



Agència
per a la Qualitat
del Sistema Universitari
de Catalunya

www.aqu.cat

Big (and Small) Data meets Quality Assurance

Anna Prades, Maribel Quirós, Maria Giné, Lorena Bernáldez

10th European Quality Assurance Forum

21th November, London



#aqu

CONTRACT: Intended Learning Outcomes

LO-1

- Recognise the potential of data analysis available for quality assurance as well as the limitations inherent to the “excess” available data

LO-2

- Appraise an evaluation model of research and teaching university departments based on statistical data

LO-3

- Identify the human resources needed to develop small-scale project related data

LO-4

- Reflect on the suitability of introducing a more quantitative analysis of programs and institutions

- **Context**

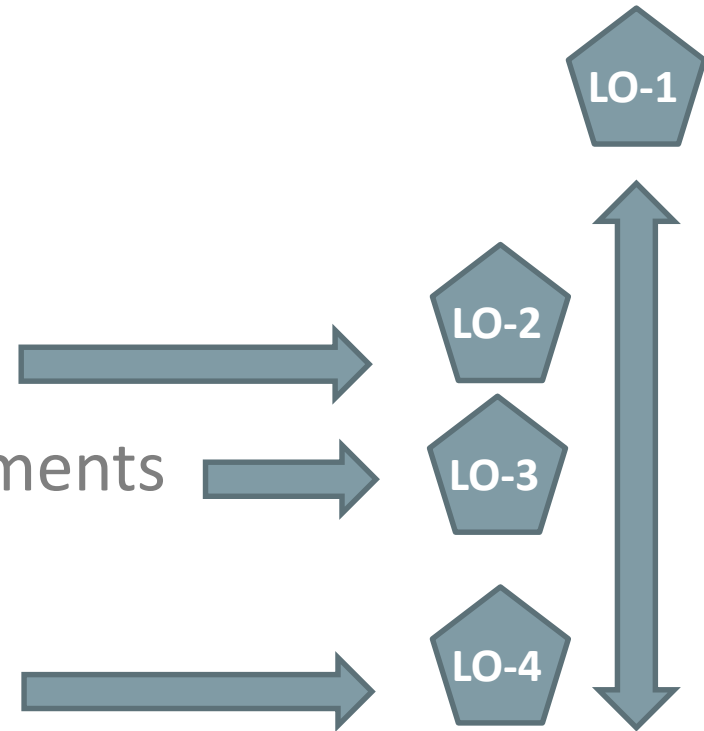
- Why do we need data?

- Case study

- Human resources & skills requirements

- The future

- Discussion





Agència
per a la Qualitat
del Sistema Universitari
de **Catalunya**

The purpose of AQU Catalunya is the **assessment, accreditation and certification of quality in the sphere of the universities and higher education centers of Catalunya.**





Low budget since 2010

Less resources



Context: Types of Data



UNEIX

Sources: university pre-enrollment ddbb, research centers ddbb (CERCA), universities microdata (academic results) + teaching data + AQU surveys



Graduates employment survey (Ba, Ma and PhD)

- Editions: 2001, 2005, 2008, 2011 and 2014 Population: 3 years after graduations (public + private universities)
- 153 variables (n= +/- 50,000)



