REPORT ON THE PROSUMER IMPLEMENTATION OF ECHEMTEST®

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1. The reorganization of EChemTest® and the Prosumer operational scheme

1.1. ECHEMTEST+: From Question Mark to a LibreEOL Prosumer scheme

The recent implementation of the Teaching and Learning (T&L) Prosumer (producer-consumer) model [1] has allowed the Higher Education Institutions (HEI)s and Agencies of the ECTN Association to take on the role of protagonists in the ECHEMTEST+ project. In the Prosumer scheme, in fact, by signing the relevant ad hoc agreement, they can act not only as users but also as producers of services by managing an Institutional Test Centres (ITC)s (either a National Test Centre (NTC) or an Accredited Test Site (ATS)). As a matter of fact ITCs, while providing support to academic activities, contribute also to their own sustainability by sharing with the ECTN Association possible gains (if any) associated with the activities of the project.

2014: (*ECTN Association General Assembly (GA) of Madrid, ECTN Association Administrative Council (AC) of Krakow*) The Virtual Education Community Committee produced a position paper and the ECHEMTEST+ Business Plan. At the same time DRAG (a cluster of 5 SMEs operating under the ECTN Association umbrella) was launched.

2015 (*Brussels AC, Ljubljana GA, Prague AC*) After wrapping up the EC2E2N2 European project, the ECHEMTEST+ project was approved by establishing also the glossary given in Table 1 and the first training event for ITC coordinators was held.

2016 (*Gdansk GA*) ECHEMTEST+ activities were officially started to port the EChemTest® Questions and Answers (Q&A)s Libraries on the EOL (Exams On Line) Open Source software LibreEOL developed by O. Gervasi at the Department of Mathematics and Computer Science of the University of Perugia. The porting was completed, as scheduled, by September and a second ITC training event was held in Perugia again. Furthermore, the ad hoc agreements with ECTN Association were signed by most of the ITCs and by the Master-UP Agency. This allowed to start the operations of the ECHEMTEST+ project before the end of the year.

2017 (*Malta GA*) the ECHEMTEST+ activities were fully implemented within the Prosumer operational scheme of **EChemTest®** (thanks to the Open Source nature of EOL and to its Cloud implementation).

1.2. Money saving, enhanced operability and Debits/Credits accounting

The main outcomes of the adoption of the above-mentioned Prosumer model for the ECTN Association were (a) a significant money saving, (b) the exceeding of the previous constraints of the QM contract and (c) the implementation of a Debits/Credits offsetting procedure.

a) money saving: the dismissal of the Question Mark (QM) software for conducting the Self Evaluation Sessions (SES)s of the **EChemTest®** e-tests thanks to the adoption of both the LibreEOL software and the Chem-Learn portal resulted first of all in the halving of the technical costs (from 8 to 4k€ per year) of the related procedures.

b) enhanced operability: the termination of the QM contract allowed the exceeding of the main limits previously affecting the ECTN Association **EChemTest®** activities consisting in a limited number of ITCs that could be activated, a high centralization of the operations with negligible autonomy of the ITCs, difficult in- and out- portability o f the Libraries, etc. At the same time,

additional ITCs were activated and their involvement became definitely more reactive (with the consequent further enhancement of the ECHEMTEST⁺ project).

c) *Debits and Credits accounting:* the adoption of the Prosumer scheme has also prompted the activation of an accounting system aimed at offsetting debits (associated with the use of services) by means of credits associated with their provision. ECHEMTEST⁺ activities can generate, in fact, both credits and debits, when, for example, an ITC conducts a SES for either its own academic use (S1) or on behalf of another entity (like a member of the ECTN Association or another entity similar to it, (S2), the Association itself or another entity similar to it, (S3), a private company or another entity similar to it, (S4)). The S1 case has a variant (S1bis) in which a member of the ECTN Association has equipped a not yet accredited Test Site (not authorized to conduct alone a SES) that needs to be tutored by an official ITC. ECHEMTEST⁺ activities can also generate credits without originating debits when, for example, Q&As are created or revised by the members of an ITC (C1).

