Developing, implementing, and disseminating an adaptive clinical reasoning curriculum for healthcare students and educators

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D4.4 Long-term integration plans

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1. Summary

During the last phase of the project all partners worked on their long-term integration plans of the DID-ACT student curriculum and train-the-trainer course. The planning was based on the integration examples we developed as part of our integration guideline and experiences we made during piloting the learning units at our institutions. Each partner developed a first idea for the integration and we discussed these plans within our consortium and each partner presented the plans to stakeholders at their University. The integration approach for EDU, Bern, and Augsburg includes the longitudinal integration of all student and train-the-trainer learning units into their curriculum in a stepwise approach. Krakow, Örebro, and Maribor are following a more targeted approach by selecting specific learning units matching their curricular learning objectives for integration. Instruct's plan is different as they will integrate DID-ACT resources to enrich and expand their current portfolio, for example, by aligning selected resources with their virtual patients in cooperation with customers.

Overall, our integration plans are ambitious but also realistic, as partners can make use of planned curricular reforms and we have already demonstrated the added value of DID-ACT resources with our pilot implementations.

2. Introduction

As part of this deliverable we developed a detailed integration plan for the train-the-trainer course and the student curriculum at our institution or enterprise. These plans were aligned with the integration guideline (D7.3) and our sustainability plans (D7.5) aiming for maximum sustainability of the plans. Each partner documented their plan including description, milestones, stakeholders to be involved, and potential costs.

3. Quality criteria

- Each partner to provide a plan
- Aligned with the integration guideline (D7.3)
- Based on change management literature
- Plans include description, milestones, stakeholders, potential costs

4. Methods

As part of our integration guideline development, we created a template in the form of a google spreadsheet for partners to suggest exemplary integration scenarios of DID-ACT learning units into their curriculum. After having completed this task, we reviewed and discussed the usefulness of the developed template for the documentation of the long-term integration plans. However, all partners agreed that the template (see Figure 1) was very helpful and no changes were necessary.

Before the final project meeting in Kraków, Poland, at the end of September 2022, all partners had completed their first draft of the integration plan with the template and presented their plans during the meeting. During this session we also discussed that such long term integration plans require changes at the faculties and we agreed to consult the literature on change management to further explore this field and see how we can integrate these findings into our plans.

Long-term Integration plan	University / Enterprise	
	Student curriculum	Train-the-trainer
Integration of LU(s)	Number of LU(s) or parts of	Number of LU(s) or parts of
Reason(s) for selected LUs	e.g. Learning Objectives, fit to /missing in local curriculum,	
Learners	(Year, study program)	
Participating professions / study programs	inter-, multi-, monoprofessional, which profession(s)	inter-, multi-, monoprofessional, which profession(s)
Relation to other curricular learning activities		
Technical integration		
Resources Needed	E.g. additional material to the DID-ACT resources, facilitators, etc.	E.g. additional material to the DID-ACT resources, facilitators, etc.
Mode of content use	use of content in DID-ACT moodle / export / translation yes/no / ...	use of content in DID-ACT moodle / export / translation yes/no / ...
Stakeholders to be involved		
Anticipated Costs		
Milestones		
Anything else you would like to include in your longterm integration plan		

Figure 1: Template for developing and documenting the long term integration plan

After the presentations we discussed in small groups, which also included associate partners, several aspects and the following two questions to align the long-term integration plans with the integration guideline and our sustainability model:

- What did you find useful or interesting from other partner's integration plans? How can this help us have better recommendations for integration?
- Can the integration plan at your institution fit into the sustainability model somehow? Why and why not?

We had an in-depth discussion about how realistic vs idealistic our plans should be.

Literature review on change management and diffusion of innovation

The science behind change management, adoption and diffusion of Information informed our long term integration strategies for D4.4 and also our future dissemination and sustainability activities.

Change management is a concept known from the business world and has been used to adapt to market shifts and disruptions of traditional business models [Palatta 2018].These concepts were adopted also in healthcare and medical education, as needed to constantly evolve and implement new solutions to challenges.

Early reports of change management in nursing education draw from Lewin. Lewin showed that in order to facilitate change, one must fully understand the current situation, problem or need. This perspective advocates that a clear understanding of rationale behind the change is needed in order to achieve staff buy-in of this change [Lehman 2008]. Through the implementation of new solutions, fundamental considerations in implementing change are training of stakeholders, problem-solving resources and communication [Lehman 2008]. Lewin also points out that in management of change not only the implementation of change is needed, but also planning for re-education is essential in cases of policies needing alteration or reinforcement of practice [Lehman 2008]. This model is not without its drawbacks so more advanced action models have been sought after.

Lipitt built on Lewins idea of planned change and has defined the following 7 phases of change management:

1. identifying the complete problem
2. assessing the motivation and resources
3. identifying the change agent and the motivation of that agent
4. identifying progressive objectives through usually pilot testing
5. choosing appropriate change agents
6. diffusing and maintaining change
7. discontinuing the support of the change agent [Lehman 2008].

The common denominators of these models are the appropriate problem identification, facilitation of change through sufficient training and leadership and the creation of self-sustaining change in the long term.

Rooted in the business mindset, the Kotter change management model (KCMM) has also been applied as a 8-step model towards change in healthcare and educational institutions. KCMM has reported use within changing of didactic curricula through the following steps[3]:

Step 1: Establishing urgency: this correlates with previous models through identification of problems and solutions or needs assessment surveys. In our case, we can convince opinion leaders at our institutions to adopt the DID-ACT curriculum for an improved clinical

reasoning teaching and focus on potential benefits – for patients, learners, educators, and institutions.

Step 2: Creating a Powerful Guiding Coalition: This step of the change management is used by a group of leaders, facilitators who are dissatisfied with the current status to initiate change. We are the guiding coalition for DID-ACT and we can inspire other coalitions within institutions to adopt and integrate our project outcomes.

