

# From centripetal University of the past to centrifugal *MULTIVERSITY* of the future (AI and IT education)

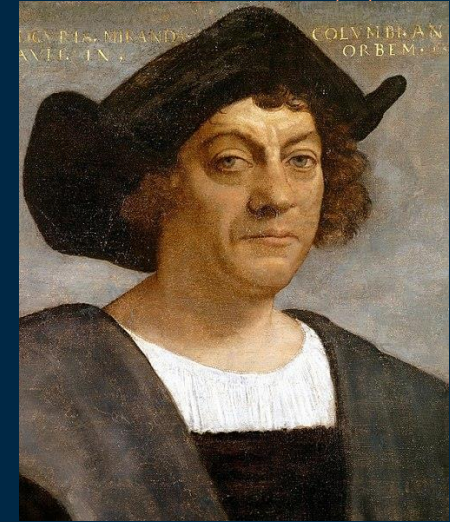
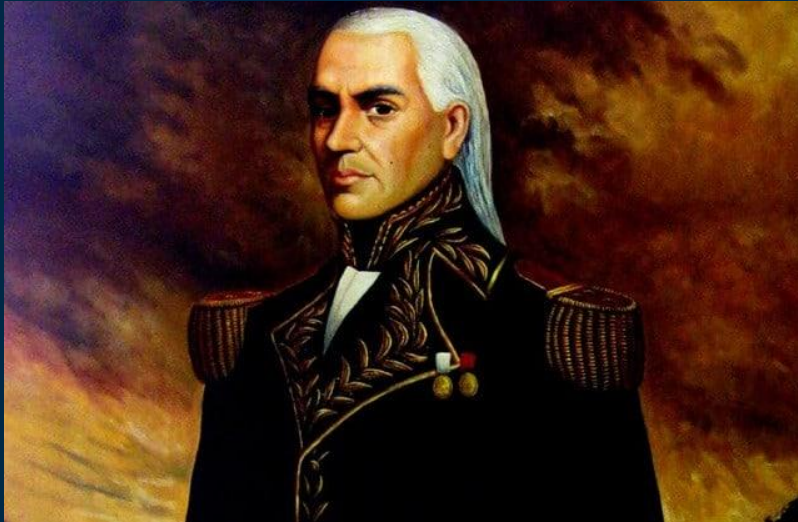
Pr. Serge MIRANDA



Emeritus Professor at University of Nice (UCA, France)  
Scientific Director of MSc BIHAR (ESTIA, Biarritz France)  
President of DATUM ACADEMY

Universidad de QUINDIO, Armenia, Colombia,  
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# Starting with Francisco de MIRANDA and finishing with Christopher COLUMBUS !



# Contents

- IT DISRUPTIONS in « **The 4th paradigm of science** » (JIM GRAY, *Turing award in 2006*)
- EDTECH disruptions and « **multiversity** » of the future
- Some practical examples we are conducting with the Bihar master at ESTIA ( France) and its « **International Institute of AI Engineering** » (AI Multiversity) based upon *Connected Digital Campuses and their DATA LABs*

# RAW RESOURCE of this millennium *like love and happiness ?*



*English – “Happiness is a marvellous thing : the more you give, the more you are left with” (Pascal)*

*French – « Le bonheur est une chose merveilleuse : plus tu en donnes plus il t'en reste » (PASCAL)*

**Arabic:** كل تيقب امالك اهتبطعاً امالك ليمج عيش ةدا عسلا

**Creole (Haïti) - Ala yon bèl bagay se kontantman, plis ou bay ladan'l plis ourete ladan'li!**

**Russian :** Счастье – волшебная вещь: чем больше ты его даришь, тем больше тебе остаётся»

**Spanish - la felicidad es un artículo maravilloso: cuanto más ceda, más le queda a uno**

**Occitan - la felicitat una chausa meravelhosa: mai ne'n donas, mai te'n rèsta**

**Swedish- lycka är något underbart: ju mer du har att ge, desto mer har du kvar av den.**

**Italian - la felicità è qualcosa di meraviglioso: più ne dai e più te ne rimane**

**German- Glück ist eine wunderbare Sache: je mehr du schenkst, destomehr hast du**

**Roman - 'a felicità è quarcosa de meravijoso: più 'a dai e più te ce rimane**

**Hungarian- a boldogság csodálatos dolog: minél többet adsz belőle, annál több marad neked**

**Brazilian Portuguese - a felicidade é uma coisa maravilhosa: quantomais você dá, mais você recebe.,**

# DATA (INFORMATION)

- Properties ☺ ?

$$1-1 = 2 !$$

- $1+1 = 4$  ( METCALFE 's law)

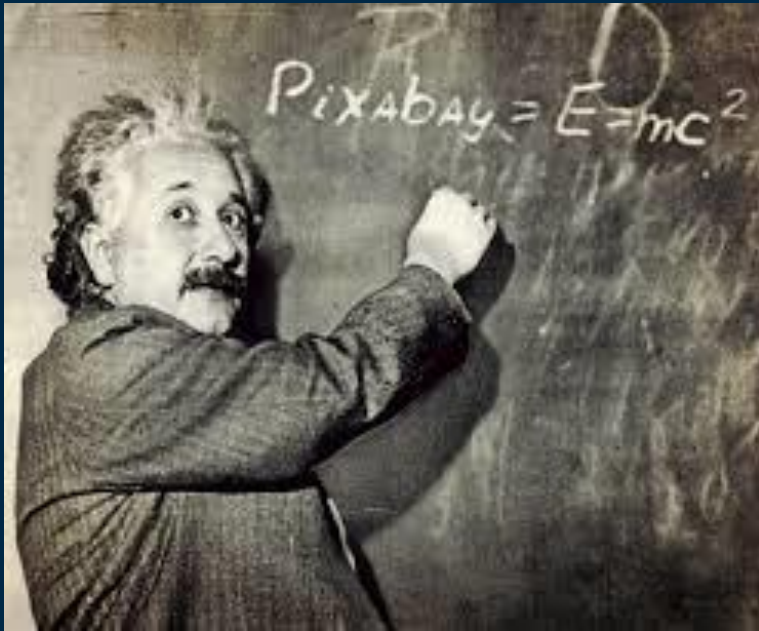
**LIFE (biology) = INFORMATION + COMMUNICATION**

**« *POVERTY is DATA-access denial* »**

F. Verella (Haïti)



# Michel Serres on 5 key contributors to humanity and ...



- Moses : « **Everything is LAW** »
  - Jesus : « **Everything is LOVE** »
  - Marx : « **Everything is MONEY** »
  - Freud : « **Everything is SEX** »
  - Einstein : « **Everything is RELATIVE** »
- &...
- JIM GRAY : « **Everything is DATA** »

# « DATA » as prefix or suffix in CS !

## DATA as prefix:

DATA base (19/8/1968 : Ted Codd and relational data model), DBMS  
DATA Schema  
Data model  
DATA bank, DATA STORE  
DATA warehouse  
DATA mart  
DATA mining (OLAP, Correlations, ..), DATA Analytics,  
DATA Pumping (ETL), Little Big Data  
DATA Systems  
DATA mash up  
DATA SCIENCE  
DATA LAKE  
DATA WEB

A word cloud on a dark blue background. The words are in various sizes and orientations, including 'Data', 'DBMS', 'Data', 'Linked', 'relational', 'Data', 'data', 'Meta', 'Data', 'web', 'Open', 'Data', 'Little', 'Data', 'Chief', 'Data', 'OLAP', 'Data', 'Labelled', and 'Data'.

## DATA as suffix:

Relational DATA  
Linked DATA,  
Labelled DATA  
Meta DATA  
Open DATA  
Web data  
Smart DATA  
**BIG DATA**

## new DATA-centrics jobs

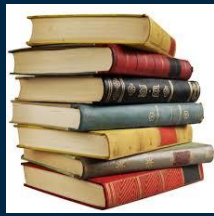
**Big Data architect**  
CDO « Chief DATA Officer »,  
« DATA SCIENTIST »,  
« DATA BROKER »  
« **DATA ENGINEER** »

# Two major human defaults

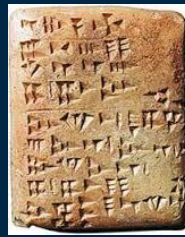
1. *Man forgets*
2. *Man can be wrong*  
« *Errare humanum es* »







# DATA ?



- Recording of ANYTHING (fact, measure, video,..) on ANY SUPPORT with any code



Spirals on La Piedra Escrita Jayuya Puerto Rico



## Serrania de la Lindosa Colombia (Amazon)

$l = \frac{2\pi^2 b}{v} \sin^2 \theta = \frac{p \sin \theta}{2b} = \frac{h \sin \theta}{2\pi b}$ 
 $l = l_1 + l_2 + 2\sqrt{l_1 l_2} \cos \delta$ 
 $A + \vec{u} = (a_1 + u_1, a_2 + u_2)$

$\vec{v} \times \vec{v} = \sqrt{X \times Y}$ 
 $E = h\nu = hc/\lambda$

$\frac{dN}{dt} = -\lambda N$ 
 $k = \sqrt{U/m}$ 
 $\min = \frac{hc}{eV}$

$V = L \times W \times h$ 
 $\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}$ 
 $\tan \alpha = \tan \alpha < \rightarrow x = d + k\pi, k \in Z$

$\frac{1}{\lambda} = A Z^2 \left[ \frac{1}{n^2} - \frac{1}{m^2} \right]$ 
 $f(x) = \frac{a}{x}$ 
 $\sqrt{v} = \sqrt{v_3} = \sqrt{\frac{v}{3}}$ 
 $\vec{u} \cdot \vec{A} = V = \frac{4}{3} \pi r^3$

