philippe Fuchs, professor at the Ecole des Mines ParisTech.

In conclusion, there is the initiative to create an Immersive Learning Lab by Nicolas Dupain to bring together French actors around an innovative ecosystem. A kick-off meeting will be held at Cnam on February 15, 2018. All information on the i2L is on its website⁶⁰.

⁵⁶ <https://events.educause.edu/annual-conference/2017/agenda/the-use-of-virtual-reality-technologies-in-architecture-instruction-and-critiques>

⁵⁷ <https://events.educause.edu/annual-conference/2017/agenda/virtualmixedaugmented-reality-overview-fall-2017>

⁵⁸ <http://www.susanolnar.com/>

⁵⁹ <https://sites.google.com/site/ppppfuchs/home/professeur/equipe-rv-ra/domaines-de-recherche/traite-de-la-realite-virtuelle>

⁶⁰ <https://www.i2l.fr/>

Artificial Intelligence & Machine Learning

Dominique Verez

Here is a vast topic! This article obviously does not intend to cover it in its entirety. It simply repeats the themes discussed during the Artificial Intelligence and Machine Learning conference: The Art of the Possible⁶¹

« *The combined use of massive amounts of information and relatively simple learning algorithms makes it possible to solve problems that were recently considered inaccessible.* »

Artificial Intelligence

Artificial Intelligence (AI) is "the set of theories and techniques used to create machines capable of simulating intelligence". The underlying concept is that "any intellectual activity can be described with enough precision to be simulated by a machine" John MacCarthy⁶².

Machine Learning

Machine Learning (ML, machine learning or statistical learning) is a field of study of artificial intelligence. It concerns the design, analysis, development and implementation of methods allowing a machine (in the broad sense) to evolve through a systematic process, and thus to fulfill difficult or problematic tasks by more conventional algorithmic means.

The possibility of predicting a phenomenon from past observations presupposes the existence of a causal mechanism. To predict a phenomenon, we have two possibilities:

- The first, traditional, is to understand the causal mechanism by developing an *explanatory model*;
- The second, used in the ML and in statistics, simply seeks to discover significant correlations in a set of observations, that is, to find a *predictive model*.

There are many ML examples that shed some light on how the principle works. The simplest to understand, while being one of the most astonishing, is the machine learning system that allows a robot with the ability to move its limbs - but initially knowing nothing about the coordination of walking movements - learn to walk. The robot begins by making random movements, then, by selecting and privileging the movements allowing it to advance, gradually sets up a more and more effective march.

⁶¹ EDUCAUSE session - Artificial Intelligence and Machine Learning : The "Art of the Possible" - Wednesday November 1st 2017 - 10:30-12:00

⁶² John MacCarthy is the principal pioneer of artificial intelligence with Marvin Lee Minsky. He incarnates the current emphasizing symbolic logic

The conference

The conference took place in 3 distinct parts, IA and ML for Canvas, IA and ML for Box, IA and ML in pedagogy. The article here resumes these 3 parts, but is mainly interested in the last, particularly interesting.

1 - AI & ML for Canvas

This presentation by Masha Chase - Sr. Product Manager, Instructure⁶³ highlights new and future developments around the LMS Canvas⁶⁴ solution that facilitate teaching and learning through AI and ML.

Masha Chase highlights three key developments:

- The contribution of the video in Canvas is often considered interesting, even indispensable, but its transcription and capture are tedious and difficult. The Speechmatics⁶⁵ product performs automatic transcription of dialogues in videos. It supports 72 languages and, thanks to the AI and the ML, improves as it performs transcriptions. The more he does, the better he gets ...
- The Amazon Alexa⁶⁶ product (recognizes the voice and can be integrated into the LMS Canvas of a university in order to answer students' questions about, for example, their schedule.
- The "Nudge" research project sends notifications (Canvas Alert) to students' smartphones to encourage them when they are not diligent enough, to procrastinate, and guide them to reach their goals with personalized encouragement.

