



EPFL

**Centre
Excellence
in Africa**

Annual report 2022

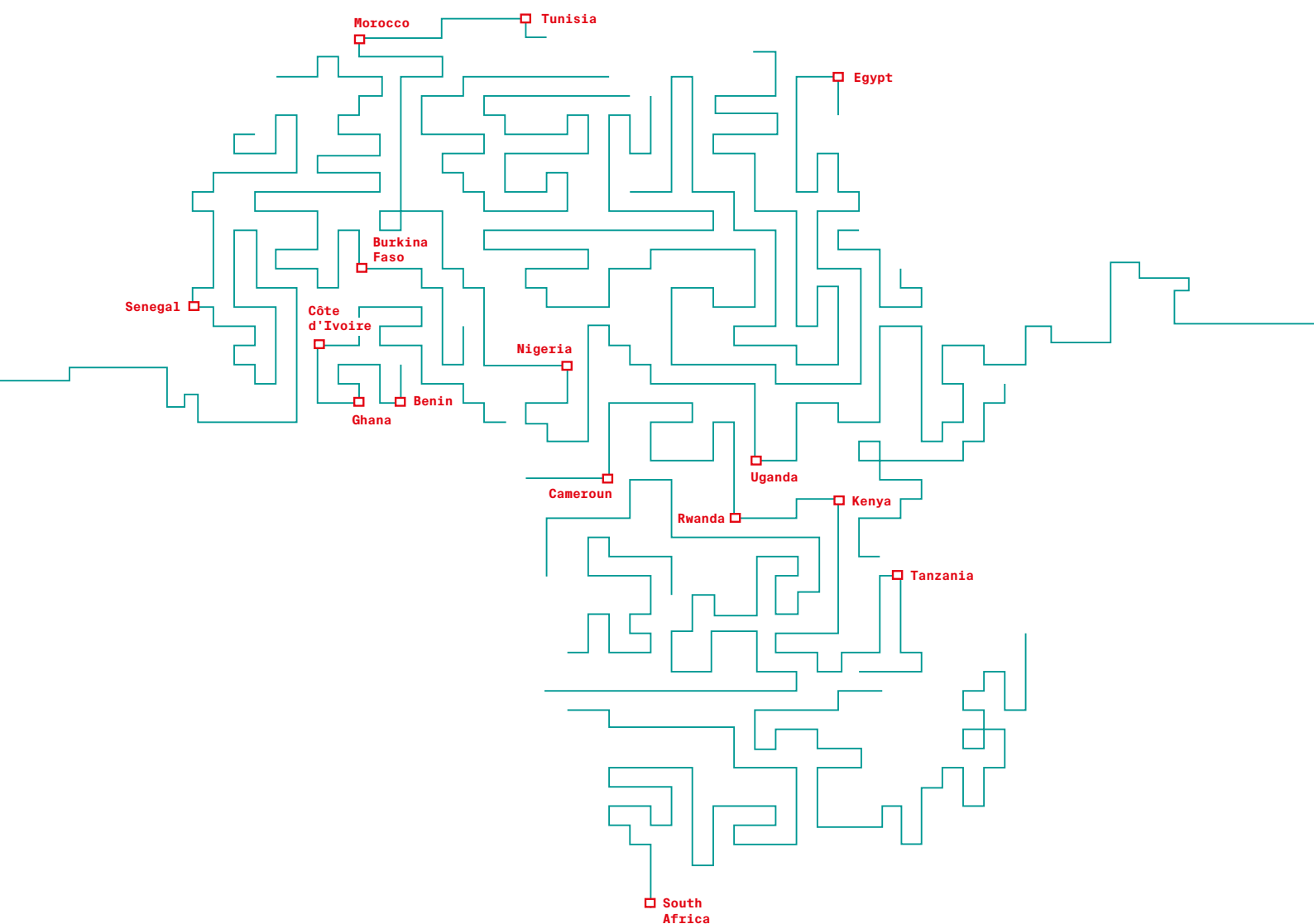
**Centre
Excellence
in Africa
Annual report 2022**

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Excellence in Africa

is an EPFL research centre whose core is digitalisation and excellence in research, training and innovation throughout Africa.



Creation in
January 2020

A team of of
15 people



Academic Director
Dr Jérôme Chenal

Ongoing projects in
15 African countries

3 areas of focus



Academic
excellence



Digital
education



Transmission

After months of work, the first results are in!

Launching an initiative on the scale of Excellence in Africa, jointly implemented with Mohammed VI Polytechnic University (UM6P) in Morocco, doesn't happen in a few weeks. It takes months. After calls for projects, selection committees and contracts, it's now the researchers' turn to do their work. So we're delighted to welcome their first scientific results!

The five research projects selected during the first phase of the **“junior faculty development”** programme, pillar 1 of Excellence in Africa, focus on major continental challenges such as health and energy (using non-edible plants to produce biofuels). This first phase confirms our expectations. The professors are working closely together.

As part of the **“100 PhDs for Africa”** programme, the second pillar of the initiative, the first ten doctoral students have had their contracts signed. The initial aim was to test the scheme. The research has been launched and we are seeing some very gratifying initial results (presentations of EXAF projects at international conferences, first internships at EPFL). Many of our colleagues have responded to the call and are showing their enthusiasm for Excellence in Africa.

Now that the teaching staff and technical experts have been trained, pillar 3 of the **“digital education”** initiative has achieved a large part of its objectives. The teams are now working hard to make the studios in the 6 winning universities operational. A series of inaugurations is scheduled for 2023.

The **“Digital solutions for sustainable cities in West Africa”** project supported by the Swiss Agency for Development and Cooperation (SDC) will become the 4th pillar of the

initiative in 2023. The EXAF Centre teams have been working on drafting the programme document throughout the year with our partner, UM6P, which will be responsible for creating and monitoring innovation in this area.

The **African Cities Lab** is online! After a year and a half of development, the platform is up and running. It is ready to host MOOCs (Massive Open Online Courses), which are currently being developed in the four corners of Africa. Twelve new online courses will be hosted on the platform in 2023.

Finally, the EXAF Centre teams have carried out other studies, such as the **“Urban strategy of the Swiss Agency for Development and Cooperation”** in partnership with the London School of Economics (LSE) and the **“E-learning in low connectivity contexts”** project for the Unité association.

2022 has been a very busy year. I would like to take this opportunity to thank all those who have contributed, in one way or another, to the success of the Centre of Excellence in Africa.

Dr Jérôme Chenal
Academic Director
of the Centre Excellence in Africa



Excellence in Africa Initiative

The Mohammed VI Polytechnic University (UM6P) in Morocco and EPFL, through the EXAF centre, have designed a programme based on the following four pillars: Junior Faculty Development, 100 PhDs for Africa and Centres of Competence in Digital Education and EPFL-DDC Project.

in partnership with





Pillar 1 Junior Faculty Development

Five projects selected in 2020 were underway or started in 2022.

A sixth project is currently awaiting an administrative decision.

Projects in progress

The following results have been obtained by the tandems that began their research:



Ines Elbini / Hilal Lashuel Tunisia, Institut Pasteur de Tunis - IPT / EPFL

In order to make progress on two "Workpackages" that are extremely important, numerous experiments were carried out in 2022, including:

- The purification of biomolecules extracted from scorpion venoms at the IPT. The peptides KAaH1 and KAaH2 were purified using various chromatographic techniques.
- The activity of these biomolecules in in vitro aggregation and in neuronal models of α -synucleinopathies was measured at EPFL.

As part of this project, several trips/internships/workshops were carried out in 2022:

- Dr Ines ELBini's internship at EPFL (18/06 to 29/07)
- Training period for Dr Zaineb Abdelkafi (Post-doc) at EPFL (12/03 to 01/04) and (06/09 to 30/09)

- A scientific conference was organised in Tunis (04/09 to 06/09). It brought together Dr Jérôme Chenal, Director of EXAF, Dr Frédéric Meylan, JFD Project Leader, Prof. Hilal Lashuel (Co-PI), Prof. Jacques Fellay and Prof. Elissa Oricchio (On-line). The title of the conference was: EPFL-IPT Symposium: **Exploring collaborations at the frontiers and interfaces of neuroscience, cancer and infectious diseases.**

The project was also featured in the EPFL quarterly journal DIMENSION.

Thanks to funding from the JFD programme, the following people worked on the project in 2022 (in addition to the two principal investigators)

Name	Position	Main tasks	Main achievements during the period
Dr Zaineb AbdelKafi	Post-doc	<ul style="list-style-type: none"> - Assessment of the effect of peptides in the primary cell culture - Order of consumable and equipment - Project management 	<ul style="list-style-type: none"> - Training in the execution of a number of experimental studies - Primary cell culture of neuron from the brain of newborn mice
Dr Chedly Ellijimi	Post-doc	<ul style="list-style-type: none"> - Purification of native form of peptides 	<ul style="list-style-type: none"> - Purification of biomolecules (KAaH1 and KAaH2) from scorpion venom
Donzelli Sonia	Scientific collaborator		
Mahul Mellier Anne-Laure,	Scientific collaborator		



Thomas Kivevele
Jeremy Luterbacher
 Tanzania, NM-AIST / EPFL

Numerous laboratory experiments were carried out in 2022, including:

- The characterisation of heterogeneous catalysts to be used in the cross-ketonisation of vegetable oils from which biodiesels are derived.
- The characterisation of extracts from various parts of Loquat (root barks, leaves, barks, peels and pulp) using chromatography techniques coupled with mass spectrometry analyses.

As part of this project, an internship was carried out in 2022:

- Prof. Kivevele's internship at EPFL in Prof. Luterbacher's laboratory (04/10 to 25/11).
 A major achievement was to become familiar with the techniques used at EPFL, so that they could be reproduced at NM-AIST.

El Mehdi Amhoud
Andreas Burg
 Morocco, UM6P / EPFL

This research project began at the end of 2022, after the contract had been finalised and signed by UM6P and EPFL. Consequently, the activities initiated in 2022 mainly consisted of putting in place the procedures that will enable the research to be launched in 2023. It has therefore been necessary to start a new recruitment procedure for the staff who will work on this project, both at UM6P and at EPFL.



Steve Ndengue
Nicola Marzari
 Rwanda, East African Institute for
 Fundamental Research - University
 of Rwanda, Kigali / EPFL



Prof. Ndengue spent time on the EPFL campus in Prof. Marzari's laboratory (and took part in the conference mentioned below).

The EPFL JFD team took advantage of Prof. Marzari's organisation of the Psy-k conference in Lausanne to present the JFD & 100 PhDs programmes. This conference is one of the most important (if not the most important) conferences organised in the field of electronic structures.

Samir El Hankari,
Wendy Queen
 Morocco, UM6P / EPFL

This research project also began at the end of 2022, once the contract had been finalised and signed by UM6P and EPFL. The activities initiated in 2022 mainly consisted of putting in place the procedures that will enable the research to be launched in 2023.

