ISO 10001/2/3/4/8 IN TEACHING: 2022/23 UPDATE

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Abstract
Examples of ISO 10000 augmentative integration further to the ones from previous EISICs are presented, with a specific focus on the August 2022 revision of the ISO 10008 standard and its impact on the related and ISO 10001/2/3/4-augmented electronic course resources delivery systems used in the 2022/23 academic year. This ISO 10001/2/3/4/8 application in two medium-sized classroom-held engineering courses, one undergraduate and one graduate, is illustrated through the perspective of the ISO IUMSS Handbook methodology. The ISO 10008: 2022 standard changes largely did not require updates in either the ISO 10008 system or in the ISO 10001/2/4 subsystems, as the updates could be linked to the already-existing ISO 10001/2/3/4/8 augmentative integrated management system. Nevertheless, further development in ISO 10003 subsystems, as well as in elements pinpointed by the student ISO 10002 feedback (e.g., video examples) and ISO 10004 surveys (e.g., online tutorials), with mostly the status quo in ISO 10001 subsystems (e.g., current guarantees and video derivations), may be considered.

Keywords
Standards, Integrative Augmentation, ISO 10008, Integrated Management Systems, Education

1. Introduction

Just around the same time of the 25th EISIC in Visby a year ago, the International Organization for Standardization (ISO) issued a new edition of its customer satisfaction standard (CSS) for electronic transactions, namely ISO 10008: 2022. Nevertheless, we had already discussed various implementations of the earlier version of this standard (ISO 10008: 2013) and the integrations of the related systems with other ISO 10000 augmentative frameworks at prior EISICs, for example in Vargas-Villarroel and Karapetrovic (2018) and Karapetrovic (2021), respectively. While the corresponding ISO 10008 and ISO 10001/2/3/4 CSSs applications focused on engineering education, the more recent ones have been limited to online courses due to the COVID-19 pandemic (e.g., Karapetrovic, 2022). The post-Sweden return to in-person lectures provided the second aspect of the update illustrated in Scotland.

Consequently, integrative augmentation through ISO 10000 CSSs continues to be the main topic presented here, albeit largely concentrated on the addressing of ISO 10008: 2022 revisions and the impacted ISO 10001/2/3/4 subsystems within the system for electronic course delivery to both undergraduate and postgraduate engineering students during the 2022/23 academic year. Similarly to Karapetrovic (2022) and (2021), an ISO 10008 system is being augmented, however with different subsystems than shown there (e.g., ISO 20844 for online reviews in the former and ISO 10017 for statistical tools for the latter). Following Ortiz and Karapetrovic (2019), Vargas-Villarroel and Karapetrovic (2018), as well as Astleitner and Karapetrovic (2017), the ISO 10000 CSSs application is performed in classroom-held courses, but with distinct integrative augmentation scopes (e.g., ISO 10001, ISO 10002 and ISO 10008, respectively).

The following section connects the ISO IUMSS (2018) methodology with the deployment of an ISO 10001/2/3/4/8 electronic course delivery system, mostly focusing on the scope of application of the past year's versions of both the ISO 10008 standard and the engineering courses illustrated. Subsequently, sections 3 and 4 show the integrative augmentation outcomes related to the added and revised content in the system foundation clauses of ISO 10008: 2022, respectively. The same is done in section 5 for the latter three ISO 10008: 2022 process clauses. Finally, short concluding musings on the coverage of ISO 10000 augmentative integration topics at EISICs are provided.

2. Methodology

In line with the goal to update an existing ISO 10008 electronic course delivery system augmented by subsystems following the other four CSSs, a flexible methodology covering both the related incorporation and integration can be used, specifically the one detailed in Chapter 3 of ISO IUMSS (2018). The first and third steps, as well as the first two sub-steps of the fourth step, modelled on ISO IUMSS (2018) subchapters 3.1, 3.3, and sections 3.4.1/3.4.2, respectively, were not particularly involving, since the professor teaching the course could be the only person managing the already-running 10001/2/3/4/8 system, a-priori also integrated per ISO 10008: 2013, sub-clauses and 4.16 and 7.1. The scope (ISO IUMSS, 3.2) encompassed a simultaneous incorporation of five ISO CSSs in two engineering courses from the same discipline. Both courses were offered at a Canadian university in 2022, and could be considered mid-size, as the number of students was in the 75-100 range for the undergraduate and 10-20 for the graduate course. As in previously-described instances (e.g., Karapetrovic, 2022), multiple delivery methods were applied in this augmentative Integrated Management System (IMS), but only a university-run "*Moodle*"-based platform is included for presentation here.