2 - AI & ML for Box

This presentation by Andrew Keating - Managing Director, Higher Education, Box highlights the dramatic progress of the future BoxSkills interface⁶⁷ on sound, image and video.

The idea is to automate - on a large scale - the detection of topics as complex as the extraction of subjects from a text (what is it about?), The recognition of the concepts that are presented, the analysis feelings (text or image), the automatic production of metadata, the transcription of manual writing, audio and video analysis ...

⁶³ Instructure : www.instructure.com

⁶⁴ Canvas : www.canvaslms.com

⁶⁵ Speechmatics : www.speechmatics.com

⁶⁶ Amazon Alexa : www.amazon.com/Amazon-Echo-And-Alexa-Devices/b?ie=UTF8&node=9818047011

⁶⁷ BoxSkills : www.box.com/skills

Thanks to the AI and the ML, BoxSkills can automatically propose for each file placed on Box:

- The transcription of audio files in text
- The discovery of metadata (tags) on the images, for example for this one presenting a tennis player:



- The discovery of metadata on videos, in order to detect the different people who appear and to place pointers to reach the different moments where they are present. We could attend a demonstration from a film shot in a kindergarten, it's absolutely stunning!

Again, the contribution of AI and ML, that the detection improves as and when the analyzes are made. The more it is done, the more this detection improves ...

Be careful however to the protection of personal data!

3 - AI & ML in pedagogy

The presentation made by Alfred Essa - VP Analytics and R & D, McGrawHill Education⁶⁸, starts from one observation: unlike the teacher, the AI is detached from all empathy and it is a plus!

Teachers are frequently unaware of the fact that they are providing more favorable conditions for learning for some students than they are for other students. Generally, they are under the impression that all students in their classes are given equality of opportunity for learning.

Benjamin Bloom⁶⁹ – The 2-Sigma Problem⁷⁰ (1984)

⁶⁸ McGrawHill Education : www.mheducation.com

⁶⁹ Benjamin Bloom : fr.wikipedia.org/wiki/Benjamin_Bloom

⁷⁰ Bloom's 2 Sigma Problem : en.wikipedia.org/wiki/Bloom%27s_2_Sigma_Problem

Benjamin Bloom, an educational psychologist, is famous for his "Taxonomy of Objectives" (classification of important levels of thought in the learning process) and for the discovery of what is called the "Bloom effect": finding that On average, "tutored" students, using their teacher's learning techniques, perform much better than students who learn by conventional teaching methods.

*The average tutored student was above 98% of the students in the control class.
Additionally, the variation of the students' achievement changed: about 90% of the
tutored students attained the level of summative achievement reached by only the
highest 20% of the control class*

*It was when I came to realize that this statement was true that I started to work on
learning analytics.*

Timothy McKay⁷¹ - Keynote Address 2017, International Learning Analytics & Knowledge Conference⁷²

With this in mind, Andrew Keating demonstrates how we can use the perspectives opened by the IA and the ML in order to best respect what is for him the essential principle of education.

*Education's Prime Directive: Design learning environments that provide equality of opportunity for
all learners!*

To do this, one must first analyze what is happening in the learning process by relying on both science and tools:

- Learning science: to measure how students learn and how they can learn better
- Data Science : What are the factors that increase the chances of success
- AI et ML : develop and use tools, especially those developed by MHE

MHE, McGrawHill Education, is an American company, based in New York. It is the result of the demise of the former McGraw-Hill Company in 2013. It is one of the world leaders in academic and scientific publishing. The company offers solutions, software and educational services from kindergarten to PhD. It operates in more than 135 countries, in partnership with 14,000 authors and professors.

