

# HCI-E<sup>2</sup>-2023: Second IFIP WG 2.7/13.4 Workshop on HCI Engineering Education\*

José Creissac Campos<sup>1</sup>[0000-0001-9163-580X], Laurence  
Nigay<sup>2</sup>[0000-0002-4854-626X], Alan Dix<sup>3</sup>[0000-0002-5242-7693], Anke  
Dittmar<sup>4</sup>[0000-0003-4810-4573], Simone D.J. Barbosa<sup>5</sup>, and Lucio Davide  
Spano<sup>6</sup>[0000-0001-7106-0463]

<sup>1</sup> University of Minho & HASLab/INESC TEC, Portugal

<sup>2</sup> University Grenoble Alpes, France

<sup>3</sup> Computational Foundry, Swansea University, Wales, UK

<sup>4</sup> University of Rostock, Germany

<sup>5</sup> Pontifical Catholic University of Rio de Janeiro, PUC-Rio, Brazil

<sup>6</sup> University of Cagliari, Italy [davide.spano@unica.it](mailto:davide.spano@unica.it)

**Abstract.** This second workshop on HCI Engineering Education aims at carrying forward work on identifying, examining, structuring, and sharing educational resources and approaches to support the process of teaching/learning Human-Computer Interaction (HCI) Engineering. The widening range of available interaction technologies and their applications in increasingly varied contexts (private or professional) underlines the importance of teaching HCI Engineering but also the difficulty of taking into account changes and developments in this field in often static university curricula. Besides, as these technologies are taught in diverse curricula (ranging from Human Factors and Psychology to hardcore Computer Science), we are interested in what the best approaches and best practices are to integrate HCI Engineering topics in the curricula of programs in Software Engineering, Computer Science, Human-computer Interaction, Psychology, Design, etc. The workshop is proposed on behalf of the IFIP Working Group 2.7/13.4 on User Interface Engineering.

**Keywords:** Human-Computer Interaction · Engineering · Education.

## 1 Workshop Topics and Scope

Engineering interactive systems is a multidisciplinary endeavour positioned at the intersection of Human-Computer Interaction (HCI), Software Engineering, Usability Engineering, Interaction Design, Visual Design, and other disciplines. The Human-Computer Interaction Engineering (HCI-E) field is concerned with providing methods, techniques, and tools for the systematic and effective design,

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development, testing, evaluation, and deployment of interactive systems in a wide range of application domains.

The aim of such contributions is threefold: i) improve the process of designing, developing, and evaluating interactive systems, ii) improve the quality of the user interface (UI) of interactive systems, including usability and user experience properties, and software properties (also known as external and internal properties, respectively [5] and iii) adapt these contributions to the specific requirements and needs of the various application domains.

In recent years, the range of interactive techniques and applications has broadened considerably and can be expected to grow even further in the future. While new interaction techniques offer the prospect of improving the usability and user experience of interactive systems, they pose new challenges, not only for methods and tools that can support their design, development and evaluation in a systematic engineering-oriented manner, but also to the designers developers who must use them. Examples of interactive applications include mobile systems, wearable medical devices, safety and mission critical systems, and AI-based systems. Such interactive applications require a broad range of HCI engineering (HCI-E) techniques, methods and tools.

These techniques, methods and tools, as well as many other novel forms of interaction, involve aspects that need to be adequately addressed in the curricula of programs in HCI, Software Engineering and Computer Science [1,4,6,8]. This begs the question of how best to address these topics in those curricula, and what the best approaches to address them are. When considering education about HCI Engineering, we need to think about who is being educated as there is likely to be different curriculum scope and educational methods for different types of learners. There are two main distinctions likely influencing these methods:

**Technical vs non-technical.** Students in Computer Science and similar areas are likely to be the main consumers of detailed HCI-E education. However, the creation of interactive applications “requires input from science, engineering and design disciplines” and multidisciplinary teamwork requires from participants an increased understanding and appreciation for other disciplines [7]. It is also important for those who are likely to have a more interface design or user research role to be able to appreciate the limits of technology and the potential impacts of architectural design choices.

**Student vs practitioner.** It is likely that the primary interest of many participants will be university education. However, developers are often involved in lively online discussions about different frameworks, and even in the use of monads in interactive JavaScript. Interaction Design Foundation courses attract tens of thousands of UX practitioners worldwide, evidencing the desire of on-the-job learning in both communities.