- **in the S1 case** the ITC is charged with no debit for the first 100 SESs (in a year) and with a gradually decreasing debit of 10€ per SES (from 101 to 150), 5€ per SES (from 151 to 200), 3.5€ per SES (from 200 up). At the same time the ITC itself, the ECTN Association and the Agency operating the EOL service get each 1/3 of the net gain (i.e. an amount equivalent to the debit subtracted by the technical costs). It should also be noted here that the debit charge is a discontinuous function (the charge for 150 SESs is, in fact, almost double than that for 151 SESs) and that in the past the VEC Committee business plan has already set the value of a single SES to 120 € and the value of the overall **EChemTest®** asset to 2 Meur);

- **in the S1bis case** the (not yet accredited) Test Site is charged with a debit of 10€ per SES (as any third entity of the next S2 case) while the ECTN Association and the Agency operating the EOL service get 1/3 each of the net gain (as already said above the debit subtracted by the technical costs). The remaining 1/3 of the net gain is split evenly between the Tutor ITC and the Test Site;

- **in the S2 case** the third entity is charged with a debit of 10€ per SES and the ITC, the ECTN Association and the Agency operating the EOL service get 1/3 each of the net gain;

- **in the S3 case** the third entity is charged with a debit of 3.5€ per SES and the ITC, the ECTN Association and the Agency operating the EOL service get 1/3 each of the net gain;

- **in the S4 case** the third entity is charged with a debit of 80€ per SES and the ITC, the ECTN Association and the Agency operating the EOL service get 1/3 each of the net gain;

- **in the C1 case** the ITC is assigned credits depending on the hours spent in elaborating T&L materials (like LOs, MOOCs, etc.), developing governance tools, designing modern teaching technologies (like e-books, lecture notes, collaborative LOs, etc.), formulating/revising Q&As (a proposal in that respect, still open for discussion, has been tentatively put forward by G. Toth after the ECHEMTEST⁺ work group meeting held at the General Assembly in Prague last April and is given here as ANNEX 1). Credits can be assigned also for costs met to attend ECTN Association/ECHEMTEST⁺ meetings. In all the mentioned C1 activities the related plans have to be agreed in advance with the VEC Commission and the credits obtained cannot exceed, once summed with all the other credits, 1/3 of the ITC net gain.

2. Practical Examples of Credits/Debits balance

Till now no planning/reporting form on the **EChemTest®** SESs conducted during the year 2017 has been filled. Nonetheless, some partial information were sent to the VEC Commission that has carried out on them a preliminary analysis of the activities performed as commented below.

2.1. The main information concerning 2017 activities.

We first consider here the information received from the Krakow ITC relevant to the first semester 2017 quotes **155 S1** (39 AC3 (Analytical Chemistry level 3), 42 IC3 (Inorganic Chemistry level 3), 49 OC3 (Organic Chemistry level 3) and 25 PC3 (Physical Chemistry level 3)

conducted for their own use and **329 S3** (conducted for Poland (152 GC1 (General Chemistry level 1) and 58 GC2 (General Chemistry level 2)), for the Czech Republic (31 GC1 and 29 GC2), for the final stage of the related international contest (24 GC1 and 24 GC2) and 11 CEL (Chemistry in Everyday Life) for the Malta demo conducted on behalf of ECTN.

2.2. Information collected from other ITCs

Information collected from other ITCs tell us (we drop here data related to ITCs having run less than the free 100 SESs and the already discussed Krakow case):

BUDAPEST **627** (145 AC3, 62 BC3 (Biological Chemistry level 3), 126 IC3, 108 OC3, 186 PC3);
GENOVA **163** (40 GC2, 41 AC3, 41 OC3, 41 PC3);
KAZAN **123** (123 GC1);
MILANO **570** (44 GC1, 133 AC3, 130 IC3, 130 OC3, 133 PC3);
VIENNA **310** (309 GC, 1 OC3).

Other relevant information are:

- **BUDAPEST**. In the year 2017 595 S1 were conducted (differing from the 627 given by EOL with the difference likely to be due to some suspended sessions). The report mentions also the use of **EChemTest®** Libraries for admitting foreign applicants to MSc and PhD in Chemistry.

- **GENOVA**. In the year 2017 163 S1 were conducted (as from EOL source).