⁷¹ Timothy McKay : en.wikipedia.org/wiki/Timothy_A._McKay

⁷² International Learning Analytics & Knowledge Conference : lak17.solaresearch.org

The ALEKS⁷³ tool, presented by MHE, is an artificial intelligence algorithm based on knowledge space theory. It assumes that learners do not follow the optimal path or the right sequence of materials to master. It systematically balances "correlation" and "causality" and tries to best answer the big questions that are:

- What are the learning factors that cause the learner's success ?
- What is the size of the effect produced ?
- How does the size of this effect vary according to the type of population ?
- Can we reach the Bloom effect ?
- Can we be sure that we have achieved true causality and have not highlighted a simple correlation ?
- Can we understand the high-performing learning factors that emerge ?
- How do these factors depend on learners' specific characteristics ?
- How to "concretely" increase the probability or chances of success of learners ?

ALEKS today

ALEKS is the acronym for "Assessment and Learning in Knowledge Spaces". Instead of offering a whole class a unique training presented by a teacher in the form of lectures, ALEKS offers each learner a "private lesson" adapted to his skills and his pace of work.

To achieve this, each student begins by taking a first in-depth test. ALEKS then analyzes the responses, using a system of algorithms based on AI and ML, and generates a specific study program, adapted to the learner, which will then be remodeled according to his/her progress.

Technology uses a form of artificial intelligence. It is the result of a work begun in the 90s with the support of NSF (National Science Foundation⁷⁴) to test different theories on knowledge and learning.

ALEKS has been tested in many universities, initially at the Westchester Community College⁷⁵ (formerly New York Institute of Applied Arts and Sciences) of New York (SUNY).

« For universities, the advantages of a software are many, because beyond the dream of "a new form of learning", the calculation is quickly made between a license estimated at \$ 25 per student and registration costs microbolants for more "classic" formations".⁷⁶ »

Huffington Post – 10/27/2015.

⁷³ ALEKS : www.mheducation.com/prek-12/program/aleks/mktsp-gab02m0.html

⁷⁴ National Science Foundation : www.nsf.gov

⁷⁵ Westchester Community College: www.sunywcc.edu

⁷⁶ ALEKS, a learning method that could revolutionize the school : www.huffingtonpost.fr/2015/10/27/methode-apprentissage-aleks-ecole-numerique-nouvelles-technologies_n_8398430.html

Results

The results presented in the conference are eloquent

| | | ALEKS vs. Non-ALEKS | Boost | Comparison Validity |
|---|---|---------------------|-------|---------------------|
| 1 | ALEKS Students vs. Non-ALEKS Students | 71% vs. 57% | 25% | Low |
| 2 | ALEKS Students vs. Non-ALEKS Students in ALEKS Sections | 71% vs. 52% | 37% | Medium |
| 3 | ALEKS Students in ALEKS Sections vs. Non-ALEKS Students in Non-ALEKS Sections | 71% vs. 57% | 25% | Low |
| 4 | Real ALEKS Sections vs. Non-ALEKS Sections | 67% vs. 57% | 18% | Low |
| 5 | Matched ALEKS Students vs. Non-ALEKS students | 70% vs. 55% | 27% | High |

The product is in constant development and as it is based on data collected over the years in dozens of "classes" in hundreds of establishments, the AI drinks from it and improves.

References

Artificial Intelligence and Machine Learning : The "Art of the Possible"

Wed Nov 1st 2017 - 10:30-12:00

Andrew Keating - Managing Director, Higher Education , Box

Alfred Essa - VP Analytics and R&D, McGrawHill Education

Masha Chase - Sr. Product Manager, Instructure

Paul Erickson - Assistant Director for Enterprise Architecture, University of Nebraska

Kyle Bowen – Director of Education Technology Services, The Pennsylvania State University

Blockchain

Yves Epelboin, Dominique Verez & Perrine de Coëtlogon

Two experts from the University of Texas at Austin, Phil Long and Phil Komarny⁷⁷ have shared their views about the blockchain, how does it work and its applications for higher education.

Among other things they have presented a project around the student data, including diplomas and badge certifications, using the blockchain ChainScript.

Phil Long made an analogy between the principles of the blockchain and the evolution of the networks from centralized to distributed. Blockchains can be considered as peer-to-peer file exchange systems. Each server in the network keeps track of all the transactions assembled together (block) and end-to-end (chained). And none of them can be erased, once the block has been validated. The trace (hash) of a transaction contains the date and time of the block validation (time stamping).