Step 3: Creating a vision: this step correlates to developing a common plan to follow for improvement and clarify how the future will be different from the past. We envision longitudinal clinical reasoning curricula at healthcare education institutions for the ultimate outcome of patient safety.

Step 4: Communicating the vision to others: communication should be deliberate, well branded and extended to a broader audience. We plan this with stakeholders at different levels interested in our curriculum, who can review it, recommend it, and integrate it at our and other institutions. As part of WP7 and our sustainability plan we disseminate information about the curriculum in events and committee meetings organized internally at our institutions for the purpose of faculty development and teaching quality improvements.

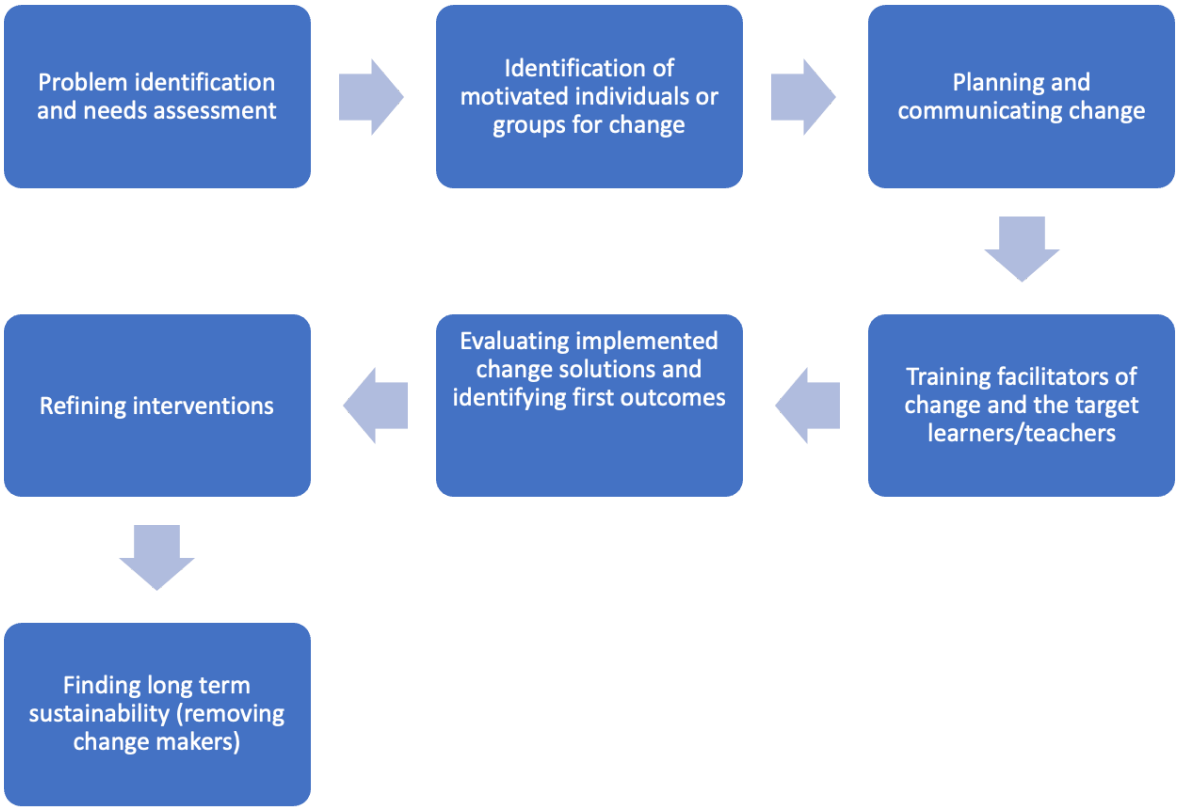
Step 5: Empower Others to Act on the Vision/ Enable action by removing barriers: this would include training and assistance in implementing change. We have identified and addressed barriers for a longitudinal clinical reasoning curriculum at the beginning of our project and based the curriculum development and integration on these findings.

Step 6: Plan for and Create Short Term Wins: These might be first positive evaluations of the program or reports of its efficiency. We plan to recognize, collect, and disseminate wins (i.e successful integrations, positive feedback etc.) to help energize the movement.

Step 7: Consolidate Improvements and Produce More Change/ Sustain acceleration: Through a feedback loop further information is gathered and evaluated in order to improve the change further for future implementations. Reels into the critical mass point of the diffusion principles, where the rate of diffusion of an idea sustains itself, and we hope to make a difference which can sustain itself along with our sustainability practices.

Step 8: Institutionalize New Approaches: Create change that is long lasting and implemented within a structured system [3]. We plan to motivate the long term changes at our institutions, while reinforcing practices and spreading awareness of success.

Most systems have in common following mechanisms in place:



5. Results

5.1 Change Management and diffusion of information

We identified the following five key elements of diffusion and how they manifest in the DID-ACT Project:

(1) Innovation: Our curriculum is the first EU open source Clinical Reasoning Curriculum for both students and educators which can be used by educators to spread knowledge on CR with the final aim to improve healthcare standards
(2) Adopters: HEIs/ Other Educational Organisations/ Educators/ Learners
(3) Communication Channels: Website and learning management platform, Social Media, Interpersonal communication, such as conferences, academic publications/research papers
(4) Time: Until end of project in December 2022 and our continued sustainability practices, aimed for self-sufficient spread by institutions between each other
(5) Social system: External influences (e.g. organizational / social requirements available, media/ awareness systems); Internal influences: Our social relationships, availability of opinion leaders

Characteristics of DID-ACT innovation:

Advantages: Open source, easily accessible, and available educational resources, quality assured, relevant and necessary, trialed, professional support.

