Entrepreneurial Curriculum through Digital-Age Learning in Higher Education – A Process-based Model

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***Abstract* – ICT revolution with direct impact on digital economy and society involves new knowledge, skills and competences for students striving to compete and succeed in a technological rich marketplace. The higher education providers are accountable for inspiring and helping students to acquire relevant and updated skills i.e. entrepreneurial and digital skills needed to innovate in the world of work.**

These challenges require designing entrepreneurial curriculum to promote innovation and exploitation of the potential of new technologies and digital content.

The paper aims to support the modernisation initiatives of organisational organisations i.e. higher education institutions in the attempt to embrace digital technologies in teaching and learning practices. It proposes a process-based model to integrate and leverage digital learning technologies in teaching, learning and organisational practices.

The results depict a coherent methodology for designing, applying, over sighting and fine-tuning the entrepreneurial curriculum with embedded digital-age learning practices as key means for stepping up digital changes in educational practices.

***Keywords* – entrepreneurial and digital skills, higher education innovation, internationalization and quality assurance, process improvement.**

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1. Introduction

The report "Europe Higher Education in the World" sets out as one of key priority towards a comprehensive internationalization strategy the integration of digital learning practices into the teaching and learning processes, enabling thus to augment education through the content of all curricula [1].

Having almost 50% of Europe population lacking basic digital skills, the higher education institutions are accountable for equipping graduates with smart digital skills, creative thinking and problem solving to innovate and use new technologies. As underlined by the ET2020 Working Group in digital skills and competences, almost 37% of the EU workforce has low digital skills and between 50% and 80% of students never use digital textbooks, exercise software or learning games [2].

The figures demonstrate a high demand for digital skills and competences which require changing the educational organization practices, training for the teachers, developing quality educational resources including software and apps, and investments in technologies. Also, all these improvements endeavors should be complemented by learning to correctly use new technologies to the advantage of students and teachers to better learn, being more creative and efficient and accessing more up-to-date worldwide knowledge.

As underlined in the New Skills Agenda for Europe, almost 40% of European employers encounter difficulties in hiring skilled people to innovation and growth, creating significant challenges for higher education institutions which are responsible for improving the quality and relevance of the skills formation for young graduates. Evidences show that only those higher education actors which actively commit the modernization of educational processes by maximizing the potential of ITC learning and strengthening links between education and employers, may give students relevant opportunities to experience entrepreneurship, to

develop digital competences, critical thinking and learning to learn [3].

Considering these concerns and recommendations from strategic policy levels, to recalibrate higher education system, the author addressed the context of a higher education provider in the area of business engineering, and proposed a structured and coherent process-based model for embracing changes in teaching and learning practices used for educating future business engineers.

The business engineers are required to have a broader comprehension of business and labor market with a cross-disciplinary view that transcend technical competences, having inner connections with entrepreneurial thinking and skills needed to mobilize available resources and develop innovative technical and business solutions. Thereby, the proposed model captures and depicts the scope of work needed for developing the entrepreneurial curriculum which changes the paradigm from teacher centred to student centred approach, incorporating digital teaching and learning resources, testing and adjusting activities based on communication and active consultation of higher education stakeholders.

The process-based model is limited to the planning phase from the management cycle (plan, do, check, act), and should be considered as appropriate improvement steps for embracing modern digital methodology in educational processes.

2. Research framework

As underlined in the Communication on Rethinking Education, the ICT technology represents notable opportunities for increased productivity, economic growth and competitiveness, paving the way for effective learning by reducing social and physical barriers in education. With the right mixt of digital and entrepreneurial skills, and effective communication with all relevant higher education stakeholders, students can develop their ability to think critical, taking initiative, resolving complex problem, becoming more responsive to the social issues and the world of work [4].

Through the new ways of teaching and learning, the teacher centred approach should be replaced by student-centred learning in which learning environment is more personalized by using digital media content, collaboration and bottom-up practices, both teachers and students becoming the creators of digital learning content.

Worthy to mention, the Entrepreneurship 2020 action plan clearly pointed out the role of higher education in entrepreneurship going beyond delivering knowledge and creating industrial alliances and partnerships, since high-tech and high-growth enterprises are increasingly becoming more focused on entrepreneurship-related public policies. As the European Institute of Technology revealed, the entrepreneurial education bridges the gap between education and industry, being in fact the key enabler for employment growth and enterprises development [5].

