OPEN EDUCATIONAL RESOURCES FOR LEARNING ENVIRONMENTAL ANALYSIS

Camelia Draghici

Transilvania University of Brasov
Department of Product Design, Mechatronics and Environment

Transilvania University of Brasov

Global context for "**open learning**"

COVID-19 pandemic OPENED the interest for OPEN LEARNING

Three accepted meanings for open learning:

1. Open Education in **Open Universities**
2. **Massive Open Online Courses** (MOOCs)
3. **Open Educational Resources** (OERs)

Differences in the "openness" types – at five levels:

1. definition of openness
2. certificates
3. degrees
4. target groups
5. main objects

(report of the Joint Research Centre, of the European Commission)

Massive Open Online Courses (MOOCs)

MOOCs are online courses designed

- for a large number of participants
- that can be accessed by anyone having internet access
- from anywhere
- are open to everyone without entry qualifications
- and are offered for free

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

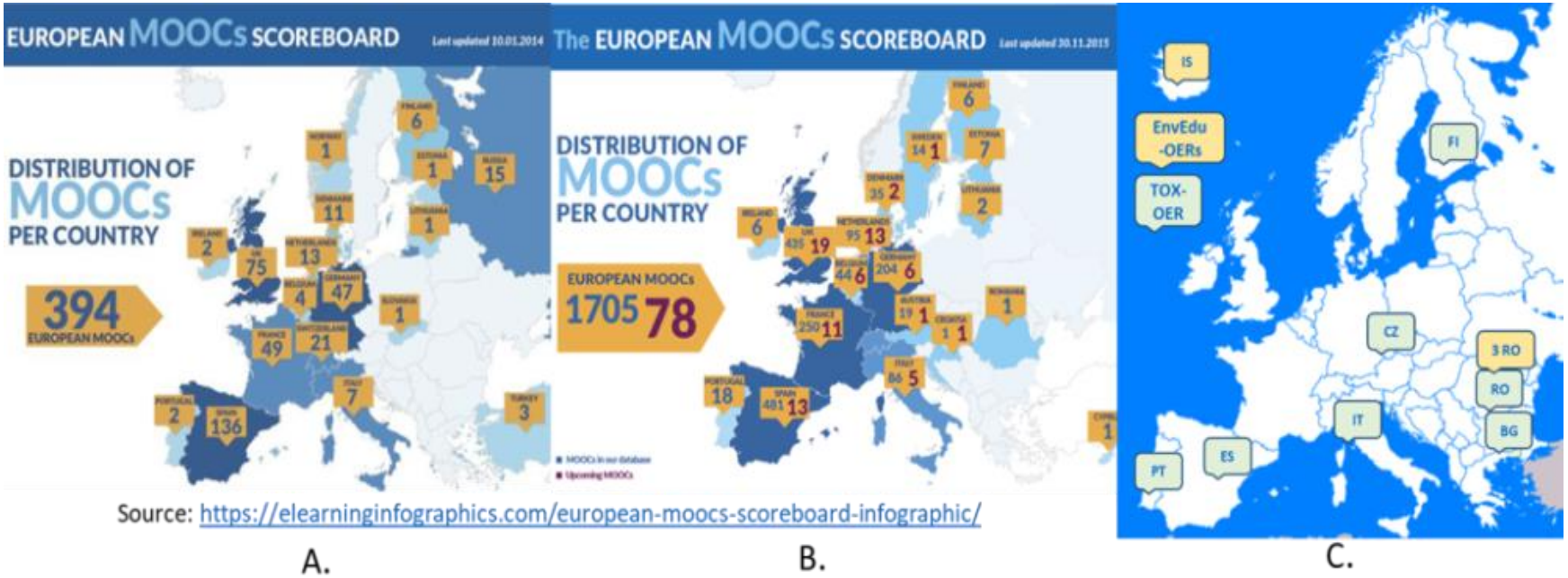
Open Educational Resources (OERs)

OERs are teaching, learning, and research resources available in the public domain; include:

- full courses
- course materials
- **modules**
- **texts**/ textbooks
- streaming **videos**
- **tests**
- software
- any other tools, materials, or techniques used to support access to knowledge

Transilvania University of Brasov

Context – MOOCs in Europe



MOOCs distribution in Europe: on **10.01.2014** (A.); on **30.11.2015** (B.)
TOX-OER and EnvEdu-OERs contributions to MOOCs in Europe (C.)

Lack of MOOCs for toxicology learning!!!