$E_p = \frac{1}{4\pi\epsilon_0} \frac{qQ}{(a^2 + x^2)^{3/2}}$ 
 $\sqrt{v} = a(Z - b)$ 
 $\vec{u} = i\vec{A}$

$V = \pi r^2 \times h$ 
 $N = N_0 / Z^h$ 
 $V = \frac{1}{4\pi\epsilon_0} \frac{p \cos \theta}{r^2}$

$b = \frac{h \cos \theta}{4\pi d} (\cos \theta_1 - \cos \theta_2)$ 
 $E = U + K = \frac{1}{2} m v^2 = (\mu_v - \mu_a) A = (\mu'_v - \mu'_a) A'$

$p_1 = p_0 \sin \omega_1 (t - x/v)$ 
 $p_2 = p_0 \sin \omega_2 (t - x/v)$ 
 $T = \frac{2\pi}{\omega} = 2\pi \sqrt{\frac{m}{K}}$



# DATA ?

« Value of man consists in GIVING » Einstein  
« It is DATA i.e. STUPID » Jim Gray

- « **DATUM** » → « **DATA** » from *DARE (to GIVE in Latin language)* « what is given »
- symmetric word : « **CAPTUM** » → **INFORMATION** !
- « **CAPTA** » (Kitchin 2014) from *Captio* (to TAKE in Latin)

« DATA » → « INFORMATION »  
(CAPTA) → KNOWLEDGE (*Insight*)



## KNOWLEDGE ?

3 Types of Knowledge for ARISTOTELES :

### 1. EPISTEME

SCIENCE <Knowing>

### 2. TECHNE

TECHNOLOGY <Knowing to do>

### 3. PHRONESIS

ETHICS

<Knowing to be ; wisdom>

# « SMART OBJECT » (IOT) ? (= DATA + COMMUNICATION )

(SMART City, car, home, bus stop, museum...)

## ➤ SMART OBJECT :

**DATA**

(Production/Processing/  
retrieval) +

**COMMUNICATION**

## ➤ LIFE IN BIOLOGY ?

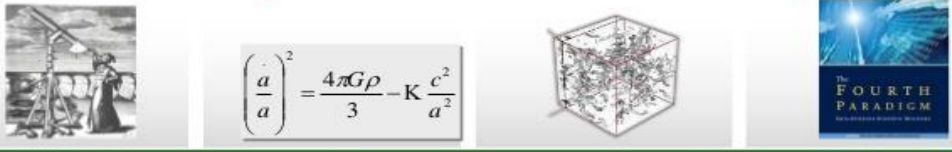
LIFE = **INFORMATION +  
COMMUNICATION**

# Major IT disruption in the DATA ECONOMY

« *the 4th (DATA-centrics) paradigm of science : the SCIENCE of DATA* »

(Jim Gray)

## The Data Science: The 4<sup>th</sup> Paradigm for Scientific Discovery



Experimental	Theoretical	Computational	The Fourth Paradigm
Thousand years ago <i>Description of natural phenomena</i>	Last few hundred years <i>Newton's laws, Maxwell's equations...</i>	Last few decades <i>Simulation of complex phenomena</i>	Today and the Future <i>Unify theory, experiment and simulation with large multidisciplinary Data</i>  <i>Using data exploration and data mining (from instruments, sensors, humans...)</i>  <i>Distributed Communities</i>

Crédits: Dennis Gannon

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Jim GRAY, IBM, .. Microsoft  
(TURING AWARD/Nobel Prize in Computing 1998)

# BIG DATA and the « $n V$ »

*(DATA : the next big wave)*



## BIG DATA and the 3 « V »

*(M.Stonebraker)*

*(for the 3 « P » and the « 3 « R »)*

DATA processing : DATA management  
& DATA analysis

**VOLUME**  
**VARIETY**  
**VELOCITY**

# Just « Volume » of BIG DATA and 2 questions...

- Q1 : Quantity of DATA produces since the beginning of humanity (10 000 years ago until 2010 cf Google ) ? And today per second cf Berkeley ?
- Q2 : Quantity of DATA to generate a digital TWIN (cf DIGITAL ETERNITY project by Jim Gray with Einstein)

- 1 KILO, 1 MEGA, 1 GIGA ( $10^{*9}$ )
- 1 TERA BYTES :  $10^{*12}$
- **1 PETA BYTES :  $10^{*15}$**
- 1 EXA BYTES :  $10^{*18}$
- 1 ZETA BYTES :  $10^{*21}$
- **1 YOTTA BYTES :  $10^{*24}$**



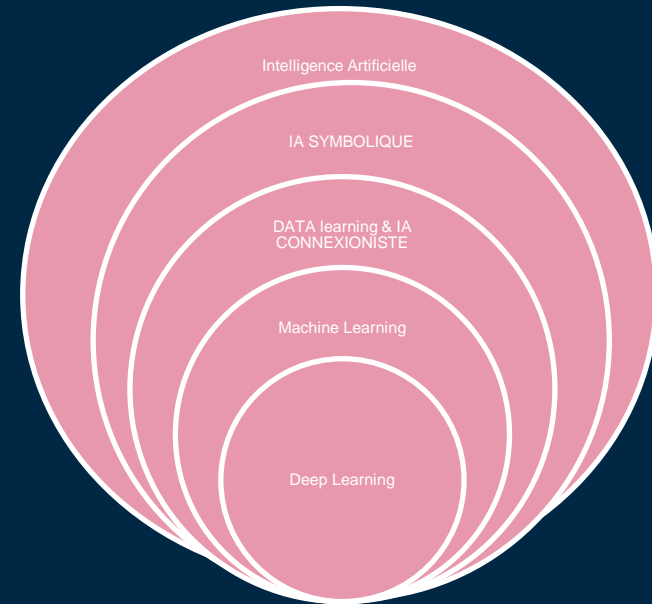
# The 4 ages of AI (born in the 50's like computers)

## « AI » : 2 underlying scientific disciplines

- AI « SCIENCE » (*Mathematics, Biosciences*)
- **AI « Engineering »** (*Computing and BIG DATA with last AI revival 10 years ago*)  
→ **MBDS/eMBDS & BIHAR/eBIHAR Masters**

## 4 AGES of AI (with 2 winters) since 1956 and Mc Carthy definition of ARTIFICIAL INTELLIGENCE

- AGE1 (<2012): **SYMBOLIC AI** (Rules and mathematics)
- AGE2 (with BIG DATA) : **DATA-centrics AI** with Machine learning and promising **DEEP LEARNING** (*Turing award in 2019*)
- **AGE3: SPECIFIC AI** with *digital twin* on ANY HUMAN ACTIVITY ( from cars, health, HR, to Agriculture) → **POCs/GRADEOS and Bihar DATA LABS**
- AGE4 (>2050) : **GENERIC AI** (*Strong AI*) ??



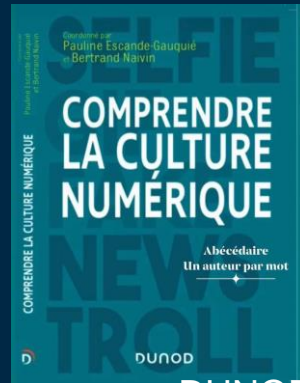
AI CONCEPTS



# IT DISRUPTIONS around DATA

## ➤ FIVE DATA –centrics– DISRUPTIVE TECHNOLOGIES

- **BIG DATA** (Cloud, IOT, ..), **AI** and the 4th paradigm of Science (Jim Gray)
  - Data science, Machine Learning, **Deep Learning**
- **NFC** (Near Field communication)
- **LIFI** (Light Fidelity)
- **BLOCKCHAIN**
- **QUANTUM** computing (2030)



DUNOD, 2019

## ➤ Three DIMENSIONS of DATA-centrics DISRUPTIONS

➤ **SMART PLACES/OBJECTS**  
IOE → *Homo Mobiquitus*  
& « **COMMUNACTORS** »

➤ **BOTTOM UP** paradigm

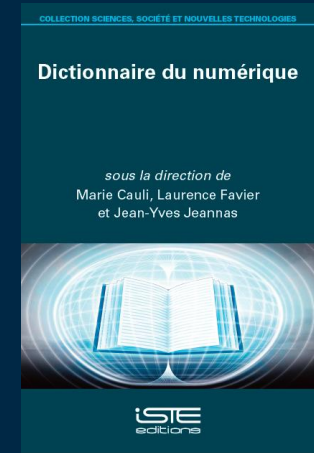
➤ **Little BIG DATA** and

**Real-time predictive analysis**

➤ **SPIRALIST INNOVATION**  
in the data economy



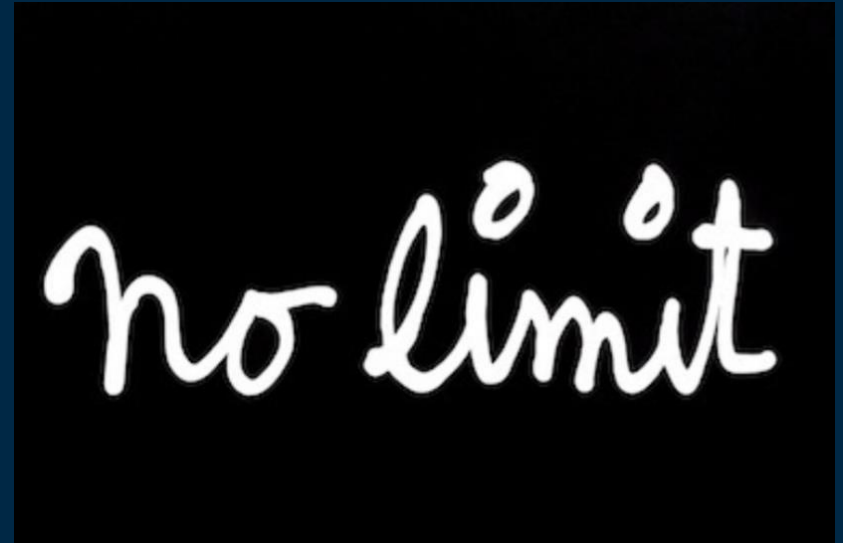
PEYO, CNAEMO, TOULOUSE, 30 septembre 2020 in French  
<https://www.youtube.com/watch?v=vYa dqlosd8Q&t=311s>)



ISTE, 2022

# IT : INNOVATION and usage/SERVICES

- Creativity on SERVICES is illimited
  - From SERVICES to « SMART PLACES »
- INNOVATION is BOTTOM UP and multidisciplinary while traditional research is top down and tubular
- Need for INNOVATION LAB in AI



# Two major e-learning disruptions (MOOCs and SKILLS) amplified by COVID : Towards the « MULTIVERSITY \* » of the future with BLENDED learning !