Disadvantages: General difficulties with integrating new content into existing structures, potentially disruptive to routine tasks at HEIs, no prior adopters (we are the primary adopters)

DID-ACT adopters:

(1) Individuals with power or agency to make decisions about integration of educational material at educational institutions including our own (e.g. deans, curriculum designers, business directors, student representatives acting on behalf of student associations) – on an institutional level, such change will more likely take place if there is an increased motivation/tension for change, improved compatibility and improved observability of results.
(2) Researchers/educators/businesses who need resources for clinical reasoning education or resource creation/ modification
(3) Students looking for free online material to learn more about clinical reasoning

Adopters are more likely to adopt if they have the ability to create change and there is motivation to change.

How to increase motivation for change:

(1) Dissemination about the importance of clinical reasoning education to create motivation for change – to students, educators, other HEIs; feedback and recommendations from adopters (starting from our HEIs)
(2) Compatibility – getting feedback and improving our curriculum as well as integration guideline/recommendations ;
(3) Improved observability of results - Successful integration and improved knowledge and awareness of clinical reasoning among learners and educators can be communicated as a success stories

Strategies to help diffusion of our innovation:

(1) Help disseminate adoptions of our curriculum within highly respected organizations/ individuals in medical educational networks – first our own (e.g. student union, quality improvement committee), and associate partners and external organizations (e.g. IFSMA, Ministry of Science and Higher Education or other governmental organizations, medical societies
(2) Supporting early adopters, first at our own institutions, with their needs to make sure they are satisfied with our product.
(3) Involving individuals and organizations with similar philosophies and looking for resources in clinical reasoning education should be targeted first in our integration, sustainability and dissemination strategies

The five stages of our adoption process:

(1) Knowledge awareness and (2) persuasion– These are achieved by our dissemination practises and communication with our own and other faculties
(3) Decision making, 4) Implementation and (5) Finalization – we should be able to support these stages and facilitate it with resources e.g. our integration guidelines, professional opinions.

5.1 Long Term Integration plans

In the following sections we describe the long-term integration plans of all partner institutions based on the template (Figure 1).

5.1.1 Long Term Integration plan - EDU

The following table illustrates the long-term integration plan developed at the EDU medical school. The overarching ambitious goal is the integration of all learning units in the Bachelor and Master program.

Long-term Integration plan	**EDU**	
	Student curriculum	Train-the-trainer
Integration of LU(s)	Provisionally all learning units: Novice and Intermediate levels planned for B.Med students in clinical rotation phase, and Advanced for M.Med students. Provisionally B.Med Module 1 – a. What is CR, b. PCC, c. Biomedical knowledge and CR – knowledge encapsulation Module 2 – a. Health Professional roles in CR, b. Illness scripts, c. Outcome Present State Test Model Module 3 – a. Dual Process theory, b. Collect + prioritize data Module 4 – a. Generating DDx and deciding about final diagnosis, b. Developing a treatment plan Module 5 - Biases and cognitive errors, b. Metacognition Module 6 – a. Analyzing and avoiding errors , b. Clinical reasoning theories into practise Module 7 – a. Collaboration of health professionals in CR , b. Shared Decision Making in CR Module 8 – a. Decision Support Systems b. Ethical Aspects Module 9 – a. Uncertainty Masters: A. Collaborate with others in CR, Decision Support Systems Masters: B. Biases and Cognitive Errors , Uncertainty Masters C: Metacognition, Reflection and models for reflection Masters D: Analyzing and avoiding errors.	Provisionally all TTT learning units
Reason(s) for selected LUs	Learning Objectives would benefit addition to curriculum, for both students and tutors	
Learners	Bachelor and Master of Medicine students	Physicians, Tutors
Participating professions / study programs	B.Med / M.Med students, Tutors	
Relation to other curricular	Part of curriculum in clinical rotation phase	Part of TTT training

learning activities		
Technical integration	NewRow and EDU learning platforms	NewRow and EDU learning platform
Resources Needed	Some teaching will be slightly adapted based on learning platforms and methods at EDU	Some teaching will be adapted based on learning platforms at EDU
Mode of content use	Potentially as is ; looking if adaptations needed due to learning platforms used.	Potentially as is ; looking if adaptations needed due to learning platforms used.
Stakeholders to be involved	EDU stakeholders including Dean, Head of Curriculum Team, Management, Tutors, Students	EDU stakeholders including Dean, Head of Curriculum Team, Management, Tutors
Anticipated Costs	Human costs mainly, to be seen based on granular plans	Human costs mainly, to be seen based on granular plans
Milestones	Planning with students starting in May 2023, until then, teach TTT to tutors, check what teaching adaptation needed due to learning platforms used, team looking at getting curriculum certified as a longitudinal course with ECTS credits.	Plan is to do TTT courses for tutors as soon as possible so they can teach students the student curriculum.

Table 1: Long-term integration plan at EDU

5.1.2 Long Term Integration plan - Instruct

The following table illustrates the long-term integration plan developed at Instruct. As Instruct is providing virtual patients and other online learning resources and infrastructure, the main goal is to integrate DID-ACT resources into the current portfolio.

Long-term Integration plan	**Instruct gGmbH**	
	Student curriculum	Train-the-trainer
Integration of LU(s)	potentially all resources generated within project, including virtual patients (VPs), learning units, integration guideline, OERs	potentially all TTT learning units
Reason(s) for selected LUs	The all fit into the portfolioInstruct offers to customers	They all fit into the portfolioInstruct offers to customers, with different focuses for the different target groups.
Learners	All target groups	All target groups
Participating professions / study programs	potentially all professions and study programs, main customers are currently medicine, dentistry, nursing, but potentially portfolio should be expanded.	
Relation to other curricular learning activities	Resources can be integrated into Virtual patients in CASUS or accompany them as additional learning resources providing	Teachers can use resources as material within or in addition to Virtual patients in CASUS for their students.