Learning Toxicology through Open Educational Resources – TOX-OER
September 2015 – February 2018 (novelty in this domain)
Project aim – to share toxicology-related knowledge and skills among the seven partners from European countries

Transilvania University of Brasov

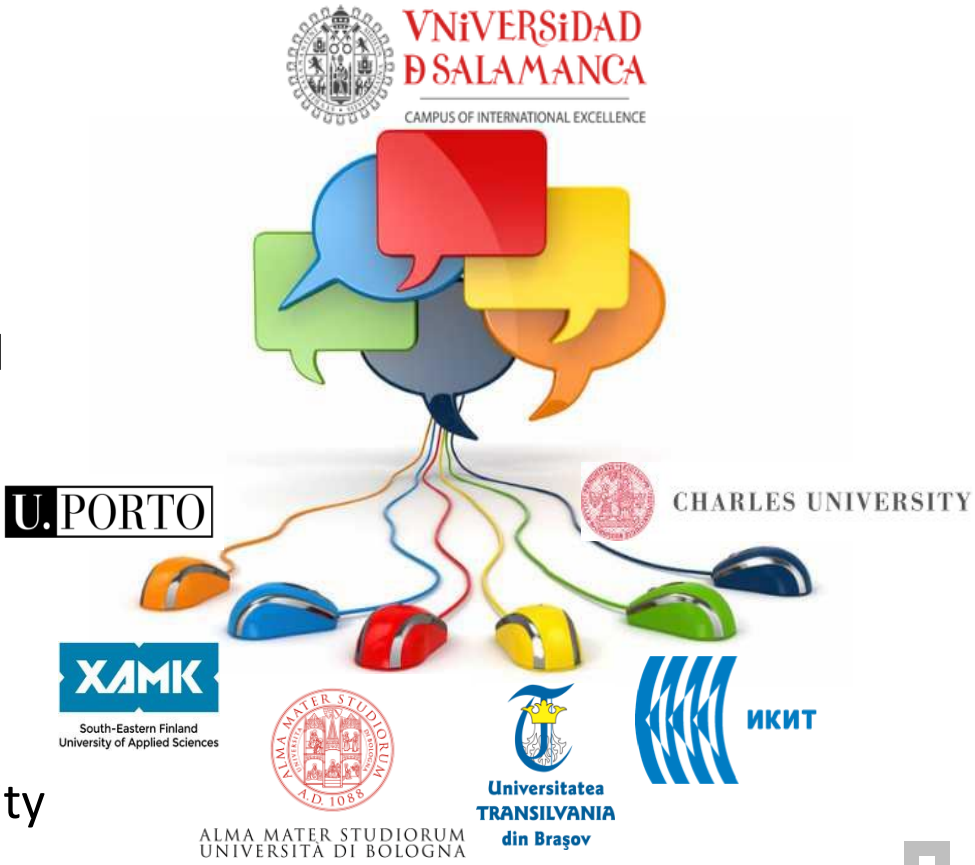
Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

TOX-OER partnership

TOX-OER

https://toxoer.com/

1. **Spain** – University of Salamanca (USAL) – project coordinator
2. **Bulgaria** – Space Research and Technology Institute (SRTI-BAS)
3. **Czech Republic** – Charles University, Prague (CUNI)
4. **Finland** – South-Eastern Finland University of Applied Sciences (XAMK)
5. **Italy** – University of Bologna (UniBo)
6. **Portugal** – University of Porto (UPorto)
7. **Romania** – Transilvania University of Brasov (UNITBV)



Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Learning contents – toxicology syllabus

Modules names (number of topics)	ECTS	Partners contribution
M1: General Concepts (1)	1	UPorto
M2: Pharmaco-Toxicokinetics (4)	6	UPorto
M3: Principal Groups of Xenobiotics (2)	4	UniBo
M4: Environmental Pollutants (5)	7	**UNITBV**, CUNI, SRTI-BAS
M5: Target Organ Toxicity and Biomarkers (5)	8	CUNI, USAL, UPorto
M6: Environmental Toxicology (4)	7	**UNITBV**, XAMK
M7: Patents and Patent Application (1)	2	UniBo
Total number of ECTS	35	

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Module 6: Environmental Toxicology Environmental quality monitoring

Topics names	ECTS	Responsible partners
M6 T6.1. European Union and National Regulations Related to Environmental Quality	2	**UNITBV**
M6 T6.2. Control of Emissions from Anthropogenic Activities and Safety	2	XAMK
M6 T6.3. Introduction to the Environmental Quality Monitoring System	1	**UNITBV**
M6 T6.4. Monitoring the Environmental Quality – Air, Water, Soil	2	**UNITBV**

http://moodle.toxoer.com/course/index.php?categoryid=9

Contents and evaluation tests – 1 ECTS

	Description	Unit	
Content	introduction text to the module	no.	1
	introduction video to the module: 3 minutes	no.	1
	multimedia learning content – video courses/ **commented slides**: 2x15 or 3x10 min. for each content	no.	2/ 3
	text-based learning content for further reading: **- learning resources** (text contents) or **- additional readings** (papers, book chapters)	h	4
Evaluation/	**self-evaluation tests** (intermediary/ quiz)	no.	2
assessment	**evaluation tests** (final)	no.	1