The future of work will be a race between education and technology facing a SKILL crisis!

© *The decline of universities and the emergence of HIGHER education* PAUL GIBBS ( "Thinking about higher education" Springer 2014)

© No more frontier between EDUCATION (top down) and LEARNING (bottom up)

**From CENTRIPETE universities of the past towards CENTRIFUGAL MULTIVERSITIES of the future !**

\* (Clark Kerr, Berkeley, 1962)

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ÉCONOMIE  
Serge Miranda

## DE L'UNIVERSITÉ CENTRIPÈTE À LA MULTIVERSITÉ CENTRIFUGE

■ Le néologisme *multiversité* (*multiversity*) a été utilisé la première fois par Clark Kerr président de l'Université de Californie en 1962, avant l'embrasement du campus de Berkeley de 1964. La multiversité de Kerr, synonyme de « *knowledge industry* » marquait le basculement entre l'enseignement théorique traditionnel universitaire et l'enseignement appliqué lié à l'industrie. Un nouveau basculement est en cours avec la révolution des MOOCs et de l'Intelligence Artificielle.

La révolution des MOOCs (*Massively Open On line Course*) est apparue cinquante ans plus tard, un peu plus au sud de Berkeley, à Stanford. Elle a bouleversé l'univers de l'enseignement à distance avec les plateformes de diffusion de MOOCs comme *Coursera*, *Udacity*, *Edx* et *FUNi*. En plus de l'enregistrement vidéo des cours, les MOOCs apportent trois principales fonctionnalités pour l'apprenant en ligne : un réseau social des apprenants (avec un *community manager* en mode supervision) permettant de créer une classe virtuelle et de créer une communauté, un *video-tutoring* (de plus en plus personnalisé) avec le professeur, une interaction systématique et régulière entre apprenants et professeurs rendant le cours *inter-croisé* (exemple : exercices corrigés par les étudiants en mode *pair-à-pair*). À la fin 2018, plus de 900 universités dans le monde avaient créé plus de 11 000 MOOCs<sup>1</sup>.

Des diplômes en ligne informatiques universitaires existent aujourd'hui tant aux États Unis (le premier diplôme sous forme de MOOC étant le master informatique de Georgia Tech depuis 2014 sur la plateforme *Udacity*), qu'en Europe (le premier étant le master *EMDS* d'UCA depuis octobre 2019 sur la plateforme *FUNi*). L'enseignement, qui est basé sur une distribution de *CONTENUS* pédagogiques (en mode *brick and mortar*, i.e. de concentration dans un espace fixe certifiée avec une diffusion *top down*), va connaître la même révolution que tous les acteurs traditionnels de vente de contenus et de services comme la musique, la vidéo, la banque, le transport ou le commerce, avec de nouveaux acteurs exclusivement en ligne ou hybrides avec des tiers lieux à inventer (pouvant être le domicile).



« TOUT LE MONDE EST UN GÉNIE. MAIS SI VOUS JUGEZ À UN POISSON SUR SES CAPACITÉS À GRIMPER À UN ARBRE, IL PASSERA SA VIE À CROIRE QU'IL EST STUPIDE. »  
ALBERT EINSTEIN

La pandémie du Coronavirus a amplifié la mondialisation numérique (télétravail, télé-médecine, télé-enseignement, transformation digitale des entreprises) et la mondialisation financière en remettant en cause la mondialisation des marchandises et des personnes ! Nous nous intéressons ici au télé-enseignement qui s'inscrit dans une mutation profonde notamment dans l'enseignement supérieur.

L'intelligence Artificielle va contribuer à une transformation des modes d'apprentissage, de suivi des apprenants et d'obtention de diplômes tant au niveau des étudiants que des professeurs, avec des institutions qui vont devoir évoluer vers de la diffusion multicanal de *type click and mortar* en utilisant la dimension disruptive des MOOCs. L'intelligence Artificielle et les MOOCs marquent un basculement vers une nouvelle ère dans l'apprentissage autour des 3P (comme en médecine) : Personnalisation, prédiction (réussite et échec) et Prévention.

En perspective, le but ultime reste la définition de chemins personnalisés d'apprentissage et de réussite vers un diplôme visé.

En conclusion, « *Notre civilisation produit cent fois plus de connaissances par siècle soit un million de fois plus aujourd'hui par rapport au XVIII<sup>e</sup> siècle* ! » (François Taddei, décembre 2019) et on ne peut imaginer passer un million de fois plus de temps dans l'apprentissage à l'école et à l'université !

Nous avons utilisé ici la multiversité dans un sens privilégiant l'axe multi-dimensionnel de l'apprentissage académique intégrant les MOOCs et l'IA. L'apprentissage académique va devenir multiple (synchrone et asynchrone), multicanal, multiforme (Classes inversées) avec la diffusion et l'intégration de MOOCs, en un mot *multiversité* !

Serge Miranda, l'auteur de cet article, est directeur du master *MAGE MDS*, [www.mage-fisage.com](http://www.mage-fisage.com) et du premier master européen en informatique sous forme de MOOCs (*EMDS*).

1 Frederic Robert dans <https://journals.openedition.org/lisa/10818> et Clark Kerr « The uses of the university » Harvard Univ Press, 1972  
2 <https://www.coursera.org>  
3 <https://www.udacity.com>  
4 <https://www.edx.org>  
5 <https://www.fun-mooc.fr/>  
6 <https://www.eduxpa.com/news/2019-01-02-year-of-mooc-based-degree-a-review-of-mooc-staff-and-students-in-2018>  
7 <https://www.udacity.com/fr/georgia-tech>  
8 <http://univ-cotedazur.fr/contenus-riches/actualites/l/universite-cotedazur-lance-son-premier-master-informatique-en-ligne>

# AI and BIG DATA ... and SKILL demand tsunami

© World Economic Forum 2020 : « *From now to 2025, half of active jobs will require up-skilling or re-skilling* »!

© Mckinsey Sept 2018 « *AI will create USD 13 trillion\* GDP growth by 2030 most of which in non-Internet Sector* »

© Harvard Business Review, Dec 2019, p40) AI will contribute to 13 trillion dollars to the global economy over the next 10 years **AI is colonizing every sector of our economy and society**: finance, health, marketing, agriculture, sport, art, press, education, etc.

© ACCENTURE, for G20 summit, 2018 " If skill building does not catch up with the rate of technology progress the G20 economy could lose up to 11 trillions US dollars in cumulative GDP Growth in the next 10 years"!

© *Trillion (10\*\*12; TERA); billion (10\*\*9; GIGA)*

© How to accelerate SKILLS acquisition in the age of intelligent knowledge ?



# AI Teaching in France – FRANCE 2030 report (→ building BIHAR curriculum)



# Dec 2021 French national Report : FRANCE 2030

## 3 basic jobs in AI

- 1) (Big) **DATA SCIENTIST**
- 2) (Big) **DATA ENGINEER**
- 3) (Big) **DATA**-centric **APPLICATION DEVELOPER** (web & mobile)

BOTTOM UP approach to build BIHAR Msc curriculum

### 4.1 Aligner l'offre de formation avec les besoins des entreprises

#### Data Scientistes

- Fondamentaux mathématiques de la data science, des algorithmes de ML/DL et de la robotique
- Préparation et nettoyage des données / Techniques de réduction de la dimension
- Conduite de projets de data science - IA de bout en bout jusqu'à l'optimisation des modèles
- Maîtrise d'une ou plusieurs sous-disciplines : traitement du signal, vision par ordinateur, traitement du langage naturel, IA embarquée, robotique autonome, etc.