The study on Entrepreneurship in EU and beyond, highlighted the more demanding challenges, since 2004 the share of people preferring to be self-employed has constantly decreased from 45% of citizens down to 37% in 2012, compared to the USA with 51% and China with 56%. Significant share of EU citizens pointed out difficulties in starting new businesses due to the shortage of available financial support (76%) and administrative processes burdens (72%).

As far as higher education, the respondents with higher education degree are more likely to consider self-employment as a feasible option (36% of people aged 20 years as opposed to 28% of respondents 16-19 aged and 16% who left education aged 15 years old). Beside this, 47% of EU citizens marked education as helping to understand the role of entrepreneurs on society, by developing a sense of initiative, and 62% of them marked the personal independence or self-fulfilment as key driver for the entrepreneurial attitude, seconded by the freedom to choose the place and time to work (30%), and better income prospects (16%) [6].

The same study, brought to light the Romanian situation where 61% of respondents marked education as giving the skills and know-how needed to run a business, complemented with a relatively low level of agreement concerning the preoccupation of teachers to make them interested in becoming entrepreneurs. However, the most important reason for starting a business was a necessity and only 9% mentioned the need or opportunity to take over a business from a family member [6].

On the demand side, investing in educating future entrepreneurs for technology-rich environment is no longer a choice. As underlined in the Entrepreneurship 2020 action plan, future entrepreneurs will have to be able to create new digital services and products, using web as a principal component, operating businesses in a complex and fast moving eco-system [5].

Although starting an ICT-based enterprise is cheaper, the entry barriers are low and expenditures for setting up a new business are affordable, the main barriers remain the e-skills of entrepreneurs which require scientific and creative working discipline, managerial and entrepreneurial skills to address new technological and digital markets, by developing new and innovative business models.

In the attempt to analyze the trends in digital economies and digital skills of people, the Digital

Economy and Society Index (DESI) ranked Romania 28th out of the 28 EU countries with low levels of digital skills having only 17% of citizens with basic digital skills compared to the EU level (27%) and only 9% with above basic digital skills versus 28% in EU. Whilst Romania has encountered positive trend in terms of science, technology and mathematics (STEM) graduates, with 1.7% of Romanians aged 20-29 years old holding a STEM degree, it is lagging behind from compensating the digital skills deficit in the labor market [7].

In the same light, the 2017 European Semester Romania country report identified key factors undermining the human capital potential and economic growth with a tertiary education attainment rate of 25.6% of 30-34 year olds in 2015, being a relatively low percentage compared to EU average of 38.7% in 2015 and being the second lowest in the EU. Beside this, the labour market relevance of education remains a challenge, while the employment rate of graduates is decreasing from 93% in 2008 to 77% in 2015 [8].

Finally, with the lowest EU level of expenditure in education (3% of GDP, in 2014, being significantly below the EU average of 4.9% of GDP), the challenges are still remaining for Romanian teachers, educators, and educational organisations which are striving to modernize their curricula needed to compete in a highly digitalised and globalized world [9].

3. Research results

By considering the cross-sector thematic elements introduced by DigComOrg for those educational organizations, i.e. higher education institutions eager to adopt the digital transformation of education, the author modeled the workflow of activities needed to boost digital skills and online learning. The elements of leadership and governance practices, teaching and learning practices, professional development, assessment practices, content and curricula, collaboration and networking, and infrastructure were captured in a process-based model with visualized inputs, interrelated and interconnected activities, and outputs [10].

The process-based model captures the scope of work into three processes groups: PG1. Develop student-centred learning methodology; PG2. Digitalize educational components for digital-age learning; PG3. Monitor and control entrepreneurial curriculum development (fig. 1., fig. 2., fig. 3.). The process components in terms of input and output variables were developed according to the generally recognized good practices of project management process methodology [11].

Process Group 1. Develop student-centred (SC) learning methodology

It is responsible for defining and articulating student-centred learning methodology with pedagogical processes, being basically linked to pedagogical design for personalized learning within digital-age learning context, and ensuring synergies across different disciplines from entrepreneurial curriculum [12].