All produced in English and the seven languages of the partners

(Manciulea I., Vasilescu A., Girotti S., Ferrari L., Protti M., Mercolini L., Dumitrescu L., Perniu D., Draghici C., EEMJ, 2019, 18(8), 1833-1842)

Transilvania University of Brasov

Produced OERs

Topics and units	Types of OERs		
	Videos (a)	Texts (b)	Tests (c)
T6.3. Introduction to the Environmental Quality Monitoring System	1+4	3	3+1
U1. Environmental monitoring scheme and related activities	1	1	1
U2. Environmental sampling and analytical measurements	2	1	1
U3. Environmental data processing and reporting	1	1	1
T6.4. Monitoring the Environmental Quality – Air, Water, Soil	1+4	4+1	4+1
U1. Air quality monitoring	1	1	1
U2. Waters quality monitoring	1	1	1
U3. Soils quality monitoring	1	1	1
U4. Environmental quality – European Environment Agency	1	1	1

(a) introduction video for the topic + video presentations; (b) text-based learning resources + additional reading; (c) self-evaluation tests + evaluation tests (final)

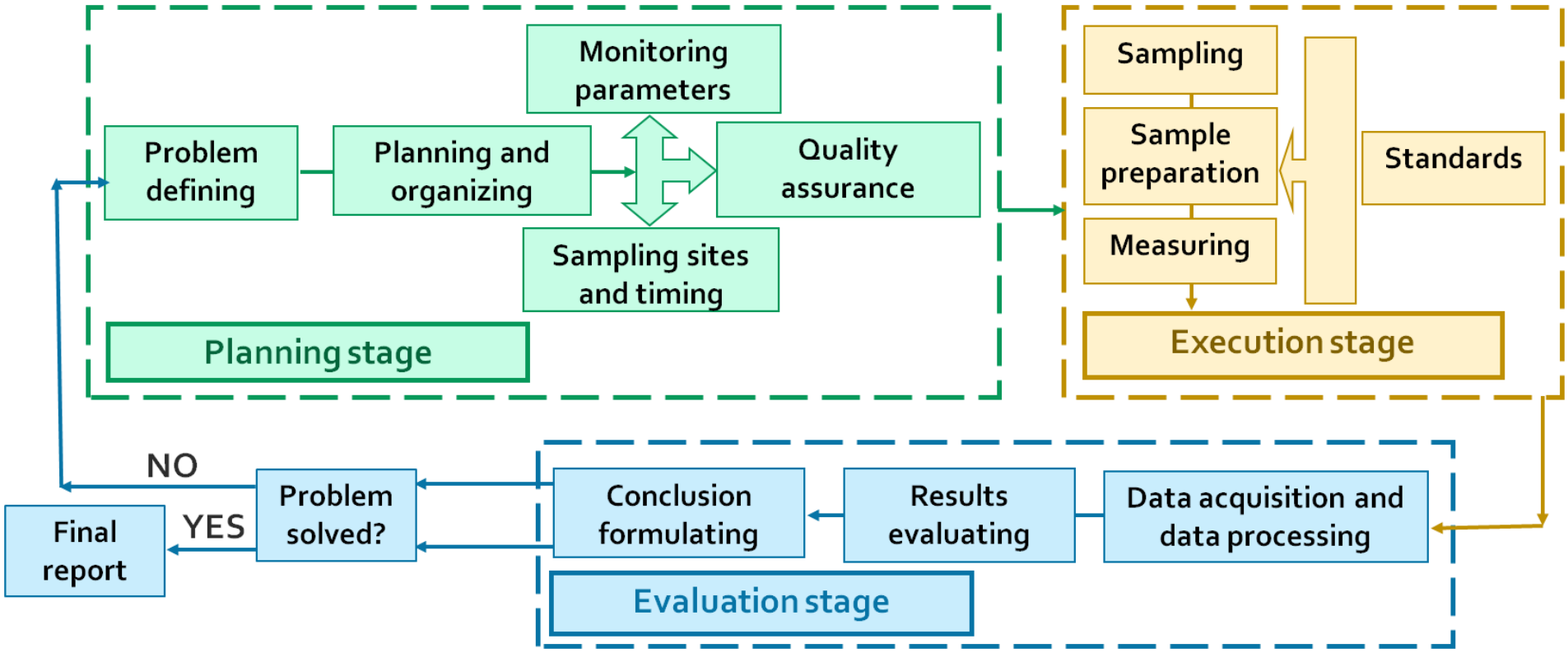
T6.3. - http://moodle.toxoer.com/course/view.php?id=34