#### Ingénieurs de la donnée

- Techniques de stockage des données volumineuses (bases SQL, objets, colonnes distribuées, clés/valeur en mémoire, new SQL, etc.)
- Techniques de calcul parallèle et construction des processus Extract Transform Load : en entrepôts de données ou en architecture virtuelle
- Techniques de traitement des flux de données en temps réel (Data Streaming)

#### Ingénieurs logiciels ML/IA

- Méthodes de programmation industrielle adaptées à la data science et à l'IA
- Automatisation du déploiement des modèles par utilisation de pipelines, orchestrateurs et conteneurs
- Gestion structurée du cycle de vie des modèles via le monitoring et la maintenance versionnée
- Développement des techniques de robustesse, d'intelligibilité et de conformité des modèles en production



# AI EDUCATION in EUROPE (Sept 2022 call) :

*« the move to a more digital world, the digital transition » : 580 Millions Euros over 7 years*

<https://digital-skills-jobs.europa.eu/en/latest/news/eu-boosting-its-digital-talent-new-digital-call-education-programmes-key-digital>

*All Member States are currently facing **a shortage of ICT specialists**, as pointed out also by the **jobs mixing sectoral competences with a proficient understanding of key digital technologies are in high-demand everywhere**. Young people are looking for programmes and courses to **prepare them for jobs in the green and digital economy**.*

*The new Call under the DIGITAL Europe Programme, 'Specialised education programmes or modules in key capacity areas', will **support the development of Bachelor's and Master's courses, jointly designed by universities, research centres and businesses active in the digital domain**.*



**Digital Skills & Jobs Platform**

# Job opportunities and bottom-up approach for SKILLS (GRADEO)

JOB	TOTAL JOB POSTINGS	JOB POSTING REQUESTING SKILLS	PROJECTED GROWTH WITHIN JOB
<b>Software Developer / Engineer</b>	1,088,223	33,395 (3,1%)	30,7 %
<b>Data Scientist</b>	42,050	28,611 (68%)	19 %
<b>Data Engineer</b>	38,571	6,928 (18%)	11,5 %
<b>Data Mining Analyst</b>	89,573	6,257 (7%)	9,3 %
<b>Computer Systems Engineer / Architect</b>	187,204	4,937 (2,6%)	9,3 %
<b>Database Architect</b>	50,583	3,011 (6%)	9,3 %
<b>Business Analyst</b>	306,954	2,448 (0.8%)	14,3 %

The BIG DATA market (Oracle):  
130,000 engineers needed by 2025 with “an announced shortage” !



# A strong fundamental couple : « BIG DATA and AI »

Two major dimensions of (BIG) DATA PROCESSING

DATA MANAGEMENT  
DATA ANALYSIS

Four highly demanded jobs

DATA ENGINEER  
DATA SCIENTIST  
DATA CLOUD Architect  
Big Data Application developer (Web & Mobile)

Two major associated INDUSTRY partnership  
*(for BIHAR MSc and GRADEOS)*

ORACLE  
GOOGLE

# AI learning targets

## COMPUTER SCIENTISTS

- data scientists and big data architects
- general-purpose CS and dual skilling
- technicians

## MANAGERS

- deciders
- Middle management
- active employees and citizens  
(cf AI360 MOOC)

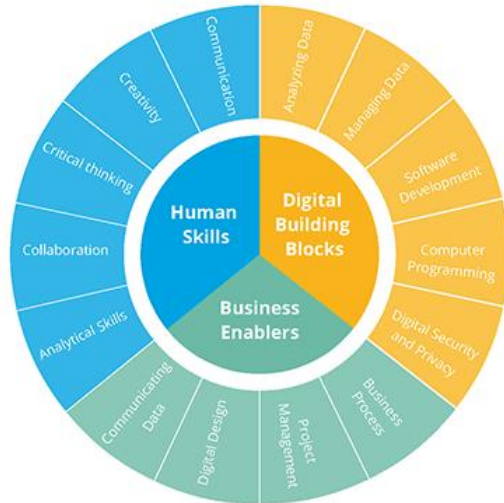
## 4.2 Les enjeux de la formation à l'IA

Une stratégie à différencier pour 6 catégories de publics



# Graduate foundation skills in the data economy

## The New Foundational Skills of the Digital Economy



These 14 skills, already in wide demand by employers, command salary premiums and are crucial for workers who want to keep pace with a changing job market.

© Burning Glass Technologies

Blocs de compétences visés par MSc BIHAR

### Compétences numériques (ABCDE)

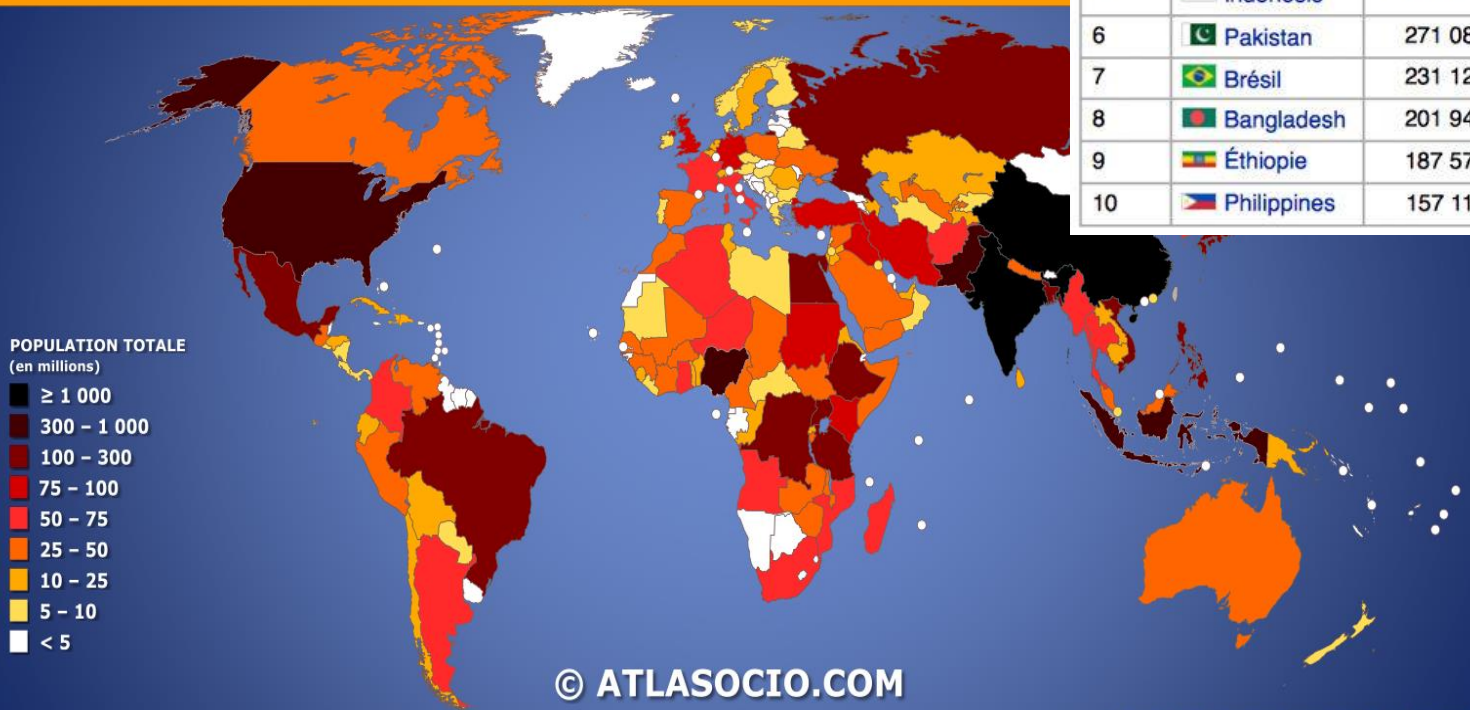
- Ⓞ Gestion de données
- Ⓞ Analyse des données
- Ⓞ Développement d'applications
- Ⓞ Cybersécurité et Cloud

### Compétences business

- Ⓞ Gestion de projet
- Ⓞ Communication de données
- Compétences humaines / soft skills (à travers des projets et des cas d'usage industriels)
- Ⓞ Créativité
- Ⓞ Collaboration
- Ⓞ Compétences analytiques
- Ⓞ Esprit critique
- Ⓞ Communication

# ...and demographic disruption ! (World population in 2050)

## POPULATION MONDIALE – PROJECTION 2050



© ATLASOCIO.COM

Rang	Pays	Population 2050	Population 2013	Croissance (%) 2013-2050
	<b>Monde</b>	<b>9 550 945 000</b>	<b>7 162 119 000</b>	<b>33,4 %</b>
1	Inde	1 620 051 000	1 252 140 000	29,4 %
2	Chine	1 384 977 000	1 385 567 000	-0,0 %
3	Nigeria	440 355 000	173 615 000	153,6 %
4	États-Unis	400 853 000	320 051 000	25,2 %
5	Indonésie	321 377 000	249 866 000	28,6 %
6	Pakistan	271 082 000	182 143 000	48,8 %
7	Brésil	231 120 000	200 362 000	15,4 %
8	Bangladesh	201 948 000	156 595 000	29,0 %
9	Éthiopie	187 573 000	94 101 000	99,3 %
10	Philippines	157 118 000	98 394 000	59,7 %

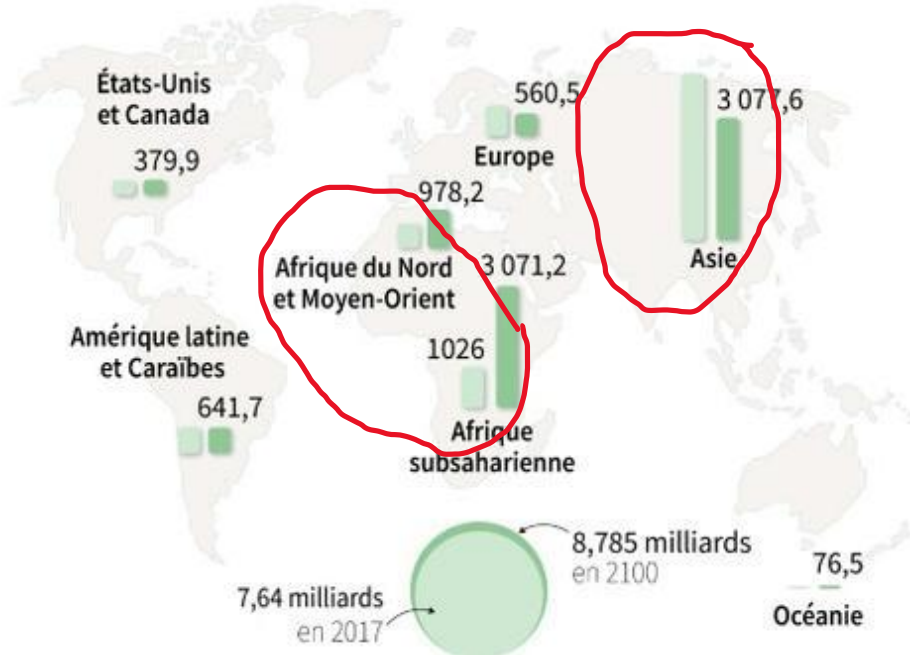
# World population in 2100 : almost 50% will be African;