Graduates satisfaction survey

- 1st edition: 2014
- Set of 22 common questions



Employers survey

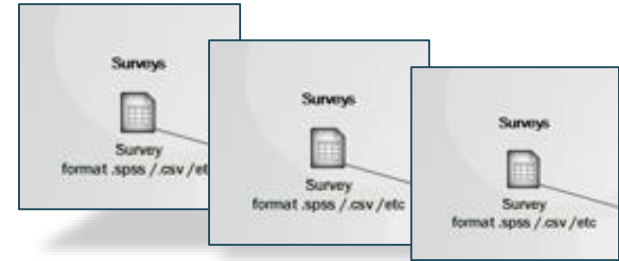
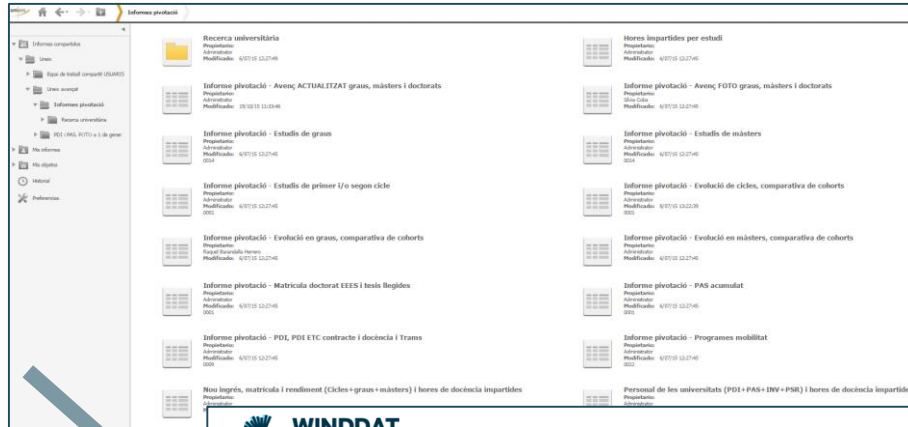
- 1st edition: 2014
- 1000 employers (from Health and Education to SMEs)





Accreditation reports

Up to date 150 assessment reports (SQL database)

Context: Uneix + Surveys -> winddat.aqu.cat



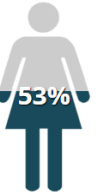




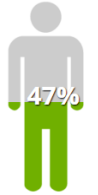
CATALONIA UNIVERSITIES COURSES
CONTACT ENGLISH

13-14
All universities Public Private
All faculties Main faculty Affiliated

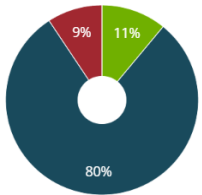
237,424 Students



53%



47%



9% 11% 80%

- Pre-Bologna courses
- Bachelors
- Masters

	Female	Male	Total
Pre-Bologna courses	11,633 43	14,342 78	25,975 121
Bachelors	103,605 26,501	85,866 23,563	189,471 50,064
Masters	11,519 7,757	10,459 6,439	21,978 14,196
Enrolled students	126,757 34,301	110,667 30,080	237,424 64,381

Students who come from abroad

7,528

Students who go abroad

6,790

Number of theses defended

2,250

New students

64,381

Graduates

44,128

Graduates

Total 44,128 Female 57% Male 43%

	Female	Male	Total
Pre-Bologna courses	5,103	5,657	10,760
Bachelors	14,404	8,903	23,307
Masters	5,605	4,456	10,061
	25,112	19,016	44,128

Staff

Teaching staff and researchers: Women 40% Man 60%

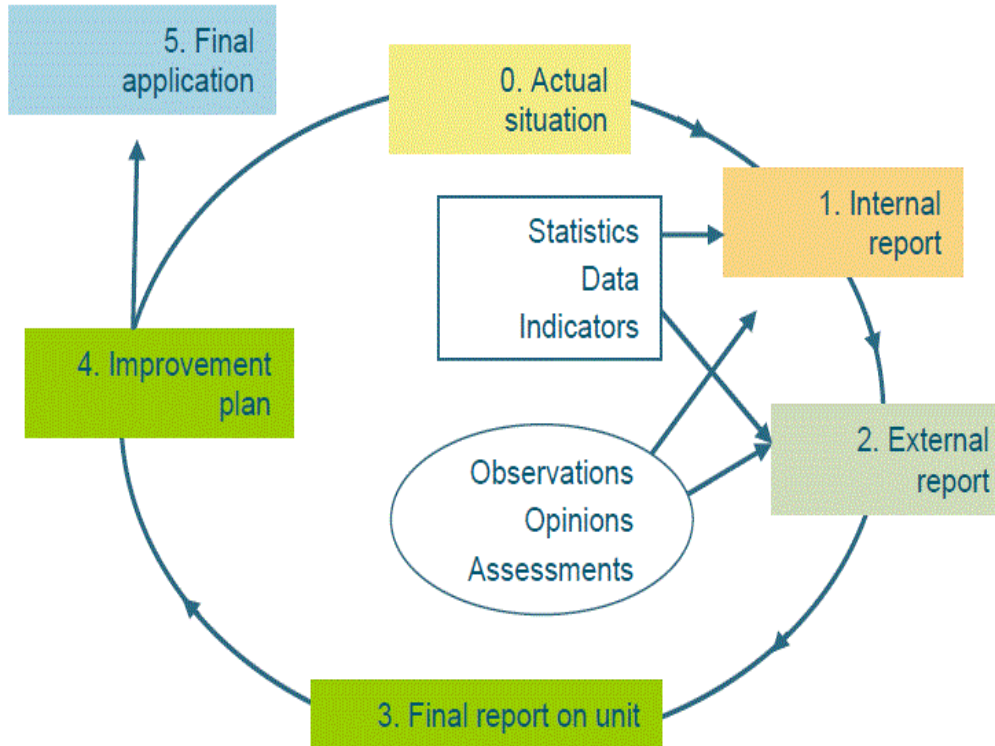
Administration and services staff: Women 65% Man 35%