T6.4. - http://moodle.toxoer.com/course/view.php?id=33

Transilvania University of Brasov

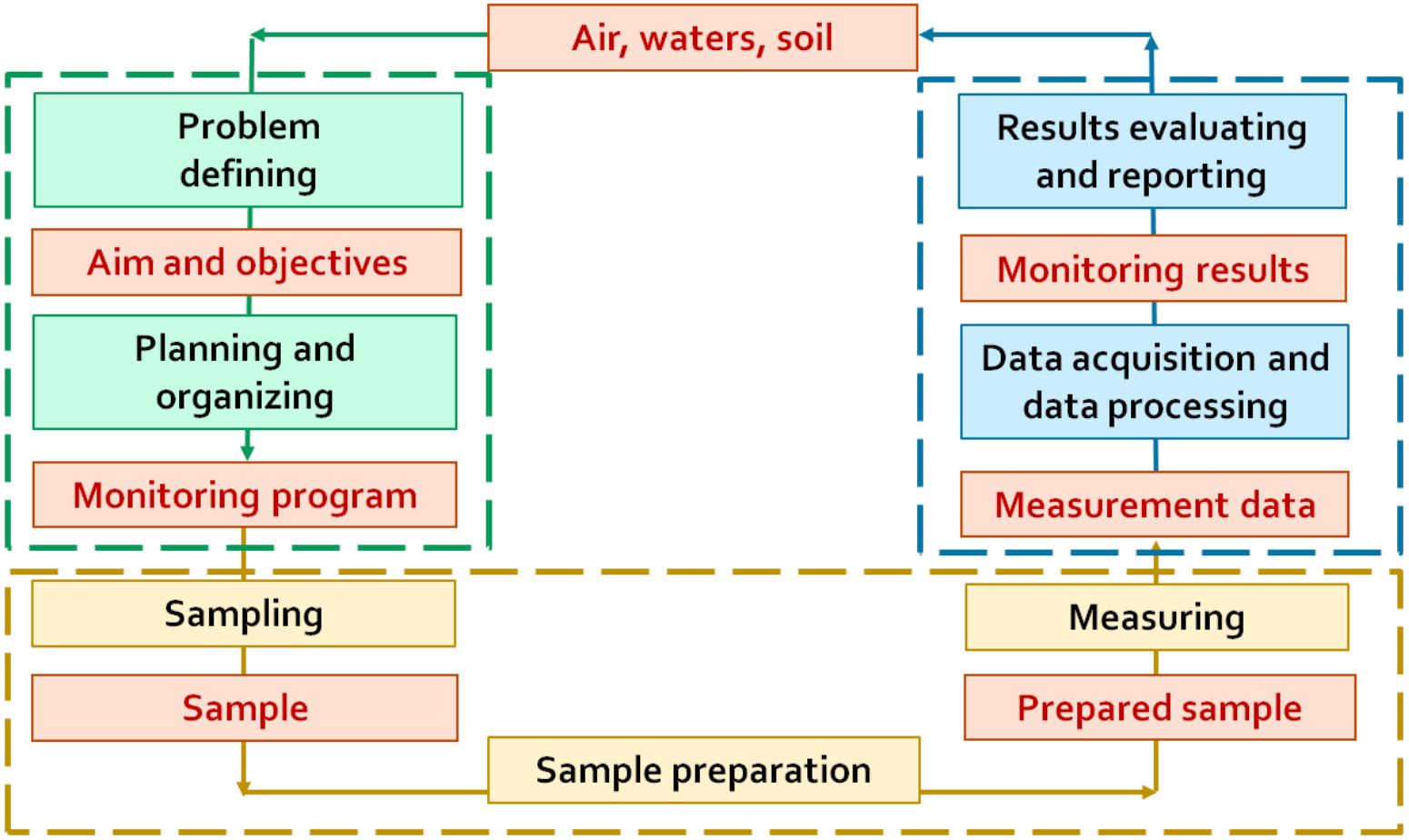
Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