The most well-known and first use off the blockchain is the one used for the bitcoin.

A blockchain is often represented as a large secure registry, because:

- The proof of any transaction and its date will be retained and is unalterable,
- The transactions are validated without any human intervention all along the chain of servers in the network.

The registry contains the history of all exchanges made between users since its beginning.

A possible use of a private blockchain in a university is to consider it as a registry to share all the data of the students. For Phil Long, the blockchain interests are self-sovereignty and digital identity, trust, transparency and traceability, immutability and disintermediation. Relevant applications for education may include: recognition of learning credits, intellectual property management, smart payments and contracts, self-sovereignty and digital identity management.

The authors are working on a blockchain for:

- The development of the recognition and certification of learners' micro-credentials,
- The sovereignty of the 215 000 students of the University of Texas over their academic data, offering them a new service to take ownership and share their learning data.

In collaboration with Salesforce company they have built a platform, called Totelic, which has the potential to integrate information of the students from the 14 campuses. The platform is fueled by the student information systems (SIS) and the learning management platform (LMS).

A proof of concept, ChainScript to certify badges and diplomas...

Chainscript is a proof of concept, based on a blockchain, which aim is to provide each learner a means to possess, manage and share the records of his/her academic achievements.

With the app, a student may visualize in his portfolio all his data, badges and diplomas. He/she can decide to share some of them with whomever he wants. And the blockchain ensures that the information has not been falsified. For instance, as shown below, this allows to share badges.



⁷⁷ <https://events.educause.edu/annual-conference/2017/agenda/blockchain-how-can-we-use-it-in-higher-ed>

In short, ChainScript's ambition is to get rid of the current systems for archiving transcripts, diplomas and other academic records, which now costs between \$5 and \$10 dollars per request. With a blockchain, the University of Texas is able to consider a new way of storing this data for the learner. It is the start of a transformation of current processes, policies and procedures for all educational record-keepers.

From now on, given the success of this proof of concept, the university imagines how to integrate this demonstrator in a more sustainable way into the servers' architecture of campuses. Students from the Online Cyber Security program at the University of Texas San Antonio will be the first to have access to their academic record by means of a blockchain via ChainScript in 2017/2018.

A new possibility for ChainScript: following the careers of the academic staff and more

New avenues, to consider for ChainScript, would concern the digital management of property rights on resources created by experts from universities or to follow the careers of teachers. The aim is not to define their future, but to provide them with new ways of thinking.

More generally Chainscript could revolutionize the way archives are handled and preserved: not only learning credits but also intellectual property management, payments and contracts intelligent, self-sovereignty and digital identity management.

Conclusion: what experiments in France ?

Blockchain is a disruptive technology that is successful because it forces all players in a given sector to think together about the best way to share their information through a common registry.

Phil Long and Phil Komarny want to move from the well-known innovative "Bring your own device" practice to a new personal practice that encourages personalized and proactive learning: "Bring your own Data ».

By placing the student at the heart of the system, the student remains the sole master of the data that is concerning him. It is the student who decides what can be seen by others, whether they are on campus or in outside societies.

Additional bibliography

Interview of Phil Komarny :

<https://medium.com/inside-the-salesforce-ecosystem/the-platform-chronicles-10-questions-with-phil-komarny-chief-digital-officer-at-the-institute-for-c7972fd73acf> (

- Interview of Phil Komarny: <https://medium.com/inside-the-salesforce-ecosystem/the-platform-chronicles-10-questions-with-phil-komarny-chief-digital-officer-at-the-institute-for-c7972fd73acf>
- Andreia Inamorato dos Santos: <https://www.youtube.com/watch?v=zTt7jKaApy8&t=106s>
- [https://www.linkedin.com/in/ainamorato/detail/treasury/summary/?entityUrn=urn%3Ali%3Afs_treasuryMedia%3A\(ACoAAACqyXgBSC6pOK9DhJ_x9qP8cUTHapqAOfc%2C1504890404638\)](https://www.linkedin.com/in/ainamorato/detail/treasury/summary/?entityUrn=urn%3Ali%3Afs_treasuryMedia%3A(ACoAAACqyXgBSC6pOK9DhJ_x9qP8cUTHapqAOfc%2C1504890404638))
- MIT Media Lab experience: <http://news.mit.edu/2017/mit-debuts-secure-digital-diploma-using-bitcoin-blockchain-technology-1017>
- Dominique Verez in the EDUCAUSE 2016 report

