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COLLABORATIVE LEARNING IN COMPUTER SCIENCE: A CASE STUDY OF CROSS-UNIVERSITY INTERDISCIPLINARY HACKATHONS

Heimo Hirner[1], Leon Freudenthaler[1], Bernhard Taufner[1], Sigrid Schefer-Wenzl[1], Igor Miladinovic[1], & Nikolaus Forgó[2]
[1]Computer Science, University of Applied Sciences FH Campus Vienna (Austria)
[2]Department of Innovation and Digitalization in Law, University of Vienna (Austria)

Abstract

Interdisciplinarity as understanding of methods, objectives, and needs of representatives from other domains is increasingly expected from graduates in both computer science and legal professions. To promote these skills, a cross-university course concept in the field of Legal Tech was developed at the University of Vienna and the University of Applied Sciences FH Campus Vienna. Within the framework of the "Legal Tech Hackathon," law students from the University of Vienna and computer science students from FH Campus Vienna work in interdisciplinary teams on cross-disciplinary issues, supervised by academic experts and experts from the private sector. In this context, digital solutions for legal problems are collaboratively developed. Feedback and outcomes from this course reveal significant student engagement and satisfaction across both universities, with several startups emerging as a direct result. The course was also awarded with the highest national education award in Austria (Ars Docendi 2023). Furthermore, the success of this course concept has prompted its adoption in other educational settings, illustrating its potential to reshape professional development in the intersecting fields with technology.

Keywords: *Collaborative learning, computer science, hackathon, higher education, legal tech.*

1. Introduction

Higher education and Computer Science are changing fields as expectations for graduate qualifications evolve. The curriculum guidelines (ACM & IEEE, 2020) of the Association for Computer Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) aim to align specialist knowledge in Computer Science with contemporary trends. The qualification profile comprises both technical expertise and social skills. For instance, Computer Science programs are adapting to the field's expanding interdisciplinary nature and the increasing significance of Big Data and Artificial Intelligence. In terms of interpersonal skills, the focus is on teamwork, awareness of the needs of end users and understanding the domain of software solutions. Similarly, the Legal Sciences are experiencing parallel advancements. In this domain, there is a growing emphasis on fostering interdisciplinary collaboration and the understanding of methods, objectives, and requirements of representatives of various professional domains. Students increasingly need to be able to react quickly, methodically, and convincingly to challenges from other disciplines. Consequently, proficiency in Computer Science and digital skills are becoming increasingly relevant.

As technology continues to intersect with legal frameworks, there arises a critical demand for professionals who possess the ability to seamlessly navigate and integrate insights from both domains (Dudchenko et al., 2023). An annual survey conducted in the Austrian legal sector (Martinetz, 2023) emphasizes the increasing importance of technology in the legal sector, particularly in providing efficient services and retaining talent. It highlights that legal departments are seeking automation and digitalization to streamline repetitive tasks, freeing up time for more complex matters and enhancing client service. The study also shows that the problems law firms have in adopting new technologies are often due to a lack of technological knowledge, including a lack of IT-staff or IT-expertise and limited knowledge of available technologies. However, traditional siloed approaches to education no longer adequately prepare students for these multifaceted tasks. In contrast, cooperative, collaborative, and interdisciplinary learning environments offer a compelling alternative, providing students with opportunities to broaden their perspectives and develop new ways of thinking. By engaging with peers from other disciplines, students are exposed to fresh insights and different viewpoints, enriching their understanding of complex and

interdisciplinary topics. Furthermore, collaborative learning environments foster the appreciation of diverse skill sets, personalities, and social dynamics within a team-based setting.

Hackathons are a promising setting for such a cooperative learning environment. Originating in the field of software development in the early 2000s (openBSD, 2024), hackathons are innovation-promoting and problem-oriented brainstorming events where people come together to rapidly develop prototype applications in a brief period (Falk et al., 2022). This format has proven effective for both refining commercial products and exploring creative solutions to existing problems. While such collaborative efforts were once rare in legal circles, the advent of Legal Tech—marked by the increasing automation and digitalization of legal processes—has catalyzed a rise in similar events within the legal context. These gatherings aim to generate novel ideas within the legal information market and swiftly assess the legal implications and potential of new concepts. These gatherings serve to foster creativity within the legal information market, facilitating the rapid assessment of legal implications and the exploration of new concepts.