	Teaching staff and researchers	Administration and services staff
Women	7,743	7,088
Man	11,544	3,800
	19,287	10,888

- Context
- **Why do we need data?**
- Case study
- Human resources & skills requirements
- The future
- Discussion



Data and QA: Love at first sight



“The quality assessment “spiral” is a circular and cyclical process which begins with collecting and systematizing information”.

Westerheeijden, 1996: 274

Why do we need to use data?



Standard 1.7

Institutions should ensure that they collect, analyse and use relevant information for the effective management of their programmes and other activities



Approved by the Ministerial Conference in May 2017

To:
 European Association for Quality Assurance in Higher Education
 European Quality Assurance Network
 European University Association
 European Association of Public Administrators in Higher Education
 European Association of Quality Assurance in Higher Education
 European Quality Assurance Network in Higher Education

May 2017

Quality culture



Data driven decision making



Turning data into **actionable** insights



It's cool!!!



Starting point: information overloading

The image shows a browser window displaying a university website. The browser's address bar shows the URL: `unex.gencat.cat/microstrategy/asp/Main.aspx?evt=2001&src=Main.aspx.2001&systemFolder=7&Main.aspx-WIN-VC4`. The website content includes a navigation menu and two tables of data. A cartoon illustration of human evolution is overlaid on the page, showing five stages from left to right: **PITHECANTROPUS ERECTUS**, **HOMO HABILIS**, **HOMO SAPIENS**, **HOMO SAPIENS SAPIENS**, and **HOMO VIDENS**. Arrows point from each label to its corresponding character in the cartoon. The cartoon shows a progression from a monkey-like creature to a modern human holding a smartphone.

The website also displays a table of 'Crèdits ordinari matriculats per estudi. Segons universitat' and another table of 'Crèdits ordinari matriculats per estudiant. Segons estudi'. The bottom of the page shows a footer with navigation links: `Universitat > Informes compartits > Unex > Unex bàsic > Graus > Centres Integrats. ... Matriculació en graus. Tipologia de crèdits matriculats per universitat. Segons branca`.

- Context
- Why do we need data?
- **Case study**
- Human resources & skills requirements
- The future
- Discussion





Case Study

Subject area	Sub-area	No Departments
Humanities	Fine Arts	6
	Philology	22
	Philosophy	5
	Geography and History	21
Social Sciences	Political Sciences and Sociology	5
	Law	17
	Economics and Business	20
	Education	19
	Journalism and Communication and Library Science	7
Experimental Sciences	Psychology	11
	Biology	6
	Geology	8
	Mathematics and Physics	19
	Chemistry	10
Health Sciences	Biomedicine	21
	Pharmacy	4
	Nursing	7
	Medicine and Surgery	16
	Veterinary Science	4
Engineering & Architecture	Architecture and Civil Engineering	12
	Mechanical and Production Engineering	28
	Agricultural Engineering	5
	ICT Engineering	14
Total		287