	background information on clinical reasoning depending on VP focus.	
Technical integration	• In general: Integration of content into CASUS virtual patients through standard APIs • National: Linking on available platforms fro student content, such as LOOOP.share, Virtual University Bavaria • International: Instruct Website, References in other cases back to DID-ACT modules.	• In general: Integration of content into CASUS virtual patients through standard APIs • National: linking on available platforms for teacher content, such as LOOOP.share • International: Instruct Website
Resources Needed	Time and budget for marketing, support of stakeholders in implementing the resources	
Mode of content use	Use of content in DID-ACT moodle, YouTube, and on website	Use of content in DID-ACT moodle, YouTube and on website
Stakeholders to be involved	Customers: Teachers of all health professions, schools	Customers, such as teachers of all health professions, schools, and potential future customers, such as private hospitals.
Anticipated Costs	Hosting, Website, Marketing and SEO activities for medical schools, content update	Hosting, Website, addressing also hospitals
Milestones	2023: evaluation of fundraising opportunities and services, and offering services on Instruct website. Pilot project with selected customers, virtual patients, and DID-ACT content 2024: larger role-out and marketing	2023: precise description of product and costs and offering services on website
Anything else you would like to include in your long term integration plan	Cooperation contracts with all project partners	Cooperation contracts with all project partners

Table 2: Long-term integration plan at Instruct

5.1.3 Long Term Integration plan - JU

The following table illustrates the long-term integration plan developed at the Jagiellonian University Medical College. The plans will be substantially updated in the near future as a new major curricular reform is in preparation, but its detailed shape is not yet defined.

Long-term integration plan	**Jagiellonian University**

	Student curriculum	Train-the trainer
Integration of LU (s) and description	**Year 2:** Biomedical Knowledge and Clinical Reasoning - The goal of this LU fits perfectly into an introductory course for 2nd year medical students, where the students try to use their biomedical knowledge to solve a patient case in a PBL format. The LU could be used as an introduction to this course. (Required time in curriculum ca 5 hours/semester). Decision Support Systems (Intermediate) - Polish undergraduate standards of medical education require that the student knows "The possibilities of modern telemedicine as a tool to support the work of the doctor". This can be addressed by DID-ACT learning objectives "Learners will be able to explain advantages and risks of decision support systems", "Learners will be able to identify situations in which decision-support systems can be of help." (Required time in curriculum ca 2 hours/semester) **Year 3:** Shared Decision Making in Clinical Reasoning - Elements of SDM are already being taught in medical programmes, but there is no explicit Learning Unit dedicated to this specific topic. The courses that could be a good fit are "Laboratory Training of Clinical Skills" part 2 and part 3. During this course students practice communication with patients that are role-played by actors. Adding one patient encounter dedicated to SDM would be both beneficial and relatively effortless. (Required time in curriculum ca 4 hours/semester). **Year 4:** Collect and prioritize key clinical findings and problems, 'Developing a treatment plan - there is a course "Evidence Based Medicine" in the medical curriculum where students learn how to formulate a clinical question, how to look for evidence-based	Learning units on: - TTT/What is Clinical Reasoning and Models - TTT/Information gathering, Generating differential diagnoses, Decision making, Treatment planning - TTT/Theoretical /Background Knowledge Organized in two courses: 1. Faculty Development Course: Basic set of CR teaching skills that would form the content of a 10 hours course offered by the Medical Education Department for teaching staff (candidates) at the medical faculty. Would permit to collect educational points (or qualify as ready for teaching). 2. Part of the PhD program is dedicated to developing teaching skills and preparing PhD students to teach undergraduate students. Basic set of CR teaching skills would help those PhD students to be better equipped for their didactic career. The content of a 10 hours course would be added to an already existing course for PhD students.

	answers, how to assess the evidence. These LUs would be a complementary topic during this course. (Required time in curriculum ca 4 hours/semester) Elective course on “New technologies in medicine”. Decision Support Systems (Advanced) - Polish undergraduate standards of medical education require that the student knows "The possibilities of modern telemedicine as a tool to support the work of the doctor". This can be addressed by DID-ACT learning objectives - "Learners will be able to describe benefits and address concerns for caution of using AI for clinical reasoning at a systems level.; - Learners will discuss the role of health professionals in the process of development and maintenance of decision support for clinical reasoning; - Learners will be able to explain the basic tenets of quality evaluation of clinical decision support systems (sensitivity, specificity, positive/negative predictive value) to judge its suitability for a particular clinical situation and interpret the results; - Learners will be able to give examples of theoretical underpinning of clinical decision support systems use in clinical reasoning (e.g. Bayes’ theorem)." (Required time in curriculum ca 4 hours/semester) **Year 5:** Collaboration of health professions in clinical reasoning (Intermediate/Advanced) Learning unit will be incorporated as a part of preparation for students of medicine and nurses (third year). This is a high-fidelity simulation course, in which different scenarios are solved by an interprofessional team. Clinical reasoning in scenarios starts at the point of preparation (before a patient arrives). It continues through the scenario, gathering information about the patient (Medical interview, physical examination, vitals monitoring, treatment and referral if appropriate). Participants are encouraged by an assistant to take pauses to collectively, interprofessional share clinical findings	

	and reason about further steps. In the end, after the scenario, there is debriefing time. The scenario is talked through and discussed. More stress on discussing aspects related to clinical reasoning will be encouraged by a tutor. (Required time in curriculum ca 4 hours/semester) **Year 6:** All 6 advanced learning units: Collaborate with others in clinical reasoning, Decision Support Systems, Biases and Cognitive Errors, Uncertainty, Metacognition, reflection and models for reflection, Analyzing and avoiding errors. Final year students have repetition classes so DID-ACT learning units could be included there (Required time in curriculum ca 6 hours/semester)	
Learners	Year 2 - Year 6 medical students, 3 year nursing students	1. Faculty development at the medical faculty 2. PhD students at medical college
Participating professions/study programs	Medical and nursing students	1. medicine (mono-professional) 2. multiprofessional
Relation to other- curricular learning activities	Integrated into several courses: **Year 2 –** “Introduction to Clinical Science” and "Telemedicine with elements of simulation" **Year 3** - "Laboratory Training of Clinical Skills" **Year 4** - "Methods of research and development of new information technologies in medical science" , "Propedeutics" , "Evidence Based Medicine" **Year 5** - "Laboratory Training of Clinical Skills" and "Crisis Resource Management in Interprofessional Teams” **Year 6 –** “Repetition of Clinical Sciences”	1. We do not have a formal faculty development programme but I would see this course as an example of a deepening ("advanced") teaching course offered as continuation/extension of the present Basic Teaching Skills course. A certificate would be recognized by the Dean to give "education points" acknowledged in staff self-assessment reports. 2. Part of "Medical Education in Medical College" course for PhD students.
Technical integration	Course on JU learning management system "Pegaz" with link to VPs in CASUS using LTI	1. Faculty development courses do not have courses on "Pegaz". As long as possible I would use the DID-ACT Moodle platform,