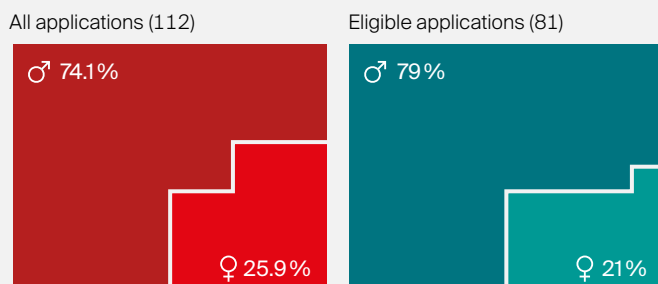


Sabastine Ezugwu
Francesco Stellacci
 Nigeria, University of Nsukka / EPFL)

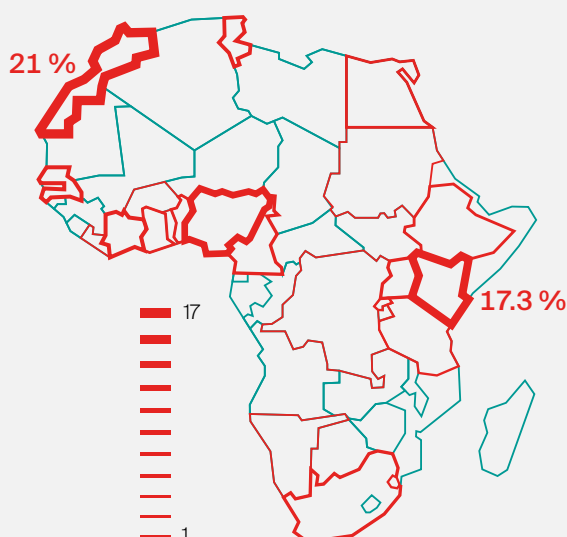
Status of the research project
 pending decision by the EPFL /
 UM6P Steering Committee



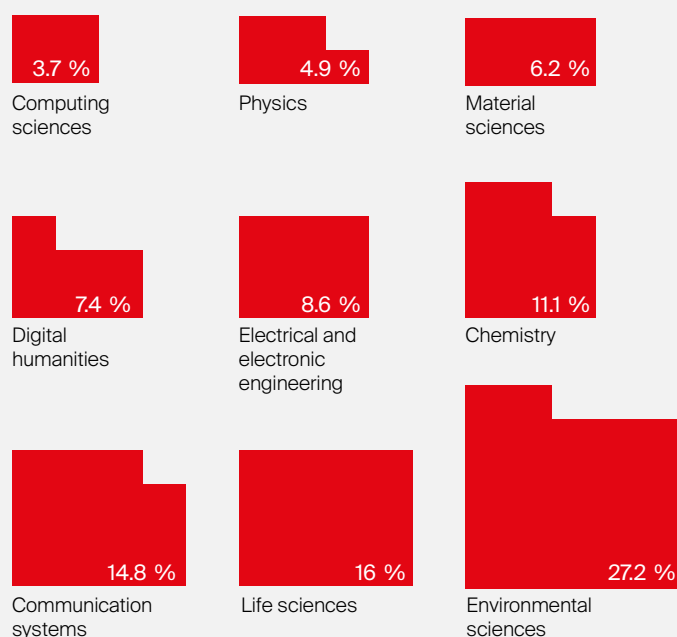
Graph 1:
Breakdown of applications by gender



Graph 2:
Breakdown of applications by country (total=112)



Graph 3:
Breakdown of applications by discipline



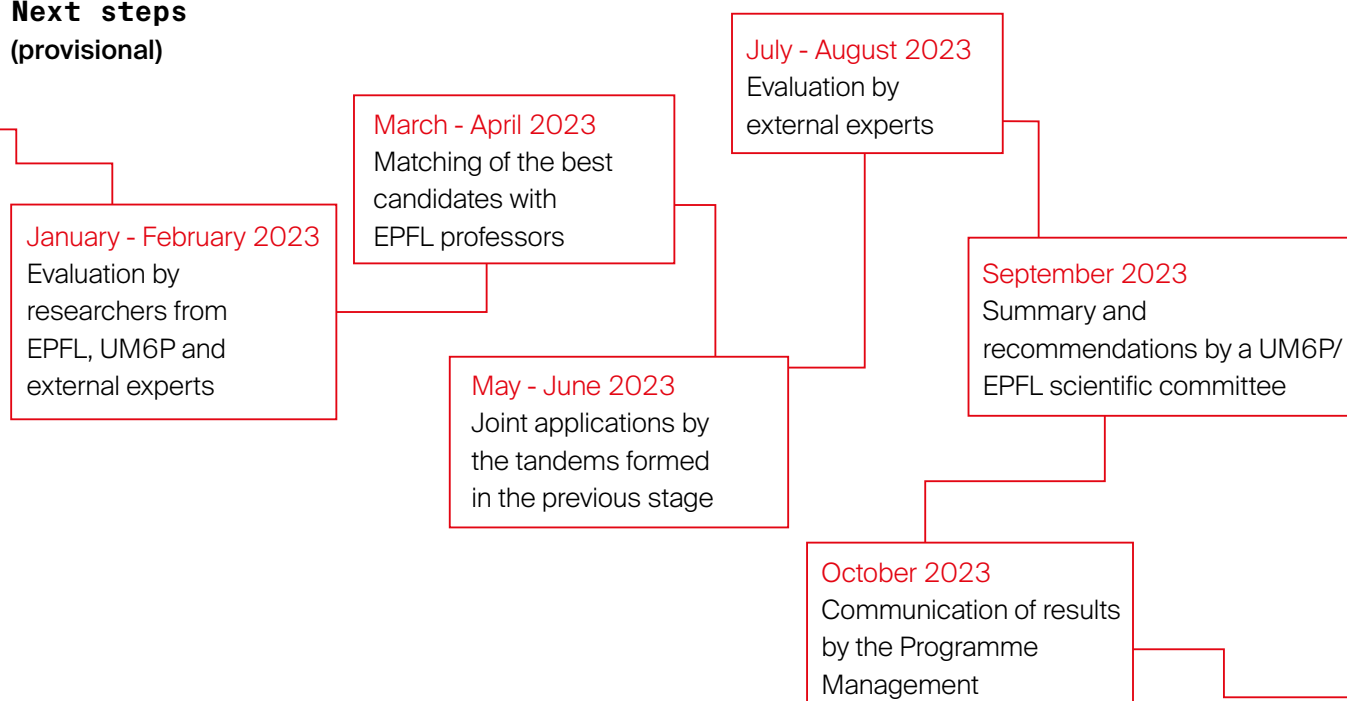
Second call for proposals (2022-2023)

For the 2nd call for proposals of the JFD call for proposals, we registered 112 applications, 72.3% of which were eligible. The distribution of applications by gender was as follows, before and after the eligibility evaluation (graph 1).

Applications by country are shown on the map below. Morocco and Kenya provided the largest contingents, with 21% and 17.3% respectively (graph 2).

Unsurprisingly, projects in the field of environmental sciences and engineering are in the majority (27.2%), closely followed by life sciences (16%) and communication systems (14.8%). As many of the projects were interdisciplinary in nature, the above breakdown is necessarily subjective. Interestingly, a digital component (e.g. machine learning analysis) is mentioned in the methodological description of a very large number of JFD projects.

Next steps (provisional)



Conclusion

Today, the JFD programme is a success. Apart from one project whose start had to be postponed because of a strike in Nigerian universities, the projects selected so far have been able to start under excellent conditions. The first tangible scientific results (e.g. the publication of articles in peer-reviewed journals) are expected this year. Nevertheless, preliminary activities organised by the various project tandems (participation in conferences, organisation of workshops, etc.) have already enabled the colours of UM6P and EPFL.

The second call for proposals confirms the relevance of this programme. Although the number of applications submitted has fallen slightly compared with the first call for projects, the average quality of the applications received has greatly improved. The JFD programme's reputation for excellence is now well established, encouraging only exceptional candidates to apply.



Pillar 2

100 PhDs for Africa

All these research projects started in 2022, after the finalisation and signature of the contract. Consequently, the activities initiated in 2022 mainly consisted of setting up the thesis plan and initial activities.



Name	Starting date	University	Supervision (Africa)	Supervision (EPFL)
Maurine Andanje	May 2022	Jomo Kenyatta University of Agriculture and Technology	Prof. Mwangi James Wamai	Prof. Sandro Carrara
Amal Machtalay*	May 2022	Mohammed VI Polytechnic University	Prof. Ahmed Ratnani	Prof. Daniel Kressner
Joseph Jjagwe	May 2022	Makerere University	Prof. Peter Wilberforce Olupot	Prof. Sandro Carrara
Brandon Bischoff	June 2022	University of KwaZulu-Natal	Prof. Yin-Zhe Ma	Prof. Jean-Paul Kneib
Shimma Heikal	June 2022	The American University in Cairo	Prof. Mohamed Salama	Prof. Hilal Lashuel
Lou Tinan Ange-Laetitia Tra	June 2022	Centre Suisse de Recherches Scientifiques en Côte d'Ivoire	Prof. Dongo Kouassi	Dr Jérôme Chenal
Maurane Gaëlle Fokam Fokam	July 2022	École Nationale Supérieure Polytechnique de Yaoundé	Prof. Fokam Kenmeugne Bienvenu	Prof. Véronique Michaud
Geoffrey Mwendwa	August 2022	University of the Witwatersrand)	Prof. Daniel Wamwangi	Prof. Hugo Dil
Achraf Delhali	October 2022	Mohammed VI Polytechnic University	Prof. Youssef Belmabkhout	Prof. Kumar Varoon Agrawal
Issa Coulibaly	October 2022	Mohammed VI Polytechnic University	Prof. Hajar El Hammouti	Prof. Anne-Marie Kermarrec

* Amal Machtalay's internship at EPFL in Prof. Kressner's laboratory (September - December).



Pillar 3 Digital education

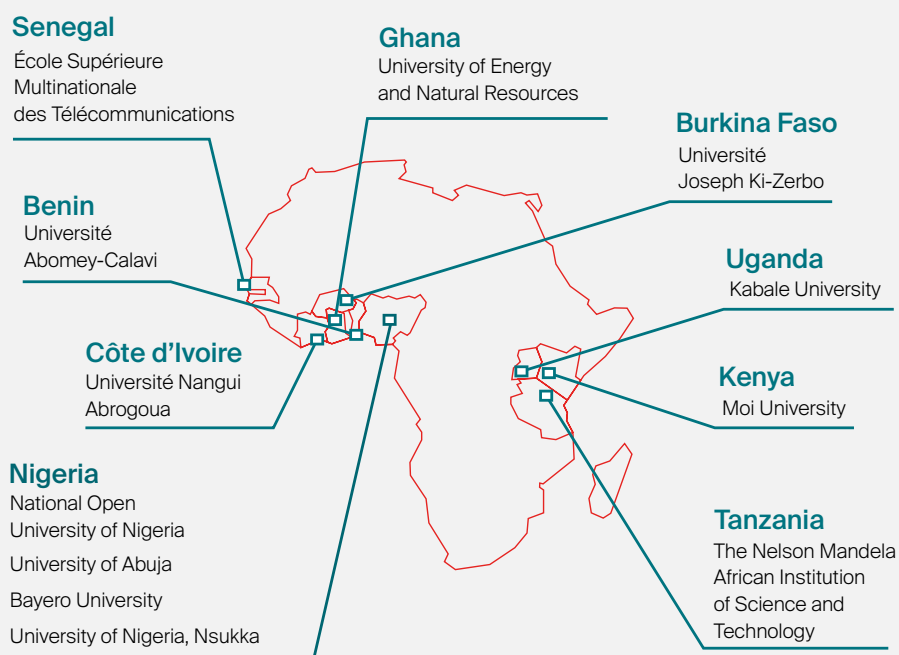
To address the growing demand to integrate digital education in African Universities, the Association of African Universities¹ and the EPFL initiated a second call to establish six additional Centres of Competence in Digital Education (C-CoDE) in ACE Impact host universities. Thus, doubling the impact of the project.

1

This was under the Africa Higher Education Centres of Excellence for Development Impact Project (ACE Impact).



Workshop in
Cotonou, April 2022



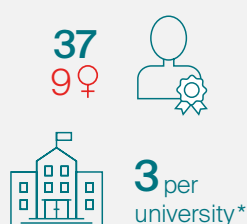
12
universities
taking part

It was a great experience for us, the trained experts in digital education. I believe we will have an impact in our respective institutions.