As figure 1. suggests, fulfilling the process aims is grounded on developing three main outputs: report on SC learning benchmarks, SC learning model framework and related pedagogical processes map, and approved SC learning methodology. In this regard, in order to guide the development workflow, it should be considered necessary inputs from higher education institution (HEI) leadership as follows:

- *HEI development strategy* mentioning the mission, the public engagement for opening up education and stating the development strategy for educational innovation and modernization through digital-based learning;
- *HEI process assets and knowledge based data* enriched with educational plans, processes, policies, procedures, and knowledge based on historical information and lessons learnt from previous projects in research, development and innovation in education area;
- *HEI environmental factors* with existing IT infrastructure, quality assurance standards, teachers knowledge and skills for using digital technology in teaching, personal administration policy in terms of didactic performance appraisals, reward schemes and promotion procedures, and staffing and retention guidelines;
- *HEI stakeholders register* nominating all relevant parties in the modernization of curricula (students, teachers, academic staff, alumni, parents, regulatory bodies, business and labor market representatives, local and national enterprises, civil society organizations, public administration, etc.), their needs and expectations related to business engineers' skills and competences.

All aforementioned inputs elements should be carefully taken into consideration since these may enhance or constrain the planning endeavor and also the implementation phase of the process-based model.

The flow of activities describes the logical thinking needed to obtain the main outputs as follows:

- *Report on SC learning benchmarks* with the results of content research in digital environment using relevant portals, database and e-publication with best practices at EU and worldwide level;