Type	Code	Description
Research	RIND01	Sum of TOTAL income generated in 4 years by PhD-holders / number of PhD-holders
	RIND02	Sum of income from EUROPEAN SOURCES generated in 4 years by PhD-holders / number of PhD-holders
	RIND03	Sum of income from STATE SOURCES generated in 4 years by PhD-holders / number of PhD-holders
	RIND04	Sum of income from CATALAN SOURCES generated in 4 years by PhD-holders / number of PhD-holders
	RIND05	Sum of income from CONTRACTS AND AGREEMENTS generated in 4 years by PhD-holders / number of PhD-holders
	RIND06	Sum of income from COMPETITIVE FUNDING SOURCES generated in 4 years by PhD-holders / number of PhD-holders
	RIND07	Sum of income from NON-COMPETITIVE FUNDING SOURCES generated in 4 years by PhD-holders / number of PhD-holders
	RIND08	Current research premiums from regional government / no. people with current research premiums in the category Principal Investigator
	RIND09	Sum of TOTAL income generated in 4 years by: 2-FULL PROFESSOR, 3-SENIOR LECTURER, 16-UNIVERSITY SCHOOL FULL PROFESSOR
	RIND10	Sum of TOTAL income generated in 4 years by ALL OTHER TEACHING STAFF (not categories 2,3 or,16, above)

Fundraising

- Income generated
- Competitive vs not competitive
- National vs International

Research awards / distinctions

By number of PhDs

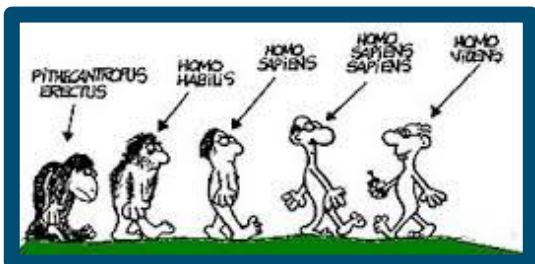
Type	Code	Description
Teaching	PIND02	Full-time teaching staff (A+B) with net teaching capacity > 0 / teaching staff (permanent + adjunct) * 100
	PIND03	Part-time teaching staff (A+B) with net teaching capacity > 0 / teaching staff (permanent + adjunct) * 100
	PIND05	Permanent teaching staff >= 60 years / total permanent teaching staff * 100
	PIND06	Permanent teaching staff >= 45 years and < 60 years / total permanent teaching staff * 100
	PIND07	Permanent teaching staff >= 35 years and 45 < years / total permanent teaching staff * 100
	PIND08	Permanent teaching staff < 35 years / total permanent teaching staff * 100
	PIND10	Six-yearly research premiums from regional government * 6 / five-yearly teaching premiums from regional government * 5
	PIND11	Total teaching and research staff + International researchers / Total teaching staff * 100
	PIND12	Total teaching and research staff + EU researchers - 15 + USA & CANADA / Total international * 100
	PIND14	% permanent teaching staff in (23 Special Services and 22 Services) / teaching staff (permanent + adjunct)
	PIND15	% net teaching capacity of permanent teaching staff / potential teaching capacity of permanent teaching staff
	PIND17	% PhD-holders / total teaching staff
	PIND18	Age indicator (sum of all groups - over-60) / over 60
	PIND19	Distribution of classroom teaching hours; % according to teaching staff category

Teachers

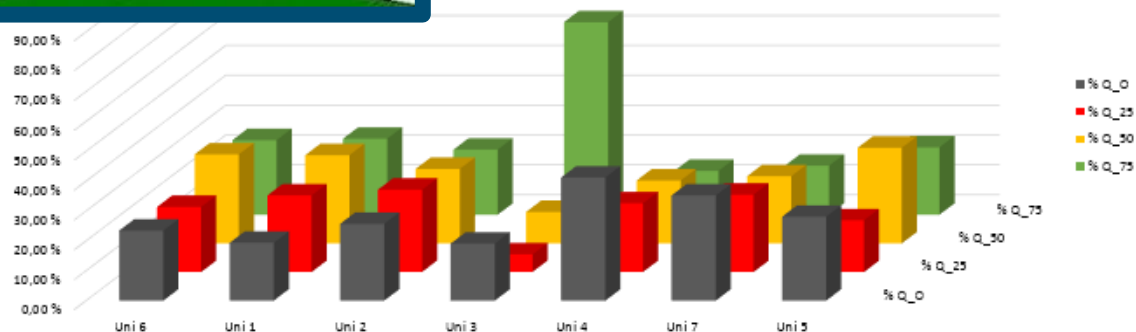
- Academic categories
- Permanent vs non permanent
- Age
- National vs International