Nicholas Nkamwesiga, Kabale University

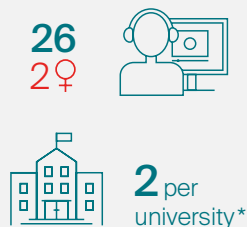
Training of Experts in Digital Education

experts trained**



Training of Technicians

trained face-to-face



■ total ■ women

Digital Education Masterclass

English speaking cohort

218
101 ♀

enrolled on the platform



started the course

184
97 ♀



certified

112
62 ♀



French speaking cohort

104
20 ♀

81
18 ♀

51
12 ♀

163
74 ♀

Training Methodology and Outputs

Experts in Digital Education followed a blended learning training to experience a full range of online courses, while Faculty Members followed a fully online course, the Digital Education Masterclass. The trainings were facilitated by digital education experts from EPFL, UM6P and other universities in Africa.

I have learnt so much that I feel like a brand-new teacher. Can't wait to apply it and improve my face-to-face lectures by converting it to blended learning.

English-speaking Expert

* Université Nangui Abrogoua and Bayero University asked to have an additional Expert and 2 extra Technicians trained respectively.

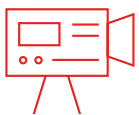
** This table includes the 19 experts trained in 2021.



Setting up the camera during the training.

I am so happy I had the opportunity to be a student here for a couple of weeks. It takes pride in Africa and I am just grateful to be here. I think it's a great example to follow.

Participant at a training at UM6P



Learning in a studio

Learning-by-doing was at the centre of the two-week trainings of technicians, taking them through all the steps of producing a video and setting up a studio.

The trainings mostly took place in African universities, namely in Morocco (UM6P), Senegal (ESP-UCAD) and Uganda (Kabale), enabling the 26 technicians to see how to set up studios in conditions that were akin to their own and learn from technicians who might face similar issues.

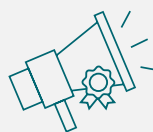
Key Outcomes



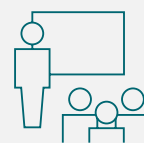
To put theory into practice during the training, faculty members transformed an existing course into an online one as a case study.



Faculty members experienced best practices in online learning and facilitation, which they can replicate with their students.



Trainees promote digital education in their universities.



Experts' new digital education competencies were recognised by their peers during regional conferences in Cotonou and Abuja.

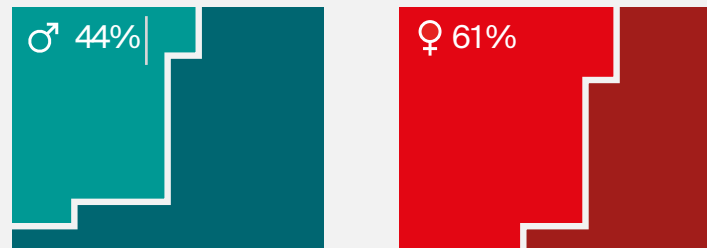


Creation of a strong learning community amongst the Experts.

The impact of training women

While fewer women enrolled in the Masterclass, 61% of them obtained their certificate, in comparison with 44% of men. Overall, 45% of those who finished the Digital Education Masterclass were women. Promoting the participation of women is, therefore, not only good for women, but also for increasing the impact of the project as a whole.

Percentage of enrolled men and women who successfully completed the Masterclass



Regional Digital Education Conferences

To promote the sustainable integration of digital education in ACE universities and other universities in sub-Saharan Africa, regional digital education conferences were held in Cotonou, Benin (April 2022) and Abuja, Nigeria (May 2022). Participants included government officials, policy makers, ACE for development impact centers of excellence and non-ACE educational institutions.

Over 70 participants from Burkina Faso, Togo, Côte d'Ivoire, Senegal, Niger, and Guinea Conakry attended the conference in Cotonou, while 150 participants attended the one in Abuja.

The new Experts in Digital Education were key advocates for digital education during the conferences. By sharing the best practices they learnt during the training, they motivated many participants to integrate digital education in their own courses.



Three new experts presenting best practices in digital education.

Pillar 4

Digital Solutions for Sustainable Cities in West Africa

After writing the report “The use of digital technology in the context of cities in West Africa” and the pre-feasibility study, EPFL applied to the SDC for a grant and an opening credit for a period of 18 months, which was granted from April 2022 to September 2023.

The request was made to:



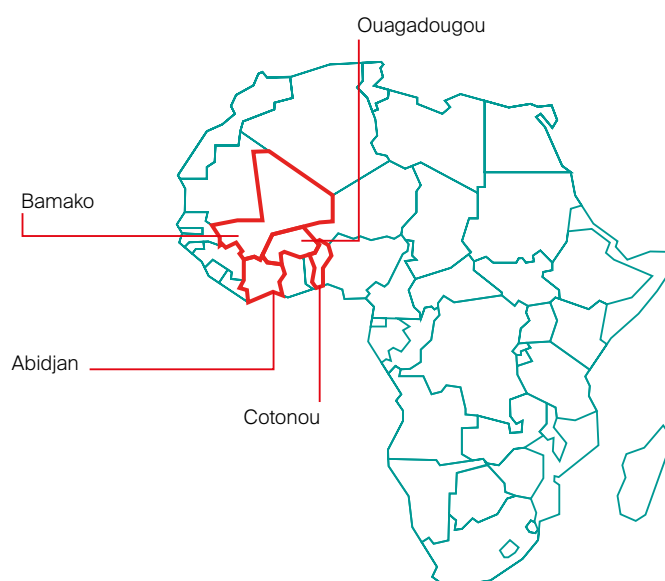
1. Prepare
the project
document (ProDoc)



2. Consolidate
partnerships in
the four towns



3. Finalise local
analysis of
digital use



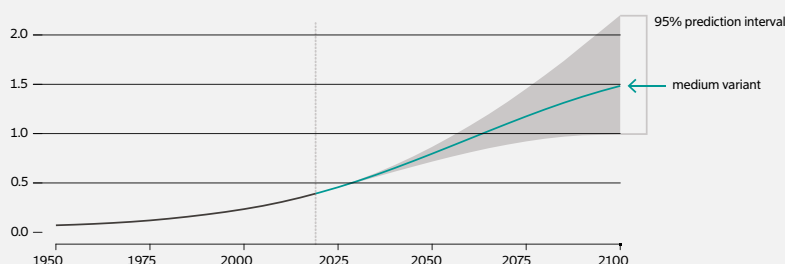
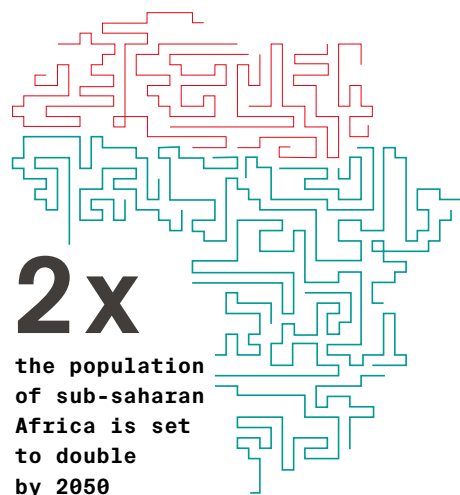
The *Digital Solutions for Sustainable Cities in West Africa* project is part of EPFL's Excellence in Africa Initiative. It will be carried out in three phases of four years each, for a total duration of twelve years from the end of 2023 to mid-2035. The project targets four cities in West Africa: Abidjan, Greater Cotonou, Ouagadougou and Bamako.

The aim of the first phase is to set up and test the project's innovative system with the installation of a pilot Living Lab in Abidjan to implement digital solutions for cities.

Context

The population of sub-Saharan Africa is set to double between now and 2050, and this increase is expected to be even greater in West Africa. This demographic growth, combined with an exodus from rural to urban areas, will lead to an inevitable and unstoppable increase in the urban population. West African cities are currently only marginally able to cope with this growth which, if left unchanged, will lead to an increase in socio-economic problems such as unemployment, the proliferation of informal housing, social polarisation and deteriorating access to basic services. Governments in sub-Saharan Africa are

looking for technical solutions and innovative ways to meet these challenges in cities, in particular to making basic services more accessible to vulnerable urban dwellers. In response, it is becoming clear that there is a largely untapped potential for using digital technologies to address urban problems at a time digital revolution in Africa. This technological breakthrough has the potential to facilitate leapfrogging and enable African cities to make a rapid leap forward in economic development and poverty reduction. The project will contribute to the digitisation of the cities concerned by developing and implementing digital solutions that will complement or replace the physical or analogue processes already in place.



Description

The project, which is an extension of the Excellence in Africa Initiative implemented by the Ecole Polytechnique Fédérale de Lausanne (EPFL), aims to encourage the use of digital technology and new technologies to meet the major challenges of urban expansion in West Africa. The creation of Living Labs (LL) will help to develop participative innovation and collaboration between cities and their universities, and help to build sustainable cities for the benefit of citizens, particularly the most disadvantaged. Scientists will benefit from ideal study sites for implementing their innovations, while cities will benefit from local academic expertise to find tailored solutions to their development problems.

Objectives

The overall objective of the “Digital Solutions for Sustainable Cities in West Africa” project is to contribute to the sustainable development of four cities in sub-Saharan Africa (Abidjan, Bamako, Cotonou, Ouagadougou) as well as secondary cities in the countries concerned, through the deployment of innovative digital solutions for the most disadvantaged citizens.

The project will focus on the following outcomes:



Outcome 1. Locally-developed and customised digital solutions, implemented at city level, solve socio-economic problems and linked to urban development in West Africa.

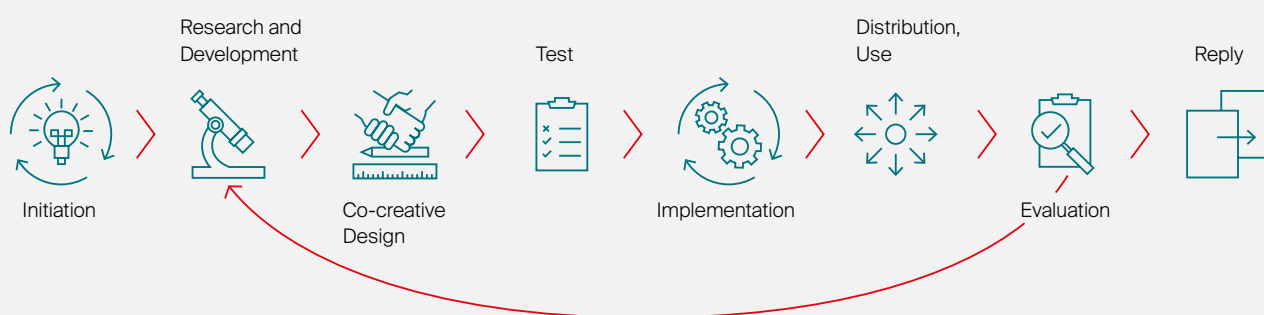


Outcome 2. Local capacities of decision-makers and technicians at city level, as well as lecturers and PhD students at partner universities, are strengthened in terms of new technologies and digital technology.



Outcome 3. The private sector in the field of new technologies is strengthened through support for the implementation of innovation results and the creation of jobs linked to the digital industry.

Participatory innovation mechanism of Living Labs



Intervention strategy

The project proposes to work initially in the four African cities mentioned above, with individual options adapted to each city. However, the following general strategies will be implemented in parallel in each of the cities at the start of the project:

Strategy 1: Create a pilot Living Lab (LL) in the city of Abidjan.

Dialogue between local authorities, universities, civil society and the private sector will enable the specific needs of the city to be identified locally and solutions found to support disadvantaged city dwellers. In the first four-year phase, a pilot Living Lab

will be set up in the city of Abidjan to facilitate this dialogue between stakeholders and encourage the co-creation and co-experimentation of applied research projects that will lead to results tailored to the territory, for several use cases, for example: spatial planning, health, financial inclusion, improvement of services such as energy, water, sanitation, transport and waste management. In the second phase of the project the Living Lab model will also be implemented in the other project cities (Cotonou, Bamako, Ouagadougou).