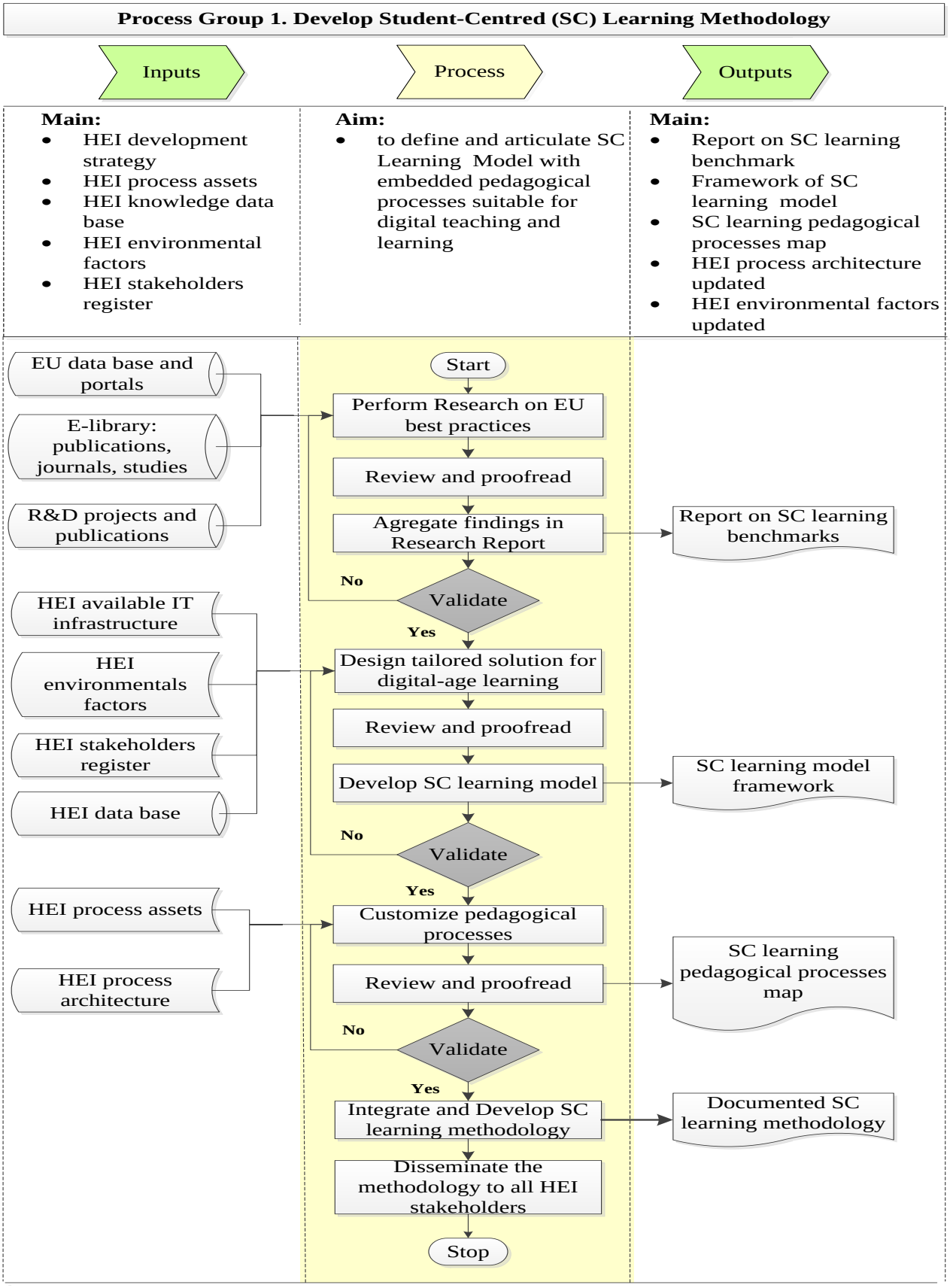

Fig.1 Process for developing student-centred learning methodology

- *SC learning model and pedagogical processes* with activities flows, pedagogical methods supporting the personalized learning and support activities;
- *SC learning methodology* with syllabus for disciplines within entrepreneurial curriculum containing: learning outcomes split per each discipline and linked to entrepreneurial phases:

opportunity recognition & idea feasibility, business model development, and new venture/enterprise development; SC learning practices with mix between formal activities and informal activities, classical learning and digital learning; processes for mentoring, coaching, lecturing, debates, and students workshops, and simulations, case studies, role-playing; assessment activities with comprehension questions, multiple choice quizzes, tests, and/or classroom presentations.

The final prerequisite is referring to aggregating all information into the consolidated version of the methodology and disseminating this to all stakeholders involved in the development process to ensure the buy-in effect for the further implementation phase.