*Last UN report (JULY 2022, World Prospect) : 9,7 billion in 2050 and 10, 9 by 2100 (7,7 in 2022)*

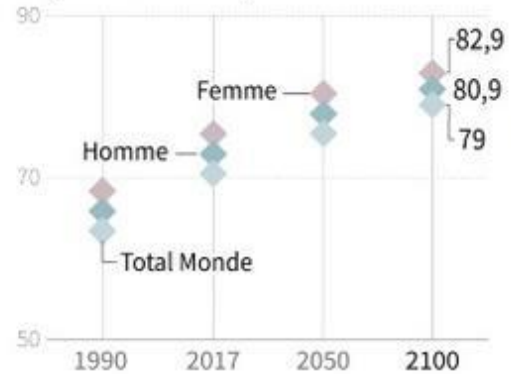
## La démographie mondiale

La population mondiale pourrait atteindre plus de 8,7 milliards de personnes en 2100, selon une projection

Répartition de l'évolution de la population par région, en millions

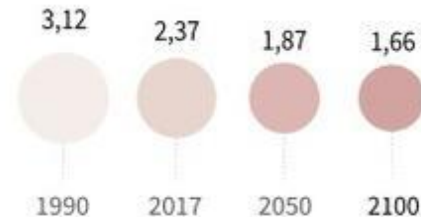


## Espérance de vie, en année



## Taux de fertilité,

nombre d'enfants par femme





## Part III

Our lessons from 2 Masters in CS :

- **MBDS/eMBDS** (University of Nice, France) with Oracle as key IT partner and
- **BIHAR/eBIHAR** (ESTIA, Biarritz, France) with Oracle and Google

Our dream of a network of **MULTIVERSITIES (International Institutes of AI Engineering)** in blended learning around BIHAR Msc



# Our legacy and lessons from 30 years of successful MBDS master of Science at University of Nice (UCA, France) leading to the 2 first on-line master degrees in Europe based upon MOOCs

eMBDS in 2019 at UCA with ORACLE

eBIHAR in 2021 at ESTIA with GOOGLE & ORACLE



May 2009 : Demo of a NFC shopwindow to Nice Mayor (C. Estrosi)

Nice : an NFC city (1st in Europe)  
« due to MBDS innovation lab » in  
May 2010

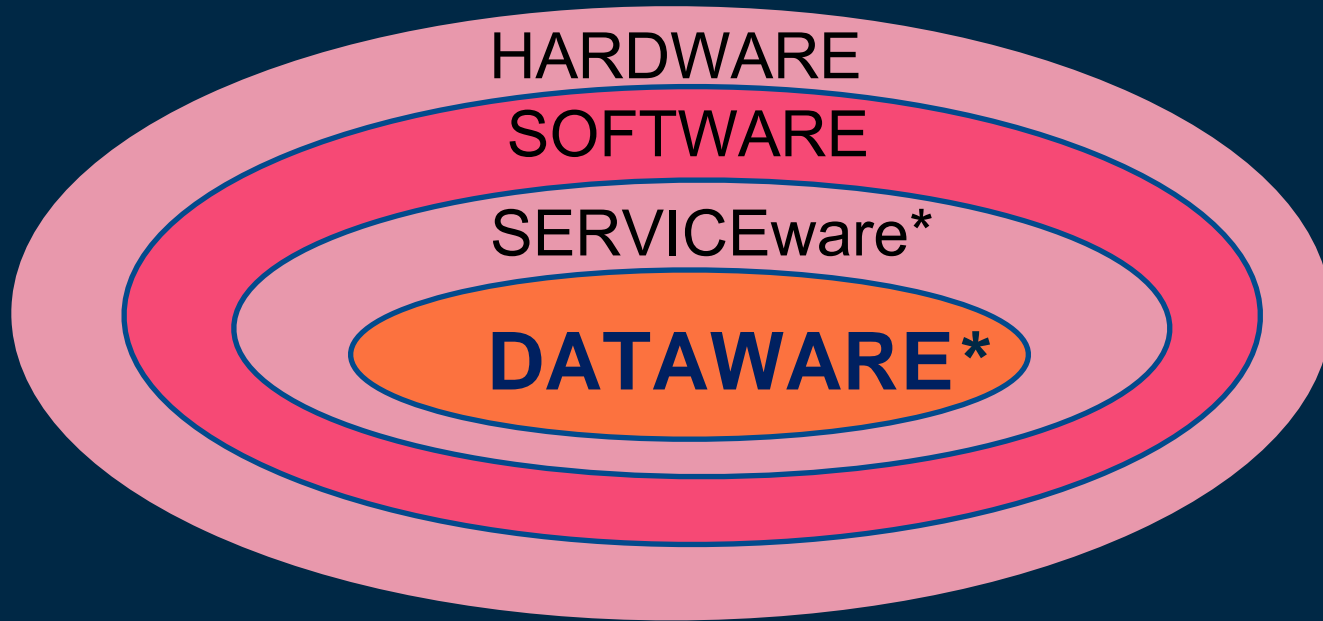


« MBDS is a unique (French) master degree in ICT along with an innovation laboratory on information services for the digital Future » Professor Stuart Madnick (MIT, September 2014)



« Golden asset of universities »  
Le Nouvel Observateur, 2013

30 years of innovation at MBDS and 4 Copernician data revolutions in our innovation lab ( DATA LAB ) !



\* **USERWARE** : « *BIG DATA & DATA SCIENCE* »



# MBDS since 1992 & eMBDS (Université Côte d'Azur, France) since 2019 with ORACLE

© MBDS master legacy since 1992 (with eMBDS launched in 2019 at University of Nice in SOPHIA ANTIPOLIS)

- © One of the best master degrees in CS in France (SMBG ranking)
- © DATA BASE & BIG DATA management centrics
- © MBDS : Delocalized in Haïti, Morocco, Madagascar and Russia



MAJOR MBDS LESSONS : **"LEARNING BY DOING"**

- **INNOVATION LAB with master** Student POCs (POVs) with industry financial support
- KNOWLEDGE creation
- Sustainability
- Employability and industry visibility
  
- Gradeos **"BY EXAMPLE"** (around POC) like "AI360 MOOC" in 2022

**Embark on the first online  
Master degree in Computer  
Science in Europe (based  
on MOOCs\*).**

**About MBDS & eMBDS**



**MBDS** stands for **Mobiquitous** [Mobile and Ubiquitous], Big Data and Systems integration and is a master's degree in Computer Science from the University of Nice Sophia Antipolis (UNS), focused on application development in the DATA economy. MBDS has been ranked among the top ten Masters degrees in Computer Science in France since 2007 with a strong focus on IT innovation.

**eMBDS** is the online version of MBDS, which is a fully European accredited master's degree. It's the first European online Master degree in Computer Science based on MOOCs. eMBDS is offered by the MBDS spin-off **DATUM ACADEMY**, in close partnership with Oracle University.

\* MOOCs: Massive Open Online Courses are online courses with social networking among students and professors.

Are you ready to take  
the digital leap?

Visit [datumacademy.com](http://datumacademy.com)  
to find out more.

## eMBDS launched in 2019 with Oracle on FUN platform (in English only)



**eMBDS launching in Paris on March the 29th 2019;** Valérie Hayotte (Oracle University), Pr Emmanuel Tric (President of University of Nice), Pr Serge Miranda (Director of MBDS and eMBDS degrees) and Catherine Mongenet (Dir. of FUN Mocc platform)

# BIHAR\* Master of Science on Big Data & Artificial Intelligence and its GRADEOS – ESTIA School of Engineering (Biarritz, France)–

The logo for BIHAR, featuring the letters 'BI' and 'AR' in a bold, red, sans-serif font. Between 'BI' and 'AR' are three horizontal green bars of varying lengths, creating a stylized 'H' shape.The logo for e-BIHAR, featuring the letters 'e-BI' and 'AR' in a bold, red, sans-serif font. The 'e' is smaller and positioned to the left of 'BI'. Between 'BI' and 'AR' are three horizontal green bars of varying lengths, creating a stylized 'H' shape. The 'e' and the bars are surrounded by a cluster of small green squares.

\* « **BIHAR** » (*Big data Intelligence for Human Augmented Reality*) means « **TOMORROW** » in Basque Language

# GENERAL ENGINEERING SCHOOL

## INSTITUTE OF ADVANCED INDUSTRIAL TECHNOLOGIES



Part of the University of Bordeaux

ISAE (National Higher French Institute of Aeronautics and Space) network partner

CTI accreditation

*Conférence des Grandes Ecoles* member

ESTIA engineering:

- Mechanical Engineering
- Industrial Engineering
- Electrical engineering
- **Computer Engineering**

- **BIHAR Master of Science on Big Data and Artificial Intelligence**

- **Bachelor on applied AI**

# BIHAR (and eBIHAR ) Master of Science on big Data & artificial Intelligence

© BIHAR: **face-to face MSc** (12- or 18-month program) at ESTIA, Biarritz (France) **with strong international partnerships**

© Special **AI track** with University of Siena, Italy (and **eBIHAR Moocs**)

© MOOCs as complementary academic resources (for flipped classrooms,..)

