

## A BACK TO FUTURE PERSPECTIVE FOR ECHEMTEST

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**ABSTRACT** – The conclusion of the trial period of the ECHEMTEST<sup>+</sup> project has confirmed its sustainability and has led the Virtual Education Committee of the European Chemistry Thematic Network to formulate and illustrate here a permanent operational scheme by defining a new ANNEX to the relevant Memorandum of Understanding. The proposed operational structure is based on three pillars: the ECTN secretariat for running financial aspects, the Test Centres for running the basic e-test services, the Accredited Test Sites, Agencies and Schools for channelling user requests.

### INTRODUCTION

The target of the European Chemistry Thematic Network (ECTN) [1] ECHEMTEST<sup>+</sup>[2] project was to build a sustainable network of EChemTest<sup>®</sup> autonomous Test Centres (TC)s by switching from an academic (only) centrally managed system running e-tests at a few passive test sites to a distributed one able to offer an “in principle” unlimited number of self-sustained local TCs running a large number of Self Evaluation Sessions (SES)s. The partners were chosen to be ECTN member Institutions committed to act as a national TC (or an Accredited Test Site (ATS)) and signed a Memorandum of Understanding (MoU) to use the Open Source e-testing software LibreEOL developed in Perugia [3,4]. The adopted organizational scheme was the so called prosumer model [5,6] in which TCs act both as users and producers of the EchemTest<sup>®</sup> Self Evaluation Sessions (SES)s with the support of ATs and Agencies having signed a Memorandum of Understanding (MoU). During the years 2017-2019 the number of TCs doubled and various SESs were run of which the most important ones for the year 2019 are (by self declaration): the University of Milano (711), the University of Budapest (602), the University of Krakow (588), the Technical University of Vienna (368) and the University of Kazan (117).

### THE CONSOLIDATED USE OF THE SESs

A large number of EChemTest<sup>®</sup> SESs were run during the years 2016-2019. They can be divided in approximately two even blocks of which the first one is made of General Chemistry (GC) Questions and Answers (Q&A). These SESs are typically used for assessment and dissemination in Schools and for admission and anti-dispersion academic activities in Higher Education Institutions. The second block is made of Analytical Chemistry (AC3), Inorganic Chemistry (IC3), Organic Chemistry (OC3) and Physical Chemistry (PC3) SESs for use at Bachelor level. To these some other SESs for Biological Chemistry (BC3) and Chemical Engineering (CE3) can be added at Bachelor level plus some others like those for Computational Chemistry (CC4), Conservation

Sciences (CA4) and Advanced Organic Chemistry (AOC4) can be added at Master Level. During the above mentioned period of time the use was in alphabetical order:

**BUDAPEST** SESs were used mainly at level 3 including biological chemistry

**GENOVA** SESs were used as an anti-dispersion measure using a packet of 4 level 3 Libraries (AC3, IC3, OC3 and PC3) and the GC2 one. In particular students regularly passing the exams with an average evaluation of 25/30 could improve their overall Thesis mark of up to one point;

**KRAKOW** SESs were used half at dissemination GC1 and GC2 level in European contests and enhancement of chemistry image. Another strongly supported library was the “Chemistry for everyday Life” (CEL) used mainly for international students’ contests;

**MILANO** level 3 SESs were largely used at Master admission level although a non negligible fraction of GC Q&As (around 10% of the total) was also used;

**VIENNA** heavily run Q&As of the GC2 library (no use at all is made of level 3 or 4) for students’ admission;

For TCs running less than 100 SESs the following figures give the use in alphabetical order:

**AMSTERDAM** and **KAZAN** only GC2 Q&A Libraries for admission;

**PERUGIA** only level 3 libraries for the admission to the Bachelor thesis work;

**SIENA** only GC2 and OC3 Libraries for anti-dispersion purposes;

**THESSALONIKI** mainly a vocational use of level 4 (CS4) Q&A libraries was made together with an admission use of GC1 and GC2 ones.

## THE CONSOLIDATION OF THE PROSUMER MODEL

As shown during the recent VEC committee meetings of October 1 and October 10, 2020, the running of the ECHEMTEST<sup>+</sup> project (though at its minimal cost) was successful in confirming the validity of the Prosumer model. Such success calls now for a more formal definition of the procedures adopted for planning and reporting the activities by adopting in the ANNEX to the MoUs a compulsory official way of booking requests for services through the e-forms of the Chem Learn portal (see below its different items) before allowing to run any activities. This allows also the cross referencing of data provided by the users against the number of SESs registered by LibreEOL and credits to be assigned for the work performed (after approval) for Libraries, Communication and Dissemination activities. At the same time the proposed procedure allows the ECTN secretariat to keep control of the detailed financial balance as well as the billing and payments. The new text of the ANNEX reads as follows:

◆ *before beginning any activities every solar year each TC/ATS has to officially:*

a) **purchase (subject to VEC approval)** on the ECHEMTEST database (accessible to the VEC Chair and LibreEOL in read) the number of planned (Q) SESs using an ad hoc e-form) partitioned as:

Q1 = planned number of SESs to be carried out by itself for its own purpose

Q2 = planned number of SESs to be carried out by itself on behalf of a different ECTN member or associate (e.g. ATS)

Q3 = planned number of SESs to be carried out by itself on behalf of ECTN

Q4 = planned number of SESs to be carried out by itself on behalf of a third party

Q5 = planned number of SESs to be carried out on behalf of the considered TC by another TC

with  $Q0 = Q1+Q2+Q3+Q4+Q5$  (partitioning of Q0 and its Q1 components need to be input into the ECHEMTEST database and requires approval by the VEC);

b) **plan (subject to VEC approval)** on the ECHEMTEST database the number of:

Q6 = to be created Q&As

Q7 = to be revised Q&As

Q8 = hours to be spent for dissemination activities.

◆ **At the end of the year of every solar year:**

a) **LibreEOL automatically produces and inputs** into the ECHEMTEST database (with TC and ATS in read) the actual number A of the SESs carried out by each TC/ATS (with A1-A5 figures expected to little deviate from the planned Q1-Q5 ones);

b) **each TC/ATS has to input** in the ECHEMTEST database (with LibreEOL in read) its estimated A1-A5 numbers of SESs plus A6 the number of created new Q&As, A7 the number of corrected existing Q&As and the number of hours A8 spent for dissemination activities (with A6-A8 figures corresponding to (and expected to agree with) the planned Q6-Q8 ones);

◆ **After the end of the solar year ECTN publishes the yearly balances based on the following credit and debit rules:**

Q1: 3.5 euro are debited per SES (with the first 100 SESs being free for this specific item and applicable to unfinished/faulty sessions if any)

Q2: 3.5/3 euro are credited per SES (the requester incurs in a 3.5 debit per SES)

Q3: 3.5/3 euro are credited per SES (ECTN incurs in a 3.5 debit per SES)

Q4: 3.5/3 euro are credited per SES (the requester incurs in the debit set for third parties)

Q5: 3.5 euro are debited per SES (3.5/3 euro per SES are credited to the provider)

Q6: 3.5 euro are credited per created Q&A

Q7: 3.5/3 euro are credited per revised Q&A

Q8: 3.5 euro are credited per dissemination hour.

Corrections by the TCs, if any, need to be agreed with the VEC not later than one month after the data publication using again the e-forms. After the end of the month credits become available for use by the creditor while the debtor is invoiced for the amount due.

◆ **The above given scheme allows the offsetting (within the same year) of debits with credits** which can be used (when available) to reimburse expenses met to carry VEC activities. In this case credits earned in one year can be spent during next year.

◆ **Credits are also earned by issuing paid Individual Proficiency Certificates (IPC)s.** As shown in the Figure below, in fact, IPCs have been issued since 2017. In order to allow the test taker to consult in his/her personal Page the summary of the SESs carried out, related scores and the procedure for ordering an IPC and pay for it via bank transfer to ECTN, LibreEOL issues to him/her an automatic message. The net gain associated with the issued IPCs is allocated for 1/3 to the TC having managed the related SES and 1/3 to the ATS/Agency having procured it.

Number of emitted certificates (last update: 2020/10/01)	2017	2018	2019	2020
NTC.HU	0	0	0	0
NTC.AT	0	0	0	0
NTC.NL	0	0	0	0
NTC.RU	0	0	0	0
NTC.PL	0	0	0	0
NTC.SI	0	0	0	0
NTC.GR	0	0	0	0
NTC.SP	0	0	0	0
NTC.BO	0	0	0	0
ATS.PERUGIA.IT	9	14	10	6
ATS.MILANO.IT	14	2	7	4
ATS.GENOVA.IT	0	0	0	0
ATS.NAPOLI.IT	0	0	0	0

This will allow, starting from January 2021, not only a more regular flow of activities but also the possibility of better supporting the activities for the maintenance of the libraries and for dissemination.

## REFERENCES

- 1] <http://ectn.eu/about-us/projects/>
- 2] <http://services.chm.unipg.it/ojs/index.php/virtlcomm/article/view/76>; A. Laganà, The VEC SC ECHEMTEST<sup>+</sup> Project, VIRT&L-COMM 7 (2015) 5
- 3] <https://echemtest.libreeol.org/>
- 4] A. Laganà, A. Riganelli, O. Gervasi, P. Yates, K. Wahala, R. Salzer, E. Varella, J. Froelich, A Metalaboratory to develop Grid e-Learning Technologies and Services for Chemistry, Lecture Notes in Computer Science 3480, 938-946 (2005)
- 5] C. Xie, R. Bagozzi, Trying to Prosume: Toward a Theory of Consumers as Co-Creators of Value. Journal of the Academy of Marketing Science, 36(1), 109-122 (2008).
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