		then move it to Jaszczur (Faculty Development Moodle at JU - http://jaszczur.czn.uj.edu.pl). 2. Course on JU learning management system "Pegaz".
Mode of content use	We will use the resources and learning units in the DID-ACT Moodle platform, a later translation into Polish might be necessary.	
Resources Needed	Protected time for the stakeholders to plan and implement the integration. Access to (a free version of) a symptom checker or differential diagnosis generator (as Isabel, Ada or Infermedica) and to (a free version of) a machine learning platform (e.g. RapidMiner)	Qualified facilitators with extra payment (cannot be recognized as regular teaching duty).
Stakeholders- to be involved	Dean for education - convince to offer elective course in IT later in the curriculum (e.g. year 4 but not year 2 as it is now) and to approve change in the course including additional hours Head of Medical Education Department - needs to approve change in the course	1. Head of Medical Education Department to include the course in the faculty development programme - Dean to acknowledge the faculty development credit points - Facilitators willing to conduct the course 2. Head of PhD program would need to increase the number of hours dedicated for "Medical Education in Medical College" course
Anticipated costs	Depending on the needs, costs for translating certain parts of the curriculum into Polish. Access to professional versions of DDX generators (can be very expensive), preparation workload.	10h payment for facilitator
Milestones	Discussion on curricular changes around January each year. Detach year of elective course from group of subjects (e.g. group B - basic sciences with electives in year 2 only; Telemedicine (Medical Informatics) and Research Methods are classified as "Basic Science")	Discussion on curricular changes around January each year.
Anything else you would like to		1. Two half-day sessions (5h) with 2 weeks in between for

include in your long-term integration plan		self-study.

Table 3: Long-term integration plan at Jagiellonian University.

5.1.4 Long Term Integration plan - MFUM

The following table illustrates the long-term integration plan developed at the medical school of the University of Maribor (MFUM). The overarching goal is the integration of selected learning units matching curricular learning objectives and in a longitudinal approach. Before new courses can be integrated on a long-term basis, they have to be held as electives. Therefore, MFUM plans to offer elective courses with six learning units as a first step for a deeper integration alongside with the relevant TTT courses.

Long-term Integration plan	**University of Maribor - Faculty of Medicine**	
	Student curriculum	Train-the-trainer
Integration of LU(s)	1) What is Clinical Reasoning, 2) Person-centered approach to clinical reasoning, 3) Biomedical Knowledge & Clinical Reasoning, 4) Dual Process Theory, 5) Illness scripts, 6) Generating differential diagnoses and deciding about final diagnoses. Integration within years 2-6 as an elective course option.	Learning units on: 1) What is clinical reasoning and models, 2) Person-centered approach and the role of patients, 3) Discussing and teaching about cognitive errors and biases, 4) Information gathering, Generating differential diagnoses, Decision making, and Treatment planning
Description	Due to curriculum development restrictions, the learning units will be firstly implemented as an elective longitudinal option	Implement as a year long longitudinal activity for teaching staff of all departments. A learning unit is conducted every 4-6 weeks.
Learners	Years 2-6 undergraduate medicine program	Junior to intermediate teaching staff at MFUM
Participating professions / study programs	multiprofessional: medical and dental students	mono-professional (medicine)
Relation to other curricular learning activities	add on to other activities for explicit development of clinical reasoning skills	newly developed longitudinal program for teaching the teachers: registration with University for accreditation
Technical integration	Use of currently available activities within Moodle platform.	Use of currently available activities within Moodle platform
Mode of content use		

Resources Needed	1) stakeholder buy-in through promotion of participation in activity, 2) development of timeplan for scheduling purposes	1) vice-dean and stake-holder buy-in: promotion and consensus activities, 2) implementation schedule
Stakeholders to be involved	1) student council and peer-tutors for motivation to participate in activities 2) curriculum developers and teaching staff for implementation 3) teaching staff of specialties for modification of content if needed.	1) representatives of different departments, 2) heads of departments and vice-dean for education
Anticipated Costs	room booking cost, implementation of workshop	facilitation of LUs (catering/room cost)
Milestones	1) February 2023: prepared plan for implementation with dates in spring semester; 2) Spring semester 2023: implementation	1) December 2022: development of longitudinal planning; 2) implementation March 2023 - December 2023 for LUs.

Table 4: Long-term integration plan at the University of Maribor (MFUM)

5.1.5 Long Term Integration plan - ORU

The following two separate tables illustrate the projected long-term integration plan developed for Örebro University, and aims to continually integrate selected and relevant learning units within the context of the pre-existing curriculum, and as such potential adjustments of the plan may be present.