© Innovation projects in the DATA LAB (POCs on industry USE CASES)

© Master 2 started in Sept. 2020 (Master 1 in Sept.2023 along with Applied AI BACHELOR)

© International Seminar on AI & BIG DATA (cf DATUM web site)

© **eBIHAR** , **MOOC-based version in French and English since 2021 (Master 2)** with 90 ECTS

- CONNECTED DIGITAL CAMPUS (CDCs) and their DATA LABS within an international network in the 5 continents

- DUAL-DEGREE agreement for the CDC with its university, ESTIA and DATUM ACADEMY

© **DATA LAB** : Innovation and Research platform in Big Data & Artificial Intelligence at ESTIA (with ESTIA-TECH support) and in CDC

© DIGITAL AGRICULTURE, HEALTH, SPORT

The logo for BIHAR, featuring the letters 'BI' in red, followed by three horizontal green bars, and the letters 'AR' in red.

# DATA LAB at ESTIA

**INNOVATION lab** (focus on services and usage of AI and Big Data)

- Proof of concepts (POCs) and Proofs of value conducted by tutored students under industry contracts
- → Support for functional gradeos
- → Support for Learning by doing
- → 2022 : Support for the popularization MOOC on AI BY EXAMPLE for every student in France in 2023 based upon 6 use cases
- 3 Key areas of innovation in our DATA LAB
  - **digital agriculture** (*towards a school on digital agriculture with CASAU d EDEN project by Marc Lassus with pilot farms?*)
  - health, smart city



# DATA LAB at ESTIA with strong Google initial support in oct 2021

© **2 EXTRA free professional Google courses on Coursera for BIHAR** (in French and English) on DATA CLOUD ARCHITECT and DATA ANALYTICS\* for BIHAR and gradeos students

© <https://www.coursera.org/professional-certificates/google-data-analytics>

© <https://www.coursera.org/professional-certificates/gcp-cloud-architect>

© in 2022 : **First BIHAR GOOGLE GRADEO** on DATA SCIENTIST in the CLOUD with 1 eBIHAR MOOC (AI) and 1 Google course\*

© **Google internship on DIGITAL AGRICULTURE in 2022 in our DATA LAB (France and Africa)**

© **RESEARCH in the METAVERSE** : with ambition to have the first master in the METAVERSE : *E-learning LMS POC in the Metaverse with Kinetix in 2022*

\* *The most successful MOOC on Coursera in 2020 (> 100 000 professional certificates)*



Oct the 5th 2021 at ESTIA  
Felix Manoharan Director of Higher Education at GOOGLE CLOUD EMEA with P.Elisalde Director of ESTIA

# BIHAR

DATUM  
ACADEMY

# DATA LAB and new Bihar Gradeos with Oracle

**ORACLE**  
University

Existing BIHAR Gradeos for computer scientists on BIG DATA, FULL STACK WEB DEVELOPMENT and AI in the CLOUD

Towards a **series of gradeos « BY EXAMPLE »** around use cases prototyped in the data lab

Example : AI Health gradeo both for doctors and computer scientists (around Oracle 21C \*engine)



With Valerie Hayotte in charge of GLOBAL SKILLS development at Oracle University



# eBIHAR and gradeo dissemination thru « CDC » (Connected Digital Campus) : 3 salient features

- **eLEARNING *third-place with LOCAL FACE-to-FACE TUTORING***: MOOC for every BIHAR Course, GRAEOS Hybrid/Hyflex  
LEARNING of the future

Broadband Internet room

Flipped classrooms with MOOCS

Learning by doing INNOVATION (DATA LAB)

The logo for BIHAR, with the letters 'BI' and 'AR' in red and 'HAR' in red with green horizontal lines through the 'A'.

- **INNOVATION laboratory / « DATA LAB » for the country** : POCs with local industry and Learning by doing

© potential start up INCUBATOR

NOTE : Special popularization FREE MOOC for every student : « AI BY EXAMPLE » (AI360 Mooc) for every student  
around 6 USES CASES/POCS)

**INTERNATIONALIZATION** : network of CDCs and DATA LABs and first step towards an Institute of AI Engineering

# eBIHAR and Gradeos within CDC agreement

Initial option : **distribution of full-on line European-certified eBIHAR master/bachelor and GRADEOS** with local tutoring

- European certification is valid
- Professional certification is valid
- academic requirement : Master1 level in CS (or Bachelor in CS in 4 year,s)
- COMPLEMENTARY international track in a local master program
- eBIHAR cost around 4 K euros (**50% reduction**) including local tutoring



Target option

- **DUAL-degree agreement** which requires Ministry administrative agreement (1 year)
- HYBRID learning with 50% of local face to face courses and 50% on-line (Bihar MOOCS)

# Formal agreement with AFRIA in 2021 at ESTIA (eBIHAR with CDC in French speaking African countries)



With Pr ERic Adja, AFRIA president at ESTIA in June 2021

## 2 Phases for any BIHAR academic partnership

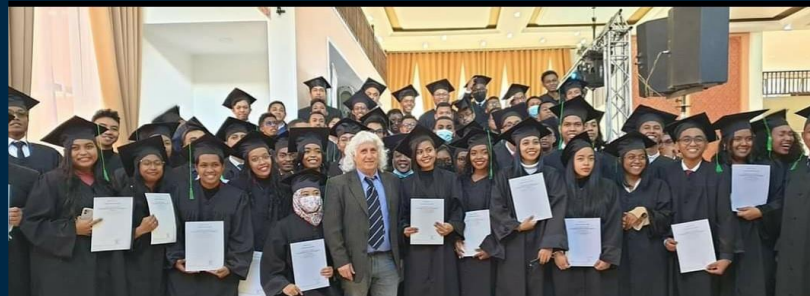
- 1) Short term : **full DISTRIBUTION of eBIHAR** (a European **professional certified** master 2) and its **GRADEOS** in the country (with 10 to 30% for the CDC for local tutoring) and **DATA LAB creation** with the support of Oracle and Google ; eBihar is thus an extra international master2 track on **BIG DATA** and **AI** for the local master students
- 2) MID-term (with required joint administrative country agreementt), **joint hybrid degrees** with 50% of local courses and 50% MOOCs

# Formal opening of the First African Estia/Bihar CDC in Ivory Coast in March 2022



*Le CAN a été inauguré le 29 mars 2022 en présence de l'Ambassadeur de France (Mr Belliard), de deux Ministres de Côte d'Ivoire, Mr ADOM, Ministre Economie Numérique et Telecom et Mr DIAWARA ministre de l'Enseignement Supérieur et de la Recherche avec P.Elisalde Directeur ESTIA et Pr S.Miranda*

# Formal CDC opening in July 2022 in Madagascar (IT UNIVERSITY)



**BIHAR**

# BIHAR master CDC (Connected digital Campus) And its « DATA LAB » (Bihar POCs) towards “International ESTIA Bihar institutes” (on AI Engineering)

Planned network of 20 CDCs in the 5 continents under deployment before 2030 \*

**and 4 International AI INSTITUTES (MULTIVERSITIES) in the next five years :**

2 CDC opened in 2022 in Africa representing **44 eBihar/Bihar master** students in 2022:

© **ESATIC (Ivory Coast)**

© **ITU ( Madagascar)**

Other CDCs **signed** for opening before 2025 with **GRADEO immediate Distribution :**

© AFRICA : **AFRIA (Benin/ISM), TOGO (IAEC) , SENEGAL (DIT),**

**Cameroon** , MOROCCO , Algeria, Tunisia, Gabon, Burkina, Senegal (UVS),Nigeria )

© ASIA : **CHINA (SRBS)** , INDIA (Amrita, Kerala), Vietnam (DANANG), Korea,  
Russia

© EUROPE and ME : **Northern Cyprus (EMU), Italy (Siena), France (Univ Lyon),**

**Spain (Uni Vigo)**, Bilbao/DEUSTO, Romania (CLUJ), IRAK, , BARHAIN

© SOUTH AMERICA : **Haiti, Dominican Republic**, PANAMA, **COLOMBIA** ,Brasil,  
Mexico (Yucatan), Guatemala, Costa Rica

© OCEANIA : TAHITI (UFP), New Caledonia (UFP)



**DATA LAB:** Smart Car, Smart city,  
Smart FARMING, DEEP HEALTH,  
Deep Marketing, Digital circular  
economy

# International Institute on Applied AI – I2A2 – (*AI Multiversity*) : « *Estia Bihar institute* »

Planned extension of existing CDC and BIHAR (master2) with its DATA LAB:  
**from Master2 down to Master 1 and bachelor and..K12!**

3 Years curriculum

- 1st year (3rd Year of the Estia Bachelor) BACHELOR on « applied AI »
- 2 Years of the master program



Goal : BLENDED learning with 50% of local courses and 50% of Bihar MOOCS

Plan for this Estia Bihar institute : Full-on line version of the 3-years I2A2 with

- eMaster 2 BIHAR in GB and French existing since 2021
- eMaster 1 and eBachelor under development in 2023 and 2024 (with Campus France in Africa, China/SRBS contract and European contract)

# SUMMARY : 2 strategic EDTECH demands in the DATA economy and the 3rd Age of AI (2010-2050) for **AI multiversities** of the future and our contribution

## 1) On-line (Mooc-based) **CERTIFIED** and **PROFESSIONAL** degrees

- *learning by **DOING*** in AI (3rd phase) around POCs
- **hybrid/hyflex learning**

## 2) **SKILL TSUNAMY** demand in continuous education **both for Computer scientists & MANAGERS**

- *double certification leading to jobs* (upskilling & reskilling)
- *4 targeted jobs* : DATA Engineer, DATA scientist, DATA-centrics application developer , CLOUD architect