- **KAZAN**. In the year 2017 123 S1 were conducted. Efforts to translate (not clear from which English version) to Russian the GC1, GC2, AC3, IC3, OC3, PC3 Libraries are mentioned in the report in order to generate a level-3 **Chemistry technology library** in the Petrol-chemistry area (both in Russian and in English). The report mentions also the organization of a contest of social interest and an extension of the ECHEMTEST+ project to Ufa and Samara.

- **MILANO.** In the year 2017 560 SES were conducted (as from EOL source). The report does not mention compensation rules because there has been no participation of Milano to other activities (even if the systematic use of four level-3 libraries for all the students applying for the Master is said to have been considered).

-**VIENNA** In the year 2017**,** despite the personal IPR signature by the ITC manager, the corresponding signature of the ITC HEI Agreement is still missing (said to be due to some inconsistencies between the text of the VEC Agreement and Austrian regulations) 310 SESs were conducted and an active role has been played by Heinz Krebs within the VEC Commission. No proposal has been made for the debits/credits offsetting.

The forms to be used for ITC planning/reporting are given in Figs 1 and 2 (submit before the end of August for the reporting of the activities of the first semester 2018).

REFERENCES
1] A. Laganà, O. Gervasi, S. Tasso, D. Perri, F. Franciosa, The ECTN Virtual Education Community prosumer model for promoting and assessing chemical knowledge, Springer International, Lecture Notes in Computer Science, 10964, xx (2018); DOI10.1007/978-3-319-95174-4_43

TABLE 1 - GLOSSARY

- PROSUMER: an operational model in which a CONSUMER of a service acts also as PRODUCER of at least part of it
- SES (Self Evaluation Session): evaluation session conducted only with the use of software and hardware without the direct intervention of the examiner (1 person, 1 computer, 1 test)
- AGENCY: a company handling services on behalf of ECTN. In the present case the service considered is the delivery of the EOL service for **EChemTest®** In particular, with ECTN acting as an umbrella organization, the DRAG cluster of 5 University spinoffs has been established for that purpose under the coordination of Master-UP srl.
- TC (Test Center either national (NTC: National Test Center) or local (ATS: Accredited Test Site))

- ITC (a TC run by an ECTN member Institution)
- S1 (SESs run by an ITC for its own academic use)
- S1bis (SESs run by an ITC on the behalf of another ECTN member)
- S2 (SESs run by an ITC for another ECTN member)
- S3 (SESs run by an ITC for ECTN purposes like testing/validating libraries, EU competitions, national contests, ECTN Agencies, non ECTN member institutions)
- S4 SES run for any other case (like a private company) that could possibly occur in future
- Q&A – question and related answers for any ECTN library with GC=General Chemistry, AC=Analytical Chemistry, BC=Biological Chemistry, IC=Inorganic Chemistry, OC=Organic Chemistry, PC=Physical Chemistry.

ANNEX 1 - Compensated EChemTest question development for AC3, IC3, OC3 and PC3 datasets
Pilot project proposal for the period of June 2018 – April 2019

Background
The aim of this pilot project was discussed at meetings in Prague, April 2018. The main idea is to connect the elaboration of questions with a compensation for free EChemTest sessions. The actual size of the sets are GC1-334, GC2-504, AC3-192, BC3-519, IC3-192, OC3-580, PC3-396. This pilot project is restricted to the elaboration of new questions and to Level 3 tests, especially for disciplines having small number of questions. It means, that AC3 seems to be more crucial than OC3 originally proposed in Prague. This project proposal is restriceted to the question sets in English.

Participants
- Administrator/developer of the question development platform in Krakow (Krysztof Szczeponek -KS)
- Administrator/developer of the EChemTest system in Perugia (Osvaldo Gervasi - OG)
- Editors for the selected sets (Gergely Tóth – PC3, Sanjiv Prashar– IC3, Peter Gartner-OC3, still to be determined – AC3)
- Referees for each discipline

Timing
till 15th September 2018
- KS modifies the existing Krakow platform, creates accounts for the editors, opens the registration possibility for referees.
- Editors announce the possibility of taking part in question development, collect names and emails

15th September – mid April 2019
- elaboration of questions by enhanced invitation of the editors
- elaboration of a transfer method from Krakow platform to Perugia system (KS, OG) and its use and testing on the new questions

Proposed scheme for question elaboration
1) Question is proposed by an author on the Krakow platform (automatic notification to the editor).
2) Editor checks the overlap to existing questions (strongly duplicate ones are rejected).
3) Editor sends the question for review by two person (reviewers can be registered on the system); they suggest acceptance or some changes (or sometimes rejection); the editor takes the decision (accept, reject, corrections).