To promote previously mentioned skill sets in an engaging learning environment, a cross-university course concept in the field of Legal Tech was developed as a cooperation between the University of Vienna and the FH Campus Vienna. The "Legal Tech Hackathon" has been held annually since 2018, at which law students from the University of Vienna and Computer Science students from FH Campus Vienna work on digital solutions to legal problems. During the course, students work in interdisciplinary teams on interdisciplinary issues, supervised by scientific experts and private sector experts.

The learning environment "Legal Tech Hackathon" pursues the following goals: To promote interdisciplinary and project-based learning, the practical application and consolidation of acquired theoretical knowledge and technological skills, entrepreneurial thinking in students, the combination of basic scientific and application-oriented skills, and an understanding of the Austrian and European legal information market.

The results and evaluations of this course show a prominent level of commitment and satisfaction among the students at both universities. Notably, the course has catalyzed the establishment of numerous start-ups. Furthermore, its innovative concept has been adopted in several other academic programs.

2. Design and didactic setting

The joint "Legal Tech Hackathon" is intended to strengthen the perception of Legal Tech among Computer Science students and to create awareness of the associated potential for cooperation between prospective lawyers and computer scientists. The following subchapters present the corresponding design and didactical setting of the "Legal Tech Hackathon" providing a brief overview of course learning objectives, course structure and implementation of the course.

2.1. Learning objectives

The course's learning objectives were developed aligned with the curriculum guidelines established by ACM and IEEE (ACM & IEEE, 2020). The acquisition of skills in this course focuses on the ability to work goal-oriented and cooperatively within interdisciplinary teams. This includes proficiency in organized planning, effective time management, facilitating communication among team members, and transferring knowledge across domains to collaboratively develop a usable product. The students will also gain competence in conducting an initial legal assessment of the legal opportunities and risks associated with a product idea. Furthermore, students will learn to record, document, and analyze interdisciplinary requirements, as well as translate these requirements into an implementable design within a structured process. Additionally, they will develop the capability to merge basic scientific skills with application-oriented skills. Moreover, students will gain insights into and be able to explain the dynamics of the Austrian and European legal information market. They will also comprehend and elucidate the cross-domain implications of the implementation process. Finally, students will be equipped to classify final projects within a multi-professional industry environment and present them to an interdisciplinary jury.

2.2. Course structure

Due to the interdisciplinary and inter-university character of this course, it is held at two locations, the University of Vienna, and the University of Applied Sciences FH Campus Vienna, and divided into four phases. It starts with a Kick-off event at which students from both universities meet for the first time, followed by the online collaboration phase characterized by activities such as brainstorming and team building. The actual hackathon lasts 2 days, each day from 9:00-21:00 or until the tasks are completed and is concluded with the final presentations (pitching) approximately one to two weeks after the hackathon.

In addition to the participating students, numerous interested representatives from companies, start-up initiatives and institutions with a focus on Legal Tech are always invited and actively engaged at the Kick-off event. Due to Covid-19 regulations in 2020 and 2021, the complete Legal Tech Hackathon event transitioned to an online format. To continue to enable the lowest possible threshold for access by external experts, the Kick-off event has since been held in hybrid form. This format allows for both onsite attendance and remote participation, accommodating individuals unable to attend in person due to scheduling constraints or other reasons. However, Happonen, Tikka et al. (Happonen et al., 2021) and our own observations showed that a hackathon in an online format has disadvantages compared to an on-site format. Therefore, after the end of Covid-19 restrictions, we moved the actual hackathon back to an in-person format.