Long-term integration plan	**ORU - Medical program**	
	Student curriculum	**Train-the-trainer**
Integration of LU(s)	**Year 1 Person-centered approach, Semester 1:** Implementation of interprofessional learning exercises) **Year 1-6 Metacognition, reflection and models for reflection:** Explicit implementation of CR aspects in pre-existing written reflection assignments (e.g., “visningsportfölj”, “portfölj och mentorverksamhet”) and under the guidance of their respective clinical supervisor at the end of the day. **Year 2 What is clinical reasoning (Semester ~1-7):** Implementation of clinical reasoning theories and models in relevant parts of the pre-existing curriculum, for example: “Dialogue, communication including interprofessional collaboration, team-work and leadership” **Year 1-6 Health professionals roles in clinical reasoning:** Implementing CR in pre-existing tasks (e.g., shadowing – see “Medföljande annan profession del olika terminerna”). **Year 3-4 Illness scripts, Biases and cognitive errors:** Introduction of illness scripts (Semester 6>) using pre-existing PBL patient “paper” cases in small working groups, cognitive errors and biases could be presented in the context of the diagnostic process using for example Multiple essay questions, MEQ. **Year 4:** Developing a treatment plan and ethical aspects of patient management and treatment. How to generate differential diagnoses and final diagnosis decision making. Biases and cognitive errors: PBL group work using patient paper cases, individual modified essay questions and actively discussing CR during clinical practice. **Year 5-6: How to analyze, avoid errors and uncertainty:** Implementation of these aspects of CR using pre-existing material within the curriculum (e.g., Semester 8, Ethics, law, patient safety and knowledge improvement: “Patient safety, what do you do when what is not suppose to happen, happens?)	1. What is clinical reasoning and models. 2. Differences and similarities among health professions. 3. Person centered approach and the role of patients. 4. Information gathering. 5. Generating differential diagnoses. 6. The decision making process and treatment planning. 7. Clinical reasoning teaching and assessment.

Reason(s) for selected LUs	Above LU's could be implemented in parallel with pre-existing student curriculum and the entrustable professional activity (EPA) initiative. In addition to providing opportunities to develop CR during clinical practice.	Potential to explicitly raise the discourse of CR within the confines of the programme and making CR material and literature available to trainers and clinical supervisors
Learners	Medical students	Teachers and clinical supervisors during clinical practice
Participating professions / study programs	Possible collaborative efforts for students of the nursing and occupational therapist programs. Year 1: Person centered approach and interprofessional aspects. Year 2: What is clinical reasoning.	Teachers and supervisors from the same programs
Relation to other curricular learning activities	Detailed in above explanation under "Integration of LU(s)"	As part of the TTT education
Technical integration	Possibility to integrate aspects of aforementioned LU's in assignments on the learning platform	Possibility to access to DID-ACT project website, CR literature and promote integration of CR within pre-existing student assignments
Mode of content use	Use of content in DID-ACT moodle	Use of content in DID-ACT moodle
Resources Needed	LUs that were not piloted before need to be adapted to local circumstances.	LUs that were not piloted before need to be adapted to local circumstances.
Stakeholders to be involved	Programme director, thematic leads, educational developer	University center for educational development, course team for clinical supervisors
Anticipated Costs	Transforming to local LMS and to current course structures, teacher workshops, curriculum development, support for units in Moodle.	Transforming to local LMS and to current course structures, teacher workshops, support for units in Moodle.
Milestones	Integration of selected LU's to local curriculum and integration in pre-existing student assignments	
Anything else you would like to include in your long-term integration plan		

Table 5: Long-term integration plan at Örebro University, Medical program.

Long-term integration plan	**ORU - Nursing programme**	
	Student curriculum	**Train-the-trainer**
Integration of LU(s)	Possibility of implementing select LU's within the context of the pre-existing curriculum, including (but are not limited to): 1. What is clinical reasoning? 2. Differences and similarities among health professions. 3. Person centered approach and the role of patients. 4. Information gathering. 5. Using the Outcome Present State Test Model.	Possibility of implementing select LU's within the context of the pre-existing curriculum, including (but are not limited to): 1. What is clinical reasoning and models. 2. Differences and similarities among health professions. 3. Person centered approach and the role of patients. 4. Information gathering. 5. Clinical reasoning teaching and assessment. 6. Using the Outcome Present State Test Model.
Reason(s) for selected LUs	Opportunity for implementation of select LU's within the context of the program. Additionally, appropriate LU's may be integrated in parallel with the existing curriculum to promote the CR during established campus, clinical and practiced-based activities.	Emphasis on the implementation of relevant LU's, suitable within the context of the pre-existing curriculum and online teaching platforms available for trainers and clinical supervisors.
Learners	Undergraduate nursing students. For interprofessional learning units also medical occupational therapy students.	Trainers and clinical supervisors
Participating professions / study programs	Possible collaborative efforts for students of the medicine and occupational therapist programs. Year 1: Person centered approach and interprofessional aspects. Year 2: What is clinical reasoning.	Teachers and supervisors from the same programs
Relation to other curricular learning activities	Detailed in above explanation under "Integration of LU(s)"	As part of the TTT education
Technical integration	Possibility to integrate aspects of aforementioned LU's in assignments on student learning platforms	Possibility to access to DID-ACT project website, CR literature and promote integration of CR within pre-existing student assignments

Mode of content use	Some of the resources and learning units will be used in the DID-ACT Moodle platform. However, much of the content and resources will be adapted to local LMS, course content and course activities. Translation of some LUs into Swedish might be necessary.	Translation of some LUs into Swedish might be necessary.
Resources Needed	LUs that were not piloted before need to be adapted to local circumstances.	LUs that were not piloted before need to be adapted to local circumstances.
Stakeholders to be involved	Program director, course directors, educational developer. Development team for new nurse curriculum	University center for educational development, course team for clinical supervisors
Anticipated Costs	Transforming to local LMS and to current course structures, teacher workshops, curriculum development, support for units in Moodle.	Transforming to local LMS and to current course structures, teacher workshops, support for units in Moodle.
Milestones	A new nursing curriculum is being developed which will be implemented in spring -24. Potential integration of learning units into this curriculum will be considered. However, some of the content and educational strategies being developed by DID-ACT will be integrated as part of regular courses not necessarily under the DID-ACT label or “as-is” but adapted into campus-based or clinical learning and practice activities.	Special emphasis could be placed on the implementation of relevant LU's for trainers and clinical supervisors prior to implementing LU's in the curriculum.
Anything else you would like to include in your long term integration plan?		