4) Question goes back to the author, if there were some changes suggested, then the author modifies the question and it goes back to the same reviewers, if necessary.

5) Editor takes final decision. The difficulty and the topic of the question is set according to the proposal of the author and the referees, the editor takes the final decision.

6) After the question is accepted, it is transferred to the Perugia database (in the pilot project by administrators using and testing the elaborated transfer method). If the transfer is ready, the „galley proof" of the question is checked by the author and the editor.

<u>Compensation</u>

The contributors are paid in free EChemTest sessions. The free sessions are linked to the centre named by the contributor. The sessions can be assigned also to dedicated activity described by the contributor.

- For author: successful question 15 SES (5 SES for first two rejected ones, for further rejected ones none)
- For referees: 5-5 SES
- For editors: 5 SES for duplicate checking, 5 SES for editorial work and check of transfer
- For maintaining of the system, for the elaboration of the transfer method and for transfers during the pilot project: 200-200 SES for Krakow and Perugia. In the case of more than 100 new questions, the VEC meeting at next General Assembly may provide additional SES compensations for the administrators/code developers.

Second version - 2018.06.01

/Gergely Tóth/

PS: This second draft is a modified version due to some of the comments on the first draft (special thanks to H. Krebs).

Your NTC/ATS Points

Data saved for the current year

| Show | | Clear all |

Activities Report of your NTC/ATS

Q1. Number of own sessions run (if any): : `<number of sessions>`

Q2. Number of sessions run on behalf of other ECTN Members (if any): : `<number of sessions>` / `<institution name, 50 chars max.>`

Q3. Number of sessions run on behalf of ECTN (if any):
Note: all the promoted special offers (e.g. school discounts) have to be added here. : `<number of sessions>` / `<event's title, 50 chars max.>`

Q4. Number of sessions run on behalf of an external institution (if any): : `<number of sessions>` / `<external institution name, 50 chars max.>`

Q5. Number of sessions run by any other ECTN Member on my behalf (if any): : `<number of sessions>` / `<institution name, 50 chars max.>`

Q6. Number of hours spent for creating a new library's question (if any): : `<number of hours>` / `<library name, 20 chars max.>`

Q7. Number of hours spent for correcting an existing library's question (if any): : `<number of hours>` / `<library name, 20 chars max.>`

Q8. Number of hours spent for dissemination activities (if any): : `<number of sessions>` / `<activity name, 50 chars max.>`

| Add |

Fig. 1 – Form for the automated reporting service provided by TCs

Your NTC/ATS Points   **Current Planning**

| Show | | Clear all |

Activities Plan for your NTC/ATS

Q1. Number of own sessions planned (if any):   :   `<number of sessions>`

Q2. Number of sessions planned on behalf of other ECTN Members (if any):   :
`<number of sessions>`
`<institution name, 50 chars max.>`

Q3. Number of sessions planned on behalf of ECTN (if any):   :
`<number of sessions>`
`<event's title, 50 chars max.>`

Q4. Number of sessions planned on behalf of an external institution (if any):   :
`<number of sessions>`
`<external institution name, 50 chars max.>`

Q5. Number of sessions planned by an other ECTN Member on my behalf (if any):   :
`<number of sessions>`
`<institution name, 50 chars max.>`

Q6. Number of hours planned for creating a new library's question (if any):   :
`<number of hours>`
`<library name, 20 chars max.>`

Q7. Number of hours planned for correcting an existing library's question (if any):   :
`<number of hours>`
`<library name, 20 chars max.>`

Q8. Number of hours planned for dissemination activities (if any):   :
`<number of sessions>`
`<activity name, 50 chars max.>`

| Add |

Fig. 2 – Form for the automated planning service provided by TCs