Exhibit Hall

Dominique Verez, Bruno Urbero & Thierry Koscielniak

Trends

In 2017, 313 companies were present in the very impressive Exhibit Hall. To simplify the course, the organizers had the good idea to describe each one with 1 to 4 areas of activity, in a total list of 58 topics (one more than in 2016), which are :

Academic Information Systems - Accessibility - Analytics - Assistive Technology - Audio and Video Conferencing - Augmented/Virtual Reality - 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

A single new entry in 2017 for the category "Augmented / Virtual Reality" with 5 companies presenting products in the field : Accenture⁷⁸, AVI-SPL⁷⁹, OneOrigin LLC⁸⁰, RoadAmico⁸¹ and expereal⁸².

Compared to previous editions of 2014, 2015 and 2016, the 2017 edition has clear trends, all in connection with news events. We thus find in the show, responses very reactive to the immediate concerns of Universities and Colleges.

This is mainly the case of accessibility and digital signage :

| Topic | 2014 | 2015 | 2016 | 2017 | % |
|----------------------------|------|------|------|------|-----|
| Accessibility | | | 7 | 16 | 129 |
| Digital Signage | 7 | 10 | 10 | 15 | 50 |
| Data Security | 20 | 29 | 25 | 35 | 40 |
| IT Governance | 0 | 13 | 13 | 18 | 38 |
| Business Intelligence (BI) | 13 | 23 | 15 | 20 | 33 |

⁷⁸ Accenture : www.accenture.com

⁷⁹ AVI-SPL : www.avispl.com

⁸⁰ OneOrigin LLC : www.oneorigin.us

⁸¹ RoadAmico : www.roadamico.com

⁸² Xpereal : www.xpereal.com

All tables in this chapter show the number of companies working on the topics that have been listed. For example, in 2017, 16 out of 313 companies offer Accessibility-themed solutions.

By Accessibility we must understand everything that promotes accessibility, especially to people with disabilities. An example is VocaSee⁸³, which makes automatic transcription of audio and video files..

The Digital Signage theme covers digital signage as a communication tool that can broadcast information, in the form of multimedia content, in public places on a screen, a wall of screens or video projection system. We can mention the company Visix⁸⁴ as an example.

The Data Security theme continues to grow, as institutions have realized that this is a major area of concern that they have all too often neglected. Code42⁸⁵ is a good example.

IT Governance highlights the need to control IT centrally, from dashboards, for example. Constituo⁸⁶, especially for its cloud integration tools.

Business Intelligence (BI) is a very active subject in France too, although it is too much oriented towards SAP BO solutions, while there are plenty of others, like GlypEd⁸⁷ that I discovered on site.

Regarding the issue of the Student Retention, or how to keep in his school, throughout their course, those who come in first year. The phenomenon has exploded in 2015 and 2016, but is now falling, the peak is over..

| Topic | 2014 | 2015 | 2016 | 2017 | % |
|-------------------|------|------|------|------|-----|
| Student Retention | 2 | 43 | 48 | 39 | -19 |

Analytics in general, and *Learning Analytics* in particular, continue to gain momentum. Big Data and its statistical and analytical processing, more and more through Artificial Intelligence and Machine Learning, are confirmed stars of the different EDUCAUSE editions.

| Topic | 2014 | 2015 | 2016 | 2017 |
|--------------------|------|------|------|------|
| Analytics | 37 | 47 | 49 | 40 |
| Learning Analytics | 21 | 21 | 26 | 25 |