6.3. U1. Environmental monitoring activities



https://youtu.be/OZyfRk1eKzE

6.3. U1. Environmental monitoring outcomes



https://youtu.be/OZyfRk1eKzE

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

6.3. U2-U3. Environmental sampling and analytical measurements

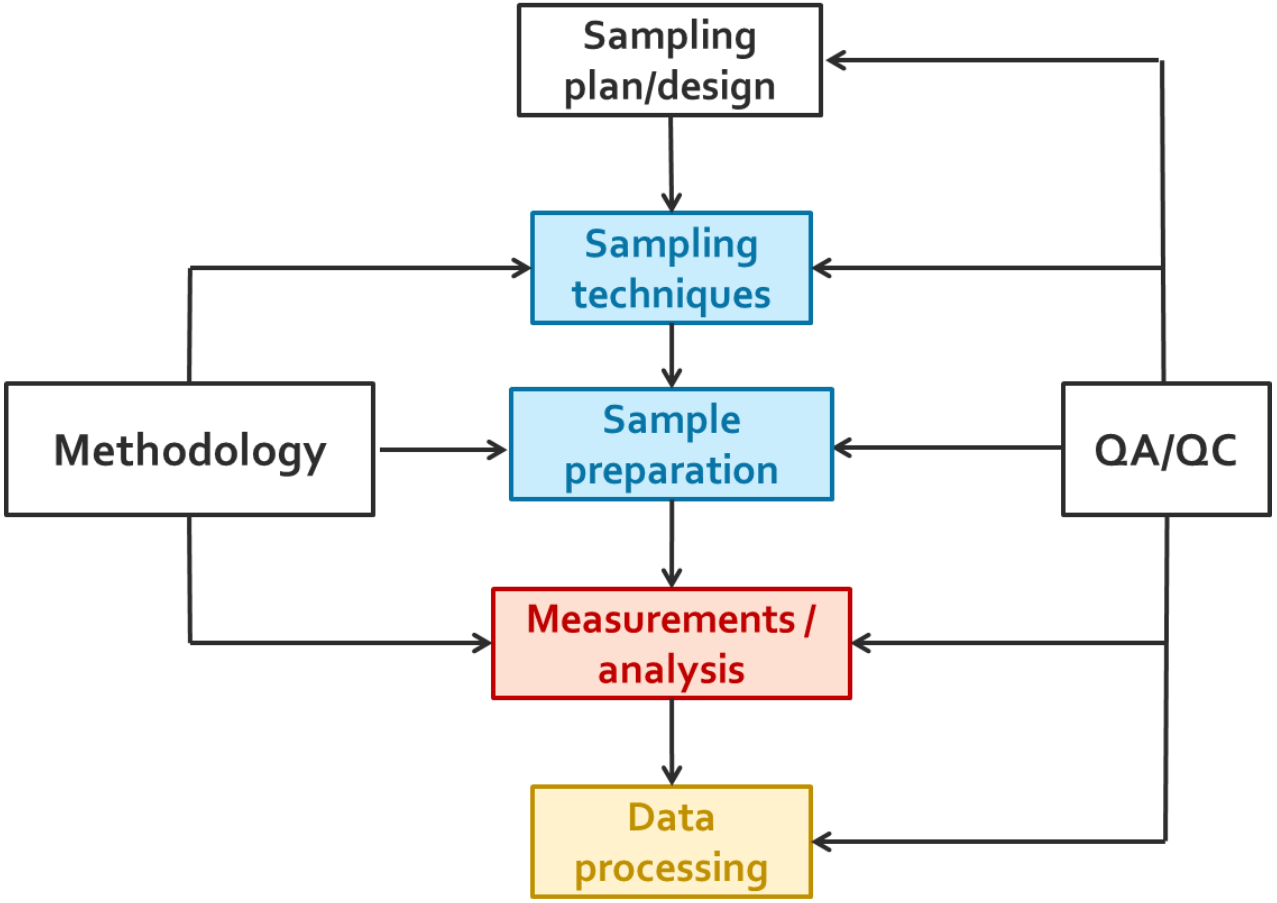
Monitoring flow – execution and evaluation stages

- **sampling and sample preparation (U2.1)**
  https://youtu.be/vgL9UAZRcVY
- **measuring – analytical methods (U2.2)**
  https://youtu.be/MgRkTXlb6Qs
- **data processing (U3)**
  https://youtu.be/qXpurc1meu4