During the Kick-off event, external company representatives provide concise overviews of implemented Legal Tech projects and suggest potential project ideas for the hackathon. This brings clarity to the abstract term "Legal Tech", which is often still vague for students. Subsequently, dedicated time is allocated for interactive discussions among students, company representatives, and lecturers. This collaborative exchange facilitates the exploration of first project ideas and the formation of project teams. The project tasks assigned to students are intentionally designed to be open-ended. They are tasked with addressing key questions related to their Legal Tech ideas, such as: *How can technology enhance legal processes beyond current capabilities? In what ways and platforms can technology improve accessibility to legal services? What innovative startup concepts have the potential for realization within this domain?* After the Kick-off, the online collaboration phase begins. All participants of the hackathon will be provided with access to an online platform dedicated to sharing project ideas and forming groups. This virtual phase typically lasts five to eight weeks (depending on the timetables of the University of Vienna and FH Campus Vienna). Throughout this period, students can engage with external experts and lecturers from both institutions via the online platform. Before the hackathon starts, students must form interdisciplinary teams comprising lawyers and computer scientists. Each team may consist of a maximum of four computer scientists, with an equitable distribution of law students across all teams. The final team allocations are determined at the outset of the hackathon.

Presently, participation is limited to 20 law students and 20 computer science students. However, in response to increasing demand, plans are underway to increase participant numbers in the coming years. The hackathon spans two full days and commences with a collaborative brainstorming session. During this session, students present project ideas, with opportunities for additional input from lecturers and external experts as needed. Experience has shown that most teams have already grouped around specific project ideas at this point. The presentation and brief discussion of project ideas ensure each team pursues a distinct project with sufficient innovation. Besides that, there are no constraints imposed on the development of project ideas or the associated functional prototypes, including the technologies employed.

Each team operates akin to a startup entity. Consequently, teams are tasked with developing business cases for their project ideas, conducting market research to assess existing, similar implementations on the market, and conducting legal evaluations of their projects.

In addition to potential competition from existing products on the market, teams must consider and address all legal implications of their solutions, such as trademark protection law and compliance with the General Data Protection Regulation (GDPR). Throughout both days of the hackathon, students regularly present and defend their projects' status. Furthermore, to promote cross-domain knowledge transfer, a role reversal occurs during one of these presentations, wherein students from one domain present the other aspect of the project; for example, law students may explain the technical aspects, while computer science students expound on the legal facets. The external experts and lecturers accompany the hackathon both on site and asynchronously online via the collaboration tool to provide guidance and support.

After the two hackathon days, the students have one to two weeks (depending on the timetables of the two universities) to consolidate their projects and presentations.

The course ends with the final presentations (pitching) and defenses of the project teams in front of a cross-domain jury made up of lecturers from both universities and selected external experts. The students present their projects within a specified time frame. The pitch needs to encompass various aspects of the project. This includes discussing the business model, addressing all relevant legal implications, presenting the technological implementation which should include a demonstration of the implemented prototype, and providing an outlook on the potential real-world implementation in the market, considering aspects such as feasibility, legal compliance, and technological extensibility as well as scalability.

Afterwards, the project pitches are evaluated based on several criteria. These include the level of innovation demonstrated, the viability of the proposed business model, the thoroughness of all relevant legal aspects, the degree of technological complexity and the maturity of the prototype.

The learning outcomes are assessed separately for each domain or university. The winning team will be given the opportunity to present the project at specialist conferences and/or interviews on social media channels (Forgo 2022). In addition, start-up support will be offered by the University of Vienna and FH Campus Vienna for any planned implementations. Three projects (2018: "RIS+", 2020: "NetzBeweis", 2022: "myLegalMatch") have so far been continued as start-ups after the “Legal Tech Hackathon" (Eberstaller, 2024; Bisset, 2020).