Table 6: Long-term integration plan at Örebro University, Nursing program.

5.1.6 Long Term Integration plan - UAU

The following table illustrates the long-term integration plan developed at the medical school of the University of Augsburg. The overarching ambitious goal is the integration of all learning units in a longitudinal course on clinical skills and communication.

Long-term Integration	**University of Augsburg**

plan		
	Student curriculum	Train-the-trainer
Integration of LU(s)	**Year 1**: What is Clinical Reasoning, Person-centered approach to clinical reasoning, Health profession roles in clinical reasoning, and Biomedical Knowledge & Clinical Reasoning. (Required time in curriculum ca. 5 hours / semester) **Year 2**: Dual Process Theory, Illness scripts, Collect and prioritize key clinical findings/problems, and What is clinical reasoning and How can theories be put into practice (Intermediate). (Required time in curriculum: ca. 4 1/2 hours/semester) **Year 3**: Generating differential diagnoses and deciding about final diagnosis, Biases and cognitive errors - an Introduction, Analyzing and avoiding errors. (Required time in curriculum: ca. 4 1/2 hours/semester) **Year 4**: Using the Outcome Present State Test Model, Developing a treatment plan, Metacognition, reflection and models for reflection, Collaboration of health professions in Clinical Reasoning (Intermediate). (Required time in curriculum: ca. 6 hours/ semester) **Year 5**: All remaining intermediate learning units: Shared Decision Making in Clinical Reasoning, Decision Support Systems, Ethical aspects - patient management and treatment, Uncertainty. (Required time in curriculum: ca. 5 hours/semester) **Year 6**: All 6 advanced learning units: Collaborate with others in clinical reasoning, Decision Support Systems, Biases and cognitive errors, Uncertainty, Metacognition, reflection and models for reflection, Analyzing and avoiding errors. (Required time: ca. 6 hours / semester. Final year students often have a day/week off from clinical work so these days could be used for DID-ACT learning units and optional participation in the train-the-trainer units) **Years 1-5**: Virtual Patients (VPs) as additional deliberate practice activities in increasing number and complexity (e.g. starting with 5 VPs (=ca. 1.5 hours)/semester) in Year 1 and increasing to 10 VPs/semester) in Year 3-5.	Learning units on - What is clinical reasoning and models - Person-centered approach and the role of patients - Differences and similarities in clinical reasoning among health professions - Discussing and teaching about cognitive errors and biases (Order depending on integration plan of student learning units) - Integration and combination of existing clinical reasoning workshop with the learning unit on "Information gathering, Generating differential diagnoses, Decision making, and Treatment planning" - Integration of the learning units on Clinical Reasoning Teaching and Assessment Methods and Clinical reasoning evaluation into existing courses on teaching and assessment methods in general.

Reason(s) for selected LUs		Learning units will match the order of implementing the student learning units, so that educators are trained on how to teach these learning units.
Learners	Year 1 - Year 6 medical students; nursing and midwifery students (years to be defined), and students in medical informatics (Bachelor & Master)	The main focus will be on clinical and basic science educators who will teach the learning units
Participating professions / study programs	The main focus especially in the beginning is on medical students, but we envision a close cooperation with the nursing school. Also, especially in the later clinical years we aim for interprofessional teaching together with the newly established midwife school. Basic learning units on clinical reasoning and the learning units on decision support systems can be implemented together with the medical informatics students.	
Relation to other curricular learning activities	Integrated into the clinical longitudinal course that covers aspects such as communication skills, history taking, or examination skills	Part of the faculty development program (category "Project workshops") with approx. 8 AE (=working units) per topic.
Technical integration	In the beginning we will use SingleSignOn links from the UAU Moodle to the DID-ACT Moodle making use of Shibboleth. As a second step we can imagine a deeper integration using the technical interfaces Moodle provides to deeply integrated different Moodle platforms.	
Resources Needed	Protected time for the stakeholders to plan and implement the integration.	Protected time for the stakeholders to plan and implement the integration. Official accreditation of the courses for the "Zertifikat Medizindidaktik", so that participants can get official credits.
Mode of content use	We will use the resources and learning units in the DID-ACT Moodle platform, a later translation into German might be necessary.	We will use the resources and learning units in the DID-ACT Moodle platform, a later translation into German might be necessary.
Stakeholders to be involved	- Chair for Medical Education - Curriculum development coordinators/teams at the medical, nursing, and midwife school and coordinator for the medical informatics program - Coordinators for evaluation and assessment	- Chair for Medical Education - Faculty Development coordinator / team - Coordinators for evaluation

Anticipated Costs	Depending on the needs, costs for translating certain parts of the curriculum to German.	- Depending on the needs, costs for translating certain parts of the curriculum to German. - Potential costs for external facilitators to train the trainers.
Milestones	- Dec 2022: Presentation of the plan to stakeholders and discussion of further needs and feasibility - Summer Term 2023: Integration of first learning units with evaluation and student feedback - From winter term 2023 on: Integration of additional learning units in a step-wise and predefined implementation plan	- Dec 2022: Presentation of the plan to stakeholders and discussion of further needs and feasibility - Summer Term 2023: Implementation of 1-2 courses - From winter term 2023 on: Integration of additional learning units in a step-wise and predefined implementation plan aligned with the student curriculum

Table 7: Long-term integration plan at the University of Augsburg (UAU)

5.1.7 Long Term Integration plan - UBERN

The following table illustrates the long-term integration plan developed at the medical school of the University of Bern. The overarching ambitious goal is, similar to other partners, the integration of all learning units into the Bachelor and Master program of the medical school.