Case Study: the Result



Universities/ Quartiles



Universities

	N ² Dept.	N ² Ind.	% Q4	% Q3	% Q2	% Q1
Uni 6	106	2014	23,44 %	21,80 %	29,79 %	24,98 %
Uni 1	57	1073	19,38 %	25,63 %	29,54 %	25,44 %
Uni 2	42	798	25,69 %	27,57 %	24,94 %	21,80 %
Uni 3	8	152	19,08 %	5,92 %	10,53 %	64,47 %
Uni 4	24	456	41,23 %	23,03 %	21,05 %	14,69 %
Uni 7	26	494	35,22 %	25,91 %	22,47 %	16,40 %
Uni 5	24	456	28,07 %	17,32 %	32,02 %	22,59 %
Total	287	5443	25,79 %	23,06 %	27,28 %	23,87 %

Quartiles
classification
of the
previous
indicators

Case Study: the backoffice

Producció (3 Capes)/Universitat (CAR)/Mis Objetos Personales/Mis Informes/2014/AGU/FDI I INV per ANY NÀIXEMENT

DATA EXTRACCIÓ: 10/04/2014

Filtro de informe:
(Grup tipus personal universitari) = FDI, INV y (Any = 2012)

Naturales universitat: PÚBLICA , Integrat S/N: SI

Universitat	Unitat	Grup tipus	Categoria	Subnivell	Estatut	Ene 1931 i 1943		1944		1945		1946		1947		1948		Ene 1950 i 1954		Ene 1955 i 1960		Ene 1961 i 1965		Ene 1966 i 1976		Ene 1977 i 1987		1988		1989		1990		1991	
						personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal	personal
UB	RECTORAT	440007003	INV	INSTITUCIONAL	Senca																														
UB	DEPARTAMENT	440007004	INV	INSTITUCIONAL	Senca																														

4 de 1 2 3 de 485 pàgines

Filas de dades: 1 - 50 de 24217 | Columnas de dades: 1

Curs Academic	Universitat	Unitat	Categoria del professor	Doctor i no doctor	Indicadores	Personal Docent Investigador
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	CATEDRÀTIC UNIVERSITARI	DOCTOR		11
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	TITULAR UNIVERSITARI	DOCTOR		33
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	TITULAR ESCOLA UNIVERSITÀRIA	SENSE INFORMAR		3
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	ASSOCIAT	SENSE INFORMAR		98
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	ASSOCIAT MÈDIC	SENSE INFORMAR		2
99-00	UNIVERSITAT DE BARCELONA	Ciències Morfològiques i Odontostomatologia	ASSOCIAT SUBSTITUT	SENSE INFORMAR		38
99-00	UNIVERSITAT DE BARCELONA	DEPARTAMENT D'ÀLGEBRA I GEOMETRIA	CATEDRÀTIC UNIVERSITARI	DOCTOR		5
99-00	UNIVERSITAT DE BARCELONA	DEPARTAMENT D'ÀLGEBRA I GEOMETRIA	TITULAR UNIVERSITARI	DOCTOR		14
99-00	UNIVERSITAT DE BARCELONA	DEPARTAMENT D'ÀLGEBRA I GEOMETRIA	TITULAR ESCOLA UNIVERSITÀRIA	SENSE INFORMAR		1
99-00	UNIVERSITAT DE BARCELONA	DEPARTAMENT D'ÀLGEBRA I GEOMETRIA	ASSOCIAT	SENSE INFORMAR		1
99-00	UNIVERSITAT DE BARCELONA	DEPARTAMENT D'ÀLGEBRA I GEOMETRIA	ASSOCIAT	SENSE INFORMAR		3

An extrapolation of the Case Study: Masters employment indicators

Anàlisi comparativa d'IL màsters
Comparació de subàrees amb el total de Catalunya 68% de confiança