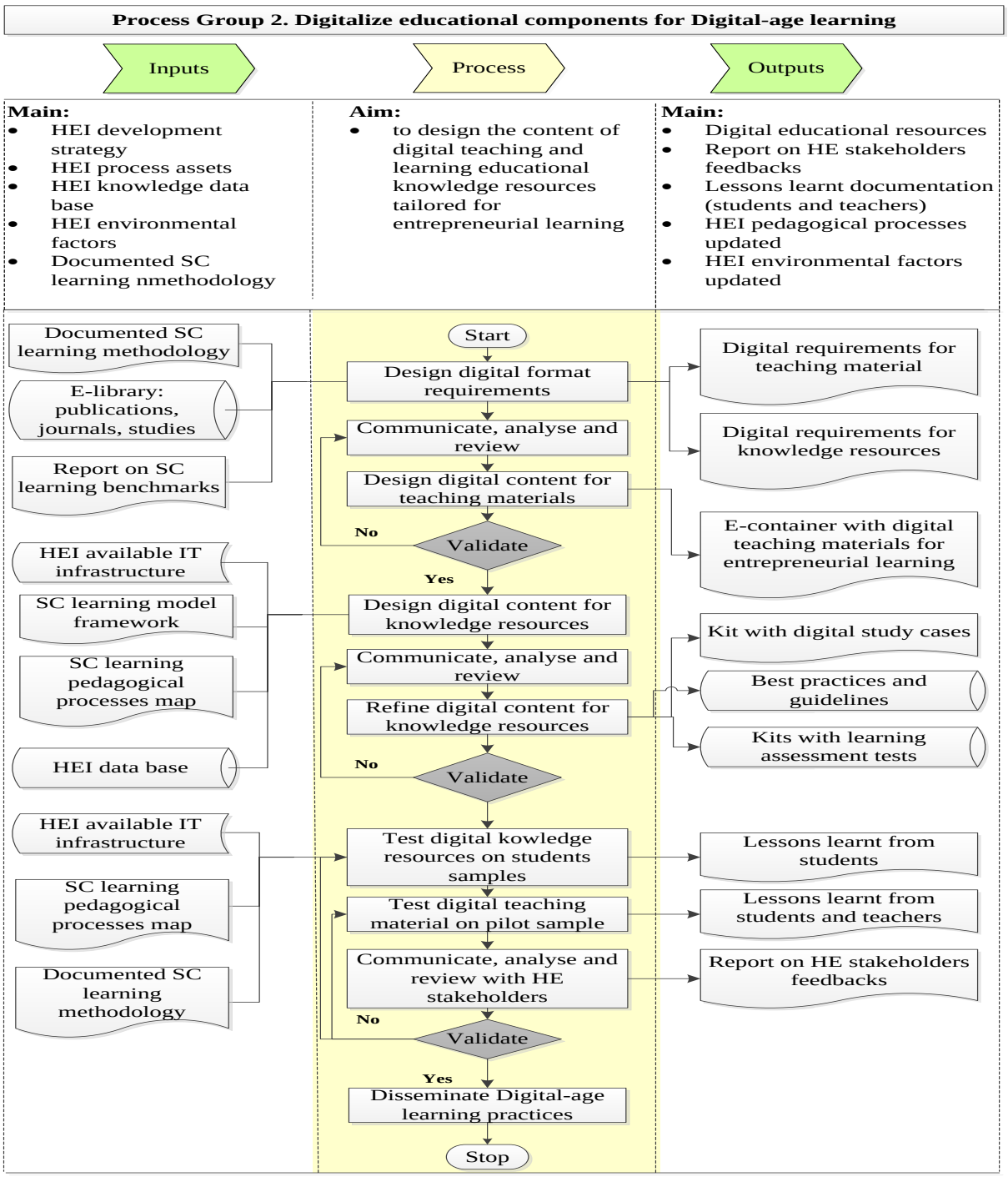

Fig. 2. Process for digitalizing educational components of entrepreneurial curriculum

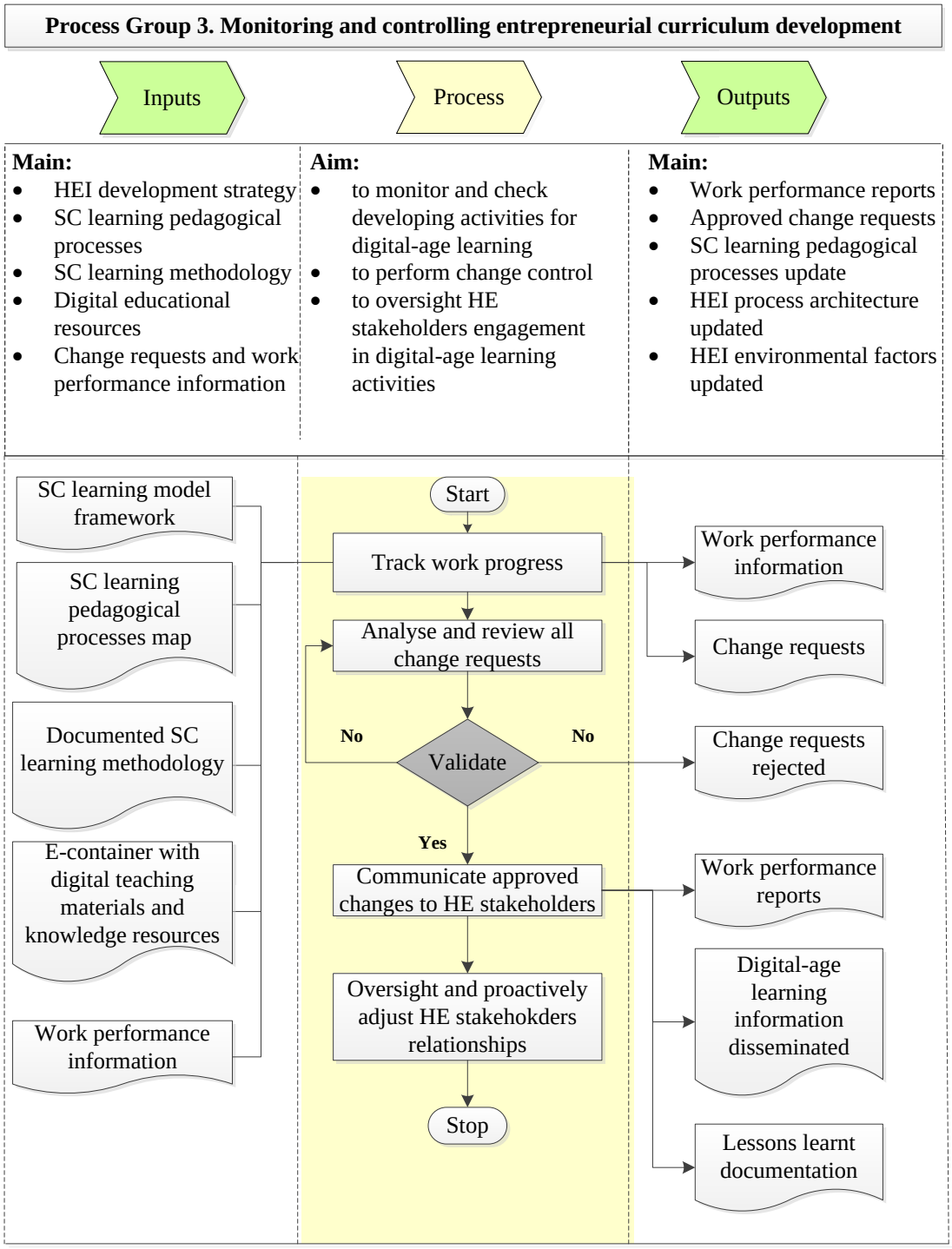

Fig. 3 Process for monitoring and controlling entrepreneurial curriculum development