Participants may target one or more of these types of learners, have interests that cover several, or indeed may address other groups.

## 1.1 Previous Workshop

The previous workshop at INTERACT 2021 [2] attracted contributions addressing a variety of educational settings for professionals and university students at various levels. The material described by participants ranged from relatively small units to full modules of various lengths. Many included project work of some kind but they also included more theoretical aspects such as user interface architectures. Motivation was also important, but varied greatly depending on the background of the students: computing students may need to be convinced that they need think about users at all, whilst those from a design/UX background might question why the need to know anything about the actual construction of user interfaces. There were also considerable differences in order, whether engineering/construction aspect should follow design, mimicking UX development practice, or whether engineering/construction aspects should come first in order to help students understand why user-centered design is needed.

In response to this range of settings, one of the workshop outcomes was to present a selection of educational resources (exercises and assignments) descriptions in relatively standard form, clarifying aspects such as objectives, and audience [3]. This has begun the process of creating a structure within which materials can be described and shared, and helped shape the goals of the present workshop.

## 1.2 Goals and Expected Outcomes

The workshop aims at identifying, examining, and structuring educational resources and approaches to support the teaching/learning of HCI Engineering. It aims to cover a range of areas from challenges related to novel forms of interaction to emerging themes stemming from new application domains. Another goal is to consider the variety of students' skills and experiences. For instance, how to incorporate and teach HCI Engineering in Computer Science curricula or in UI/UX Design curricula? How to teach HCI Engineering to students with different skills (e.g., engineers, designers)? The goal is also to consider different lecturing modalities, ranging from on-site lectures, project-based pedagogy to online/remote lecturing. The intended outcome of the workshop is a structured overview of educational resources, described in a common structure (see [3] for an initial definition of the intended structure). This overview will take the form of an online resource, built around a version control system, which will be made available to the community. We expect that, through this resource, educational materials (e.g., from slides and reference materials to exercises and exams) will be made available. In addition to the description of the educational resource itself, and for educators planning to use the resource, practical aspects and lessons from the experience of using the resource form a complementary part of the description of each resource. It is expected that the workshop will result in the first public instance of this resource and that this work will be continued in follow-up workshops, as well as in the context of IFIP Working Group 2.7/13.4

on User Interface Engineering<sup>7</sup>. Depending on the quality of the submissions and the workshop results, revised versions of the contributions will be considered for publication in the INTERACT 2023 post-proceedings. In addition, we will produce a journal paper summarizing and consolidating the contributions, in the form of an HCI Engineering Education roadmap. These results shall serve as a basis for drafting a roadmap for a curriculum for the engineering of advanced interactive computing systems and for identifying quality lecturing modalities.

### 1.3 Target Audience

Achieving the workshop's goals means bringing together experiences from people teaching HCI concepts impacting how we engineer interactive systems and from people working in HCI-E to identify topics and methods that should be included in teaching this subject. Besides the courses in HCI-E, interesting inputs may arrive from HCI courses outside the CS curriculum requiring to communicate engineering challenges, or from more general software engineering courses discussing aspects related to human factors. Hence, we will solicit contributions from the HCI-E-related communities, and we will be very interested in welcoming members of the educational community, for a fruitful discussion. To do so, we will dispatch the call to the usual channels, including announcements in mailing lists, conferences, and personal contacts.

### 1.4 Submissions

Position papers (6-10 pages in Springer format) must report experiences related to HCI Engineering education. Submissions could report software engineering units including some aspects of HCI-E, curricula or teaching units dedicated to HCI-E, case studies/projects demonstrating aspects of HCI-E, evaluation of students' skills related to HCI-E, training non-technical and mixed students in HCI-E, training appropriate aspects of HCI-E to professionals/practitioners, a new teaching modality promising for teaching HCI-E, introducing HCI-E into existing curricula, etc. Authors could also provide in their submission a short summary of their experience in the field and their motivation to participate in this workshop. Submissions will be processed via a web-based conference management system to be defined (e.g. EasyChair). Position papers will be reviewed by a committee composed of members of IFIP Working Group 2.7/13.4, and participants will be invited to attend the workshop based on review results.

## 2 Workshop Structure

The workshop will last one day. We will start with a brief introduction to the workshop's goals, and a sequence of presentations of the different position papers in the first half. The second half will contain group activities aimed at the

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<sup>7</sup> <http://ui-engineering.org>

production of materials for the online resource mentioned in Section 1.2. The current version of the resource, resulting from the first workshop at INTERACT 2021, will be made available to participants in advance of the workshop.