Àrea: C. Socials
Subàrea: Ciències Polítiques

Àrees

Àrea	núm. Indicadors	SD11	SD12	SD13
C. Socials	49	100,0%	100,0%	100,0%
Subàrea C. Socials	49	100,0%	100,0%	100,0%
Subàrea Ciències Polítiques	49	100,0%	100,0%	100,0%
Total	98	100,0%	100,0%	100,0%

Subàrees

Subàrea	núm. Indicadors	SD11	SD12	SD13
Procedència del titulat	2	100,0%	100,0%	100,0%
Qualitat de la inserció laboral	37	100,0%	100,0%	100,0%
Impacte en la carrera professional	10	100,0%	100,0%	100,0%
Comprensió	4	100,0%	100,0%	100,0%
Satisfacció amb el treball i la assessoria	2	100,0%	100,0%	100,0%
Total	55	100,0%	100,0%	100,0%

Indicadors

Indicador	núm. Indicadors	SD11	SD12	SD13
Procedència del titulat	2	100,0%	100,0%	100,0%
Qualitat de la inserció laboral	37	100,0%	100,0%	100,0%
Impacte en la carrera professional	10	100,0%	100,0%	100,0%
Comprensió	4	100,0%	100,0%	100,0%
Satisfacció amb el treball i la assessoria	2	100,0%	100,0%	100,0%
Total	55	100,0%	100,0%	100,0%

C. Socials

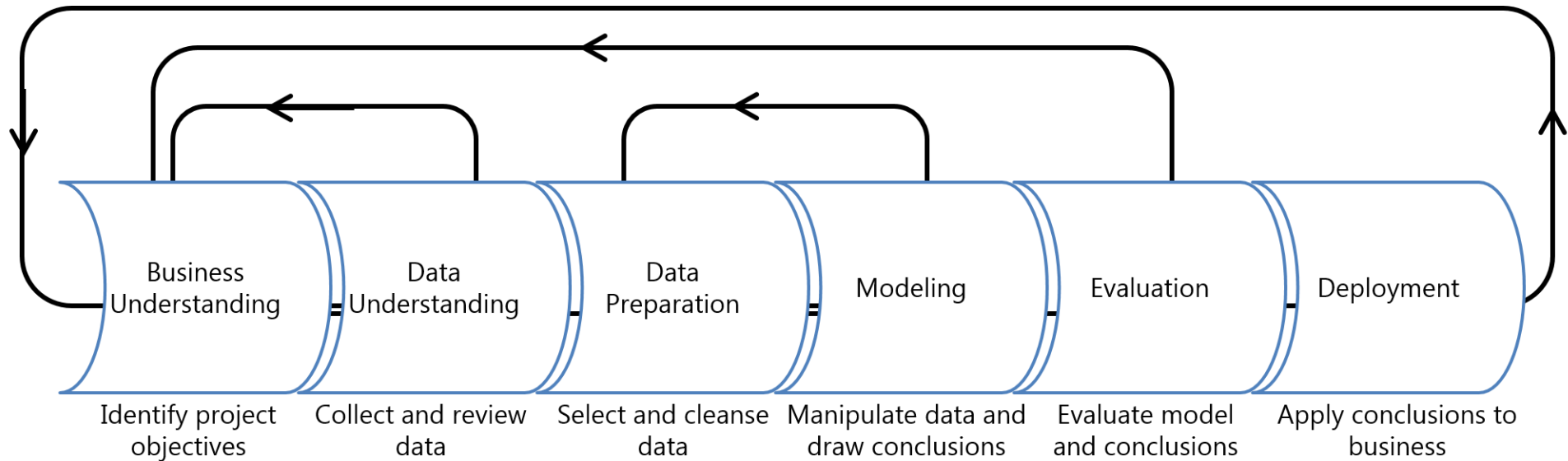
Ciències Polítiques

Print to PDF

Excel report master

<https://youtu.be/1fadu1fvf28>

The data science process



CRISP DM(2000)