Strategy 2: Capacity building in each city

EPFL's collaboration with local partners in urban development and new technologies will strengthen the capacities of local authorities and universities. The project will fund applied research projects carried out by local

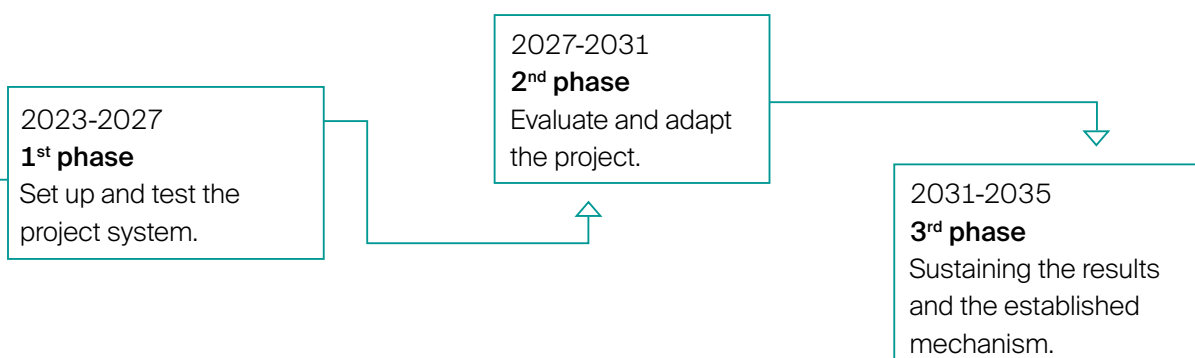
researchers and universities with the support of local authorities to develop digital tools or solutions. For example, an analysis of traffic data could improve the efficiency of transport; the use of a Geographic Information System (GIS) could improve waste management; a mobile money application could enable people to use and pay for services such as electricity generated by a domestic solar system, etc.

Strategy 3: Implementation the results of innovation by supporting the creation of local start-ups

Putting in place a financial and technical support mechanism to facilitate the commercialisation of the results of innovation will encourage the projects developed by the intervention. In addition, the expansion of the private sector in an area that is not saturated will help to create new jobs.

Project duration

The project will start at the end of 2023 and will be carried out in three phases of four years each, for a total duration of twelve years.





African Cities Lab

The African Cities Lab project aims to create a digital education platform and MOOCS on urban development in Africa.

in partnership with the Swiss State
Secretariat for Economic Affairs



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

African Cities Lab

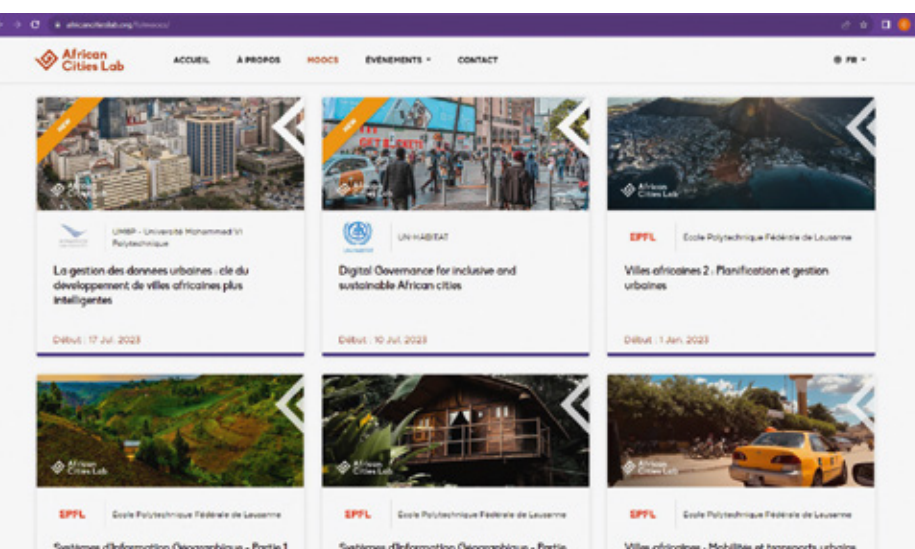
The overall objective of the project is to create an African digital education platform on urban development, offering quality MOOCs and online continuing education training for professionals.

It will also act as a forum for the exchange of digital educational resources and the management and governance of African cities to foster sustainable urban development.

Anchored on African soil, initially under the supervision of EPFL, the Platform will gather leading universities in the English-speaking and French-speaking regions in order to create a network of institutions in digital education and have impact on the entire continent. Six African institutions are part of the project: (i) the UM6P in Morocco, (ii) the African Centre for Cities at the University of Cape Town in South Africa, (iii) the Higher Institute of Environment, Urbanism and Building Technologies at the University of Carthage in Tunisia, (iv) the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana, (v) the University of Rwanda (UoR), and (vi) Sèmè City in Benin. These institutions have technical capabilities to facilitate the production of digital material. The project will be implemented over a two-and-a-half year period. This initial

period will set the ground to anchor the activities of the Platform in Africa in a sustainable way, including by strengthening the financial strategy for future developments. The project is structured along three components that started concomitantly:

- **Component 1**
African Platform on urban development
- **Component 2**
Digital educational content on urban development
- **Component 3**
Continuing education



Description of the project's progress

Component 1 – African Platform on urban development

Sèmè City, the UM6P and the EPFL have developed the educational platform in an open EdX format. Interactions between UM6P and Sèmè City have facilitated a South – South cooperation and knowledge exchange. The platform's landing page was launched in February 2022 (africancitieslab.org / africancitieslab.com). It serves as the project website as well as the interface for learners signing up to follow the MOOCs and training programmes. The Beta version of the platform was launched in April 2022. The developers are testing the open EdX plugins and integration of the EdX course catalogue. The MOOC “African cities: introduction to urban planning” by Dr Jérôme Chenal is used to test the platform. The platform was released on October 15, 2022, using the “tutor” open edX distribution, which provides a reliable setup and allows to easily customize the platform features. It also let upgrade the Open edX version, extend the functionalities of the platform with plugins and upscale the platform resources when required by user growth.

Component 2 – Digital educational content on urban development

EXAF launched the call for proposals to produce MOOCs on African cities and urban development on March 17th 2021. A list of 13 MOOCs was validated by the Board of Directors. The list of MOOC that started to be developed in 2022 is as follows:

- 1.** Digital Governance for inclusive and sustainable African cities led by UN-Habitat
- 2.** Urban data management: Key to developing smarter African cities led by Mohammed VI Polytechnic University
- 3.** Making housing markets work in African cities: understanding the role and opportunity of finance led by Centre for Affordable Housing Finance in Africa (CAHF)
- 4.** African urban economic development in the context of climate change led by Mohammed VI Polytechnic University
- 5.** Integrating land use and mobility planning for sustainable cities led by Urbaplan and Transitec
- 6.** The collective urban factory: Ideas and tools to co-produce african cities led by gret

7. Smart cities, clever tactics, and urban possibilities in Africa led by African Cities Center

8. What can food tell us about cities in Africa? led by African Cities Center

9. Urbanisation in Africa: the art of the possible led by African Cities Center

10. Introduction to Sanitation Economy Systems & Markets led by Water Research Commission

11. Photovoltaic solar energy and its applications for urban development led by Mohammed VI Polytechnic University

12. Resilient Housing led by Institute for Environmental, Urban and Building Technologies (ISTEUB)

Component 3 – Continuing education

3a – Training programmes

Executive Master Course
Based on the selected MOOC proposals, a Master course has been developed by the Center for Urban Studies at UM6P on smart/digital cities from technical urban data management to governance.

The Executive Master course entitled “Smart Cities Strategies in Africa” is a bilingual (English - French) hybrid training programme that aims to train experts in the design, implementation and management of smart city projects with a focus on Africa.

3b – Partnerships on continuing education

In June 2022, the ACL Project Manager visited the ACL partner in Tunis. More in-depth discussions with ISTEUB (Institut Supérieur des Technologies de l'Environnement de l'Urbanisme et du Bâtiment de l'Université de Carthage) took place on the organisation of a hybrid training at the end of October.

The experimental hybrid training module was developed in partnership with ISTEUB, the EPFL and Campus AFD. This latter also had an interest in collaborating with ACL and the ISTEUB, therefore synergies could be created.

The teachers were experts, professionals or academics specialised in urban, environmental and heritage issues. They are working in different institutions in particular: three teachers were from ISTEUB (University of Carthage), and the others were from universities in North Africa and Europe (details below). They are all familiar with the region and the global themes targeted by the training (sustainability, heritage and resilience to climate change).

The scientific coordination of the training was led by Dr Ludovic Jonard, EPFL expert in Urban Planning in the South, together with Dr Yasmine Attia, Olfa Ben Medien and Yassine Turki from ISTEUB (University of Carthage) who also thought the on site training in Tunis.

Webinars and international conference 2023

Through a series of four webinars, the partners of the African Cities Lab, in collaboration with EPFL, are providing insights for the policy and scientific dialogue in the run-up to the Cotonou conference on African Cities in 2023. The objective of these webinars is to discuss the major themes of the African digital city and set the framework for the agenda of the ACL Conference. This webinar series will present research, trends, use cases and critical insights on how cities are or could be more effective in harnessing and leveraging digital technologies to promote sustainable development and achieve SDGs.

Two of the four webinars were held before the end of October (reporting period), the other two are due in November and February respectively.

Project organisation Board of directors

The third meeting took place on October 14th 2022. The meeting was mainly focused on the presentation of the activities carried out since the last Board of directors. Each implementing partners took the floor to share their contribution to the project. The time for discussion was limited and was dedicated on talking about the importance of increasing partners' participation to the ACL project in particular for the organisation of the international conference and webinars.

The meeting had a hybrid format, in person at the EPFL in Lausanne, where three partners were present on site (EPFL, ISTEUB-University of Carthage and UM6P) and remotely, with all the others partners connected through Zoom.

It is planned to hold the next meeting in Cotonou, Benin, in May 2023 during the International Conference on African Cities.



Webinar n. 1:
Integration of open data and artificial intelligence in the development of smart cities in Africa
July 5, 2022



Webinar n. 2:
African Cities: What role for the youth?
October 11, 2022



Webinar n. 3:
How to build resilient African Cities in response to climate change?
November 24, 2022

Main lessons and perspectives

The MOOCs' development is ongoing and the first courses will be ready at the beginning of 2023. Once accessible from the platform it will be important to understand if they are responding to the needs of the public. Specific questionnaires have been developed and will have to be filled out at the beginning and at the end of each course to collect information on the type of users and test the MOOCs quality and the learners' expectations. All MOOCs

teams have received a training on how to create a MOOC. This has been fundamental to ensure the quality of final products since almost none of the team had ever designed and developed online courses. This training has been provided by the EXAF Digital Education experts, however it will be important for future project sustainability that an expert is trained in one of the partners' institution.

The hybrid training in Tunisia has been an excellent pilot project. The hybrid course, developed in collaboration with an ACL partner (University of Carthage) and an external partner (Campus AFD), met the expectations of participants. It seems that the course replied to the participants' need of training and contributed to change their vision on urban planning.

Conclusions and next steps

The ACL initiative continue to trigger positive reactions in all sectors including academia, development organisations, professional associations and the private sector. The urbanisation theme is attracting more attention at international level and the increasing in urban population in Africa is raising the interest of international organisations and NGOs on the project.

The ACL project has encountered a slight delay in the development of MOOCs. The main reason is probably due to the fact that for all teams it was the first time they were developing an online course.

Other continuing education courses will have to be developed in 2023. Discussions will start with the partner in Ghana to organise a hybrid training on urban mobility.

The Stable version of the platform was launched in October 2022 and two MOOCs were uploaded on the platform. The next two months will see the integration of the learning platform with the africancitieslab.org website to allow browsing courses directly from the website.