Transilvania University of Brasov

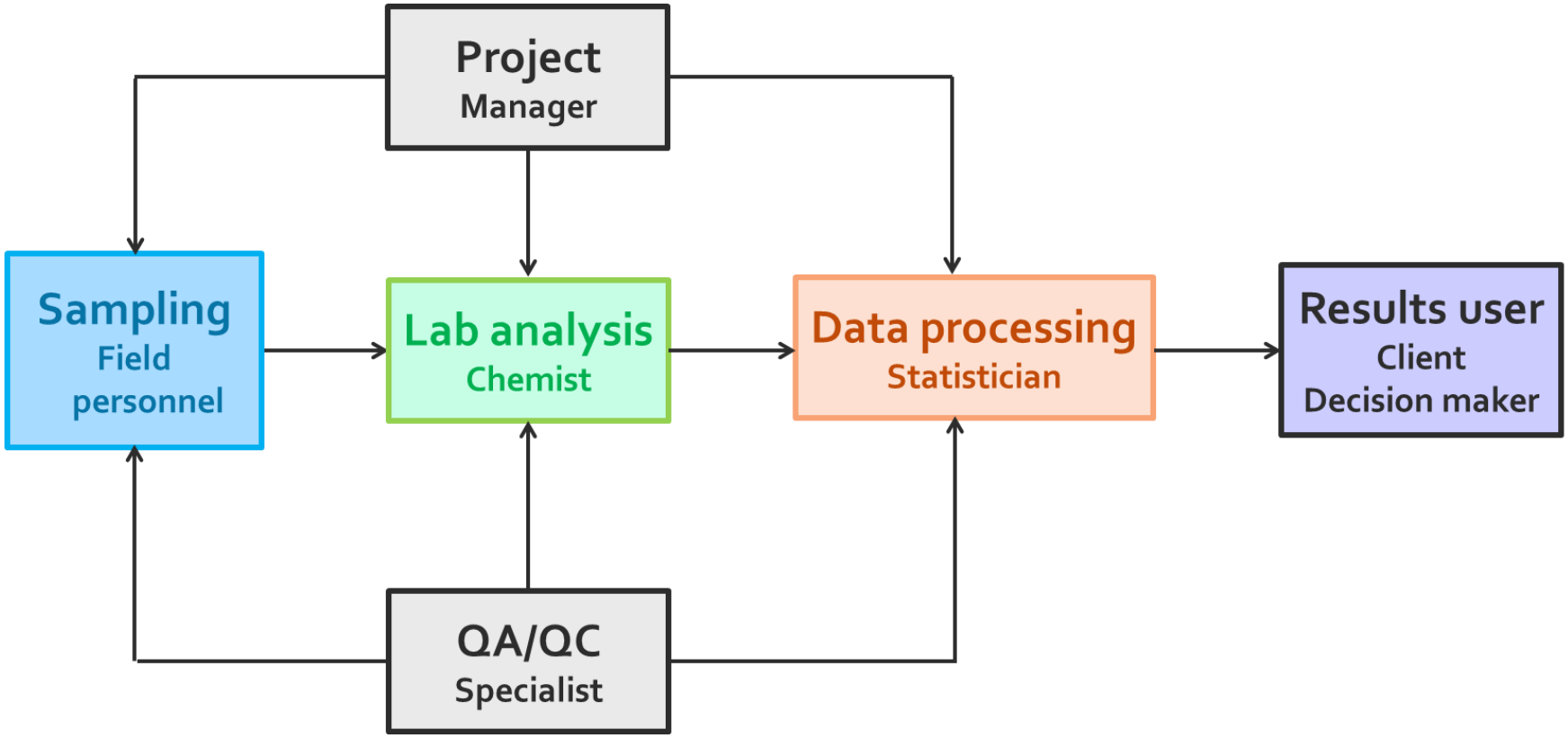
Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

6.3. U2. Quality requirements for environmental measurements



1. Method validation
2. Uncertainty estimation
3. Reference materials
4. Proficiency testing & inter-laboratory comparison