With respect to ISO IUMSS (2018) 3.4.3 and 3.5, namely the mapping of ISO 10008: 2022 to the IMS and the incorporation / integration of updated ISO 10008 plus ISO 10001/2/3/4 criteria, the related ISO 10008: 2022 guidance that, compared to ISO 10008: 2013, had been added (e.g., sub-clauses 4.8, 4.17 and 5.1), revised (e.g., 4.9/4.10 and 5.2) or deleted (e.g., 4.14), was addressed. This was done with links to the application of ISO 10001/2/4 in terms of two professor guarantees, class feedbacks and students surveys, respectively. The initial survey in the undergraduate course had a response rate of 26%, while the survey conducted at the end of the semester exhibited the rate of 9%. Both surveys had a 13% response rate in the graduate course. Finally, for the last two steps from ISO IUMSS (2018), i.e., sub-chapters 3.6 and 3.7 respectively, viewing methods from ISO 19011: 2018 section 6.4.7 could be used for a professor self-audit of the provided video examples and questions against ISO 10008: 2018, clauses 4.8 and 5.2/5.3 as an example, whereas the improvements would be concentrated on an ISO 10003 subsystem and the next (i.e., 2023/24) course offering.

3. Results: ISO 10008 Clauses 4 and 5 Additions

As far as the updates related to the "*Guiding Principles*" go, among the four newly-introduced ones, the two that did not require practically any ISO 10001/2/3/4/8 system changes were 4.17 and 4.20. While the former refers to "*safety of […] services*" and is addressed largely by the anonymity of all ISO 10008 tools available to students and a unique access to the ISO 10008 system, the latter on "*customer focus*" had already been embedded, for example through the various ISO 10002/4 feedback mechanisms, such as "ISO 10008 Overall Feedback", and the ISO 10001-related "Questions to Professor" (QtP) forum.

The third principle added to ISO 10008: 2022, namely 4.18 "*Sustainability*", has also been addressed by an exclusive use of electronic, rather than paper, forms for student feedback (e.g., as opposed to Vargas-Villarroel and Karapetrovic, 2018) or for Statistical Process Control in lectures (e.g., as illustrated in Karapetrovic, 2021). In addition, course assessment components, such as assignments and projects in the undergraduate course, included video questions that had been recorded outdoors with a cell phone. The effectiveness of these questions was probed in a final survey set up according to ISO 10004: 2018, receiving a mean of 3.6 on a 5-point Likert scale from 1 – "Strongly Disagree" to 5 – "Strongly Agree".

A number of alternative channels for providing general student feedback, such as the "ISO 10008 Overall Feedback" tool, "ISO 10008 Initial, Term and Final Survey" link and the "QtP" forum, connected to ISO 10002/4/1 subsystems, respectively, were provided. They were supplementary to the channels related to student feedback on the specific ISO 10008 system elements, e.g., video examples and derivations ("ISO 10008 Videos Feedback", including a rating, as described in Karapetrovic, 2022) and tutorials ("ISO 10008 Online Learning Tools (OLT) Feedback"), and thus represent examples of incorporating the "*Choice*" principle recently appended to ISO 10008: 2022 in sub-clause 4.8. Nevertheless, alternative methods mentioned in Note 2 of that sub-clause or social media, some of which had been applied previously (e.g., email and polls, see Ortiz and Karapetrovic, 2019), were not used this time due to research ethics considerations. Interestingly also, although 100% of the responses in the initial survey indicated that OLTs would be useful, the mean on the question of usefulness at the end of the undergraduate course was only 3.6/5.

Regarding the updated ISO 10008: 2022 Clause 5 content, the new sub-clause 5.1 on basically the course teaching "*context*" had been tackled in the original ISO 10008 application, and included items in the initial survey on student needs with respect to the ISO 10008 system components (Table 1), as well as limitations to its scope (e.g., restricting fora to anonymous only or determining online vs. in-person assignment / project parts).

Table 1. Usefulness of Selected ISO 10008 System Elements from the Initial Survey (Percentage)

Needs / Course	Undergraduate	Graduate
Class notes / videos with examples	100%	100%
Discussions with student questions	78%	100%

Source: Author's study files

4. Results: ISO 10008 Clauses 4 and 5 Revisions

The incorporation of four revised ISO 10008: 2022 "*Guiding Principles*" into the augmentative IMS is now touched upon. An example of addressing the "*accessibility*" aspects from sub-clause 4.9 is the provision of the text of video questions that had previously been posted on the course site only as video files without subtitles. In effect, this revision of the ISO 10008 system was implemented as a consequence of a student feedback received two years prior. Generating closed captions was also considered, but was not applied in 2022, since incorrect captions were created by the software in an instance when an introductory video for the ISO 10008 system had been shot.

Although the original "*Responsiveness*" principle (4.9 from ISO 10008: 2013) was broken down into two separate sub-clauses in ISO 10008: 2022, the tracking of professor response times to student inquiries in the QtP forum, which was done according to the ISO 10001 subsystem's 24-hour "Response Code", and the posting of the related statistics on the course site, each related to principles 4.10 and 4.11, respectively. For example, the average time it took the professor to reply in the first and second months of the course was 16 hours 1 minute and 9 hours 57 minutes, respectively, with the maximum time of slightly over 23 and a half hours, for the guarantee to be fulfilled in all instances. On the other hand, the modifications in the 4.14 "*Legality*" principle did not apply to the 2022 course, since it was conducted in person, thus solely in Canada. The deletions from this and other clauses likewise did not impact the ISO 10001/2/3/4/8 systems applied in either course.