Process Group 2. Digitalize educational components for Digital-age learning

The process intends to digitalize the content of all educational materials used in teaching and learning business engineering students according to the needs and expectations of relevant stakeholders as students, teachers, academic staff, alumni, parents, regulatory bodies, business and labor market representatives, local and national enterprises, civil society organizations, public administration, etc.

The digital-age learning educational components should be developed according to the previous SL learning methodology designed and approved, and should also consider the context in which the higher education leadership and governance view the modernization endeavor.

The activities workflow starts with defining the suitable digital format for teaching materials and educational knowledge resources, being followed by designing teaching materials for entrepreneurial learning in the digital format.

The flow goes on with creating the pull with applications and exercises suitable for personalized learning and collaborative work in a digital environment. Through the virtual integration of digital teaching and knowledge resources in the interdisciplinary e-container, it envisages going beyond technical aspects and preparing business engineering students to use the know-how by applying innovative knowledge to complete multidisciplinary tasks and problems.

The process is complemented by an ongoing flow of communicating, analyzing, and reviewing activities with higher education stakeholders in order to ensure the effective link between education and industry, raising the relevance of skills acquisition process.

Beside this, the model foresees specific activities for testing and adjusting by considering different control samples for each of the actors involved: students and teachers.

Finally, it envisages evaluating, adjusting and improving the digital educational components based on users' experiences, stakeholders' recommendations and feedbacks, complemented by disseminating the results to all parties involved.

Process Group 3. Monitoring and controlling entrepreneurial curriculum development

The process is intended to monitor and check developing activities for digital-age learning, to perform integrate change control by monitoring change requests and the engagement of higher education stakeholders in the activities flow.

The flow is fed by the inputs from the previous process groups such as SC learning model framework and pedagogical processes map, the SC learning methodology, the e-container with digitalized educational materials, and also with work performance information from the planning activities.

The outputs entail work performance information and change requests both gathered during tracking the progress, and encompass the rejected change requests issued after the activity of analyzing and reviewing. The aim is to perform an integrated change control to determine preventive, corrective and follow up measures.

Also, the flow of activities covers adjusting and monitoring the higher education stakeholders' relationships to avoid possible misunderstandings, miscommunications and escalation effects.

The activities foreseen within this processes group aims to oversight the way of performing the work so as only the approved changes related to digital-age learning activities should be incorporated in the revised baselines.

Finally, by performing the activities flow, it will be possible to collect lessons learnt documentation related to the modernization of higher education offer through an entrepreneurial curriculum encompassing key dimensions of leadership and governance practices, teaching and learning practices, professional development, assessment practices, content and curricula, collaboration and networking, and infrastructure.

4. Conclusions

Educating students to be successful in the interconnected and complex world that faces cultural, economic, and informational changes represents a key initiative for those educational organisations, i.e. higher education institutions which seize the opportunities of the digital revolution and strive to integrate digital-age teaching and learning into their educational practices.

Thanks to the unleashed new business opportunities in the digital age, business engineering education gained particular importance being accountable for equipping students with the right mixt of entrepreneurial and digital skills. These constitute a key enabler for organizational education to modernize curriculum by systematically integrating digital-age learning into educational levels even though all educational value chains should be reconsidered, i.e. teaching and learning practices and related assessment, curriculum reform, and teachers professional development.

In this context, the paper addressed the challenges of digital learning space and proposes a process-based model to facilitate the adoption of digital content within the current educational practices of business engineering.

It depicted the core process groups responsible for developing student-centred learning methodology, designing the digital content for educational material and knowledge resources, and monitoring and controlling the work process to effectively change the pedagogical, technological, and organizational educational practices.

However, the challenges are still remaining for educators, teachers, and academic staff as further implementation of the process-based model requires effective engagement of organizational education leadership, complemented by awareness-raising actions.

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