6.3. U3. Personnel responsible for data processing and results announcing

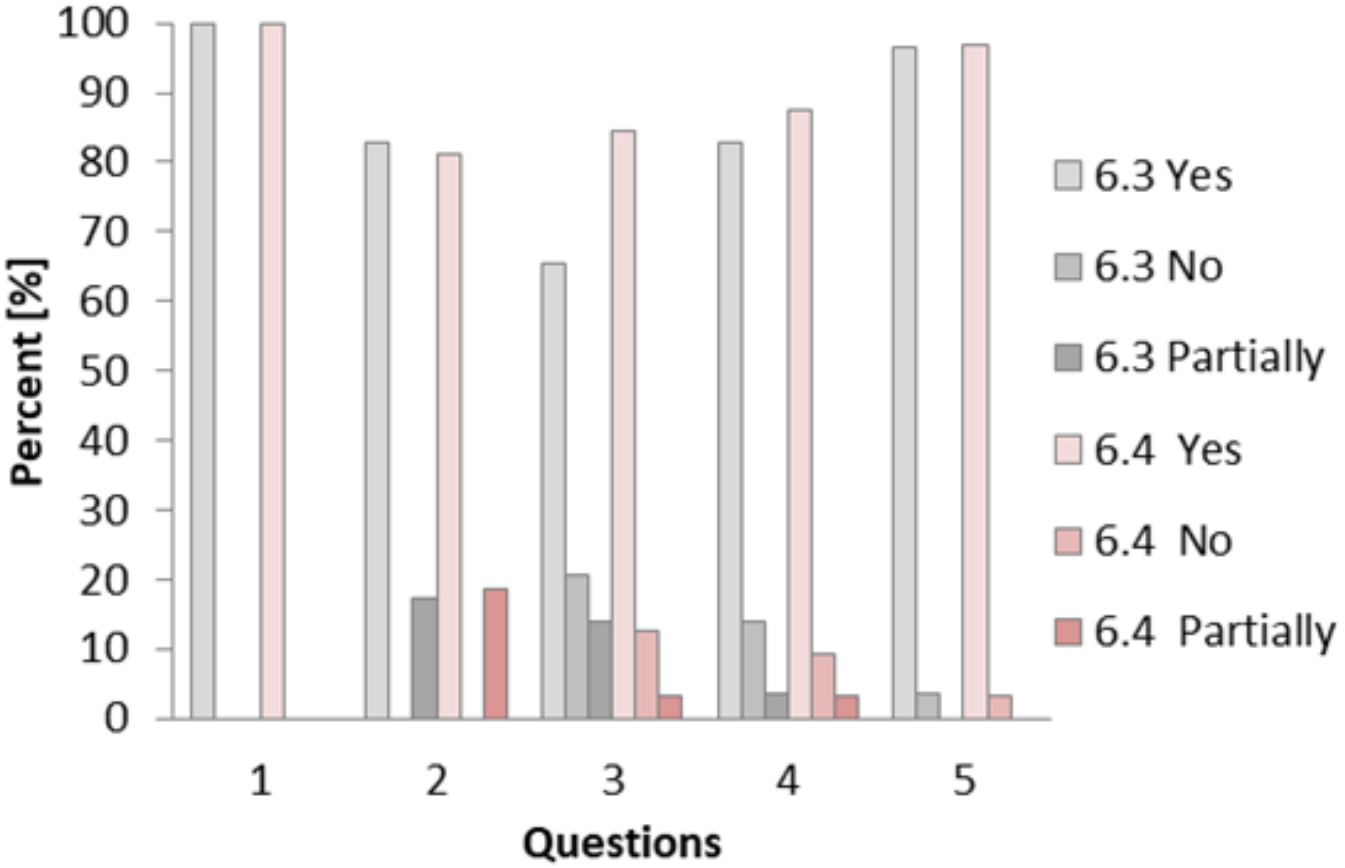


Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Survey results after following the OERs

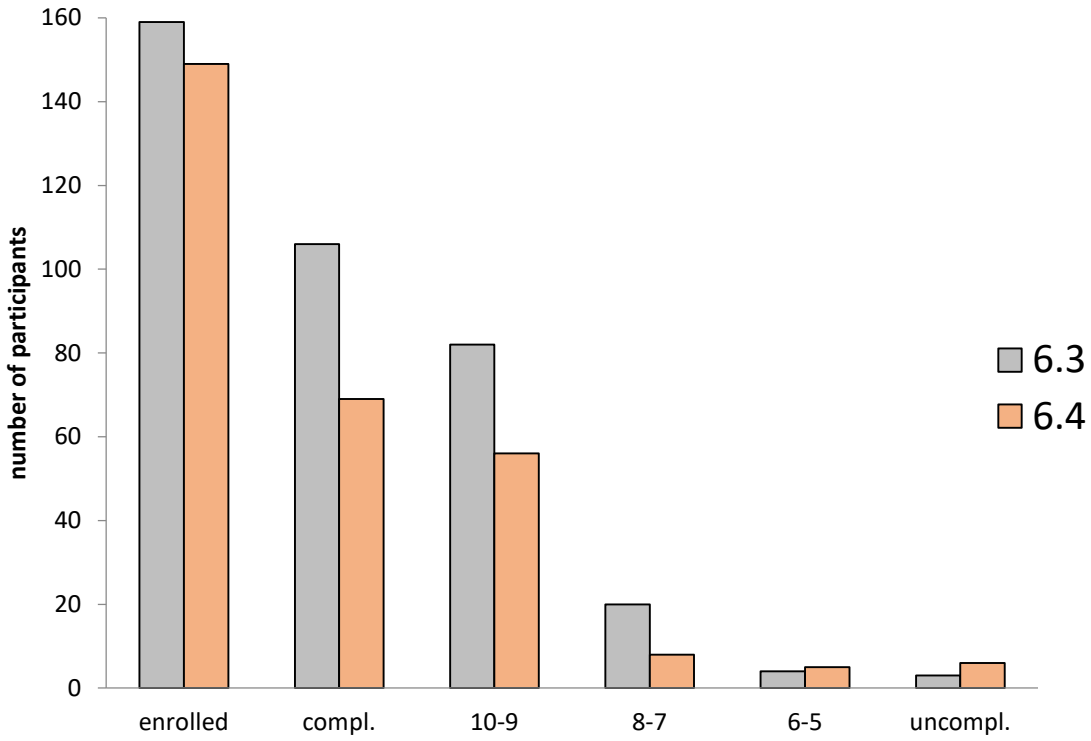
- bachelor and master students from UNITBV
- students and alumni