The Top 4 most represented sectors of activity does not change. The strongest increases are those related to Data Security, Consulting and Network Security, which gained 7 places. The biggest decreases are those related to Enterprise Information Systems and Student Information Systems which respectively lose 20 and 17 places, a sign that these issues are already well resolved.

| Topic | 2014 | 2015 | 2016 | 2017 | évol. |
|----------------------------|------|------|------|------|-------|
| Cloud Computing & Services | 90 | 115 | 96 | 70 | → |
| Online Learning | 45 | 55 | 51 | 53 | → |
| Analytics | 37 | 47 | 49 | 40 | → |
| Student Retention | 2 | 43 | 48 | 39 | → |

⁸³ VocaSee : www.vocasee.com

⁸⁴ Visix : www.visix.com

⁸⁵ Code42 : www.code42.com

⁸⁶ Constituo : www.constituosoftware.com

⁸⁷ GlypEd : www.glyphed.co

| Topic | 2014 | 2015 | 2016 | 2017 | évol. |
|--------------------------------|------|------|------|------|-------|
| Security Management | 26 | 30 | 35 | 37 | ↑ +3 |
| Mobile Apps | 23 | 46 | 41 | 36 | ↓ -1 |
| Data Security | 20 | 29 | 25 | 35 | ↑ +7 |
| Mobile Learning | 32 | 28 | 26 | 33 | ↑ +4 |
| Content Management Systems | 24 | 32 | 29 | 31 | ↑ +1 |
| Consulting | | 27 | 23 | 30 | ↑ +7 |
| Identity and Access Management | 16 | 15 | 24 | 29 | ↑ +4 |
| Network Security | 20 | 19 | 22 | 29 | ↑ +7 |

Top 12 most popular topics seen in the Exhibit Hall

Should you want to know which companies are working on a particular theme, log on the EDUCAUSE website⁸⁸. In case of concern, do not hesitate to come back to us, as the CNL (French National Software Agency) has all the available contacts.

Startup alley

In 2017, Thierry Koscielniak offered to visit all the stands of the Start-Up Alley one by one in the exhibition hall of the EDUCAUSE 2017 conference.

Here are the statistics of the number of startups present in previous years:

| | 2012 | 2013 | 2014 | 2015 | 2016 |
|--------------------|------|------|------|------|------|
| Number of startups | 30 | 30 | 29 | 24 | 27 |

But this year 42 startups were present on a large space sponsored by AWS (Amazon Web Services). It took more than a day to open the exhibition hall to interview them all.

Of these 42 startups, 16 were "graduates", a term chosen to distinguish those already present in 2016.

The organizers chose to classify according to five topics; here they are with the number of corresponding startups:

| Topic | Number of startups |
|--------------------|--------------------|
| Student Success | 16 |
| Content Management | 9 |
| IT | 7 |
| Cost Management | 6 |
| Security | 4 |

⁸⁸ events.educause.edu

Almost all startups came from the United States. It should be noted the presence of a French EdTech startup: TestWe⁸⁹ (dematerialization of exams). The other nationalities present were English, Italian, Swedish, Indian and Israeli.

Ten startups use artificial intelligence engines to varying degrees. OneOrigin⁹⁰ is the only one to build its offer on an assistant named SIA who will help the students to orient themselves and choose the institution of higher education which suits him. SIA will then help him not to become demotivated or even drop out.

Ten startups have been nominated to compete in the "Under The Ed Radar" competition. The winner is Cytillife⁹¹ (attention to the voluntarily modified spelling) which proposes to improve campus life and help students organize themselves better⁹²; see a more complete description in the chapter "Learning Analytics".