We will organise the workshop in a hybrid mode. We will allow participants to attend the workshop in person, and we will also provide means for supporting remote participation for those unable to attend in person. The support for remote participation will consist of using a teleconferencing application (e.g., MS Teams) streaming all the activities in the workshop room (e.g., presentations and discussions) during the first half of the workshop. We will use the workshop room facilities to broadcast the remote participants' activities on a shared screen and use loudspeakers. The second half of the workshop will make use of collaborative editing environment such as shared text documents (e.g., Google Docs), shared whiteboards (e.g., Miro), etc., to support joint work, regardless of the mode of participation. If necessary, we are ready to organise the workshop in a completely remote mode.

### 3 Organisers Background and Experience

The workshop is proposed on behalf of IFIP Working Group 2.7/13.4 on User Interface Engineering, and intends to further work ongoing within the group. WG 2.7/13.4 aims at advancing the state of the art in all aspects of designing, developing, and evaluating interactive computing systems with a particular focus on principled methodological engineering approaches. The scope of investigation comprises, among others: methods and tools for modelling, prototyping, developing, and evaluating user interfaces; quality models for interactive systems; and new interface technologies suitable to improve user interaction.

The WG understands HCI Engineering as the creation and application of scientific knowledge and systematic, structured design and development methods to predictably and reliably improve the consistency, usability, scalability, economy, and dependability of practical problem solutions. HCI Engineering addresses all aspects related to methods, processes, tools, technologies, and empirical studies involved in the invention, design and construction of interactive systems. The techniques addressed concern all types of applications, for example, business applications, social media, smart environments, medical devices, automotive and aeronautics applications, among others.

**José Creissac Campos** is the former chair of IFIP WG 2.7/13.4 on User Interface Engineering. He is an associate professor at the informatics department of the University of Minho, and a senior researcher at HASLab/INESC TEC. He has served in several organizing committees, including several IFIP TC13 INTERACT 2011, ACM SIGCHI EICS, and Formal Methods Week 2019. He regularly serves on the Program Committees of , INTERACT, EICS and IUI, among others.

**Laurence Nigay** is a full Professor (Exceptional class) in Computer Science at the University of Grenoble Alpes (UGA) and is also an elected senior member of the Academic Institute of France (IUF). She is the director of the En-

gineering Human-Computer Interaction (EHCI) research group of the Grenoble Informatics Laboratory (LIG). From 1998-2004, she was vice-chair of the IFIP working group 2.7/13.4. From 2005 to 2019 she was the director of the Masters of Computer Engineering at the University of Grenoble.

**Alan Dix** is Director of the Computational Foundry at Swansea University. He is author of one of the principle textbooks in Human Computer Interaction as well as many other research publications and a recent book on Statistics for HCI. He was the general chair of HCI-Educators 2007 as well as several more recent workshops in the area, including a series of Covid-related virtual workshops on video in HCI education early in 2020. He has worked in a number of commercial roles in addition to his academic posts and contributes to courses at Interaction Design Foundation. Alan still designs and codes interactive systems.

**Anke Dittmar** is an associate professor at the informatics department of the University of Rostock. She is a long time researcher and teacher in human-computer interaction, software engineering, and interaction design. Anke is member of IFIP WG 2.7/13.4 on User Interface Engineering, and the current president of the European Association of Cognitive Ergonomics (EACE).

**Simone Diniz Junqueira Barbosa** is a professor in Computer Science at the Pontifical Catholic University of Rio de Janeiro, PUC-Rio. She is author of one of the main textbooks on Human-Computer Interaction in Portuguese and has for many years worked in projects with governmental and industrial partners. She is the Vice-chair for Working Groups at IFIP TC13, and has served in several conferences over the years in various capacities, including general chair of INTERACT 2007, EICS 2012, and CHI 2022, and full papers chair of INTERACT 2015.

**Lucio Davide Spano** is an associate professor at the University of Cagliari, Italy, since 2019. He is the chair of the IFIP Working Group 13.4/2.7 on User Interface Engineering. He has been a member of the Model-Based User Interface Working Group of the World Wide Web Consortium (W3C), paper-chair at IUI 2020, workshop chair at INTERACT 2021.

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