Hybrid course at ISTEUB in Tunis, *Nature and heritage as resources for planning secondary cities*, November 2022



Digitalisation for the urban environment (Num-Urb)

In coordination with the Swiss Embassy in Senegal and with the support of the Swiss Federal Department of Foreign Affairs, the EXAF Centre coordinated the Num-Urb project.

in partnership with the Federal
Department of Foreign Affairs (DFAE)



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Num-Urb competition

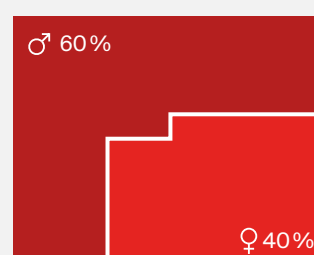
It consisted of a competition for Master's degree projects on urban issues linked to digital technology as part of the French-speaking world's network of excellence in engineering sciences (RESCIF), and a scientific symposium on the role of digital technology in African cities.

At the conference, held in Dakar, Senegal, in June, EXAF organised a round-table discussion with high-ranking political figures, a graduation ceremony attended by the Swiss Ambassador to Senegal, and a workshop bringing together a host of urban planning experts.

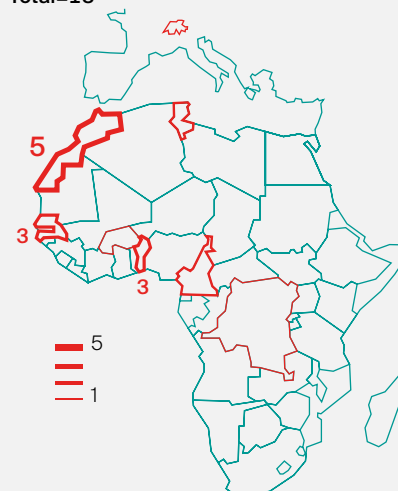
Candidates enrolled in their final year of a Master's degree at a RESCIF member institution or any other African higher education establishment, whose subject explored the application of digital technologies in at least one French-speaking African city and who had defended their Master's thesis before 1st September 2021 could compete for the Num-Urb prize. The year of study and the pandemic episode affected the initial timetable for the awards ceremony and the conference.

18 entries were submitted by participants from 8 different countries. Of the 18 entries, only one came from a country in the North (Figure 2), and the health situation during the pandemic was directly responsible for this. The corollary was obviously a very high level of participation from the South, demonstrating the

Graph 1:
Breakdown of entries by gender
Total=18



Graph 2:
Breakdown of entries by countries
Total=18



interest of young African students in this type of competition. Among the African countries, Morocco was the most represented, with 5 entries; Senegal and Benin were also in the lead, with 3 entries for each of these countries: which shows that the response rate corresponds to the strength of the EXAF networks on urban and digital issues in these countries.

As a prelude to the Num-Urb awards and the scientific conference entitled “*Digital technology applied to urban issues*”, a round table was organised on 8 June, moderated by Dr Jérôme Chenal, Director of EXAF, and attended by:

- **Mr Alé Badara Sy**, Technical Advisor to the Minister of Urban Planning, Housing and Public Hygiene, specialist in green cities at the World Institute for Green Growth, Senegal
- **Mr Oumar Saw**, Director General of Urban Planning and Architecture at the Ministry of Urban Renewal, Housing and the Living Environment, Senegal.

The aim of this round table was to set the political context for the conference, with contributions from two major institutional players involved on a daily basis in the operational and regulatory implementation of digital urban planning.

As EXAF firmly believes in the potential of the next generation of scientists (in general) and urban planners (in particular) in Africa, a scientific symposium entitled “Le numérique appliqué à l'urbain” was organised on Thursday 9 June, following the Num-Urb competition prize-giving ceremony.

The day continued with the scientific symposium, with applied themes chosen on the basis of the Master's subjects of the Num-Urb competition prize-winners.

The symposium brought together some forty elected representatives, local authority representatives responsible for urban planning and development, urban planners and architects, academics and researchers, and telecommunications and digital infrastructure manufacturers to discuss the challenges of managing the Internet of Things, digitising land, digitising urban services and building capacity in digital technologies.

Num-Urb awards ceremony in Dakar
6 June 2022



The aim was to explore new avenues, discuss possible technical solutions to meet the challenges of rapid urbanisation and analyse the issues and operational recommendations that could enable African cities to take full advantage of the contributions of digital technologies.

The themes of the conference were broken down into round tables of four panellists each, as distributed below:



Workshop 1 - Infrastructures and Management of the IoT (Internet of Things)

- Technologies, networks, storage, sensors
- Technologies & uses for IoT & expression of the need to use IoT
- Economic model(s) for IoT implementation & governance



Workshop 2 - Digital applications in the land sector

- Town planning engineering, urban modelling, urban logistics
- Dematerialisation of town planning authorisations: digital tools to facilitate territorial governance
- Land markets



Workshop 3 - Digital applications for citizen services

- Digitisation of public services
- Digitisation of private urban services



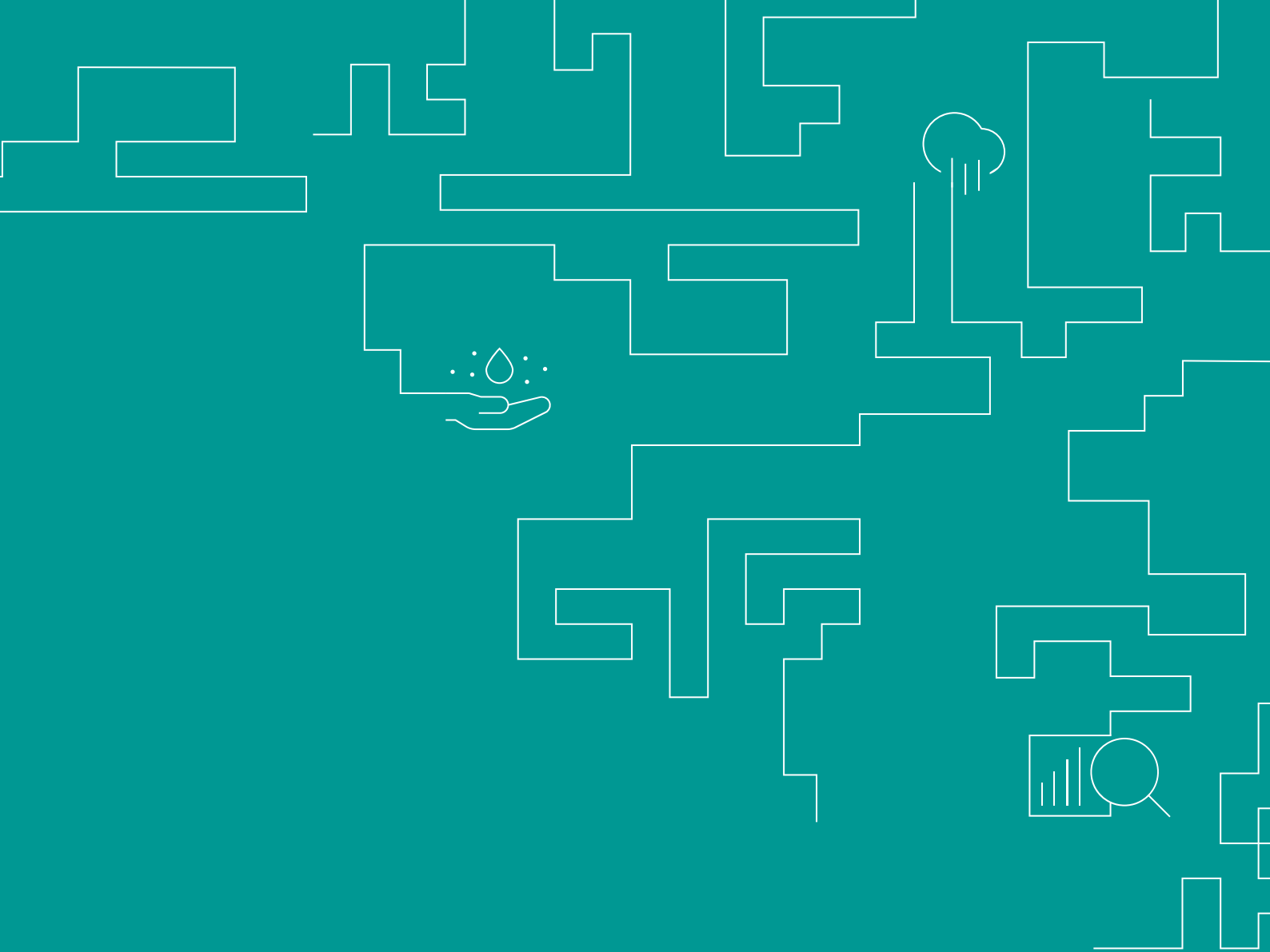
Workshop 4 - Training in the digital age

- Pedagogical urban planning: a strategic alliance between educational planning, pedagogy and urban planning
- The city as a digital classroom: feedback from urban planning and architecture taught on digital media
- Urban planning of educational facilities as infrastructure for the city of knowledge

A proceedings report setting out the objectives and recommendations of the conference in the search for digital solutions to the challenges of urban planning has been published. Entitled *"African Cities and the Digital Age: Between Risks and Potential"* and compiled by Armel Kemajou - Architect and Practitioner in Urban, Resilience and Land Management at the World Bank, Nicola Felder - Head of the Francophonie Service at the Federal Department of Foreign Affairs, and EXAF staff, this report places the discussions

at the conference in the global context of urban planning in Africa. In addition, the Dakar events received unique coverage, with the publication of an article in the leading magazine *African Innovation Network*, not forgetting EXAF's social networks and its contact communities on the continent.





World Bank Project Resilience Academy

The Resilience Academy project in Abidjan aims to improve access to solid waste management, sanitation and water services, increase resilience to flooding in certain vulnerable areas of the capital and targeted neighbouring communes, and build urban management capacity.

in partnership with



THE WORLD BANK



Flooding in a disadvantaged area of Africa

World Bank Project Resilience Academy

The Resilience Academy is a partnership and service delivery programme with the World Bank that aims to maximise the impact of urban resilience and disaster risk management projects and ensure that the use of data and digital technologies for these purposes is effective, innovative and inclusive.

Urban development and disaster risk management efforts to reduce vulnerability are often based on projects in Africa, and specially in Côte d'Ivoire. Partnerships between governments, academic institutions and the private sector are needed to create an innovative ecosystem that ensures that the skills, knowledge, and data generated by these projects have a long-term impact and are kept up to date. Together, these components create an ecosystem in which up-to-date geospatial information for urban resilience required by a stakeholder such as a government agency, development partner or private company is generated by young students as part of mass internship programmes.

In addition, hosting these digital resources in an open access data repository will improve accessibility and encourage research and innovation on locally relevant topics. Finally, the theoretical knowledge and digital skills of the future workforce are consolidated through the integration of new learning resources into existing university programmes.

An initial workshop will be organised by EXAF to introduce the concept to key stakeholders to raise awareness of the potential benefits of the Resilience Academy, secure their commitment and gather information on their interest, needs and potential role in the project.

The project will start on 1st September 2023

The role of EXAF will be:



Assess the capacity and receptivity of local stakeholders

to establish a Resilience Academy adapted to the Ivorian context.



Recommend the mix of components to be selected and prioritised,

paying particular attention to the themes and data needs identified in the project.



Identify local stakeholders and champions, as

well as potential partnerships with local or regional initiatives. The main objective is to ensure the sustainability of the knowledge generated by the World Bank project and to create an environment that fosters the continued development and implementation of new technologies and solutions for urban resilience.