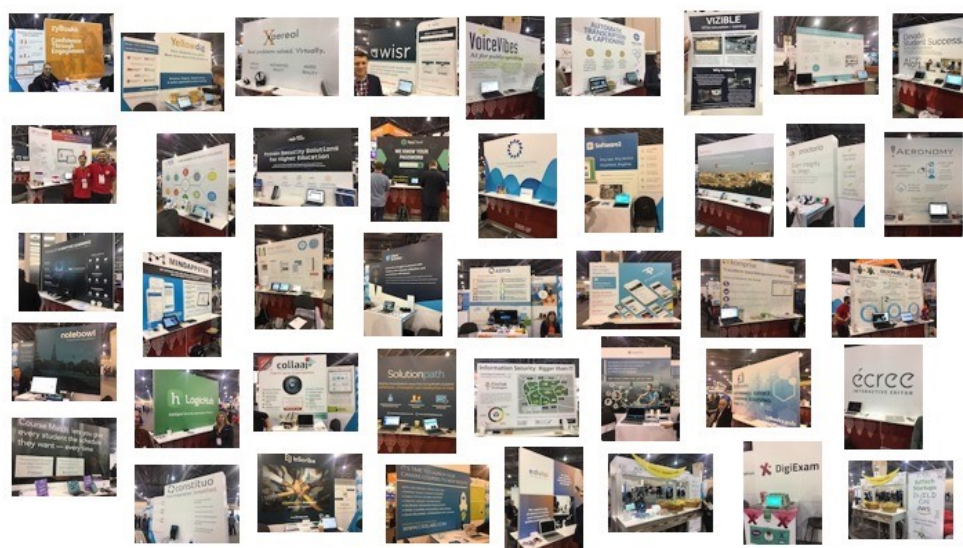
The second-biggest startup is SpyCloud⁹³, whose provocative slogan is "We know your password"! This company offers to scan the Dark Web constantly looking for stolen data at your institution.

It is interesting to note that Top Ten IT issues⁹⁴ rank security first and second-class success. These are the two themes of startups who have arrived at the top of the competition, but in reverse order of the Top Ten.

The favorite: xpereal⁹⁵ provides advice on the use of virtual reality technologies, augmented, 360 ° views (VR / AR / 360).

The strangest: Alpha who proposes to analyze brain waves by electroencephalograms to help students to revise. No website to consult or prototype to discover ...

Only 11 startups sent a follow-up email to the author. Can do better ;-)



Mosaic of the 42 booths in the Start-up Alley
Photos credit : Thierry Koscielniak

⁸⁹ <https://testwe.eu/fr/>

⁹⁰ <http://www.nibletz.com/education/one-origin-sia-college>

⁹¹ <http://cytilife.com/>

⁹² <http://www.nibletz.com/events/educause/cytilife-win>

⁹³ <https://spycloud.com/>

⁹⁴ <https://www.educause.edu/research-and-publications/research/top-10-it-issues-and-strategic-technologies>

⁹⁵ <https://www.xpereal.com/>

Spotted in the Exhibit Hall

The participation in EDUCAUSE allowed the identification of many companies. The focus has been on new partners and solutions in cloud themes, in the implementation of the RGPD⁹⁶ and security solutions (mainly encryption).

Four companies have been specially approached in this process. For two of them, the establishment of a rapid and effective collaboration is envisaged in the form of a protocol. The other two were especially approached for their innovative solutions for technology watch purposes.

Box⁹⁷

This company, little known in the HE community, offers a complete cloud hosting service. Its services are widely used by American universities, many of which consider it to be the partner of the field most suited to their needs.

It is a "pure player" cloud actor whose features are found in other major cloud hosting providers such as Dropbox, OneDrive, Amazon or Google. The company is based in France and, after initially concentrating its efforts on the industrial sector, opens up to the public sector including the HE.

Like all the companies we met, it is aware of the constraints of the GDPR and offers a set of technical solutions to take into account in terms of traceability, audit, logs, report, etc. Possibilities of retention, classification, legal deletion, etc. are existing and implemented when documents are created.

The solution is based on content management and all services offered have been built around it.

The platform was built to meet professional needs and therefore teamwork and administration by an IT team. As a result, an advanced management, while being ergonomic, rights is present as well as the association of the metadata on the files used by the search engines. The Administration Console allows you to manage large teams by delegating administrative rights. A single user account manages all of its collaborative spaces and gives it the ability to define a wide variety of rights to the data that it owns.