Instances of incorporation of the ISO 10008: 2022 revisions from two sub-clauses of the "*Framework*" clause, namely 5.2 and 5.5, are demonstrated next. With respect to the former, and specifically as related to "*risk*", all course notes were planned to be posted on the undergraduate course site at the very beginning of the term. However, close to the end of the second month, a student submitted an inquiry in the QtP forum regarding the unavailability of the notes corresponding to the last 14 lectures. This inquiry was initially answered according to the ISO 10001 "Response Code" the same day and subsequently processed through the ISO 10002 subsystem, with the first five sets of notes made available the following day and the remaining ones within five days from the student feedback. As to the latter sub-clause, and particularly the "*limitations*" mentioned in Note 1 of section 5.5.4, the same "Response Code" contains a "*provision*" (ISO 10001, 3.4) regarding technical issues, e.g., potential unavailability of the university-run course site platform, which is thus outside of professor control.

5. Results: ISO 10008 Clauses 6, 7 and 8

Focusing on the "*processes*" clauses, the addition of sub-section 6.3.2.2 "*Service Delivery*" in ISO 10008: 2022 largely did not impact the system in either course, since the associated processes had already been applied. For example, the ISO 10001 "Response" and "Learning

Tools" guarantees were established and the course site section headings indicated the time and subject of each update in the section, corresponding to the first and second item in 6.3.2.2, respectively.

Aspects reworked in the 2022 version of ISO 10008 included 6.1.3 "*Content Delivery*", where augmentative integration related to the ISO 20488-linked provision of video examples and derivations reviews and ratings (Karapetrovic, 2022) for 6.1.3.2, fifth paragraph, as well as for 7.1.4, third sentence. Other examples were the corrective or augmentative actions posted within the ISO 10002 "Feedback Forms", for instance regarding the provision of the missing course notes and the future delivery of the summary class notes stemming from the student feedback as illustrated in the preceding section and referring to the last paragraph of section 6.1.4 "*Content Governance*", as well as the third and fifth items in 6.3.3 "*Correction*". In addition, for the first item in 6.1.4, the professor managed the course site, thus both the overall ISO 10008 system and the ISO 10001/2/4 subsystems.

From Clause 7 and further to the afore-mentioned ISO 10008: 2022 section 7.1.4, usefulness of ISO 10001/2/4 subsystems was monitored through three student surveys in accordance with sections 7.1.2, 7.1.4 and 7.1.5. Table 2 shows the percentage of the corresponding responses from the initial survey in both courses.

Table 2. Usefulness of ISO 10001/2/4 Subsystem Resources from the Initial Survey (Percentage)

Subsystem / Course	Undergraduate	Graduate
ISO 10001 Code Reports	65%	100%
ISO 10002 Feedback Forms	57%	100%
ISO 10004 Satisfaction Surveys	61%	100%

Source: Author's study files

Evidently, ISO 10003 was not used here (following 7.1.5), and should be included in the future "initial surveys", e.g., referring to course site support for video or login issues. Additionally, both the unsolicited and solicited student feedback with ISO 10002 and ISO 10004 subsystems, respectively, were collected anonymously, thus not requiring personally-identifiable information as described in section 7.2.3 "*Privacy*". The ISO 10008 system introductory video and information in the various feedback or survey tools also indicated the usage of feedback and survey data (see 7.2.3, first item).

Finally, on the account of the 2022 revisions in Clause 8, "*maintenance*" and "*improvement*" elements corresponding to sub-clauses 8.3 and 8.4, as well as 8.5, are addressed through an illustration of ISO 10001/8/1 – related outcomes from the final ISO 10004 course survey, with the means of the 5-point Likert "strongly disagree" to "strongly agree" scale given in Table 3.

Table 3. Selected ISO 10001 and ISO 10008 System Outcomes from the Final Survey (Mean)

Maintenance & Improvement Aspect / Course	Undergraduate	Graduate
"Learning Tools" code effective	4.3	5.0
Course site needs met	4.5	5.0
Additional guarantees inclusion suggested	2.6	5.0

Source: Author's study files

Namely, students were able to point out errors in diverse components of the ISO 10008 system, such as "Video Examples and Derivations" and "Online Learning Tools", and invoke

the associated "Learning Tools" guarantee, exhibiting an "*interaction with the system*" (ISO 10008: 2022, 8.3). According to the final ISO 10004 survey (Table 3), this code was considered to be effective and their ISO 10008 system-related needs were met (8.4). Nevertheless, with respect to the "*opportunities*" (8.5), results from the undergraduate course pertaining to the need to establish more guarantees were slightly on the negative side (mean of 2.6).

6. Conclusion

Once again at the EISIC, integrative augmentation of ISO 10000 systems in university courses was discussed, this time with the focus on all five ISO CSSs. In particular, last year's updates to the ISO 10008 standard and two engineering program offerings were addressed. Although the changes to the augmentative IMS were not significant, fairly low engagement with ISO 10002 and ISO 10004 subsystems may indicate an impetus for the related revisions in the 2023/2024 teaching, perhaps to be presented at the next EISIC.

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