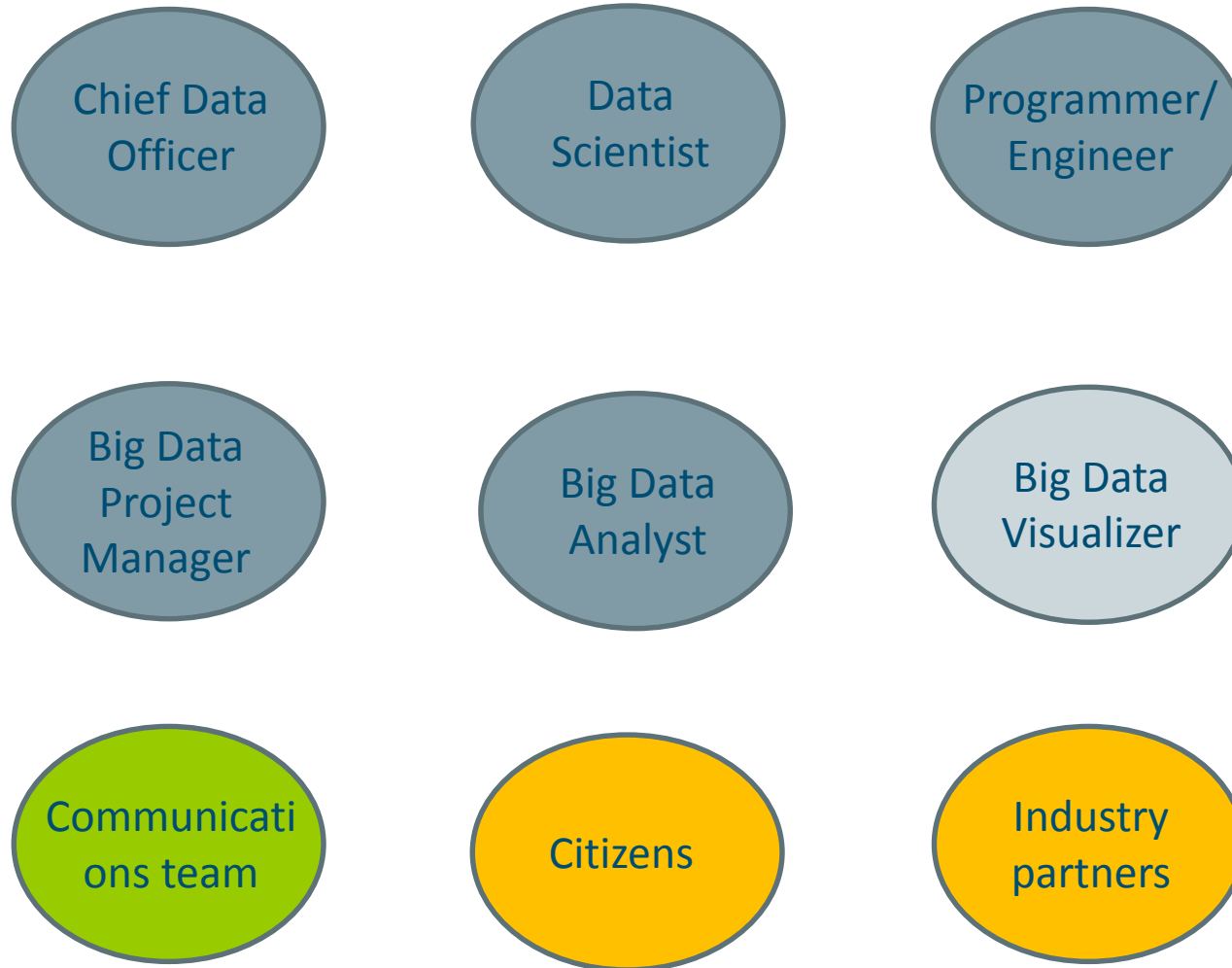
Image from Data Science and Machine Learning Essentials (edX), by Cynthia Rudin and Stephen F Elston



- Context
- Why do we need data?
- Case Study
- **Human resources & skills requirements**
- The future
- Discussion