Interconnection with other applications is offered thanks to a large number of connectors and offers as standard APIs for taking into account specific situations.

This actor met to position himself as a challenger could be more promising than expected.

ServiceNow⁹⁸

ServiceNow is a service-oriented cloud platform that brings together features that are dispersed across the various departments of the organization. The provided platform only includes the software and relies on cloud services to be taken separately. It is supported by most cloud hosts and even private solutions (on premise). It administers a service desk, offers an HR module, and integrated infrastructure monitoring solutions that can detect problems early and fix them without interruption. Security and incidents are proactively managed. This first is coupled with a preventive action via a self-service platform that provides patches and avoids overloading the service center by users.

A special effort is made for the user experience not only with the preventive actions of the service center but also by facilitating access to the service by offering ergonomic and native mobile accesses (Web applications responsive design).

Even in the case of public cloud usage, there is isolation of the client in single tenant (non shared instance) securing the data contained

⁹⁶ GDPR : General Data Protection Regulation

⁹⁷ BOX : www.box.com

⁹⁸ ServiceNow : www.servicenow.com

The platform uses a configuration management database (CMDB): this information library contains all the configuration elements, connections and workflows. It is this brick that allows the platform to be administered centrally and securely.

Many connectors exist and the presence of APIs⁹⁹ also allows a wide interconnection.

SysCloud¹⁰⁰

Syscloud is an overlay of cloud hosting services (like Box, Google suite, Office 365). The prerequisite is that the use of the cloud has become a de facto standard.

Two major features, threat detection and backup, integrated into the same services are proposed

A service for detecting threats and malware, phishing, etc. is present and efficient for large organizations (tens of thousands of users) and blocks the dissemination of confidential information and reports to the IT team.

Mail filtering, web content, documents, chats are possible in the case of the prevention of threats of violence, suicide, harassment, hate messages

Tools are available to manage FERPA¹⁰¹ and CIPA¹⁰² (and by extension the GDPR)

Detection and blocking of the dissemination of personal data, health, the activity of malware potentially contained in student data, attempts by activity analysis hackers, phishing, ransomware, etc. are services offered by the platform.

FinalCode¹⁰³

FinalCode offers a solution for sharing confidential documents without losing control. It is therefore possible to transmit them, to prevent them being copied (even by copy and paste), printed and transmitted legibly. The use of these documents remains controlled even when they are no longer in the cloud which, moreover, they can be destroyed.

To be controlled outside the cloud, there is the need to have a heavy client on the computer where the decryption is done. The solution is natively supported by the Box Management Console which is expanded

The system relies on key management managed by a FinalCode server that can be either in the cloud or on-premise. The set is configurable and allows to define rules according to users, groups, files, etc.

⁹⁹ API : Application Programming Interface

¹⁰⁰ SysCloud : www.syscloud.com

¹⁰¹ FERPA : Family Educational Rights and Privacy Act

¹⁰² CIPA : Children's Internet Protection Act

¹⁰³ FinalCode : www.finalcode.com

Acknowledgements

Richard Katz.

The teams from SUNY Stony Brook: Melissa Woo, Kim Scalzo, Patricia Aceves, Michael Ospitale, Matthew Nappi, Diana Voss, Gary Van Sise, Jarrod McFarlane, Matt Froehlich, Victor Montanez, Wendy Tang, Ken Lindlom, Sarah Jourdain.

The teams from Princeton: Nadine Stern, Jay Dominick, Serge Goldstein, Rebecca Graves-Bayazitoglu, Ben Johnson, Robert Knight, Steven Sather, Donna Tatro, Carol Williams.

The teams from University of Pennsylvania: Greg Palmer, Peter Decherny, Josh Beeman, Thomas Murphy.

The teams from EDUCAUSE: President & CEO John O'Brien, Malcolm Brown, Cathy Hafkus.

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English translation: John Augeri & Yves Epelboin.

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