## **ESTIA with DATUM ACADEMY**

### 1) « Estia Bihar institute » : **International Institute of AI Engineering**/3 years

- BACHELOR on Applied AI
- eBIHAR Master (M1 & M2) < M2 available in FR and GB>
- eMBDS in English with Univ of Nice (UCA, France)

### 2) The DATA LAB at Estia and in a connected digital campus (CDC) for POCs

### 3) 4 Gradeos with Oracle (3) and Google (1)

**ORACLE**  
University

**GRADEO** ▶▶



Google Cloud

**DATUM**  
ACADEMY



# eBIHAR and *Adaptive Learning*

**BLENDED LEARNING IS A DIMENSION OF HIGHER EDUCATION OF THE FUTURE** (amplified by the covid) towards MULTIVERSITY

© Need to build CUSTOMIZED track to knowledge (MOOC flexibility) to predict your success : **the 3 "P"** (Personalization, Prevention, Prediction) < cf PHD by Sergio Simonian CIFRE at DATUM >

Our long-term EDTECH vision : towards **the first AFRICA/ASIA/ME/LATIN AMERICA Multiversity** (*International Institute of AI Engineering*) in the DATA economy (from K12 to K22) providing

- © fully European on-line certified degrees (as extra international learning paths) for blended learning
- © professional degrees (and Gradeos) with industry leaders in
  - © DATA management (Oracle) and
  - © DATA analysis (Google)
- © DATA processing SKILLS (cf Gradeos) expected by the market both for Computer scientists and managers
- © A network of international Connected Digital Campuses in the 5 continents to support this international vision



# BIHAR MSc and *EXPERIENTIAL Learning* :

- the **DATA LAB**
- the international Connected Digital Campus (CDC) towards **click and mortar**
- International Institute of AI Engineering/MULTIVERSITY** (“ESTIA-Bihar” institute)

The power of **LEARNING BY DOING** in the 3<sup>rd</sup> AGE of AI :

© INNOVATION Bihar POCS (Proofs of concepts) in every year of the Bihar curriculum → **DATA LAB and sustainability**

© «Needs for experiential and adaptive learning

© TOWARDS a series of GRADEOS in the future on

- SPECIFIC AI “BY EXAMPLE” (industry, bank, agriculture,..) both for CS and managers **built around POCS with the 3 “A” : *Acquire, Adopt, Adapt***

**NEW BM under study** : *Towards eBIHAR students becoming SUBSCRIBERS for Data Labs POCS and GRADEOS for incremental knowledge upgrade*

© Example : « 6 BIHAR USE CASES » in Deep Learning , ANR Contract in 2022 for a free popularization MOOC for French students on « AI BY EXAMPLE » < *In France and in each CDC within BIHAR DATA lab*>

***Our eBIHAR proposal in the rise of ADAPTIVE learning, BLENDED LEARNING, EXPERIENTIAL LEARNING, HYFLEX learning (Hybrid + flexible) and ...MULTIVERSITY of the future!***

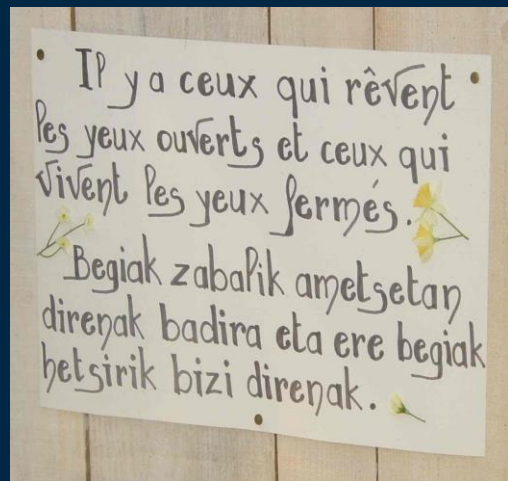
**CONCLUSION1 : To be AUDACIOUS : « Be OUT of the box » !**



➤ *« Your Highness ...determined to send me, to the country of India...and furthermore directed that I should not proceed by land to the East as is customary, but by a Westerly route, **in which direction we have hitherto no certain evidence that anyone has gone** »*

➤ Christopher COLUMBUS

## CONCLUSION 2 : See you “bihar” \* to create AI MULTIVERSITIES with their DATA LABS !

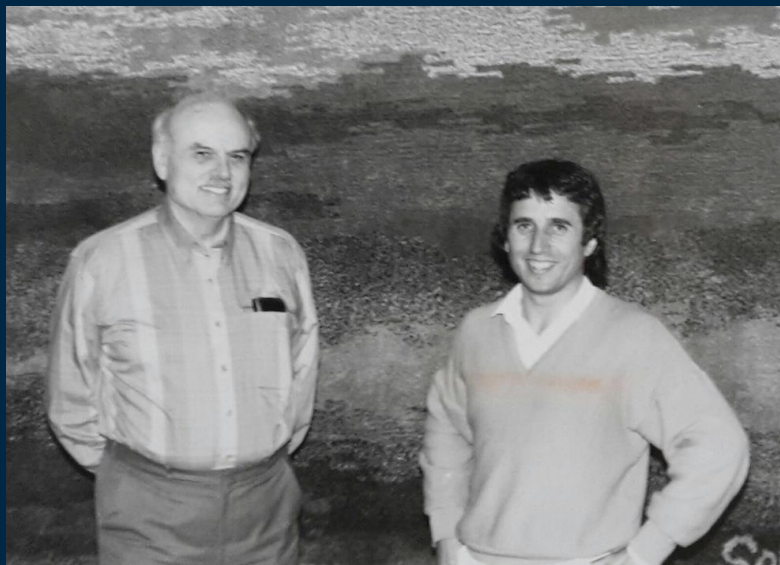


\* “BIHAR” means “TOMORROW” in Basque language

EXTRA SLIDES



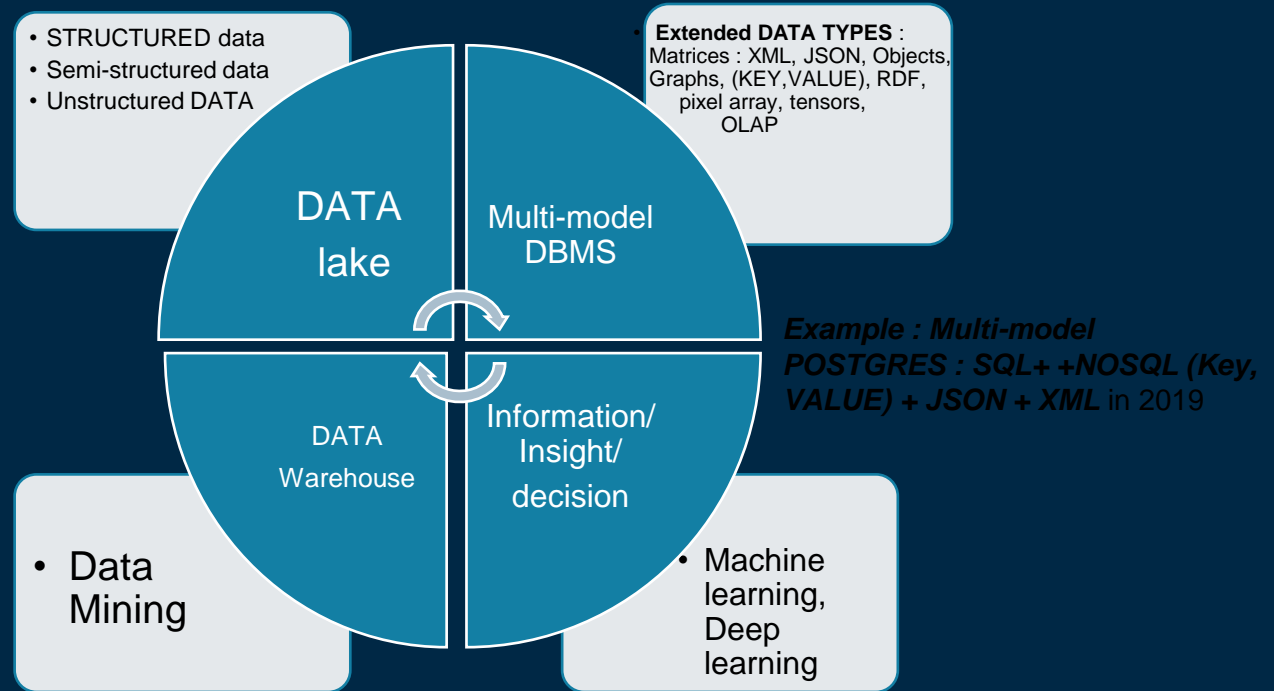
# And other key contributors to BIG DATA MANAGEMENT and Engineering



With Ted Codd in Sophia Antipolis (1986)

- **Ted CODD 1968 (Relational ALGEBRA & SQL2) : « Everything is VALUE »**
- Chris DATE & Mike Stonebraker 1995 (SQL3) :  
« **Everything is POINTER-VALUE** »
- TIM BERNERS LEE 1998 (SparQL, RDF) :  
« **Everything is PREDICATE-VALUE** » (**WEB DATA**)
- Chang 2006 (N.O.SQL) :  
« **Everything is KEY-VALUE (N.O.SQL)** »
- STONEBRAKER 2013 (NEW SQL) :  
« **Everything is SQL** »
- EIMore 2015 « **Everything is POLYSTORE** »
- Deep Learning : « **Everything is an IMAGE** »
- and Evariste Gallois 1832 !! :  
« **Everything..is a GROUP (CATEGORY)** »

# DATA refinery



# Conclusion DATUM ACADEMY with ESTIA (3 features)

- 1) eBIHAR Master (M1 & M2) < M2 available in FR and GB>
- eMBDS in English part of an « **Estia Bihar institute** » :  
**International Institute of AI Engineering/3 years**  
With a BACHELOR on Applied AI
- 2) **The DATA LAB** at Estia and in a connected digital campus for POCs for functional gradeos

The logo for BIHAR, featuring the letters 'BI' and 'AR' in red, with a stylized green and blue graphic element between them.