3. Course evaluation

A total of 258 students have taken part in the “Legal Tech Hackathon” since it was first held in 2018. Of these, 118 were Computer Science students and 140 were law students. Each year the course was evaluated by the students using the standard evaluation tools available at both universities. In addition, in 2018 the Teaching Support Centre at FH Campus Vienna conducted a survey among the participants. In the survey, the points "I was able to improve my problem-solving skills", "The task promoted collegial cooperation" and "The task promoted my understanding of interdisciplinary work" were rated particularly high. The overall assessment at FH Campus Vienna, i.e., the mean value across all questions, except for the question on personal commitment, was 91% (excluding the year 2024, as the course had not been completed at the time this paper was finalized). The basic idea of the course was particularly emphasized in the evaluations. *“It was motivating and inspiring because it was innovative and interesting. It was fun to work together with students from other universities and programs. The diversity of backgrounds and perspectives has enriched the collaboration and led to an interdisciplinary learning environment.”*

The feedback from both students and industry experts is used to continuously improve and develop the hackathon so that it is adapted to the changing needs of the participants, but also to new technological challenges.

By involving company representatives and external experts from the legal tech sector, the course also serves as a direct interface to the job market. The concept of the hackathon can be done on site, hybrid or online. In the summer semesters of 2020 and 2021, the "Legal Tech Hackathon" was held exclusively online due to existing lockdowns. The knowledge gained from this was incorporated into the hybrid format in 2022. Although a hybrid mode allows more flexibility for all participants, in the last two years it was again limited to the participation of legal experts. The dynamics and interdisciplinary exchange among the students are significantly higher when they are present at the hackathon on site. Nevertheless, the provision of collaborative online tools enables interdisciplinary exchange between students, lecturers, and external experts, regardless of location and time.

We are particularly pleased that the “Legal Tech Hackathon” has also been recognized beyond the two universities and was awarded the Ars Docendi State Prize for Excellence in Teaching by the Austrian Federal Ministry of Education, Science and Research in 2023 (BMBWF, 2023).

4. Conclusion and future work

The intersection in form of a hackathon between computer science and legal sciences presents an evolving landscape where traditional silos are being dissolved to make way for interdisciplinary collaboration and innovation. As the demands of contemporary industries evolve, so must the skills and competencies of graduate students. The “Legal Tech Hackathon” emerges as an innovative approach, to bridge the gap between law and technology by fostering a collaborative learning environment. Through the hackathon, students from diverse backgrounds converge to tackle real-world challenges, leveraging their respective expertise to develop innovative solutions in the sector of Legal Tech.

The success of the “Legal Tech Hackathon” inspired the inception of similar hackathons in other courses. Recognizing the transformative potential of collaborative learning environments, faculty members from various disciplines have embraced the hackathon model to foster interdisciplinary collaboration. The “Advanced Software Development” course in our master program “Software Design and Engineering” uses a hackathon event supplanting traditional examination methodologies. Similarly, the “Mobile App Development” course in the bachelor program “Computer Science and Digital Communications” has integrated a condensed iteration of the hackathon format, functioning as a design thinking workshop to expedite the ideation phase of mobile app projects, subsequently facilitating their implementation over the duration of the course. Additional events have already been successfully executed, such as a “GameJam” where students developed a complete game within two days. The “GameJam” also featured workshops and support from industry experts who provided invaluable insights and assistance to the students. Another notable event was a “Makerthon” conducted in collaboration with the bachelor program “High Tech Manufacturing”. This event focused on using embedded devices, 3D printing and other rapid prototyping methods to create functional prototypes. These events not only enhance technical and creative skills but

also promote practical problem-solving and teamwork, reflecting the interdisciplinary approach initiated by the "Legal Tech Hackathon."

For future work, there are several possibilities for further development and enhancement of the “Legal Tech Hackathon”. Firstly, scalability and broader engagement could be considered. As interest in interdisciplinary learning grows, there is a need to expand the hackathon to accommodate a larger cohort of students. Exploring opportunities for international collaborations and exchange programs represent another promising avenue for future development. By forging partnerships with institutions abroad, the hackathon can offer students the opportunity to engage with diverse perspectives and legal systems, enriching their learning experience and broadening their global outlook.

The success of the “Legal Tech Hackathon” is evident not only in the satisfaction of participating students but also in the tangible outcomes, including the establishment of numerous start-ups and the adoption of the hackathon model in other academic courses and programs.

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