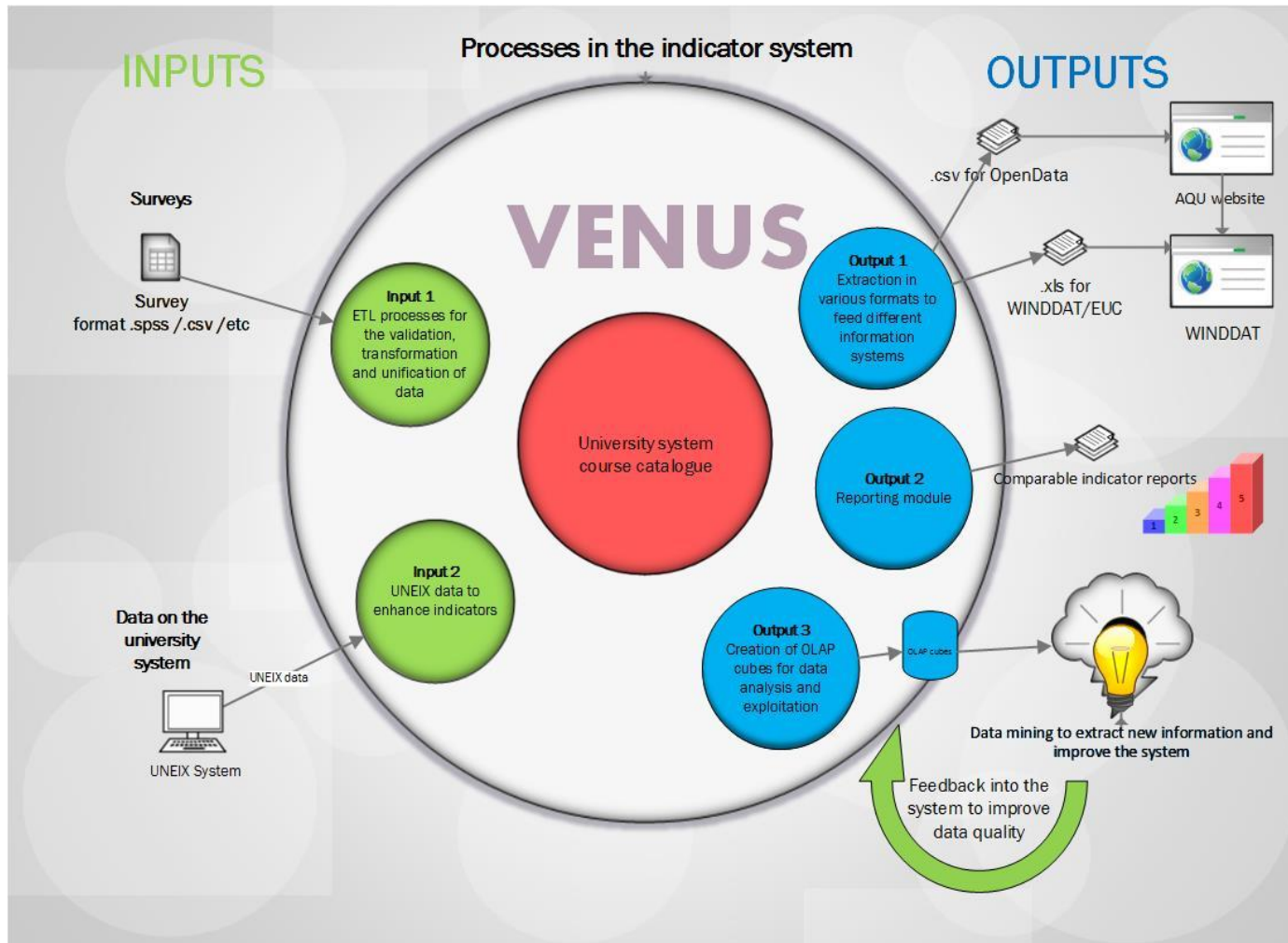
HR: Your All-Star Team (by GovLoop)



- Context
- Why do we need data?
- Case Study
- Human resources & skills requirements
- **The future**
- Discussion



- Predictive models of professional success
- Detect good practices regarding skills gap
- Real-time teaching staff renewal (upcoming retirements)
- Institutional KPI for teaching and research
- Predictive model of accreditation results: a self-assessment tool
- Possible use of existing data to simplify the assessment procedures



Thank you for your attention

<http://www.aqu.cat>

aprades@aqu.cat

mquiros@aqu.cat



[@aqucatalunya](https://twitter.com/aqucatalunya)