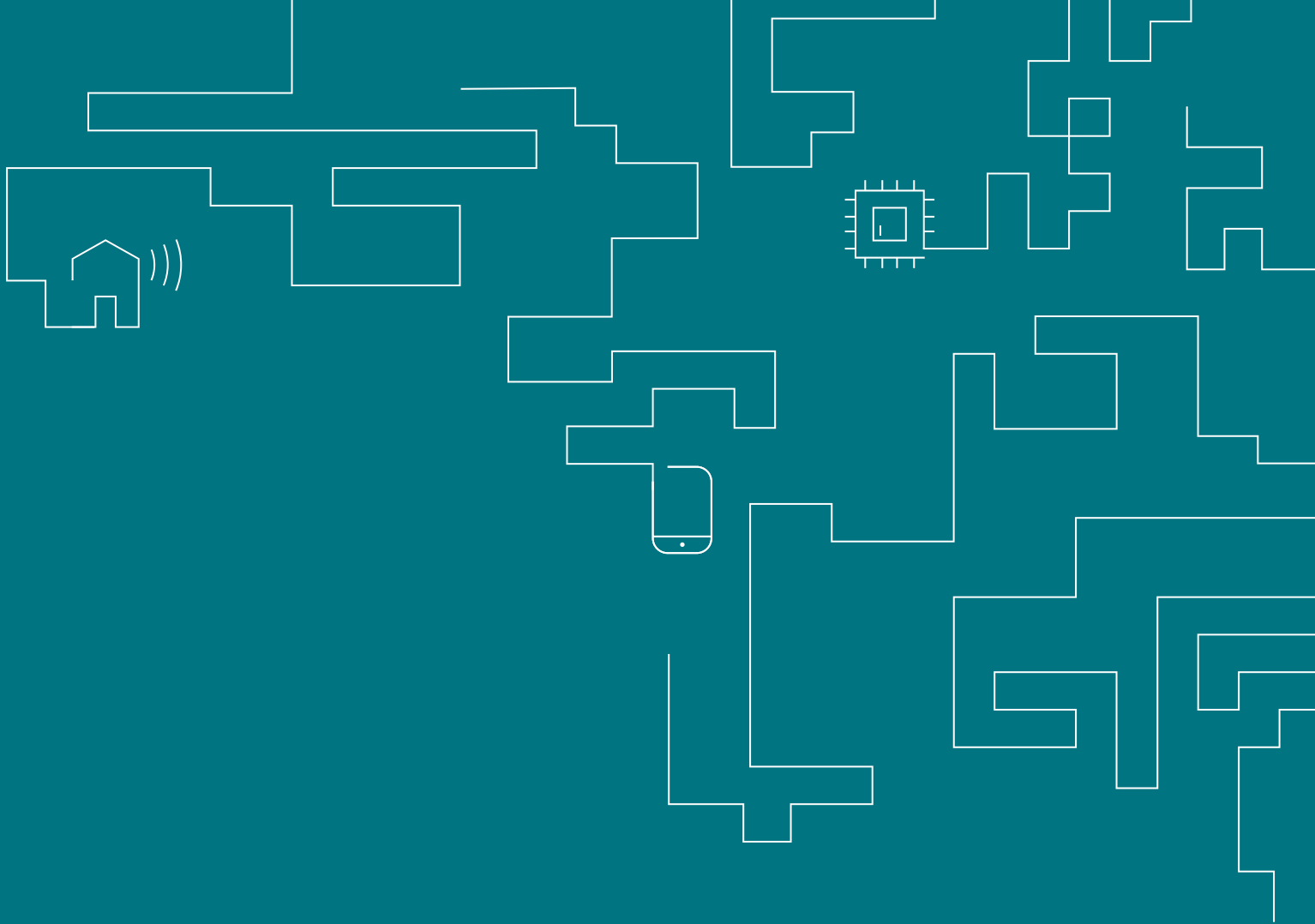
Organise workshops with stakeholders so

that each participant can focus on the objectives to be achieved, understand the project overview, and begin to take ownership of the project.

Based on the local context analysis of the first workshop and the experience of the existing Resilience Academy in Tanzania, a second workshop will be organised by EXAF to assess the feasibility of the Resilience Academy in Côte d'Ivoire. This workshop will focus on the desired approach to the research consortium and the respective work plans of each stakeholder.

A third workshop will be organised by EXAF to design the local model for implementing the Resilience Academy, with all the characteristics of the stakeholders involved and the project management scheme.

Based on the results of each workshop organised and drawing on consultations with local universities, EXAF will conduct surveys to define the steps needed to develop a local model of the Resilience Academy. EXAF will build a network of local research and innovation stakeholders to broaden the scope of the Resilience Academy so that it can be rooted in an inclusive approach. EXAF will develop a core model with performance indicators to bring the Resilience Academy model to other African cities and countries with their specific characteristics.



“E-learning in low connectivity areas” project

in partnership with



“E-learning in low connectivity areas” project

The EXAF Centre was approached by Unité, an association of 13 Swiss organisations involved in development cooperation, with a view to developing a technological solution for delivering distance learning courses in areas with very poor Internet access.

In order to develop a sustainable digital education system for areas with low Internet connectivity, we have worked on both reducing the size of educational files and on hardware solutions.

An analysis was carried out to understand the characteristics and needs of our target audience. Moreover, almost all existing technological solutions were evaluated, including both hardware and software elements. To ensure the long-term viability of the system, the technical solution had to be in line with user expectations, accessible in the target contexts, reproducible and easy to use with just a few brief instructions.

In any cases, it has proved necessary to reduce the size of the files used in e-learning as much as possible.

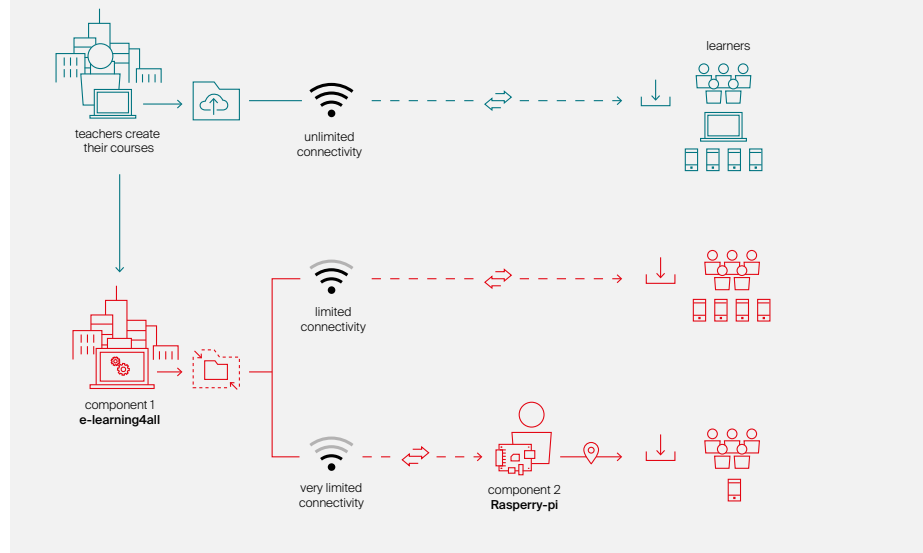
Therefore, EXAF has developed a web application, E-learning4all, to compress the files used in digital education. By compressing and optimising files, it is possible to reduce the size of the data transmitted and therefore the costs associated with learning. In addition to the compression tool, the application offers features for creating online educational content, providing teachers with instructions for producing suitable content. As E-learning4all is open source, any interested IT specialist will be able to access the code and modify or improve the application, for example by translating it into another language.

Despite all our efforts to reduce the size of teaching content, our analyses have shown that the Internet connectivity of learners is sometimes too weak for standard distance learning. In general, teachers have a better home connection than their learners. We therefore also opted for the use of a microcomputer to create local intranet networks.

Working on the first day of the pilot project in Egypt



Structure of the proposed technical solution

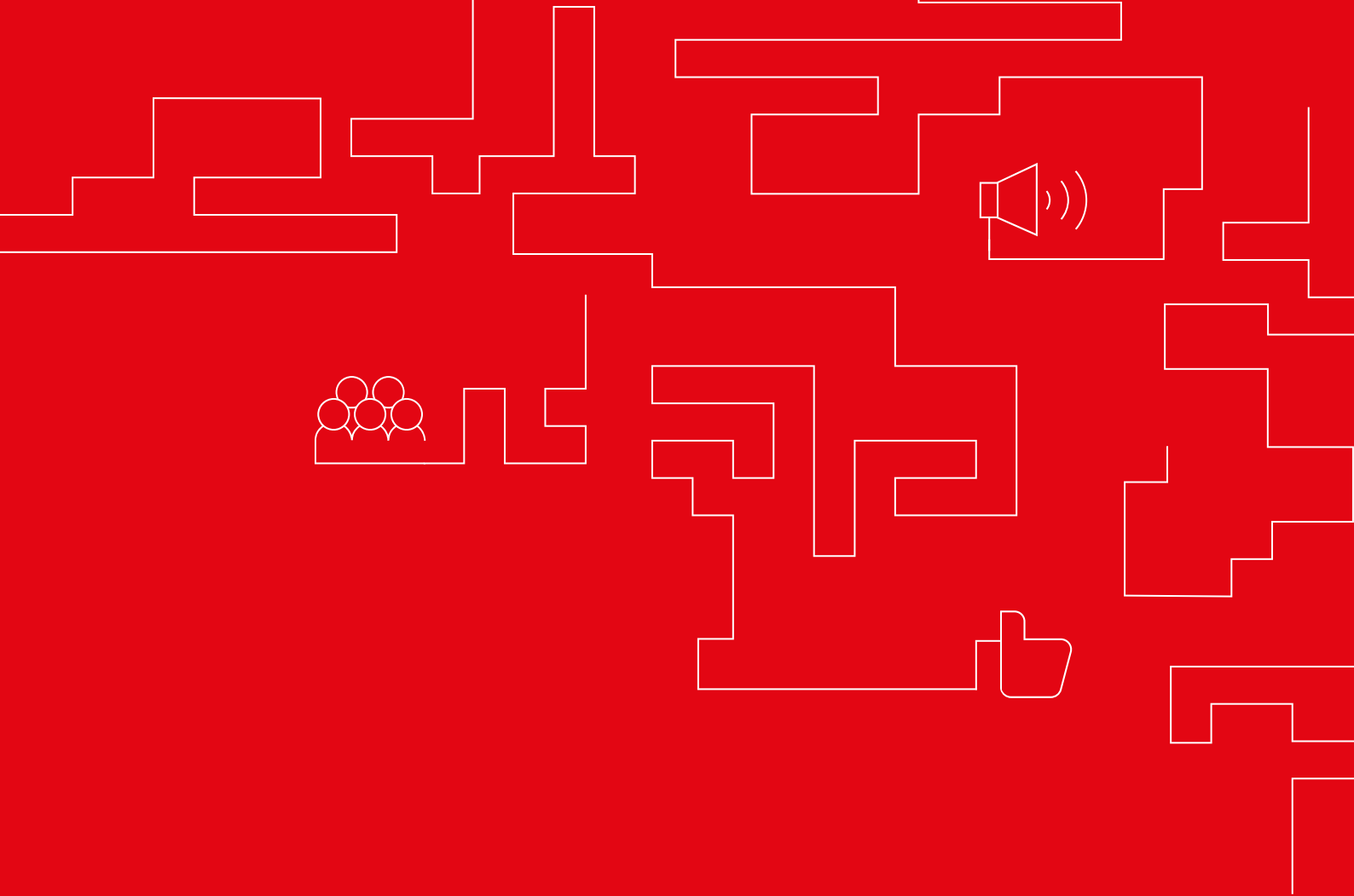


In this case, the teacher will create his or her course at home, or anywhere with a good Internet connection, and upload it to a micro- computer. Someone will then have to physically bring it to the course venue (often the person delivering the course), which may raise questions about the 'distance learning' aspect of this solution. It should be noted, however, that the timeframe will not be the same as for face-to-face training. With our solution, the trainer only has to travel occasionally, for example once a month. It is even possible to come only at the beginning of the course and share all the content at once. It is also possible to entrust the computer to someone who has to visit the trainees for a completely different reason.