Long-term Integration plan	**University of Bern**	
	Student curriculum	Train-the-trainer

Integration of LU(s)	The plan is to integrate all DID-ACT learning units (LUs): **Bachelor**: What is Clinical Reasoning, Person-centered approach to clinical reasoning, Health profession roles in clinical reasoning, and Biomedical Knowledge & Clinical Reasoning. Dual Process Theory, Illness scripts, Collect and prioritize key clinical findings/problems, and What is clinical reasoning and How can theories be put into practice (Intermediate). Generating differential diagnoses and deciding about final diagnosis, Biases and cognitive errors - an Introduction, Analyzing and avoiding errors. (Required time in curriculum: 4-5 hours/semester) **Master**: Using the Outcome Present State Test Model, Developing a treatment plan, Metacognition, reflection and models for reflection, Collaboration of health professions in Clinical Reasoning (Intermediate). All remaining intermediate learning units: Shared Decision Making in Clinical Reasoning, Decision Support Systems, Ethical aspects - patient management and treatment, Uncertainty. All 6 advanced learning units: Collaborate with others in clinical reasoning, Decision Support Systems, Biases and cognitive errors, Uncertainty, Metacognition, reflection and models for reflection, Analyzing and avoiding errors. (Required time: ca. 5-6 hours / semester) Years 1-6: Virtual Patients (VPs) as additional deliberate practice activities in increasing number and complexity (e.g. starting with 5 VPs (=ca. 1.5 hours)/semester) in Year 1 and increasing to 10 VPs/semester) in Year 3-6.	Learning units on - What is clinical reasoning and models - Person-centered approach and the role of patients - Differences and similarities in clinical reasoning among health professions - Discussing and teaching about cognitive errors and biases - Information gathering, Generating differential diagnoses, Decision making, and Treatment planning - Clinical Reasoning Teaching and Assessment Methods (Order depending on integration plan of student learning units)
Reason(s) for selected LUs	content missing in the local curriculum so far	content missing in the local curriculum so far
Learners	Years 1-6 mainly in Medicine, the idea is to extend this also to other professions	Teachers
Participating professions / study programs	mono/multi-professional	mono/multi-professional

Relation to other curricular learning activities	As addition and aligned to existing content, will be discussed with stakeholders accordingly	As addition and aligned to existing content, will be discussed with stakeholders
Technical integration	Moodle, CASUS virtual patients, link from Ilias (local platform)	Moodle, CASUS virtual patients, link from Ilias (local platform)
Resources Needed	LUs that were not piloted before need to be adapted to local circumstances.	LUs that were not piloted before need to be adapted to local circumstances. Teachers have to be found. Train-the-trainers might also be external.
Mode of content use	TBD	TBD
Stakeholders to be involved	Involvement of responsible persons for the curriculum (dean of studies, dean's office...)	Involvement of responsible persons for the curriculum (dean of studies, dean's office...)
Anticipated Costs	teachers institutions get teaching reimbursed	teachers institutions get teaching reimbursed, possibly external train-the-trainers who have to be paid
Milestones	1. Stakeholder involvement, decision-making regarding curriculum integration (March 2023) 2. Adaptation to local circumstances of not yet piloted LUs (in 2023) 3. Start of curricula integration in regular curriculum (in 2024)	1. Stakeholder involvement, decision-making regarding curricula integration (March 2023) 2. Adaptation to local circumstances of not yet piloted LUs (in 2023) 3. Start of curricula integration in regular curriculum (in 2024)

Table 8: Long-term integration plan at Bern University.

5.2 Similarities, differences, and challenges

Based on our discussions during the project meeting in Krakow, we discovered the following similarities and differences concerning our integration plans.
All partners encountered similar **challenges** in developing their long term integration plans, most of which have already been mentioned in our needs analysis [Sudacka 2021]. Most frequently, finding **time in the curriculum** and finding the **key persons** was mentioned. Another aspect was the need for not only changing the teaching part of the curriculum, but also the **assessment**. Although all DID-ACT learning units include assessment methods and resources, it requires changing or adapting long-established and standardized assessment routines in each institution or even national state exams. For some exam methods that are often implemented in healthcare education such as Objective Structured Clinical Examinations (OSCE) or oral exams, there do not yet exist evidence-based clinical reasoning assessments. Thus, we see a clear need for research and development of assessing clinical reasoning with standard assessment methods, to ease the full integration of clinical reasoning teaching.
All partners also identified similar stakeholders / key persons who will be indispensable for implementing the integration plan. These include students, educators, or deans. Some partners have explicit positions for curriculum development and faculty development coordination, so in such cases, these are obvious key persons. If such structures do not exist at institutions, it is even more important to involve deans and individual educators or clerkship directors. However, we are also aware that such an onboarding of persons will require some time and effort.

Some partners, such as UBERN or UAU follow a **top-down** and others a **bottom-up** approach, e.g., ORU. These differences are due to the structural differences and who the key-persons in their institutions are, respectively how helpful they are in supporting the curricular integration of DID-ACT learning units. For both approaches, we agreed that it is crucial to identify motivated persons, or "early adopters" who will start integrating resources and then spread the word to their colleagues. Therefore, for all integration plans we will focus as a first step in identifying these persons and onboard them.
All partners emphasized the importance of including the DID-ACT train-the-trainer units into **faculty development** programs or courses. Therefore, in all plans the introduction of student learning units is closely aligned with offering the corresponding train-the-trainer course(s) beforehand.

Some institutions will use upcoming **structural curriculum changes** for introducing the DID-ACT resources. JU is planning a major curriculum reform transforming the current traditional discipline-based curriculum into an integrated curriculum. ORU plans to make use of the transition of a 11-semester into a 12-semester program to introduce DID-ACT learning units into this longer program that is currently in development.

6. Conclusions

Overall, partner's integration plans are ambitious but we believe also realistic. Some partners such as ORU and Krakow can make use of planned curricular reforms and we have already demonstrated the added value of DID-ACT resources with our pilot implementations. However, we are also aware that plans will change with new curricular demands and priorities or new stakeholders at institutions. So, we see our integration plans as a starting point from which we will further develop and refine it based on the developments at our institutions.

7. References

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