Legend:
1 – video presentations
2 – text-based learning resources
3 – additional readings
4 – self-evaluation tests
5 – final evaluation test

Students from UNITBV – results after completing the final evaluation tests

- students were accepted as users and enrolled on the TOX-OER MOOC platform
- and completed the final evaluation tests



Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Intermediate conclusions to TOX-OER project

- **The TOX-OER project** created the conditions for the recognition and certification (ECTS) of learning achievements
- MOOC platform was installed (University of Bologna)
- Open Educational Resources are available
- Possible improvements of the OERs
  - in terms of content
  - and presentation
- **Identified disadvantage: the 8 languages of OERs presentation!!!**

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

(lack of) MOOCs for environmental education

MOOC title	Host university
1. Greening the Economy: Lessons from Scandinavia	Lund University, Sweden
2. Environment, computer science and society	Hochschule für Technik und Wirtschaft, Berlin, Germany
3. Sustainable Energy in Education	University of Helsinki, Finland
4. Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems	Cornell University, USA
5. Marine Litter	University of Madrid, Spain
6. Environmental Sustainability of Organizations in the Circular Economy	Universidad San Jorge, Zaragoza, Spain

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

(lack of) MOOCs in Romania

MOOC	Host university
1. UniCampus	Politehnica University of Timisoara
2. UniBuc Virtual	University of Bucharest
3. Palliative care (Med&Lang project)	Gr. T. Popa University of Medicine and Pharmacy, Iasi
4. Zoonoses Online Education (ZOE project)	Gr. T. Popa University of Medicine and Pharmacy, Iasi

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Environmental Education – OERs for Rural Citizens (EnvEdu-OERs)

- **enlarged the group of specialists** in EnvEdu
  - Transilvania University of Brasov (UNITBV, Romania) as coordinator
  - Reykjavik University (RU, Iceland)
  - Bucharest University of Economic Studies (BUES, Romania)
  - Gheorghe Asachi Technical University of Iasi (TUIASI, Romania)
- **enlarged the target group** to rural citizens, non-academics
- **new MOOC to be develop**, on the UNITBV Moodle platform
- **new OERs to be develop** for continuous training in EnvEdu
  - opening the MOOCs and OERs to **socio-economically disadvantaged learners**

- financing was approved – EEA funds
- EnvEdu-OERs will start in November 2020

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

EnvEdu-OERs new modules to be developed

Module	Module title	Responsible partner
M1	Sustainable Communities and Social Communication	UNITBV
M2	Environment Quality	UNITBV
M3	Environmental Management, Impact and Risk Assessment	TUIASI
M4	Waste Management in Rural Communities	TUIASI
M5	Water Resources and Water Balance for Sustainable Community	RU
M6	Environmental Projects Management	BUES

Perniu, D., Manciulea, I., Salca Rotaru, C., Draghici, C., (2020), Open Educational Resources for Environmental Education, in Visions and Concepts for Education 4.0 – Proceedings of the 9th International Conference on Interactive, Collaborative and Blended Learning (ICBL2020), vol 2, Springer Nature Switzerland, in press

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Final conclusions

Several key ingredients needed for developing project-based OERs:

- identified interested target groups
- subject of interest – for learners
- specialists with high level experience and expertise
- strong/ adequate partnership
- creative approach of the OERs

Nothing new!!!

Transilvania University of Brasov

Eurachem 2020 Virtual Scientific Workshop
Quality Assurance for Analytical Laboratories in The University Curriculum
14 – 15 July 2020

Possible follow-up

Invitation for cooperation/ partnerships

for MOOCs and OERs development for

CHEMICAL ANALYSIS RELATED COURSE!!!

EURACHEM offers collaboration network

Acknowledgements to the financial support from the European Erasmus+ Programme, key action KA2, Strategic Partnership, project Learning Toxicology through Open Educational Resources (TOX-OER), code 2015-1-ES01-KA203-015957.