We chose to test the technological solution in pilot projects with different characteristics: Côte d'Ivoire (where connectivity was weakest), Egypt, and Kenya (where connectivity was best). The EXAF team's assessment of the intrinsic effectiveness of the various components of the technical solution was complemented

by an analysis of user satisfaction with the proposed solution. This made it possible to improve and adapt the technical solution implemented by EXAF. In the end, the solution convinced all those who tested it. A few areas for improvement were also identified (off-line availability of the application, translation into other languages, etc.) but will require a little more development time.

With the E-Learning in Low Connectivity Contexts project, the EXAF Centre was honoured to work with the Unité association to help meet Sustainable Development Goal 4, which promotes equitable access to quality education for all



Communication

2022 Projects

2022 was a year of consolidation for the launch of the first tools of the communications department.

It was the year that Camille Deillon, a professional graphic designer, joined the team. The layout and content of publications play an important role. She is responsible for coordinating the graphic design for all the centre's projects.

2022 was a year of calls for projects, such as the 2nd call for JFD projects (09/2022) publications, papers and digital reports. These include the summary of the report, on the impact of digital technology on cities in West Africa, presentations, and conferences, such as the EPFL International Conference organised by the Research Office.

2022 was a year of many publications on social networks. Sharing content with the EXAF communities on three social networks was a way of raising the centre's profile and generating interest in the various projects we manage.

Finally, 2022 was a year of meetings with our partners, programme beneficiaries and our donors. From Nigeria to Morocco, via Tunis and Ghana, EXAF teams travel to work on and share the results of competitions such as Num-Urb, which we presented in a variety of formats.

Social network statistics



505 followers

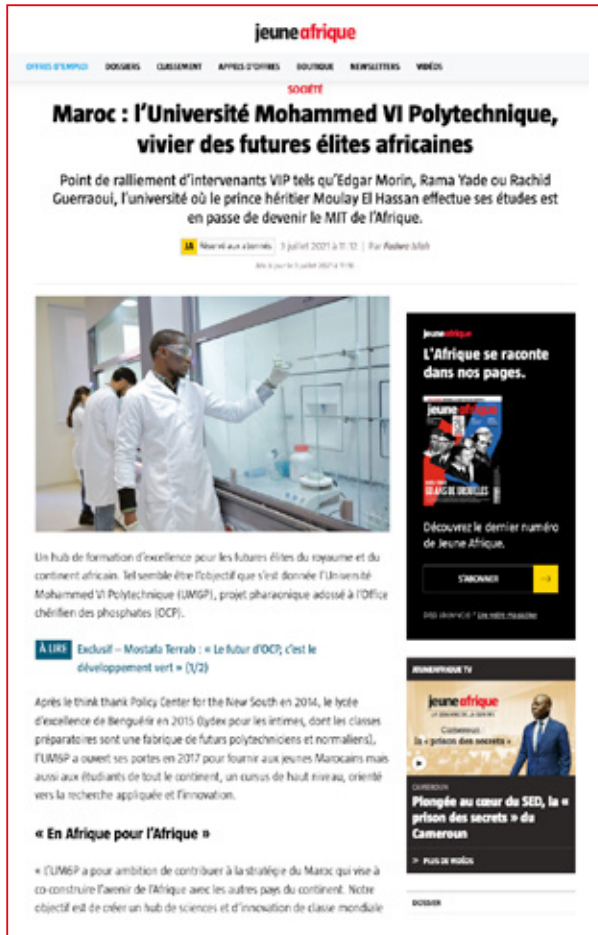


887 followers

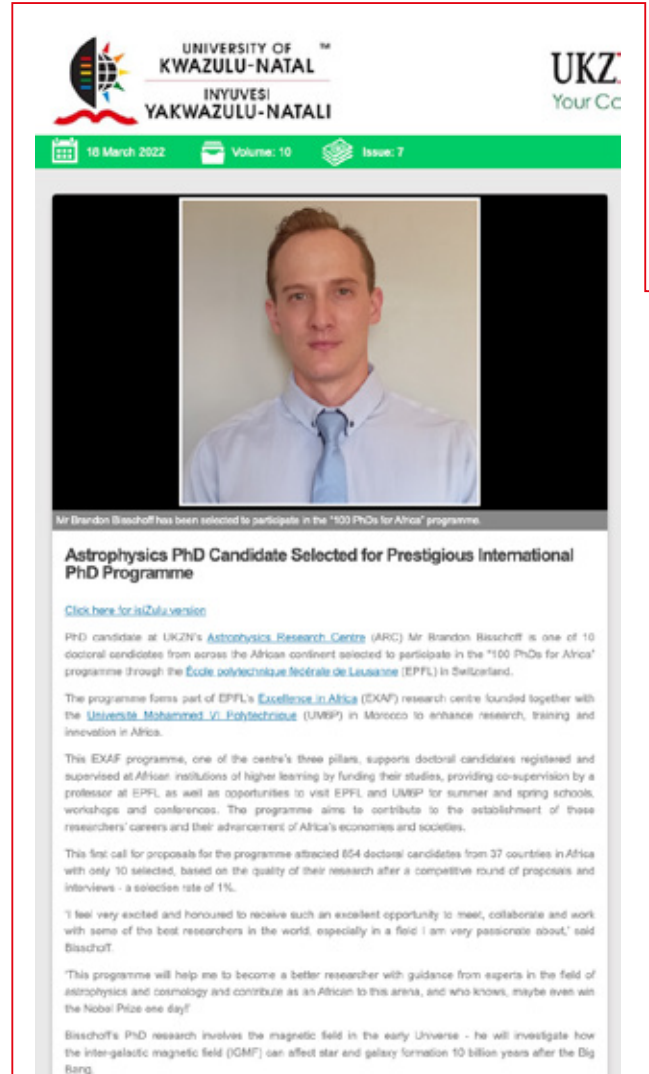


1993 followers

Press review



July 3, 2022
jeuneafrique.com



May 24, 2022
Twitter Swiss Embassy Cairo





espacemanager.com



The Centers of Competence in Digital Education (C²DE) Initiative is building capacity/building workgroups/experts in digital education, to build their capacities in the sustainable integration of digital tools and technologies into teaching and learning.

The event, held from Oct 10–12th, May 2023 at the National Open University of Nigeria is jointly organized by the R&D Center of Excellence on Technology Enhanced Learning (ACETEL), the Association of African Universities, the European Polymerization Institute under contract (European Union), with financial support from the World Bank. The opening ceremony was hosted by the Vice-Chancellor of the National Open University of Nigeria (NOUN), Prof. Oluwole Ismail, who encouraged all the participants to large collaboration networks through the gathering, and to harness the opportunities presented by the initiative to contribute to the development of local national economies, and that of the continent as a whole.

Speaking on behalf of the AAI, Dr. Silvia Mundwiler, the ACE Inquest Project Manager, underscored the importance of the C-CaCE initiative for the project, stating that it emerged as a COVID-19 response, to support institutions effectively deliver on their own targets. She extended the AAI's appreciation to the Vice Chancellors and management of other institutions of the C-CaCE initiative and generally the ACE Inquest Project for their continuous support.

© CCoE is an initiative being implemented under the Africa Higher Education Centres of Excellence for Development Impact (AHECEI) Project with the objective of strengthening the techno-pedagogical skills of lecturers by promoting the use of innovative digital technologies in educational practices. Ultimately, the sustainable integration of digital education in African universities is seen as a means to develop the quality education as well as the competitiveness of graduates.

The ongoing training forms part of a series of trainings which commenced in September 2001 for the six (6) universities which are part of this initiative, namely: 1) National Open University of Nigeria (UNO) at Oyo State; 2) Bayero University, Kano; 3) Federal Polytechnic, Ilorin; 4) Federal Polytechnic, Ede; 5) Federal Polytechnic, Lagos; 6) Federal Polytechnic, Owerri.

The greatest initial findings have concerned how to use the tools of Course Design, Educational Resources, Development, and Implementation, while the overall focus has been on the use of the tools in the classroom.

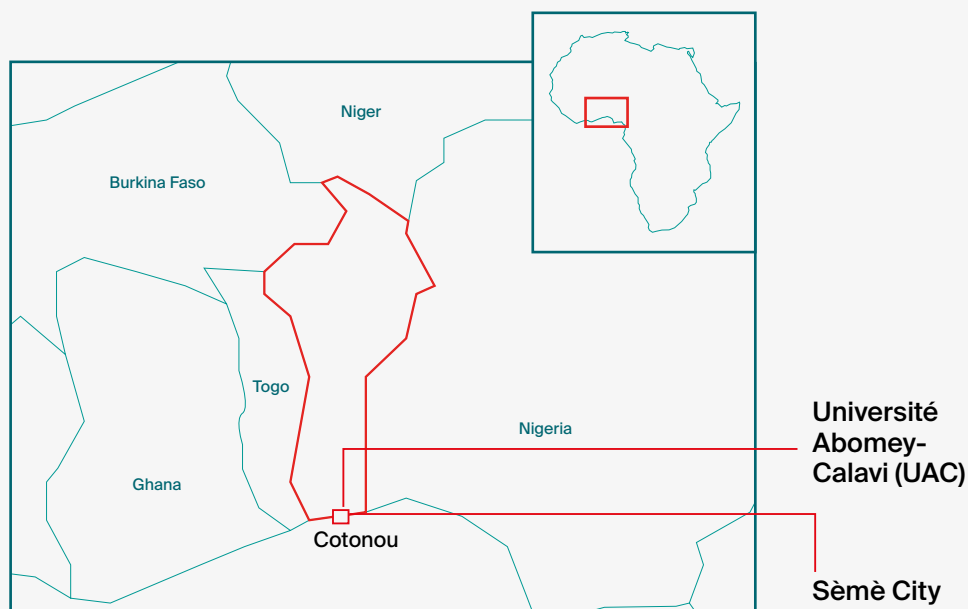
It is expected that the involved universities would eventually serve other African institutions using a training-the-trainers model, within the broader ACE Impact project portfolio and across the Sub-Saharan Africa (SSA) region.

The fourth 8th training workshop of experts in digital education which is underway, features 48 participants and is being facilitated by the UPRU, represented by Dr. Lisa Gossely Myers and Ms. Virginia Torres who are both digital education experts. The key training content areas include online teaching (i.e. the actual delivery of an online course to students), course evaluation, applying interactive teaching strategies to facilitate active learning, preparing students to learn online, and producing how-to select and train facilitators, course evaluators.

ace.aau.org

EPFL projects in Benin

Partner universities



EPFL academic partnerships in Benin

2014

Collaboration agreement with Abomey-Calavi University, Cotonou.
Academic collaboration agreement.

2016

Running a MOOC scriptwriting and production workshop with Abomey-Calavi University, Cotonou.

2017

Construction of a MOOCs production studio with the University of Abomey-Calavi, Cotonou.