[www.jecandidate.estia.fr/](http://www.jecandidate.estia.fr/)

*Applications are OPEN for on-line  
eBIHAR MSc and its GRADEOS*

The logo for eBIHAR, featuring the letters 'eBI' and 'AR' in red, with a stylized green and blue graphic element between them.

Both English & French on  
[www.datumacademy.com](http://www.datumacademy.com)

The logo for GRADEO, featuring the word 'GRADEO' in white on a black background with a blue arrow pointing right.The logo for ORACLE University, featuring the word 'ORACLE' in red and 'University' in white.The logo for Google Cloud, featuring the Google Cloud logo and the text 'Google Cloud'.



# 4 SKILLS sets with BIHAR MSc leading to JOBS

## DATA ENGINEER & BIG DATA ARCHITECT

- ✓ DATABASE ADMINISTRATOR (SQL & NoSQL)
- ✓ DATA WAREHOUSE & DATA LAKE MANAGER

## DATA SCIENTIST

- ✓ MACHINE LEARNING & DEEP LEARNING
- ✓ ARTIFICIAL INTELLIGENCE ENGINEER

## BIG DATA DEVELOPER

- ✓ WEB APPLICATION DEVELOPER
- ✓ NATIVE MOBILE DEVELOPER AROUND NEW TECHNOLOGIES (NFC, AR, BLOCKCHAIN ...)

CLOUD DATA ARCHITECT (with Google)

# eBIHAR : English Version

OBJECT-RELATIONAL DATABASES AND SQL STANDARD	from October 3th to November 11th 2022
ARTIFICIAL INTELLIGENCE (ML & DL)	from October 3th to November 11th 2022
FULL-STACK MOBILE WEB DEVELOPMENT	from October 3th to November 18th 2022
DISTRIBUTED BIG DATA MANAGEMENT	from January 2nd to February 17th 2022
CYBERSECURITY	from January 2nd to February 17th 2022
NFC TOOLS AND AGILE PROJECT MANAGEMENT	from February 20th to March 31th 2022
CLOUD PROGRAMMING	from April 3th to May 26th 2022
MOBILE PROGRAMMING	from April 3th to May 19th 2022
BLOCKCHAIN	from April 3th to May 26th 2022

## Oracle mandatory courses

Machine Learning on Oracle  
Cloud SLS

SQL & PL/SQL  
Fundamentals on Oracle  
Cloud SLS

Big Data Fundamentals on  
Oracle Cloud SLS

Oracle Database 19c:  
Administration Workshop  
on Oracle Cloud SLS

# eBIHAR : French Version

Programmation SQL & Relationnel Objet	du 03 Octobre au 11 Novembre 2022
Intelligence Artificielle (Machine Learning & Deep Learning)	du 03 Octobre au 11 Novembre 2022
Développement Mobile Web Full Stack	du 03 Octobre au 18 Novembre 2022
Blockchain	du 28 Novembre au 9 Décembre 2022
Gestion Répartie du Big Data	du 02 Janvier au 10 Février 2023
Cyber Sécurité	du 02 Janvier au 17 Février 2023
NFC	du 20 Février au 31 Mars 2023
Programmation Agile, DevOps et Outils de gestion de Projet	du 20 Février au 17 Mars 2023
Programmation Cloud	du 17 Avril au 26 Mai 2023
Programmation Mobile	du 17 Avril au 12 Mai 2023
Réalité Augmentée et Réalité Virtuelle avec Unity	du 12 Juin au 07 Juillet 2023

## Two Google Cloud optional courses in 2022

Digital Leader  
(CLOUD fundamentals)

Data Analyst

Cloud Architect

# 4 KEY differentiating features for MSc BIHAR & eBIHAR

## CURRICULUM BUILT AROUND 4 SKILLS SETS and a DATA LAB

Leading to highly-demanded jobs  
BOTTOM UP approach from JOBS

## STRONG PROFESSIONAL INVOLVEMENT (with certification)

ORACLE for DATA MANAGEMENT  
GOOGLE for DATA ANALYSIS

## STRONG INTERNATIONAL PARTNERSHIP

University of Siena in Italy on AI,  
Network of Connected Digital Campuses (CDC)

## HYBRID LEARNING

Every course is available off-line in French and English  
(MOOC) as extra-academic resource  
(or for flipped classroom)

# Micro-Credentials :



*Dual Certificates leading to JOBS*

# GRADEO : continuous professional development for UP-SKILLING and RE-SKILLING

© A growing demand from employers and employees for short programs that provide new skills and focus on the labour market needs.

© The European MOOC consortium has defined a common **microcredential** framework to tackle these issues

**100-150 hrs workload 4-6  
ECTS**

**Assessment combined with a  
reliable method of ID  
verification**

**Level : Bachelor or master**

**Transcript with specification  
of learning outcomes, hours,  
level and credits earned**

**GRADEO**



# BIHAR GRADEO to meet SKILL demand in Big Data, AI and Application development

Double certification included :  
3 or 6 ECTS (CONCEPTS- what?) and  
PROFESSIONAL Certification (TOOLS- HOW?)

DUAL CERTIFICATION LEADING TO JOBS

# 3 GRADEOS with Oracle

## ADVANCED SQL PROGRAMMING

- ✓ OBJECT-RELATIONAL DATABASES AND SQL STANDARD
- ✓ SQL ON ORACLE CLOUD

## BIG DATA & ARTIFICIAL INTELLIGENCE

- ✓ ARTIFICIAL INTELLIGENCE ML/DL
- ✓ DISTRIBUTED BIG DATA MANAGEMENT
- ✓ MACHINE LEARNING ON ORACLE CLOUD

## FULL-STACK MOBILE WEB DEVELOPMENT

- ✓ FULL-STACK MOBILE WEB DEVELOPMENT
- ✓ JAVASCRIPT & HTML5: DEVELOP WEB APPLICATIONS ON ORACLE CLOUD



# One BIHAR gradeo with Google : *AI /BIG DATA and CLOUD*

## ARTIFICIAL INTELLIGENCE AND BIG DATA ARCHITECT IN THE CLOUD

GRADEO : certificates leading to jobs



### Google Cloud Courses (Google Cloud Career Readiness Program)

#### INTERMEDIATE SPECIALIZATION COURSE

##### Data Analyst specialization 16 weeks

- ▶ Mining and preparing your data with BigQuery
- ▶ Creating new BigQuery datasets and viewing insights
- ▶ Get advanced insights with BigQuery
- ▶ Apply machine learning to your data with GCP

##### Associate Cloud Engineer Specialization 16 weeks (certificate included)

- ▶ Google Cloud Platform Basics: Basic Infrastructure
- ▶ Google Cloud Infrastructure Essentials: Foundation
- ▶ Google Cloud Core Infrastructure: Core Services
- ▶ Google Cloud Elastic Infrastructure: Scaling and automation
- ▶ Google Cloud Reliable Infrastructure: Design and process

#### BEGINNER COURSE

##### Cloud Digital Leader (certificate included)

- ▶ Introduction to digital transformation with Google Cloud
- ▶ Innovating with data and Google Cloud
- ▶ Modernising infrastructure and applications with Google Cloud
- ▶ Understanding Google Cloud security and operations

COURSE OFFERED TO THOSE WHO DO NOT HAVE THE BASICS IN CLOUD



Pr. Marco GORI & Stefano MELLACI  
University of Siena (UNISI)  
Teachers of Artificial Intelligence



Pr. Serge MIRANDA  
University Côte d'Azur (UCA) & ESTIA  
Big Data Teacher

Information & Enrolment for GRADEO and Master eBIHAR on [www.datumacademy.com](http://www.datumacademy.com)

## ARTIFICIAL INTELLIGENCE AND BIG DATA ARCHITECT IN THE CLOUD

in partnership with Google Cloud

DURATION: 6 MONTHS

PRICE: 999 €

ENROLMENT : ALL YEAR ROUND

DELIVERING: 6 ECTS & 2 GOOGLE CERTIFICATES\*  
LEARNING MODE: 100% ONLINE

The AI and Big Data architect must master 3 environments at the heart of this GRADEO :

- 1.The management of DATA, both structured with pre-definition of a fixed schema (SQL3, OQL), semi-structured with meta data (SparQL) and unstructured (NOSQL, New SQL) as well as the concepts of DATA WAREHOUSE and DATA LAKE.
- 2.The analysis of DATA with computer methods (Data Mining and OLAP), statistics (Machine learning in supervised or unsupervised mode) or based on AI with the fundamental approach of Deep Learning (multi-layer neural networks)
- 3.The Cloud which is the future of DATA management and analysis

### Academic courses from ESTIA's Master BIHAR/eBIHAR

#### BD2: from databases to Big Data 6 weeks

- ▶ BIG DATA paradigms and Codd relational data model for structured data
- ▶ Introduction to SQL2, relational SQL
- ▶ ChrisDate's third manifesto for hybrid object-relational data models
- ▶ Introduction to ODMG
- ▶ Introduction to SQL3, object-relational SQL
- ▶ NOSQL and NEW SQL for unstructured data

#### Artificial Intelligence : Machine Learning & Deep Learning 6 weeks

- ▶ Mathematical tools for AI
- ▶ The basics of Machine Learning
- ▶ The basics of Deep Learning
- ▶ Learning with Deep Learning
- ▶ Computer vision, natural language
- ▶ Software for Machine Learning