Position Paper for the Workshop

TeaDIS - Teaching Design of Interactive Systems

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Teaching design of interactive systems

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Basic statement

Efforts for education in the field of design of interactive systems is of paramount importance as such systems are now everywhere around. Design in this field has two basic aspects, the interface with a user (or a group of users) supported by all kinds of devices and means - I call it the aspect of design for users - and the technical realisation of this aspect by software systems - I call it the software design aspect -.

It is my observation that in the discussion about Higher Education in the field the former aspect is attracting more attention. It leads to proven requirements covering education in psychology, cognitive science, ergonomics, human factors and the like, which are already mapped into corresponding courses and even curricula at various places.

The second aspect is in most cases only covered under the label interdisciplinarity. There are no much educational programs covering software design aspects in a depth that, in my opinion, is adequate to the demand of any degree of Higher Education in Design of Interactive Systems.

Following appropriate studies of mathematics and natural and/or engineering sciences on the undergraduate level I consider software design aspects as listed in the following to be required for a successful study on the diploma/master level.

They form a basis for a continuing high-level work in the field when a person has to take over guidance and responsibility for then state-of-the-art design tasks in the professional phase subsequent to the study phase. The field is and will in the future be changing so rapidly and will be cover wider application areas with different requirements that an education without knowledge about fundamentals will not be sufficient .

As established in Germany, university studies leading to a diploma demand between 160 to 180 what is called weekly hours (SWS) in 8 to 9 terms, half of it in the 4 terms of the

undergraduate level and the second half in the 4 to 5 terms of the diploma/master level, i.e., 80 to 90 SWS each level. Programming techniques, mathematical foundations, and foundations in natural and/or engineering sciences of about 30 SWS are a prerequisite in the undergraduate level for the 25 to 35 SWS in computer science covering the software design aspects mentioned below in the diploma/master level.

List of software design aspects to be covered in computer science courses.

One may add to any item listed the restriction “Elements of”. Thus, typically not computer science courses covering the items in total are asked for, but courses integrating essential aspects of the items relevant to the software design aspect of interactive systems.

Undergraduate level

- Programming methodology.
- At least one procedural programming language and at least one object-oriented programming language.
- Data structuring.
- Mathematical foundations.
- Foundations in natural and/or engineering sciences.

Diploma / Master level

- Formal languages, specification methods, grammars.
- Principles of programming languages (e.g., typing) and compiler design.
- Object-oriented analysis and design.
- Processes, interprocess communication, synchronisation, multitasking/multithreading, event handling, callbacks, exception handling.
- Modelling of dynamics (e.g., Petri nets).
- System architectures, client-server, bus architecture, communication protocols.
- Data bases, data structures, relations, constraint handling, ER-model, normal forms, object-orientation.
- Access languages (e.g., SQL).
- Software engineering, design methodologies, life cycles, project management, quality assurance, system evaluation.
- Tools, UIMS, UIDS, prototyping tools, interface specification tools.
- Computer graphics, multimedia, video, sound, VR (standards included).
- CSCW.

Is the list of items complete? Are the items balanced in their grouping and in their weight? Are items antiquated, are they too futureous? What is the appropriate form of treating the items in courses?

Teaching HCI at Darmstadt University of Technology Up to now there is no programme leading to a formal qualification in design of interactive systems. There are courses and interdisciplinary seminars offered in the computer science programme and in the psychology programme. Students show much interest in these courses and seminars.

Agreement on scope and contents for education in the field of design of interactive system covering both aspects mentioned (aspect of design for users and software design aspect) would support efforts to establish the field in a programme offered to students of the university.