Collaborative projects

- African Cities Lab
- Capacity building in digital development for ACE impact centres. Installation of a C-CoDE
- MOOCs 4 Africa
- Excellence in Africa: Digital solutions for sustainable cities - SDC

Workshop in Cotonou,
April 2022

Official missions

Mission 1

Virginie Torrens,
Dimitrios Noukakis
25-29.04.2022
ISMP/UAC
Porto Novo and
Cotonou

Training workshop 4 as part of the training of experts in digital education (Porto Novo) and participation of teachers in training in the regional conference (presentation of their work and their achievements following the training)

CEA Impact regional conference (28/29 April 2022)
Sustainable integration of digital education in the post-Covid-19 era (Cotonou)

EPFL privileged contacts

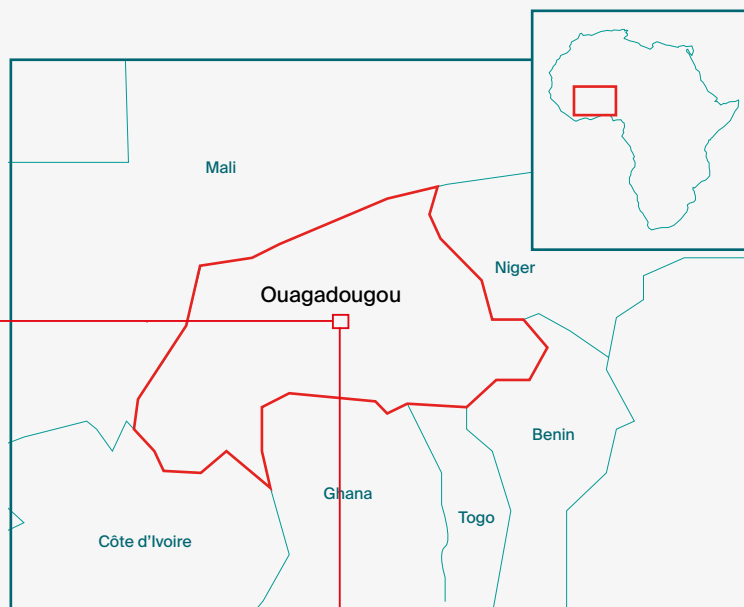
Mr TOSSA Joël
ISMP/UAC

Mr OKÉ Eugène
UAC

EPFL projects in Burkina Faso

Partner universities

Université
Joseph
Ki-Zerbo



Institut International
d'Ingénierie de l'Eau et
de l'Environnement – 2iE

EPFL academic partnerships in Burkina Faso

1980-2011

Collaboration agreement with the Institut International d'Ingénierie de l'Eau et de l'Environnement (2iE) Academic collaboration agreement.

2012-2018

3E project (Water, Energy and Environment) with the Institut International d'Ingénierie de l'Eau et de l'Environnement (2iE) Academic collaboration agreement.

2018

Training on the use and creation of MOOCs at the Institut International de l'Eau et de l'Environnement (2iE) Training course.

2018

Construction of a MOOC production studio at the Institut International de l'Eau et de l'Environnement (2iE).

Collaborative projects

- Capacity building in digital development for ACE impact centres.
Installation of a C-CoDE
- MOOCs 4 Africa
- RESCIF

EPFL privileged contacts

Mr CISSE Rabiou
Université Joseph Ki-Zerbo

Mr SAVADOGO Aly
Université Joseph Ki-Zerbo

Mr SAWADOGO Natéwindé
Université Joseph Ki-Zerbo

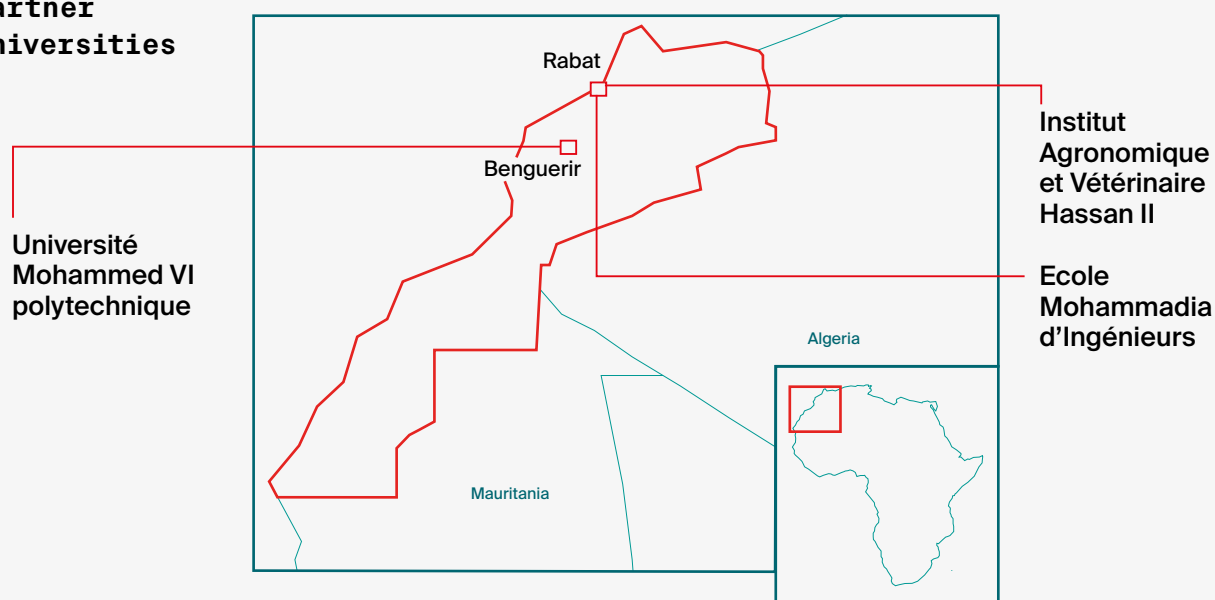
Mr NANA Séni
Université Joseph Ki-Zerbo



Visit to Joseph
Ki-Zerbo
University

EPFL projects in Morocco

Partner universities



Collaborative projects

- Excellence in Africa (JFD)
- African Cities Lab
- RESCIF
- 100 PhDs for Africa
- Num-Urb

Kick-off at UM6P,
Benguerir,
July 2021

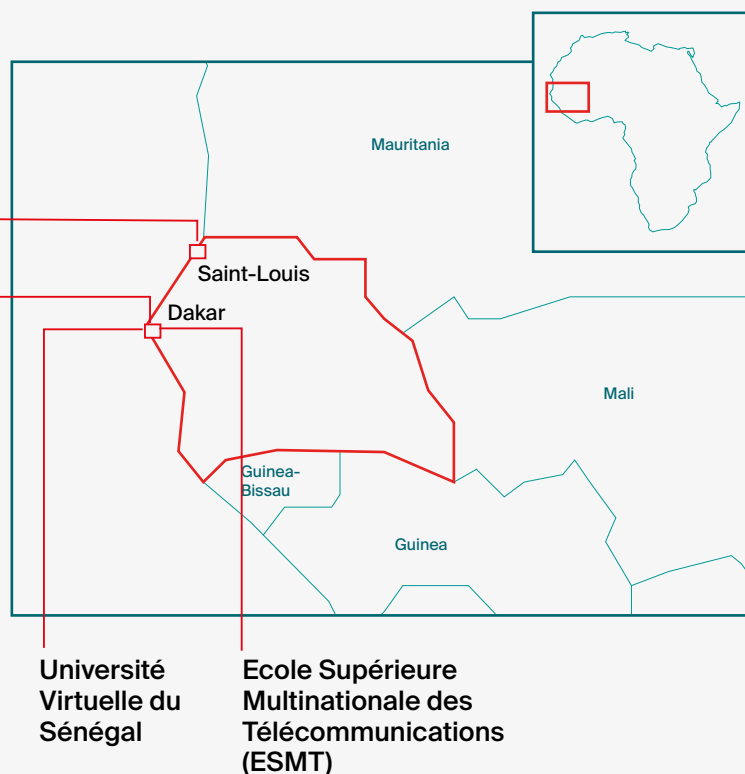


EPFL projects in Senegal

Partner universities

Université Gaston Berger

Ecole Supérieure Polytechnique
Université Cheikh Anta Diop (ESP-UCAD)



EPFL academic partnerships in Senegal

2011

Memorandum of Understanding with the Ecole Supérieure Polytechnique de Dakar (ESP-UCAD), as the initiating institution of RESCIF.
Academic collaboration agreement.

2014

Collaboration agreement with Gaston Berger University (UGB)
Academic collaboration agreement.

2016

Memorandum of Understanding with the Ecole Supérieure Polytechnique de Dakar (ESP-UCAD) for the implementation of the FAST pilot project.

2014

Collaboration agreement with the Virtual University of Senegal (UVS).

2018-2019

Production of MOOCs collaborations.

Num-Urb awards ceremony



Collaborative projects

- MOOCs 4 Africa
- Excellence in Africa (C-CoDE)
- Num-Urb
- RESCIF

Official missions

Mission 1

Frédéric Meylan,
Saida Naji,
Chiara Cirimina,
Jérôme Chenal
07-10.06.2022
ESP Dakar
Dakar

Num-Urb awards ceremony at ESP Dakar, followed by a round-table discussion and conference on the application of digital technologies in African cities.

EPFL privileged contacts

Prof. SAMBE Fallou Mbacke
ESP Dakar

Mrs FAYE Ndèye Fatima
ESP Dakar

Mrs THIONGANE Nadia
Embassy Attaché (Switzerland)

Mr DOMENIG Mathias
First collaborator (Switzerland)

SE, Mr Ambassador
SEMADENI Andrea
Swiss Embassy in Senegal

Mission 2

Frédéric Meylan,
Saida Naji,
Chiara Cirimina,
Jérôme Chenal
17-20.07.2022
ESP of UCAD,
ESMT,
UVS
Dakar

1. Participation in and monitoring of the training of ESMT and Ki-Zerbo technicians by the ESP CRENT team.
2. Visit to the future studio on the ESMT campus.
3. Meeting with the Rector of the Virtual University of Senegal.

EPFL privileged contacts

Prof. SAMBE Fallou Mbacke
ESP

Prof. DIALLO Moussa
ESP

Prof. KOUAWA James
ESMT

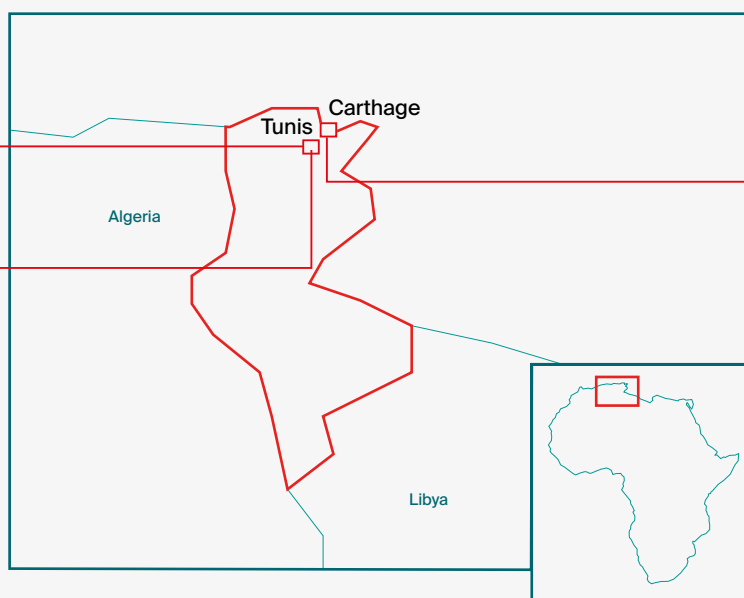
Prof. LO Moussa
UVS

EPFL projects in Tunisia

Partner universities

Institut Pasteur de Tunis

Ecole nationale d'ingénieurs de Tunis



Université de Carthage ISTEUB

Collaborative projects

- Excellence in Africa (JFD)
- RESCIF
- African Cities Lab

September 2022
Institut Pasteur de Tunis



Official missions

Mission 1

Frédéric Meylan,

Jérôme Chenal

09-12.05.2022

Institut Pasteur

de Tunis

Tunis

1. Presentation of EXAF programmes JFD & 100 PhDs
2. EPFL/IPT strategic discussion
3. Visit ENIT
4. Visit to Polytech Intl Group

EPFL privileged contacts

SE, Mr Ambassador

RENGGLI Josef

Swiss Embassy in Tunisia

Mrs RIAHI Monia

Swiss Embassy in Tunisia

Mr TOMAGIAN Stéphane

Swiss Embassy in Tunisia

Prof. LOUZIR Hechmi

Institut Pasteur de Tunis

Prof. BEN SAAD Kamal

ENIT

Dr CHAABANE Sadok

Polytech Intl Group

Mission 2

Frédéric Meylan,

Jérôme Chenal

27-30.06.22

Université de

Carthage - ISTEUB

Tunis

1. Contact for ACL
2. Participation in AFD workshop on old towns

EPFL privileged contacts

Mrs HABLI Sabra

ISTEUB

Mrs ATTIA Yasmine

ISTEUB

Mrs BEN MEDIEN Olfa

ISTEUB

